

**Nonpoint Source Water Quality Management Plan
For the Tahoe Keys Property Owners Association**

**Prepared Pursuant to
California Regional Water Quality Control Board
Lahontan Region Board Order No. R6T-2014-0059**



-Update-

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Nonpoint Source Water Quality Management Plan

**Prepared for the Tahoe Keys Property Owners
Association**



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In association with RO Anderson Engineering, Inc.

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1.0 Introduction, Purpose and Scope of the Tahoe Keys Property Owners Association Nonpoint Source Water Quality Plan

1.1 Introduction

Polluted water runoff is a concern of every urban community in California. It is an environmental health problem that can seriously affect sensitive wildlife habitats and aquatic species and that can have serious economic impacts. Polluted water runoff has a multitude of sources and can carry a wide range of pollutants. The best solution to the problem of polluted water runoff is preventing it from happening by changing our everyday practices so that pollutants do not reach our waterways.

This Nonpoint Source Water Quality Plan (NPS Plan) addresses the issue of polluted water runoff in the Tahoe Keys development in South Lake Tahoe, California. Due to a continuing aquatic weed infestation in the waterways of the Tahoe Keys, the primary pollutants of concern are nitrogen- and phosphorous-containing compounds that originate from the landscaped areas. Control of these pollutants relies on reducing the use of fertilizers in landscaped areas, reducing runoff from landscape irrigation, and educating the member homeowners, property managers, and landscape contractors in the Tahoe Keys development about eliminating nonpoint sources pollution.

1.2 Purpose of the NPS Plan

The Lahontan Regional Water Quality Control Board (Lahontan Board) is one of the nine regional water quality control boards in the state of California. The Lahontan Board has established water quality objectives and has designated beneficial uses for water bodies in the Tahoe Basin. This NPS Plan was written to satisfy requirements of the “Water Quality Certification and Waste Discharge Requirements for the Tahoe Keys Property Owners Association” (WDRs), issued on July 18, 2014 by the Lahontan Board (Board Order No. R6T-2014-0059). The Findings of the Board Order state, in part, that the Tahoe Keys Property Owners Association (TKPOA) shall increase its institutional control, education, and outreach to member homeowners to reduce inputs of nitrogen and phosphorous that could discharge to the waterways and requires TKPOA to develop an NPS Plan to address these pollutants.

The Findings in the WDRs specified the following two objectives for this NPS Plan:

- To identify and evaluate land-based activities in the Tahoe Keys Facility that may be sources of pollutants (including nutrients) that have the potential to be discharged into surface waters.
- To identify and implement site-specific management practices to reduce or prevent pollutants associated with those activities from discharging into surface waters.

This document addresses the requirement of the WDRs to develop an NPS Plan. The NPS Plan was written with guidance and direction from the Lahontan Board staff and describes first and

foremost how TKPOA can minimize water pollution caused by uncontrolled run-off of the nitrogen- and phosphorous-containing nutrients.

This NPS Plan evaluates and addresses the land-based activities occurring in the Tahoe Keys development that could contribute to nonpoint source pollution. The NPS Plan describes activities that TKPOA will undertake to reduce the potential for nonpoint source pollution originating from areas under the direct control of TKPOA. This NPS Plan also describes how TKPOA will inform and educate member homeowners about how to reduce nonpoint source pollution emanating from their private property. This NPS Plan does not address regulating storm water discharges from the storm water drainage system in the Tahoe Keys development. The storm water drainage system is under the control of the City of South Lake Tahoe (City) and, per California law, is regulated by the National Pollutant Discharge Elimination System (NPDES) permit issued to the City by the Lahontan Board for the entire storm drain system. This NPS Plan does not describe or direct activities to be undertaken by the City, nor does this NPS Plan cover activities undertaken by other private entities that own parcels adjacent to the Tahoe Keys development, but over which TKPOA has no authority.

1.3 Pollutants of Concern for the Tahoe Keys Waterways

The primary pollutants of concern identified in the WDRs are those containing nitrogen and phosphorous. Nitrogen and phosphorous compounds decrease water clarity in Lake Tahoe. The primary source of nitrogen is atmospheric deposition (57%), while runoff from both urban and non-urban areas contributes approximately 30% of the total accumulation. Sources of phosphorous compounds are primarily runoff from both urban and non-urban areas (65%), with approximately 20% of the accumulation originating from atmospheric deposition (TERC 2015). The Tahoe Regional Planning Agency (TRPA) has identified the over-use of fertilizers and the over-use of supplemental irrigation as NPS pollution concerns (TRPA 2014).

1.4 Non-point Sources of Pollution Compared to Point Sources of Pollution

For the purposes of this NPS Plan, it is important to distinguish between non-point and point sources of water pollution. Point sources include discharges from outfalls and pipes, including discharges from storm water pipes. Non-point source water pollution is pollution that enters waterways by overland flow or percolation, as opposed to entering through conveyances such as pipes or channels. It occurs when storm water, snowmelt, irrigation, or other non-storm water source transports pollutants separately from a conveyance structure and deposits the pollutants into rivers, lakes, or into ground water. Controlling point sources of water pollution is outside the scope of this NPS Plan.

1.5 Explanation of BMPs

Best Management Practices (BMPs) are methods proven to prevent sediment, nutrients, and other pollutants from entering waterways and groundwater. BMPs include pollutant source

control measures which reduce the amount of pollutants present and hydrologic source control measures to direct stormwater and snowmelt runoff so that pollutants are filtered out and prevented from entering surface or groundwater. BMPs range from simple measures to complex installations. This NPS Plan describes activities TKPOA will use to reduce the sources of nitrogen and phosphorous pollutants in the Tahoe Keys.

TRPA publishes the “Best Management Practices Handbook”, an extensive guide to selection, design, and installation of a wide range of BMPs for property owners and managers of small or large parcels. Recommended BMPs in this NPS Plan are explained in full detail in the TRPA Handbook (TRPA 2014).

1.6 Organization of the NPS Plan

This NPS Plan describes how demonstrated BMPs will be implemented in the Tahoe Keys, how best management practices for individual homeowners and property managers will be identified, and how training to utilize BMPs will be conducted.

1.6.1 BMPs for Common Areas

TKPOA is responsible for maintaining areas of recreational turf and accent plantings for TKPOA Common Areas and for maintaining the Common Areas of the townhouse subdivisions. This NPS Plan describes BMPs previously implemented by TKPOA and describes how TKPOA will ensure and track compliance with those BMPs, including using the training manual for landscape professionals who work in the Tahoe Keys and TKPOA employees (Appendix A).

1.6.2 BMPs for Single-Family Homes

The majority of landscaped area in the Tahoe Keys Facility is under the control of individual homeowners who may maintain their properties or may contract with private landscaping companies for maintenance. This NPS Plan evaluates the status of BMP installations in the single-family residential areas and describes the programs that TKPOA will implement to educate homeowners and property managers about steps to take that will reduce nutrient runoff from single-family properties. The NPS Plan also describes how TKPOA will track BMP installations and how TKPOA will evaluate the success of the outreach and education programs by tracking participation and surveying the residents.

1.7 Relationship to Integrated Management Plan for the Tahoe Keys Lagoons

The Findings of the Lahontan Board Order noted the high rates of growth of the aquatic plants in the Tahoe Keys lagoons. The density of these plants in the Tahoe Keys lagoons is such that they now limit navigation, recreational, and other beneficial uses of the lagoon waterways and impact water quality. In 2015, TKPOA drafted an Integrated Management Plan (IMP) to identify a range of methods to control the growth of aquatic plants. The IMP identified cultural controls, everyday practices that reduce runoff of nutrients, as essential to success of the IMP. Therefore, this NPS Plan is linked to the IMP and the activities described herein will support the aquatic plant control work that will be completed under the IMP.

2.0 Physical Conditions of the Tahoe Keys Facility

This NPS Plan applies to areas of the Tahoe Keys Facility controlled either by TKPOA or by TKPOA members who are owners of single-family properties. This section describes the existing, site-specific conditions of the Tahoe Keys Facility in terms of the soil type, the hydrology, and the stormwater drainage patterns so that the recommended NPS activities can be understood in the proper physical context.

2.1 Description of the Tahoe Keys Facility and Geographical Scope of the NPS Plan

The Tahoe Keys is a multi-use development situated at the southern end of Lake Tahoe on approximately 372 acres of land. The development features 1,529 residential dwellings consisting of a combination of homes and townhouses. There are three primary man-made water features in the Tahoe Keys: the Main (west) Lagoon, the Marina (east) Lagoon, and the Lake Tallac Lagoon.

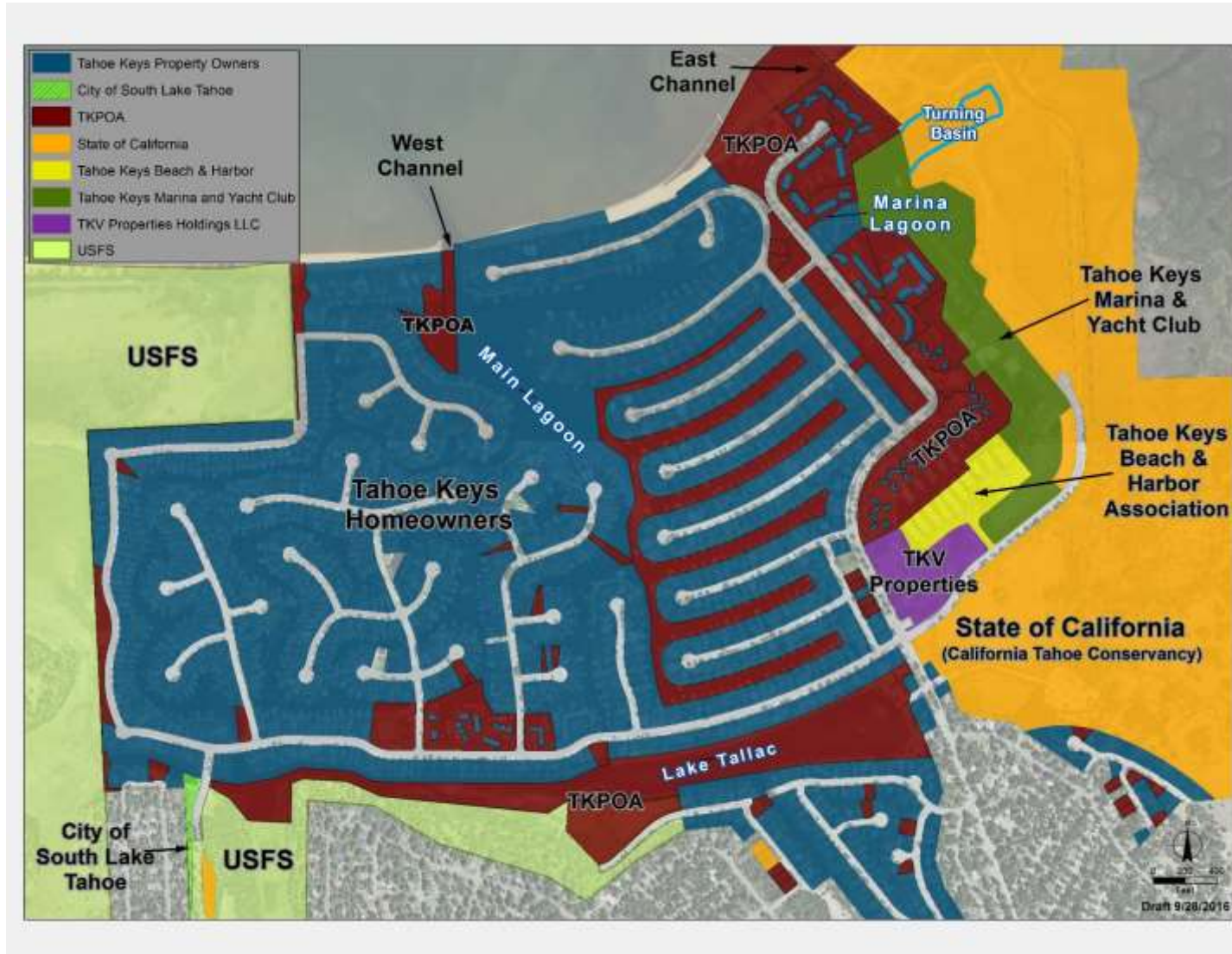
There are six major owners of what is known collectively as the Tahoe Keys: TKV Properties; Tahoe Keys Beach and Harbor Association; Tahoe Keys Marina and Yacht Club; the State of California, which owns land to the east of the Marina Lagoon that is managed by the California Tahoe Conservancy; the owners of single-family parcels of the Tahoe Keys; and TKPOA, which owns and maintains several Common Areas and buildings that are under their direct management and control. In 2016, TKPOA purchased the Lake Tallac Lagoon from Lagoon Inc. For the purposes of this NPS Plan, the Tahoe Keys Facility, as described in the WDRs, is the property owned and controlled by TKPOA or single-family properties owned by members of TKPOA. This NPS Plan does not address the commercial areas of the greater Tahoe Keys development, which TKPOA does not maintain, nor the commercial marina, which operates under a separate permit from the Lahontan Board. The land ownership of the Tahoe Keys Facility and the geographical scope of this Plan are shown in Figure 1.

The Tahoe Keys is a planned development. The common areas and common facilities are owned and maintained by TKPOA, a nonprofit mutual benefit association. All property owners within the development are subject to the Covenants, Conditions, and Restrictions (CCRs), Architectural Control Rules Brochure (ACRB) issued by the Architectural Control Committee (ACC), and the By-Laws maintained by TKPOA. The single-family property owners in the Tahoe Keys Facility are members of TKPOA by benefit of their parcel ownership.

There are 12 townhouse subdivisions within the Tahoe Keys Facility. The exteriors of the townhouse buildings and the surrounding landscaping are Exclusive Use Common Areas that are maintained by TKPOA. Each townhouse subdivision is represented by a resident volunteer Cove Advisor who coordinates with TKPOA on issues such as necessary repairs or building and landscape maintenance. Oversight and management of all maintenance contracts rests with TKPOA.

TKPOA maintains landscaping in and around parks and Common Areas of the Tahoe Keys Facility. There are 28 parks that are, collectively, over 26 acres in area. There are two swimming pool areas and the TKPOA Pavilion, which are collectively 6 acres in area. The landscaped area surrounding the 12 townhouse subdivisions is approximately 10.4 acres. The total acreage of landscaped area that is maintained by TKPOA is approximately 43 acres. Landscape maintenance is completed by either TKPOA staff or by landscaping companies under contract to TKPOA.

Figure 1: Geographic Scope of the NPS Water Quality Management Plan for the Tahoe Keys Property Owners Association



2.2 Soils of the Tahoe Keys Facility

The Tahoe Keys and Tahoe Keys Marina were constructed in the 1960s on the Upper Truckee River Marsh by excavating the lagoons and capping the soil with decomposed granite sand to form stable building bases. The Tahoe Keys Facility therefore has one primary soil type (Oxyaquic xerothents) throughout. The soil cap of decomposed granite drains quickly to the finer textured soil below, does not have a high capacity to hold water, and may not hold sufficient nutrients for satisfactory plant growth (NRCS 2015). Given the limitations of this soil, nutrients and irrigation must be managed carefully to maintain healthy landscapes. The soil found in the bottom of the lagoons of the Tahoe Keys has not been characterized by the Natural Resources Conservation Service (NRCS), but could be a more fine-textured soil similar to the peat or silty loam soils found nearby.

2.3 Hydrology and Drainage Patterns of the Tahoe Keys Facility

The three water bodies of the Tahoe Keys lagoons each have a connection to Lake Tahoe. The Main Lagoon has smaller lagoons and coves with residential docks and is connected to Lake Tahoe by the West Channel. The Tahoe Keys Marina Lagoon is connected to Lake Tahoe via the East Channel. Lake Tallac Lagoon normally discharges into Pope Marsh but also can drain into the Main Lagoon when gates located under the Venice Drive Bridge are lowered during flood conditions in Lake Tallac Lagoon (TKPOA 2015).

The Tahoe Keys watershed is approximately 372 acres or 0.6 square mile. No natural surface water channel discharges into the Tahoe Keys lagoons. Lake Tallac Lagoon intercepts most of the storm water runoff from the adjacent, upland, developed areas of South Lake Tahoe that flows towards the Tahoe Keys lagoons. Lake Tallac Lagoon in turn discharges to Pope Marsh. Given the relatively flat topography and the barriers of Lake Tallac Lagoon to the south and the Upper Truckee River to the east, only a negligible amount of storm water runoff reaches the Tahoe Keys from lands that are not part of the Tahoe Keys development. The developed residential property in the Tahoe Keys and the roads owned by the City, are the primary source of discharge of surface water flows into the Tahoe Keys lagoons.

The majority of stormwater runoff in the Tahoe Keys Facility is directed to a storm drain system and is considered a point source of discharge. The stormwater drain system is owned and operated by the City of South Lake Tahoe. The City holds the Municipal Separate Storm Sewer System (MS4) Permit for the system, issued by the Lahontan Board. TKPOA and the City have a shared stormwater facility in the Cove 3C parking lot which drains stormwater from the parking lot into the Marina Lagoon via a common drain pipe that carries stormwater from the surrounding City streets. TKPOA and the City coordinate to ensure that this stormwater facility meets fine sediment and nutrient load reduction requirements per the MS4 permit (LRWQCB 2014).

The TKPOA Common Areas and parking lots have drop inlets that capture surface flows and convey runoff to City's storm water system. There are approximately 180 storm drains located

across the TKPOA project area and most of these storm drains discharge directly into the Tahoe Keys lagoons, including the Lake Tallac Lagoon, and Pope Marsh.

R.O. Anderson Engineering, Inc. conducted a field assessment for drainage in the Tahoe Keys development on November 20, 2015 prior to significant snow cover and completed the assessment on November 23, 2015 during a period of visible snowmelt and runoff. Results of this assessment are displayed in Figure 2.

General Notes from the Field Assessment

The field assessment found that the land-based Common Areas were generally well vegetated with grass cover or landscaped with shrubs, forbs, rocks and mulch. There were very few areas of exposed soils and a minimal weed cover was noted. The exception is the Tahoe Keys Lagoon Water Treatment Facility, which had some small areas with little to no cover on exposed soil. Runoff that originates in the parking lots and walkways of the townhouse areas along Tahoe Keys Boulevard and Ala Wai Boulevard enters rock-lined swales prior to discharging into the Boat Harbor and Marina Cove. The rock-lined swales are well maintained and free of debris and leaf litter. Most of the runoff infiltrates along the length of the swales but there is evidence of discharge over the top of the bulkheads and beneath the safety fences. When City of South Lake Tahoe storm drains were encountered during the survey, the connectivity and direction of flow was documented.

Sensitive Areas Defined

Sensitive areas are defined in the WDRs as those areas "...that drain directly to waterways from both common and private areas" (LRWQCB 2014). As described above, stormwater runoff is regulated under the MS4 permit held by the City. Non-stormwater runoff could be a potential nonpoint source of pollution. The field observations made by R.O. Anderson focused on identifying portions of TKPOA Common Areas and private properties that could be considered sensitive areas where water runoff could drain directly to the surface water. The survey was limited to observing public and common areas of the Tahoe Keys Facility. No front or back yards of private, single-family properties were directly observed.

Potential Sensitive Areas – TKPOA Common Areas

One potentially sensitive area and two areas with problematic drainage were observed during the field assessment.

The potentially sensitive area was noted at the Townhouse subdivision at Cove 5. The rock-lined swale BMPs in this area appeared to be well-maintained and functioning as intended, but there are raised mounds covered in turf between the buildings that capture some of the run-off from the area including from the roofs and walkways. The adjacent turf-covered swales could carry water runoff from the turf mounds toward the bulkhead, where it would discharge into the Marina Lagoon. This area is shown in Figure 2.

Two areas with problematic drainage were at parking lots with paved ingress and egress sloping toward the adjacent roadway. Water runoff from these areas could enter the City's storm

drains. These areas do not meet the strict definition of sensitive areas but are areas where there is an opportunity to improve the quality of water runoff. The field notes of these areas are summarized below and the areas are shown in greater detail in figures 2A and 2B:

Figure 2A: This figure shows the Common Areas for townhome complexes along Venice Drive. The egress/ingress points for the parking lots do not have slot drains or other method to attenuate flow and capture pollutants prior to discharging to storm drains.

Figure 2B: This figure shows Common Areas along Ala Wai Boulevard. Runoff that originates in the parking lots and walkways of the townhomes areas along Ala Wai Boulevard is conveyed to rock-lined swales prior to discharging into the Marina Lagoon. Most of the runoff appears to infiltrate along the length of the swales but there is evidence of discharge over the top of the bulkheads and beneath the safety fences. The rock-lined swales are well maintained and free of debris and leaf litter. The potentially sensitive areas noted are associated with paved egress/ingress points, which do not have slot drains or other method to attenuate flow and capture pollutants prior to discharging to storm drains. The potentially sensitive area to the west of the tennis courts slopes toward a drain inlet that eventually discharges to the Marina Lagoon.

Potential Sensitive Areas – Single-family Properties

Given the proximity to the waters of the Tahoe Keys Facility, the yards of the single-family properties are potentially sensitive areas. Water runoff could drain directly from these properties to the waterways if proper BMPs have not been installed that direct runoff away from the surface water. Single-family properties are shown in Figure 2.

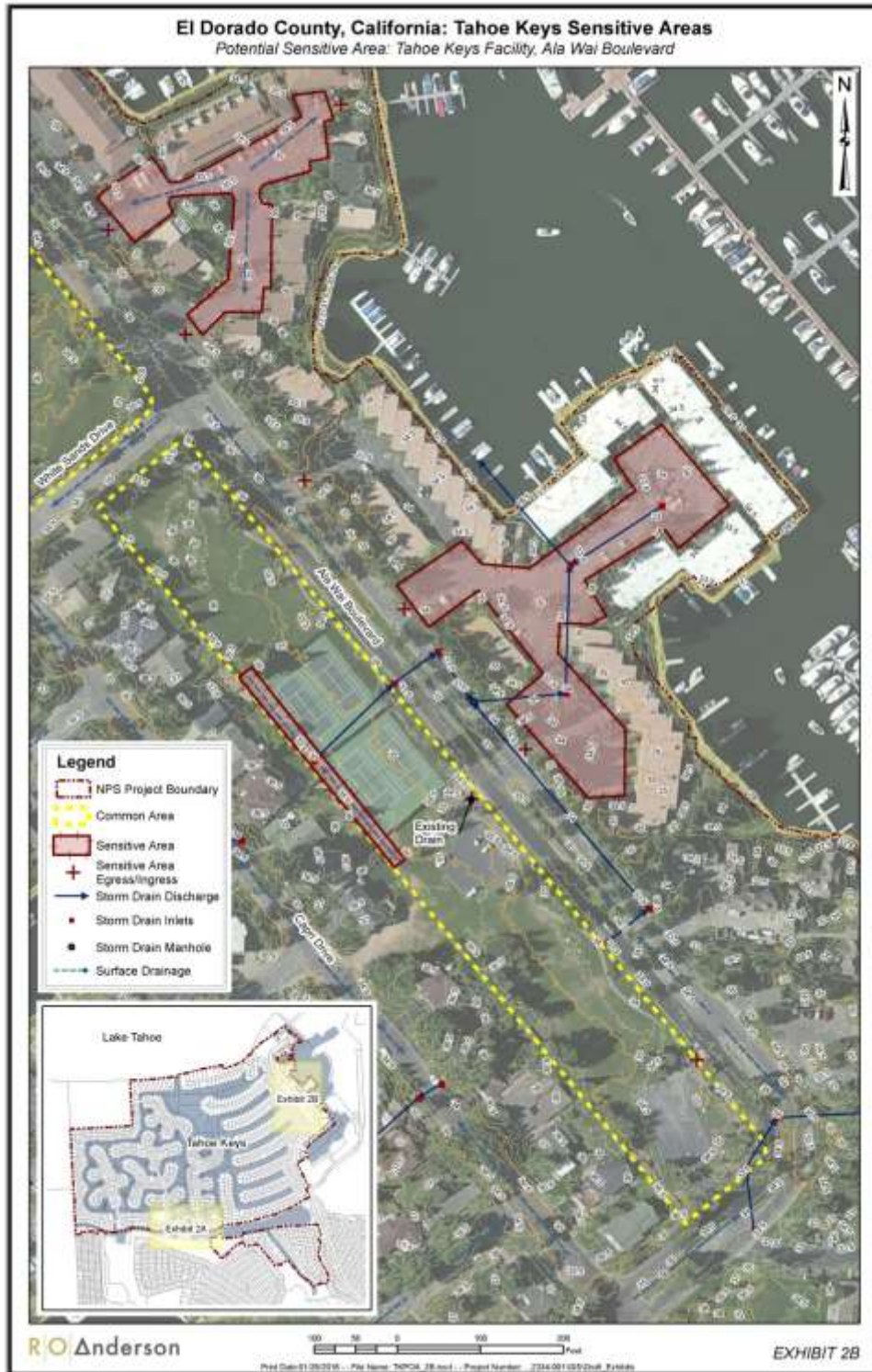
Snow Storage

The field assessment in November 2015 noted snow storage sites. Snowmelt can be a source of sediments and other pollutants. The snow storage near the townhouses along Tahoe Keys Boulevard drain to rock-lined swales however, some snow storage areas along the east side of Ala Wai Boulevard appeared to drain to drop inlets in the parking lots.

Figure 2A: Potential Sensitive Drainage Area: Venice Drive, South



Figure 2B: Potential Sensitive Drainage Areas, Ala Wai Boulevard



3.0 Evaluation of Current Best Management Practices in the Tahoe Keys Facility

The top-priority pollutants identified in the WDRs are the nutrients nitrogen and phosphorous, which are found in commonly used fertilizer products. Loading of these nutrients into the waterways could be affected by landscape practices such as fertilizer use and irrigation runoff. In this chapter, current conditions and landscape practices in both the Tahoe Keys Common Areas and the residential areas are evaluated.

3.1 Current Activities

TKPOA and its members have taken a number of positive steps to reduce runoff pollution and to protect the waters of Lake Tahoe including adopting and enforcing rules regarding fertilizer use and water conservation, and educating the membership about the impacts of nutrient pollution.

In 2015, TKPOA adopted two rules, which will continued to be enforced, to minimize sources of nutrients and to prevent nutrient loading and runoff into the waterways:

- The use of phosphorous fertilizer in the Tahoe Keys Facility was banned.
- Water Use Restrictions, which specified landscape watering days and times throughout the Tahoe Keys Facility, were instituted by the TKPOA Board.

Copies of these rules are in Appendix B. The office of the TKPOA General Manager is responsible for enforcing the rules as they apply to the Common Areas and oversees the landscape maintenance companies and in-house staff that maintain the Common Areas. The TKPOA Architectural Control Department (ACD) is responsible for enforcing these rules on the private property. The ACD staff inspects the streets and lagoons of the Tahoe Keys Facility for various violations. In addition to ACD staff, the TKPOA Security Department patrols the Tahoe Keys Facility daily. They are informed of the regulations of the ACRB and have the responsibility to report violations to the ACD. Infractions reported by the TKPOA Security Department include reporting irrigation mismanagement and the use of prohibited fertilizer.

3.1.1 Evaluation of the Common Areas

The TKPOA Common Areas include townhouse subdivisions, the TKPOA Pavilion and administrative offices, parking lots, open space parks, playgrounds, tennis courts, pools, and the Tahoe Keys Water Company facilities. TKPOA contracts with various landscape maintenance companies to maintain these Common Areas. The Common Areas are generally well vegetated with grass cover or with shrubs, forbs, rocks and mulch.

TKPOA has improved the drainage from the parking area near the tennis courts on Ala Wai Boulevard by building a vegetated catchment area, or rain garden, that directs snowmelt and stormwater from the impervious surfaces so that the water percolates into the soil, thus trapping nutrients and other pollutants.

A rain garden to capture runoff for a planting area has been proposed for the Cove 3C parking lot.

Chemicals Stored On-Site

The WDRs require that TKPOA address chemical storage and track chemicals used at the Tahoe Keys Facility as part of this NPS Plan. TKPOA maintains such an inventory. A current copy of the inventory is in Appendix C.

3.1.2 Single-family Properties

Typically, the single-family properties within the TKPOA project area have little to no slope and are well vegetated with grass cover or are suitably landscaped.

Single-family property owners must adhere to fertilizer and water use restrictions in the ACRBs. In addition, many single-family property owners have installed TRPA-approved BMPs to prevent sediment and other pollutants from entering the waterways. TRPA acknowledges and tracks BMP installation by inspecting and issuing a BMP Certification or Source Control Certificate (SCC) letter to the property owner. A BMP Certificate is issued to property owners that have fully implemented BMPs on their property. An SSC letter is issued to property owners whose property is somehow constrained but who have installed BMPs to the extent possible (TRPA 2014). In 2017, TRPA issued BMP Certifications or SCCs to 12 additional property owners in the Tahoe Keys (TRPA 2018). There may be additional properties in the Tahoe Keys development with BMPs installed that have not been documented by TRPA.

Additional rules to encourage BMP installation and reduce nonpoint source pollution are codified in the ACRB. These additional rules in the ACRBs include:

- Making single-family property owners responsible for the products used by landscape maintenance companies under contract.
- Requiring that all developed lots be landscaped and maintained. Undeveloped lots must be maintained, but landscaping is not required.
- Encouraging the use of pavers in driveways.
- Requiring irrigation with automatic systems with backflow prevention on valves.
- Encouraging planting with native plants and readily adaptable plants that require minimal fertilization and watering.
- Approving conversions from live to permeable artificial turf, per Assembly Bill 349. The ACC will approve such conversions providing that all other applicable ACRs and conditions for the project are met.
- Verifying that all major remodeling projects comply with BMP requirements of the City.

Enforcement of the rules set forth by the ACC is described in Section 21 of the ACRB. The ACC seeks voluntary compliance with the standards and restrictions from TKPOA members first and takes enforcement action if necessary. The ACC can issue notices of violation with increasing levels of enforcement action, including fines, as necessary for non-compliance. The ACC has the

authority to take corrective action and be reimbursed for the costs of such action by the property owner.

3.1.3 Current Outreach and Education Activities

TKPOA educates and informs their members through publications, posting information on TKPOA’s website, by sending emails to all members, and by holding public town hall-type meetings.

The Tahoe Keys website is available for members to access water quality data and to learn about upcoming community events. TKPOA regularly posts articles about landscaping, BMPs, and water conservation on the website.

TKPOA also publishes the “Keys Breeze” monthly for TKPOA members. The Keys Breeze provides information to members regarding updates such as the irrigation water restrictions and the ban on phosphorous fertilizer. The “Keys Breeze” also seasonally publishes information about BMPs and landscaping practices to educate the homeowners.

TKPOA members and Tahoe Keys residents are actively engaged in volunteer programs for protecting Lake Tahoe. For example, in 2014, residents helped Tahoe Keys become the first neighborhood in the Lake Tahoe Basin to mark all the storm drains with “No dumping – Keep Tahoe Blue” markers (see photos, below). In addition, TKPOA has hosted Pipe Keeper trainings for residents in the Tahoe Keys. This program trains citizens on how to monitor and report water quality in their area.



Volunteers marking storm drains



Storm drains marker, detail

3.1.3.1 Nonpoint Source Plan: Education and Outreach Actions in 2017

TKPOA continued with property owner educational campaigns in 2017 in order to educate residents and help modify behaviors around irrigation and landscaping. Activities included facilitating meetings with key stakeholders on NPS-related materials, creating two main education campaigns for property owners within TKPOA and surveying property owners on awareness of education materials. NPS activities were connected to aquatic invasive plant management efforts in educational material.

Campaign #1

The first education campaign, called **Lake and Lagoon Friendly Landscaping**, utilizes a number of educational materials to inform property owners on best practices to reduce runoff and pollutants through better landscaping techniques. Products include:

- A Landscaper Handout distributed by TKPOA staff to landscaping companies that operate within TKPOA
- Informational trifold sent out with TKPOA billing to all property owners (1,500 properties) and available at TKPOA office
- Informational poster hung at TKPOA main office and other public spaces
- Email blasts, Keys Breeze articles and Keys Breeze advertisements based on Lake and Lagoon Friendly Landscaping materials
- Prominent placement of educational materials on primary TKPOA water quality site: keysweedsmanagement.org

Key points of this campaign were:

- Water only on allotted days
- Use automatic shut-off nozzles
- Use re-circulating water systems for fountains and other water features
- Water no more than 1.5 inches per week in spring and fall, and no more than 2 inches in July and August
- Phosphorous fertilizer ban
- Fertilize no more than twice a year
- Don't use more than one pound of nitrogen per 1000 sq. ft. (calculator provided at keysweedsmanagement.org)
- Maintain 5-foot buffer between lawn and lagoons or lake
- Never apply fertilizer to frozen ground or before rain event

Property Owner Survey

TKPOA property owners were surveyed in 2017 on their awareness of current BMP practices.

Questions included:

- Are you aware of Tahoe Regional Planning Agency's Best Management Practices (BMPs)?
- Have you seen TKPOA materials on which BMPs pertain to Tahoe Keys Residents?
- Do you have your free BMP or Source Control certificate from TRPA?
- Are you aware of the impacts of not having your BMP certificate - permitting for additions/remodels, selling your home, potential fines, etc?
- Who does your landscaping?

The responses showed that while the majority of homeowners are aware of the BMP program, many are uncertain of what all it entails, why it is required, or why it matters. This suggests that education efforts this year should be focused more on what BMPs are useful in the Tahoe Keys, why BMPs are important, and how they help protect the lagoon ecosystem.

Campaign #2

The second campaign, created with consultation from Tahoe Regional Planning Agency, is **BMPs in the Tahoe Keys** distilling the extensive rules and guidelines for BMPs to those applicable for the Tahoe Keys. Products included:

- Informational trifold sent out with TKPOA billing to all property owners and available at TKPOA office
- Email blasts with BMP educational materials
Prominent placement of educational materials on primary TKPOA water quality site: keysweedsmanagement.org

Key points of this campaign were:

- Paved driveway
- Soil protections along driveway and under driplines of structures (details on soil protection outlined per TRPA)
- Create 5-foot wide defensible space zone around all structures
- BMPs benefits for the environment and for the Tahoe Keys
- BMP benefits to property values
- BMP requirement for remodel or addition
- BMP value in resale
- Possibility of non-compliance fines
- Educational materials on how to get a BMP certificate from TRPA

Additional Materials

In addition to original education and outreach materials, brochures and other products from relevant campaigns, such as Take Care Tahoe, were made available at TKPOA offices.

Meetings/Public Forums

TKPOA staff organized a “Lunch and Learn”, which was designed to educate the property managers, land scape companies, hot tub companies, and nursery employees on the TKPOA AIS management plan, TKPOA landscaping policy and procedures and TKPOA rules and regulations. On July 18, 2017, TKPOA staff hosted a presentation followed by a free lunch to all of those who attended. There were eight individuals from five companies that attended.

Greater Public Outreach

NPS efforts were discussed in coordination with aquatic invasive plant efforts in public forums, press releases and on the weed management website: keysweedsmanagement.org. The website categorizes efforts as “On the land” for the NPS, and “In the water” for the IMP efforts. This messaging was designed to tie the importance of NPS activities to the pressing, visible issue of the aquatic invasive plants.

4.0 NPS Plan Activities

TKPOA will implement NPS Plan activities for the Common Areas and for single-family properties. TKPOA will reduce the sources of nutrients and causes of nutrient loading by monitoring and reporting compliance with rules regarding fertilizer use and irrigation scheduling, by enhancing education and outreach to the members, and by encouraging installation of hydrologic and source control BMPs and obtaining TRPA certification for this work.

This section describes initial activities to be undertaken in the NPS Plan and describes the Adaptive Management Program, which will allow TKPOA to evaluate and refine NPS activities in future years.

The NPS Plan is required reading by employees of TKPOA and will be made available for review by inspectors of the Lahontan Board.

4.1 NPS Plan Activities for Common Areas

The first activities are a training program for landscape professionals and to verify compliance with rules previously adopted by the TKPOA with improved monitoring and reporting. Contracts with landscaping companies doing business with TKPOA will be modified to require that personnel be trained and that they acknowledge the requirements and recommendations for fertilizer use and proper irrigation. Completed reporting sheets showing proof of compliance with the ACRs will be required from all landscaping companies.

Additional NPS Plan activities to be undertaken are to more closely assess the drainage from the sensitive areas so that improved drainage can be identified and installed as funding becomes available for such projects and to schedule additional maintenance to keep drop inlets free of plant debris.

Training:

A detailed training manual has been written for landscape professionals and landscape workers maintaining the Common Areas of the Tahoe Keys Facility. Appendix A contains the training manual that is based in part on the TRPA's Best Management Practices Guidebook (TRPA 2014). The training manual specifies the following:

- Landscape professionals will be required to review the training manual in Appendix A and provide acknowledgement to TKPOA. All landscape workers will be encouraged by TKPOA to participate in other training conducted by TRPA or other agencies regarding landscape practices suitable for the Lake Tahoe area.

- Landscape professionals under contract to TKPOA will be required to show proof of compliance with the phosphorous fertilizer ban by providing copies to TKPOA of labels of fertilizer used and a count of bags or weight used on an area basis.
- Landscape professionals will be held to the standards established by the TKPOA Board for members including keeping sprinklers from discharging to impervious surfaces, scheduling irrigation outside of the 6:00 a.m. to 9:00 a.m. time period, and watering only on designated days. Irrigation schedules will be submitted to the TKPOA General Manager.
- Landscape professionals will inspect irrigation systems weekly and repair leaks immediately. A summary record of weekly inspections will be submitted to the TKPOA General Manager at the end of the irrigation season.
- TKPOA will consider installing lock boxes on irrigation controllers for common areas to ensure compliance with irrigation scheduling rules.

Improving Drainage at Potential Sensitive Areas

The field assessment completed by R.O. Anderson identified several ingress/egress points where slot drains could be installed to divert runoff from directly entering the storm water system and the potential sensitive area at Cove 5. TKPOA will complete a more detailed assessment of these points so that priority for installation of slot drains and BMPs can be established. Once the priority is determined, TKPOA can be able to identify funding for construction.

4.2 NPS Plan Activities for Single-family Properties and Townhouse Subdivisions

Plan activities for single-family properties and townhouse subdivisions include improving enforcement of current rules and improving outreach and education to single-family homeowners and property managers.

The ACD enforces compliance to the water conservation rules and the ban on the use of phosphorous-containing fertilizer on single-family property owners. Property owners found in violation are subject to fines for violation of TKPOA rules (see TKPOA Disclosure Document 2016 for a schedule of fines.) To improve compliance with these ACRBs, TKPOA will develop a sample agreement that single-family property owners can use when contracting with commercial landscaping companies. The sample agreement will list these ACRBs, describe the financial consequences of violations, and state that the landscape company will be held accountable to the property owner for the violation.

TKPOA will continue its effort to educate members and will improve the outreach to homeowners and property managers about nonpoint source pollution and its prevention. The

Cove Advisors for each townhouse subdivision will be specifically targeted in this outreach work. Cove Advisors are typically on-site and can monitor landscape activities.

Outreach will include publishing and distributing information to member homeowners and property managers on the website and via hardcopy, installing informational displays, and holding workshops and seminars.

Outreach information will include the following information:

- A Basic Guide to Fertilization and Irrigation Scheduling for Single-family Homeowners and Property Managers (Appendix D). This will be made available to homeowners on the TKPOA website and copies will be available in the TKPOA office.
- Maintaining informational displays in the lobby of the TKPOA Administrative Office to educate and inform residents about BMP installations in the Tahoe Keys and how to obtain certification from TRPA.
- Encouraging homeowners to apply for certification for their properties. TKPOA will provide informational brochures about TRPA-approved BMPs to homeowners applying for permits to modify their properties. Homeowners will be requested to inform TKPOA of their certification so that acreage protected by BMPs can readily be tracked and reported. TKPOA will also track BMP installations on the TRPA website. The goal is 100% compliance.

Homeowners will be encouraged to work as a group in their neighborhood to evaluate the possibility of meeting BMP requirements in an area-wide approach.

- TKPOA will consider developing an incentive program for BMP compliance. Incentives could include posting announcements in TKPOA publications or posting plaques.

Outreach strategies will include:

- Posting materials on TKPOA's website
- Email blasts to TKPOA members
- Direct mail to TKPOA members
- Using social media
- Writing articles for the Keys Breeze
- Distributing informational materials at TKPOA member events
- Coordinate with other groups in the Lake Tahoe Basin and work with established programs with the same or similar goals
- Create an educational video on NPS topics to be posted on TKPOA's website or distributed to social media

Monitoring and Reporting

Single-family Properties

TKPOA will monitor the success of the NPS Plan by surveying TKPOA members, tracking attendance at workshops, and tracking the number of times the website has been accessed for information about BMPs. The data gathered will be summarized for the General Manager and will be part of the annual General Manager's NPS Report.

The TKPOA will conduct an annual survey of its members to determine the success of the outreach program. Survey questions will ask members such questions as:

- Have they used the sample agreement with their landscaping company?
- Have they requested and received materials? Are they aware of the recommended procedures for landscaping?
- Have they followed the procedures? And if not, what prevented them from doing so.

BMP Installation

TKPOA will request that homeowners provide a copy of the BMP Certification or SSC letter they receive from TRPA for installation of BMPs on their property and will work with the TRPA Stormwater Program staff to keep an accurate count of BMP-compliant properties in the Tahoe Keys.

4.3 NPS Plan Adaptive Management Review

The NPS activities are being annually reviewed by the ACC and WQC. The Adaptive Management Program is identifying changes to the ACRBs to improve compliance or to promote installation of additional BMPs. The ACD staff and the General Manager are responsible for drafting rule changes for consideration by the TKPOA Board. Updates and refinements are being reported to the Lahontan Board. Success of the NPS Plan will be measured by:

- Monitoring compliance by TKPOA staff and landscaping companies with the nutrient reduction rules to reduce fertilizer use and prevent irrigation water runoff.
- Tracking member participation in educational workshops
- Tracking member participation in TRPA's Stormwater Management Program to obtain certification for BMP installation

Future NPS activities will be scheduled based on the review of the successes of the prior year. For example, if workshops are well attended, TKPOA will continue holding them. If not well attended, the number of workshops may be reduced in favor of other more productive outreach approaches, such as publishing articles more frequently in the Keys Breeze. During the annual review, TKPOA will consider changes to the ACRs to provide more options to control residential sources of nitrogen and phosphorous nutrients.

4.4 Plan Implementation

The NPS Plan was implemented starting in 2016, after acceptance by the Lahontan Board. The initial steps of the NPS Plan were to improve outreach to owners and managers of single-family homes, and require enhanced reporting from landscape professionals to demonstrate compliance with existing rules regarding fertilizer use and water conservation. Implementation of the NPS Plan will continue to be directed by the General Manager and overseen by members of the Water Quality Committee (WQC).

4.5 Summary and Discussion of Topics not Considered in the NPS Plan

This NPS Plan addresses the requirements of the WDRs issued to TKPOA. The objectives of the NPS Plan are to:

- Evaluate the current management practices at the Tahoe Keys Facility
- Identify activities that could be sources of pollutants with the potential to be discharged into surface water
- Identify and implement site-specific management practices to reduce or prevent pollutants from being discharged into surface waters

The NPS Plan describes activities that TKPOA will undertake to:

- Monitor landscape activities to ensure that fertilizer use and runoff is prevented
- Educate members, residents, property managers, landscape contractors, and TKPOA staff how to reduce potential source loading of nutrients to the surface waters of the Tahoe Keys Facility
- Develop an Adaptive Management process to evaluate and refine land-based activities to further address water quality improvements
- Tally the total number of houses and acreage retrofitted with BMPs
- Modify the ACRB to provide options for landscapes to reduce residential sources of nitrogen and phosphorous

Several topics listed in Attachment D for consideration in the NPS Plan have not been included due to their technical nature. These topics are:

- Determining Distribution Uniformity (DU) for each irrigation station
- Determining the leaching fraction
- Conducting plant tissue testing to determine nutrient levels
- Taking soil moisture measurements and soil water-holding capacity measurements
- Measuring evapotranspiration rates for the Tahoe Keys Facility
- Measuring the concentration of water soluble Total Kjeldahl Nitrogen, nitrate and water-soluble phosphate in ground water
- Measuring soil compaction parameters

5.0 References

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UNR 2004. Post, R.L. and J. Christopherson. Turf Fertilization at Lake Tahoe. University of Nevada, Reno Fact Sheet 94-64.

UNR 2011. How to Install Residential Scale Best Management Practices in the Lake Tahoe Basin. Published by the University of Nevada Cooperative Extension, Reno, NV. 2011.

6.0 Acronyms

ACC	Architectural Control Committee
ACR	Architectural Control Rules
ACRB	Architectural Control Rules Brochure
ACD	Architectural Control Department
BMPs	Best Management Practices
CCRs	Covenants, Conditions, and Restrictions
City	City of South Lake Tahoe
IMP	Integrated Management Plan
Lahontan Board	Lahontan Regional Water Quality Control Board
NPDES	National Pollutant Discharge Elimination System
NPS Plan	Nonpoint Source Water Quality Plan
NRC	Natural Resources Conservation District
SCC	Source Control Certificate
TKPOA	Tahoe Keys Property Owners Association
TRPA	Tahoe Regional Planning Agency
UNR	University of Nevada
WDRs	Waste Discharge Requirements

Appendix A

Tahoe Keys Property Owners Association

Training Guide: Landscape Practices for TKPOA Common Areas

Tahoe Keys Property Owners Association
Training Guide: Landscape Practices for TKPOA Common Areas

Reducing nutrient and irrigation runoff are essential steps to take to reduce nonpoint source pollution in the Tahoe Keys waterways. Landscape professionals and maintenance workers can prevent nonpoint source water pollution by complying with rules and requirements of the Nonpoint Source Plan (NPS Plan) for the Tahoe Keys Property Owners Association. The guidelines presented below are taken from several sources of information including publications from the University of Nevada, Reno (UNR), University of California, Davis, Agriculture and Natural Resources Department.

All landscape maintenance companies under contract with TKPOA and TKPOA landscape maintenance staff are required to comply with the guidelines in this chapter to minimize the use of fertilizers and to minimize the potential for water run-off from irrigated areas. These guidelines are subject to change and maintenance company staff members are to review these guidelines annually and provide notice to TKPOA by signing the attached acknowledgment sheet.

These Guidelines describe required practices for fertilization and irrigation scheduling in the Tahoe Keys development. Recommended practices for landscape maintenance are also discussed.

In addition to following the required practices, landscape companies are required to file reports to TKPOA to demonstrate compliance. These reports are in worksheet format and directions for reporting are described.

Following the practices described here will protect the waterways while maintaining healthy landscapes.

General Consideration: Soil Type of the Tahoe Keys Development

Fertilization and irrigation requirements are dependent on the soil as well as the type of plant. The Tahoe Keys development has a uniform soil type (Oxyaquic xerothents) that was created when the lagoons were formed. The soil has a cap of decomposed granite that drains quickly to the finer textured soil below. The coarse textured decomposed granite drains quickly, does not have a high capacity to hold water, and may not have a sufficient nutrients for satisfactory plant growth. Given the limitations of this soil, landscape plants may need fertilization and water. Therefore, fertilizer and water must be added in small amounts at any one time because the soil does not retain either for an extended time.

Fertilizer Use: Turf

Proper fertilization is essential for healthy turf. Proper fertilization includes applying at the proper time, using the proper amount and type of product, using the proper application method, and following the manufacturer's directions. Fertilizing properly provides sufficient nutrients present for plant health and reduces the chance that excess nutrients leach out of the soil or runoff from the site of application.

Timing of application

In the Tahoe Keys development, turf will be fertilized twice per year.

- Fall application: fertilizer will be applied when the average daily temperature is below 50° F (typically by August 31)

- Spring application: fertilizer will be applied after snowmelt and when soil temperatures reach 50^o to 65 ^oF (typically by May 1)
- Never apply fertilizer to frozen ground

Type and amount

- **Only phosphorous-free fertilizers can be used in the Tahoe Keys development.** Actual brands and formulations are the responsibility of the landscape contractor who should rely on their knowledge and familiarity with local conditions.
- Fast-release types are preferred for most areas.
- Slow-release type fertilizer may be used when working in close proximity to open water. Otherwise, its use is restricted to the spring application.
- No more than one pound of nitrogen per 1,000 square feet of turf will be applied at any one time, for a total applied amount of no more than two pounds of nitrogen in a year.

Application Method

Care must be taken to keep fertilizers out of the surrounding waterways.

- Fertilizers may never directly enter the waters of the lagoons of the Tahoe Keys. Establish a 10-foot buffer from open water when using a drop or rotary spreader with a deflector. Slow-release fertilizers are recommended for use near open water.
- Any fertilizer reaching hard surfaces such as sidewalks or streets will be swept back onto the turf or swept up and discarded.
- Fertilizer must not be washed or swept into storm drains.
- Manufacturer's recommendations for application must be followed.
- Spreaders or sprayers for fertilizer must be calibrated correctly and according to manufacturer's directions.

Record-keeping and Reporting by Landscape Contractors

All landscape maintenance staff will record type, amount, location, date and time of fertilizer applications using the "Fertilizer Application Record", found at the end of this section. Companies will provide a sample label (clean copy or photo of label are acceptable) of the fertilizer with the invoice wherein payment for fertilizer application is requested.

Fertilizer Use: Landscape plants

Trees and shrubs have different fertilizer requirements than turf. Fertilizer is not food. It is beneficial when needed but is not a cure-all for ailing plants and in fact, over-fertilizing can result in plants that are more prone to disease or insect damage.

Prior to adding fertilizer, the following must be considered:

1. Conduct a soil test to determine pH and nutrient levels. The availability of nutrients is influenced by soil pH. Add the proper amendments to make sure the pH is proper first and add additional nutrients only if necessary.
2. Inspect the signs of poor growth. Twig or branch die back or unusual coloring of leaves may not be related to nutrient availability. These signs could be symptoms of compacted soil, insect infestation, disease, or adverse weather conditions. Rule out these causes before applying unneeded fertilizer.
3. Consider the location: trees and shrubs growing in sandy soils with little organic matter may benefit from fertilizer application. Plantings growing in or near turf should not require additional fertilizer.

If plants in the Common Areas show signs of nutrient deficiency, the landscape contractor will advise TKPOA of the need for soil or plant testing and costs associated with the testing. If tests indicate a nutrient deficiency, TKPOA and the landscape contractor will identify the appropriate product to be applied, timing of application and method. A summary of this application will be provided to TKPOA to include in the annual report for review through the adaptive management component of the NPS Plan.

If the landscape contractor recommends fertilization, the guidelines described above for turf fertilization will be followed, including observing the prohibition on phosphorous-containing products, establishing buffer zones from open water, and sweeping up fertilizer that lands on pavement.

Timing of application

Apply fertilizer when roots are actively growing and can easily take up the nutrients. This is typically early summer and early fall in the South Lake Tahoe area, when soil temperatures are 50° to 65° F.

Type and amount

Slow-release types may be preferred for trees and shrubs. This is left to the discretion of the landscape contractor.

Standard rates for landscape fertilization are the same as for turf: no more than 2 pounds of nitrogen applied per 1,000 sq ft of root area per year.

Irrigation

Irrigation efficiency

Landscape contractors will complete an irrigation audit in turf areas by using a standard test (commonly called a catch can test) to determine average volume of water delivered. For an example of this test see: "Irrigation System Auditing", available at <http://Earthkind.tamu.edu>. This testing will be conducted in 2016 for all areas of turf in the Common Areas. The results of the catch can test will be submitted to TKPOA and will be used to determine the irrigation schedule. Once the system has been evaluated, this will not need to be repeated unless there are significant changes made to the system, such as adding lines, valves, or replacing the majority of sprinkler heads.

Irrigation will be scheduled to deliver no more than:

- Spring and Fall: 1.5 inches per week
- July and August: 2.0 inches per week

Irrigation controllers will be set to deliver water in short intervals as described above. Landscape contractors will provide the irrigation schedules to TKPOA and demonstrate how the schedule complies with these parameters.

Water conservation

Water should never be wasted. Landscape professionals will be held to the Mandatory Conservation Rules for the Tahoe Keys:

- Designated irrigation days are
 - Even numbered street addresses: Monday, Wednesday, and Friday.
 - Odd numbered street addresses Sunday, Tuesday, and Thursday.
 - No irrigation between 6:00 a.m. and 9:00 a.m.

- Do not allow water to flow over the ground surface or from sprinklers onto surfaces that are not able to absorb water or on neighboring properties.
- Repair all leaks in plumbing and irrigation systems.
- The irrigation on non-landscaped, natural vegetation or undeveloped property is prohibited.
- Always use an automatic shut-off nozzle on hoses. Continuous discharge from a hose is prohibited.
- Water shall not be used to wash sidewalks, driveways, parking areas, tennis courts, decks, patios or other improved areas.
- Water use in water features such as fountains is prohibited unless the water is re-circulated.
- Landscape irrigation on Saturday is prohibited.
- Drip irrigation systems and hand watering with an automatic shut-off nozzle are exempt from the designated irrigation days.
- Exemptions are:
 - Newly planted sod will be exempt for 21 days from date of installation.
 - Seeded lawns, whether by hydro seeding or other means, will be exempt for 30 days from date of seeding.
 - Bedding plants, including annuals and perennials, will be exempt for 15 days from date of planting.

Inspections

This section describes the routine inspections required for irrigation systems, Best Management Practice (BMP), and protocols to be used by landscape professionals and workers. In addition, in, all areas are subject to routine inspection by TKPOA staff and the General Manager.

Irrigation System Inspection Schedule and Protocol

Irrigation systems will be inspected weekly when system is running, typically late spring to early fall in the Tahoe Keys area.

Inspection Protocol: See worksheet attached. Landscape professionals may substitute their own worksheets and inspection protocol for the attached worksheet with approval from TKPOA General Manager.

1. Visually inspect the irrigated area for signs of water runoff and signs of ponding water.
2. Briefly test system for leaks, broken heads, or broken pipes. Flag as needed and repair immediately.
3. Log inspection and repair on weekly inspection form, attached.
4. Submit all weekly reports to TKPOA General Manager's office at end of irrigation season or by October 31 for inclusion in annual report.

Inspection and Maintenance for other BMPs

For detention areas and rain gardens, and infiltration systems:

Inspect annually for clogging, damage. Replace failing plants, remove accumulated debris. Dispose of debris properly.

For slotted drains: clean twice annually, after snowmelt and prior to snowfall. Sweep out debris rather than flush out with high-pressure water.

Complex installations may require additional maintenance. Follow TRPA-recommended guidelines for system maintenance.

Reporting

A brief report with the dates and descriptions of the inspections and maintenance performed must be filed with the TKPOA General Manager's office at end of irrigation season or by October 31 for inclusion in annual NPS Report.

Other considerations for Landscaped Areas

- Recycling of grass clippings is encouraged to return nutrients to the soil. Clippings must not be discharged to sidewalks or other impervious surfaces.
- The use of natural fertilizers, such as composted sewage sludge, composted manures or complete fertilizer blends is encouraged. These products have low concentrations of nutrients, but can be beneficial because they release the nutrients slowly, contain micronutrients that are necessary for plant growth, and can improve soil structure and water holding capacity.

Summary

Landscape professionals and maintenance workers can demonstrate reduction in NPS pollution by completing and filing the following reports with the TKPOA General Manager:

- Fertilizer Use
- Irrigation Scheduling
- Irrigation Inspection
- BMP Inspection and Maintenance

Fertilizer Application Record¹

Tahoe Keys Property Owners Association				Management Area Information				
				Management Area Location:				
Address:	356 Ala Wai Boulevard			Management Area Size:				
	South Lake Tahoe, CA 96150			Landscape (turf, shrubs, or trees):				
Phone #:	(530) 542-6444			Notes:				
Date (M/D/Y)	Supervisor/Applicator	Weather Conditions			Fertilizer Analysis/ Brand Name ²	Rate	Amount Fertilizer Used	Application Equipment Used/Date Calibrated
		Temp	Wind Speed	Precip.				
<p>¹ Form to be filed with TKPOA with invoice of month when application was made</p> <p>² Clean copy of label can be attached to form</p>								

Turf Irrigation Schedule: Summer / Fall¹

Tahoe Keys Property Owners Association				Management Area Information			
				Management Area Location:			
Address:	356 Ala Wai Boulevard			Irrigation Controller Location:			
	South Lake Tahoe, CA 96150			(Note: Summer months 2"/week; Fall and Spring months 1.5"/week)			
Phone #:	(530) 542-6444			Notes:			
Date (M/D/Y)	Company	Supervisor	Can Test Results		Days of Week (No watering SAT)	Cycle Duration	Number of Cycle Times ²
			Date of Test	Results in inches/minute			
<p>¹ Submit Form twice per year and whenever controllers are programmed</p> <p>² Interval time between starts (one hour)</p>							

TAHOE KEYS PROPERTY OWNERS ASSOCIATION: IRRIGATION SYSTEM INSPECTION FORM

STATION	CONTROLLER DESIGNATION:	IRRIGATION TYPE	BROKEN HEADS	CLOGGED HEADS	MISSING HEADS	SUNKEN HEADS		HEADS NOT VERTICAL	MIXED HEADS	MIXED NOZZLES		LOW PRESSURE	OVERSPRAY	VARIABLE SPACING	BROKEN PIPE OR FITTINGS	NOTES	DATE INSPECTED AND INITIALS
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	

FROM: Irrigation System Maintenance and Repair, U of A Cooperative Extension 194026, September 1995

SPRINKLER IRRIGATION EQUIPMENT PERFORMANCE CHECKLIST

PROBLEM	WHAT TO LOOK FOR	SOLUTIONS
Clogged/broken/missing nozzles or heads	Brown spots. Standing water. Incorrect spray pattern. Water-stained asphalt or sidewalk.	Replace missing or broken heads and nozzles. Replace with the same type and performance head. Clean clogged nozzles. Select matched precipitation rate heads and nozzles. Institute a weekly after-mowing inspection routine.
Malfunctioning wiper seals	Water spraying from base of head.	Replace wiper seal or replace entire head with same type and brand.
Heads blocked by grass Sunken heads	Standing water. Brown spots. Reduced throw. Distorted spray pattern.	Reduce mowing height. Raise sprinkler level to the soil grade.
Head rotation out of adjustment	Brown spots. Excessively wet areas.	Adjust head so that each head is rotating correctly and at the same rate.
Heads not vertical or flush with grade	Standing water. Brown spots.	Adjust sprinklers to a vertical position that is flush with the soil grade. Compact soil tightly around the head. Swing joint installation may be required.
Mixed heads	Different spray patters and rotations. Brown spots. Excessively wet spots.	Determine original design head and nozzle. Replace all heads with original heads and nozzles.
Low head drainage	Draining water after system is turned off. Excessively wet spot.	Install check valves at low heads.
Low pressure		

	Water sprays in large droplets. Rotor sprays rotate slowly. Pop-up sprays slow to rise. Green "doughnuts" around head.	Install lower flow nozzles. Make sure two stations are not operating at the same time. Increase the setting at the pressure reducing valve. Check for broken pipes or fittings. Reduce number of heads on the line and install another valve. Increase the size of line components. Install booster pump.
High pressure	Water mists, drifts, and evaporates. Overspray on paved areas.	Install pressure regulating valve. Turn the flow control stem down. Use spray nozzles with pressure compensating devices. Install pressure compensating inserts in spray head.
Overspray	Standing water on paving. Water stains and damage on paving.	Reduce pressure. Adjust arc pattern of head. Move spray heads 4-6 inches from edge of paving. Move larger radius heads 10 inches in.
Variable spacing	Brown spots. "Scallops." Excessively wet areas.	Adjust nozzles and pressure. Determine manufacturer's recommended spacing. Relocate and add heads. Or change to heads or nozzles that perform at the measured spacing and pressure.
Broken pipe or fittings	Standing water. A washed-out hole.	Fix pipe. Replace fittings with a flexible swing joint. Flush soil from system.

Source: Irrigation System Maintenance and Repair, U of A Cooperative Extension 194026, September 1995

Appendix B

Selected Tahoe Keys Property Owners Association Architectural Control Rules for Landscaping and Mandatory Water Conservation Rules

Section 10 - Landscaping

10.01 New Construction: A complete landscaping plan must accompany new construction plans. Landscaping plans may be on the plot plan. No plan will be accepted that does not have a complete landscaping plan for front, rear, and side yards. It is required that all landscaping be completed within sixty (60) days of completion of the residence unless a specific variance is obtained from the ACC. Landscaping is to be done according to plans.

10.02 New Construction: Upon filing an application, the owner must deposit a Clean-up Compliance, and Landscaping Deposit (Refer to Section 04.08) with the Tahoe Keys Property Owners' Association. As long as the construction, clean-up, landscaping, and painting have been completed in accordance with the approved plans. Deposits will be refunded less any clean-up costs that may have been incurred by the Tahoe Keys Property Owners Association.

10.03 All developed lots within the Tahoe Keys are to be landscaped and maintained. Undeveloped lots must also be maintained. The dumping of any debris is prohibited. Vehicles must be parked on approved paved areas. Trailer/Boat storage is not allowed.

10.04 Changes: Revisions to existing landscaping must be approved by the Architectural Control Committee prior to any work.

10.05 If the owner has not landscaped, refuses to do so, or inordinately delays landscaping, it is stated in the CC&Rs (Article VIII, Section 3) that it is within the authority and discretion of the ACC to authorize expenditures (up to \$5000.) from the Common Operating Budget to proceed with landscaping on behalf of the owner. Re-payment is the responsibility of the owner and will become immediately due, and if not paid, a lien will be imposed and if necessary, non-judicial foreclosure will be pursued.

10.06 It is required that all areas be landscaped. A timed automatic sprinkler system with a backflow preventive device is mandatory. Planting is to be done with native or readily adaptable sod, plants, shrubs, ground cover, and trees that require minimal soil fertilization and watering.

10.07 Left intentionally blank

10.08 Left intentionally blank

10.09 Boulders, rocks and earth mounds are to be used in moderation.

10.10 Boulders, earth mounds, rocks, large plantings (trees), and shrubs cannot be placed within any easement. Snow removal and access to buried utilities must be provided for at all times.

10.11 Lagoon banks are not to be disturbed in the landscaping process without prior approval by the ACC. It is the owner's responsibility to keep lagoon banks free of debris, litter, and trash, and to control overgrowth of brush and weeds.

10.12 It is the property owner's responsibility to keep landscaping free from weeds/debris and well maintained.

10.13 Trees cannot be planted closer than ten (10') feet to the front property line, five feet (5') to the side property lines or fifteen (15') to the high water line.

10.14 Trees with invasive root systems and heavy leaf fall in winter (Poplar, Aspen, Willow, etc.) are not allowed in the Tahoe Keys. Pines, hemlocks, cedars, and evergreens are

encouraged. TKPOA is encouraging the removal of deciduous trees. Volunteer plant growth removal is the responsibility of the homeowner. Any tree less than fourteen inches (14") in diameter, as measured four feet, six inches above the ground can be removed without the need of a TRPA permit. Larger trees require a permit. An ACC Application for tree removal is required for all the above.

10.15 Do not over water or fertilize. Under no circumstances may phosphorous-based fertilizers be used. (The middle number on bags of fertilizers must be zero.) Homeowners are responsible for the products used by their landscapers. Refer to TKPOA Rules and Regulations Booklet, LANDSCAPING CRITERIA AND GUIDE TO PLANTING

NOTICE OF CHANGE TO ASSOCIATION RULES
TEXT OF PROPOSED CHANGES

(Deletions are shown in ~~strike through~~ type and additions in **bold underlined** type)

The TKPOA Board of Directors approved to adopt the following changes to the Association Rules at the July 17th, 2015 Regular Board Meeting.

Purpose and Effect of Proposed Rule Change

To implement mandatory and enforceable Water Conservation program for the Tahoe Keys Property Owner Association in compliance with the State of California – Executive Order B-29-15. [April 25th 2015 State of Emergency – Severe Drought Conditions]

WATER CONSERVATION RULES - MANDATORY

A. HOMEOWNERS RESPONSIBILITY FOR WATER CONSERVATION:

Members are required to maintain their landscaping in accordance with the Architectural Control Rules Brochure (ARCB). TKPOA Members and Water Company are required to observe mandated water conservation requirements. The requirements are:

1. Designated irrigation days are:
 - a. Even Numbered Street Addresses: Monday, Wednesday, and Friday
 - b. Odd Numbered Street Addresses: Sunday, Tuesday, and Thursday
 - c. No irrigation between 6:00 am and 9:00 am due to limitations on the TKPOA Water Distribution System.
2. Do not allow water to flow over the ground surface or from sprinklers onto surfaces that are not able to absorb water or on neighboring properties.
3. Repair all leaks in plumbing and irrigation systems.
4. The irrigation of non-landscaped, natural vegetation or undeveloped property is prohibited.
5. Always use an automatic shut-off nozzle on hoses. Continuous discharge from a hose is prohibited.
6. Water shall not be used to wash sidewalks, driveways, parking areas, tennis courts, decks, patios or other improved areas.
7. Water use in water features such as fountains is prohibited unless the water is re-circulated.
8. All Water Users are encouraged to report to the Water Company all signs of water leaks or water waste.
9. Landscape irrigation on Saturday is prohibited.
10. Drip irrigation systems and hand watering with an automatic shut-off nozzle are exempt from the designated irrigation days.
11. **Exemptions** are:
 - a. Newly planted sod will be exempt for twenty-one (21) days from date of installation.
 - b. Seeded lawns, whether by hydro seeding or other means, will be exempt for thirty (30) days from date of seeding.
 - c. Bedding plants, including annuals and perennials, will be exempt for fifteen (15) days from date of planting.

B. ENFORCEMENT PROCEDURES:

General Approach (Voluntary Compliance):

1. The objective of these rules shall be to promote and seek voluntary compliance by owners and tenants with the standards and restrictions set forth by the CC&Rs and Board of Directors.
2. Under circumstances requiring immediate action, the Security Department and Architectural Control Department (ACD), as agents for the Association, will be authorized to undertake immediate corrective action.
3. Accordingly, In the event that the Association becomes aware of an infraction that does not necessitate immediate corrective action, the owner and/or tenant responsible for the violation will receive written notice thereof and will be given a reasonable opportunity to comply voluntarily. Such notice will describe the non-complying condition, request that the owner and/or tenant correct the condition within a reasonable time specified in the notice. It will also advise the owner of their appeal rights. The owner is ultimately responsible for the achievement of compliance and will be responsible for any fines or litigation, administrative costs, legal actions and fees necessary for the resolution of the violation.

C. NOTICE OF VIOLATIONS:

1. **First Notification** – A notice which states the nature of the violation and will be issued to the property owner by the Association. The notification gives 5 to 14 days to correct the violation or to inform the Security Department or Architectural Control Committee (ACC) of a timeframe by which the violation will be corrected, shall be issued to the property owner and/or tenant by the Association. In the body of the notice, the fine policy and the consequences of non-compliance will be clarified. The notification of violation will be mailed to absentee owners. It is the responsibility of the owner and/or his contractor to advise the Association when the violation has been corrected. A re-inspection of the property will be conducted to verify compliance and recorded in the property's file.
2. **Second Notification** -- Those violations that are not promptly corrected by the owner are subject to a fine as prescribed in the Fines and Charges for Violations Procedures and Fine Schedule of the Rules in the TKPOA Annual Disclosures. A second notification letter stating that the owner must comply within 72 hours after first attempt to deliver a certified letter or contact the Association informing them of the time period by which compliance will be achieved.
3. **Recurrent Violations** -- In the event the rule violations are recurrent, then ACC at its discretion may start the enforcement process with the third and final notification.
4. **Third and Final Notification** - A certified letter will be sent informing the property owner that the violation has not been resolved. The letter will inform the owner, at least 10 days before the meeting that a hearing will be held before the ACC to consider imposing a fine. The owner has a right to appear and address the ACC at the hearing. If a fine is imposed, the owner shall be notified in writing of the decision within 15 days following the action.
5. **Owner's Right to Appeal** - The owner has the right to appeal to the Board of Directors if the owner is not satisfied with the decision. In those cases where an individual assessment (fine) has been imposed upon the property and the Board of Directors finds in favor of the property owner, a release will be issued after the violation has been appealed, heard, and deemed revoked by the Board..
6. **Lien on Owner's Property** - Individual Assessments imposed upon a property are due by the date set by the Board of Directors. If the payment is not made on or before this date, a lien may be placed on the Owner's property by the Association who will follow its collection policy.

Appendix C

Tahoe Keys Property Owners Association
2017 Chemical Inventory

Location Information		Chemical Identification		
1a*	201	205	207*	209
CERSID	ChemicalLocation	ChemicalName	CommonName	CASNumber
10203382	Pool Shed	Muriatic	Hydrochloric Acid	7647-01-0
10203382	Landscaping Shed	Ammonium Sulfate	Ammonium sulfate	7783-20-2
10203382	Landscaping Shed	Fertilizer	Sewage sludge fertilizers	308066-19-5
10203382	Landscaping Shed	Ethylene Glycol	Ethylene Glycol	107-21-1
10203382	Landscaping Shed	Diesel Fuel No. 2	Diesel Fuel No. 2	68476-34-6
10203382	Outdoor Pool	Sodium Hypochlorite	Sodium Hypochlorite	7681-52-9
10203382	Pool shed	Sodium Hypochlorite	Sodium Hypochlorite	7681-52-9
10203382	Water Treatment Plant	Acetylene	Acetylene	74-86-2
10203382	Landscaping Shed		Used Oil Filters (Drained)	
10203382	Water Treatment Plant	Oxygen	Oxygen	7782-44-7
10203382	Landscaping Shed	Oxygen	Oxygen	7782-44-7
10203382	Landscaping Shed	Distillates (petroleum), hydrotreated heavy paraffinic	Hydrotreated heavy paraffinic petroleum	64742-54-7
10203382	Landscaping Shed	Lubricating oils, used	Used lubricating oils	70514-12-4
10203382	Water Treatment Plant	Diesel Fuel No. 2	Diesel Fuel No. 2	68476-34-6

Appendix D

Basic Guide to Fertilization and Irrigation Scheduling for Single-family Homeowners and Property Managers in the Tahoe Keys

Tahoe Keys Property Owners Association Nonpoint Source Plan

Basic Guide to Fertilization and Irrigation Scheduling for Single-family Homeowners and Property Managers in the Tahoe Keys

Landscape maintenance practices have a great impact on the clarity of Lake Tahoe. Nonpoint source water pollution results from everyday activities, including fertilizer being washed off of a landscaped area. Because all developed lots in the Tahoe Keys are required to be landscaped and maintained, it is important to prevent runoff of irrigation water and fertilizers from entering the waters of the Tahoe Keys lagoons.

The Lahontan Regional Water Quality Control Board (Lahontan Board) identified nutrient runoff from landscapes as a potential cause of nonpoint source pollution in the Tahoe Keys lagoons in issuing the Waste Discharge Requirements to the TKPOA (LRWQCB 2014). The "Landscaping Guidelines for Homeowners and Property Managers" addresses concerns about preventing nutrient runoff from private landscapes in the Tahoe Keys and was written as part of the Nonpoint Source Plan (NPS Plan) that was required by the Lahontan Board.

This "Landscaping Guidelines for Single-family Homeowners and Property Managers" is a basic guide to turf fertilization and irrigation. It is a supplement to the regular articles published by TKPOA monthly publication, the "Keys Breeze", and to the information available on the TKPOA website. Homeowners and property managers are also encouraged to read "Home Landscaping Guide for Lake Tahoe and Vicinity" published by the University of Nevada Cooperative Extension (UNR 2008) which provides in-depth coverage on a range of landscaping topics including plant selection, planting techniques, and best management practices that homeowners can use to protect water quality of the Tahoe Keys lagoons.

General Information for Homeowners and Property Managers

TKPOA has banned the use of phosphorous-containing fertilizer in the Tahoe Keys. Also, as part of the water conservation program, TKPOA has established watering days and times for landscapes throughout the development. Homeowners and property managers are responsible for reviewing and adhering to these Architectural Control Rules (ACRs), which are published by TKPOA.

The mandatory water conservation rules are:

- Designated irrigation days are
 - Even numbered street addresses: Monday, Wednesday, and Friday.
 - Odd numbered street addresses Sunday, Tuesday, and Thursday.
 - No irrigation between 6:00 a.m. and 9:00 a.m.
- Do not allow water to flow over the ground surface or from sprinklers onto surfaces that are not able to absorb water or on neighboring properties.
- Repair all leaks in plumbing and irrigation systems.
- The irrigation on non-landscaped, natural vegetation or undeveloped property is prohibited.
- Always use an automatic shut-off nozzle on hoses. Continuous discharge from a hose is prohibited.
- Water shall not be used to wash sidewalks, driveways, parking areas, tennis courts, decks, patios or other improved areas.
- Water use in water features such as fountains is prohibited unless the water is re-circulated.
- Landscape irrigation on Saturday is prohibited.

- Drip irrigation systems and hand watering with an automatic shut-off nozzle are exempt from the designated irrigation days.
- Exemptions are:
 - Newly planted sod will be exempt for 21 days from date of installation.
 - Seeded lawns, whether by hydro seeding or other means, will be exempt for 30 days from date of seeding.
 - Bedding plants, including annuals and perennials, will be exempt for 15 days from date of planting.

Property owners or property managers who fail to comply with the Water Conservation Rules or the ban on the use of phosphorous-containing fertilizer, including those who contract for landscape maintenance, will be subject to fines for violation of TKPOA rules.

See TKPOA Disclosure Document 2016 for a schedule of fines.

Fertilizer Guidelines for Lawns

Proper fertilization is critical for healthy turf. Proper fertilization includes applying at the proper time, using the right amount and type, choosing the proper application method, and following manufacturer's directions. Fertilizing properly minimizes the amount of nutrients present to the level necessary and reduces the chance that nutrients leach out of the soil and into the surrounding waterways and groundwater. By using proper application methods, overall fertilizer use can be minimized.

In addition to the ACRs in force for the Tahoe Keys, keep in mind the following:

- When fertilizing, create a 5-foot buffer between the application area and open water where fertilizer will be applied to prevent granules from directly entering the water.
- Never apply any fertilizer on frozen ground or prior to a rain event.
- Never apply fertilizer near water or so that the fertilizer could enter the water.
- Never apply fertilizer so that it falls on pavement or where it could be washed into the storm water sewer.

Timing of application

Fertilize turf no more than twice per year: once in the fall and once in the spring.

- Fall application: apply when the average daily temperature is below 50° F (typically by August 31)
- Spring application: apply after snowmelt and when soil temperatures reach 50° to 65 °F (typically by May 1)
- Apply no more than one pound of nitrogen per 1,000 square feet of turf at any one time (no more than 2 pounds of nitrogen applied in one year).

Fertilizer Type

Only phosphorous-free fertilizers can be used in the Tahoe Keys development.

Fast-release types are preferred. Slow-release type fertilizer should only be applied in the spring or when applying near waterways.

Method of Application

Take care to keep fertilizers out of the surrounding waterways.

- Fertilizers may never directly enter the waters of the lagoons of the Tahoe Keys. Avoid applying fertilizer within 5 feet of waterways when using a drop or rotary spreader with a deflector.

- Remove fertilizer reaching hard surfaces such as sidewalks or streets by sweeping it back onto the turf or sweeping up and discarding in the trash.
- Do not wash fertilizer into storm drains.
- Always follow manufacturer's recommendations for application.
- Correctly calibrate spreaders or sprayers according to manufacturer's directions.

Irrigation control

The Tahoe Keys development has a uniform soil type with a cap of decomposed granite that drains quickly to the finer textured soil below. Turf should be watered in short intervals to avoid washing nutrients down to the shallow water table.

Irrigation should be scheduled to deliver no more than:

- Spring and Fall: 1.5 inches per week
- July and August: 2.0 inches per week

Irrigation controllers should be set to deliver water in short intervals as described above. In order to determine the delivery rate of the sprinkler system, a simple irrigation system test should be performed (Texas 2015). A step-by-step test is described in Attachment A.

References

- LRWQCB 2014. California Regional Water Quality Control Board, Lahontan Region, Board Order No. R6T-2014-0059, WDID No. 6A 090089000 for Water Quality Certification and Waste Discharge Requirements for Tahoe Keys Property Owners Association. July 18, 2014.
- TKPOA 2015. Tahoe Keys Property Owners' Association Architectural Control Rules Brochure, Sections 1-22. 2015 Revision.
- TKPOA Disclosure Documents 2016. The Tahoe Keys Property Owners Association Annual Disclosure Document for 2016.
- Texas 2015. Irrigation System Auditing. 2015. Texas AgriLife Extension Service publication available at <http://EarthKind.tamu.edu>
- UNR 2004. Post, R.L. and J. Christopherson. Turf Fertilization at Lake Tahoe. University of Nevada, Reno Fact Sheet 94-64.
- UNR 2008. Home Landscaping Guide for Lake Tahoe and Vicinity. Published by the University of Nevada Cooperative Extension. Available at: <http://www.trpa.org/wp-content/uploads/Home-Landscaping-Guide-for-Lake-Tahoe-and-Vicinity.pdf>

Attachment A: Stepwise Approach to Conducting a Catch-can Test for Sprinkler Systems

1. Locate and mark locations of sprinkler heads.
2. Lay out small cans to catch water. Small, clean cans such as those used for tuna fish or other small containers will work.
3. Turn on sprinkler system for a determined number of minutes.
4. Use a ruler to measure the depth of water (in inches) in each can. Note depth on a data sheet and note how long the system ran.
5. Repeat steps 1-4 for each valve on the sprinkler system.

Use the data to determine the rate for each valve on the system using this calculation:

Precipitation rate = (average depth of water in cans/ test run time)

Example:

Test run time: 15 minutes

4 cans placed in lawn

Measured water depths (in inches): 0.75, 1.0, 0.5, and 0.75

Therefore the average water depth is = 0.75 inch

Precipitation rate = 0.75 inch/15minutes = 0.05 inch per minute (average)

In the Tahoe Keys area, use the following guides for irrigating turf:

Recommendation for Spring and Fall: 1.5 inches per week

Therefore:

Run the system a total of 30 minutes each week

(30 mins x 0.05 inch/min = 1.5 inches water delivered)

Recommended schedule: Water 3 days each week, with 2 cycles of 5 minutes run time.

Recommendation for July and August: 2.0 inches per week

Run the system a total of 40 minutes each week

(40 mins x 0.05 inch/minute = 2 inches water delivered)

Recommended schedule: Water 3 days each week, with 3 cycles of 5 minutes run time. This will give 45 minutes total run time each week. This schedule will work with the majority of home sprinkler controllers.