Final

Burke Creek-Rabe Meadow Complex Master Plan

Development of Capital Improvement Projects and Alternatives Evaluation Report

November 2014

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ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations identified below are used throughout this document. This list is intended for reference use.

ac.....Acre
AC……..……Asphalt concrete
ADA……..… Americans with Disabilities Act
BMP.....Best Management Practice
cfs.....cubic feet per second
CIP.....capital improvement project
CMP……..corrugated metal pipe
CY…….cubic yard
DI.....drop inlet
EA…….each
EIP.....Environmental Improvement Program
ft.....feet
FSP.....Fine Sediment Particles
FEA.....Formulation and Evaluation of Alternatives
HDPE……high density polyethylene
H:V.....Horizontal to Vertical
GIS.....Geographic Information System
Inc.....Incorporated
lf……linear feet
LS……..lump sum
LTBMU.....Lake Tahoe Basin Management Unit
LWD…….large woody debris
NAC……..Nevada Administrative Code
NRS……...Nevada Revised Statutes
NV.....Nevada
NDEP.....Nevada Division of Environmental Protection
NDOT.....Nevada Department of Transportation
NDSL.....Nevada Division of State Lands
NTCD.....Nevada Tahoe Conservation District
rcp…….reinforced concrete pipe
ROW.....right of way
SF……..square feet
sq.....Square
SR.....State Route
SEZ.....Stream Environment Zone
TAC.....Technical Advisory Committee
TES.....Threatened and Endangered Species
TRPA.....Tahoe Regional Planning Agency
US.....United States
USDA.....United States Department of Agriculture
USFS.....United States Forest Service
USGS.....United States Geologic Survey

1.0 INTRODUCTION

This report summarizes the Development of Capital Improvement Projects and Alternatives Evaluation process for the Burke Creek-Rabe Meadow Complex Master Plan as performed by Nevada Tahoe Conservation District (NTCD) and Wood Rodgers, Inc. (Wood Rodgers), with additional information on the stream restoration from ECORP Consulting. Figure 1 shows the project area location. A portion of this project area, the restoration of Burke Creek around US 50, has been identified by Tahoe Regional Planning Agency (TRPA) as Environmental Improvement Program (EIP) project # 01.02.03.01. The end result of this project development process is the submittal and review by the project's Technical Advisory Committee (TAC) and identification of individual projects for the benefit of the project area and the prioritization of conceptual design alternatives.

The level of detail provided in this report is sufficient for conceptual design only. Information provided in this report includes suggested improvement locations, stormwater Best Management Practices (BMPs), areas of potential wildlife enhancement, potential fish habitat restoration areas, the refinement of opportunities and constraints, and preliminary cost estimates for these improvements. Where assumptions have been made, they have been applied consistently to each alternative to avoid the favoring of one alternative over another.

The individual projects, prioritization for capital improvement projects and the conceptual design of alternatives identified within each of these individual projects will be reviewed by the TAC. A subsequent TAC meeting will take place to prioritize the potential projects and their alternatives.

The TAC consists of personnel from the following entities:

- Wood Rodgers, Inc.
- Nevada Tahoe Conservation District (NTCD)
- United States Forest Service – Lake Tahoe Basin Management Unit (USFS-LTBMU)
- Nevada Department of Transportation (NDOT)
- Nevada Division of State Lands (NDSL)
- Nevada Division of Environmental Protection (NDEP)
- Douglas County
- Tahoe Regional Planning Agency (TRPA)
- Sustainable Community Advocates

The capital improvement projects and conceptual alternatives for erosion control, water quality treatment, drainage facilities, and overall meadow health were developed and analyzed. The alternatives focus on:

- Habitat Restoration
- Water Quality Improvements
- Environmental Impact
- Utility Conflicts
- Right-of-Way Requirements
- Maintenance Requirements
- Cultural Impacts
- Noxious/Invasive Weed Abatement
- Roadway Safety
- Recreation/Trail Connectivity
- Threatened and Endangered Species
- Stream Channel Improvements
- Drainage Facility Improvements

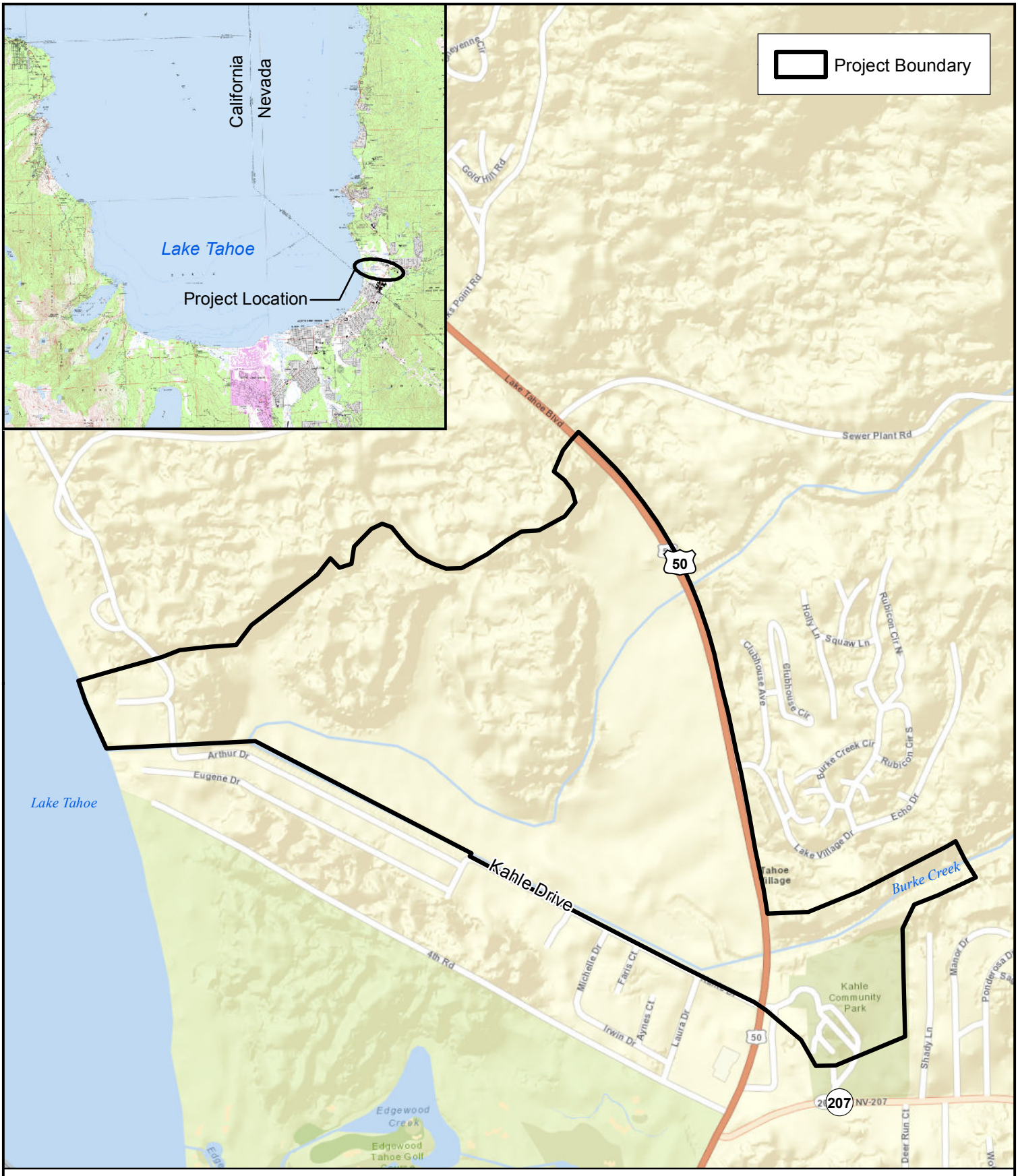

FIGURE 1: VICINITY MAP

BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NOTES:

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand),

NORTH

0 300 600

FEET

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1.1 Acknowledgements

Funding for this effort was provided by the USDA Forest Service Lake Tahoe Basin Management Unit, Nevada Department of Transportation and by Douglas County through the TRPA SEZ mitigation funds. The inspiration and vision for this effort was provided by Craig Oehrli of the USFS LTBMU and the late Mahmood Azad, P.E. of Douglas County and NTCD. Their early conversations galvanized the project and provided contagious enthusiasm in moving it forward.

Numerous existing and ongoing reports and projects were instrumental in shaping this report. They include:

- Burke Creek Restoration Project Alternatives Analysis Report
- Burke Creek Restoration Potential and Design Concepts
- Douglas County Master Plan
- South Shore Vision Plan
- Kahle Drive Plan
- Nevada Stateline to Stateline Bikeway
- Beach Club on Lake Tahoe plans
- Sierra Colina Village Project Environmental Impact Statement

1.2 Implementation

As funding becomes available for projects identified through the master planning effort, NTCD will work closely with the TAC to ensure that all project features meet long-term programmatic goals and objectives with full consideration of cost effectiveness. At the time of writing (June 2014), the Burke Creek Restoration Project is anticipated to have complete funding for design and construction in place by fall 2014.

- Project design will consider integration with current and planned future infrastructure to the greatest extent practicable.
- The project will be designed to NDOT or County standards and will meet TRPA EIP and threshold requirements.
- Project features will minimize the necessity of changes to NDOT or County maintenance equipment and practices.

2.0 DEVELOPMENT OF CAPITAL IMPROVEMENT PROJECT AREAS

The project area has been broken down into seven Capital Improvement Project (CIP) areas. These areas have been broken down by further evaluation based on the opportunities and constraints presented in the Existing Conditions Report. The boundaries of the CIP are shown on Figure 2.

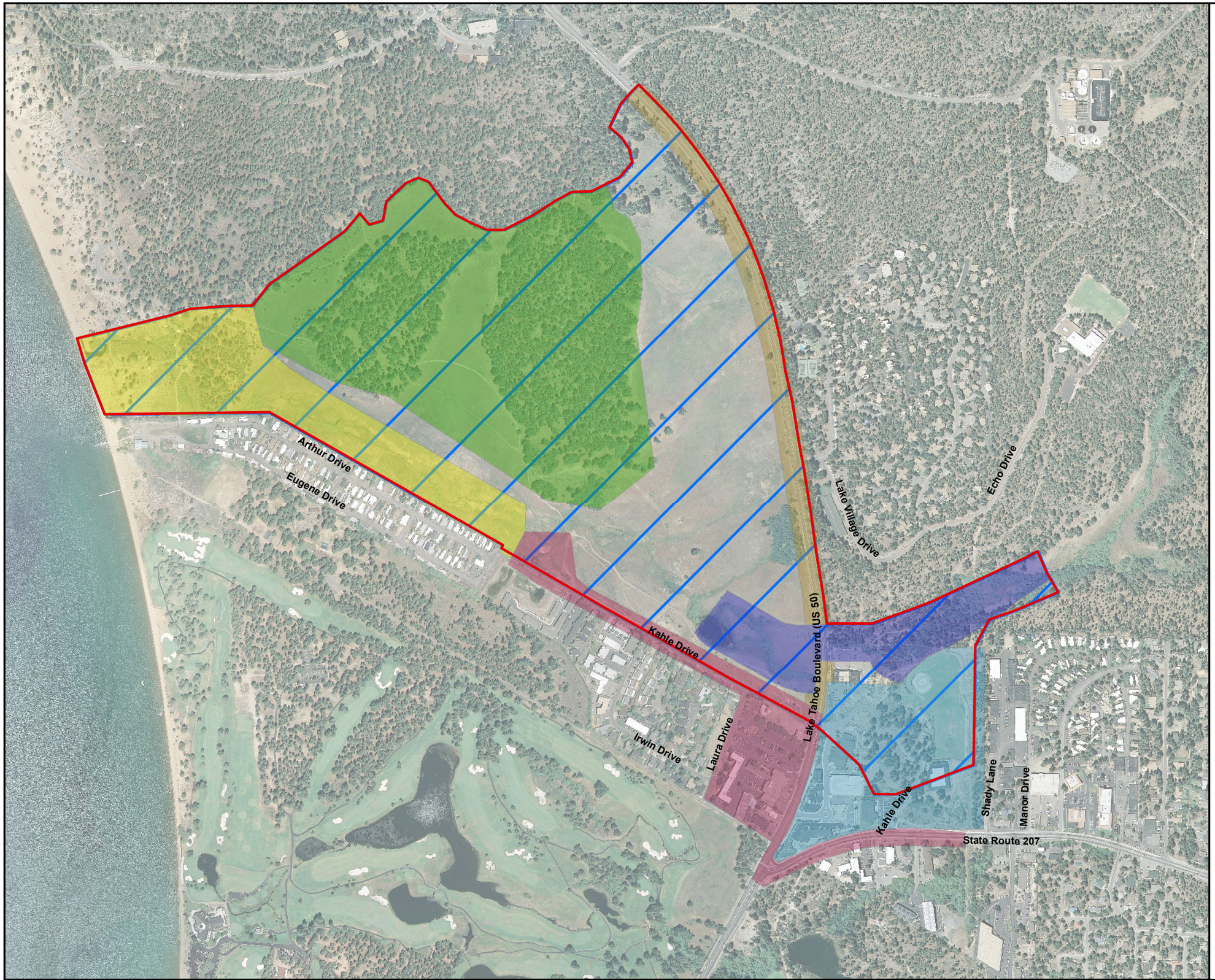
These capital improvement projects have been identified as follows:

- Rabe Meadows Weed Abatement Project
- Burke Creek Restoration Project

- Kahle Community Center Project
- US 50 Improvement Project
- Northern Meadow Project
- Kahle Drive Stormdrain and Basin Improvement Project
- Lower Meadow Improvement Project

The goal was to provide multiple alternatives for each of the CIP areas; however, due to constraints, such as potential utility conflicts, property owner constraints, water quality benefits, and estimated costs, some project alternatives are limited. The TAC chose the preferred alternative for the Burke Creek Restoration Project in January, 2013 for purposes of furthering the design to a 50% level and securing design and implementation grant monies. This report discusses each CIP and the associated alternatives. Figures and cost estimates have been included for each of the alternatives.

FIGURE 2
CAPITAL IMPROVEMENT PROJECT AREAS
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014



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- Master Plan Project Area Boundary
- **Captial Improvement Project Area Boundary**
- 50 Improvements
- Burke Creek Restoration
- Kahle Community Center
- Kahle Drive Basin / Stormdrain Improvements
- Lower Meadow
- Northern Meadow
- Noxious Weed Abatement

NOTES:
IMAGERY: DOUGLAS COUNTY

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3.0 RABE MEADOWS WEED ABATEMENT PROJECT

Vegetation types were mapped for the project area as part of the existing conditions report. The report not only identified noxious and invasive weeds found within the project area, but also identified areas that support the "at risk" Tahoe Yellow Cress.

Tahoe Yellow Cress is a small plant that only grows on the shoreline beaches of Lake Tahoe and nowhere else in the world. It was on the verge of extinction as recent as 1996, but through the efforts of concerned citizens of the Lake Tahoe Basin as well as state, local and federal agencies, has been able to increase its population.

Pursuant to Nevada Revised Statutes (NRS) Section 555.005 "noxious weed" means any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate. The University of Nevada Reno Cooperative Extension defines "invasive weed" as weeds that are not native to the United States. Most of the invasive weeds threatening Nevada come from neighboring infested states but they originated in Europe or Asia. In their native ecosystems these weeds are held in check by competing plants, diseases, and natural predators. In Nevada there are no naturally occurring enemies to control invasive weeds. Noxious and invasive weeds compete with native species for space, nutrients, water and light.

With regard to noxious and invasive weeds, it is the objective of this project to develop an integrated management plan that addresses the control or eradication of these plant species where possible. An integrated management plan that addresses control or eradication of existing invasive and noxious weed populations and decreases the potential for introduction of new infestations would result in a healthier meadow ecosystem.

Due to the disturbed conditions and vectors for spreading these weed species through the meadow such as road, wind, foot and animal traffic, the potential for increasing the existing weed populations and/or introducing new weed infestations is a concern. According to the Lake Tahoe Basin Weeds Coordinating Group, noxious weeds can reduce land values, damage water quality and clarity, contribute to soil erosion, and degrade wildlife habitat. The goal of control or eradication for noxious as well as invasive weed management is important to not only the project area, but the Tahoe Basin.

The Nevada Department of Agriculture and the Lake Tahoe Basin Weeds Coordinating Group have categorized and established guidelines for treatment of weed species presented in Table 1 below.

Table 1: Treatment Guidelines for Categories of Weed Species.

Weed Categorization		
Nevada Department of Agriculture pursuant to NRS 555 and NAC 555		
Category	**Description**	**Action**
Category "A"	Weeds that are generally not found or that are limited in distribution throughout the State	(a) Active exclusion from the State and active eradication wherever found. (b) Active eradication from the premises of a dealer of nursery stock.
Category "B"	Weeds that are generally established in scattered populations in some counties of the State.	(a) Active exclusion where possible. (b) Active eradication from the premises of a dealer of nursery stock.
Category "C"	Weeds that are generally established and generally widespread in many counties of the State.	(a) Active eradication from the premises of a dealer of nursery stock.
Lake Tahoe Basin Weeds Coordinating Group		
Category	**Action**	
Group 1	Watch for, Report, and Eradicate Immediately	
Group 2	Manage infestations with goal of eradication	

The categorization/group of weeds identified within the project area are provided in Table 2 below. Additional management/control methods specific to each species and stage of phenology have been provided in Appendix A.

Table 2: Categorization/Group of Weed Species within the Project Area

Identified Weeds				
Weed Type		**Description**	**Category/Group**	
Common Name	**Scientific Name**		**Nevada Dept. Ag.**	**Lake Tahoe Basin Weeds Coordinating Group**
Sulfur cinquefoil	***Potentilla erecta (POER)***	Perennial forb with a short caudex attached to a woody taproot. May have some lateral growth but no rhizomes. Reproduces by seed and vegetatively by sprouting from the caudex. Seed viability in the soil seed bank approximately 3 inches below ground surface can be approximately 28 months.	Category A	Group 1
Canada thistle	***Cirsium vulgare (CIVU)***	Cool season perennial that reproduces by seed and vegetatively via creeping. New shoots can appear in the cool fall months. Seeds can remain viable in the soil +20 years.	Category C	Group 1

Identified Weeds				
Weed Type		Description	Category/Group	
Common Name	Scientific Name		Nevada Dept. Ag.	Lake Tahoe Basin Weeds Coordinating Group
Bull thistle	***Cirsium arvense (CIAR)***	Biennial that reproduces from seed and does not have rhizomes. Prefers a sunny open-canopy with moist to dry soils. Seed is short lived on the soil surface. Can germinate in the spring and fall.	Not listed	Group 2
Cheatgrass	***Bromus tectorum (BRTE)***	Typically a winter annual, however can assume spring annual character when fall moisture is limiting and seeds germinate in the spring.	Not listed	Not listed

Three treatment alternatives are proposed for this project area. The highest potential success would be realized by application of an integrated and systematic management protocol including annual monitoring, manual treatment and targeted herbicide applications. The following alternatives are presented in the order of highest to lowest in potential success. Costs are estimated on a per acre basis. Manual controls can be done at a much lower cost if interns and/or volunteers are used. Herbicide treatment costs were provided by Douglas County Weed Control.

Alternative 1

This alternative is a combination of manual treatment and targeted herbicide application. It is recommended that this treatment be repeated for a minimum of 3 years, however for the highest potential success at least 5 years is recommended. Treatment would include the following:

- **Weed Surveys:** In the spring prior to treatment, weed treatment areas should be surveyed to establish boundaries of treatment areas and to collect an ocular estimate of cover by species.
- **Manual treatment:** In spring at rosette to bolt/bud stage for POER, CIAR, and CIVU manually remove rosette and root crown down to 6 inches below ground surface. For BRTE, mow at boot stage. Boot stage occurs when vegetative growth slows and plant resources are directed to seed development. In fall for BRTE, mow at boot stage. For all species, removed plant materials must be collected and disposed of in plastic bags.
- **Seeding:** Scarify soil surface on all weed treatment areas, broadcast seed of desirable species, drag to ensure seed is covered and in contact with soil. Seeding should be done as close as possible to the onset of snow cover.
- **Herbicide application:** For POER, CIAR and CIVU apply "Open Sight" in accordance with label requirements in the spring and the fall. Only herbicides that are licensed to be used in proximity of aquatic habitats (for treatments within SEZ areas), on the USFS list, and in compliance with TRPA requirements will be considered for use within the project area.

Table 3: Alternative 1 Cost Estimate

Description	Cost per Acre	Notes
Spring survey	$95	
Manual treatment	$850	POER, CIAR, CIVU
Manual treatment	$400	BRTE
Herbicide application (Spring & Fall Application)	$140	Boom sprayer
	$320	Hand sprayer
	$600	Backpack sprayer
Seedbed Prep and Seeding	$1,200	
Seeding	$600	

Alternative 2

This alternative includes manual treatment. It is recommended that this treatment be repeated for a minimum of 3 years, however for the highest potential success at least 5 years is recommended. Treatment would include the following:

- **Weed Surveys:** In the spring prior to treatment, weed treatment areas should be surveyed to establish boundaries of treatment areas and to collect an ocular estimate of cover by species.
- **Manual treatment:** In spring at rosette to bolt/bud stage for POER, CIAR, and CIVU manually remove rosette and root crown down to 6 inches below ground surface. For BRTE, mow at boot stage. In fall for BRTE, mow at boot stage. For all species, removed plant materials must be collected and disposed of in plastic bags.
- **Seeding:** Scarify soil surface on all weed treatment areas, broadcast seed of desirable species, drag to ensure seed is covered and in contact with soil. Seeding should be done as close as possible to the onset of snow cover.

Table 4: Alternative 2 Cost Estimate

Description	Cost per Acre	Notes
Spring survey	$95	
Manual treatment	$850	POER, CIAR, CIVU
Manual treatment	$400	BRTE
Seedbed Prep and Seeding	$1,200	
Seeding	$600	

Alternative 3

In this alternative, it is recommended that the project area be monitored to document current and future infestations. It is recommended this be done on an annual basis for an indefinite period of time. Treatment will include the following:

- **Weed Surveys:** In the spring and fall of each year the project area should be surveyed to determine if current uses and/or future improvements have had any effect on existing and future weed infestations.

Table 5: Alternative 3 Cost Estimate

Description	Cost per Acre	Notes
Spring survey	$95	
Fall Survey	$95	

Preferred Alternative

Alternative 1 is the preferred alternative for this project area as it will be the most effective for controlling weed infestations.

4.0 BURKE CREEK RESTORATION PROJECT

The natural stream channel functionality of Burke Creek within the project area has been compromised in part by the channelization just upstream of US 50 into a steep man-made ditch north of the existing parking lot. At US 50 the stream is currently routed through a 24" CMP culvert that also collects stormwater runoff from the adjacent privately owned parking lot and NDOT right-of-way. The culvert is approximately half full of sediment at its outlet. This culvert currently acts as a barrier for any fish passage upstream of the culvert. Downstream of US 50, the stream channel has been realigned multiple times, shifting the creek to the north of its historic channel in order to accommodate the continual development to the south of the project area.

The restoration of Burke Creek will improve water quality, help control soil erosion, increase wildlife habitat, and enhance vegetation and scenic resources. The preservation and restoration of Stream Environmental Zones (SEZs) is an important stated component of the Lake Tahoe Environmental Improvement Program (EIP). Functional SEZs protect the clarity of the lake by providing natural storm water treatment and stable conveyance of runoff. SEZs often include diverse plant communities and are a key habitat for wildlife. Furthermore, functional SEZs enhance the scenic resources of the Lake Tahoe basin and can provide dispersed recreation opportunities.

Reconstruction of the stream channel and associated floodplain will restore stream functionality and promote the frequent interaction between channel and floodplain. Restoring a more natural, wetter, moisture regime with a greater vitality of plant community will provide sediment and nutrient removal and promote SEZ habitat.

Per the TRPA Code, 60.4.6.D, drainage conveyances through a SEZ shall be designed for a minimum of a 50-year storm, which is more conservative than NDOT, which recommends using the 25-year peak flows for design. Based on previous TAC discussions about the flows in Burke Creek, flows from the Burke Creek Restoration Project Alternatives Analysis Report by Winzler & Kelly were utilized for this analysis. These flows were derived using standard frequency analysis of five USGS gages located on the southeast shore of Lake Tahoe. From their analysis the 50-year peak flow for Burke Creek in the project area is 94 cfs. As the design of this project moves forward these flows should be further analyzed to ensure the best design moving forward.

The proposed improvements for this project area are outlined below.

Preferred Alternative

For this alternative, at the most upstream end of the project area there are five locations in need of spot treatments in order to eliminate the head-cutting/entrenchment currently occurring, shown on Figure 3. Each location will be evaluated to determine the best corrective action available for the area.

At the upstream most end of the project reach there are a number of locations that are in need of repair due head cutting or channel incising. As design moves forward each of these sites would be evaluated and the best corrective measures determined. Just downstream from these locations is an area where soil has slumped off into the floodplain, the project would remove this soil to improve the functionality of the stream channel. Flows being conveyed from the Douglas County ball fields to Burke Creek currently overflow the channel and flow to the parking lot to the west. The project would improve this channel in order to better convey nuisance flows from the ball fields to the creek without erosion.

Just upstream of US 50 it is proposed that the existing parking lot be reduced adjacent to Burke Creek. The reduction in the size of the adjacent parking lot will allow for the construction of a restored stream channel that will meander through the area. This will decrease the slope of the channel as the stream approaches US 50, improve the wildlife habitat, add connectivity to the floodplain, and improve conveyance. It is anticipated the constructed channel will include boulder clusters, log habitat (large woody debris), and constructed riffles and pools. The boulder clusters are a triangular arrangement of three large boulders placed in a reach with intact and robust streambanks (Flosi et al. 1998). The boulders are typically 3 to 5 foot in diameter and will provide additional fish resting and cover opportunities. Boulder clusters are limited in the amount of cover and habitat they can provide due to their low level of complexity. Boulder clusters are composed of spherical elements that create habitat by the development of pools and scour holes through selective erosion of the stream bed. Cover is limited to the depth of the pool/scour hole, and to a lesser degree the amount of undercut, if any, below the boulder. Habitat is provided by lower velocities at pool and scour hole tailouts.

In addition, two boardwalks will be constructed across the stream channel at locations where existing trails currently cross the creek.

The culvert under US 50 will likely be replaced with a 12 foot wide, 4 foot high open bottomed arch with headwalls. The channel through the culvert will likely be constructed of rounded rock with riffles and pools.

This will allow for ease of maintenance and also allow for fish passage. In order to meet NDOT safety requirements guardrail will be constructed on each side of US 50.

Downstream of US 50 a newly constructed stream channel through the upper meadow would convey flows to the pond. The outlet of the culvert will require rock lined steps. The steps will be constructed with weirs of rounded stream rock to dissipate the energy of the stream flows. The design of the lower constructed stream channel may consist of an inset channel for low flow events and an associated floodplain for larger events. The channel will also include large woody debris (LWD) structures and constructed riffles and pools. The connected floodplain and adjacent meadow will provide opportunity for riparian vegetation and wildlife habitat.

The LWD will provide flow diversification, cover, and habitat complexity. Large woody debris comes in many forms and can be installed as single (Log Structure) or multiple units (Log Jams/Crib Wall) keyed into the stream bank. Log structures are composed of 2-3 logs arranged in a crossing pattern. Logs will be partially buried in the streambed, and combined with several boulders. Logs may be secured to each other and into the streambed with anchors. Boulders are placed to provide ballast for the logs. Habitat can be enhanced with the installation of boulder clusters in conjunction with LWD structures. The more complex the habitat, the greater the opportunities for providing cover for aquatic species. The total amount of habitat associated with LWD structures is difficult to estimate prior to installation due to the high degree of complexity. Logs are long linear features that behave differently depending upon the incoming flow angle and water level. The same LWD structure may act as a dam at certain water levels, deflector at other water levels, and flow constrictors at other water levels. They do however provide a high degree of cover and habitat through scour under and around the structure.

The constructed riffles are shallow water areas in the streambed created by elevating the streambed. Compared to pools, riffles have coarser streambed material, shallower water depths, and higher water velocities than those found in pools along the same reach. Riffles are ideal sites for macro-invertebrates, a major food source for aquatic species. Turbulent flow associated with riffles provides in-stream cover for fish by obscuring predators' view into the channel. Constructed riffles are keyed into the stream bed and streambank at the upper and lower extents of the structure with boulders. Boulders are sized so as not to be mobilized by the 100-year discharge. A gradation of particle sizes ranging from coarse sand through cobble is introduced between the upstream and downstream boulder keys and forms the core of the riffle. While the amount of habitat and cover provided by constructed riffles is limited, the areas represent a major source of food production for sight-feeding trout, and act as grade control against erosive forces.

With Burke Creek diverted to the north, the abandoned channel can be modified to treat runoff from the commercial property and US 50. One potential option for treating this runoff is through a series of basins at the existing outlet, which will treat private and NDOT right-of-way runoff. These basins are anticipated to be rock lined to allow for ease of maintenance and provide water quality treatment prior to discharging to the Jennings Pond.

The estimated construction costs for this alternative are $1.2 million and have been provided in Table 6.

Table 6
Preferred Alternative
Burke Creek Restoration Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design, Permitting, Monitoring	$571,005
	Total	$571,005

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$183,000
	Total	$183,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$87,598	$87,598
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$26,279	$26,279.00
3	1	LS	Traffic Control (3%)	$26,279	$26,279
4	1	LS	Control of Water (5%)	$43,799	$43,799
5	9000	CY	Earthwork for Channel Construction	$17.00	$153,000
6	9000	SF	Removal of AC Pavement	$7.00	$63,000
7	25	EA	Tree Removal	$500.00	$12,500
8	5400	SF	AC Pavement	$8.00	$43,200
9	150	LF	Guardrail	$100.00	$15,000
10	25	EA	Guardrail Post	$50.00	$1,250
11	4	EA	Guardrail Terminal	$3,000.00	$12,000
12	1	EA	Remove Portion and Plug Existing 24" CMP	$1,000.00	$1,000
13	750	CY	Culvert Excavation	$45.00	$33,750
14	100	LF	6' x 2'-4" Steel Arch Culvert	$170.00	$17,000
15	2	EA	Headwall	$12,500.00	$25,000
16	100	LF	Boardwalk	$350.00	$35,000
17	250	LF	Curb and Gutter	$32.00	$8,000
18	200	LF	Roadway Striping	$5.00	$1,000
19	300	TON	Rock for Channel Construction	$65.00	$19,500
20	20	EA	Large Woody Debris	$350.00	$7,000
21	8	EA	Large Woody Debris (logs with rootwads)	$1,500.00	$12,000
22	6	EA	Channel Vanes (logs)	$1,600.00	$9,600
23	35000	SF	Revegetation	$5.00	$175,000
24	1	LS	Augment Stormwater Treatment Sytem	$10,000.00	$10,000
25	1	EA	Drainage Inlet/Sediment Trap	$3,000.00	$3,000
26	1	EA	Sewer Line Relocation	$65,000.00	$65,000
27	20	CY	Remove Failed Slope Material	$40.00	$800
28	175	LF	Lined Ditch	$25.00	$4,375
29	4	EA	Spot Stream Treatments (headcuts and incisions)	$6,000.00	$24,000
30	2000	SY	Soil Removal	$25.00	$50,000
31	1	LS	Irrigation	$75,000.00	$75,000
				Subtotal	$1,059,930
				Contingency (15%)	$158,989
				Total	$1,218,919

FIGURE 3:
PREFERRED ALTERNATIVE
BURKE CREEK RESTORATION PROJECT

BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 100 200
FEET

- Existing Burke Creek Channel
- Burke Creek Restoration Project Area Boundary

Proposed Improvements

- Spot treatment of headcuts / entrenchment
- Soil Removal
- Plug Existing Culvert
- Boardwalk
- Channel Improvements
- Construct Culvert
- Curb and Gutter
- Construct Restored Stream Channel
- Guardrail
- Remove Asphalt
- Property Acquisition
- Creek Restoration

Existing Drainage Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Existing Trail
- Curb and Gutter
- Parcels

NOTES:
IMAGERY: DOUGLAS COUNTY

Nevada Tahoe Conservation District

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5.0 KAHLE DRIVE COMMUNITY CENTER PROJECT

The Kahle Community Center CIP area is comprised of the community center building, parking lot, ball fields, and adjacent drainage facilities. Because the area maintains a consistent slope to the west, drainage conveyance in this area appears to be good, with no evidence of ponding or other major drainage deficiencies.

Stormwater runoff from SR 207 flows to a drop inlet located at the south east corner of the project area and then discharges to the wet basin located to the south of the Kahle Community Center building. A channel conveys wet basin outfall flows under Kahle Drive to a dry basin. Runoff from the dry basin is routed to the stormdrain conveying flows north and west towards US 50. Runoff from the community center ball fields is conveyed with curb and gutter and discharges as concentrated flow to Burke Creek on the north, and as sheet flow to the storm system on the west. Runoff from the community center building and parking lot enters the storm drain and is directed towards US 50. The southwestern parking lot, which is also used for snow storage, directs snowmelt and other stormwater runoff into the Douglas County parking structure drainage system which then comingles with runoff from NDOT 207 and 50.

The project area is generally well vegetated and has few opportunities for sediment production with the exception of the Community Center parking lot. Exposed slopes surrounding the parking areas have created an active sediment source. The slopes are approximately 1 to 2 feet high and combined with the exposed soil and adjacent impervious surface, which allows for no intervening flow diversions, has led to significant sediment production and degradation of adjacent asphalt. Several locations have eroded to the point where asphalt at the edge of the top of the slope is beginning to show signs of failure as it cracks and crumbles under the eroded edges. In addition, many of the slopes are directly connected to the storm drain system and could potentially impact downstream stormwater quality, both directly and by prematurely clogging downstream water quality improvement measures. The PLRM model was run for baseline conditions and this area is estimated to contribute 837 lbs/year of FSP.

Alternative 1

Alternative 1 will stabilize the slopes and divert runoff from bare soil slopes that exist adjacent to the Community Center parking lot, shown on Figure 4. One potential option for stabilizing the bare slopes is partially grouted riprap but as this alternative is developed further other stabilization methods could be discussed. Curb and gutter will be constructed along exposed parking lot edges and concentrated curb and gutter flows will be directed to the existing storm drain system by installing drop inlets at key locations. This treatment would keep the existing parking area from continuing to deteriorate as the soil erodes from beneath the asphalt and will result in capturing a larger amount of the parking lot runoff. The Douglas County wet basin adjacent to US 50 will be slightly regraded to allow overflow from the basin to be directed to the Burke Creek channel that is to be abandoned with the construction of the Burke Creek Restoration project. This will allow for more flow to be infiltrated or be treated by existing vegetation.

It is estimated the construction costs for this alternative will be $300,742 shown on Table 7.

Alternative 2

Alternative 2 focuses on improving the recreational and landscaping components in the project area. The area currently has a dirt path directing pedestrians from the intersection of US 50 and Kahle Drive, north to the commercial area. The slope above the curb and gutter along this section is eroding into the adjacent gutter and conditions in the area could greatly benefit from minor grading and low water landscaping. The existing dirt path would also be formalized into a paved pathway.

A bike/pedestrian path is proposed from the community center to the Douglas County parking lot. Due to the steep slopes in this area the path will need to be a switchback trail in order to minimize the grades. Even with a switchback trail, grades may be steep and as the design of this path moves forward safety measures will need to be evaluated.

Proposed improvements are shown on Figure 5 and estimated construction costs for this alternative are $95,615, as detailed in Table 8.

Preferred Alternative

Based on TAC discussions and the different focuses of alternative 1 and 2 depending on available funding both alternatives are the preferred alternative.

Table 7
Alternative 1
Kahle Community Center Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$43,000
	Total	$43,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$46,000
	Total	$46,000

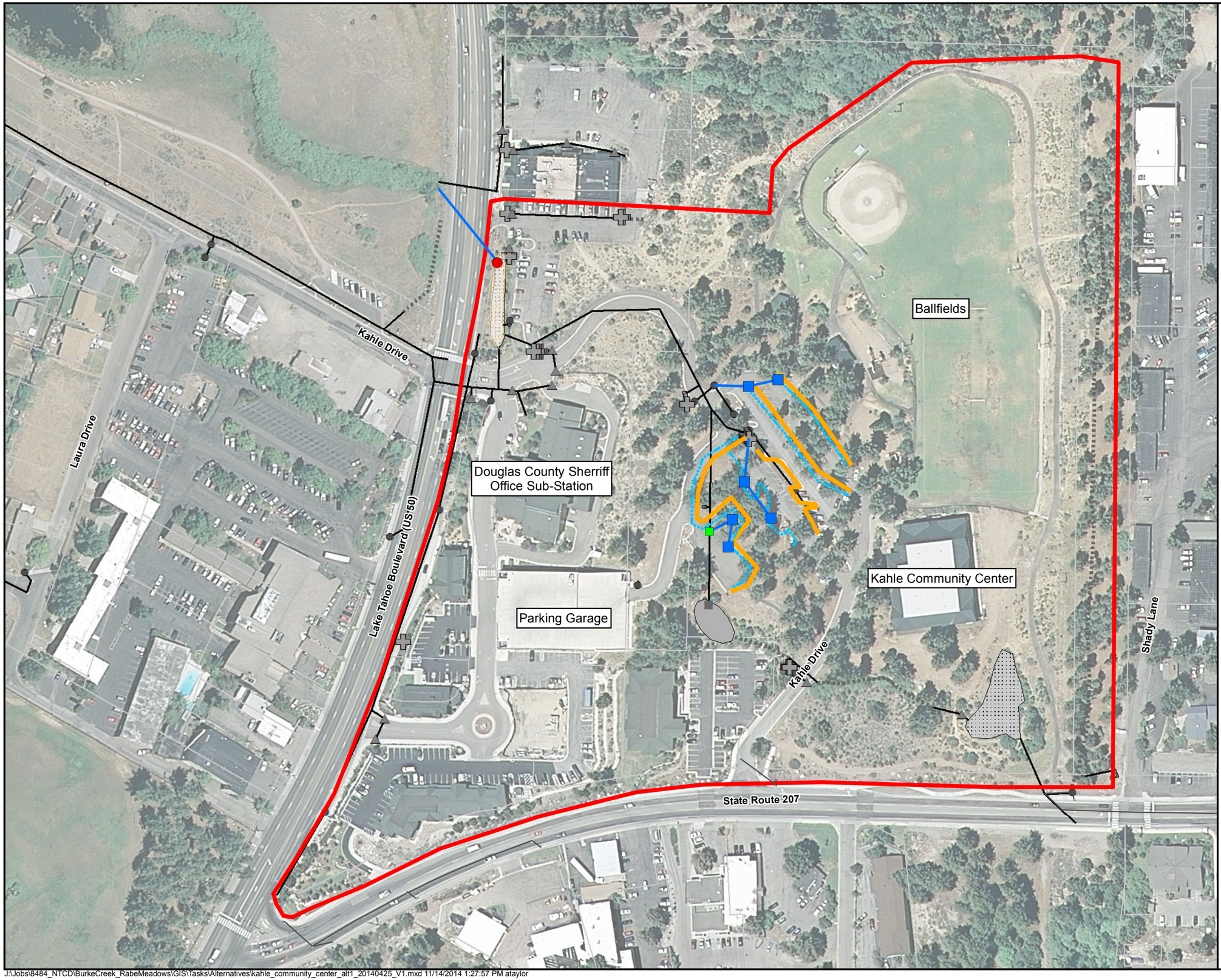
Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$21,605	$21,605
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$6,482	$6,482
3	1	LS	Traffic Control (3%)	$6,482	$6,482
4	350	CY	Excavation	$45.00	$15,750
5	4600	SF	Removal AC Pavement	$7.00	$32,200
6	1	EA	Remove DI/Plug Exsting Culvert	$2,000.00	$2,000
7	1700	SF	AC Paving	$8.00	$13,600
8	170	CY	Grouted Riprap	$300.00	$51,000
9	1500	LF	Curb and Gutter	$40.00	$60,000
10	350	LF	15" HDPE Stormdrain	$32.00	$11,200
11	160	LF	24" HDPE Stormdrain	$55.00	$8,800
12	1	EA	Standpipe	$1,500.00	$1,500
13	6	EA	Drop Inlet	$2,500.00	$15,000
14	1	EA	Manhole	$5,000.00	$5,000
				Subtotal	$250,618
				Contingency (20%)	$50,124
				Total	$300,742

FIGURE 4: ALTERNATIVE 1
KAHLE COMMUNITY CENTER PROJECT

BURKE CREEK-RABE MEADOWS
MASTER PLAN

DOUGLAS COUNTY, NV
NOVEMBER, 2014



NORTH

0 75 150

FEET

- Drop Inlet
- Manhole
- Standpipe
- Kahle Community Center CIP Area

Proposed Improvements

- Culvert
- Slope Protection
- Curb and gutter
- Basin Improvements

Existing Features

- Standpipe
- Drop Inlet
- Vault
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Basin
- Treatment Vault
- Wet Basin
- Parcel Boundary

NOTES:
IMAGERY: DOUGLAS COUNTY

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Table 8
Alternative 2
Kahle Community Center Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$14,000
	Total	$14,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$15,000
	Total	$15,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$6,753	$6,753
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$2,026	$2,026
3	1	LS	Traffic Control (5%)	$3,376	$3,376
4	80	CY	Excavation	$45.00	$3,600
5	6000	SF	AC Paving	$8.00	$48,000
6	15	EA	Container Plants	$35.00	$525
7	140	CY	6"-12" Rip Rap	$110.00	$15,400
			Subtotal		$79,680
			Contingency (20%)		$15,936
			Total		$95,615

FIGURE 5: ALTERNATIVE 2
KAHLE COMMUNITY CENTER PROJECT

BURKE CREEK-RABE MEADOWS
MASTER PLAN

DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 75 150

FEET

- Bike/Pedestrian Path
- Landscaping/Pedestrian Path Formilization
- Kahle Community Center CIP Area

Existing Features

- Standpipe
- Drop Inlet
- Vault
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Basin
- Treatment Vault
- Wet Basin
- Parcel Boundary

NOTES:
IMAGERY: DOUGLAS COUNTY

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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6.0 US 50 IMPROVEMENT PROJECT

US 50 is oriented approximately north/south along the eastern side of the project area. Stormwater runoff is generated from the east through Lake Village residential area, the small commercial development, Burke Creek, and the Kahle Community Park, all of which cross the highway into Rabe Meadow through a number of culverts and stormdrain systems. The Lake Village subdivision is outside the project limits and currently contains a number of treatment BMPs, including but not limited to sediment traps, treatment vaults, infiltration basins, stabilized slopes, and outlet treatments prior to entering the project area and crossing beneath the highway. With Burke Creek, and the Kahle Community Center also highlighted as CIP areas, the main emphasis for water quality improvements in this area is directed at the NDOT right-of-way.

Two design alternatives have been developed to improve the quality of stormwater runoff discharging to the meadow. These alternatives focus on treatment options via source control and/or infiltration.

Alternative 1

Alternative 1 focuses on source control and conveyance improvements. Improving stormwater conveyance and stabilizing sediment sources will allow systems to function more effectively, ultimately allowing BMPs to better treat stormwater runoff. This Alternative mostly entails improving conveyance and modifying current drainage facilities to facilitate easier maintenance. See Figure 6 for Alternative 1 improvements.

The US 50 CIP area has locations where ponding of stormwater runoff in the roadway and shoulder is prevalent. Although ponding is typically a roadway safety issue, improving roadway drainage can also provide a water quality benefit by reducing roadway degradation and potential sediment sources. South of Lake Village Drive and adjacent to a rock outcropping, ponding currently occurs in the northbound lanes of US 50 and is a safety issue. As part of the proposed alternative, a trench drain will be installed at this low point, capturing ponded stormwater runoff and providing proper conveyance to a nearby drainage inlet. It is estimated that approximately 140 linear feet of trench drain will be required to adequately capture the ponding runoff.

Outlet locations along the west side of US 50 discharge to riprap outlet protection prior to entering the meadow and all appear to be functioning except for one which ponds stormwater runoff. Deposited sediment can be seen at a number of these outlets. This alternative focuses on minor improvements to six of these outlets to correct any deficiencies through cleaning, replacing riprap, reshaping the outlet or providing other minor modifications in order to ensure they can be easily maintained.

Field observations indicate that many of the culverts crossing US 50 are approximately half full of sediment and are in need of maintenance. Maintaining these culverts will eliminate sediment sources within the culverts and allow for the culverts to function property. Inspection and cleaning of all culverts which currently contain large amounts of sediment is recommended under current NDOT maintenance operations rather than included as part of this Alternative. Alternative 1 under CIP funding scope does not include maintenance practices which falls within NDOTs current maintenance operations and instead focuses on alleviating flooding issues that are a safety concern.

It is estimated the construction costs for this alternative will be $204,860 and is shown on Table 9.

Alternative 2

Alternative 2 will include the work associated with Alternative 1with the additional improvements described below, see Figure 7. Similar to the Burke Creek crossing, there is another location where onsite and offsite flows comingle. Onsite NDOT right of way flows and those originating in Folsom Spring are combined and outlet to the same location. The pristine spring water is not in need of water quality improvements; however, the roadway runoff often contains sediment, oils, grease, roadway salts and other contaminants and requires treatment prior to discharging to surface waters. The current drop inlet that discharges to Folsom Spring would be replaced and conveyed 250' north to an existing basin that could be expanded to treat NDOT runoff. This will allow flows to infiltrate in the drier meadow area, rather than discharge directly to Folsom Spring which has a year round flow.

As outlined in the Burke Creek-Rabe Meadow Complex Master Plan Existing Conditions report, there are a number of undersized culverts in the US 50 capital improvement project area, resulting in ponding on the roadway shoulders. These locations are not as critical as the previously mentioned roadway ponding location, but still have the potential to cause safety and erosion issues. This alternative will replace three undersized culverts conveying flow across US 50. NDOT's design guidelines require US 50 to convey the 25-year storm event. The existing and proposed capacities of the culverts to be upsized are provided below in Table 10.

Table 10: Culverts to be Replaced

Culvert #	Length (ft)	25-year Peak Flow (cfs)	Existing Pipe Size (in)	Existing Pipe Capacity (cfs)	Proposed Pipe Size (in)	Proposed Pipe Capacity (cfs)
C01	71	9.9	15	8	18	12.6
C03	120	15.2	18	4.4	36	14.8
C10	66	11.6	24	4.9	36	13.5

Towards the north end of the project area, culvert number C03 shows signs of ponding on the roadway shoulder east of US 50. Upsizing the pipe will increase conveyance and reduce ponding, resulting in increased roadway safety and reduced erosion potential.

In recent years, NDOT has improved methods for sanding and sweeping operations within the Tahoe Basin resulting in a decrease in road sand application and collection. In locations where sand accumulates on the shoulders and/or rilling and erosion is occurring, it is proposed that curb and gutter be installed to allow for

the capture of sediment through sweeping plus reduce road shoulder degradation through erosion and rilling. In addition, sand, snow and compaction often deter vegetation growth on roadway shoulders; however, with the curb and gutter providing some protection, these shoulders may have a better opportunity to revegetate. In conjunction with the curb and gutter, drop inlets will be installed to help capture roadway abrasives and ensure runoff spread meets NDOT design criteria.

Flows collected by the drop inlets will be directed to an existing depression at the northwestern corner of Kahle Drive and US 50 that will be improved with small vegetated step/infiltration basins. The basins will promote infiltration. It is anticipated the basins will be constructed as to allow for easy access and maintenance.

It is estimated the construction costs for this alternative will be $448,235 and is shown on Table 11.

Preferred Alternative

Based on TAC discussions alternative 2 is the preferred alternative.

6.1 US 50 Improvement Project PLRM Results

The results of the PLRM analysis for the baseline conditions and the two alternatives outlined above have been summarized below in Table 12.

Table 12: US 50 Improvement Project PLRM Results

Condition	FSP (lbs/yr)	FSP Removal (lbs/yr)	Estimated Construction Costs	Estimated Project Credits	Cost/Credit
Baseline	2,375	-	-	-	-
Alternative 1	2,047	328	$223,204	1.6	$139,503
Alternative 2 (Preferred Alternative)	10	2,365	$466,619	11.8	$39,544

Table 9
Alternative 1
US 50 Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$29,000
	Total	$29,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$31,000
	Total	$31,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$14,468	$14,468
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$4,340	$4,340
3	1	LS	Traffic Control (5%)	$7,234	$7,234
4	415	CY	Excavation	$45.00	$18,675
5	3500	SF	Removal of AC Pavement	$7.00	$24,500
6	3850	SF	AC Paving	$8.00	$30,800
7	140	LF	Trench Drain	$325.00	$45,500
8	525	LF	Curb & Gutter	$48.00	$25,200
				Subtotal	$170,717
				Contingency (20%)	$34,143
				Total	$204,860

FIGURE 6: ALTERNATIVE 1
US 50 IMPROVEMENT PROJECT
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 200 400

FEET

- US50 Improvement CIP Area
- Trench Drain
- Curb and Gutter

Existing Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Basin
- Wet Basin
- Parcel Boundary

NOTES:
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Table11
Alternative 2
US 50 Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$63,000
	Total	$63,000

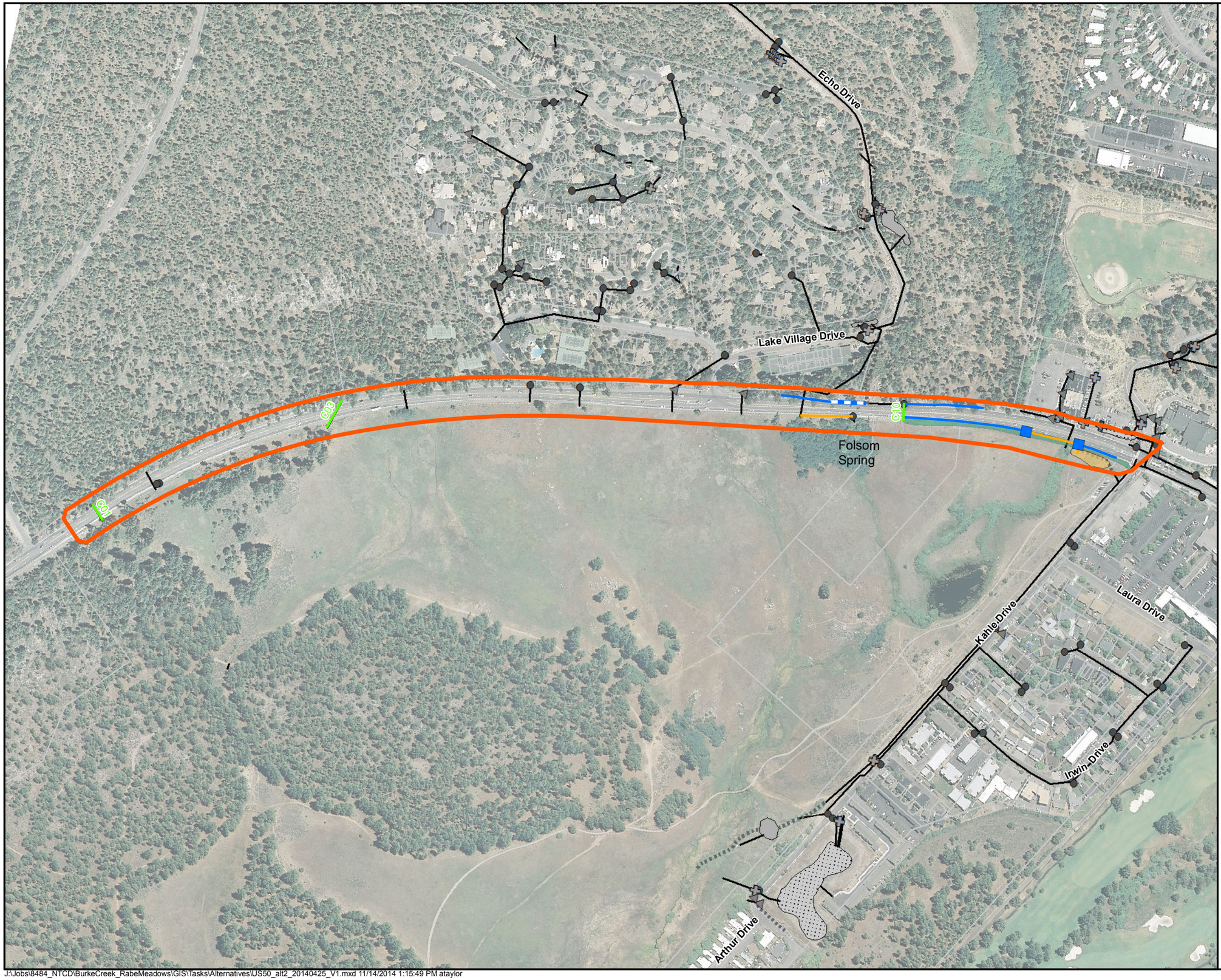
Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$68,000
	Total	$68,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$31,655	$31,655
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$9,497	$9,497
3	1	LS	Traffic Control (5%)	$15,828	$15,828
4	790	CY	Excavation	$45.00	$35,550
5	3500	SF	Removal of AC Pavement	$7.00	$24,500
6	9500	SF	AC Paving	$8.00	$76,000
7	140	LF	Trench Drain	$325.00	$45,500
8	515	LF	15" HDPE Stormdrain	$32.00	$16,480
9	75	LF	18" RCP Stormdrain	$56.00	$4,200
10	190	LF	36" RCP Stormdrain	$78.00	$14,820
11	1500	LF	Curb & Gutter	$32.00	$48,000
12	16,000	SF	Revegetation	$1.10	$17,600
13	3	EA	Drop Inlet	$2,500.00	$7,500
14	240	CY	6"-12" Rip Rap (Outlet Protection/Step Pools/Basin)	$110.00	$26,400
				Subtotal	$373,529
				Contingency (20%)	$74,706
				Total	$448,235

FIGURE 7: ALTERNATIVE 2
US 50 IMPROVEMENT PROJECT
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014



NORTH

0 200 400

FEET

- US 50 Improvement CIP Area

Proposed Improvements

- Embankment Protector
- Replace Culvert
- Trench Drain
- Construct Stormdrain
- Curb and gutter
- Revegetation
- Basin

Existing Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Basin
- Treatment Vault

NOTES:
IMAGERY: DOUGLAS COUNTY

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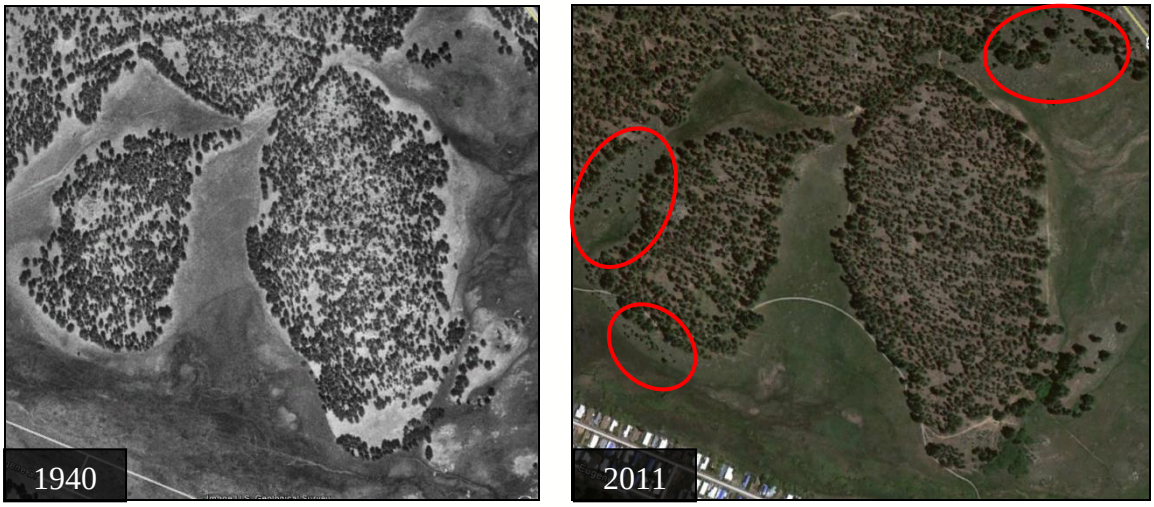
7.0 NORTHERN MEADOW IMPROVEMENT PROJECT

The Northern Rabe Meadow CIP area is generally bound to the north by the Burke Creek-Rabe Meadows Master Plan Project Area Boundary and is generally bounded on the south side by the tree line in the meadow. This area is immediately to the east of the Nevada Beach Campground, and has an extensive network of improved trails with informational signage to support recreation. Drainage infrastructure in this area is limited to culverts where trails intersect flow paths, and these crossings are generally in good condition. This area has generally good vegetation cover and limited areas of disturbed soil, the exception being head cuts in the ephemeral drainage on the northeast corner of the project area.

A comparison of Google Earth historical aerials, from 1940 to 2011, was used to determine if meadow area was being lost to coniferous tree encroachment. While more conifers appear in recent photos (areas highlighted by the red ovals) the trees are young and tree density is low. As this is the only area where potential loss of meadow is occurring, it does not appear to be an immediate problem, but ongoing monitoring of tree density and meadow habitat is recommended.



Preferred Alternative

Because the area is generally in good condition, only one alternative recommending minimal work is needed. Currently, head cutting exists in the northeast corner of the project area, but it is confined to the area east of the trail crossing. Although this ephemeral drainage is unlikely to impact Lake clarity, the head cuts are effectively dewatering the meadow and facilitating tree and sagebrush encroachment. A series of check dams constructed across the incised channel to control the head cutting of the stormwater flows is proposed for this area, shown on Figure 8.

Downstream from these head cuts is an existing perforated culvert. This culvert has a negative grade and is causing erosion upstream of it. It is proposed that this culvert be removed and a rock lined swale be placed across the path to protect the channel from erosion.

Within the conifer trees in the project area there appears to be a series of homeless camps set up within the large rocks. With this alternative it is proposed to remove the trash and debris left by these camps.

It is estimated that the construction costs for this alternative will be $11,397, provided in Table 13.

Table 13
Preferred Alternative
Northern Meadow Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$2,000
	Total	$2,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$2,000
	Total	$2,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$841	$841
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$252	$252
3	20	LF	Remove Culvert	$25.00	$500
4	165	CY	Earthwork for Channel Construction	$17.00	$2,805
5	10	CY	Rock Check Dams	$110.00	$1,100
6	2	CY	Gravel (6" Depth)	$40.00	$80
7	2200	SF	Revegetation	$1.10	$2,420
8	1	LS	Debris Cleanup	$1,500.00	$1,500
				Subtotal	$9,498
				Contingency (20%)	$1,900
				Total	$11,397

FIGURE 8:
PREFERRED ALTERNATIVE
NORTHERN MEADOW PROJECT
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 125 250

FEET

- Northern Meadow CIP Area

Proposed Improvements

- Regrade Channel
- Remove Culvert

Existing Drainage Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Existing Trail
- Curb Gutter
- Parcels

NOTES:
IMAGERY: DOUGLAS COUNTY

Nevada Tahoe Conservation District

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8.0 KAHLE DRIVE STORMDRAIN AND BASIN IMPROVEMENT PROJECT

The Kahle Drive stormdrain and basin CIP area is generally bound by US 50 to the east, 4-H and Kahle Drive to the south, Laura drive and the Kahle basin to the west and Rabe Meadow to the north. This capital improvement area includes portions of the stormdrain system that starts on SR 207. This system continues down to the intersection with US 50. At the intersection of US 50 and SR 207 there is a manhole that diverts the majority of the flow towards Kahle Drive, but during high flows, a portion is directed towards Edgewood Creek. This stormdrain system continues down Kahle Drive where it outlets into Kahle basin in the lower portion of Rabe Meadow.

The 36" CMP storm drain that outlets to the dry basin has a capacity of approximately 86 cfs, as calculated by StormCAD. NDOT and Douglas County design standards specify that the 25-year peak flow be conveyed in the system which has been calculated to be approximately 116 cfs, indicating the system is currently undersized. In addition, field data indicates that the stormdrain facilities are not functioning properly because drop inlets and sediment cans are clogged with sediment.

Kahle basin is a dry basin constructed in 1992 as part of the Burke Creek/Kahle Ditch Restoration Project. This project was implemented by Douglas County and funded by the USFS. Since its construction, Kahle basin has not been regularly maintained due to access issues. Because maintenance activities have not been performed the basin is full of sediment, leaving no remaining volume to retain excess runoff. Field observations of snowmelt runoff indicate that runoff flows through the basin without treatment, as turbid water was observed flowing into and out of the basin. Currently the 20-year, 1-hour volume reaching Kahle basin in existing conditions is 2.2 acre-feet, the current basin is undersized with approximately 0.2 acre-feet of capacity.

In addition, this basin is located within soil map unit 7041. This soil type is a very poorly drained hydric soil with a depth to groundwater between 6 and 39 inches and a mapped infiltration rate of 0.3 inches/hour. These conditions are not suitable for stormwater treatment utilizing a dry basin, but may be ideal for a wet basin treatment system, such as that found across Kahle Drive with the Oliver Park wet basin. Enhancements of the Kahle basin could assist with other goals and objectives of the area including redevelopment opportunities within the area as well as incorporating recreational objectives of bike and walking pathways.

For this project area three alternatives have been developed and are discussed below.

Alternative 1

Alternative 1 proposes to retain the existing stormdrain system and focus strictly on repairing and maintaining the system (culverts, drainage inlets and dry basin). Given the extended maintenance neglect, the basin and stormdrain system will need to be cleaned out and repaired in order to try to restore system function. While the culverts and basin are undersized, the only improvements associated with this alternative

would be the construction of an access road to allow for ease of basin maintenance in the future, shown on Figure 9.

Due to the condition of the basin, the stormwater runoff is not being treated before entering Burke Creek. The existing basin, storm drain, drop inlets, trench drains, and sumps are currently full of sediment and would require extensive cleaning to restore full function. Once the system is clean, it should be re-inspected, as there is potential for additional required repairs to the infrastructure that is not visible at this time.

Basin improvements would include the construction of a gravel access road for maintenance/equipment access, and the establishment of a routine maintenance schedule. The gravel access road will allow for the routine removal of the accumulated sediment from within the basin. It is anticipated that due to the amount of sediment currently in the basin, maintenance activities will impact existing vegetation and require revegetation. When possible, existing vegetation will be salvaged and utilized for revegetation. Access and maintenance activities will require a determination of the adjacent wetland boundary so as to avoid or minimize impacts to wetlands, and other meadow vegetation. This alternative would also require coordinating with Douglas County and NDOT in order to develop a maintenance plan and allocate maintenance responsibilities and specify maintenance frequency.

It is estimated that this alternative will cost $117,709. The proposed improvements have been shown on Figure 9 and a breakdown of costs has been provided on Table 14.

Alternative 2

Alternative 2 involves many of the maintenance activities outlined above in Alternative 1; however, this alternative also proposes the replacement of the stormdrain system down Kahle Drive in order to convey the 25-year peak flow, the reconstruction of the dry basin and the installation of a Jellyfish treatment vault to treat stormwater runoff. To properly analyze the stormdrain system and design the basin, both survey and geotechnical work will be needed prior to developing this design alternative.

Based on the information available, the stormdrain system down Kahle Drive is undersized and would need to be upsized from a 36" RCP to a 48" HDPE pipe in order to convey the 25-year peak flow, approximately 109 cfs. A media filter such as a Jellyfish would be constructed at the end of this system to ensure treatment of the stormwater runoff. The accumulated sediment would be removed from the basin, the basin regraded, and revegetated. The basins outlet culvert would also be removed.

It is estimated that this alternative will cost $1.0 million to construct. The proposed improvements have been shown on Figure 10 and a breakdown of costs has been provided on Table 15.

Alternative 3

Alternative 3 includes maintaining a portion of the current stormdrain system and upsizing the portion of the stormdrain system along Kahle drive as outlined in Alternative 2. It also includes the redirection of stormwater runoff from a portion of the Lakeside Inn into the Kahle Drive system and a full redesign of the basin. The existing contributing drainage area and proposed Lakeside Inn drainage area have been shown on Figure 11.

Improving the Kahle Drive stormdrain system to meet current Douglas County design standards and include the Lakeside Inn runoff would involve implementing the following improvements:

Douglas County design requirements were followed when developing the preliminary design of this system. These requirements state the minimum allowable stormdrain size is 15 inches in diameter and have a minimum slope of 0.25%.

The stormdrain system would be constructed on the east side of Laura Drive. The system would begin at the intersection of Irwin Drive and Laura Drive. It is anticipated the system will consist of approximately 600 feet of 18" HDPE pipe, three drop inlets, and one manhole before tying into the Kahle Drive stormdrain system. If Laura Drive is reconstructed by the Tahoe Transportation Project in association with the Stateline to Stateline Demonstration Project during the summer of 2014, a 5 year moratorium on cutting the pavement to install the proposed stormdrain would be in place.

Based on the information available, the stormdrain system down Kahle Drive is undersized and would need to be upsized from a 36" RCP to a 48" HDPE pipe in order to convey the existing 25-year peak flow (design storm) of approximately 109 cfs. The Lakeside Inn area runoff is approximately 23 cfs. By installing drop inlets and conveyance pipe along Laura Drive the Lakeside Inn area runoff could be treated by the proposed Kahle Drive stormdrain treatment system. The proposed 48" HDPE pipe would be sufficiently sized to handle the 132 cfs peak flow for the 25-year runoff from the existing contributing area as well as the added Lakeside Inn area runoff.

At the downstream end of the stormdrain system, the dry basin would be completely reconstructed into a multi-chambered wet basin. The wet basin will include a forebay at the outlet of the stormdrain to collect sediment prior to discharging to the main basin. Flows will outlet from the multi-chambered basin via either a standpipe or the currently existing spillway with a riprap lined outlet for high flow events and the existing berm will be utilized as the downstream boundary of the proposed basin. A vegetated modular block maintenance access road will be constructed across one of the berms and will double as a path for pedestrians and would link lower Kahle Drive to the Stateline-to-Stateline bike path. A short boardwalk/pedestrian bridge will be constructed to direct foot traffic over the gap between the end of the berm and the meadow. In addition, signage will be constructed to provide educational information on the purpose and benefits of the basin. This wet basin is estimated to contain 2.2 acre-feet.

This alternative estimated cost would be $1.1 million. The proposed improvements have been shown on Figure 12 and a breakdown of costs has been provided on Table 16.

Geotechnical, field survey, utility potholing, a more detailed hydraulic analysis, and design plans, specifications and engineers estimate will need to be conducted at key points to ensure minimal impacts to existing wetlands, vegetation, utilities, or any other existing features.

Preferred Alternative

Based on discussions with the TAC, Alternative 3 is the preferred alternative for this area.

8.1 Kahle Drive Stormdrain and Basin Improvement Project PLRM Results

The results of the PLRM analysis for the baseline conditions and the three alternatives outlined above have been summarized below in Table 17.

Table 17: Kahle Drive Stormdrain and Basin Improvement Project PLRM Results

Condition	FSP (lbs/yr)	FSP Removal (lbs/yr)	Estimated Construction Costs	Estimated Project Credits	Cost/Credit
Baseline	7,168	-	-	-	-
Alternative 1	7,168	-	117,709	-	-
Alternative 2	377	6,791	$1,027,116	33.9	$30,298
Alternative 3 (Preferred Alternative)	239	6,929	$1,127,390	34.6	$32,584

Table 14
Alternative 1
Kahle Drive Stormdrain and Basin Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$17,000
	Total	$17,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$18,000
	Total	$18,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$8,313	$8,313
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$2,494	$2,494
3	1	LS	Traffic Control (3%)	$2,494	$2,494
4	1	LS	Control of Water (2%)	$1,663	$1,663
5	830	CY	Earthwork (Removal of Sediment/Reshape Basin)	$17.00	$14,110
6	35	CY	Crushed Rock - Access Road Base	$120.00	$4,200
7	25	CY	6"-12" Rip Rap (Spillway Outlet Protection/Inlet/Outlets)	$190.00	$4,750
8	3425	LF	Maintain Culvert/Stormdrain	$3.50	$11,988
9	22	EA	Maintain DI/Sediment Trap	$275.00	$6,050
10	7900	SF	Revegetation Wet Basin	$5.00	$39,500
12	2300	SF	Revegetation Upland	$1.10	$2,530
				Subtotal	$98,090
				Contingency (20%)	$19,618
				Total	$117,709

FIGURE 9: ALTERNATIVE 1
KAHLE DRIVE STORMDRAIN AND BASIN IMPROVEMENT PROJECT
BURKE CREEK-RABE MEADOWS MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 100 200
FEET

- Kahle Drive Stormdrain and Basin CIP Area

Proposed Improvements
- Maintain Stormdrain
- Gate
- Maintain Inlet
- Access Road
- Maintain Basin

Existing Drainage Features
- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Curb Gutter
- Parcels

NOTES:
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Table 15
Alternative 2
Kahle Drive Stormdrain and Basin Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$144,000
	Total	$144,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$155,000
	Total	$155,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$72,536	$72,536
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$21,761	$21,761
3	1	LS	Traffic Control (3%)	$21,761	$21,761
4	1	LS	Control of Water (2%)	$14,507	$14,507
5	1160	SF	Removal of AC Pavement	$7.00	$8,120
6	18	EA	Remove Drop Inlet/Pipe Riser/Sediment Can	$800.00	$14,400
7	1	EA	Remove Culvert	$25.00	$25
8	3000	CY	Excavation	$45.00	$135,000
9	1	EA	Media Filter	$225,000.00	$225,000
10	120	LF	15" HDPE Stormdrain	$32.00	$3,840
11	1060	LF	36" HDPE Stormdrain	$65.00	$68,900
12	680	LF	48" HDPE Stormdrain	$80.00	$54,400
13	9	EA	Drop Inlet/Pipe Riser/Sediment Can	$1,500.00	$13,500
14	10	EA	Manhole	$4,500.00	$45,000
15	10070	SF	AC Pavement	$8.00	$80,560
16	1785	LF	Maintain Culvert/Stormdrain	$3.50	$6,248
17	14	EA	Maintain DI/Sediment Trap	$275.00	$3,850
18	11320	SF	Revegetation Wet Basin	$5.00	$56,600
19	9020	SF	Revegetation Upland	$1.10	$9,922
				Subtotal	$855,930
				Contingency (20%)	$171,186
				Total	$1,027,116

FIGURE 10: ALTERNATIVE 2
KAHLE DRIVE STORMDRAIN AND BASIN IMPROVEMENT PROJECT
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 125 250
FEET

- Kahle Drive Stormdrain and Basin CIP Area

Proposed Improvements
- Media Filter
- Replace Existing Inlet
- Maintain Inlet
- Remove Culvert
- Maintain Storm Drain
- Replace Storm Drain
- RegradeBasin/Revegetate

Existing Drainage Features
- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Curb Gutter
- Parcels

NOTES:
IMAGERY: DOUGLAS COUNTY

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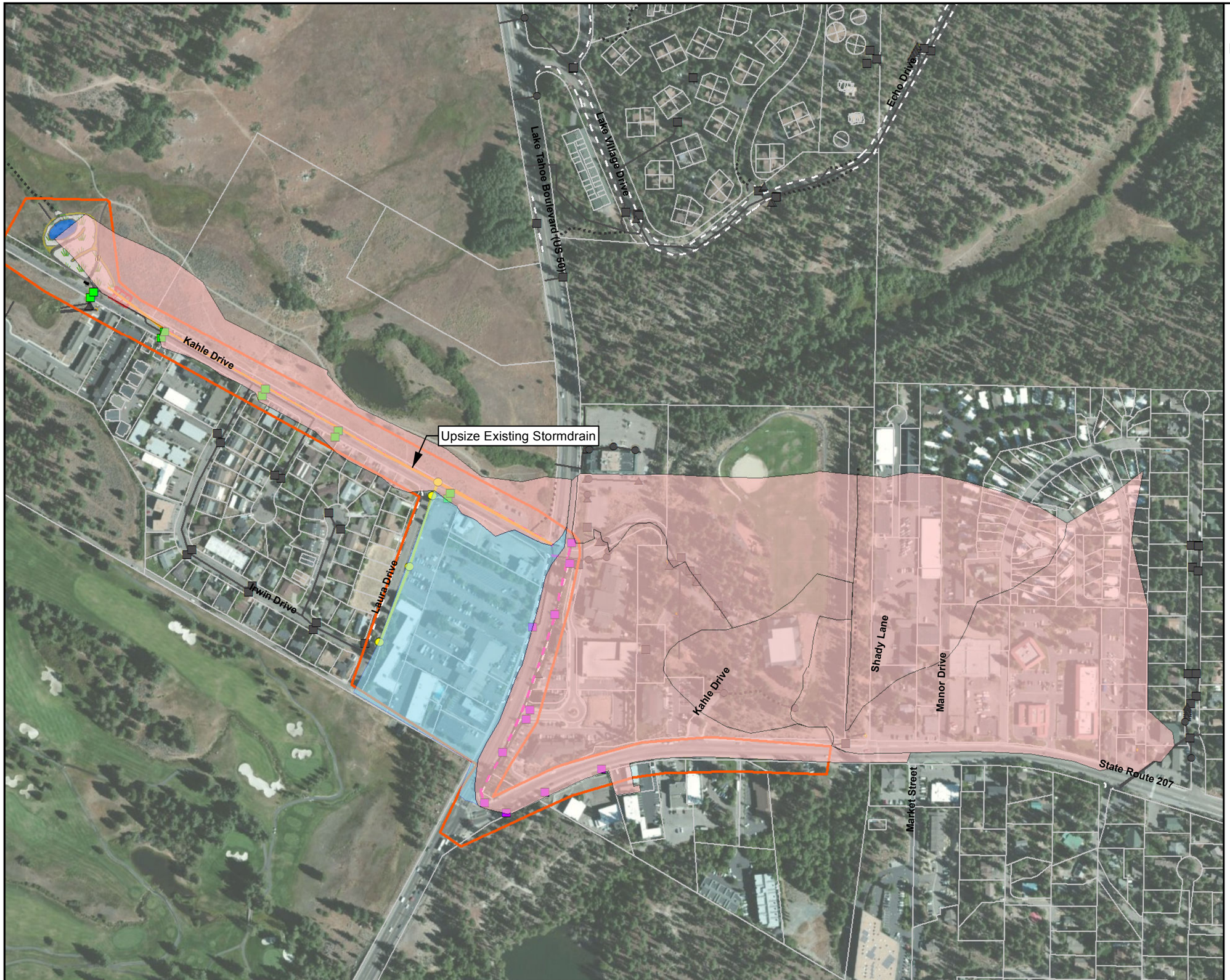
FIGURE 11
EXISTING AND PROPOSED STORMDRAIN CONTRIBUTING DRAINAGE AREAS
BURKE CREEK-RABE MEADOWS MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014



NORTH

0 125 250
FEET

- Existing Contributing Drainage Area
- Proposed Lakeside Inn Contributing Drainage Area
- Kahle Drive Stromdrain and Basin Improvement CIP Area

Proposed Improvements

- Proposed Drop Inlet
- Replace Existing Inlet
- Maintain Inlet
- Gate
- Boardwalk
- Proposed Stormdrain
- Maintain Storm Drain
- Replace Storm Drain
- Gate
- Articulated Block Forebay
- Access Road / Pedestrian Path
- Slope
- Spillway
- Treatment Wetland
- Weir
- Wet Basin

Existing Drainage Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Curb Gutter
- Parcels

NOTES:
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Table 16
Alternative 3
Kahle Drive Stormdrain and Basin Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$158,000
	Total	$158,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$170,000
	Total	$170,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$80,508	$80,508
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$24,152	$24,152
3	1	LS	Traffic Control (3%)	$24,152	$24,152
4	1	LS	Control of Water (2%)	$16,102	$16,102
5	4500	CY	Earthwork (Removal of Sediment/Reshape Basin)	$17.00	$76,500
6	2600	SF	Geopave/Ecogrid/Drivable Grass - Access Road	$6.50	$16,900
7	32	CY	6"-12" Rip Rap (Spillway Outlet Protection/Inlet/Outlets)	$110.00	$3,520
8	1800	SF	Atriculated Block Forebay	$35.00	$63,000
9	1160	SF	Removal of AC Pavement	$7.00	$8,120
10	18	EA	Remove Drop Inlet/Pipe Riser/Sediment Can	$800.00	$14,400
10	2550	CY	Excavation	$45.00	$114,750
11	120	LF	15" HDPE Stormdrain	$32.00	$3,840
12	600	LF	18" HDPE Stormdrain	$45.00	$27,000
13	350	LF	36" HDPE Stormdrain	$65.00	$22,750
14	1290	LF	48" HDPE Stormdrain	$80.00	$103,200
15	12	EA	Drop Inlet/Pipe Riser	$1,500.00	$18,000
16	8	EA	Manhole	$4,500.00	$36,000
17	17420	SF	AC Pavement	$8.00	$139,360
18	3425	LF	Clean Existing Culvert/Stormdrain	$3.50	$11,988
19	14	EA	Vactor-Clean DI/Sediment Trap	$275.00	$3,850
20	5300	SF	Revegetation Wet Basin	$6.50	$34,450
21	26000	SF	Revegetation Wetland	$3.20	$83,200
22	12500	SF	Revegetation Meadow/Upland- Salvage	$1.10	$13,750
23	30	LF	Boardwalk	$350.00	$10,500
				Subtotal	$939,491
				Contingency (20%)	$187,898
				Total	$1,127,390

FIGURE 12: ALTERNATIVE 3
KAHLE DRIVE STORMDRAIN
AND BASIN IMPROVEMENT PROJECT
BURKE CREEK-RABE MEADOWS
MASTER PLAN
DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 125 250
FEET

- Kahle Drive Stormdrain and Basin CIP Area

Proposed Improvements
- Proposed Drop Inlet
- Replace Existing Inlet
- Maintain Inlet
- Gate
- Boardwalk
- Proposed Stormdrain
- Maintain Storm Drain
- Replace Storm Drain
- Gate
- Articulated Block Forebay
- Access Road / Pedestrian Path
- Slope
- Spillway
- Treatment Wetland
- Weir
- Wet Basin

Existing Drainage Features
- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Curb Gutter
- Parcels

NOTES:
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9.0 LOWER MEADOW IMPROVEMENT PROJECT

The Lower Meadow Improvement CIP area is bounded by Kahle ditch on the south, Lake Tahoe to the west, and extends approximately 300 feet north of Kahle ditch to the north. This area includes a portion of Nevada Beach and campground, the Douglas County Sewer Plant access road, Kahle ditch and the lower portion of Burke Creek. As previously requested by the USFS in earlier TAC meetings the improvements in this area has been left general and the design very conceptual; however, it is important to include possible improvements and the potential benefits that may result through these improvements to the lower meadow.

Preferred Alternative

Improvements include the removal of the trench drain along the end of Kahle Drive and constructing a 15" stormdrain pipe to convey flows from the existing drop inlet to the vault on the north side of Kahle Drive. The existing trench drain connects to the Oliver Park Wet Basin outlet pipe flowing across Kahle Drive. The conveyance pipes direct runoff to a standpipe in Rabe Meadow adjacent to Burke Creek. The trench drain is at a low point in Kahle Drive and because of the insufficient slope between the trench drain and the standpipe the trench drain is consistently full of water. During precipitation events, runoff fills the trench drain completely, flows over the trench drain and continues down Kahle Drive to a drainage inlet and curb cut which direct runoff to Kahle ditch.

In order to alleviant the minor flooding in this area it is proposed to remove the trench drain and replace it with a stormdrain pipe. In addition, it is proposed to regrade the lower portion of Kahle Drive to promote proper drainage from the roadway into Kahle ditch and alleviate the minor flooding that occurs in this area. A rock lined depression for stormwater treatment will be constructed in Kahle ditch where the drainage inlet on the south side of lower Kahle Drive outlets. Below this location, along the Kahle ditch, the future Tahoe Beach Club would restore the area along the ditch on their property which will likely improve the water quality through this lower section of the reach. The USFS should consider a Kahle Ditch restoration project to be designed and constructed concurrently with the Tahoe Beach Club improvements. With the future construction of the Tahoe Beach Club arises the need for a bike trail linking the Tahoe Beach Club to the campground and meadow. It is proposed to utilize a portion of the existing roadway through this section to connect the Tahoe Beach Club to this recreational area.

The final improvement to this area is for the Tahoe Yellow Cress protection area. This fence is currently run-down and should be improved. Along with these fence improvements it is also proposed to add informational signage in this area.

With the proposed improvements throughout the project area, including the Burke Creek Restoration Project, there is potential for an increase in flows in Burke Creek through this lower reach than that which currently exists. With the potential flow increase, it is proposed to monitor and model the improved stream flows to determine if there is need to upsize the three culverts under the Douglas County sewer plant access road and the campground access road. Currently, two of these culverts are regularly full of water and likely overtop both roads in larger events.

This alternative estimated cost would be $359,699. The proposed improvements have been shown on Figure 13 and a breakdown of costs has been provided on Table 18, because of the preliminary nature of the improvements no costs have been provided for the treatment wetlands improvements.

Table18
Preferred Alternative
Lower Meadow Improvement Project
Burke Creek-Rabe Meadows Master Plan

Design & Permitting

Item No.	Description	Amount
1	Design & Permitting	$51,000
	Total	$51,000

Construction Management

Item No.	Description	Amount
1	Inspection/Testing/CM (15%)	$54,000
	Total	$54,000

Construction Costs

Item No.	Quantity	Unit	Item Description	Unit Price	Amount
1	1	LS	Mobilization and Demobilization (10%)	$25,403	$25,403
2	1	LS	Water Pollution Control (Temporary BMPs) (3%)	$7,621	$7,621
3	1	LS	Traffic Control (3%)	$12,701	$12,701
4	3060	CY	Excavation	$45.00	$137,700
5	4650	SF	Removal of AC Pavement	$7.00	$32,550
6	190	CY	Eathwork (Kahle)	$17.00	$3,230
7	2500	SF	AC Paving	$8.00	$20,000
8	1	EA	Remove Trench Drain	$25.00	$25
9	60	LF	15" HDPE Stormdrain	$32.00	$1,920
10	180	LF	36" HDPE Stormdrain	$65.00	$11,700
11	520	LF	Fence	$50.00	$26,000
12	190	CY	6"-12" Rip Rap (Basin)	$110.00	$20,900
				Subtotal	$299,750
				Contingency (20%)	$59,950
				Total	$359,699

FIGURE 13:
PREFERRED ALTERNATIVE
LOWER MEADOW RESTORATION PROJECT

BURKE CREEK-RABE MEADOWS
MASTER PLAN

DOUGLAS COUNTY, NV
NOVEMBER, 2014

NORTH

0 150 300
FEET

- Lower Meadow CIP Area

Proposed Improvements

- Improve Conveyance
- Remove Trench Drain and Construct Storm Drain
- Bike Path Connection
- Regrade/Repave
- Treatment wetlands
- Kahle Ditch Improvements
- Tahoe Yellow Cress Enclosure Improvements

Existing Drainage Features

- Vault
- Drop Inlet
- Sediment Trap
- Conveyance Ditch
- Conveyance Pipe
- Existing Trail
- Parcels

NOTES:
IMAGERY: DOUGLAS COUNTY

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10. COST ESTIMATE ASSUMPTIONS

Estimates are based on bid tallies for past projects within the Lake Tahoe Basin over the last three to four construction seasons for the Nevada Department of Transportation (NDOT) and Placer County. The following bid summaries for various projects were used to estimate costs:

1. Placer County, Lake Forest Water Quality Improvement Project-Panorama – (2013)
2. NDOT SR431 Erosion Control Project #MS-0431(006) - (2012)
3. NDOT SR28 Erosion Control Project #SI-0028(007) & #MS-0028(006) - (2011)

Excavation:

The following assumptions were made to determine how much excavation each alternative would require:

- Excavation has been included for all storm drain pipe which is in cubic yards.
- Because of the depths on the Kahle Drive Stormdain project are anticipated to be deep the trenches for 15"-24" pipe have trench width of 4 ft, 36"-48" pipes trench width are 6 ft. Depths were estimated based on the preliminary layout.
- For all other areas with stormdrain a width of 3 ft plus the pipe diameter and a depth of 1.5 ft plus the pipe diameter was used.
- Trenching excavation includes a 4 ft by 4 ft by 3 ft area for all drop inlets.
- Articulated block, maintenance access road, rip-rap, and AC patching excavation is included in the cost per each item.
- Existing Kahle Drive basin is assumed to be approx. 10,000 sq. ft. and will require 1-3ft of excavation to remove accumulated sediment.
- Proposed Kahle Drive basin is assumed to be approx. 40,500 sq. ft. and will require an average of 3 ft of excavation for the improvements.
- In the US 50 project area the proposed basin was assumed to be 3,000 to 6,000 sq. ft. with an average of 2 ft of excavation.
- The unit cost is per cubic yard (cy) and was estimated to be $45 per cy for excavation and $17 per cy for earthwork.

AC Pavement (Installation/ Patching/Removal):

While no new AC pavement is proposed with this project, due to the replacement of pipe AC patching will be required. The following assumptions were made to determine how much AC pavement the project would need:

Removal

- Removal area is based on the improvement being installed or modified. 2 ft width along the length of the curb and gutter and 3 ft width along the length of trench drain was assumed to be removed.
- The unit cost is per square foot and was estimated to be $7.00 per sq. ft.

Installation/Patching

- 2 ft width along the length of the curb and gutter was assumed as needed for patching.
- 3 ft width along the length of the trench drain was assumed as needed for patching.
- The unit cost is per square foot and was estimated to be $8.00 per sq. ft. was used

Drop Inlet/Sediment Can/Standpipe/Manhole/Trench Drain Installation & Maintenance:

The following assumptions were made to determine cost for the installation of drop inlets and sediment cans, and standpipes:

- Excavation and AC patch are not included in the cost of installation but included in the excavation and AC Pavement costs.
- For all drop inlets the unit cost is per each and was estimated to be $2,500.
- For all stand pipes the unit cost is per each and was estimated to be $1,500.
- For all manholes the unit price per each and was estimated to be $4,500.
- For all trench drains the unit cost is per each was estimated to be $325.

Remove Stormdrain/Culvert/Trench Drain/Drop Inlet/Sediment Can/Standpipe/Manhole/:

The following assumptions were made to determine cost of removal of existing culverts:

- Excavation, backfill, and disposal are all included in the estimated price.
- For stormdrain/culverts and trench drain the unit cost is per each and was estimated to be $25.
- For drop inlets/sediment cans/manholes the unit cost is per each and was estimated to be $800.

Plug Existing Culvert:

The following assumptions were made to determine cost of plugging the existing culvert:

- The unit cost is per each and was estimated to be $1,000.

Tree Removal:

The following assumptions were made to determine cost for the removal of trees:

- The unit cost is per each and was estimated to be $500.

Stormdrain/Culvert Installation & Maintenance:

The following assumptions were made to determine cost for the installation of culverts and cleaning and maintaining existing systems:

- Excavation and AC patch are not included in the cost of installation.
- For installation cost per linear foot (lf) each varies from pipe size, depth of pipe and type of pipe. Cost includes pipe, base preparation, backfill material, and compaction.
- For maintenance the unit cost is per linear foot and was estimated to be $3.50.

Channel Maintenance:

The following assumptions were made to determine cost for channel maintenance:

- Cost to clean channels is assumed to be $17 per cubic yard was used.
- Area to be cleaned out was estimated on a site by site basis utilizing channel dimensions.

Revegetation:

The following assumptions were made to determine cost for the installation of revegetation:

- For the noxious weed abatement project the unit cost is per acre and varies from $600 to $1,200 depending on type and placement mechanism.
- For all other project areas the unit cost is per square foot and has been estimated at to be $1.10 for upland areas and $5 for wet meadow areas.

Curb & Gutter:

The following assumptions were made to determine cost for the installation of Curb & Gutter:

- The unit cost is per linear foot and is estimated to be $32.

Fence:

The following assumptions were made to determine cost for the installation of Fence:

- The unit cost is per linear foot and is estimated to be $50.

Headwall:

The following assumptions were made to determine cost for the installation of headwalls:

- For the Alternative 1 of the Burke Creek Restoration project, NDOT standard details were utilized to determine the quantities of concrete and steel. A cost of $600 per cubic yard was utilized for the concrete. A cost of $1 per pound was utilized for the steel. The unit cost is per each and is estimated to be $2,500.
- For Alternative 2 of the Burke Creek Restoration project, cost estimates from Contech were utilized.

Large Woody Debris/Channel Vanes:

The following assumptions were made to determine cost for the installation of woody debris/channel vanes:

- For channel vanes the unit cost is per each and is estimated to be $1,600.
- For large woody debris the unit cost is per each and is estimated to be $350.
- For large woody debris (los with rootwads) the unit cost is per each and is estimated to be $1,000.

Grouted Riprap:

The following assumptions were made to determine cost for the installation of grouted riprap:

- Slopes where utilized were assumed to be 4 feet in height and the depth of riprap was assumed to be 1 foot.
- The unit cost is per cubic yard and is estimated to be $300.

Slope Stabilization:

The following assumptions were made to determine cost for slope stabilization:

- The unit cost is per cubic yard and is estimated to be $25.

Rock (Rip Rap Loose/ Channel River Rock):

The following assumptions were made to determine cost for the installation of rock:

- For 6-12" rip rap the unit cost is per cubic yard and is estimated to be $110.

- For rock for channel construction the unit cost is per ton and is estimated to be $65.
- For gravel the unit cost is cubic yard and is estimated at $40.

Rock Check Dams:
The following assumptions were made to determine cost for the installation of rock check dams:

- Assume 20' long , 1 foot high, 3:1 side slopes
- For rock the unit cost is per cubic yard and is estimated to be $110.

Modular Block Surface (Articulated Block/Driveable Grass):
The following assumptions were made to determine cost for the installation of modular block surface:

- The unit cost is per square foot and is estimated to be $35.

Roadway Striping:
The following assumptions were made to determine cost for the installation of roadway striping:

- The unit cost is per linear foot and was estimated to be $5.00.

Guardrail (Rail/Posts/Terminals):
The following assumptions were made to determine cost for the installation of guardrail:

- For rail the unit cost is per linear foot and was estimated to be $100.
- For posts the unit cost is per each and was estimated to be $50.
- For terminals the unit cost is per each and was estimated to be $3,000.

Boardwalk:
The following assumptions were made to determine cost for the installation of the boardwalk:

- The unit cost is per linear foot and was estimated to be $350.

Clean/Repair Outlet Protection:
The following assumptions were made to determine cost for cleaning/repairing the outlet protection:

- The unit cost is per each and was estimated to be $2,100.

Irrigation:
The following assumptions were made to determine cost for irrigation:

- The Lake Forest estimates for irrigation were utilized and compared to the size of the Burke Creek Restoration area to determine the lump sum cost.

Debris Removal:
The following assumptions were made to determine cost for the installation of Debris Removal:

- The cost of debris removal was determined by assuming one day of work for two people at $85/hour plus a $100 disposal fee.

Mobilization/Traffic Control/Water Pollution Control/Control of Water:

- Mobilization/Demobilization, Traffic Control, Water Pollution/Control (BMPs) are assumed to be a lump sum and a percentage of the overall cost of the project.
    - Mobilization and Demobilization – 10% was used.
    - Water Pollution Control – 3% was used.
    - Traffic Control- 3% for residential/parking areas & 5% for Highways was used.
    - Control of Water (Diversion/Dewatering) – 5% was used where appropriate.

11. CAPITAL IMPROVEMENT PROJECT PRIORITIZATION

The capital improvement projects discussed above have been preliminarily prioritized from highest to lowest. Based on the discussions with the TAC the prioritization for the projects was determined by reviewing improvement areas which pose the highest risk to water quality, public safety, overall meadow health or where recreational opportunities can be maximized.

Priority 1: Burke Creek Restoration

The restoration of Burke Creek would not only be beneficial to water quality but to the overall health of the meadow. The restoration would enhance wildlife habitat by creating a more diverse plant community with the creation of an inset channel and associated floodplain. A new culvert at US 50 and new channel immediately upstream and downstream of the culvert will allow conveyance of 50 year events without avulsion into the urban environment and stormwater conveyance system. Habitat and water quality would also be improved by the reduction of impervious surface which would allow for the creation of additional habitat, a more diverse plant community, and allow for treatment of stormwater runoff.

Priority 2: US 50 Improvements

Roadway flooding on US 50 presents a safety hazard to motorists as well as locations of increased shoulder erosion. Both alternatives presented in this document will address the underlying issue of inadequately sized drainage facilities, as well as provide improved outlet treatment prior to discharging to Rabe Meadow. In addition, Alternative 2 will eliminate comingling of flows between NDOT right-of-way runoff and Folsom Spring flows.

Priority 3: Kahle Drive Stormdrain and Basin Improvements

The current Kahle Drive stormdrain system is in desperate need of maintenance. Because of the lack of maintenance to the system it is no longer operating at its full capacity. All of the inlets are more than half full of sediment have standing water on regular basis and the basin is providing minimal treatment. Implementing any of the alternatives presented in this document would improve the water quality of the stormwater runoff that is leaving the system and entering Burke Creek.

Priority 4: Kahle Community Center

The existing exposed slopes in the Kahle Community Center parking lot are impairing water quality and degrading the Kahle Community Center parking lot. Water quality is being affected as the slopes are actively eroding sediment into the stormdrain system. Continued erosion is causing degradation of the existing

parking lot as asphalt from the parking lot is being lost around and below the edges. Both alternatives presented in this document adequately address both issues.

Priority 5: Noxious Weed Abatement

Due to existing noxious and invasive weed infestations, disturbed conditions and vectors for spreading these weed species such as road, foot and animal traffic, the potential for increasing existing weed populations and introducing new weed infestations is a concern for the overall health of the meadow. The eradication of these weed populations would result in a healthier meadow ecosystem.

Priority 6: Lower Meadow Improvements

Improving the drainage path from the end of Kahle Drive into Kahle ditch will alleviate the current roadway flooding and pavement degradation, resulting in improved safety and water quality. Upgrading the current Tahoe Yellow Cress fence and signage will improve aesthetics along the beach as well as increase public awareness of the Yellow Cress. These improvements, combined with the Tahoe Beach Club construction, will provide for the continued function of the Lower Meadow Area.

Priority 7: Northern Meadow Improvements

The head cuts on the east side of the project area have the potential to worsen over time and degrade both existing meadow habitat and downstream water quality. Regrading and the placement of check dams across the drainage channel will eliminate the head cuts and allow the meadow to properly function as a water quality enhancement area.

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APPENDIX A

Appendix A

Sulfur cinquefoil (*Potentilla erecta*) (POER)

Tahoe List: Group 1

Nevada Dept. of Agriculture: Category A

Perennial forb with a short caudex attached to a woody taproot. May have some lateral growth but no rhizomes and there are no known mychorrizal associations.

Reproduces by seed and vegetatively by sprouting from the caudex. Seed viability in the soil seed bank approximately 3 inches below ground surface can be approximately 28 months.

Phenology	
Month	**Stage**
Early/mid March	First basal leaves
April	Basal rosette fully formed
May	Bolt
Late May/early June	Bud stage
June	Bloom
July	Seed set
Late July/ early August	Seed dispersal begins
August	Leaf senescence
Sept/Oct	Fall green up – new basal leaves
Late Oct	Growth until sustained freeze

Control:

Observation – annual monitoring

Manual – hand digging of root crown down 4 to 6 inches below the ground surface, spot application of herbicide, and monitor for new germination for up to 5 years due to seed viability in the soil seed bank.

Chemical**	Trade Name	Tahoe List[1]	On Label
Aminopyralid	Milestone	Yes	Yes
Chlorsulfuron	Telar	Yes	Yes
	Open Sight**	Partially	Yes

[1]Environmental Assessment Terrestrial Invasive Plant Species Treatment Project Lake Tahoe Basin Management Unit, US Forest Service. October 2010

** Open Sight is a mix of Milestone and Escort (Metsulfuron) and has been applied successfully by Douglas County Weed Control for control of Sulfur cinquefoil, bull thistle and Canada thistle. It can be applied in upland and in close proximity of aquatic habitats. Herbicide application should be done for a minimum of 3 years, with 5 years recommended (Jeff Begovich, March 6, 2014).

Canada thistle (*Cirsium vulgare*) (CIVU)

Tahoe List: Group 1

Nevada Dept. of Agriculture: Category C

Cool season perennial that reproduces by seed and vegetatively via creeping roots at 7 to 8 weeks after germination. New shoots can appear in the cool fall months. Buds on creeping roots can account for reestablishment a year or more after top growth has been destroyed. Seeds can remain viable in the soil +20 years.

Phenology	
Month	**Stage**
Late April through May	first basal leaves and basal rosette fully formed
Late May through June	bolt, bud stage, bloom
July	seed set
Late July/ early August	seed dispersal begins
August	leaf senescence
Sept/Oct	fall green up – new basal leaves
Late Oct	growth until sustained freeze

Control:

Observation – annual monitoring

Manual – shading, hand digging of root crown down 4 to 6 inches below the ground surface, spot application of herbicide, monitor for new germination for +20 years due to seed viability in the soil seed bank.

Chemical**	Trade Name	Tahoe List[1]	On Label
Picloram	Tordon	No	Yes
Clopyralid	Stinger	No	Yes
	Open Sight**	Partially	Yes

[1]Environmental Assessment Terrestrial Invasive Plant Species Treatment Project Lake Tahoe Basin Management Unit, US Forest Service. October 2010

** Open Sight is a mix of Milestone and Escort (Metsulfuron) and has been applied successfully by Douglas County Weed Control for control of Sulfur cinquefoil, bull thistle and Canada thistle. It can be applied in upland and in close proximity of aquatic habitats. Herbicide application should be done for a minimum of 3 years, with 5 years recommended (Jeff Begovich, March 6, 2014).

Bull thistle (Cirsium arvense) (CIAR)

Tahoe List: Group 2

Nevada Dept. of Agriculture: Not listed

Biennial that reproduces from seed and does not have rhizomes. Prefers a sunny open-canopy with moist to dry soils. Seed is short lived on the soil surface, but persistent for long periods in the soil. Can germinate in the spring and fall.

Phenology	
Year 1	
Month	**Stage**
Late April through May	First basal leaves and basal rosette fully formed
Year 2	
Month	**Stage**
Late May through June	Bolt, bud stage, bloom
July	Seed set
Late July/ early August	Seed dispersal begins
August	Leaf senescence
Sept/Oct	Fall green up – new basal leaves
Late Oct	Growth until sustained freeze

Control:

Observation – annual monitoring

Manual – dig up rosettes and 3 to 6 inches of the root stalk in bud stage*

*cut stems of flowering plants may form viable seed. Cut flower stalks should be bagged and disposed of at an appropriate location.

Mechanical: Mowing two times per year can prevent seed production and reduce the population over the long term.

Chemical**	Trade Name	Tahoe List[1]	On Label
Picloram	Tordon	No	Yes
Clopyralid	Stinger	No	Yes
Dicamba	Many	No	Yes
2,4-D	Many	No	Yes
Metsulfuron	Ally, Cimmaron, Escort	No	Yes
Chlorsulfuron	Telar	Yes	Yes
Add nonionic surfactant			
	Open Sight**	Partially	Yes

[1]Environmental Assessment Terrestrial Invasive Plant Species Treatment Project Lake Tahoe Basin Management Unit, US Forest Service. October 2010

** Open Sight is a mix of Milestone and Escort (Metsulfuron) and has been applied successfully by Douglas County Weed Control for control of Sulfur cinquefoil, bull thistle and Canada thistle. It can be applied in upland and in close proximity of aquatic habitats. Herbicide application should be done for a minimum of 3 years, with 5 years recommended (Jeff Begovich, March 6, 2014).

Cheatgrass (Bromus tectorum) (BRTE)

Tahoe List: Not listed

Nevada Dept. of Agriculture: Not listed

Typically a winter annual, however can assume spring annual character when fall moisture is limiting and seeds germinate in the spring.

Control:

Observation – annual monitoring

Manual – Successful control of cheatgrass can be accomplished by reestablishing desirable competition back into the plant community. It is recommended to mow cheat grass in the boot stage, prior to seed dispersal in the spring and fall, and collect and dispose of mow cut. In the fall after mowing and collection of mow cut, scarify the soil surface, broadcast seed of desirable species, and drag to cover seed. This should be done as close to the onset of snow cover as possible to protect seed from bird and other wildlife collection and to take advantage of winter moisture for the highest potential germination success in the spring and summer.

APPENDIX B

TAC COMMENTS – DEVELOPMENT OF CAPITAL IMPROVEMENT PROJECTS AND ALTERNATIVES EVALUATION REPORT

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
COVER , TABLE OF CONTENTS AND EXECUTIVE SUMMARY				
Acronyms and Abbreviations	ii	Rupali Mohansingh/NDOT	Include acronyms for ADA and CIP	Added
SECTION 1.0 - INTRODUCTION				
1.0	1	SF/TRPA	In the 1st paragraph it states that the project has been identified as TRPA EIP # 01.02.03.01. This EIP number is for the Burke Creek Restoration project only, not the entire Master Plan. I am not sure if this has an EIP number, but this item should be clarified.	Added text to clarify.
Paragraph 4	1		Line 1- Capital improvement projects are developed for improvement of drainage facilities.	Added.
SECTION 2.0 –DEVELOPMENT OF CAPITAL IMPROVEMENT PROJECT AREAS				
SECTION 3.0 – RABE MEADOWS WEED ABATEMENT PROJECT				
Paragraph 5	6	Rupali Mohansingh/NDOT	Line 1- Disturbed conditions are also due to wind.	Added
Alternative 2	8	Rupali Mohansingh/NDOT	Manual treatment, line 5 “Disposed off in plastic bags” Seeding, line 2 include “the” as in “contact with the soil”	Revised
3.0	8	SF/TRPA	Consider adding Woolly Mullein and Sweet White Clover to the list. I know they are not listed as noxious or invasive and are simply a non-native, but seem to be taking over, particularly in areas adjacent to disturbance.	Cheatgrass was included because it has been identified as a problem in the area in the past. At this point in time we will not be adding Wolly Mullein and Sweet Clover to the list.

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
3.0	8	SF/TRPA	Need to be mindful of herbicide application in SEZ areas. TRPA code has specific requirements regarding its use that will be discussed more if this is chosen as an alternative through the permitting process.	Only herbicides licensed to be used in proximity of aquatic habitats, on the USFS list and in compliance with TRPA requirements will be considered for use
3.0	1/10	SF/TRPA	Tables 3, 4 and 5 should state that the costs are based on one year of work.	This has been clarified
		ST/SCA	SCA is a frequent user of this area and has seen the alarming proliferation of non-native invasive and noxious weeds. The problem requires an integrated management plan that addresses control and the eradication of noxious and other insidious non-native species that detract from the overall health of the meadow. Alternative 1 takes an integrated and systematic approach, including both manual and herbicide treatments. SCA encourages the longer-term (5-year) approach in an effort to achieve the highest potential for success. We recognize this is a very high profile and ecologically important meadow area.	Agreed
3.0		SF/TRPA	This project should only be considered if alternative 1 is able to implemented for the full 5 years, otherwise I do not see the point in pursuing this as a project.	Agreed
3.0, Alt. 3	10	SF/TRPA	Under weed survey it should state the "management practices" refer to management practices of the area as future improvements are made not specifically related to this alternative, since no specific weed abatement management practice is being implemented.	Revised text

SECTION 4.0 – BURKE CREEK RESTORATION PROJECT				
SECTION	**PAGE(S)**	**INDIVIDUAL/ AGENCY**	**COMMENT**	**RESPONSE TO COMMENT**
Alt. 1	11	Rupali Mohansingh/NDOT	Paragraph 2, line 2. Mention of head cutting shown on Figure 3. Figure 3 does not show the areas. Paragraph 3 line 2- Include "to" in the line "repair due to head cutting" Paragraph 3, line 3- Mention of area where soil has slumped- Show it on the Figure if possible. Paragraph 4, line 8- Mentioned of the use of boulder clusters. For the benefits of using boulder clusters average flows have to exceed 2 feet per second.	Added Added Added Noted.
Alt. 1	11	SF/TRPA	Since the preferred alternative has already been chosen for this project as part of another TAC, I would say preferred alternative or just the project, instead of Alternative 1.	Revised
		ST/SCA	This project is clearly the priority cornerstone of Burke Creek-Rabe Meadow Complex Master Plan. I recognize the TAC selected the preferred project alternative (Alternative 1) in January 2013 for purposes of furthering the design to a 50 percent level and securing funds for final design and implementation. The project team is actively pursuing this preferred alternative to final design and construction. Go Team!	Agreed

SECTION 5.0 – KAHLE DRIVE COMMUNITY CENTER PROJECT				
SECTION	**PAGE(S)**	**INDIVIDUAL/ AGENCY**	**COMMENT**	**RESPONSE TO COMMENT**
	15	Rupali Mohansingh/NDOT	Paragraph 3- PLRM model estimated FSP contribution of 837 lbs/year. How much of a reduction is expected with the implementation of the alternatives?	The load reduction for this alternative equates to less than one credit. While the crediting is low stabilizing the slopes will also keep the slope from undermining the parking lot.
Alt. 1	15	Rupali Mohansingh/NDOT	Paragraph 4, line 2- Stabilization of bare slopes could be done with the use of partially grouted riprap.	Revised
Alt. 2	16	Rupali Mohansingh/NDOT	Paragraph 2, line 4- Spell check on "therefore"	Revised
Figure 5		Rupali Mohansingh/NDOT	Would it be safe for the bike path to be developed due to the steep grade in the area?	Added discussion to text.
Alt. 1	15	SF/TRPA	Not crazy about grouted riprap, is the grout really necessary? I suppose specific details related to a project and alternatives will be more thoroughly discussed if/when funding becomes available for a project.	Added discussion in text that other options could be explored.
Alt. 1	15	SF/TRPA	Alternative 1 is my preferred alternative. Would be great to combine the 2 alternatives into 1, but I understand that for funding purposes there is a benefit to keeping them separate.	Agreed
		ST/SCA	SCA advocates that the preferred alternative for this project consist of the maximum feasible slope stabilization and diversion of runoff from the bare slopes that exist in and around the parking lot at the popular Kahle Community Center. Of the two alternatives presented, a more comprehensive approach is reflected in Alternative 1 (page 15).	Noted

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
		ST/SCA	SCA understands the "pavement" that connects the parking lot to both Kingsbury Grade and US Highway 50 is not considered a roadway. However, we believe abrasives are used on the pavement during winter conditions (If not, they should be). This is one factor that that indicates the "pavement" would be more appropriately characterized as a road. If in fact it were a road, it would seem to increase the priority status for water quality improvements at the Kahle Community Center and the potential for TMDL credits for Douglas County.	Noted.
		ST/SCA	The scope and location of the proposed "bike/pedestrian path proposed along Kahle Drive to the community center" referenced in Alternative 2 is not clear. The existing AC path from the Kahle Center to US 50 at Kahle Drive is narrow, steep, and does not meet ADA requirements. It is not an adequate "connector" between the popular park and community center and the new Class 1 multi-use trail and recreation network now located to the north and west of Highway 50. SCA has observed moms, dads, kids, and others struggle up and down the current "path." As a mobility advocate, SCA urges the development of a more appropriate solution than the one described in current Alternative 2. We would be pleased to contribute more specific ideas.	Noted- revised trail.
SECTION 6.0 – US50 IMPROVEMENT PROJECT				
Alt. 2	22	Rupali Mohansingh/NDOT	Paragraph 4, line 1-Include "operations", for sweeping and sanding operations	Revised
Alt. 1	21	SF/TRPA	It was agreed in the TAC meeting that general maintenance of the facilities is an NDOT responsibility regardless of a project or not, so this should be clarified in the report.	Added clarification to report.

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
Alt. 2	22	SF/TRPA	Given that this is such a flat section of road, I am not sure that curb and gutter is necessary along this segment. You can still effectively sweep without curb and gutter.	Although sweeping and sanding operations will add a beneficial effect on water quality, the second aspect of installing curb and gutter is to direct flows to inlets or basins where they can be treated. The East side of the road has C&G install to help direct flow to the inlet/proposed trench drain in order to allow for better conveyance and reduce ponding. The west side C&G will collect roadway flow to a proposed basin on the corner of Kahle drive and US 50. All other locations along US50 will be allowed to sheet flow over the shoulder and be dispersed throughout the meadow.
Alt. 2		ES/NDEP	To extent feasible, maintain/enhance dispersion runoff into meadow, where feasible with maintained sed trap	See previous response
		ST/SCA	As confirmed in the document, US 50 in this area has several locations where the ponding of stormwater runoff in the shoulder and on the roadway is prevalent and chronic. This is both a water quality problem and a safety concern for motorists, cyclists, and pedestrians. The source control and more diligent general roadway maintenance described in Alternative 1 are important, but Alternative 2 includes vital additional improvements. SCA supports the approach described in Alternative 2.	Noted
Alt. 2	22	SF/TRPA	Alt. 2 is my preferred alternative	
SECTION 7.0 – NORTHERN MEADOW IMPROVEMENT PROJECT				
		ST/SCA	Alternative 1 as described makes sense and should be pursued.	noted
SECTION 8.0 – KAHLE DRIVE STORMDRAIN AND BASIN IMPROVEMENT PROJECT				
Alt. 2	33	SF/TRPA	Remove Jellyfish from this alternative.	Left for comparison purposes since this is not the preferred alternative.

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
Alt. 3	34	SF/TRPA	Add in the option to install a basin at the corner of Kahle Dr. and US 50, aka the "Matt Alternative" if it is determined it is possible.	This was investigated further after the meeting and because of elevations of the surrounding facilities and the meadow this option will not be feasible.
Alt. 3	34	SF/TRPA	Alternative 3 is the clear preferred alternative out of the 3 given.	agreed
Alt. 3		ES/NDEP	In planning and design of resizing stormdrain system and stormwater treatment BMP improvements, take into consideration disposition of private BMP strategy for CICU parcel block between US 50 and Laura Drive. For these parcels, has discussion been held as to preferred private BMP approach to optimize stormwater treatment and feasibility for near term implementation and long term maintenance?.	Yes
SECTION 9.0 – LOWER MEADOW IMPROVEMENT PROJECT				
Alt. 1	43	SF/TRPA	The 2nd paragraph under alt. 1 states the future Tahoe Beach Club would restore the area along the ditch, I was under the impression that this is not within their property boundary, so while it is probably they will improve it, it is not guaranteed. Consider revising the language here is this is accurate.	Added language
		ST/SCA	Based on the information in this document and the needs and interests emerging from outreach and meetings with area commercial and other property owners, SCA supports the approach described in Alternative 3. As the planning and design continues, it seems likely there will be a potential for TMDL credits associated with this project. There are clearly a number of benefits to taking a more comprehensive approach to stormwater and drainage in the Kahle Drive basin.	Noted.
		ST/SCA	At the TAC meeting August 6, NDOT Hydrologist Matt Nussbaumer suggested a variation for some elements of an expanded stormdrain system that may merit further consideration as part of exploring design alternatives.	This was investigated further after the meeting and because of elevations of the surrounding facilities and the meadow this option will not be feasible.

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
		ST/SCA	As indicated in the document (page 43), planning for this area has been left at a conceptual stage. Various projects and planning activities now moving forward in and adjacent to the area suggest it could be time to further consider the role the "Lower Meadow" could play in the bigger picture of Kahle Drive-Rabe Meadow and related improvements, including drainage, stormwater, recreation, vegetation, and additional restoration	Noted
		ST/SCA	SCA recommends that area stakeholders* be invited to share information and help shape further thinking and CIP refinements. The description of Alternative 1 provides a good foundation for next steps. * Area stakeholders should include ownership/management from Lakeside Inn & Casino, developers of the Tahoe Beach Club, and management at the Kingsbury General Improvement District (KGID). There are likely others we can identify.	Noted
SECTION 10.0 – COST ESTIMATE ASSUMPTIONS				
SECTION 11.0 – CAPITAL IMPROVEMENT PROJECT PRIORITIZATION				
11	51	SF/TRPA	My prioritization is Burke Creek Restoration, US 50 Improvements, Kahle Drive Stormdrain and Basin Improvements, Kahle Community Center, Noxious Weed abatement, Lower Meadow Improvements, Northern Meadow Improvements	Thanks!
SECTION 12.0 – PREFERRED ALTERNATIVE SELECTION				
12		SF/TRPA	I have identified my preferred alternative for each CIP project above. Basically I prefer the alternative that provides the most treatment.	Thanks!

SECTION	PAGE(S)	INDIVIDUAL/ AGENCY	COMMENT	RESPONSE TO COMMENT
SECTION 13.0 – REFERENCES				
GENERAL				
		ES/NDEP	A question, maybe for NTCD -- What analysis might be necessary to examine whether or not the projects with stormwater system and treatment improvements that add or concentrate urban stormwater runoff will not cause instability in the lower meadow or stream channel? Generally, the projects in total tend to concentrate stormwater requiring thoughts about treatment BMP volumes and hydraulic bypass arrangements.	Any of the water that is concentrated is for the purposes of downstream treatment. Therefor no instability in the lower meadow is anticipated.