DRAFT ALKALI MEADOW
MITIGATION AND MONITORING PLAN
CITY OF BISHOP – SEWER TRUNK REPLACEMENT
INYO COUNTY, CALIFORNIA

PREPARED FOR

R|O|Anderson

Engineers • Surveyors • Planners

AND

PREPARED BY

TEAM

ENGINEERING & MANAGEMENT, INC.
Bishop and Mammoth Lakes, California

July 17, 2017

DRAFT ALKALI MEADOW
MITIGATION AND MONITORING PLAN
CITY OF BISHOP – SEWER TRUNK REPLACEMENT
INYO COUNTY, CALIFORNIA

TABLE OF CONTENTS

SECTION PAGE

1.0 INTRODUCTION 1
- 1.1 BACKGROUND 2
- 1.2 BIOLOGICAL SETTING 2

2.0 PROPOSED MITIGATION 3
- 2.1 REVEGETATION OF TEMPORARILY DISTURBED AREAS 3
- 2.2 ENHANCEMENT OF ALKALI MEADOW ADJACENT TO PROJECT AREA 4
- 2.3 MANAGEMENT AND ROUTINE MAINTENANCE 4
- 2.4 RATIONALE FOR ANTICIPATING SUCCESS 5

3.0 PROPOSED MONITORING 6
- 2.1 QUALITATIVE MONITORING METHODOLOGY 6
- 2.2 QUANTITATIVE MONITORING METHODOLOGY 6
- 2.3 REPORTING 7

4.0 CONTINGENCY MEASURES 8

5.0 CONCLUSIONS 9

6.0 REFERENCES 10

7.0 GENERAL CONDITIONS 11

FIGURES

FIGURE 1 SITE LOCATION
FIGURE 2 PROJECT AREA AND HABITAT TYPE SUMMARY

APPENDIX

APPENDIX A SAMPLE DATA FORMS

1.0 INTRODUCTION

The City collects wastewater from within its jurisdictional boundaries and transports it via a gravity sanitary sewer trunk line to the City of Bishop Wastewater Treatment Plant. The City proposes to replace the existing sewer trunk line for several reasons including a change in grade in about the middle of its length which causes settlement problems, being too shallow where it crosses the canal making it vulnerable to damage, being too low where it enters the sewer plant, and being approximately 60 years old and nearing the end of its useful life.

Overall the trunk line is approximately 2,500 feet in length. The existing line is shallow below natural grade with dirt mounding over its alignment to provide cover in portions of the eastern half of the project area. The majority of the project site is undeveloped and vegetated with grasses, shrubs and a few scattered trees. The project site generally slopes to the east/southeast at a very mild grade. It should be noted that the sewer trunk line discharges approximately 0.75 million gallons per day (Nolte, 2008) which supports a wetland area to the South and East of the City of Bishop Wastewater treatment plant (Figure 3). Replacement of the sewer trunk ensures the continued water supply for this wetland area.

An approximately 200 foot portion of the sewer trunk will be crossing an area (approximately 0.47 acres) which has been identified as Alkali Meadow Wetland. The project as currently designed, is going to be permanently affecting just under 0.10 acre of low-functioning Alkali Meadow Wetland.

Because the potential permanent impacts to wetlands will be less than 0.10 of an acre, the wetland mitigation requirements of the US Army Corps of Engineers (USACE) will not be triggered. However, the Lahontan Regional Water Quality Control Board (LRWQCB) will be issuing a permit for the project and require a Mitigation and Monitoring Plan to mitigate the impacts to the Alkali Wetland Habitat. According to local California Fish and Wildlife personnel there are currently no existing mitigation bank projects in the same watershed, so the option of purchasing mitigation credits is not possible. Therefore the City of Bishop proposes to mitigate permanent impacts through in-kind enhancement of surrounding Alkali Meadow.

To compensate for permanent and temporary impacts caused by the implementation of the Project, two basic strategies for mitigation are proposed herein to address the potential impacts to up to 0.47 acres of Alkali Meadow Habitat. Temporary impacts to Alkali Meadow resources have the potential to be up to 0.37 acres; these impacts will be mitigated by revegetation and weed removal. Permanent impacts, which are not anticipated to extend more than 0.10 acres, will be mitigated by enhancing a portion of the Alkali Meadow which is adjacent to the impacted project area primarily through removal of invasive vegetation and trash from the area, and/or re-vegetation. These types of enhancements could improve floodwater, sediment and nutrient retention as well as providing improved dust control. It could also improve habitat for wildlife, however the proximity to existing development and grazing practices cause this area to have low suitability for wildlife. The replacement of the Sanitary Sewer Trunk will also assure a continued water supply for the extensive wetland area supported by Sewer Plant treated effluent, so the net effect of the project to sensitive wetlands communities will be net-positive.

1.1 BACKGROUND

The proposed project area falls within the Bishop 7.5-minute USGS quadrangle map and within the Crowley Reservoir Watershed (HUC-18090102). The general boundaries of the biological resource field surveys conducted in May 2014 by Sierra Ecotone Solutions are shown on Figure 2. Figure 2 also shows the location of the general habitat types observed on site, including Alkali Meadow Habitat, in the project area.

The project area that is addressed by this report consists of the 0.47 Acres of Alkali Meadow Habitat.

1.2 BIOLOGICAL SETTING

The subject site is located just west of the City of Bishop, at approximately 4,125 feet above sea level. The subject site is to the South of Johnston Drive and ownership is primarily Los Angeles Department of Water and Power (LADWP) property with permanent and temporary City of Bishop easements in the area where the project crosses the identified Alkali Meadow Habitat.

The primary soils on site consist of the Dehy-Dehy calcerous complex, with slopes of 0-9% (USDA, 2017).

Native alkali meadow vegetation consists of primarily *Distichlis spicata*, *Glycyrrhiza lepidota* and *Juncus balticus*. The alkali meadow and surrounding is currently used for grazing horses. It is in close proximity (within 200') to a residential housing area, Johnston Drive. Current management practices are unknown, but evidence of vegetation removal (piles of woody debris) is evident on site. The meadow is already bisected by the existing Sewer Trunk Line, which will be abandoned in place upon project completion. An irrigation ditch also occurs to the South of the project site. The alkali meadow is likely to be supported by shallow groundwater that may be maintained by the Bishop Creek Canal which is approximately 600' to the West of the subject site.

2.0 PROPOSED MITIGATION

A two part approach will be taken to mitigate potential direct and indirect impacts to alkali meadow habitat following completion of the construction phase of the project. Part one will consist of revegetation of temporarily impacted Alkali Meadow Habitat. Part two will consist of enhancement of adjacent Alkali Meadow habitat to potentially improve beneficial Alkali Meadow characteristics (sediment control, stormwater infiltration, dust control, native plant habitat improvement). However it should be noted that alkali meadow habitat is dependent on shallow groundwater and water table drawdown can cause a decline in cover of native grasses (Manning, 2012). The City of Bishop has no control over groundwater management practices in the area and changes in groundwater management practices in the area have the potential to be a controlling factor in the success of the proposed re-vegetation efforts. The City of Bishop also has no direct control of grazing practices which could affect project success.

2.1 REVEGETATION OF TEMPORARILY DISTURBED AREAS

Prior to project implementation, an average percent cover of native species will be measured at an appropriate nearby reference site. This survey will be considered the baseline value which revegetation success will be measured. Planting of rhizomes should be at least twice the density determined in pre-project surveys (anticipated to be 40-60% cover based on August 23, 2016 Wetland Delineation) to allow for mortality. Specific methods will not be discussed in detail for this report as there are varying methods which are likely to produce successful results. The initial plan is to use rhizomes collected on or near the site at the beginning of project implementation. If rhizomes remain viable then they will be replanted at the end of the construction phase. This approach will work best if rhizomes are collected in the fall as they become dormant and planted in the spring before they resume active growth. Dependent on timing and/or to increase chances of successful revegetation, it may be necessary to supplement or replace rhizome planting with nursery raised vegetation, a hand broadcast seed mix or Hydroseeding as site conditions allow or revegetation contractor suggests. A more robust approach which includes both re-planting of on-site collected rhizomes supplemented by an alkali meadow seed mix is recommended in order to increase chances that success criteria are met in the short time frame requested.

Prior to ground disturbing activities, City personnel or project contractor will scrape topsoil and rhizomes from the areas within the area identified as Alkali Meadow in Figure 2. No more than 0.47 acres of delineated alkali meadow habitat will be temporarily disturbed. Care will be taken to preserve viable plant material of rhizomatous alkali meadow species (*D. spicata, J. balticus, G. lepidota, Leymus triticoides* and *Sporobolus airoides*) identified in the project area for replanting/re-establishment during the mitigation phase. The focus of revegetation will be restoration of *D. spicata* as it was the dominant native species observed in the meadow during the Wetland Delineation work conducted by Sierra Ecotone Solutions on August 23, 2016. Other rhizomatous wetland species which are unearthed during project implementation will be re-planted if determined to be viable at time of re-planting. Ideally, rhizome collection should be conducted shortly after they become dormant for the winter and should be planted before their return to an active growth phase. This timing may or may not coincide with the pending construction timeline. If rhizomes are determined to be non-viable prior to planting, plant material could be collected from the City of Bishop property adjacent to the project area or the city lot on Sunland Drive. A third source could be nursery propagated *D. spicata* or from USDA-

NRCS Lockeford Plant materials Center or an equivalent source. If project timing changes different methods may be required in order to ensure success of the mitigation efforts.

Three key items will need to be addressed in order to ensure the success of the proposed mitigation: grazing livestock, invasive plants and available soil moisture for establishment of new plantings.

It is highly recommended that the revegetation and meadow enhancement area have livestock excluded during construction and revegetation phases. However it is unknown whether landowner (the City of Los Angeles) will allow this encumbrance on their property. Invasive plants will be periodically removed during the revegetation and mitigation phase. If planting of rhizomes is proposed to occur around the beginning of the hot and dry season for the area, it is likely that supplemental watering will be necessary during the spring and summer of the first year of the project. This plan is not intended to determine what specific methods will be best to address these issues. It will be up to the City of Bishop and their potential contractor to determine the best methods to address these issues, and it should be understood that if potential deleterious conditions are not addressed it may affect the attainment of success criteria.

2.2 ENHANCEMENT OF ALKALI MEADOW ADJACENT TO PROJECT AREA

In order to mitigate for the permanent loss of an approximately 0.10 acre portion of the Alkali Meadow the City of Bishop proposes in-kind mitigation of the Alkali Meadow adjacent to the impacts. The City of Bishop has agreed to enhance the adjacent meadow with a combination of low net improvement functional enhancements based on preliminary input from LRWQCB staff. These enhancements may include invasive species management, exclusion of grazing, trash removal and potentially seeding with an alkali meadow seed mix. The city will conduct the enhancements on a small area directly to the south of the permanent impacts. The exact area should be within the delineated alkali meadow boundary shown in Figure 2, will cover about 0.37 acres and will be entirely within the temporary easement area. Prior to implementation of enhancement measures, and at one-year intervals, vegetation will be sampled. A permanent transect will be set up across the meadow enhancement area prior to project construction. Ten one meter quadrats will be randomly located along this transect each year. Attainment of project success will be indicated at two years by an increase in average total plant count and/or native plant diversity from pre-project conditions, with less than 10% non-native vegetation.

2.3 MANAGEMENT AND ROUTINE MAINTENANCE

Invasive weeds, availability of soil moisture and exclusion of livestock are three important factors which will need to be addressed by the City in order to attain project success.

It is recommended that the City remove weeds on at least a monthly basis throughout the project. Methods should be restricted to physical pulling of non-native vegetation. Weed pulling events may be required more or less frequently than suggested in this document depending on site conditions and will be the responsibility of the City to determine appropriate frequency in order to attain project success criteria.

Depending on timing of project implementation, supplemental watering may be necessary. Methods of applying water might include setting up a temporary sprinkler system or hand

watering from a truck with a water reservoir. Methods and timing of watering events will not be described in detail for this report as there are a variety of strategies which could reasonably produce successful outcomes. Details will vary depending on timing of project implementation. Supplemental water may not be necessary if planting/seeding is done in a time of naturally high soil moisture, but it may be required if planting is conducted in the typically hot and dry summer months.

Exclusion of grazing livestock from restoration and enhancement areas will be important to achieving project success as most of the alkali meadow vegetation is palatable to livestock. Some of this vegetation can tolerate trampling and recovers well following grazing (Bishop, 1996) however grazing livestock can make it difficult for native vegetation to become established and will affect percent cover when compared to ungrazed areas.

2.4 RATIONALE FOR ANTICIPATING SUCCESS

There are several reasons to anticipate success from this revegetation and enhancement effort. First, native soils and plant rhizomes will be collected on site. Use of native soils and native propagation stock should ensure plant stock is a known regional variety or hybrid that has the same genetic composition to what exists currently on site. This should ensure that the resultant plants will be adapted to site specific conditions. Implementation is proposed to occur during the dormant period for rhizomatous species in the area which should allow rhizomes to remain viable until needed for re-planting in the spring.

Manual removal of invasive species will be conducted at least monthly in the months following planting which should reduce competition with native plants for nutrients and water, and help to control non-native species.

The limited extent of project impacts and the low-value of the existing wetland make it reasonable to believe that restoration or improvement of existing conditions is feasible. Due to the low diversity of plant species in the grazed meadow, a numerical success criteria for the revegetation portion of the project are proposed for only grass species and invasive weeds. The success criteria were developed based on the current condition of the delineated Alkali Meadow, which is highly impacted by grazing activities and existing land use.

If revegetated areas do not meet the success criteria at the end of the two-year monitoring period, the site will be reassessed and contingency measures will be implemented if necessary, as described further in Section 4.0. If after two years the restoration is not meeting success criteria, recommendations will be developed in collaboration with LRWQCB.

3.0 PROPOSED MONITORING

The purpose of monitoring is to assess whether mitigation actions have been successful in establishing alkali meadow habitat that mitigates for impacts that were caused by implementation of the project. Monitoring will be conducted periodically during the anticipated 2-year monitoring period.

3.1 QUALITATIVE MONITORING METHODOLOGY

Qualitative monitoring is conducted in order to assess problems with plant mortality, weed invasion, erosion, herbivory and other issues which could affect the success of the project. Qualitative monitoring is recommended at least monthly in the first months after revegetation implementation. After a more frequent initial monitoring period, monitoring may be reduced if initial intensive monitoring period indicates mitigation measures are progressing towards success criteria. Also, if monitoring triggers a contingency measure, increased monitoring may be necessary to ensure success of contingency measures. Monitoring may need to be conducted more or less frequently as site conditions warrant. This portion of monitoring is not required but will improve the chances that Mitigation Measures are progressing towards success criteria and will allow for a written record of site development.

Data to be collected should include:

1. Presence/status of planted vegetation by species
2. Presence of native plant recruitment by species
3. Presence of non-native plant species with focus on invasive species
4. Presence and degree of erosion
5. Status and effectiveness of irrigation system (if applicable)
6. Trash/construction materials requiring removal
7. Exclusion fencing condition and repair recommendations (if applicable)
8. Herbivory
9. Any indications of problematic areas and analysis of potential causes and actions needed
10. Site Photo – taken from permanent reference point, to allow for repeat photography

Qualitative monitoring will be recorded on a datasheet like the one provided in Appendix A. Qualitative monitoring data is intended for internal use by City of Bishop, RO Anderson and the consultant/City of Bishop personnel responsible for monitoring project success.

3.2 QUANTITATIVE MONITORING METHODOLOGY

Quantitative Monitoring is necessary to document the revegetation area's progress toward attainment of the success criteria.

Due to the low diversity of plant species in the grazed meadow a numerical success criteria for the revegetation portion of the project are proposed for only grass species and invasive weeds. At the end of the two-year monitoring period, success of the re-vegetation portion of the project will be measured by:

1) Mean native grass density as measured by direct count in randomly located quadrats, reaches 70% of reference site grass density.
2) Non-native invasive species: density is less than 10%.

A permanent transect will be placed across the greatest extent of the revegetated area and ten quadrats one square meter in size will be randomly located on the transect line. Presence is defined as having the central stem rooted within the plot. Success will be indicated when the average of all quadrats are measured to be within the above criteria. Quantitative Monitoring will be recorded on a datasheet like the one provided in Appendix A.

Quantitative monitoring will be performed annually at the period of peak growth, which is anticipated to be near the end of September. Monitoring should be conducted at the optimum time to allow for identification of the majority of species expected to be present, and be conducted by an individual who is trained on vegetation monitoring techniques.

3.3 REPORTING

An annual monitoring report will be prepared within 90 days of the quantitative monitoring event and submitted to the LRWQCB in support of the required permitting for the project. Monitoring reports will include a summary of revegetation and enhancement methods, a brief discussion of qualitative monitoring observations and any issues identified in these monitoring events, discussion of any contingency measures implemented and a summary of significant qualitative monitoring findings. The report will also include an evaluation of mitigation efforts with respect to success criteria, and will provide any associated recommendations.

4.0 CONTINGENCY MEASURES

Contingency measures will be developed as needed during the revegetation period. There is a chance that the typical hot and dry weather conditions in the summer months will negatively impact project success. If monitoring efforts at the end of the first growing season (August-September) indicate that project is unlikely to meet success criteria, it will be necessary to either collect and re-plant additional *D. spicata* rhizomes or nursery raised *D. spicata* plants may need to be planted. A seed mix including native alkali meadow grasses including (but not limited to) *D, spicata, J. balticus, L. triticoides* and *S. airoides* may also be recommended. Other contingency measures may include to delivery of supplemental irrigation, increased treatment of non-native species, additional seeding or planting and grazing exclusion.

If revegetated areas do not meet the criteria at the end of the two-year monitoring period, the site will be reassessed and contingency measures will be implemented if necessary. If after two years the restoration is not meeting success criteria, recommendations will be developed in collaboration with LRWQCB. These recommendations may include reevaluating success after each successive 12 month period, until success criteria have been met. Success criteria could also be proposed to be modified to include native perennial herb cover or non-native species density could be adjusted. If success criteria are not achieved due to factors outside the control of the City of Bishop, alternative success criteria will be proposed.

It is intended that this plan not constrain the City of Bishop to specific methods as slightly different methods will be used dependent on timing of construction. Upon acceptance of this plan by LRWQCB and finalization of construction details, a more specific scope of work can be developed.

5.0 CONCLUSIONS

This report is intended to determine reasonable and appropriate mitigation measures to reduce the potential impacts to a small portion of low-functioning alkali meadow habitat as a result of the City of Bishop's Sanitary Sewer Trunk replacement project. Methods described herein can be modified by the City of Bishop and/or revegetation contractor as site and environmental conditions require. Methods were kept general so that the City and/or revegetation contractor have flexibility to use methods which are best for the timeframe which the project is actually implemented, site specific conditions that may not be evident at this time, and or cost effectiveness.

Success criteria for the temporary disturbance area are proposed to be measured by:

1) Mean native grass density reaches 70% of reference site grass density, as measured by direct count in randomly located quadrats,.
2) Non-native invasive species: density is less than 10%.

Success criteria for the alkali meadow enhancement, which is required for mitigation of the potential permanent loss of less than 0.10 acres of alkali meadow habitat, is proposed to be a mean increase in total plant count and/or plant diversity from pre-project conditions, with less than 10% non-native vegetation.

As requested by the City of Bishop, mitigation efforts are anticipated to be complete within two years of construction completion. If a longer timeframe is required to meet success criteria, additional recommendations will be proposed to LRWQCB in annual monitoring reports.

It is intended that this plan not constrain the City of Bishop to specific methods as slightly different methods will be used dependent on timing of construction. Upon acceptance of this plan by LRWQCB and finalization of construction details, a more specific scope of work can be developed.

6.0 REFERENCES

Bishop, G. 1996. A vegetative guide to selected native grasses of California. Technical Note PM-40. USDA-NRCS, Davis, CA.

California Wetlands Monitoring Workgroup (CWMW). 2012. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas, Version 6.0 pp. 95

Elmore, A.J., S.J. Manning, J.F. Mustard, AND J.M. Craine. 2006. Decline in alkali meadow vegetation cover in California: the effects of groundwater extraction and drought. Journal of Applied Ecology 43:770–779.

S.J. Manning, D. Pritchett. 2012. Response of an Intermountain Groundwater-Dependent Ecosystem to water Table Drawdown. Western North American Naturalist 72: p48–59.

Morris, K. and Reich, P. (2013) Understanding the relationship between livestock grazing and wetland condition. Arthur Rylah Institute for Environmental Research Technical Report Series No. 252. Department of Environment and Primary Industry, Heidelberg, Victoria

Nolte Engineering. 2008, City of Bishop Wastewater Master Plan.

RO Anderson Engineering. 2013. Preliminary Engineering Report for Sewer Trunk Replacement Project. Prepared for the city of Bishop. 66pp.

Sawyer, J.O., Keeler-Wolf, T. 2000. A Manual of California Vegetation. Online version. http://davisherb.ucdavis.edu/cnpsActiveServer/index.html

United States Department of Agriculture, Natural Resources Conservation Service, 2014. Custom Soil Resource Report using http://websoilsurvey.sc.egov.usda.gov/

United States Fish and Wildlife Service. 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed Proposed and Candidate Plants. USFWS, January.

7.0 GENERAL CONDITIONS

This report has been prepared according to generally accepted standards of environmental practice at the time this assessment was performed. TEAM Engineering & Management, Inc. (TEAM) does not assume responsibility for conditions that did not come to its attention or for conditions not generally recognized as environmentally acceptable at the time this report was prepared. Professional judgments contained in this report are based upon our education and experiences on similar projects. Services performed for this project by TEAM are in accordance with professional standards for environmental practice; no guarantees are either expressed or implied.

FIGURES

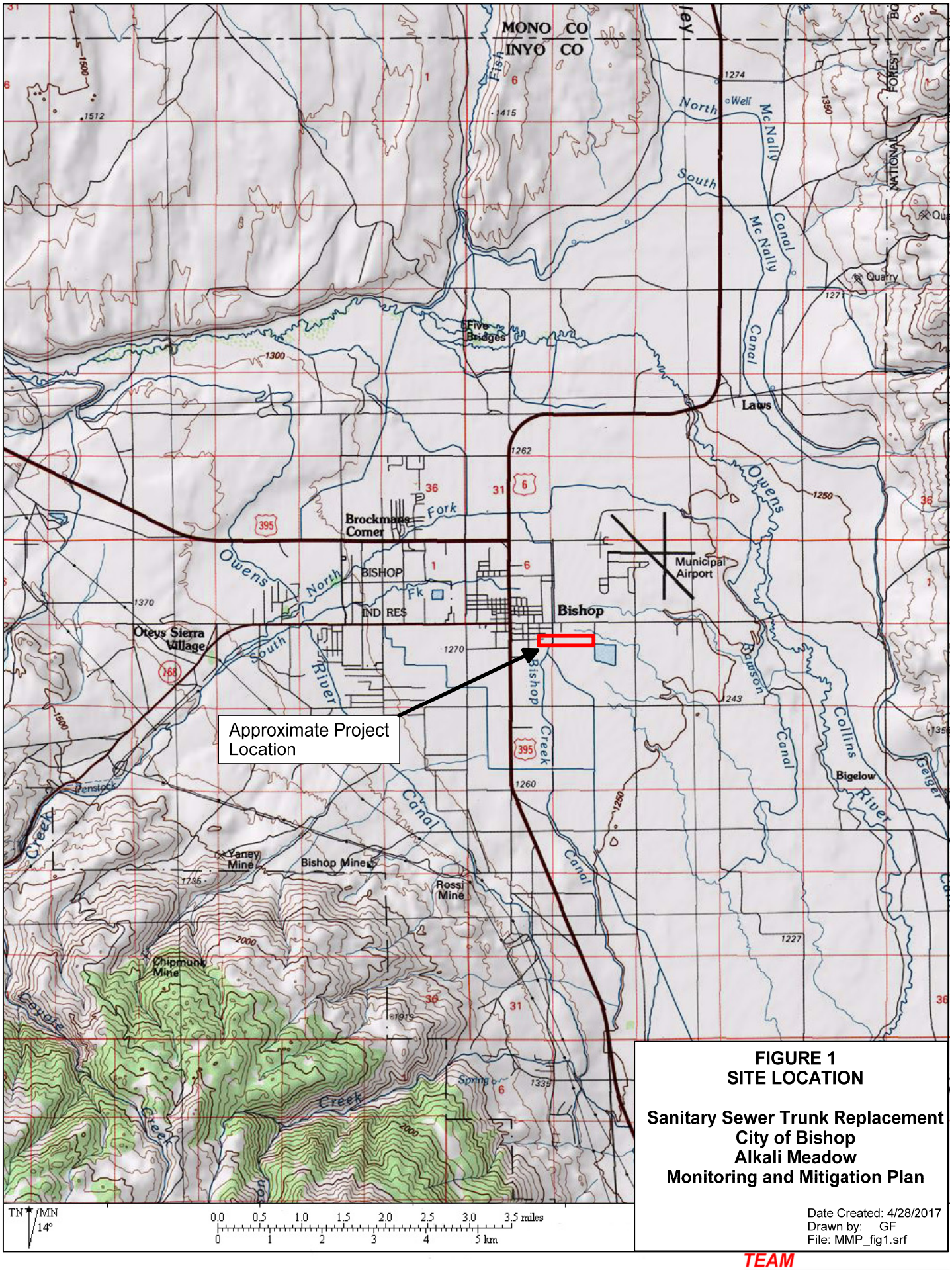

FIGURE 1
SITE LOCATION

Sanitary Sewer Trunk Replacement
City of Bishop
Alkali Meadow
Monitoring and Mitigation Plan

Date Created: 4/28/2017
Drawn by: GF
File: MMP_fig1.srf

TEAM
ENGINEERING & MANAGEMENT, INC.
Bishop • Mammoth Lakes

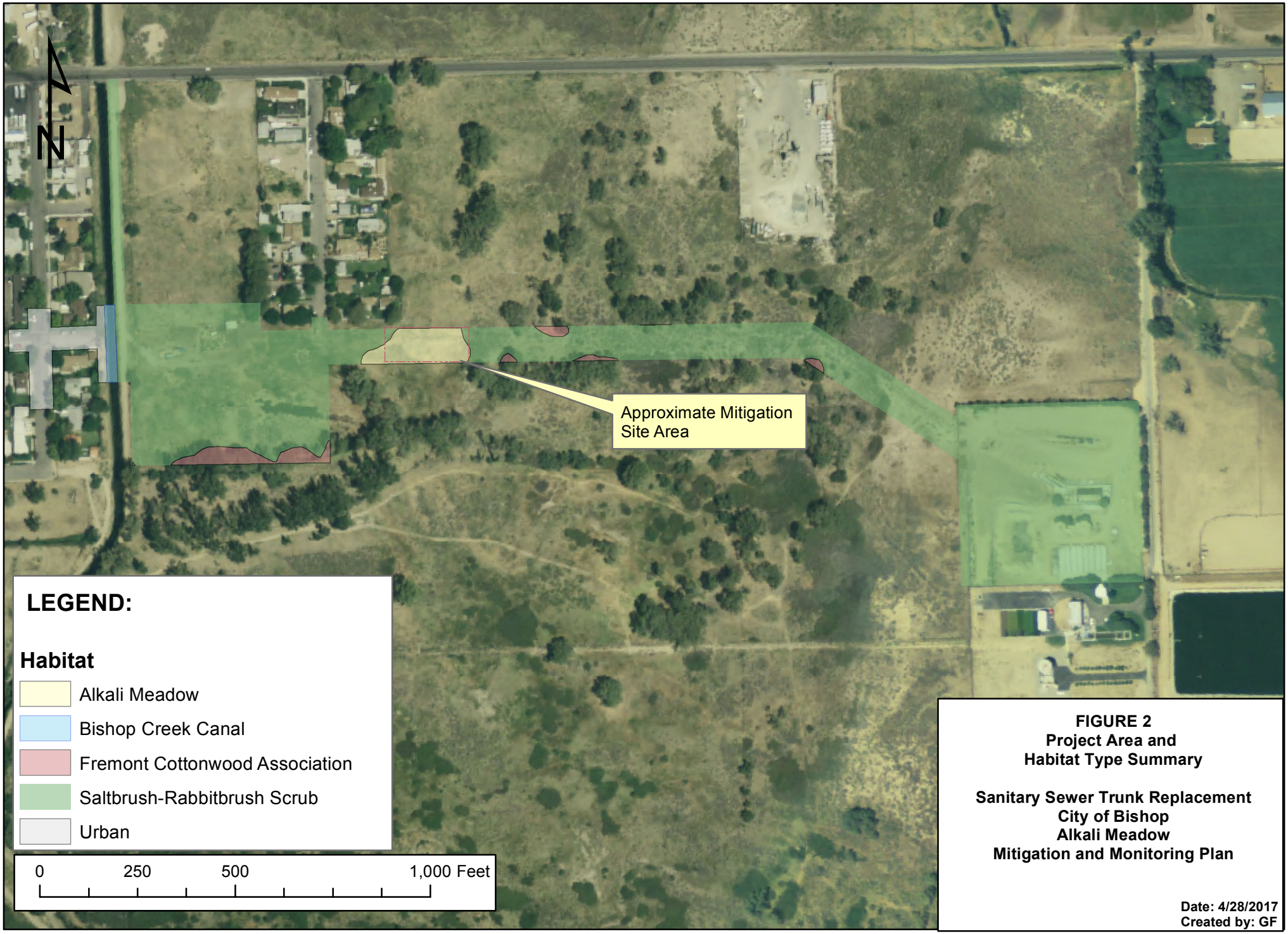

FIGURE 2
Project Area and
Habitat Type Summary

Sanitary Sewer Trunk Replacement
City of Bishop
Alkali Meadow
Mitigation and Monitoring Plan

Date: 4/28/2017
Created by: GF

TEAM
ENGINEERING & MANAGEMENT, INC.
Bishop, California

APPENDIX A

SAMPLE DATA FORMS

City of Bishop - Alkali Meadow, Quantitative Monitoring Datasheet

Date: _____ Personnel: _____

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

Plot #

Grasses (sp, #)	
Other species (sp, #)	
Non-native species (sp, #)	

City of Bishop - Alkali Meadow, Qualitative Monitoring Datasheet

Date: _____ Personnel: _____

Grass species:	
Other species:	
Non-native species:	
Erosion:	
Trash/debris:	
Irrigation system:	
Fencing:	
Herbivory:	
Actions taken:	
Actions needed:	
Photo #:	