ATTACHMENT 1- PROJECT DESCRIPTION

Steven and Cecilia Tweed would like to secure proper permits for the installation of a second water storage tank, which along with the existing tank would be supplied by an unnamed spring on their property, located at 5913 McKinney Creek Road, Klamath River, Siskiyou County, CA (APN 014-020-030). The project site is approximately 9 miles southwest of the town of Klamath River. This property is a 1900's era homestead comprised of 159 acres abutting McKinney Creek, a tributary to the Klamath River. Currently, the property consists of one residence and one guest cabin. Potable water for both buildings is supplied by a well. Four springs emerge within the property boundaries that are not hydrologically connected to McKinney Creek on the surface as the waters infiltrate back into the ground within or just outside the property boundaries.

The Tweed's are requesting in their application to divert 1.5 acre-feet per annum in total from a single point of diversion on an unnamed spring, referred to as Spring 1. An inlet and pipeline would deliver the water to the existing and proposed storage tanks, respectively, in order to dispense or store 1.5 acre-feet (af) of water. The diversion system will be designed in such a way that the maximum or adjusted capacity will be 1.5 af per annum. The tanks would be connected, so that they could be filled or emptied consecutively.

The existing off-stream water storage tank is constructed of redwood and the proposed tank would be constructed of polyethylene. The new tank will have an approximate diameter of 8 feet and height of 8 feet, with a 2500 gallon capacity. The beneficial use of the stored water will be gravity-fed flood irrigation of up to 10 acres of meadow on the property.

Attachment 3 of the Application to Appropriate Water contains a regional map and a site map, together indicating the position of the property in the watershed in relation to McKinney Creek, the location of the proposed point of diversion, the location of the proposed second storage tank and the area of use.

ATTACHMENT 2- WATER AVAILABILITY ANALYSIS

TO: Deputy Director, Division of Water Rights, State Water Resources Control Board

FROM: Chico Environmental Science & Planning, 333 Main St., Suite 260, Chico, CA 95928

DATE: August 15, 2012

SUBJECT: **WATER AVAILABILITY ANALYSIS (WAA) FOR APPLICATION TO APPROPRIATE WATER OF: Steven and Cecilia Tweed**

1.0 INTRODUCTION

The purpose of this report is to summarize the results of the water availability analysis conducted for the subject application located within the McKinney Creek watershed in Siskiyou County. The objectives of the analysis are as follows:

- To provide information required under California Water Code section 1275 (a), 1375 (d), 1243, 1243.5 and California Code of Regulations, Title 23, section 782, to demonstrate whether water is available for appropriation; and
- To determine the impact of the applications/project on streamflow in order to evaluate potential impacts to Public Trust Resources and provisions for compliance with various federal and state requirements. Examples include the California Environmental Quality Act (CEQA), the California Endangered Species Act (CESA), California Fish and Game Code and the federal Endangered Species Act (ESA).

2.0 PROJECT DESCRIPTION

Steven and Cecilia Tweed would like to secure proper permits for the installation of a second water storage tank, which along with the existing tank would be supplied by an unnamed spring on their property, located at 5913 McKinney Creek Road, Klamath River, Siskiyou County, CA (APN 014-020-030). The project site is approximately 9 miles southwest of the town of Klamath River. This property is a 1900's era homestead comprised of 159 acres abutting McKinney Creek, a tributary to the Klamath River. Currently, the property consists of one residence and one guest cabin. Potable water for both buildings is supplied by a well. Four springs emerge within the property boundaries that are not hydrologically connected to McKinney Creek on the surface as the waters infiltrate back into the ground within or just outside the property boundaries.

The Tweed's are requesting in their application to divert 1.5 acre-feet per annum in total from a single point of diversion on an unnamed spring, referred to as Spring 1. An inlet and pipeline would deliver the water to the existing and proposed storage tanks, respectively, in order to dispense or store 1.5 acre-feet (af) of water. The diversion system will be designed in such a way that the maximum or adjusted capacity will be 1.5 af per annum. The tanks would be connected, so that they could be filled or emptied consecutively.

The existing off-stream water storage tank is constructed of redwood and the proposed tank would be constructed of polyethylene. The new tank will have an approximate diameter of 8 feet and height of 12 feet, with a 4500 gallon capacity. The beneficial use of the stored water will be gravity-fed flood irrigation of up to 10 acres of meadow on the property.

Attachment 3 of the Application to Appropriate Water contains a regional map and a site map, together indicating the position of the property in the watershed in relation to McKinney Creek, the location of the proposed point of diversion, the location of the proposed second storage tank and the area of use.

3.0 METHODS

McKinney Creek is a perennial drainage beginning at an elevation of approximately 1800 meters mean sea level (msl) on the Scott Bar Mountains in Siskiyou County, and running down to an elevation of approximately 520 meters msl where it meets the Klamath River.

The McKinney Creek watershed was calculated by GIS to encompass approximately 7,289 acres (see Figure 1), and receives an average of 8.85 inches of annual cumulative precipitation according to the USFS Station CLB located 3 miles west of the project site.

McKinney Creek is an ungauged watercourse. Due to the lack of data, the Rainfall-Runoff Method was used to calculate runoff for the watershed. The value 0.52 was used for C (Runoff Coefficient) (Dunne and Leopold, 1978) (See Appendix A).

Monthly precipitation data was collected from 1992-2008 from USFS Collins Baldy Station (CLB) and used to determine the estimated average annual runoff (Q) in acre-ft per year.

The Point of Diversion would be fed by Spring 1. Flow from Spring 1 was measured on June 9, 2009, as 0.001 cfs. Flow was too low to be measured during site visit on September 22, 2009. Rainfall supplements the flow in the Spring 1 drainage seasonally.

3.1 Rainfall-Runoff Method

Rainfall runoff methods use rainfall data and land use characteristics to calculate runoff for a particular watershed area. When the rate of rainfall exceeds the rate of infiltration of water into the ground, excess water (runoff) is available to supply surface waters. The rational method is typically used by engineers and hydrologists to design hydraulic structures and predict peak flood flows. However, under the assumptions discussed below, the rational method is used to estimate the average annual runoff based on the average annual precipitation. The equation is shown below:

$$Q = C\,i\,A$$

Where: Q = Estimated average annual runoff (acre-feet per month);
C = Runoff coefficient;
i = Average monthly precipitation (feet per month); and
A = Tributary watershed area (acres)

The runoff coefficient "C" in the rational method equation represents the percent of water that will run off the ground surface during a storm event. The California Department of Transportation (Caltrans) Highway Design Manual provides tables (See Appendix A) showing various values for

"C" depending on soil type, relief, vegetation and surface storage[1]. Where multiple land uses are found within the watershed, it is customary to use an area-weighted runoff coefficient[2]. In addition, the runoff coefficients given in the Caltrans Highway Design Manual are applicable for storms of up to 5 or 10 year frequencies. Less frequent, higher intensity storms require adjustment[3].

Since the rational method is so commonly used, it is important to note the assumptions in its development. The equation assumes that rainfall is of equal intensity over the entire watershed. Because actual rainfall rates vary over space and time, the rational method should only be used within small watershed areas where rainfall is likely to be relatively uniform.

Due to the absence of gauges within the McKinney Creek watershed, the rational method was used for the entire watershed.

Table 1. Estimated average annual runoff

	McKinney Creek Watershed	Units	POD #1 Watershed	Units
Area	7289	acres	17*	acres
Jan	321.6164	acre ft/mo	0.7501	acre ft/mo
Feb	180.7815	acre ft/mo	0.4216	acre ft/mo
Mar	229.8322	acre ft/mo	0.5360	acre ft/mo
Apr	237.2641	acre ft/mo	0.5533	acre ft/mo
May	243.5812	acre ft/mo	0.5681	acre ft/mo
Jun	139.3485	acre ft/mo	0.3250	acre ft/mo
Jul	115.5664	acre ft/mo	0.2695	acre ft/mo
Aug	49.9796	acre ft/mo	0.1165	acre ft/mo
Sept	57.7831	acre ft/mo	0.1347	acre ft/mo
Oct	243.3954	acre ft/mo	0.5676	acre ft/mo
Nov	439.5982	acre ft/mo	1.0256	acre ft/mo
Dec	536.7705	acre ft/mo	1.2519	acre ft/mo
Total	2795.517	acre ft/yr	6.5199*	acre ft/yr

*Estimate does not include flow from Spring 1.

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[1] California Department of Transportation. *Highway Design Manual*, July 1, 1995. http://www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm

[2] Bedient and Huber. *Hydrology and Floodplain Analysis*, 2nd ed. 1992. Pg 395.

[3] Linsley, et al. *Water Resources Engineering*, 4th edition, 1992. Pg. 59.

APPENDIX A
Runoff Coefficient for Undeveloped Areas

	Watershed Types			
	Extreme	High	Normal	Low
Relief	0.28 – 0.35 Steep, rugged terrain with average slopes above 30%	0.20 – 0.28 Hilly, with average slopes of 10 to 30%	0.14 – 0.20 Rolling with average slope of 5 to 10%	0.08 – 0.14 Relatively flat land, with average slope of 0 to 5%
Soil Saturation	0.12 – 0.16 No effective soil cover; either rock or thin soil mantle of negligible infiltration capacity	0.08 – 0.12 Slow to take up water; clay or loam soil of low infiltration capacity; imperfectly or poorly drained	0.06 – 0.08 Normal; well-drained, high or medium-textured soils, sandy loams, silt and silty loams.	0.04 – 0.06 High; deep sand or other soil that takes up water readily, very high level drained soils.
Vegetal Cover	0.12 – 0.16 No effective plant cover, bare, or very sparse cover	0.08 – 0.12 Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	0.06 – 0.08 Fair to good; about 50% of area in good grassland or woodland, not more than 50% of area in cultivated crops	0.04 – 0.06 Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover
Surface Storage	0.10 – 0.12 Negligible surface depression few and shallow; drainage ways steep and small, no marshes	0.08 – 0.10 Low; very well defined system of drainage ways; no ponds or marshes	0.06 – 0.08 Normal; considerable surface depression storage, lakes and pond marshes	0.04 – 0.06 High; surface storage high; drainage system not sharply defined, large floodplain storage or large number of pond marshes

The watershed of the project site consisting of:

Solutions:

1) Hilly terrain with average slope of 30%,
2) Well-drained gravelly loams,
3) Woodland, and
4) Low, well-defined

Find the runoff coefficient, C, for the above watershed.

Relief = 0.30
Soil infiltration = 0.06
Vegetal Cover = 0.06
Surface storage = 0.10

C = 0.52

Reference Source: California Department of Transportation, *Highway Design Manual*,

July 1, 1995, pp. 810-816