

**HYDROLOGY EVALUATION
MILLER VINEYARD
3906 SILVERADO TRAIL, NAPA COUNTY, CA
APN 021-030-006**

At the request of Napa County Planning, Building & Environmental Services (PBES), this evaluation outlines the potential for a reduction in stormwater runoff as a result of the proposed vineyard development.

PROJECT DESCRIPTION

The proposed project involves a Track I Vineyard Development and Erosion Control Plan that includes the planting of three (3) separate vineyard blocks (Vineyard Blocks B1, B2, and B3) located on the above referenced subject parcel that is located within the Agricultural Watershed (AW) zoning district. The 27.76± acre subject parcel is currently developed with a residence, barns, wells, driveway, access roads, pool, other residential structures, residential onsite wastewater dispersal field, and 1.2± acres of vineyard (Block A). The project will be constructed under a single (1) phase and includes a disturbed area of approximately 6.0± acres.

HYDROLOGY OVERVIEW

Bartelt Engineering has completed this hydrology evaluation utilizing TR-55 and the SCS Runoff Curve Number (CN) method by comparing the groundcover of the existing conditions against the proposed development conditions.

The SCS runoff equation is given as follows¹:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \quad [\text{eq. 2-1}]$$

Where:

Q = runoff (in)

P = rainfall (in); use 2-year, 6-hour rainfall, 2.28 inches

S = potential maximum retention after runoff begins (in)

I_a = initial abstraction (in)

Initial abstraction (I_a) is all losses before runoff begins; for small agricultural watersheds, I_a was found to be approximated by the following empirical equation:

$$I_a = 0.2S \quad [\text{eq.2-2}]$$

The combination of S and P into equation 2-1 results in the following:

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)} \quad [\text{eq.2-3}]$$

S is related to the soil and cover conditions of the watershed through the CN. S is related to CN by:

$$S = \frac{1000}{CN} - 10 \quad [\text{eq.2-4}]$$

¹ USDA, NRCS, Urban Hydrology for Small Watersheds Technical Release 55 (TR-55), June 1986

VINEYARD DEVELOPMENT AREA

The soil within the proposed vineyard development area consists primarily of soil type, 107-Boomer Loam, volcanic bedrock 2 to 35 percent slopes, and classified in Hydrologic Soil Group “C”.

Existing Vegetal Conditions and Runoff Calculations:

The existing vegetation within the proposed vineyard development area falls under the vegetative community of “permanent pasture, range, idle land, or grazed woodland”; the vegetal canopy consists of “trees, but no appreciable low brush with fall height of 13-feet”. For the described cover type an appropriate curve number of 82 corresponds to “woods-grass combination” with poor hydrologic condition². The stormwater runoff is calculated as follows:

S = potential maximum retention after runoff begins (in)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{82} - 10 = 2.195 \text{ inches}$$

Q = runoff (in)

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} = \frac{(2.28 - 0.2(2.195))^2}{(2.28 + 0.8(2.195))} = 0.84 \text{ inches}$$

Proposed Vegetal Conditions and Runoff Calculations:

The vegetation cover type within the proposed vineyard development area is specified as “close-seeded or broadcast legumes or rotational meadow, Straight row in good hydrologic condition with 80% groundcover”. For the specified cover an appropriate curve number of 81 can be assigned to the vineyard development areas³. The stormwater runoff is calculated as follows:

S = potential maximum retention after runoff begins (in)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{81} - 10 = 2.346 \text{ inches}$$

Q = runoff (in)

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} = \frac{(2.28 - 0.2(2.346))^2}{(2.28 + 0.8(2.346))} = 0.79 \text{ inches}$$

STORMWATER RUNOFF SUMMARY:

Based on the above calculations, there is a reduction in stormwater runoff from the proposed vineyard development compared to the existing conditions for any given storm event. The slight increase in the CN will also slow down the velocity of the stormwater runoff within the vineyard blocks.

² Table 2-2c Runoff curve numbers for other agricultural lands; TR-55, Second Ed., June 1986.

³ Table 2-2b Runoff curve numbers for cultivated agricultural lands; TR-55, Second Ed., June 1986.