Appendix D

Erosion Control and Mitigation Plan

Artesa Annapolis Vineyard
35147 Annapolis Road
Annapolis CA 95412

Prepared for:

Artesa Vineyards and Winery
1345 Henry Road
Napa CA 94559

by

Erickson Engineering Inc.
Valley Ford CA 94972-0446
707/795-2498 Voice/Fax

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Introduction

An erosion control plan which addresses the concerns of regulatory agencies including but not limited to the California Department of Forestry and Fire Protection (Cal Fire), North Coast Regional Water Quality Control Board (NCRWQCB), and the California Department of Fish and Game (CDFG) has been developed for the proposed Artesa Vineyard at 35147 Annapolis Road, Annapolis CA 95412. The Plan addresses normal temporary and permanent erosion control requirements for vineyard development. A format consistent with CDFG Mitigation Plan Development Guidelines has been followed for the work.

Project Description

The property is located on the broad crest of Beatty Ridge south of Annapolis in northern Sonoma County. The proposed vineyards are situated on ridge tops and hillside slopes of 0 - 25% on a property that has been logged, pastured, and farmed in the past. The attached figures show the site, access, major water courses, and watershed limits as determined by other consultants and are adapted from the USGS 7.5-minute quadrangle map, Annapolis at 1" = 2000' and 40’ contours. On-site improvements within the proposed vineyard are limited to old orchards, field fences, historic property access and logging trails, a public utilities corridor, and other incidental improvements.

Vineyard development activities will be completed over a number of seasons in the designated areas within the project work area. The individual blocks have an irregular boundary on finger ridges within previously logged areas that have regrown over the past 30 - 50 years. The ground is generally undulating at 5 - 20% with alternating minor ridges and swales at 5% - 30% slope. Vineyard perimeter edge effects to allow for existing roads, field avenues, reservoir, sump, sediment detention basins, and other incidental facilities will result in vineyard and plantable areas somewhat less than the gross area. Based on the companion vineyard development topography map, about 160 total vineyard acres and 129 acres of plantable vineyard are expected.

This report covers erosion and sediment control activities associated with timber harvest and subsequent vineyard development and agricultural improvements on the property. Vineyard drainage is an integral part of the erosion control plan and is covered. The drainage system interfaces with collection and storage of surface runoff for irrigation purposes, so the vineyard water budget is discussed as well.

Site Geologic Setting

The USGS Santa Rosa Quadrangle Map 2A was consulted to assess underlying geologic strata. The property is situated within a large-scale block delineated as an early Tertiary era (60 - 120 million years old) Coastal Belt Franciscan Formation (TKf) with subsurface geology, consisting of marine sandstone, shale, and conglomerate, typical of adjacent ridge top uplands on north west trending major ridges in the interior coastal range area in northern Sonoma County. Portions of the area are capped by more recent Pliocene age (3-11 million years old) Ohlson Ranch Formation (Por) subsurface geology, consisting of marine sandstone, siltstone, and conglomerate. Vineyard development on the Fairfax property appears to be predominantly within the Por zone, based on sandstone-derived ridge top soil types and generally low-slope ridge top swales that trend rapidly into steep and rocky canyons of Franciscan origin. Based on presence of marine sandstones and undamaged fossilized seashells commonly found at relatively shallow depth in local profiles, the area has been uplifted from sea beds as part of the tectonic activity forming this part of California.

The geologically active San Andreas fault extends through Plantation and the South Fork Gualala River canyon, about 5 - 8 miles to the west. Earthquakes generated from this fault or other sources may cause ground shaking during the lifetime of the project, but are not normally considered as a design factor during vineyard development. Distance to active fault lines and presence of bedrock at relatively shallow depth would tend to minimize potential for earthquake induced damage at this location.

The general geologic patterns indicated on the low-resolution 1:250,000 base map can be expected to show overlap and diversity in features observed on the property. Surface characteristics at the vineyard are consistent with a uplift and erosional -derived history, varying from area to area.

Most of the property appears to have topography consistent with natural long-term erosion rather than recent or surface land sliding processes. This is characterized as gentle swales in uplands and vee-shaped channel areas bisected by prominent ridges, rather than stair-stepped benches on the hillsides. The property does not have obvious characteristics of recent slumping or landslide activity, indicating suitability for the intended purpose of vineyard development.

Vineyard Soils

Surface soils in the area have been mapped on the USDA Soil Conservation Service - Soil Survey of Sonoma County, Sheet 16. Note that the mapping was completed using general topography, land forms, and vegetation to mark boundaries, supplemented by intermittent field verification, sometimes many miles from a particular project location. Soil types should therefore be verified on a site-specific basis, as the low-resolution mapping scale is insufficient to provide a high level of detail, particularly in areas of topographic or geologic complexity.

Area soils have been mapped as predominantly Goldridge fine sandy loam GdE (15-30%). They consist of moderately well drained fine sandy loams that have a sandy clay loam subsoil and are formed from coarse-grained, weakly consolidated sandstone. They are located on uplands inland from the coast, extending from Sebastopol to the Annapolis area. They are associated with Blucher, Cotati, Sebastopol, and Steinbeck soils. Other site soils include GdF Goldridge fine sandy loam 30 - 50% and HkF Hugo very gravelly loam 30-50%. The Goldridge soil would be considered the limiting condition with regard to site development.

According to the report, in a typical profile the Goldridge surface layer is about 16” deep, light brownish gray, strongly acid, with light gray, pale yellow and yellow brown subsoils. Permeability is moderately slow in the subsoil. Runoff is medium to rapid, and the hazard of erosion is moderate at low slope, increasing to high at high slope.

Soils were observed at the time of site inspection in cleared field areas and in existing road cuts, and in soils test pits related to future reservoir development. In general, they appear to be consistent with the mapping units. Soils observed were brown to yellow brown sandy loams with intermittent shallow decomposed sandstone or shale bedrock outcrops at canyon mouths or steep slopes outside of vineyard development areas.

The local soils are believed suitable for vineyard development, based on historical and ongoing agricultural activity in similar upland soils in the region. Soil amendments are typically applied in response to soil testing, in order to moderate acidity. Nutrients are applied to vineyards on an as needed basis through foliar or irrigation methods, based on annual monitoring results. Satisfactory levels of surface drainage and permanent cover crop development will be necessary to prevent formation of sheet and rill erosion.

Site Hydrology

Estimates of surface runoff flow rates are necessary for drainage design to meet erosion control objectives and Agency requirements. Estimated peak values for surface runoff for a particular return period are typically correlated with average annual rainfall for design purposes. The Sonoma County Water Agency isohyetal map is based on near 100 years of data and indicates an average annual rainfall of between 70 and 75 inches in the project area. NOAA data for the same area covers a shorter, more recent time period at a substantially lower level of detail and estimates the average annual rainfall at about 58 inches.

Actual rainfall on the specific ridge crest in question is a function of, slope, aspect, surrounding orographic features, vegetative cover, long-term and perhaps evolutionary regional climate factors, and similar factors not accounted for in the generalized regional maps. Both seasonal and peak runoff will be further influenced by soil type, antecedent moisture conditions, ground cover, vegetative cover, drainage facilities, erosion control facilities, storm frequency and intensity, and similar factors. Due to the numerous parameters and inherent parameter variability, exact runoff volume and rate values for a particular time period cannot be predicted with certainty.

A conservative drainage design was developed by using the higher Sonoma County Water Agency average annual rainfall values as a basis for computation. Peak flow rate estimates for this site were developed using Rational Method procedures as defined by Sonoma County. Short-duration runoff flows are expected to be relatively high for this ridge top location at about 900 feet elevation with relatively high annual average precipitation.

For the 100-year 15-minute storm at 2.4 inches/hour, a 45% runoff factor, and average site and baseline rainfall totals at 70"/year and 30"/year respectively, design flows are estimated at Q = .45*2.4*(70/30) = 2.5 cubic feet per second per acre. Peak flows for the USDA Type II storms expected in coastal California have relatively short duration, with the flows noted expected for only a matter of minutes. In a 24-hour period, estimated flow rates are expected to exceed 2/3 of the values noted for only about an hour.

The runoff factor and rainfall rates used in this report and for vineyard drainage system design may vary from those used by other consultants. This is because parameter values reflect requirements of the drainage design review agency (Sonoma County), a different audience than agencies associated with Environmental Impact Report environmental review. Other consultants may use different design conditions and assumptions that are professionally defensible and valid for their particular analyses. Note that the parameter values used herein in the ECP are more conservative (2.4 in/hr versus 1.76 in/hr and .45 versus .40 runoff factor) than those used elsewhere, resulting in a more conservative drainage system design, a desirable attribute from the standpoint of reliability, maintenance, and risk management.

Drainage System Design

Drainage design for a particular sub-watershed is accomplished on an individual basis by determining tributary area, developing a peak total flow based on the unit area rates noted, and selecting a pipe size and location appropriate for handling the design flows. Attention to detail is important regarding pipe placement with respect to swales, rows, or terraces, pipe bedding, inlet configuration, inlet design, outlet armor, and other features in order for the structure to function as intended. For this property, proposed drainage configurations are shown on the attachments. Final drainage configurations will be fine tuned on an individual sub-watershed basis at the time of vineyard development to account for design variables including row layout and final grading that cannot be determined with certainty at this time.

All vineyard development areas have been excluded from Class III or Class II watercourses, so concentrated flows in channel or gully areas will not be encountered within the vineyard. Recommendations of the hydro-geomorphology consultants involved in project development have been incorporated in the work to minimize risk of soil mobilization in downslope channel areas. A number of mitigation sites have also been developed around the periphery of the vineyard, addressing specific areas determined to have higher than normal erosion potential.

Diffuse sheet flow and swale flow will be intercepted and conveyed by pipe to a proposed sump and reservoir system in Block 2. Other blocks will be drained via pipes to armored outlets at downslope locations, or by diffuse sheet flow to downslope areas. Sediment detention basins have been specified at most drainage outfall locations to minimize risk of bedload transport from the site.

Conversion from poor quality second and third growth timber with abandoned skid roads and passively developed gullied areas to an improved vineyard is believed to have a limited impact on surface water hydrology. Total watershed runoff yields are determined by rainfall and tributary area. The companion

hydrologic assessment by O'Connor Environmental indicates that surface runoff and late season groundwater supplies may be enhanced in areas where vineyards replace the existing trees and brush. The vineyard is expected to ultimately be managed with permanent cover crop, tending to result in similar infiltration rates relative to historical grassed meadow conditions. Post-construction conditions will be optimized by development of both temporary and permanent cover crops to maximize infiltration rate to the extent possible.

Mitigation for any potential increased runoff rate in vineyards includes measures to limit flow velocity and exposure to unprotected soil as discussed in the Erosion Control Methods section below. These measures include but are not limited to temporary soil mulching, seasonal fiber roll checks, development of permanent cover crops, control of slope for rows and terraces that concentrate runoff, installation of detention basins at piped outfall locations, and placement diversion structures, inlets and drain pipes to prevent erosive flow concentrations and water velocity during runoff events.

Watershed areas for individual vineyard blocks are relatively small and highly subdivided per the vineyard Plan. This is due to location of individual vineyard blocks on discrete ridge top areas and because individual blocks discharge into different headwater tributary watercourses. Watershed peak flows at individual vineyard outfalls have been estimated as part of the drainage design evaluation and specific pipe sizes determined for each area so treated. Individual pipe size and location verification will be necessary at time of final configuration determination prior to construction.

Temporary Timberland Harvest and Conversion Activities

Timberland harvest involves selective removal of merchantable trees. The subsequent conversion involves residual slash collection and removal, stump removal, root picking, and other activities as discussed in the vineyard development section below. A comprehensive and seamless approach to erosion control and runoff management will be present, covering the transition from temporary harvest and conversion activities through vineyard installation and throughout the year.

Historic logging activities in the region and in this watershed were held to few if any standards with regard to erosion controls, runoff management, logging road removal/management, slash management, and similar factors. As a result, temporary and long-term watershed sediment budgets were likely negatively impacted by the results of those historic activities. Current Forest Practice Rules, Water Quality objectives, and Vineyard and Orchard Ordinance rules are very much more stringent in this regard, and multiple agencies now exercise considerable review and oversight on planning, implementation, and post-project management of timber harvest and conversion activities. Observations as to watershed-wide negative impacts of historic logging activities as expressed in the NCRWQCB *Gualala River Watershed Technical Support Document for Sediment* (TSD) do not necessarily apply to this project, because the operational parameters and methodologies are not comparable.

For a project of this size and complexity, phased development is expected. Incremental areas will be harvested, followed immediately by the initial conversion activities. From a benefit-cost standpoint, and from an installation efficiency standpoint, it makes no sense to install temporary infrastructure-type erosion control measures, followed by replacement with permanent measures in the following year. Therefore, permanent measures such as detention basins and surface drainage improvements will be installed following site preparation to serve both temporary and permanent runoff control functions.

Timber harvest and conversion activities, as well as subsequent vineyard installation activities are limited to normally dry summer months. Likelihood of rain is quite low during the time period, and any precipitation amounts would be expected to be light. Chance of runoff would be extremely low, due to high expected infiltration of dry soil disturbed by tree removal and related vineyard preparation activity.

Timber removal will result in a temporary haul road system extending into the major harvest areas. The property has been logged in the past, and the basic road and trail system is believed already present and appropriately located. Reconditioning and reuse of the old haul roads will minimize soil disturbance

related to timber harvest. Assuming feeder trails spaced at about 500' on center results in an estimated road system length of less than 24000 feet in the +-184-acre conversion area. For 10' road widths, the temporary transportation corridors require about 5.3 acres, less than 3% of the total work area.

Temporary soil compaction due to equipment operation may occur in the transportation corridors, with potential for reduced infiltration, should rainfall occur. The roads will generally be surrounded by areas subject to increased permeability because of soil disturbance associated with stump and root removal. Standard Best Management Practices including straw mulch, outsloped roads, water bars, fiber rolls, and the like will be employed on an as-needed basis to prevent runoff and soil migration from haul roads and other disturbed areas.

Weed-free mulch, native slash or clean straw will be used for erosion control throughout the project site. All cover crops and erosion control seed mixes will use either native grasses derived from genetic stock from the region of the project site, or the sterile wheat/tall wheat hybrid, Regreen©. Within the horkelia preserve, erosion control shall be used on existing and temporary roads in areas where the potential exists for excessive sediment delivery to preserves and existing wetlands. All necessary erosion and sediment controls will be in place during activity associated with the construction of the access road west of the thin-lobed horkelia preserve.

The combination of dry season construction, advanced planning, effective runoff management, and installation of permanent drainage features is expected to result in no significant risk of sediment mobilization from the work areas.

As part of the permitting process, a State of California mandated Storm Water Pollution Prevention Plan (SWPPP) will be developed and implemented. The Plan requires comprehensive assessment and planning for minimizing risk of sediment export from the work areas. After BMPs are in place, supplemental stockpiled materials will be maintained on site for use in emergency situations, should they arise.

A work area and erosion control system monitoring program has been developed by O'Connor Environmental Inc. in conjunction with the Landowner and the vineyard development team. Monitoring will be conducted on a visual basis by OEI and others during the THP-TCP process as discussed in their report covered elsewhere within the EIR. The basic mission will be to evaluate winter preparedness, ensure BMPs are in place, and to evaluate performance of ECP components and BMPs installed regularly throughout the runoff season. Should any require adjustment, monitoring will provide an early-warning system for remediation.

Wide area exposure to wind and rain erosion during the construction season is expected to be minimal. Work will occur during summer months when rainfall is not expected and wind conditions are usually light to moderate. During initial harvest, logging slash will provide effective soil mulch. After stump, root, and slash removal, any necessary minor shaping and grading will occur. Drainage and detention basin systems will be installed. Straw mulch at 4000 lb/ac will be installed per Vineyard and Orchard Ordinance requirements and will help maximize soil infiltration rates. The combination of near-continuous ground cover and drainage system development is expected to minimize exposure and risk of sediment transport from vineyard work areas.

Irrigation Water Development

Vineyard development feasibility is dependent on adequate quality and quantity of water. A separate report is devoted to evaluating irrigation demand and related water storage requirements. Results of that work demonstrate that adequate local surface water supplies are available under wet, normal, and dry year conditions to support viticultural objectives.

Vineyard Layout Considerations

As shown on the attachments, vineyard blocks on site will be developed on hillside slopes ranging from nearly level to about 25 percent. Most hillside slopes on the property are typically in the range of 5 to 20%. Some areas with lesser slopes are located on ridge top areas, and small inclusions of greater slope on larger hillside areas have been incorporated where surrounded by lesser slopes or where necessary to accommodate efficient field layout, terrace design, or equipment operation.

The row layouts will generally be at an angle relative to slopes, with regularly spaced intermittent cross slope drainage ditches provided in some blocks and sheet flow controls in other blocks. Where used, shallow low-slope vee ditches of suitable capacity will drain to a pipe collection system used convey the water down slope to a detention basin and armored discharge points in existing natural channel areas. Hillsides of similar slope with similar soils on nearby properties have been successfully developed without significant erosion on a large scale basis. Many vineyards of up to 30% are farmed perpendicular to slope when adequately drained, cover cropped, and operated under no-till conditions with crawler-type equipment.

Vineyard Installation Activities

Land clearing and development activities will begin in spring and summer of the year that Cal Fire Timberland Conversion and Timber Harvest Plan permits are in place. The vineyard owner intends to develop all vineyard areas according to high quality industry standards.

Work on the land includes timber and fuel wood harvest per Cal Fire permit requirements. Work on cleared land includes stump extrication and stockpile for grinding or off-site disposal, root removal, minor shaping where required, soil amendment application, shallow ripping, and vine row installation. Drainage and erosion control features will be installed in conjunction with vineyard development.

Work will be conducted during spring, summer, and fall months. Erosion control and sediment retention components will be in place on a temporary basis as required during the construction season, and on a seasonal or permanent basis prior to onset of winter rains. A typical operational sequence includes:

- Placement of temporary erosion control measures around work areas.
- Tree and stump removal and stockpiling, or disposal.
- Surface shaping and grading as desired/required to facilitate efficient vineyard layout.
- Shallow ripping to break up roots and modify soil structure.
- Rough grading or shaping as required to smooth field irregularities, improve drainage, modify field layout, or meet other management objectives.
- Concurrent root picking using hand or mechanical means to remove materials down to 1” diameter or less.
- Discing the rough field to smooth contours.
- Final land leveling as required.
- Layout of vineyard blocks, vine rows, drain lines, basin locations.
- Installation of surface and subsurface drainage features consistent with block, row, and avenue placement.
- Vineyard installation, including row and vine layout, training stakes, drip irrigation lines.
- Installation of irrigation water system components.
- Installation of soil mulch and cover crop components.
- Installation of permanent erosion control measures.

Voluntary Mitigation of Existing Erosion

An Environmental Impact Report has been developed for this project. One of the many resource-based evaluations for the EIR was undertaken by O'Connor Environmental Inc. where pre-project and post-project sediment delivery to off-site channels was evaluated. It was determined in that work that proposed vineyard drainage improvements, drainage system detention basins, vineyard development Best Management Practices, and related property improvements would nearly reduce post-project sediment yield to that of pre-project conditions. It was further determined that post-project off-site sediment delivery could be reduced below existing background levels if certain existing degraded areas outside the plantable vineyard footprint and within the work area limits were addressed and mitigated from an erosion control standpoint. The seven mitigation sites and activities proposed by OEI have therefore been added to the vineyard ECP, and are included in the vineyard development construction drawings. They include:

1. Elimination of a degraded ATV trail under power lines caused by unauthorized site users. This will redeveloped as vineyard and drainage within Unit 1.
2. Rock armored outfall on an Annapolis Road culvert outside the vineyard. Hand placed rock armor will mitigate and prevent further enlargement of a small channel scour area in an area with negligible tributary area from roadside drainage.
3. Seepage control in abandoned skid road that has eroded and formed a semi-naturalized channel. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement below the reservoir site.
4. Groundwater and seepage control in an existing gully. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement downslope in a normally dry Ordinary Water reach below Unit 2.
5. Groundwater and seepage control in a second existing gully. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement downslope in a normally dry Ordinary Water reach below Unit 2.
6. Abandoned skid trail repairs below Unit 5. An overgrown and gullied skid trail will be shaped and outsloped. Surface water will be diverted from the entering the site by shaping and periodic rolling dips or water bars installed to prevent accumulation of surface runoff on the trail.
7. Roadside ditch dewatering and armoring. Surface runoff from the SE corner of Unit 8 will be routed through detention basins to a more appropriate swale location. An existing roadside ditch will be armored.

Standard Best Management Practices for repair and abatement of these existing degraded sites are indicated on the vineyard development drawings, in standard details, and in the construction specifications.

Erosion Control Methods

The landowner has high expectations regarding installation and operation of a premium quality vineyard over an extended time period at this location. The vineyard system will therefore be designed and installed using extensive erosion and sediment control features, consistent with recommendations, practices, and standards of:

1. Sonoma County Hillside Vineyard Ordinance Stormwater, Erosion, and Sediment Control Plan, to be developed at time of vineyard installation.
2. Erosion and Sediment Control Field Manual, San Francisco Bay Regional Water Quality Control Board, 1996.
3. Hillside Vineyards Unit, Redwood Empire Target Area, Napa and Sonoma Counties CA, USDA Soil Conservation Service, 1985.

The final design and installation will include the following general components:

- Season of Construction:
  Work will be deferred until after threat of significant winter rainfall is over. For work conducted under threat of rainfall, temporary erosion control measures will be in place prior to onset of earthwork. A typical construction planning and sequence list is included below.
- Field layout considerations:
  Hillside vineyard rows:
  Temporary and permanent cover crop required.
  Field avenues and perimeter roads:
  Include drainage and runoff controls.
  Temporary and permanent cover crop required.
- Control of surface runoff:
  Row lengths maximum 300' between drainage improvements.
  Individual drainage inlets per plan.
  Underground drain lines used in swales and concentrated flow areas,
  Armored inlet and outlet structures,
- Erosion controls for hydraulic structures:
  Rock-lined existing hillside gully channels,
  Rock-armored culvert outlets,
  Sediment detention basins
- Subsurface seepage controls:
  French drains in known seepage areas
  Drain discharge into surface drains or runoff swales
- Equipment and vehicle separation from swales and waterways:
  Culvert crossings,
  Spillway inlet/equipment crossing,
- Sediment basins, where indicated on plans:
  Considered secondary or backup system to minimize risk of accidental discharges
  Locate at outfall of major swale drains
  Piped outlet or weir overflow to existing natural channels
  Outlet structures sized to watershed
  Accessible for future cleanout using appropriate equipment.
- Vineyard access roads:
  Crowned and graded or outsloped to prevent flow in wheel tracks
  Water bars at 100' o.c. max for slopes over 15%
  Rocked fords installed through seasonal swales or runoff areas
  Ditches graded and shaped
  Cut and fill slopes consistent with slope stability, available access corridors.
  Sidecast material stabilized by slope limits, compaction, mulching, seeding.
- Spoils management:
  Vineyard work results in balanced cut and fill areas with no net excess or deficit of materials.
  Temporary stockpiles (e.g. topsoil) placed on ridgetops, areas with no runoff potential.
  Seasonal erosion control methods as required practiced around temporary stockpiles.
- Erosion control vegetation:
  Install permanent cover crops using annual, perennial, and native grasses.
  Temporary cover provided with straw mulching.

Minor intermittent sheet and rill erosion between terraces rows is possible until vegetative cover for erosion control is fully established. Sediment loss potential from the rows is considered low, because runoff quantity from individual rows or terraces will be small and the vegetative and straw mulch cover will restrict runoff flows to non-erosive velocities.

For temporary sediment control on hillside slopes, the following improvements will be provided on an as-needed basis: A contour furrow will be constructed at base of the hill, with a companion fiber roll to collect

surface runoff and minimize sediment loss from hillside. Any concentrated runoff will be directed to a sediment catch basin at the contour furrow outfall, with piped outfall of sediment-free water to the channel below.

After vineyard improvements are completed, disturbed surfaces will be treated with weed-free mulch, native slash or clean straw for initial erosion control. All cover crops and erosion control seed mixes will use either native grasses derived from genetic stock from the region of the project site, or the sterile wheat/tall wheat hybrid, Regreen©. Erosion control revegetation will be completed prior to October 15. Irrigation may be provided if available to enhance growth of residual and hand-broadcast grass seed.

All work in upland areas is believed exempt from California Department of Fish and Game Stream Alteration Agreement requirements. However, conditions noted in a typical Agreement will be followed as a matter of conservative and environmentally-sensitive construction, including:

- Completion of earthwork in such a manner and of such materials to prevent future erosion which could potentially contribute siltation to any watercourse below the site.
- Revegetation of all exposed slopes with seeding, mulching or other erosion control measures prior to winter rains.
- The 22 standardized Recommendations for construction-related activities noted on the reverse of the permit form will also be followed during vineyard development.

No surface runoff flows are expected during construction activities, which will take place between Spring and Fall when chance of rainfall is minimal. Flow diversion around the upland worksites is not believed necessary.

If necessary, fiber roll checks may be placed on contour across the head of channels below the disturbed work areas. The checks will separate the downstream channel from potential non-point source sediment loading from the work area. These and other temporary features such as straw bale checks and sediment basins will be maintained as required to ensure satisfactory performance of the erosion control system. All earthwork construction activities will be completed during summer months. Subsequent erosion and sediment control efforts are focused on maintenance, management, and fine-tuning of existing improvements.

Chemical Contamination Potential

No heavy metals are known or believed to be present at this undeveloped site, based on an understanding of historic land use on this agricultural property. No mining sites, or other practices associated with heavy metals or possible high pesticide or chemical usage are known or believed to be present. An abandoned automobile dismantling and deposition area is located in the woods in the Vineyard Unit 4 area, created by property trespass over the years. All abandoned vehicles and components will be removed from the site as part of vineyard development. Hand methods will be used for final cleanup, to eliminate all fragmentary evidence of the vehicle boneyard. Any unusual or deleterious materials encountered during that cleanup will be handled and disposed of in a manner consistent with all local and State regulations. No materials deleterious to waters of the State are known or expected to impact, potentially impact, or enter dry channels or surface waters during construction. This includes petroleum products for use in construction equipment, agricultural chemicals, fertilizers, and the like.

Use of any fertilizer, herbicide, insecticide, or other agricultural chemicals in this vineyard will be at low, safe, and least-cost agronomic rates according to label direction by qualified, properly certified vineyard management individuals. No significant potential for contamination exists for environmentally-sensitive use of State-approved materials when label instructions are followed.

Estimated Sediment Yields

The intent of this erosion and sediment control plan is to minimize potential for man-made erosion and associated sediment and bedload transport from vineyard sites. Adherence to plan elements is expected to result in similar erosion potential for both pre construction and post construction conditions.

From a practical standpoint, length of runoff run is the only management variable available for sediment mobilization control for a given site and set of cultural practices. For sites with higher annual precipitation, steeper slopes, more erodible soils, less vegetative cover, and more annual tillage, distance that rainfall runoff travels prior to being intercepted and conveyed to a drainage system should be minimized.

Presence of both temporary and permanent cover crops is the key element in minimizing sheet and rill erosion potential. The surface erosion and sediment yield potential for a properly installed and maintained hillside vineyard is estimated to be similar or better than the pre-existing agricultural site conditions. Temporary fiber roll checks on contour will minimize potential for sediment transport during the critical first season of installation. The vineyard sediment retention structures at individual drop inlets will further function as a bedload transport trap for upland sources, reducing contribution to downstream channels in the case of substandard performance or accidental failure of any system components. Project mitigations recommended by O'Connor Environmental and biologic consultant Monk and Associates and incorporated in plan design include the Best Management Practice of placement of detention basins at all significant drainage outfalls from the vineyard, further limiting potential for bedload transport from the site. Therefore, no increase in baseline sediment transport is expected from the entire vineyard system.

The Hydrologic Analysis, Artesa Fairfax THP and Conversion by O'Connor Environmental Inc. provides an in-depth analysis of runoff and sedimentation potential for the proposed project. It concludes that the combination of Best Management Practices used during vineyard development and certain mitigations incorporated in site development as proposed by OEI will result in reduced sediment yield from the project areas, relative to existing background conditions.

System Maintenance

The surface runoff and erosion control system is believed conservatively designed, and should function satisfactorily with normal and routine maintenance. Annual maintenance work will consist of inspection and as-needed repair of:

- Permanent hillside cover crops as required.
- Drain line inlets, outlets where present.
- Swale surface drainage improvements
- Hillside vineyard/cover crop drip irrigation system.
- Culvert inlets, outlets, rock armor systems.
- Vineyard channel swale rock-lined ditches.
- Field road and avenue water bars.
- Roadside ditches, banks.
- Seasonal water bar checks as required.
- Individual sheet/rill erosion sites.
- Inboard ditches on avenues or roads, where present.
- Underground pipe inlets - clean trash, maintain grates.
- Seasonal re-establishment of permanent cover crops on an as-needed basis.
- Consider additional underground drain lines if small-scale problem drainage sites are identified.

- Sediment detention basin observation, maintenance, cleanout if required. If more than background volumes are deposited in the basin, forensic review of tributary areas is required to locate and address the source of sediment.
- Deer exclusion fences.
- Other items as required to maintain system function.

The responsible party for vineyard maintenance activity is the landowner or a qualified vineyard management company working under direction and direct supervision of the landowner.

System Monitoring

Minor potential for water turbidity by surface runoff to receiving waters is believed the only potential undesirable material expected from this vineyard. The combination of extensive erosion and sediment control improvements as well as detention basins and runoff energy dissipaters is expected to minimize risk of off-site sediment transport. Details are provided in the OEI reports, indicating that the overall installation has potential for performance at less than background levels of sediment mobilization and transport. Any agricultural fertilizer or chemicals will be used at label rates, consistent with Agricultural Commissioner requirements. Agricultural chemicals are typically applied during the dry season when runoff is not expected. No process water will be generated on site. Imposition of an extensive scientifically-based sediment yield monitoring program is inconsistent with the nonexistent or very nominal regulatory water quality constraints imposed on other local growers. Therefore, implementation of a formal water quality monitoring program is not believed necessary, appropriate, or required.

The erosion control system component monitoring will be conducted on a traditional visual basis over an appropriate time period, with the landowner or vineyard manager identified as the responsible party. Initial monitoring during the THP-TCP process will be augmented by O'Connor Environmental Inc. as discussed in their report covered elsewhere within the EIR. The basic mission will be to evaluate winter preparedness, ensure BMPs are in place, and to evaluate performance of ECP components and BMPs installed regularly throughout the runoff season. Should any improvements require adjustment, the monitoring will provide an early-warning system for remediation.

CDFG recommends a 5-year monitoring program in their draft Erosion Control Plan outline. The following monitoring program is recommended:

1. Establish permanent hillside cover crop of annual and perennial grasses in the Year 1 growing season.
2. Review a winter-preparedness monitoring checklist prior to October 15 on an annual basis.
3. Inspect all hydraulic features and storm water control facilities prior to October 15. Maintain/repair as required to obtain desired performance.
4. Monitor all drainage features during and after major winter storms.
5. Take remedial action as required to ensure function of drainage systems on an as-needed basis.

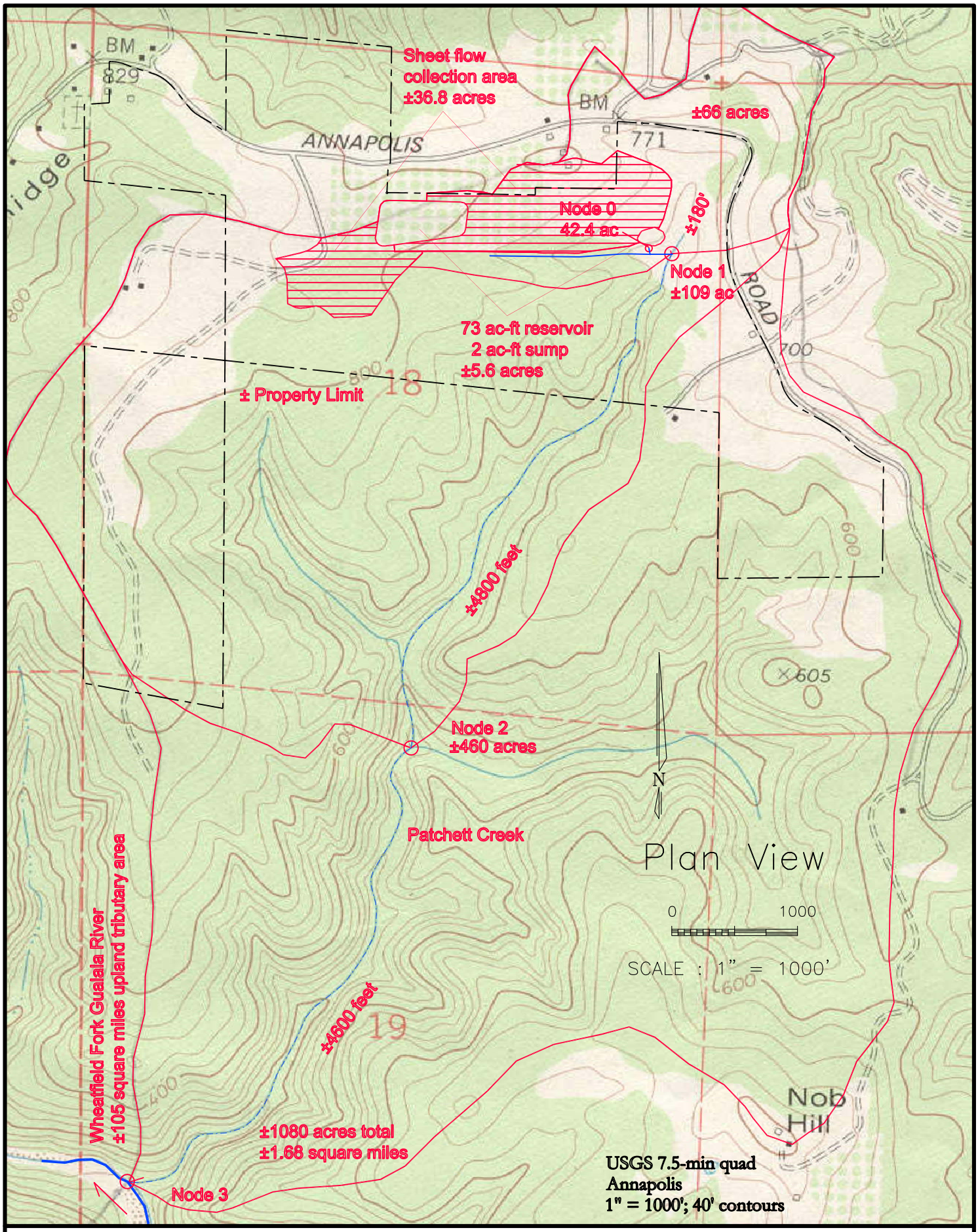
Plan Documentation

Erosion Control Plan elements are quantified on a multi-page vineyard development plan set. The drawings contain condensed plans, specifications, and detailed drawings for the recommended Best Management Practices. The drawings also reference this Erosion Control Plan and the Hydrologic assessment and monitoring recommendations by O'Connor Environmental Inc, which are incorporated therein by reference.

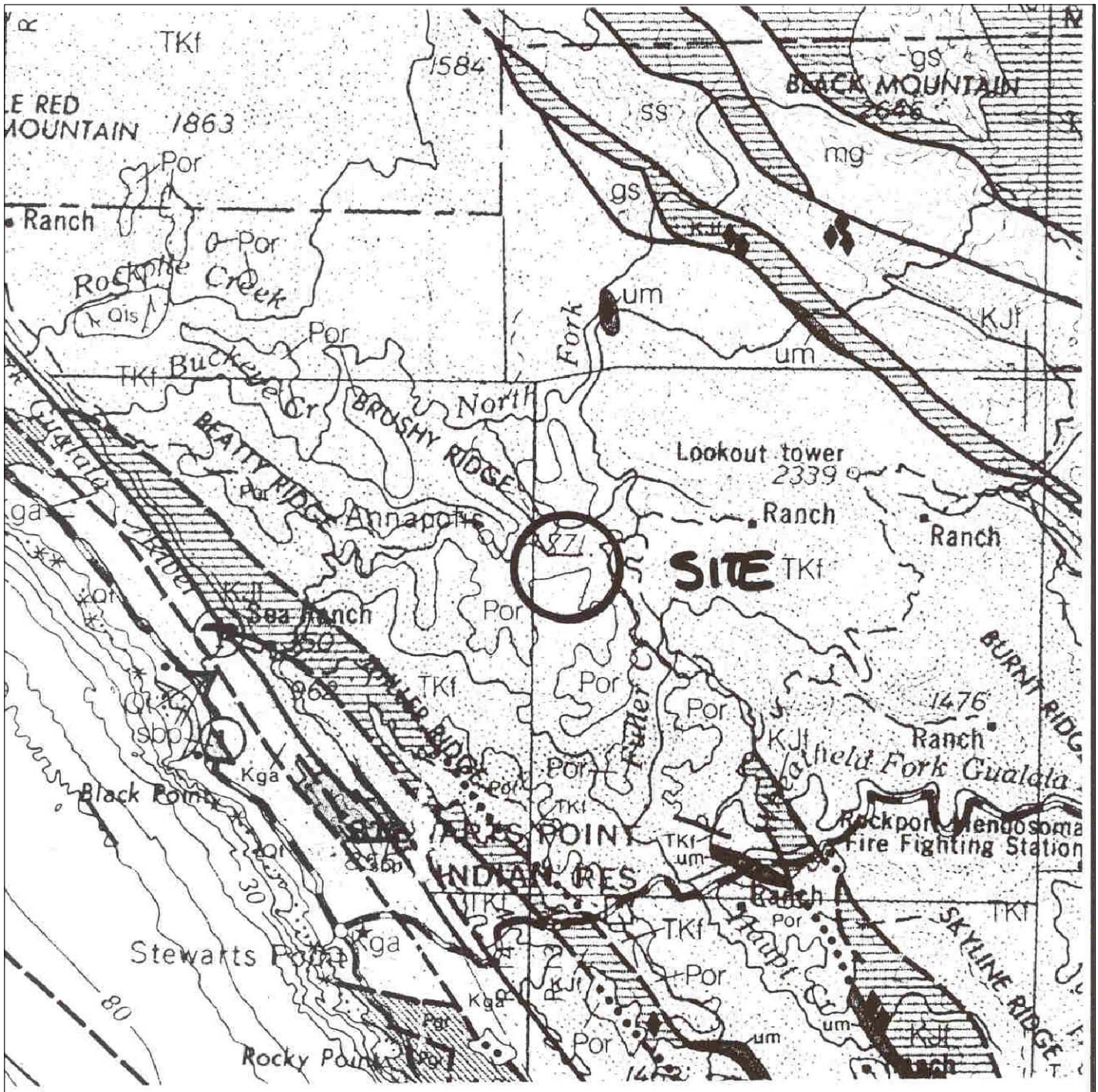
Summary

The vineyard development project has been described, along with a companion erosion control plan. An overview of processes affecting erosion and erosion potential for the vineyard has been reviewed. Geologic, soils, hydraulic, and watershed-related factors have been considered. Vineyard factors necessary for minimum erosion potential and impact to receiving waters have been evaluated, including layout constraints, drainage design, reservoir construction, management, scheduling, and maintenance. Specific erosion control methods appropriate for vineyard development activities are summarized, as are technical resources available for documenting such techniques. Chemical contamination potential and sediment yield estimation techniques are reviewed. A general seasonal timetable has been provided for site development work. System maintenance and monitoring requirements are outlined, as is an annual maintenance checklist.

List of Figures

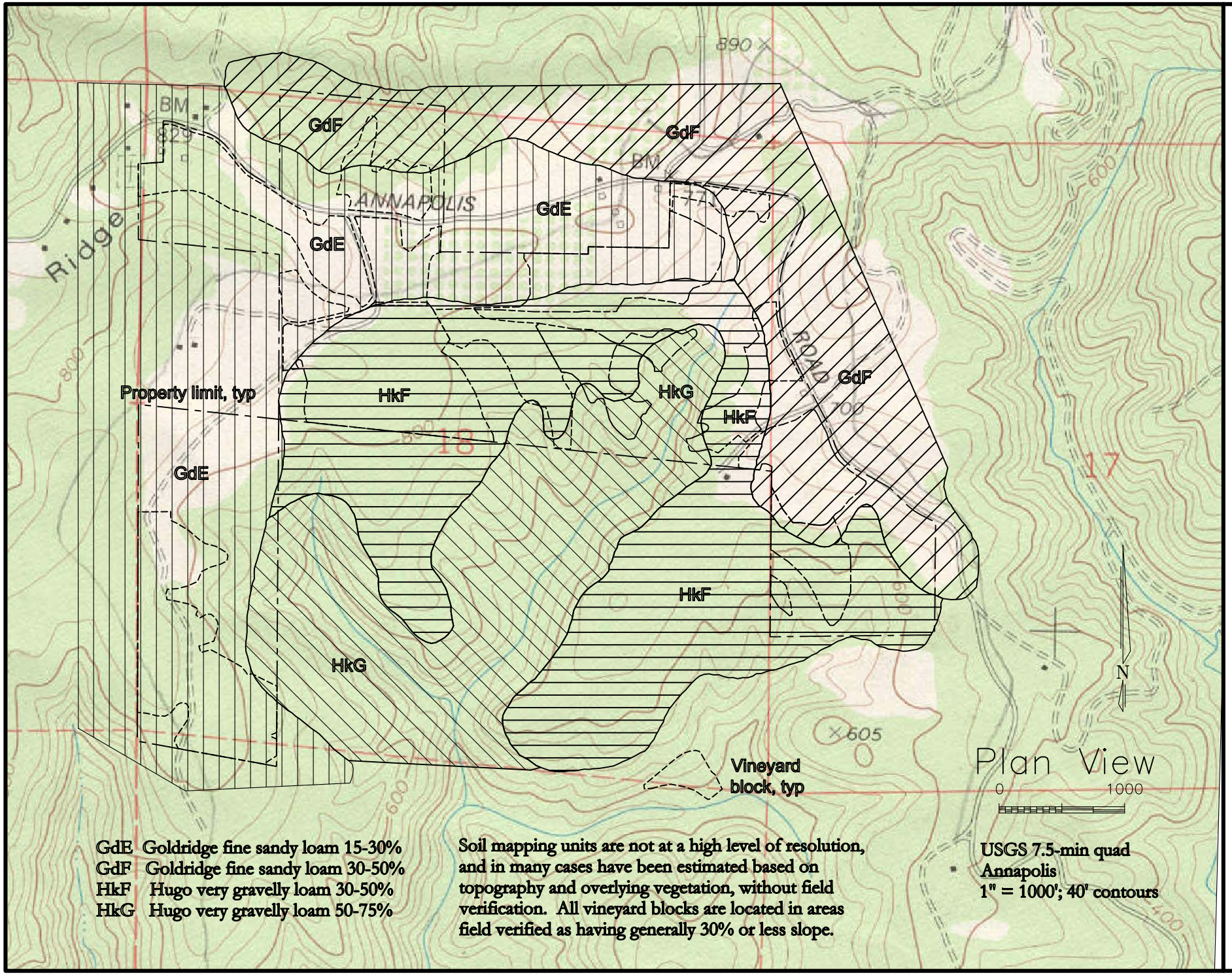


Artesa Fairfax Vineyard 35147 Annapolis Road Annapolis CA 95412	Artesa Winery 1345 Henry Road Napa CA 94559	Figure 1 Tributary Watershed Areas	Erickson Engineering Inc. Valley Ford CA 94972-0446 707/795-2498 Voice/Fax	11.12.2009 91112 figs.dwg Scale: 1" = 1000'



California Division of Mines and Geology
Special Report 120, Plate 2A, Santa Rosa, Ukiah Quadrangles

Artesa Fairfax Vineyard 35147 Annapolis Road Annapolis CA 95412	Artesa Winery 1345 Henry Road Napa CA 94559	Figure 2 Geologic Setting	Erickson Engineering Inc. Valley Ford CA 94972-0446 707/795-2498 Voice/Fax	11.12.2009 91112 figs.dwg No Scale



GdE Goldridge fine sandy loam 15-30%
GdF Goldridge fine sandy loam 30-50%
HkF Hugo very gravelly loam 30-50%
HkG Hugo very gravelly loam 50-75%

Soil mapping units are not at a high level of resolution, and in many cases have been estimated based on topography and overlying vegetation, without field verification. All vineyard blocks are located in areas field verified as having generally 30% or less slope.

USGS 7.5-min quad
Annapolis
1" = 1000'; 40' contours

Artesa Fairfax Vineyard
35147 Annapolis Road
Annapolis CA 95412

Artesa Winery
1345 Henry Road
Napa CA 94559

Figure 3. Soils per Sonoma County GIS, USDA-NRCS Sheet 25

Erickson Engineering Inc.
Valley Ford CA 94972-0446
707/795-2498 Voice/Fax

11.12.2009
91112 figs.dwg
Scale: 1" = 1000'

Figure 4 Erosion Control Plan

Reference: Flood Control Design Criteria, Sonoma County Water Agency, Santa Rosa CA 95401, Rev. 1983.

$Q = C*i*A*K$ C = .45 Vegetated, 15% slopes

i = 2.4 in/hr 100_{year}, 15_{min} precip rate

$Q_{100yr\text{-}15min} = .45*2.4*(70/30)*A$ K = 70/30" (Avg precip/Base precip)

$Q_{100yr\text{-}15min}$ = 2.5 cfs/Ac A = Acres

Sonoma County Water Agency, Plate B-3 indicates average precipitation at 70 – 75" per year. NOAA sources with a shorter period of record indicates an average precipitation of about 58" per year. The more conservative higher County rate has been used with County-mandated computational procedures to determine design criteria hydrology and required size of hydraulic structures for vineyard drainage, reservoir, and sump.

For sump and reservoir surfaces where C = 1.0,
$Q = 1*2.4*70/30*A = 5.6$ cfs/ac.

For upland vineyard drainages, Sonoma County Water Agency procedures that take Time of Concentration and cumulative tributary subareas into account have been used to determine hydrology and required size of hydraulic components for the required design criteria in accordance with normal County grading and drainage permitting activities.

Fairfax Vineyard Hydrology - Sonoma County Rational Method

Erickson Engineering Inc.
Valley Ford CA 94972-0446
707/795-2498 Voice/Fax

November 12, 2009

Figure 5

Artesa Fairfax Vineyard Reservoir

73 Acre Foot Elevation - Volume Curve

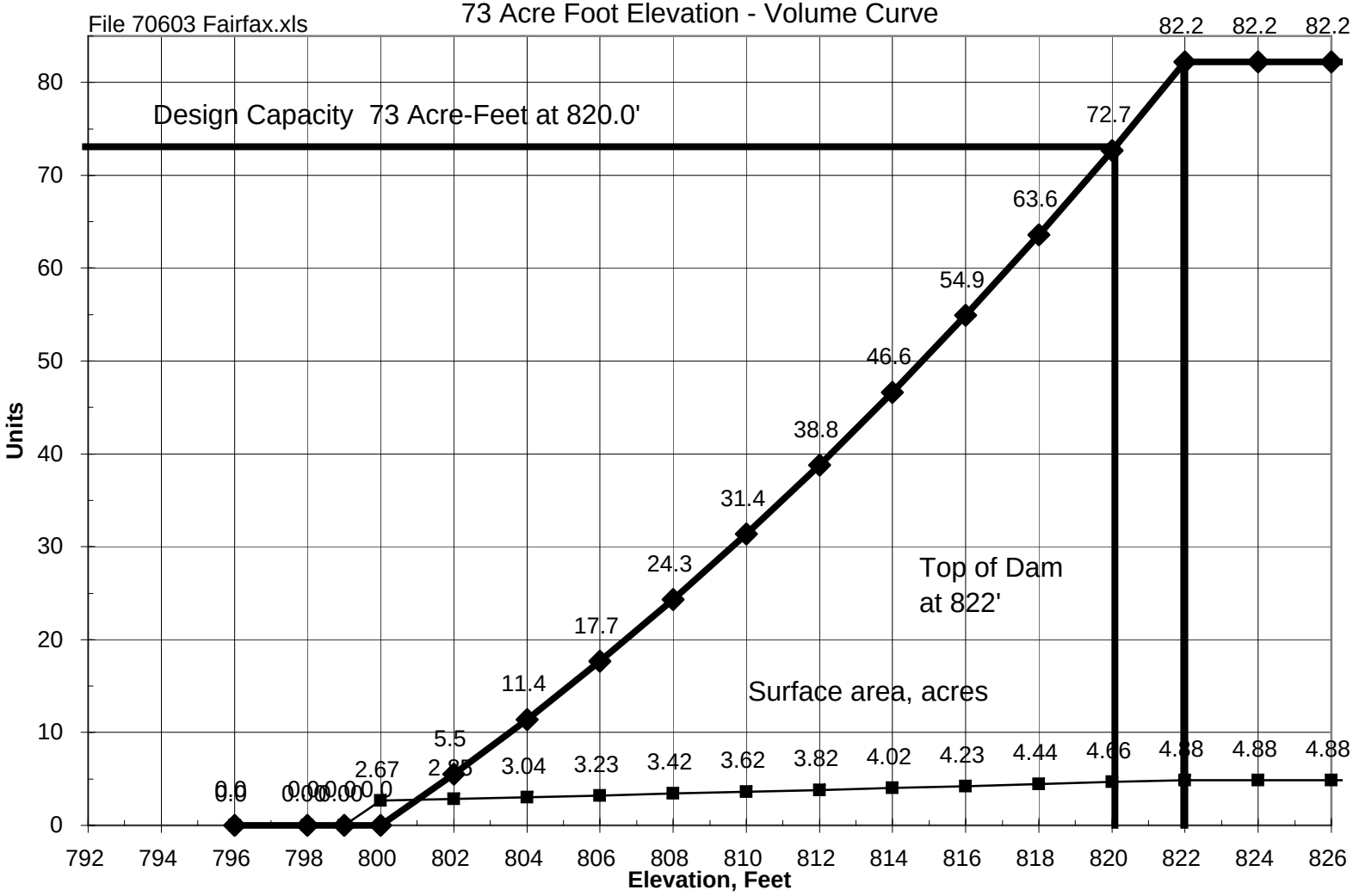


Figure 6A
Artesa Fairfax Vineyard Reservoir at Annapolis CA
Outlet Curve for 30" dia Drop Inlet, 18" PVC Spillway and
USDA-SCS Type IA Synthetic Hydrograph
using Rational Method Q 100yr-15min at 29 cfs peak flow

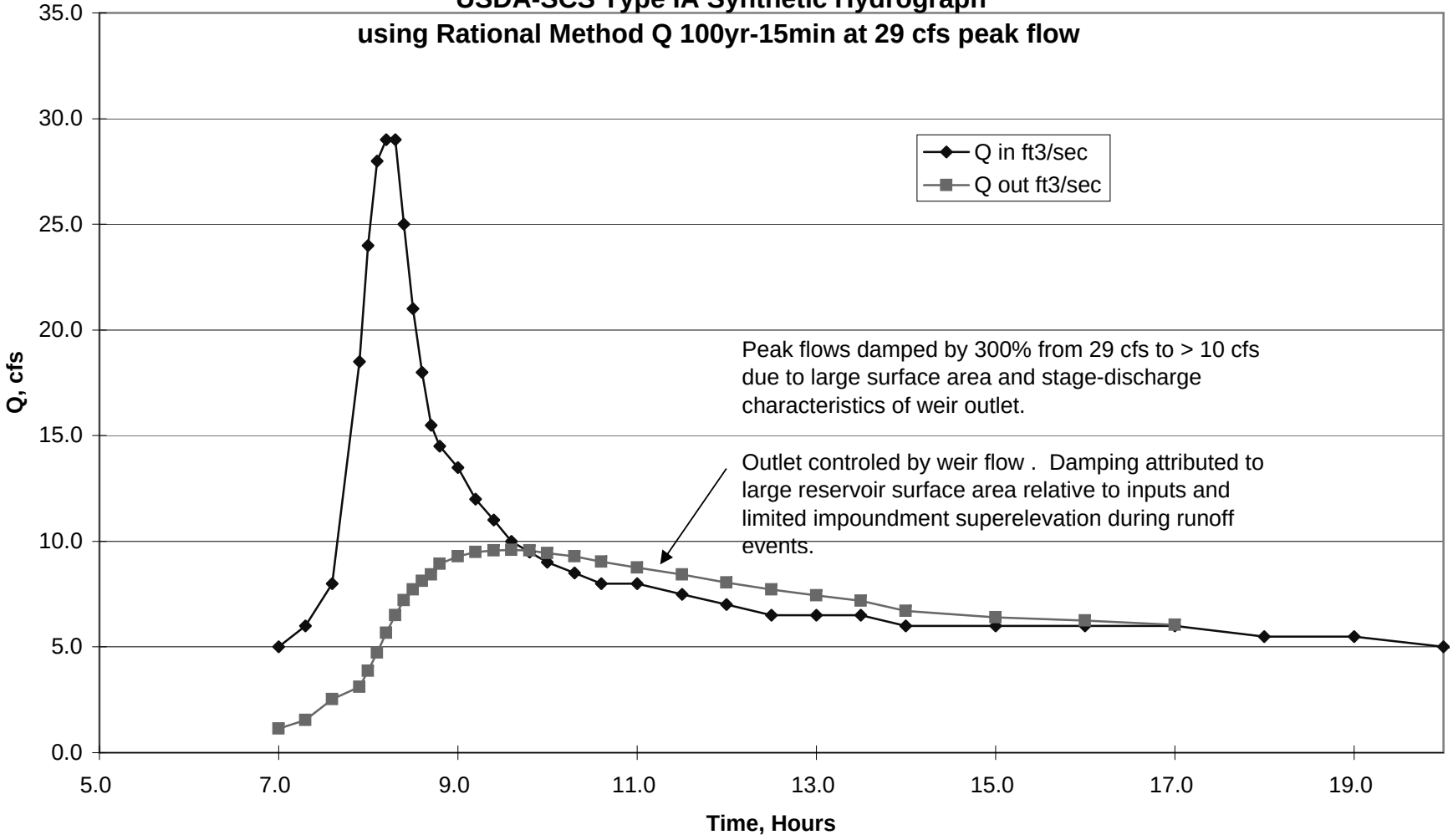
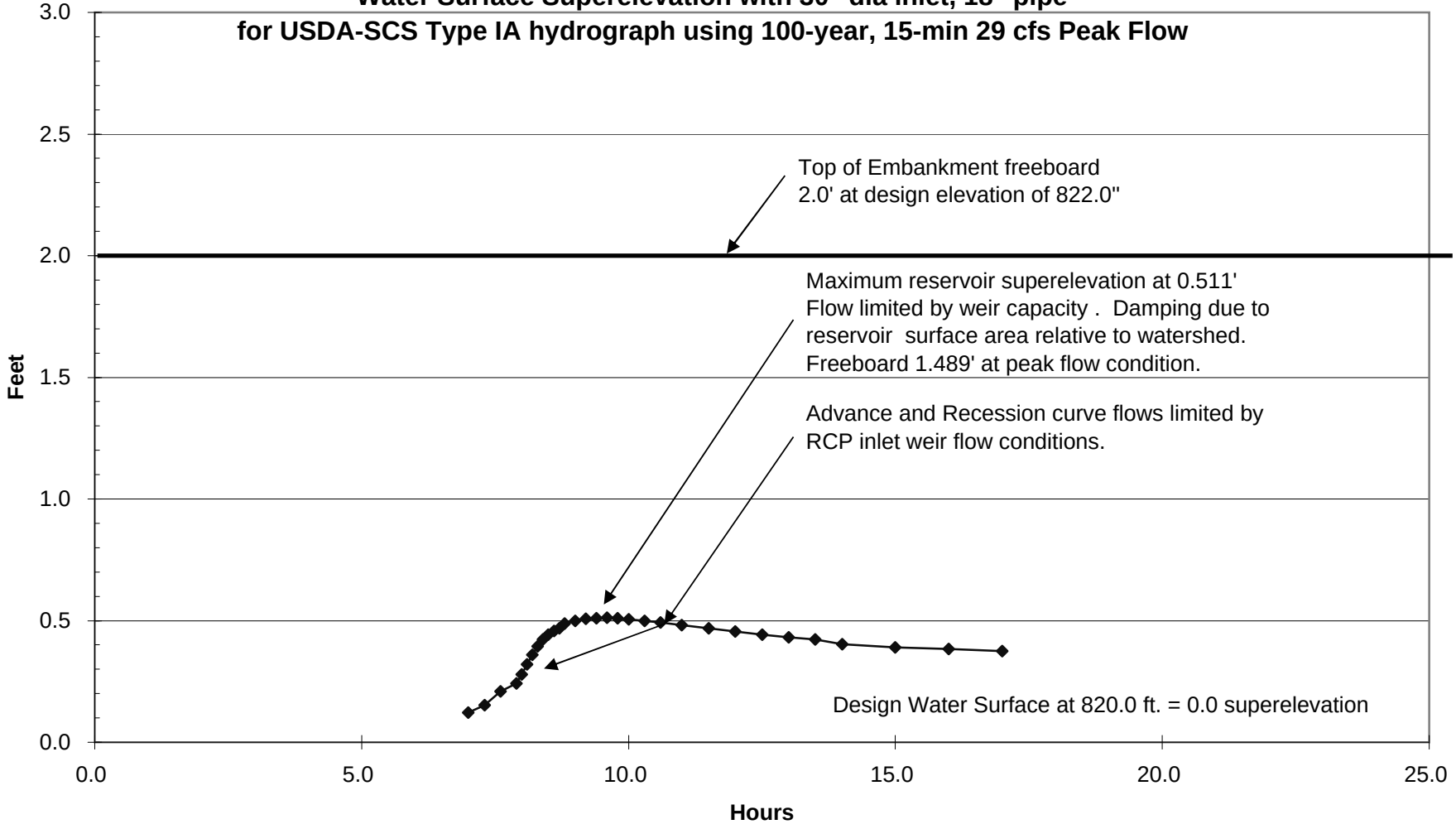


Figure 6B
Artesa Fairfax Vineyard Reservoir at Annapolis
Principal/Emergency Spillway Modeling
Water Surface Superelevation with 30" dia inlet, 18" pipe
for USDA-SCS Type IA hydrograph using 100-year, 15-min 29 cfs Peak Flow



Reservoir Stepwise Stage-Discharge Curve Evaluation
Weir/Orifice and Pipe-type Principal Spillway
USDA-SCS TR55 Synthetic Hydrograph
Q100-24 runoff flow, Incremental elevation Calcs.

Erickson Engineering Inc.

USDA-SCS References:
NEH-5 Hydraulics
EWP-5 Conduit Outlets
TR-46 Gated Outlets
TR-55 Hydrology Estimation
Closed Conduit Spillways
Blaisdell 1980. ASCE Proceedings

File: Fairfax 2004
Date: 12-Nov-09
Time: 01:23 PM
Landowner: Artesa Vineyards and Winery
Property: Annapolis Road, Annapolis CA
Project: Spillway Evaluation

Figure 6C
Erosion Control Plan

Q1000-15: 29 cfs from 5 ac watershed
Direct precip into reservoir

INPUT PARAMETERS							
Inlet dia, ft:	3.00	n":	0.012				
Inlet ht, ft:	4.00	upper SS:1	2.5			Top elev:	822.0
Pipe dia, ft:	1.50	lower SS:1	7.5			Toe elev:	810.0
Outlet dia, ft:	1.50	Topwidth:	15.0			Tailwater	0.0
Outlet ht, ft:	0.00	Freeboard:	2.0			Reservoir Stage-Storage	
pipe area sq ft:	1.77	Em Fboard:	2.0			ac.ft/ft:	5
SPILLWAY CALCULATIONS							
Horizontal length:	110.0	Vertical:	6.0	Net:	110.2		
Head, pond-tail	10.0						
HEADLOSS FACTORS:		per ft:		Summation K:	4.54		
enter:	0.5	pipe:	0.016	Grates, dec % area:	0.10		
in bend:	1.3	riser:	0.006	PIPE-FULL FLOW, CFS:	21.1		
out bend:	0	outlet:	0.016				
INITIAL CONDITIONS				Stage, ft:	0.100		
				Qout, cfs:	0.9		

Time, hr.	Q in ft3/sec	Incr. V ft3	Surcharge V ft3	Incr. h, ft.	Total h ft.	Qweir ft3/sec	Qorf ft3/sec	Qpipe ft3/sec	Qmin = Q out ft3/sec	Outlet superelev ft.
7.0	5.0	4943	26723	0.023	0.123	1.1	10.7	21.2	1.1	0.03
7.3	6.0	6341	28121	0.029	0.152	1.6	11.9	21.2	1.6	0.06
7.6	8.0	12632	34412	0.058	0.210	2.5	14.0	21.3	2.5	0.16
7.9	18.5	6741	28521	0.031	0.241	3.1	15.0	21.3	3.1	0.24
8.0	24.0	8243	30023	0.038	0.279	3.9	16.2	21.3	3.9	0.37
8.1	28.0	8869	30649	0.041	0.319	4.7	17.3	21.4	4.7	0.55
8.2	29.0	8733	30513	0.040	0.359	5.7	18.4	21.4	5.7	0.79
8.3	29.0	7682	29462	0.035	0.395	6.5	19.2	21.5	6.5	1.04
8.4	25.0	5935	27715	0.027	0.422	7.2	19.9	21.5	7.2	1.27
8.5	21.0	4428	26208	0.020	0.442	7.7	20.4	21.5	7.7	1.47
8.6	18.0	3248	25028	0.015	0.457	8.1	20.7	21.5	8.1	1.62
8.7	15.5	2476	24256	0.011	0.469	8.4	21.0	21.5	8.4	1.74
8.8	14.5	4013	25793	0.018	0.487	8.9	21.4	21.6	8.9	1.96
9.0	13.5	2752	24532	0.013	0.500	9.3	21.6	21.6	9.3	2.11
9.2	12.0	1600	23380	0.007	0.507	9.5	21.8	21.6	9.5	2.21
9.4	11.0	732	22512	0.003	0.510	9.6	21.9	21.6	9.6	2.25
9.6	10.0	124	21904	0.001	0.511	9.6	21.9	21.6	9.6	2.26
9.8	9.5	-247	21533	-0.001	0.510	9.6	21.9	21.6	9.6	2.24
10.0	9.0	-876	20904	-0.004	0.506	9.4	21.8	21.6	9.4	2.19
10.3	8.5	-1294	20486	-0.006	0.500	9.3	21.6	21.6	9.3	2.12
10.6	8.0	-1847	19933	-0.008	0.491	9.0	21.5	21.6	9.0	2.01
11.0	8.0	-2335	19445	-0.011	0.481	8.8	21.2	21.6	8.8	1.88
11.5	7.5	-2705	19075	-0.012	0.468	8.4	20.9	21.5	8.4	1.74
12.0	7.0	-2998	18782	-0.014	0.454	8.0	20.6	21.5	8.0	1.59
12.5	6.5	-2785	18995	-0.013	0.442	7.7	20.3	21.5	7.7	1.46
13.0	6.5	-2178	19602	-0.010	0.432	7.4	20.1	21.5	7.4	1.36
13.5	6.5	-2159	19621	-0.010	0.422	7.2	19.9	21.5	7.2	1.27
14.0	6.0	-4300	17480	-0.020	0.402	6.7	19.4	21.5	6.7	1.10
15.0	6.0	-2503	19277	-0.011	0.390	6.4	19.1	21.5	6.4	1.01
16.0	6.0	-1477	20303	-0.007	0.384	6.2	19.0	21.5	6.2	0.96
17.0	6.0	-1778	20002	-0.008	0.376	6.0	18.8	21.4	6.0	0.90
18.0	5.5									
19.0	5.5									
20.0	5.0									
21.0	4.5									
22.0	4.5									
23.0										
MAXIMUM VALUES	29.0 CFS		0.79 AC-FT		0.51 FT				9.6 CFS	2.26 FT

Pipe Entrance Cavitation Check: Vmax f/s: 5.43
Head at entrance, ft: -6.66 OK if > -25 ft.

ASSUMPTIONS by column:
A, B: USDA-SCS TR55 Synthetic Hydrograph, Type 1A storm for spec
C: Incremental time * (Qin-Qout)
D: Incremental h for specific reservoir. Specify as ac.ft/ft between ou
E,F: Summation of incremental h = reservoir water surface above outl
G,H,I: Outlet flow using Weir, Orifice, or Pipe flow equations.
J: Outlet flow = min flow from Weir, Orifice, or Pipe constraints.

NOTES:
Set input parameters to match geometry of embankment and desired spillway.
Change Qin values to match synthetic hydrograph for watershed of interest.
Reservoir stage-storage constant (ac-ft/ft) must match site conditions.
Set initial stage condition to reflect start of period conditions.
Surcharge volume shows instantaneous water storage above design water surface.
Differential area under inlet and outlet rate curves is proportional to surcharge stora
Compare Qw, Qo, and Qp columns to determine limiting flow condition for any time
Adjust parameters to prevent orifice control of output flow to prevent erratic stage cu
Adjust spillway geometry to obtain desired peak flows, max surcharge height,
and output flow elevation.
Use 123 PRINTGRAPH to document flow rate and stage curves.

Figure 7A Artesa Fairfax Vineyard Erosion Control Plan

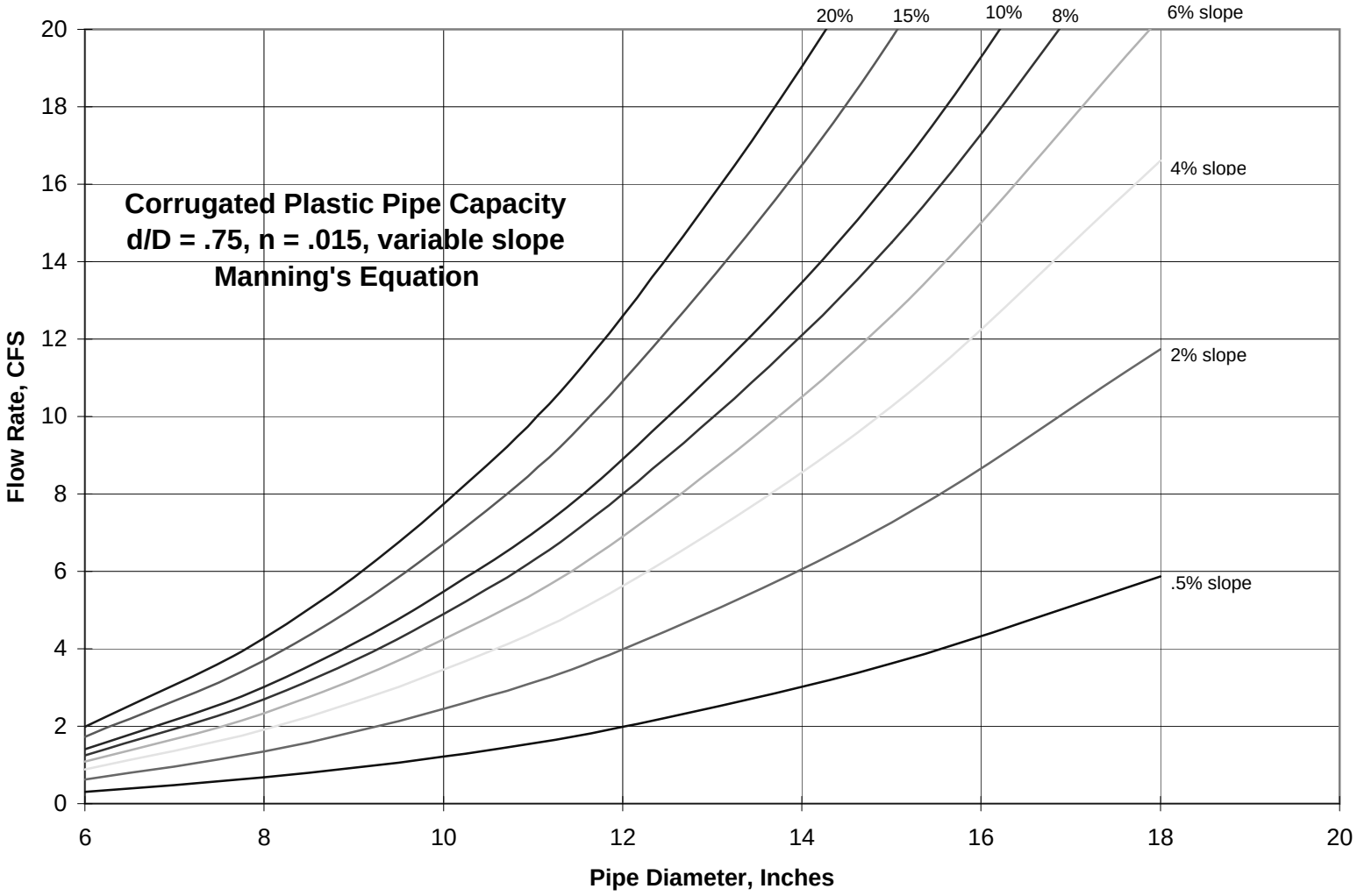
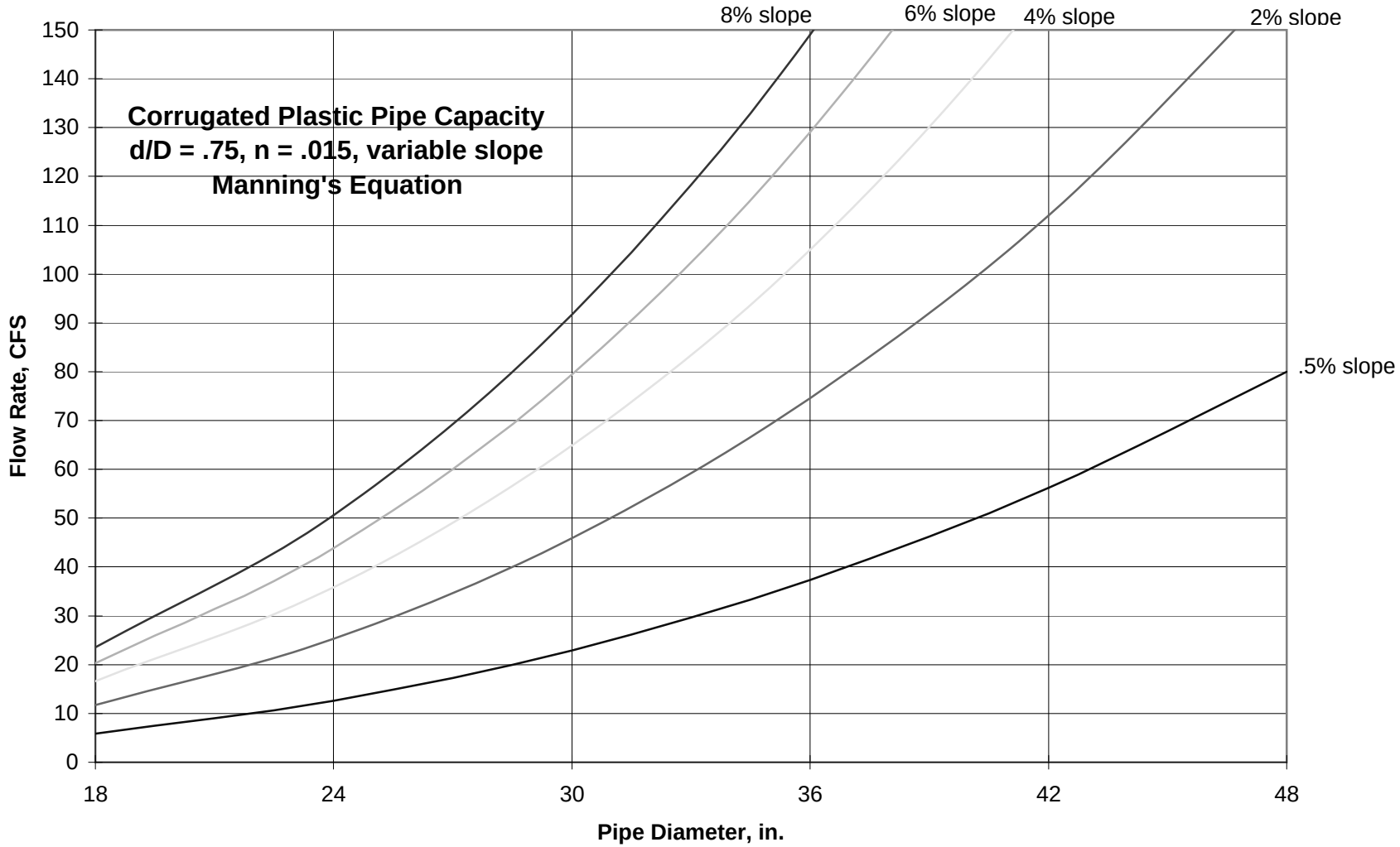


Figure 7B Artesa Fairfax Vineyard Erosion Control Plan



Project Time Line - Erosion and Sediment Controls
Sonoma County Vineyard and Orchard Ordinance

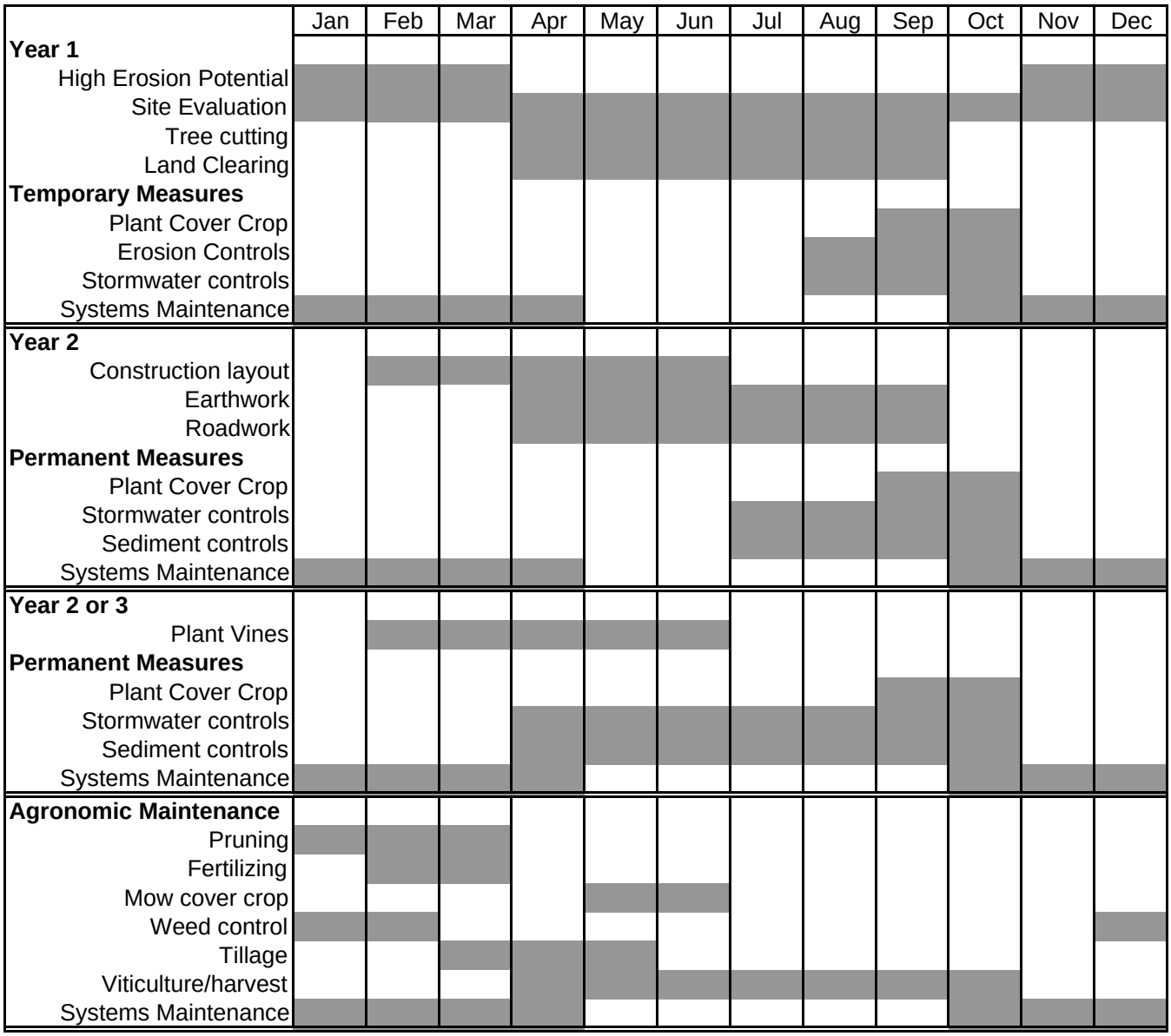
File: Excel/eei/vineyard/timeline

Figure 8
Erosion Control Plan

Artesa Fairfax Vineyard
35147 Annapolis Road
Annapolis CA 95412

Artesa Winery
Vineyard Management Team
1345 Henry Road
Napa CA 94559

1:39 PM 12-Nov-09
Updated: 12-Nov-09



Timeline may be accelerated at discretion of Owner and Vineyard Management so long as work is in conformance with County statutes and regulatory agency requirements.
Conform to seasonal operation constrains as imposed by CalFire, Timber Harvest Plan and any other agency requirements.

Figure 9
Vineyard Erosion Control System Maintenance Checklist

Checklist to be completed by vineyard manager prior to October 15. Check all field installations that apply for each review category. Note repairs needed, if any, and provide date of completion of repair work. Send copies to Landowner.

Reviewer: _____ Date completed:_____

Field Access Roads and Perimeter Avenues:

1. Culverts: Inlets, outlets, rock cover, debris.
2. Ditches: Rock armor, scour, debris, capacity.
3. Waterbars: Location, condition.
4. Surface: Slope, crown for water control, surface loss prevention to waterways
5. Cut/fill slopes: Stable, well vegetated.

Vineyard Reservoir, if present:

1. Spillway/outlet armor, condition.
2. Embankment cover crop.

Hillside Terraces, if present:

1. Cut and fill slopes: Stable, in good repair. Armor/buttress/repair as required.
2. Inboard ditches: Clean, uniform slope, no debris or flow restrictions.
3. Drainage inlets: Clean, functional, correct elevations, not plugged.
4. Cover crop: Complete, uniform coverage. Replant and irrigate as required.

Swale Drains:

1. Inlets: Clean, functional, correct elevations, not plugged.
2. Inlets: Satisfactory location(s) for performance. Add/adjust as needed to control water.
3. Outlets: clean, functional, armored, discharge erosion prevented.
4. Outlets: discharge to sediment trap where appropriate.

Subsurface Drains:

1. Outlets: clean, functional, armored, discharge erosion prevented.
2. Satisfactory location(s) for performance. Add/adjust as needed to control water.

Sediment Retention Structures, if present:

1. For sediment accumulation, determine upland source(s) and remediate.
2. Excavate annual accumulation, redistribute uniformly in upslope areas.
3. Check inlet, outlet, armoring for satisfactory condition, operation.

Vegetation Management:

1. Evaluate permanent cover crop for vigor, health. Irrigate/fertilize/improve as required.
2. Provide straw mulch or other erosion control cover where poor cover exists.
3. Repair and provide hand mulching of problem sheet/rill erosion areas if required.

Special conditions requiring maintenance or repair work by vineyard management:

_____

_____

_____

Installation, Pre/Post-Storm, and Periodic Inspection/Maintenance Report

Drainage and Erosion Control Plan
Artesa Fairfax Vineyard
35147 Annapollis Road
Annapolis CA 95412

Notification Party:
Artesa Vineyards and Winery
1345 Henry Road
Napa CA 94559
707/224-1668 x132

Vineyard Block (circle one): 1, 2, 3, 4, 5, 6, 7**,** 8
Date of Inspection_____
Time of Inspection_____
Weather Conditions_____
Inspector_____
_

Best Management Practice	Site ID; Temporary (T), Permanent (P) measure	GPS Location Coordinates per Construction Plan	Status 1 = OK 2 = needs maint 3 = failed	Action Taken or Comments
Mulch				
Fiber Rolls				
Cover Crop				
Water Bars				
Culvert				
Culvert				
Culvert				
Ditch, Vee				
Ditch, Vee				
Ditch, Vee				
Drain, Surface				
Drain, Surface				
Drain, Surface				
Inlet, Pipe				
Inlet, Pipe				
Inlet, Pipe				
Outlet Armor				
Outlet Armor				
Outlet Armor				
Basin, Silt				
Basin, Silt				
Basin, Silt				
Swale, Vegetated				
Drain, Subsurface				
Deer Fence				

Add sheets and categories as required for detailed inspection of individual blocks.
Comments:

Figure 10
Vineyard Erosion Control Plan

Drainage and Erosion Control Plan
Artesa Fairfax Vineyard
35147 Annapollis Road
Annapolis CA 95412

Notification Party:
Artesa Vineyards and Winery
1345 Henry Road
Napa CA 94559
707/224-1668 x132

Figure 10 consists of the 9-sheet vineyard Plan Set in size Arch D, 24" x 36", available in Portable Document Format (pdf) or hard copy, and appended to the Erosion Control Plan.

Sheet	Contents
C1	Vineyard Overview at 1" = 250'
C2	Unit 1 Plan View
C3	Units 2, 3 Plan View
C4	Units 4, 5 Plan View
C5	Units 6, 7 Plan View
C6	Unit 8 Plan View
C7	Erosion Control Details
C8	Settling Basin, Rocked Ford Details
W1	Mitigation Wetlands Schematic Plan