ATTACHMENT 12

BRSP EVALUATION OF SURFACE WATER RUNOFF, GROUNDWATER AND WATER QUALITY

Bickford Ranch Specific Plan
Evaluation of Surface Water Runoff, Groundwater and Water Quality

August 24, 2015

This document describes the stormwater and water quality features of the proposed Bickford Ranch Specific Plan (BRSP), including the geological setting that influences runoff. This document also describes revisions to the BRSP made between 2004 and 2014 and how the modifications to the project affect the stormwater and water quality.

1. Project Background

The 1,927.9-acre BRSP site is located southwest of the City of Auburn, east of Sierra College Boulevard, south of State Route 193 and north of English Colony Way in unincorporated Placer County.

2001. The BRSP was approved by the Placer County Board of Supervisors in 2001. With the project approval, the Board certified the Bickford Ranch Final Environmental Impact Report (EIR).

2004. The Board approved revisions to the project (2004 Project). At that time, the Board considered the previously certified Bickford Ranch EIR (2001), together with an Addendum to the EIR (2004). The Addendum addressed the changes between the project evaluated in the Bickford Ranch EIR (2001) and minor modifications to the project as described in the Bickford Ranch Specific Plan (BRSP) (2004).

2014. LV Bickford Ranch, LLC (Applicant) plans to develop the BRSP with minor modifications (2014 Project). The 2014 Project consists of the following modification to the 2004 Project:

- Reduction of approximately 230± acres in the size of the overall development footprint and corresponding increase of 230± acres in the open space preserve area;
- Removal of the 316-acre golf course and associated facilities;
- Elimination of the 9.7-acre commercial site;
- Elimination of the 17.3-acre high density residential site;
- Adjustments to the mix of residential uses and lot sizes; and
- Adjustments to the circulation plan and project entry locations.

In the 2014 Project, no change is proposed to the unit count (1,890 units). The proposed project, with modifications, is known as the 2014 Project.

2. Regulatory Framework

Development in Placer County is subject to the National Pollutant Discharge Elimination System (NPDES) municipal regulations for stormwater quality protection. Placer County is a designated municipal permittee under the State's Phase II NPDES program, which regulates stormwater flows into natural water bodies. The NPDES regulations require permitted areas to implement specific activities and actions to eliminate or control stormwater pollution. Under the Phase II NPDES program, unincorporated areas of Placer County are permitted in the western county area, which includes the BRSP site. In California, the NPDES program is implemented and enforced by the Regional Water Quality Control Board (RWQCB). The BRSP site is within the oversight of the Central Valley RWQCB.

NPDES General Construction Permit. The NPDES General Construction Permit requires that a project applicant control discharges associated with construction activity equal to or exceeding one acre of disturbance by:

- Eliminating or reducing non-stormwater discharges to stormwater systems and other waters;
- Developing and implementing a stormwater pollution prevention plan (SWPPP); and
- Performing inspections of stormwater control structures and pollution prevention measures.

NPDES Phase II Small MS4 Permit. Implemented by the State of California in 2013, the NPDES Phase II Permit covers municipal separate storm sewer systems (known as MS4s) and implements a stormwater management plan that is intended to improve waterways by reducing the quantity of pollutants that stormwater picks up and carries in the storm sewer system during storm events. NPDES Phase II requires post-construction storm water management criteria including site design and low impact development (LID) for new development and redevelopment. Among other requirements, regulated projects are required to perform site assessments as part of the early stages of project design. Site design measures and source control measures must be implemented. LID measures shall be incorporated in the design to disconnect runoff from impervious surfaces and infiltrate runoff to the extent possible, prior to installation of bioretention BMPs for water quality control for long-term (i.e., post-construction) water quality improvement. In addition, regulated projects that create or replace more than one acre of impervious surface shall maintain post-project runoff equal to or below pre-project flow rates for the 2-year, 24-hour storm event.

Project NPDES Requirements. In 2004 when the 2004 Project was approved, Placer County did not have an NPDES permit. Individual projects, such as the 2004 Project, were responsible for obtaining a project-specific NPDES permit. At that time, the NPDES permit only regulated stormwater pollution and did not require specific water quality measures. The 2014 Project is subject to both the General Construction Permit for stormwater and the Phase II MS4 Permit requirements for surface runoff which were implemented in 2013. In addition, the 2014 Project is required to comply with the following County requirements:

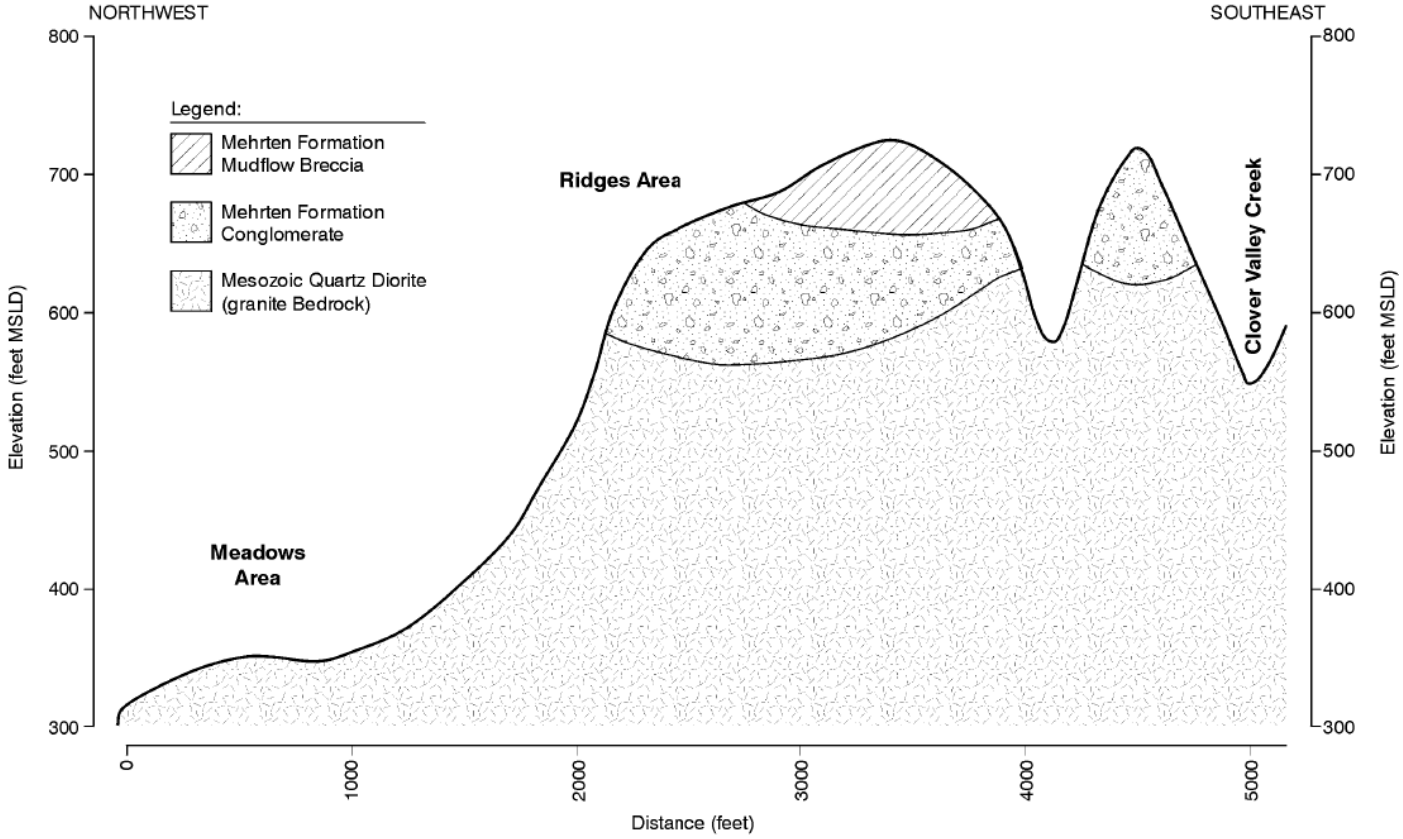
- Placer County Stormwater Management Manual (SWMM)
- Placer County Grading, Erosion and Sediment Control Ordinance (Article 15.48 of County Code)
- Placer County Stormwater Quality Ordinance (Article 8.28 of County Code)
- West Placer Stormwater Quality Design Manual (SQDM)

3. Physical Setting

The BRSP is located along the ridge line (Boulder Ridge) separating the Dry Creek and Auburn Ravine watersheds. In general, areas of the BRSP north of the ridge drain toward Auburn Ravine and areas south of the ridge drain toward Dry Creek.

Approximately 80 percent of the BRSP site is underlain by Mehrten Formation which is typically over 100 feet thick and thicker on the east side of the site. The Mehrten Formation is composed of two layers: the upper layer consists of a volcanic mudflow containing boulders ranging from less than a foot to larger than an automobile, the lower layer is a mudflow containing silt, sand, cobbles and boulders. Beneath the Mehrten lies the granitic Penryn Pluton, a granitic bedrock that has been classified as quartz diorite. The Penryn Pluton is highly erosive where it is not protected by the volcanic cap which is evidenced by the steep topography at the geologic contact of the two formations. The hardened volcanic camp formed by the Mehrten Formation has protected the deeply weathered underlying Penryn Pluton from erosion. The geology of the site affects the movement of natural and applied waters through the site.[1] Figure 1 is a cross section through the site from the northwest to the southeast that shows the geological formations and the relationship of the Mehrten to the quartz diorite

Figure 1
Bickford Ranch
Geologic Cross Section



[1] Evaluation of the Surface Water Runoff, Groundwater and Water Quality Treatment, Gasch Geophysical Services, Inc., May 2015, contained in Appendix B.

4. Stormwater Management and Water Quality in the 2014 Project

Bickford Ranch Stormwater Management Plan. A Stormwater Management Plan (SWMP) will be prepared for the 2014 Project to meet the requirements of the NPDES Permit and to minimize effects of stormwater runoff on the natural open space areas. The West Placer Storm Water Quality Design Manual will be used as part of the SWMP during BRSP project design in order to meet the Phase II MS4 Permit post-construction requirements.

The SWMP provides the framework for stormwater treatment during two components of the development process. First, during the construction phase while infrastructure is being built to support the community, and then during the post-construction phase, which will be part of the improvements that make up the community and continue to protect the natural resources in perpetuity.

Stormwater Management During Construction. The release of on-site stormwater runoff during construction activities is regulated by the NPDES General Construction Permit issued by the RWQCB for all construction sites greater than one acre. The General Construction permit requires that a Storm Water Pollution Prevention Plan (SWPPP) be prepared for the 2014 Project to address how the stormwater from the site will be maintained and treated prior to being discharged from the site.

The SWPPP is an evolving document that changes with the dynamics of the site development and includes the use of Best Management Practices (BMPs) for erosion and sediment controls. Erosion and sediment control BMPs include such things as applying straw mulch to disturbed areas, the use of fiber rolls and silt fences, sedimentation basins, drain inlet protection, stabilized construction accesses, and material management. The final sizing and selection of BMPs will consider requirements specific to the watershed and proposed developed activities. If construction occurs during the wet season, additional winterization improvements will be required to stabilize the disturbed areas of the site, prevent erosion, and clean runoff prior to discharge.

BRSP EIR Mitigation Measure H-E requires that in addition to the required visual inspection of runoff at selected monitoring points, the SWPPP will include a plan for sampling and analyzing runoff at selected discharge points at several storm events each year. If samples exceed thresholds, the SWPPP shall be modified to remedy the situation.

Post-Construction Stormwater Management. Post construction stormwater management is intended to treat the urban runoff generated on-site in perpetuity. The site design, source control, and LID techniques within the site will reduce and/or eliminate the pollutants from the urban stormwater runoff and prevent the contamination of receiving waters.

Post-construction stormwater treatment is composed of three general elements: source control, runoff reduction and treatment of runoff. By implementing the West Placer Storm Water Quality Design Manual, all three elements will be used in the BRSP. The basic practice of source control is to minimize the potential for constituents to enter runoff at the source. Site design measures and Low Impact Development (LID) measures

are the main tool the BRSP will employ for runoff reduction. Any remaining runoff will be treated using bioretention based water quality treatment control measures.

Site design measures are used to reduce project site runoff. LID features are stormwater management practices that emphasize smaller scale, natural, constructed and proprietary drainage facilities to capture and infiltrate runoff and precipitation. LID measures provide improved water quality prior to surface water runoff entering local drainage ways. These practices slow, clean and infiltrate runoff, resulting in a cleaner runoff and reduced volume of runoff to be conveyed via pipes and drainage systems. LID practices are a sustainable, practicable approach that benefit local aquifers and surface waters and can contribute to the groundwater supply and water quality. The selection and use of site design measures and LID measures may vary throughout the BRSP, depending on the runoff reduction needed, and include but are not limited to the following:

- Stream setbacks and buffers;
- Soil quality amendments;
- Tree planting, interceptor trees along sidewalks;
- Tree preservation;
- Disconnected roof drains;
- Disconnected and separated impervious surfaces;
- Porous pavement;
- Vegetated swales and channels;
- Rain barrels and cisterns;
- Water quality settling ponds;
- Curb cuts and vegetated filter strips;
- Infiltration trenches;
- Infiltrating bioretention facilities; and
- Impervious surface reduction.

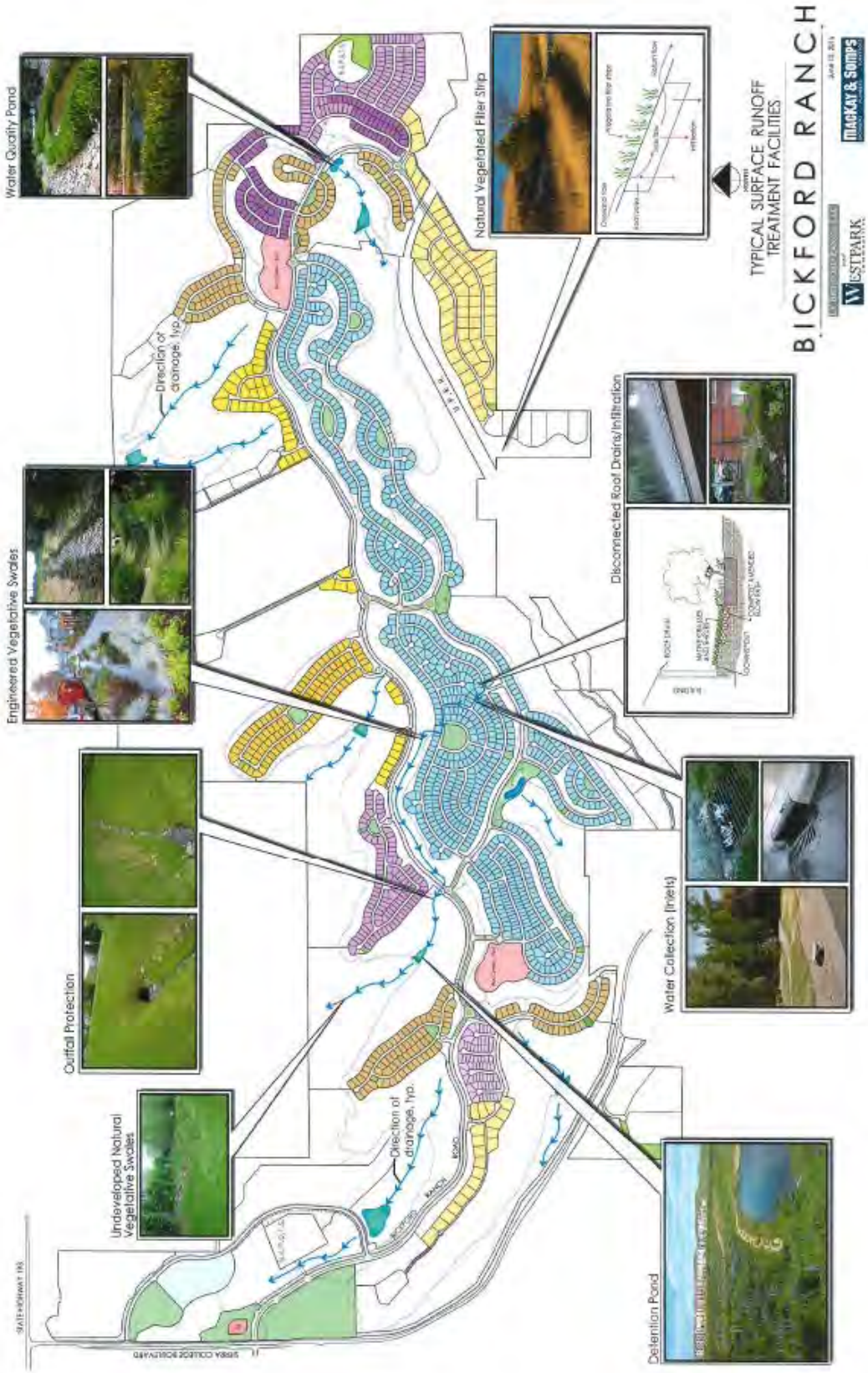
Typical surface runoff treatment facilities planned in the 2014 Project are shown on Figure 2.

Post-Construction Stormwater Treatment Train. The BRSP stormwater treatment train consists of the multiple components for managing the quantity and quality of stormwater runoff.[2]

Stormwater Percolation on Pervious Surfaces. Precipitation that falls on pervious surfaces in the BRSP (open space preserve, open space transition, parkways, landscape areas) will flow toward the Mehrten/Penryn Pluton contact. As runoff moves down slope, it flows across the Mehrten and onto the weathered Penryn Pluton surface and percolates slowly. During percolation the water moves down slope, laterally and vertically through tens of feet, a process that filters and effectively treats the percolating water. The treated water then becomes part of the groundwater system where it may remain indefinitely.

[2] Evaluation of the Surface Water Runoff, Groundwater and Water Quality Treatment, Gasch Geophysical Services, Inc., May 2015, contained in Appendix B.

Figure 2
Surface Runoff Treatment Facilities



Stormwater Water Runoff to Surface Waterways. The BRSP is located along the ridge line (Boulder Ridge) separating the Dry Creek and Auburn Ravine watersheds. In general, areas of the BRSP north of the ridge drain toward Auburn Ravine and areas south of the ridge drain toward Dry Creek. Stormwater than does not infiltrate the soil will drain to surface waterways via engineered and natural vegetative swales which treat the water. Some swales will drain to water quality basins which will further treat surface runoff before discharging to natural drainages. Water quality ponds allow for settlement of pollutants and suspended solids via a wider and flatter feature that is similar to a vegetated swale but wider and longer. This system ensures that stormwater is treated before entering waterways.

Additional project design elements within the open space areas will also provide hydrograph modification benefits. The created water quality grassy swales will provide additional water quality treatment and floodplain storage capacity which is factored into the hydrology analysis. The created swales also provide water quality treatment potential including added infiltration opportunities, evapo-transpiration opportunities, nutrient uptake, biological filtering, and buffers.

Stormwater Water Runoff to Storm Drain System. The BRSP will introduce impervious surfaces such as structures, parking lots, roadways, sidewalks, Class I trails, and driveways. As stormwater runoff flows over land or impervious surfaces, it accumulates debris, chemicals, sediment or other matter that could adversely affect water quality if the runoff is discharged untreated.

In the BRSP, the West Placer Storm Water Quality Design Manual will be used to design each phase of development. Runoff from impervious surfaces will first be reduced using source control, site design measures, and LID measures prior to being collected in a storm drain system. The main streets will have curb and gutters that convey runoff to storm drain inlets or catch basins. The catch basins will be fitted with external screens and/or internal capture devices to separate trash/debris from runoff. From the catch basin, runoff will flow to a network of underground pipes which outfall into meandering grassy swales and infiltration areas located along the perimeter of the development footprint. The grassy swales will treat the low-flow events and will discharge to rock-lined ditches or armored channels to provide erosion control at the outfall locations. Where outfall locations are located upstream of an established swale or water feature, a flexible, synthetic liner within a vegetated channel will be used. From the grassy swales, runoff will flow to natural drainage ways.

Surface Runoff in Residential Areas. The BRSP will introduce impervious surfaces (e.g. rooftops, sidewalks, driveways, and hardscapes) to the site that will increase the rate of surface water runoff. In the 2014 Project, most of the impervious surfaces are associated with residential uses. In residential areas, surface runoff will be reduced using source control, site design, and LID measures such as disconnected roof drains, tree preservation and planting, and soil amendments in accordance with the West Placer Storm Water Quality Design Manual. Remaining runoff will be treated using infiltrating bioretention facilities and engineered and natural vegetated swales before entering natural drainage ways.

5. Potential Impacts to Groundwater

Development of the 2014 Project will increase the overall amount of impervious surface on the project site and construction activities and buildout of the project will introduce urban runoff conditions. The Bickford Ranch EIR evaluated the potential impacts to groundwater that would result from the following activities related to the proposed project:

- Use of chemical fertilizers and pesticides at the golf course;
- Accumulation of degradable organic compounds in manmade lakes and wetlands from wildlife fecal material;
- Failure of septic leach field systems; and
- Leakage from on- and off-site sanitary sewer pipes.

Golf Course. The 2004 Project included a 316-acre golf course and related facilities (driving range, maintenance facility). A majority of runoff from irrigated areas of the golf course would have drained by sheet flow to existing natural channels (Auburn Ravine Creek and Clover Valley Creek) that are groundwater recharge sources, and significant impacts to runoff quality would have potentially reduced groundwater quality within the creek recharge zones. In addition, because of the need to maintain large areas of high-quality turf grass, golf courses typically use relatively large quantities of chemical fertilizers, pesticides, herbicides and fungicides which would have affected groundwater. The Bickford Ranch EIR included mitigation measures to address water quality and groundwater impacts resulting from golf course operations.

The 2014 Project no longer proposes the golf course and related facilities and impacts to water quality and groundwater as a result of the golf course are not present in the 2014 Project.

Man Made Lakes. The 2004 Project proposed man-made lakes designed as an amenity for the northwestern portion of the project. In the lake ecosystem, if the population of wildlife were to exceed the biodegradation capacity of the system, nitrates and related animal waste constituents could infiltrate into the relatively shallow water table aquifer below the lakes area, which could have affected groundwater quality.

The 2014 Project no longer proposes man make lakes and impacts to water quality and groundwater as a result of the lakes will not result with the 2014 Project.

Individual Septic Systems. The 2004 Project included 18 residential parcels with individual septic tank and leach field systems for disposal of wastewater. Failure of leach field systems could result from poor design and/or maintenance and could potentially result in groundwater impacts.

In the 2014 Project, the number of residential parcels with individual septic tank and leach field systems has been reduced from 18 to 12. The 2014 Project proposes to provide adequate septic system design for each parcel based on site-specific soil percolation test data[3] and will comply with Placer County's Environmental Health design requirements and standards as well as State Health Department standards. Implementation of Placer County policies and ordinances relating to property setbacks, septic system permitting, design,

[3] Soil percolation studies completed in 2004, Aqua-Terra Environmental Consultants.

construction and maintenance is required (Mitigation Measure H-J), and would reduce the impact to less than significant.

Sanitary Sewers. Sanitary sewers within the project will conform to the current design standards and practices set forth by the Placer County Environmental Health Services and Placer County Land Development Manual. Sewer transmission pipes and services will be separated based on County Health Department standards from potable water facilities and wells. Pursuant to State Department of Health, appropriate separation distances of no less than ten feet of horizontal distance between parallel sewer and water lines will be provided and will eliminate the potential for any sewer leaks to infiltrate potable water facilities. Construction installation and testing practices will also ensure that the quality of the sewer pipe is maintained during installation and during the service life of the sewer system.

Pursuant to the Placer County Land Development Manual Section 6.03, sewer pipes within 50 to 100 feet of any water well sites are required to be constructed of Ductile Iron Pipe or C-900 PVC pipe with approved water tight joints and shall be completely encased in concrete. This practice eliminates the risk of possible contamination that could occur due to potential accidents.

In addition to the above, the California Department of Water Resources has developed water well standards (DWR, 1991) that require that domestic supply wells be located no closer than 50 feet from sanitary sewers underlain by unsaturated soil exhibiting relatively low permeability. Proposed on-site wells would be constructed in accordance with DWR standards, thereby reducing the level of impact to less than significant. It is uncertain at this time whether any domestic supply wells exist in close proximity to the proposed off-site sewer alignment. Mitigation for potential groundwater impacts from off-site sewers (Mitigation Measure H-K) include notifying Placer County Department of Environmental Health and property owners with wells within 50 feet of the sewer line, and providing compensation for impacts to wells related to the breakage. Groundwater in the vicinity of the proposed off-site sewer may already have nitrate impacts due to agricultural land use and/or septic systems, and determination of baseline coliform and nitrate levels prior to sewer construction is therefore suggested, but not mandatory. The recommended mitigation would reduce the level of impact to less than significant.

6. Well Monitoring for Golf Course Groundwater Impacts

To address water quality impacts associated with the proposed golf course in the 2004 Project, the Bickford Ranch EIR included Mitigation Measure HW-F that required preparation of a Golf Course Chemical Application Plan (CHAMP) and Water Quality Plan. The mitigation required ground water wells to monitor potential groundwater impacts resulting from the golf course. See Appendix A for Mitigation Measure HW-F.

In addition, the Bickford Ranch Specific Plan (2004, pages 7-15 and 7-16), included measures to monitor groundwater quality as a result of potential groundwater quality impacts resulting from construction and long-term management of the golf course. The measures included the installation of groundwater wells and on-going monitoring of wells.

Baseline Data Collected from Off-Site Wells. A detailed water quality protocol was prepared for the golf course[4] to comply with specific water quality objectives outlined in the CHAMP. In 2003, four off-site domestic wells were sampled and analyzed to collect a baseline of data prior to construction of the golf course. No chemical pesticides were detected in the samples from off-site wells.

Elimination of Golf Course from 2014 Project. The 2014 Project does not include the proposed golf course and related facilities. Elimination of the golf course eliminates the impact identified in the EIR related to groundwater as a result of chemical applications and long-term management of the golf course. Consequently, Mitigation Measure HW-F, including the requirement for the CHAMP and continued off-site groundwater monitoring no longer applies to the 2014 Project.

7. Well Monitoring of Wells North of Project

There is a condition of approval on the 2004 Project small lot tentative maps to construct three shallow monitoring wells to monitor groundwater on the north side of the BRSP, consistent with the established monitoring plan.[5] The condition requires baseline water quality monitoring prior to improvement plan approval for Phase 1 in order to establish existing conditions and regular monitoring. Well monitoring is the responsibility of the Bickford Ranch Homeowners Association. The requirement for monitoring wells and a monitoring program will be applied as a condition of approval on the small lot tentative map for the 2014 Project.

8. Conclusions

In both the 2004 and 2014 Projects, the geology of the site provides ample distance and the soil column of the weathered diorite to allow percolated waters (runoff) to be effectively cleansed and/or filtered of organic impurities. Given the geological setting and planned control systems for runoff and the width of the open space area surrounding the BRSP development footprint, water wells outside of the BRSP will not be affected by BRSP runoff.

The 2014 Project will have fewer impacts than the 2004 Project related to surface water runoff, groundwater and water quality based on the following:

- Compared to the 2004 Project, the size of the overall development footprint of the 2014 Project has been reduced by approximately 230 acres with a corresponding increase of 230 acres in the open space preserve area. As a result, the area of impervious surfaces has been reduced and the area of pervious surface has increased.

- The 2004 Project included a 316-acre, 18-hole golf course and related facilities, a 9.7-acre commercial site and 17.3-acre high density residential site. These three uses are no longer proposed in the 2014 Project which eliminates the potential water quality impacts associated with each of the uses.

[4] Environmental & Turf Services, 2003.
[5] Bickford Ranch Three Northerly Wells Monitoring Plan, October 22, 2002.

- The 2014 Project does not include man-made lakes previously proposed in the 2004 Project. Nitrates and related animal waste constituents associated with the lakes had the potential to infiltrate the water table and affect groundwater quality. Since the lakes are not proposed in the 2014 Project, these potential impacts have been eliminated.

- The 2014 Project proposes six fewer septic tank and leach field systems than the 2004 Project.

- Since the 2004 Project, the County has become a designated municipal permittee under the National Pollution Discharge Elimination System and the NPDES regulatory framework has been expanded to include installation of BMPs for long-term improvements in water quality. The regulatory environment for the 2014 Project is more restrictive than it was for the 2004 Project.

- The range of options and types of best management practices (BMP) and low impact development measures (LID) available for the 2014 Project are more advanced than the 2004 Project. The 2014 Project includes more innovative stormwater pollution (BMPs) and water quality measures (LID) and the 2004 Project included only stormwater pollution measures (BMPs).

Therefore, the 2014 Project does not result in additional impacts to surface water runoff, groundwater and water quality beyond those identified in the 2004 Project.

Appendix A
Mitigation Measures to Reduce Impacts to Water Quality (Surface Water and Groundwater) During Construction and Buildout

The following are mitigation measures contained in the Bickford Ranch EIR to reduce impacts to water quality (surface water and groundwater) during construction and buildout.

The measures have been updated in the 2014 Project to reflect the current regulatory environment relative to water quality. Changes to the mitigation measures since the 2004 Project to reflect the 2014 Project are shown in underline and strikeout text. Only the full text of mitigation measures proposed for revision(s) are shown.

Mitigation Measure to Address Reduced Stormwater Quality Due to Increased Erosion and Sedimentation During Construction
(Bickford Ranch EIR, Impact H-3)

To address reduced stormwater quality due to increased erosion and sedimentation during construction, the Bickford Ranch EIR includes Mitigation Measures G-B, H-D and H-E. No changes are proposed to Mitigation Measures G-B and H-E. Changes to Mitigation Measure H-D are proposed to update the measure to current practices.

- **Mitigation Measure G-B: Prepare and implement a grading and erosion control plan.**
  (No changes are proposed to Mitigation Measure G-B)

- **Mitigation Measure H-D: Prepare and implement a Storm Water Pollution Prevention Plan for construction activities.**

  The Applicant shall ~~proposes to~~ prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). Construction activities involving the disturbance of ~~five~~ one or more acres are required to apply for coverage under the SWRCB's NPDES General Permit for Storm Water Discharges Associated with Construction Activities. To obtain coverage under the permit, the Applicant must submit a Notice of Intent with the required permit fee and prepare a SWPPP. The contents of the SWPPP are set forth in detail in the permit application package and include development of site-specific structural and operational BMPs to prevent and control impacts to runoff quality, measures to be implemented before each storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means. The RWQCB will issue Waste Discharge Requirements (WDRs) which set forth conditions, discharge limitations, and monitoring and inspection requirements. Development and implementation of the SWPPP is the responsibility of the Applicant and its assignees.

  - A spill prevention and countermeasure plan shall be developed which would identify proper storage, collection, and disposal measures for potential pollutants (such as fuel, fertilizers, pesticides, etc.) used onsite. The plan would also require the proper storage, handling, use, and disposal of petroleum products.
  - Construction activities shall be scheduled to minimize land disturbance during peak runoff periods and to the immediate area required for construction. Soil conservation practices shall be completed during the fall or late winter to reduce erosion during spring runoff. Existing vegetation will be retained where possible. To the extent feasible, grading activities shall be limited to the immediate area required for construction.
  - Surface water runoff shall be controlled by directing flowing water away from critical areas and by reducing runoff velocity. Diversion structures such as terraces, dikes, and ditches shall collect and direct

runoff water around vulnerable areas to prepared drainage outlets. Surface roughening, berms, check dams, hay bales, or similar devices shall be used to reduce runoff velocity and erosion.

- Sediment shall be contained when conditions are too extreme for treatment by surface protection. Temporary sediment traps, filter fabric fences, inlet protectors, vegetative filters and buffers, or settling basins shall be used to detain runoff water long enough for sediment particles to settle out. Store, cover, and isolate construction materials, including topsoil and chemicals, to prevent runoff losses and contamination of groundwater.
- Topsoil removed during construction shall be carefully stored and treated as an important resource. Berms shall be placed around topsoil stockpiles to prevent runoff during storm events.
- Establish fuel and vehicle maintenance areas away from all drainage courses and design these areas to control runoff.
- Disturbed areas shall be revegetated after completion of construction activities.
- Provide sanitary facilities for construction workers.

- **Mitigation Measure H-E: Monitor erosion and sediment control measures during construction.**
  (No changes are proposed to Mitigation Measure H-E).

Mitigation Measure to Address Water Quality as a Result of Construction Activities (Bickford Ranch EIR, Impact H-4)

To address water quality impacts associated with the construction of the project, the Bickford Ranch EIR includes Mitigation Measure H-D which requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for construction activities. Changes to Mitigation Measure H-D are shown above in the discussion of Impact H-3.

- **Mitigation Measure H-D: Prepare and implement a Storm Water Pollution Prevention Plan for construction activities.**
  (See text of Mitigation Measure H-D above in discussion of Impact H-3).

Mitigation Measures to Address Increased Erosion and Sedimentation after Buildout (Bickford Ranch EIR, Impact H-5)

To address increased erosion and sedimentation after buildout, the Bickford Ranch EIR includes Mitigation Measures G-B, H-A, H-F and H-G. No changes are proposed to Mitigation Measures G-B, H-F and H-G.

- **Mitigation Measure G-B: Prepare and implement a grading and erosion control plan.**
  (No changes are proposed to Mitigation Measure G-B)

- **Mitigation Measure H-A: Prepare and implement a post-~~development~~ construction stormwater management plan.**

  The Applicant shall ~~obtain coverage under~~ meet the requirements of the National Pollutant Discharge Elimination System (NPDES) Phase II General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The Applicant shall prepare and implement a post-~~development~~ construction storm water management program ~~compatible~~ in accordance with the requirements of the Phase II MS4 Permit, by implementing the West Placer Storm Water Quality Design Manual during project design, including the implementation of LID measures.

The Applicant shall implement one or more of the following site design measures to reduce project site runoff (Order No. 2013-0001-DWQ (CAS000004), Section E.12.b.ii):

- Stream Setbacks and Buffers - a vegetated area including trees, shrubs, and herbaceous vegetation, that exists or is established to protect a stream system, lake reservoir, or coastal estuarine area;
- Soil Quality Improvement and Maintenance - improvement and maintenance soil through soil amendments and creation of microbial community;
- Tree Planting and Preservation - planting and preservation of healthy, established trees that include both evergreens and deciduous, as applicable;
- Rooftop and Impervious Area Disconnection - rerouting of rooftop drainage pipes to drain rainwater to rain barrels, cisterns, or permeable areas instead of the storm sewer;
- Vegetated Swales - a vegetated, open-channel management practice designed specifically to treat and attenuate storm water runoff.

The Applicant ~~proposes to~~ will develop a Stormwater Management Program in accordance with the West Placer Storm Water Quality Design Manual and ~~under the guidelines set up by~~ the Placer County Flood Control and Water Conservation District's Stormwater Management Manual. The components of the program include reducing storm water runoff from impervious surfaces using source control, site design, and LID measures, protection from flooding, baseline hydromodification management, protection and enhancement of the stream environment, prevention of erosion and adverse water quality, and incorporation of regional stormwater management goals. ~~creation of multiple resource use, and assurance of the growth of the project to minimize its adverse impacts.~~

The purpose of this mitigation measure is to provide a plan for ensuring that the project is designed to reduce impacts to surface water both during and after construction, incorporate site design and LID features, and manage increased flows from impervious surfaces accordingly. Where necessary, structural BMPs constructed as part of the proposed project ~~are~~ will be maintained ~~appropriately~~ properly such that they continue to perform their intended function as long as the project site is occupied. ~~Placer County does not have an NPDES permit covering storm water discharges in the county; however, the Placer County General Plan sets forth several policies which function to bring the County into compliance with the substantive requirements of the NPDES program.~~ The Storm Water Management Plan will address site-specific drainage characteristics, site assessment, site design measures, source control, LID design, storm water conveyance systems, discharge points, potential sources of runoff water quality impacts, specific structural BMPs that have been constructed as part of the project after runoff from impervious surfaces has been effectively reduced, recommended operational BMPs, a maintenance program for structural BMPs, a monitoring program designed to evaluate the need for BMP modifications or additional BMPs, and identification of specific parties responsible for implementing each part of the plan.

- **Mitigation Measure H-F: Monitor site erosion and sediment control measures for two years after implementation of final erosion control measures.**
  (No changes are proposed to Mitigation Measure H-F)

- **Mitigation Measure H-G: Design runoff detention basins to promote solids settling and provide capacity for accumulated sediment.**
  (No changes are proposed to Mitigation Measure H-G)

Mitigation Measures to Address Water Quality as a Result of Buildout of Project (Bickford Ranch EIR, Impact H-6)

To address water quality impacts associated with the buildout of the project, the Bickford Ranch EIR includes Mitigation Measures HW-F, H-A, H-H, and H-I. Mitigation Measures HW-F and H-H are deleted because the 2014 Project no longer includes a golf course or constructed lakes.

- **Mitigation Measure HW-F: Finalize and Implement the Applicant's Golf Course Chemical Application Plan.**
  (Mitigation Measure HW-F is deleted because the project no longer includes a golf course.)

  ~~The Applicant shall prepare a draft Golf Course Chemical Application and Management Plan (**CHAMP**) and Water Quality Monitoring Plan. The purpose of the CHAMP is to document turf/landscape maintenance policies and procedures to be employed at the golf course and associated facilities. The specific objectives of the policies and procedures are to:~~

  - ~~Prevent and minimize potential impacts to soil, surface water (runoff), and groundwater from use of pesticides, fertilizers, and other potentially hazardous materials;~~
  - ~~Provide for appropriate management and storage of potentially hazardous chemicals used at the golf course; and~~
  - ~~Provide for monitoring to provide data for management feedback and to demonstrate these objectives have been achieved.~~

  ~~Locations for water monitoring shall be based on the management information objectives of the CHAMP and shall have a sound hydrogeologic basis. Two types of groundwater monitoring wells shall be provided. Type 1 monitoring wells shall be located in the shallow groundwater zone within the zone of decomposed granitic bedrock adjacent to selected fairways to provide early feedback for management purposes. Type 2 wells shall be sited to provide more general coverage within the shallow groundwater zone of portions of the golf course and associated detention basins.~~

- **Mitigation Measure H-A: Prepare and implement a post-~~development~~ <u>construction</u> stormwater management plan.**
  (See text of Mitigation Measure H-A above in discussion of Impact H-5).

- **Mitigation Measure H-H: Finalize and implement the Applicant's Lake Management Plan**
  (Mitigation Measure HW-H is deleted because the project no includes constructed lakes.)

  ~~The Applicant proposes to construct several man-made lakes in the Meadows area of the proposed project. These lakes are planned to function as natural ecosystems with vegetation appropriate to lake and/or wetlands habitat and will receive stormwater runoff from a portion of the project site. The lake systems will likely be attractive to wild waterfowl, and residents might potentially introduce fish and/or birds. Based on the results of the preliminary geotechnical investigation, the local groundwater table in this area is relatively shallow, and groundwater may therefore be encountered during construction of the lakes. If the system is designed properly, including consideration of lake depth, surface area, types of vegetation, and vegetation densities, the system would tend to provide for natural degradation of organic waste products which would otherwise tend to infiltrate and impact groundwater quality. Additionally, such a design will also promote biological treatment of organic pollutants introduced into runoff in catchment areas draining into the lake system, thereby allowing the lakes to function as a storm water structural BMP. A draft Lake Management Plan has been developed in concert with appropriately trained specialists in the field of aquatic ecosystems, and includes specific plans for vegetation types~~

~~and densities that will support and promote long-term health of the system while minimizing the need for maintenance. The plan also addresses maintenance requirements, present a monitoring program to ensure that the system continues to function as designed following project buildout, and identify parties responsible for maintaining the system. Because the lakes are part of the natural open space areas dedicated to the County, the County will be responsible for the long-term operation and maintenance of the lakes.~~

~~The Final Lake Management Plan shall include (but not be limited to) the following items:~~

1. ~~Section 1 – Project Description of Lakes: Characterize water quality from Caperton Canal; identify expected volume of make-up water; monitor total dissolved solids in make-up water to ensure that it will not adversely affect existing water quality coming from Caperton Canal.~~
2. ~~Section 2 – Lake Construction: Calculate the estimated seepage rate for the method chosen for sealing lake bottoms, and choose a method (among the alternatives presented in the draft plan) that does not allow high seepage rates. Provide a complete description of lake maintenance infrastructure that will achieve the objectives of the plan.~~
3. ~~Section 3 – Lake Management: Identify the parties responsible for maintaining the lake management systems. In Section 3.1, describe the nutrient input control and turnover rates necessary to ensure proper maintenance. Finalize the description of the revegetation plan (include additional mid- and low-level species to ensure sufficient habitat during the natural revegetation period; specify recommended flora densities). In Section 3.6, identify soil erosion techniques and implementation procedures to control soil erosion. In Section 3.8, identify management techniques to control aquatic invertebrates and fish species that might become established in the lakes.~~
4. ~~Section 4 – Recreation: Identify provisions for non-destructive access to the lakes for nonmotorized boats.~~
5. ~~Section 5 – Lake Monitoring: Monitor Lakes Six and Seven for total petroleum as oil, total petroleum as gasoline, and semivolatile organic compounds to ensure that contamination from the road intersecting the two lakes and the associated traffic does not adversely affect water quality, using RWQCB standards. For the first year, collect and analyze one sample per quarter. If no contamination is detected, monitoring activity could be decreased to an annual or semiannual schedule.~~

   ~~For all lakes, include monitoring for pesticides and herbicides used on the golf course, using RWQCB standards, monthly for the first two years and quarterly for the subsequent three years unless contamination is present at levels indicating that continued monitoring is appropriate.~~

   ~~For Lakes One, Two, and Three, monitor for contamination that might result from activities on this property, such as leakage from the septic tank and sediment accumulations due to erosion.~~
6. ~~Section 6 – Water Quality Corrective Actions: Develop a corrective action threshold above 5 mg/L for dissolved oxygen in order to ensure that the health of lake biota is not jeopardized by a sudden decrease in dissolved oxygen levels. Identify corrective action for contamination resulting from runoff from the road, from chemical usage, and from activities on the NAPOTS property affecting lake water (if any).~~
7. ~~Section 7 – Corrective Action Management Alternatives to Common Problems: Delete full draw down or the use of dyes as two alternative methods for managing nuisance aquatic vegetation. Revise Section 7.2 regarding muddy water to identify the cause(s) of the turbidity and implement a management strategy to ensure its reduction, rather than treating the effects. Identify appropriate fishing seasons for each species of game fish identified in Section 7.3.~~

~~Implementation of a Lake Management Plan approved by the County would adequately address impacts associated with the constructed lakes and wetland areas.~~

- **Mitigation Measure H-I: Design and construct improvements to protect water quality in canals in accordance with PCWA standards and County requirements for a 100-foot setback from structures.**
  (No changes are proposed to Mitigation Measure H-I)

Mitigation Measure to Address Reduced Groundwater Quality (Bickford Ranch EIR, Impact H-7)

To address reduced groundwater quality, the Bickford Ranch EIR includes Mitigation Measures HW-F, H-H-J and H-K. Mitigation Measure HW-F and H-H are deleted because the 2014 Project no longer includes a golf course or constructed lakes. A minor revision to Mitigation Measure H-K is proposed to identify the full name of the County Department of Environmental Health Services.

- **Mitigation Measure HW-F: Finalize and Implement the Applicant's Golf Course Chemical Application Plan.** (Mitigation Measure HW-F is deleted because the project no longer includes a golf course.)

- **Mitigation Measure H-H: Finalize and implement the Applicant's Lake Management Plan** (Mitigation Measure HW-H is deleted because the project no includes constructed lakes.)

- **Mitigation Measure H-J: Implement Placer County policies and ordinances related to permitting, design, construction and maintenance of septic systems.**

- **Mitigation Measure H-K: Notify Placer County Department of Environmental Health Services and affected property owners if off-site sewer pipeline breaks**

  If there is a breakage of the off-site sewer line along SR 193, the owner of the sewer (the Applicant, or the JPA, or another entity) will be responsible for notifying the Placer County Department of Environmental Health Services and the adjacent property owners that may have water wells within 50 feet of the pipeline. To the extent that the sewer pipeline break affects a particular well, the sewer pipeline owner will compensate the well owner for damages sustained.

Appendix B
Evaluation of the Surface Water Runoff, Groundwater and Water Quality Treatment
Gasch Geophysical Services, Inc.
May 2015

Project: Bickford Ranch Development

To: Mr. Mark Sauer, P.E.
MacKay & Somps Civil Engineers, Inc.

From: Jerrie W. Gasch, PGp, PG, CEG
Kent L. Gasch, PGp

Re: Evaluation of the Surface Water Runoff, Groundwater and* Water Quality Treatment *at the Bickford Ranch Development Site, Placer County, California.

Introduction

The proposed Bickford Ranch Development is located in western Placer County approximately 2.5 miles east of the City of Lincoln, southeast of the intersection of Sierra College Boulevard and Highway 193. This site is naturally divided into twelve watershed areas, as identified by Civil Solutions (February, 1999). Since the planned development areas are generally native ground, it is important to evaluate the surface water runoff, groundwater and water quality treatment with regard to geology and topography at the site.

Local geology and soil development are pertinent to both surface and groundwater movement. As fluid is applied to the ground surface in the form of rain or irrigation water, it will, in time, evaporate to the air or percolate into the soils and become part of the groundwater system. Knowing the geology and topography of a site is paramount in understanding how the site geology and topography may affect the movement of natural and applied waters through the site.

The purpose of this memorandum is to explain the controlling effects that geology and topography will have on the movement and quality of groundwater on and in proximity of the planned Bickford Ranch Development. Utilizing accepted standards for soil percolation and filtering distances, this memorandum will demonstrate that groundwater from the site will not affect off-site wells.

Development

Bickford Ranch is situated along a ridgeline separating the Dry Creek watershed to the south and Auburn Ravine watershed to the north. Development of Bickford Ranch will introduce impervious surfaces that may increase the rate of surface water runoff leaving the site. This increase in post-construction stormwater surface runoff will be treated using three general elements: source control, runoff reduction and treatment of runoff. Surface stormwater drainage will be routed overland through streets to local drainage inlets and allowed to discharge into the nearest natural drainage way. Surface runoff

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will be treated before entering the drainage way via source controlled low impact development (LID's) features such as disconnected roof drains and soil amendments. Further treatment of runoff will be provided using water quality features such as vegetated swales, natural vegetated filter strips, and stream setbacks and buffers. Runoff reduction will be achieved by providing on-site detention basins to hold back the increased flows from the post-developed project and will discharge at flow rates approximately equal to the pre-developed condition.

Geology

The bulk of the Bickford Ranch land is made up of a sequence of Tertiary age Mehrten formation typically over 100 feet thick and thicker on the eastern portion of the ranch. The Mehrten Mudflow Formation underlies approximately 80% of the planned Bickford Ranch Development. This erosion resistant volcanic Mehrten Mudflow is Eocene to Pliocene in geologic age. The formation is comprised of two distinct units. Typically 60 to over 100 feet of Mehrten Volcanic Mudflow Breccia cover the topographically high elevations of the ridges. This very hard, impermeable material appears as a coarse concrete-like mix in outcrop. Boulders in this formation are known to range in size from less than one foot in diameter up to larger than automobile size. Immediately beneath this mudflow breccia is a thick and more extensive sequence of Mehrten formation conglomeratic mudflow. The lower unit of this formation is a cemented andesitic conglomerate containing silt, sand, rounded to sub-rounded pebbles, cobbles and boulders. This conglomeratic material is, characteristically, moderately to well cemented with volcanic ash and other mudflow related material.

The material underlying the lower volcanic unit is a Jurassic age quartz diorite termed the Penryn Pluton. Where exposed, the Penryn Pluton is very commonly found to be deeply weathered and eroded. Where the pluton is buried beneath the Mehrten Mudflow cap, previous erosion is known to have formed stream channels. These channels were later cover with a thin sequence of sands, gravels and cobbles prior to being covered by the mudflows.

The accepted depositional sequence for the Mehrten formation is one in which this wet mass flowed down the old drainages that were eroded into the Penryn Pluton surface. The drainage pattern curving from west, to southwest, to south, is also expressed by the Clover Valley drainage pattern evident today. This curvature is likely the effect of the Penryn Pluton rising while intruding the foothill belt rocks as the drainage was developing. As the Penryn Pluton continued to uplift, it was eroded to gently rolling hill topography, with a slight tilt to the northwest. Volcanic material from high on the Sierra Nevada mountain crest flowed down slope in a semi-liquid state. This volcanic mudflow traversed down the old diorite surface drainages, covering the pre-existing sands and gravels.

Following this mudflow depositional sequence, a period of weathering and erosion took place. During this period, the diorite weathered and eroded more rapidly than did the

Mehrten, leaving the highly resistant Mehrten formation topographically higher, as it remains today.

The diorite located north, east and south of the Bickford Ranch lands are generally deeply weathered and more easily eroded than the Mehrten formation. This is clearly evident in the 27 trenches excavated and 8 drill holes drilled on the Bickford Ranch by Anderson Geotechnical Consultants, Inc.

The geologic map in the Dames & Moore and Anderson reports clearly shows a pattern of Mehrten material filling old drainages cut into the Penryn Pluton. In the field, the contact of the diorite at the base of the Mehrten conglomerate is typically a change in slope.

The highly indurated volcanic cap formed by the Mehrten Formation has protected the deeply weathered underlying diorite of the Penryn Pluton from erosion. Because the diorite is highly erosive where it is not protected by the volcanic cap rock, the topography typically becomes steep near the geologic contact of these two formations. Additionally, the diorite terrain is typically at lower elevations and has a more subdued topographic relief compared to the adjacent ridge forming mudflow topography.

The geologic contact between the base of the mudflow and the diorite is found at a higher elevation along the southern and eastern areas of the Bickford Ranch lands. This indicates a gentle slope of the base of the Mehrten Formation toward the northwest. Six Exploratory drill holes were drilled through the mudflow to determine the thickness of this formation near the center of the main Bickford Ranch ridge. In each drillhole, the mudflow demonstrated a thickness greater than 100 feet. Comparing the drillhole contact elevations to the elevations of the exposed contacts around the edges of the ridge, it is apparent that the base of the Mehrten formation follows a gentle northwestward sloping depression beneath the mudflow cap. This sloping depression is a remnant of the old channel that controlled the mudflow as it flowed to the west-southwest.

On the ridge top, the volcanics have developed a thin veneer of soil. By contrast, the highly erosive dioritic terrain characteristically has a much thicker sequence of soil. This can be observed in numerous road cuts and exposures throughout the area and was confirmed in the six exploratory holes drilled through the volcanic cap rock.

Based on the known geologic and topographic framework of the area, runoff water from the site can be expected to flow toward the Mehrten/diorite contact. As runoff moves down slope, it flows across the Mehrten and onto the weathered diorite surface. As runoff fluids reach the weathered material, it percolates slowly and is filtered as it moves down slope. Studies have shown that runoff fluids percolating through a few tens of feet, laterally and vertically, will be effectively cleaned. This concept was partially responsible for the basis for domestic community water well seals being required at a minimum depth of 50 feet below surface.

In addition, post-development surface runoff may be routed to a roadside grassy swale designed to act as another source for water quality control before entering a local storm drain piping system. Meandering grassy swales will be provided at outfall locations discharging directly upstream of a creek. These grassy swales will a treat the low-flow events and will discharge to a rock-lined ditch or armored channel to provide erosion protection at the outfall locations.

Detention basins will be constructed by installing berms across natural drainage ways to provide stormwater attenuation. All detention basins will be located on site and will be designed in accordance with the Placer County Stormwater Management Manual (SWMM) and will meet the requirements of the County's National Pollutant Discharge Elimination System (NPDES).

Three water quality basins will also be provided to treat surface runoff before discharging to a natural drainage way in areas where larger combined flows are anticipated. These water quality basins will allow for settlement of pollutants and suspended solids via a wider and flatter water quality basin (similar to a vegetated swale but wider and longer) with an approximately 3:1 width to length ratio to provide adequate treatment capabilities.

LID features are stormwater management practices that emphasize smaller scale, natural, constructed and proprietary drainage facilities to capture urban runoff and precipitation. LID measures provide improved water quality prior to surface runoff entering the local storm drain system. These practices will slow, clean and infiltrate runoff, resulting in a cleaner runoff and can reduce the amount of surface runoff through soil infiltration. LID practices are a sustainable, practicable approach that benefit local aquifers and surface waters and can contribute to groundwater supply and water quality.

A soil percolation study was performed on 14 lots proposed in the 2004 Bickford Ranch plan by Aqua-Terra Environmental Consultants. This study was carried out on the lots which were proposed to utilize individual on-site sewage disposal systems and followed Placer County's Ordinance regarding such systems. The study concluded that soil percolation results were "highly variable but were generally within the acceptable range for purposes of on-site wastewater disposal".

During construction of Bickford Ranch, appropriate Best Management Practices (BMP's) will be implemented to treat surface runoff and eliminate pollution, as outlined within a general stormwater pollution prevention plan (SWPPP). The SWPPP requirements incorporate erosion controls and sediment controls. These may include, but are not limited to, straw mulch, fiber rolls, silt fences, sedimentation basins, drain inlet protection, stabilized construction entrances, and material management. Based upon the requirements specific to the contributing watershed and proposed

development, each of the above described erosion and sedimentation controls will be sized and selected accordingly.

Conclusion

With the implementation of the surface runoff water source control, runoff reduction, and treatment of runoff, LID features, detention basins and three water quality basins, will allow for controlled releases of stormwater runoff. In addition, the geology of the site will provide ample distance and soil column of the weathered diorite to allow for percolated waters to be effectively cleansed and/or filtered of organic impurities from runoff or on-site wastewater disposal systems. Since there are no known domestic water wells within several hundred feet of the Mehrten/diorite contact, it is our conclusion, based on the geologic setting and the planned runoff control systems, that water wells outside the Bickford Ranch lands will not be affected by runoff or on-site wastewater disposal systems.