4.9 GEOLOGY

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INTRODUCTION

This section analyzes the effects of the proposed Clover Valley Large and Small Lot Tentative Maps (LSLTSM) upon soils and geology within the project area. Much of the analysis focuses on the surface grading required for anticipated development of the proposed project. The potential for erosion of topsoil during construction and the effect that expansive soils will have on the development are also discussed in this chapter. Issues related to the anticipated small lot tentative subdivision maps are included where applicable.

Information in this chapter is drawn from the *Geotechnical Investigation* prepared by Kleinfelder, Inc.,[1] (see Appendix K of this Draft EIR) the *Geotechnical Engineering Report*[2] and *Environmental Site Assessment* undertaken by Wallace·Kuhl & Associates, Inc.,[3] (see Appendix L of this Draft EIR) the *City of Rocklin General Plan EIR*,[4] and preliminary earthwork data provided by Stantec Consulting, Inc.[5] Pertinent comments received in response to the Notice of Preparation (NOP) for the proposed project have been considered in this analysis.

ENVIRONMENTAL SETTING

The following background setting information focuses on the existing topography of the project site, the underlying bedrock, site seismicity, past mining activity, and the general conditions and expansiveness of the on-site soils.

Regional Geology

Granitic rock types and sedimentary rocks form the regional tectonic structure, which consists also of the volcanic Mehrten formation and alluvial materials. As described in the City of Rocklin General Plan EIR, the Rocklin area is "located within the Loomis Basin, which is situated in the western foothills of the Sierra Nevada Range. The Sierra Nevada is a large fault block composed of granitic and metamorphic rocks tilted gently from the summit near Donner Lake to the west where the block dips under sedimentary and alluvial units of the Sacramento Valley."

Topography

Topography varies from flat to hilly, with low-lying areas, bluffs, ravines and creeks. Many areas are still undeveloped and feature oak woodlands and riparian areas. Sweeping vistas across low-lying areas and ravines are common throughout the planning area. Urbanized residential areas feature large newer homes in planned developments set in rolling topography, and older residential areas exist in both flat and hilly areas.

The topography of the project site is relatively flat to steeply sloping and is characterized by the north-south oriented, U-shaped Clover Valley. Clover Valley Creek traverses the central portion of the valley. Elevations range from a low of approximately 310 feet in the southern portion of the site to a high of approximately 640 feet in the northwestern corner of the site. Most of the natural slopes on the site exist at gradients of 30 percent or less. However, isolated slopes have gradients up to 50 percent or more.

Underlying Bedrock

The bedrock below the project site is located within the boundary between the Sierra Nevada Geomorphic Province and the Great Valley Geomorphic Province. The Sierra Nevada Geomorphic Province is a northwest trending range of mountains that consists of a complex assemblage of primarily metamorphic and igneous rocks. The Great Valley Geomorphic Province (consisting of the Sacramento and San Joaquin Valleys) is a deep structural trough that has been, and is presently being, filled with sediments derived primarily from the Sierra Nevada. These sediments typically dip gently toward the central portion of the valley.

Geologic conditions at the site are dominated by rock of the Mehrten Formation and by granite rock of the Penryn Pluton. The Penryn Pluton is granitic rock that was deposited approximately 130 million years ago during the Early Cretaceous Period. Subsequent faulting, uplift, and erosion exposed the pluton at the surface. This granitic rock is exposed on the valley floor and on the lower portions of the valley slopes. Very dense bedrock consisting of granitics in the flanks to Mehrten Formation volcanics is located on the ridges.

The presence of solid bedrock surfaces typically defines shallow soil depth and groundwater seepage. Such surfaces would also be considered a potential impediment to excavation and blasting, if necessary, during anticipated development of the project site.

Site Seismicity

The seismicity of the project site is considered relatively low. The principal fault zones nearest the area are those of the Foothills Fault System (FFS) which include the Bear Mountain Fault Zone approximately eight miles to the east and the Melones Fault Zone approximately 18 miles to the east. These faults are not known to have ruptured during historic times (approximately the last 200 years), but are presently considered as potentially active.

The region withstood a large-magnitude earthquake when the Cleveland Hill Fault ruptured in 1975, 40 miles north of Oroville, California. As stated in the Kleinfelder report[6]: "The 1975 Oroville earthquake gave rise to concern that the FFS may be capable, and launched a number of subsequent studies." Because a number of locations along the FFS were identified as having possible Quaternary displacement, a low slip rate has been assigned to short segments along the FFS considered capable of generating infrequent earthquakes of Magnitude 6.0.

Past Mining Activity

Although the City of Rocklin has a mining history, mine shafts have not been discovered on the project site, and research of the site's history by Wallace, Kuhl & Associates, Inc. did not reveal the existence of or potential for any on-site mines. A full discussion of existing mines on the proposed project site is included in the Hazards chapter (4.10) of this Draft EIR.

Mineral Resources

The primary productive mineral resources within the City of Rocklin's planning area, as specified by the Draft Environmental Impact Report for the City of Rocklin's General Plan (1991), are granite and gravel. One granite quarry is currently in operation, located south of City Hall. This quarry, which was founded in the 1870s, contains a vast quantity of granite, which could allow it to stay in operation far into the future. A gravel extraction operation existed with the Stanford Ranch area, but has been discontinued.

The State Geologist does not classify any mineral areas within the City of Rocklin's planning area. Placer County, however, has designated a portion of the Northwest Properties area located west of Sunset Boulevard and north of Roseville city limits as a mineral resources area. An aggregate extraction facility is currently running within this area under a Placer County use permit.

Portions of the subject site have been classified as MRZ-3a for placer gold. However, these are considered to be potential resources only, and are not noted within the Resource Conservation Element of the Rocklin General Plan.

Soil Conditions

The soil cover is poorly developed on the majority of the site, the soil cover in the higher portions of the site could be expected to be very thin, and soil thickness typically increases downslope. The most highly developed soil is expected to occur on the valley floor within the alluvial areas and adjacent floodplains. The soil covering the Mehrten volcanic mudflow breccia typically consists of a sandy silt with gravel less than 12-inches in thickness. Soil covering the conglomerate is also silty with pebbles and cobbles that is less than two feet in thickness.

<u>Expansive Soil</u>

Expansive soil on the project site creates the potential for inconsistent soil settlement when bearing structural weight. The Kleinfelder report[7] states:

> Very loose to loose silty sandy alluvial deposits were encountered in about the upper 3 to 14 feet across a majority of the valley floor. The low-density condition that the alluvium present at or near the ground surface suggest a high potential compressibility of these soils. It is our opinion these soils are under consolidated and thus will likely undergo densification in response to the existing loads as well as the low to moderate loads

associated with foundations and traffic loads. Although unlikely, offloading existing loads (i.e. excavation) in the valley area could reduce this potential. If not mitigated, this densification may result in differential settlement of the ground surface and thus potential damage to site improvements.

REGULATORY CONTEXT

Existing policies, laws and regulations that would apply to the proposed project are summarized below.

State

California Building Standards Code / Uniform Building Code

Site development and design are regulated in the State of California by the California Building Standards Code (CBC), based on the federal Uniform Building Code (UBC) and suited to the unique sensitivity of the state's geology and faultlines. CBC and UBC regulations must be adhered to with regard to expansive soils, drainage, erosion, earthquake resistance, and required safety measures during on-site development. Geologic and soils conditions would also determine the proper installation of underground communications and utility lines.

Local

City of Rocklin General Plan

Goals and policies established in the 1991 City of Rocklin General Plan, as applicable, are as follows:

Community Safety Element

Goal To minimize the danger of natural and man-made hazards and to protect residents and visitors from the dangers of earthquake, fire, flood, and other natural disasters, and man-made dangers.

Policy 1 To require engineering analysis of new development proposals in areas with possible soil instability, flooding, earthquake faults, or other hazards, and to prohibit development in high danger areas.

Policy 7 To prohibit development along stream channels that would adversely reduce the stream capacity, increase erosion, or cause deterioration of the channel.

Policy 11 To limit development in areas with severe slopes.

Open Space, Conservation and Recreation Element

Goal To designate, protect, and conserve natural resources, open space, and recreation lands in the City; and provide opportunities for recreation activities to meet citizen needs.

Policy 1 To encourage the protection of natural resource areas, scenic areas, hilltops, open space areas and parks from encroachment or destruction by incompatible development through the use of conservation easements, buffers, set-backs or other measures. Developments shall be required to provide usable yard areas outside of conservation easements or established natural resource buffers.

Policy 3 To encourage the protection of historically significant and geologically unique areas and encourage their preservation.

City of Rocklin Zoning Ordinance

Chapter 8.30 – Stormwater Runoff Pollution Control Ordinance

This ordinance prohibits the discharge of any materials or pollutants that cause or contribute to a violation of applicable water quality standards, other than stormwater, into the municipal storm drain system or watercourses. Examples of materials that are not prohibited under this ordinance include the following:

- Motor oil
- Yard waste
- Animal waste
- Grease and oil from restaurants
- Commercial carpet cleaning waste
- Concrete washout
- Paint and associated equipment cleaning

Chapter 15.28 – Grading and Erosion and Sedimentation Control

The City's grading and erosion and sediment control ordinance requires that all grading in the City, unless exempt under the ordinance, must have a grading approval and provides for a separate grading permit. Plan check and issuance of grading permits is done by the Engineering Services Division and approved by the Engineering Services Manager, who is the designated City Engineer. The grading permit process is divided into a minor plan approval for smaller low impact jobs and a considerably more complex engineered grading plan approval for bigger jobs. The grading permit is a staff-level discretionary decision and more comprehensive CEQA environmental review is required for some applications.

IMPACTS AND MITIGATION MEASURES

The geological impacts related to the proposed project are analyzed and assessed in this section.

Standards of Significance

An impact on the geology of Clover Valley would be considered significant if the proposed project would do any of the following:

- Substantially alter the existing topography through significant grading activities; or;
- Expose people or structures to substantial, adverse effects as a result of strong groundshaking, seismic-related ground failure, liquefaction, lateral spreading, landslides, or lurch cracking; or;
- Substantially erode or create unstable slopes or soil conditions through alteration of topographic features, dewatering, or changes in drainage patterns; or;
- Expose people, structures, or infrastructure components to increased risk of injury or damage due to the presence of expansive soils, soil settlement/compaction, or other geotechnical constraints.

Method of Analysis

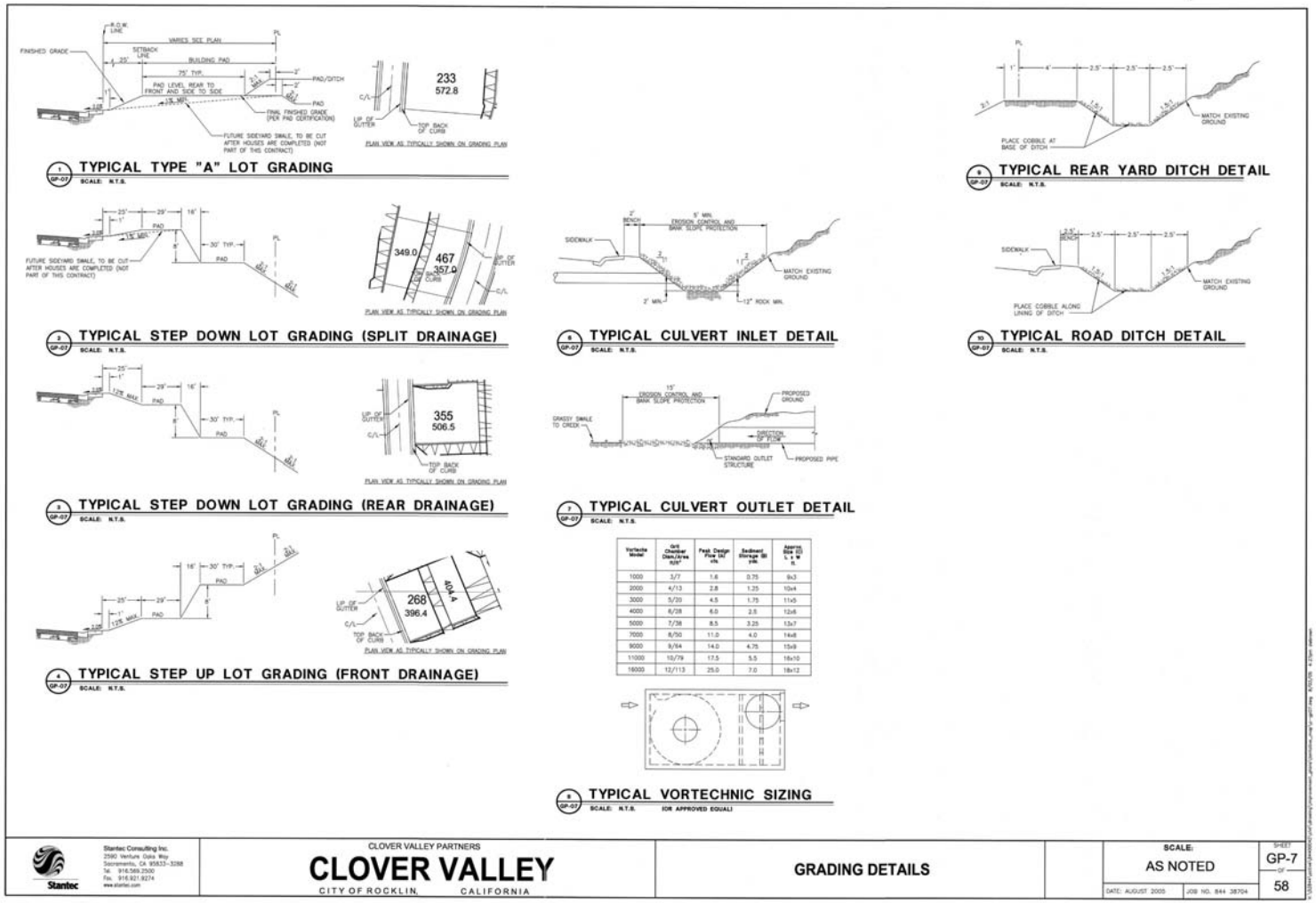
The analysis for the proposed Large and Small Lot Tentative Subdivision relies on an Environmental Site Assessment undertaken by Wallace·Kuhl & Associates, Inc. (March 2001), as well as preliminary earthwork data from Stantec Consulting, Inc., and a geotechnical investigation prepared by Kleinfelder, Inc. (June 1998).

Project-Specific Impacts and Mitigation Measures

4.9I-1 Impacts related to grading and slope stability.

Clover Valley is long and narrow, with steep slopes forming its natural eastern and western borders (at elevations ranging from 310 to 640 feet). Most of the natural slopes on the site have gradients of 30 percent or less, although some isolated slopes have gradients up to 50 percent or more. Based upon the project information submitted by the applicant, the anticipated development of the proposed project would require substantial grading and alteration (cuts and fills) to topography on the sloped horizontal and vertical surfaces to allow for construction of proposed on-site roadways and future homesites (see Figure 4.9-1, Grading Details). As a result, potential structural and safety issues would be created by implementation of cuts and fills in steep-sloped areas, areas of fractured rock, and areas susceptible to rockfall.

Figure 4.9-1
Grading Details



The conceptual phasing plan associated with the proposed project includes one major phase of grading and construction (Phase 1), in various locations (represented as Phases 2 through 4J in Table 4.9-1). The table sets forth the total cubic yards of cut and fill necessary for the construction of the anticipated development, associated roadways, and other infrastructure. Approval of the project would allow for the grading and construction of the major roadways as well as grading and lot division, although the applicant would be required to comply with the City's grading and erosion and sediment control ordinance, as well as with the NPDES permit.

As shown in Table 4.9-1, the project would result in a total grading cut of 1,474,644 cubic yards and a total fill of approximately 1,455,525 cubic yards for a net excess of fill material of 19,120 cubic yards. This fill material is anticipated to remain available for use during the grading of the future lots as part of the Small Lot Tentative Subdivision Map. Because nearly 20,000 cubic yards of excess fill would occur, the potential for soil stockpiles exists.

Figure 4.9-2 conceptually depicts two fill cross sections anticipated for the proposed project. Section E illustrates a more extensive cut and fill on a steeper slope, while Section F shows the earthworks on a less extreme angle.

Table 4.9-1
Clover Valley
Phase 1 Grading Summary
(quantities are in cubic yards)

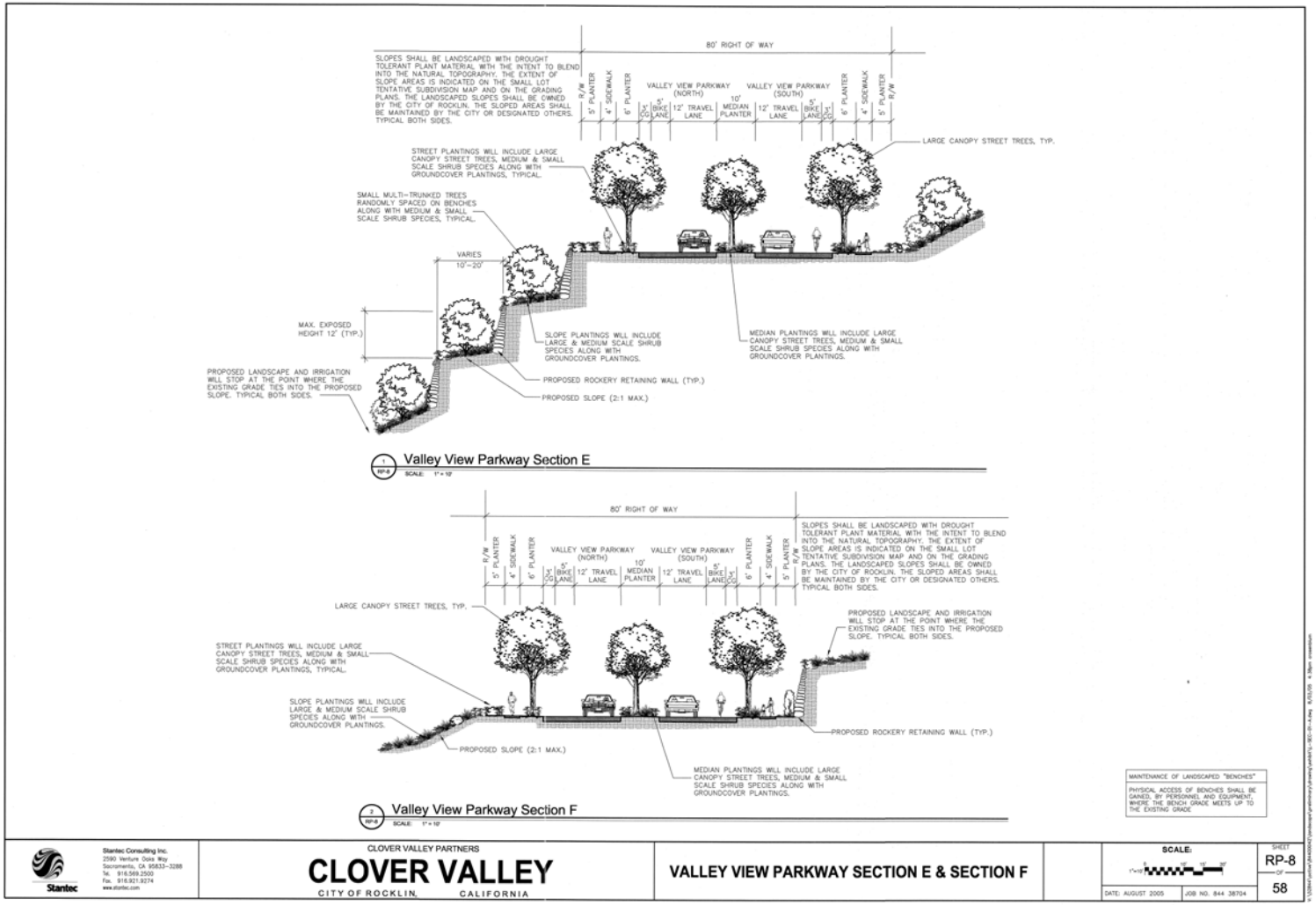
Site	Method	Cut	Fill	Net
Phase 2	Grid/Comp	185,438	61,440	123,998
Phase 3		39,131	42,876	-3,745
Phase 3A		68,739	66,248	2,491
Phase 4 A	Grid/Comp	253,831	106,628	147,204
Phase 4 B	Grid/Comp	190,549	237,193	-46,644
Phase 4 C	Grid/Comp	350,092	253,862	96,230
Phase 4 D		44,499	159,056	-114,558
Phase 4 E	Grid/Comp	6,641	15,305	-8,664
Phase 4 F	Grid/Comp	65,216	64,915	301
Phase 4 G	Grid	21,155	71,522	-50,367
Phase 4 H	Grid/Comp	21,492	106,264	-84,772
Phase 4 I	Grid/Comp	61,549	129,379	-67,830
Phase 4 J	Grid/Comp	166,314	140,839	25,476
Total	**Average**	**1,474,644**	**1,455,525**	**19,120**

Source: Stantec Consulting, 2005.

Phase #1

Grading of entire project including tree removal. Phase 1 would include the following.

Figure 4.9-2
Valley View Parkway Section E & Section F



Phase #2
Construct Valley View Parkway from Sierra College Boulevard (existing) to Park Drive (existing). As required, improve existing Park Drive and existing Sierra College Boulevard intersections.

Phase #3
Construct Nature Trail Way and Wild Ginger Drive from Valley View Parkway to Valley Clover Way. Construct Valley Clover Way.

Phase #3A
Construct emergency vehicle access and utilities within the right-of-way of Nature Trail Way and Wild Ginger Drive from Valley Clover Way to existing Rawhide Road.

Phase #4A - #4J
Develop individual project areas (A-J) or portions there of in no particular order. Phasing of individual project areas will be determined based upon market conditions.

Furthermore, the proposed grading activities required for the construction of the major roadways would create deep cuts and high side slopes along these roadways. Therefore, the construction activities related to the approval of the proposed project would result in a high risk of slope instability. In addition, slopes associated with the grading activities necessary for the Small Lot Tentative Subdivision Map may also increase slope stability impacts. Therefore, although the applicant would be required to comply with the City's grading and erosion and sediment control ordinance, the impact of the proposed project on existing topography and slope stability would be considered ***potentially significant***.

Mitigation Measure(s)
Implementation of the following mitigation measures would reduce the potential impacts to a *less-than-significant* level.

4.9MM-1(a) *The developer shall submit Small Lot Design Guidelines for the review and approval of the City of Rocklin which include the following:*

- *Delineation of building envelopes;*
- *Delineation of open space areas;*
- *Delineation of driveway access;*
- *Suggested methods of site development including treatment of cuts, fills and retaining walls, and appropriate adaptive foundations on individual lots of 20 to 29 percent slope; lot-by-lot design approval shall be conducted on these sites. Grading of lots sloping 15 to 30 percent shall be*

designed by a licensed civil engineer and shall include site-adaptive foundations and terracing of commercial parking lots. (See 1995 Annexation EIR for sketches illustrating potential site-adaptive techniques.); and

- *Master Drainage Plan for graded and non-graded subdivisions.*

4.9MM-1(b) *Prior to the approval of Improvement Plans, geotechnical studies shall be completed for each phase of development, including development of the major roads, to evaluate soil and rock conditions to provide allowable gradients for cut and fill slopes as well as appropriate construction techniques. The studies shall be submitted for the review and approval of the City Engineer.*

4.9MM-1(c) *All phases of project development shall be designed to maximize the use of retaining walls, terracing, and avoidance of steep areas. Grading plans for subdivision preparation shall adhere to this goal. In addition, Small Lot Design Guidelines shall specify appropriate fill design and limits. The grading plans shall be submitted for the review and approval of the City Engineer prior to the approval of Improvement Plans.*

4.9MM-1(d) *All phases of development shall protect slopes from concentrated runoff and sheetflow originating from developed areas by incorporating construction methods specified in the project Small Lot Design Guidelines. Possible techniques to be used include:*

- *Lined v-ditches to drain water away from the slope face.*
- *Benches and drainage ditches on slopes greater than 30 feet in height.*

4.9MM-1(e) *Slope protection measures shall be included on the grading plans for the major roadways identified in the LSLTSM. Possible slope protection measures may include, but are not limited to, re-vegetation of slopes (with native foliage if applicable), or retaining walls with intercepting drainage components. The grading plans shall be submitted for the review and approval of the City Engineer prior to Improvement Plan approval.*

4.9MM-1(f) *Prior to approval of improvement plans, a plan for the storage of excess fill materials shall be submitted for the review and*

approval of the City Engineer. The plan shall identify measures to prevent erosion of the stockpiled soil.

4.9I-2 Impacts as a result of alteration of the topography.

The perimeter of the existing Clover Valley is characterized by a rolling ridgeline, which is bounded on the west by Whitney Oaks and on the east by Sierra College Boulevard. To create space within the valley for roadway and utility infrastructure, as well as future residential development, the existing valley perimeter would undergo grading and topographical alteration.

As discussed above in Impact 4.9I-1, the total surface grading of the proposed project is estimated to be 309.6 acres, which equates to approximately 50 percent of the proposed project area. The amount of cut for the total project buildout has been determined to total approximately 1,474,644 cubic yards and fill to be 1,455,525 cubic yards. The proposed project would be require to comply with the City's grading and erosion and sediment control ordinance, in addition to the NPDES permit.

The proposed project would include installation of four major roadway infrastructures, including Nature Trail Way, Wild Ginger Drive, Valley Clover Way, and Valley View Parkway, the construction of which would require the alteration and removal of existing valley topography and total an estimated 46.4 acres of grading for major roadways.

Therefore, although the project would be subject to the City's grading ordinance, the total grading for the project combined with the 19,120 cubic-yard excess that would result from the cut and fill of the project area would thus result in ***potentially significant*** impacts to the topography of the project site.

Mitigation Measure(s)
Implementation of the following mitigation measures would reduce the magnitude of the impacts; however, impacts related to topography would remain *significant and unavoidable*.

4.9MM-2 *The grading plans for infrastructure associated with the proposed project shall indicate the following for the review and approval of the City Engineer:*

- *Roadway rights-of-way shall be graded only to the extent needed to install roads and utilities. Specific site plans shall be reviewed to determine where sidewalks or on-street parking could be restricted to allow for narrowed streets. Overgrading to dispose of soil or to remove viable existing plant growth shall not be permitted. The effect of*

narrower road-widths and terraced retaining walls on cross-slopes of 20-percent or greater shall be assessed;

- *As required in the City of Rocklin Construction Specifications Improvement Standards, City grading standards shall be adhered to. In addition, the Master Grading Plans for each subdivision/development shall recommend appropriate grading techniques including cut/fill treatment. Methods to reduce the height and visual impact of cuts/fills shall be included such as terracing of cuts, revegetation techniques, etc. where appropriate;*
- *Grading associated with detention basins shall be confined to the specific area forming the boundaries of the basin;*
- *Construction fencing shall be erected within and/or around all intensive grading sites as determined by the City Engineer to protect desirable features and limit grading impacts. These areas include the park sites, detention ponds, commercial site, and home sites on wooded hillsides; and*
- *All cuts and fills associated with project roadway construction, or the construction of future commercial and recreational or public components of the project (excluding cuts and fills associated with home construction on a single-family lot) shall be re-vegetated. Re-vegetation plans shall be submitted with grading plans.*

4.9I-3 Impacts related to seismic hazards.

The principal fault zones nearest the area are those of the Foothills Fault System which include the Bear Mountain Fault Zone approximately 8 miles to the east and the Melones Fault Zone approximately 18 miles to the east. These faults are not known to have ruptured during historic times (approximately the last 200 years), but are presently considered as potentially active. In 1975, an earthquake of Richter Magnitude 5.7 occurred on the Cleveland Hill Fault, approximately 40 miles to the north, near Oroville, California. The Cleveland Hill Fault is associated with the Foothills Fault System. An earthquake event similar to the Oroville event could occur along the Bear Mountain Fault zone.

In the June 1998 geotechnical investigation, Kleinfelder, Inc. reported that the Foothills Fault System had a "very low slip rate." The Kleinfelder report also cited a forecast from the California Division of Mines and Geology[8] (CDMG) which compiled a probabilistic map of California using 10 percent probability of exceedance in 50 years, and calculated an estimated acceleration of 0.20g for the project site. "Using these methods as a basis," the report stated, "a site design acceleration of 0.20g is considered reasonable."[9] However, the

proposed surface grading would be considered to affect the strength of the valley slopes during seismically induced groundshaking.

A potential hazard exists on the proposed development site regarding the effect of seismically induced groundshaking on valley slopes weakened by surface grading. Although the site is considered to lie in an area of relatively low seismic activity, and the site does not lie within an Alquist-Priolo Special Studies Zone (active fault zone), ground shaking associated with seismic activity on nearby or distant faults may occur at the site. Additionally, because the potential exists for earthquake-induced landslides to occur if steep slopes are created by grading, the project would be considered to have the potential for landslides in correlation with the potential for earthquakes in the project area. Therefore, the impact of the anticipated development and the proposed project would be ***potentially significant***.

Mitigation Measure(s)
Implementation of the following mitigation measures would mitigate potential impacts related to seismic hazards to a *less-than-significant* level.

4.9MM-3(a) *Construction of cut or fill slopes of gradients of 2:1 (horizontal to vertical) or flatter will reduce the potential for earthquake-induced landslides. Cut slopes shall be reviewed by the City Engineer and the Public Works Director prior to and during construction for adverse conditions, such as fractures, clay seams, or seepage, that may affect slope stability. Cut slopes proposed at gradients steeper than 2:1 shall be evaluated for theoretical stability by a qualified geotechnical expert. A geotechnical report shall be submitted for cut slopes steeper than 2:1 for the review and approval of the City Engineer prior to approval of Improvement Plans.*

4.9MM-3(b) *Design-level geotechnical studies shall be submitted which address the possibility of liquefaction of sediments on the valley floor. The study shall be reviewed and approved by the City Engineer and Building Official prior to the issuance of building permits.*

4.9MM-3(c) *Prior to the issuance of building permits, the City Building Official shall ensure that structures are designed and shall be constructed in accordance with UBC guidelines for Seismic Zone III.*

4.9I-4 Impacts related to groundwater seepage.

Seepage of naturally occurring groundwater is typical of valley wetlands. Seeps have been observed on the site. Changes in grade could expose seepage

particularly along the contact between the Mehrten volcanic breccia and conglomerate, and the conglomerate and underlying granitics. Some seepage into utility trenches should be anticipated. Dewatering may be necessary for utility installation, particularly where utilities cross the existing drainages. However, the magnitude of the potential problem is not extensive.

Based on results from on-site test pits, the Kleinfelder report[10] anticipated three potential locations for seepage on the project site: (1) soil-bedrock interfaces, where the interfaces would become exposed or approach the ground surface, (2) fill-over-cut contacts, where granular, permeable fill would be placed over less-weathered, less-permeable bedrock, and (3) canyon-bottoms, where soils would thicken and subsurface flows would be governed by contributory runoff. Furthermore, the report[11] noted "significant seepage . . . at depths of about 4 to 12 feet below the existing site grade."

The report concluded that shallow groundwater could have an adverse influence on the performance of proposed site improvements and could also impair grading and utility excavation operations if performed while such conditions persist.[12] The study by Wallace·Kuhl & Associates, Inc.[13] observed that "ground water elevations and gradients in the area vary considerably, due to the highly fractured nature of the underlying rock." Therefore, the impact of anticipated development and the proposed project would be considered ***potentially significant***.

Mitigation Measure(s)
Implementation of the following mitigation measure would mitigate potential impacts related to groundwater seepage to a *less-than-significant* level.

4.9MM-4 *Prior to issuance of a grading permit, the City Engineer shall review the plans to ensure they indicate that if shallow ground water exists at the time of proposed grading, subdrainage shall be installed in advance of the grading operations to de-water soils within the depth of influence of grading to the extent reasonable. A qualified geologist and/or geotechnical engineer shall estimate the configuration and design of the subdrain systems during exposure of field conditions at the time of or immediately before construction. The contractor may also recommend an alternative which may be mutually agreed upon by the City Engineer and Public Works Director.*

4.9I-5 Impacts related to foundation support and expansive soils.

Construction of the proposed roadways and future construction of the houses would require solid building surfaces. The site currently contains soils that are considered expansive, notably along the valley floor and lower slopes.

The surface soil, underlying rock, and compacted fill composed of native soil and rock is expected to provide adequate bearing support for conventional footings provided concentrations of organics are removed from below the footings. Some differential movement or heave of structures could occur if constructed on expansive soil without utilizing appropriate grading practices or foundation systems. Some lots could be situated on natural slopes (no graded pad.)

The surface soil covering most of the site will provide moderate support for pavement while the underlying rock or fill composed of excavated rock would provide much better support. Structural pavement sections may vary significantly across the site depending on the type of subgrade material exposed. Differential movement or heave of roadways could occur if constructed on expansive soil without appropriate grading practices. Based on this information, the impact of anticipated development and the proposed project would be considered ***potentially significant***.

Mitigation Measure(s)
Implementation of the following mitigation measure would mitigate potential impacts related to foundation support/expansive soil to a *less-than-significant* level.

4.9MM-5 *Prior to the approval of Improvement Plans, the developer shall submit a soil investigation for the review and approval of the City Engineer and Building Official which evaluates soil and rock conditions particularly the potential for expansive soils. The study shall recommend appropriate roadway construction and foundation techniques. This Mitigation Measure shall be consistent with 4.9MM-3(c).*

4.9I-6 Impacts to mineral resources.

Portions of the subject site had been classified as MRZ-3a for placer gold. Additionally, the recovery of any potential resources could be lost due to project development. However, the resources are only potential, and are not noted within the Resource Conservation Element of the Rocklin General Plan. Therefore, the impact of anticipated development and the proposed project would be considered ***less-than-significant***.

Mitigation Measure(s)
None required.

4.9I-7 Impacts related to soil erosion.

Key components to the discussion of soil erosion include the integrity of sloped surfaces during the implementation of grading, and the restorative

revegetation of disturbed surfaces after grading. Two stages of development typically cause erosion: (a) when initial site grading occurs for road construction, utility-line placement, and lot preparation; and (b) when homes and the commercial/public areas are incrementally developed by individual lot purchasers. The proposed project would be required to comply with the provisions of the City's grading and erosion and sediment control ordinance in order to help prevent erosion.

Anticipated development of the site can be expected to disturb natural drainage swales and vegetation. Unprotected cuts and fills will be subject to erosion. A particular concern exists relative to erosion on manufactured slopes with over a 2:1 gradient. Natural areas outside of immediate construction areas are also likely to be disturbed, which could result in increased erosion.

Furthermore, proposed roadways located on the valley walls are aligned across steep hillsides and will require cut and fill slopes. In addition, site soils are somewhat shallow, especially on the higher parts of the site. When removed to form cut slopes, revegetation to control erosion will be difficult. Erosion channels incised into cut and fill slopes, concentrating flow and creating further erosion could result. Individual lots located on slopes over 30 percent can experience potentially significant erosion if proper erosion control measures are not utilized.

The proposed project does not currently expect to maintain any soil stockpiles as a result of cutting and filling. To a large degree, cut and fill operations for the proposed project would be in close proximity, and the applicant has indicated that long term storage of soil stockpiles is not expected. Although the total cut and fill for the proposed project is roughly balanced, a total excess of 19,120 cubic yards would occur. This excess may remain on-site temporarily, resulting in a ***potentially significant*** impact.

Mitigation Measure(s)

Implementation of Mitigation Measure 4.11MM-3 in Chapter 4.11, Hydrology and Water Quality, of this Draft EIR would reduce the magnitude of the potential impacts related to soil erosion. The following mitigation measure would reduce impacts related to soil erosion to a *less-than-significant* level.

4.9MM-7 *Prior to approval of final maps, the applicant shall submit for the review and approval of the Public Works Department an Erosion Control Plan, including BMPs as outlined in Mitigation Measure 4.11MM-3 of the Hydrology and Water Quality chapter (Chapter 4.11) of this Draft EIR. The Erosion Control Plan shall also be in compliance with the requirements of the City's grading ordinance.*

4.9I-8 Impacts related to excavation/blasting.

Some blasting combined with ripping by heavy equipment would potentially be necessary for the anticipated grading involved with the proposed project. Excavation of utility lines would potentially require the use of a hydraulic hammer or blasting as well. The proposed cut areas would be studied to determine the ripability of the existing rock, and utility trench depths would potentially be minimized based on the results (particularly in higher areas).

During construction, any required blasting would cause noise and vibration. As the proposed project would develop, the blasting would progress from area to area and, in the future, lot to lot (in the vicinity of newly built or neighboring homes). Consequently, the occurrence of flying rock and debris would potentially damage properties or even their residents. Vibrations from strong blasts could also potentially upset the integrity of concrete foundations nearby. It should be noted that drilling to set the blasts causes more noise than the blasts themselves, which are typically muffled.

In addition, the potential for related structural, noise and safety issues is still anticipated to exist. Based on this information, the impact of anticipated development and the proposed project would remain ***potentially significant***.

Mitigation Measure(s)
Implementation of the Mitigation Measure 4.6MM-5(b) would mitigate potential impacts related to excavation and blasting to a *less-than-significant* level.

4.9I-9 Geological impacts related to the off-site sewer.

The proposed project includes the installation of a new 12-inch off-site sewer line in the streets of Rawhide, Midas, Argonaut and Union. Construction would include digging a large trench, lowering the sewer pipe, and ultimately repaving the street. Typically, this construction process would be performed in segments, such that throughout the duration of the project, trenching, pipe-laying, and backfill activities would occur only along one portion of the entire alignment at any given time. If impenetrable rock surfaces were discovered below the street surface during excavation, blasting would potentially become necessary to continue the process.

The proposed off-site sewer line would not impact mineral resources or the existing topography to a significant degree because the sewer line would be installed either immediately adjacent to the existing line, or the existing force main would be used; in both of these scenarios, the sewer line would be located under existing roadways. In addition, the off-site sewer line is not expected to result in impacts related to seismic hazards and expansive soils because these impacts typically occur to above-ground structures; however,

the underground off-site sewer line would be subject to the same UBC regulations and standard construction practices and regulations as above-ground improvements, reducing any potential impacts, however minimal.

However, as with the on-site improvements, installation of the off-site sewer could result in impacts related to grading and slope stability, particularly if the grading occurs on slopes; blasting; soil erosion; and seepage of groundwater could also interfere with trenching and installation of the sewer line. Therefore, impact resulting from construction of the off-site sewer line would be considered ***potentially significant***.

Mitigation Measure(s)
Implementation of Mitigation Measures 4.6MM-5(b) (related to grading), 4.9MM-4 (related to seepage), and 4.9MM-8 (related to blasting), as well as Mitigation Measure 4.11MM-3 (related to soil erosion) in Chapter 4.11, Hydrology and Water Quality, of this Draft EIR, would reduce impacts resulting from the off-site sewer to a *less-than-significant* level.

Cumulative Impacts and Mitigation Measures

4.9I-10 The cumulative potential for geological impacts and hazards resulting from the proposed project in combination with existing and future developments.

The proposed project would increase the number of people and structures that could be exposed to potential effects related to seismic hazards. Anticipated development of the proposed project would also increase the number of structures that could be subject to the effects of shallow depth to rock or expansive soils. Site preparation would also result in temporary and permanent topographic changes that could affect erosion rates or patterns. However, potentially adverse environmental effects associated with seismic hazards, as well as those associated with geologic or soils constraints, topographic alteration, and erosion, are usually site-specific and would not combine with similar effects that could occur with other projects in Rocklin. Consequently, the proposed project would not be affected by, nor would it affect, other development anticipated under the City of Rocklin General Plan. Therefore, the impact would be considered ***less-than-significant.***

Mitigation Measure(s)
None required.

Endnotes

[1] Kleinfelder, Inc.*Geotechnical Investigation*, June 1998.
[2] Wallace, Kuhl & Associates, Inc. *Geotechnical Engineering Report.* May 9, 2001.
[3] Wallace,·Kuhl & Associates, Inc. *Environmental Site Assessment*, March 2001.
[4] City of Rocklin General Plan EIR, 1991.
[5] Stantec Consulting, Inc., 2005.
[6] Kleinfelder report (p. 4)
[7] Kleinfelder report (p. 7)
[8] Kleinfelder report (p. 5)
[9] Kleinfelder report (p. 4)
[10] Kleinfelder report (p. 5)
[11] Kleinfelder report (p. 6)
[12] Kleinfelder report (p. 8)
[13] Wallace·Kuhl & Associates, Inc. *Environmental Site Assessment*, March 2001, p.16.