

REVISED PLAN OF CONTROL

GEOLOGIC HAZARD ABATEMENT DISTRICT
(GHAD) 1990-01

Submitted to:

BOARD OF DIRECTORS – GHAD 1990-01

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1. AUTHORITY AND SCOPE

Under authority of the California Public Resources Code (Division 17, commencing with Section 26500), the City of San Ramon, in 1990, adopted Resolution No. 90-106 forming the West Branch Geologic Hazard Abatement District (“GHAD” or “District”) 1990-01. The District’s original boundaries included the approximately 400-acre West Branch property. In 1997, the Gale Ranch development (Phases 1 through 4) and the Windemere property were annexed into the District. In 2007, the GHAD Board of Directors approved annexation of the Old Ranch Summit Subdivision and, in 2008, it approved annexation of the Silva Property. The Plan of Control to support the annexation of the 2,708-acre Gale Ranch site into the GHAD is dated July 21, 1997. The Plan of Control prepared to address the 2,300-acre Windemere property is dated August 13, 1997. The Plan of Control for the Old Ranch Summit Subdivision and Silva Property Annexations are dated February 6, 2007, and January 15, 2008, respectively.

Development of a Plan of Control prepared by a State-Certified Engineering Geologist is a requirement for both formation and amendment of a GHAD. Pursuant to Section 26509, this Plan of Control was prepared by an engineering geologist certified pursuant to Section 7822 of the Business and Professions Code and describes potential geologic hazards within the proposed GHAD boundaries. It also provides a plan for the prevention, mitigation, abatement, and control thereof. As used in this Plan of Control, and as provided in Section 26507, “geologic hazard” means an actual or threatened landslide, land subsidence, soil erosion, earthquake, fault movement, or any other natural or unnatural movement of land or earth.

The GHAD’s Plan of Control was last updated in 2003 to combine the separate Plans of Control for the West Branch, Gale Ranch and Windemere developments that were in effect at that time into a single document. The GHAD now wishes to revise its Plans of Control for the Silva Annexation, Old Ranch Summit Annexation and the rest of the GHAD into one uniform, updated document that reflects the present nature and scope of its services.

Property Identification

The existing GHAD boundary is shown on Figure 1. The District boundary for GHAD 1990-01 excluding the Old Ranch Summit territory is shown on the District Boundary Map in Appendix 2, Exhibit A, and further described in the District Boundary Description in Appendix 2, Exhibit B. The District boundary for the Old Ranch Summit portion of GHAD 1990-01 is shown on the District Boundary Map in Appendix 2, Exhibit C, and further described in the District Boundary Description in Appendix 2, Exhibit D.

2. BACKGROUND

The GHAD area consists of about 5,820 acres of open space and mixed-use development. As currently planned, approximately 2,450 acres within the GHAD will remain open space. It is expected that those GHAD parcels that are not already in the City, with the exception of the Silva Property, will be incorporated within the City of San Ramon boundaries in the future.

In general, the open space property included within the GHAD is generally characterized by open, rolling, grass-covered hills with few scattered trees, intersected by drainages. Within the graded areas of the District, the terrain has been extensively altered to create building pads, streets, and other improvements. The named drainages within the GHAD include Alamo Creek (main, west, and east branches) and Coyote Creek. Primary roadways crossing the GHAD property include portions of Bollinger Canyon Road, Crow Canyon Road, Dougherty Road and Windemere Parkway.

Mass grading has been completed for the improvements planned within the District as shown on Table 1-1. It is anticipated that finish grading, improvement construction, residential and nonresidential construction will continue in selected areas within the District. Grading and improvement construction will be completed prior to the GHAD accepting ownership, maintenance and monitoring responsibilities within the GHAD-owned open space areas.

TABLE 2-1

Development	Phase(s)	Geotechnical Engineer	Project No.	Testing and Observation Report Date	Mass Grading	
					Start Date	Completion Date
Gale Ranch	1	ENGEO	2489-W16	4/15/00	8/28/95	12/1/99
	2	ENGEO	2489.5.202.01	12/5/03	5/26/01	10/21/03
	3	ENGEO	2489.1.305.01	12/5/05	5/17/04	10/14/05
	4	ENGEO	2489.1.406.01	11/3/06	7/15/05	10/13/06
West Branch			N9-2311-M3	6/5/89	4/18/89	5/30/89
Windemere	1 and 2	ENGEO	2581.3.100.01	1/17/03	6/6/00	11/27/02
	3	ENGEO	2581.1.300.01	10/11/06	5/27/03	5/31/06
	4	ENGEO	2581.1.410.01	12/23/04	5/27/03	8/24/04
	Silva and Phase 5	ENGEO	2581.1.510.01	6/30/06	4/15/04	12/15/05
Old Ranch Summit		Berlogar Geotechnical Consultants	2812.300	2/22/07	6/3/06	10/17/06

Since 1996, the open space areas of the West Branch portion of Gale Ranch have been included in a monitoring program based on recommendations contained within the original and revised GHAD 1990-01 Plans of Control. In 2008, additional parcels were included within the GHAD monitoring program in the Gale Ranch and Old Ranch Summit developments. It is anticipated that additional parcels will be offered for GHAD ownership and the associated monitoring and

maintenance responsibilities as these parcels become eligible upon completion of the transfer process.

Open Space

Based on the terms of the Annexation Agreements executed in 1997 between GHAD 1990-01 and the developers of Gale Ranch and Windemere, some open space parcels within Gale Ranch and Windemere have been transferred to the GHAD. The parcels owned by the GHAD and the approximate location of open space that is anticipated to be owned by the GHAD are indicated on Figure 1. As the open space within and immediately adjacent to the subdivision tracts is an amenity that benefits all of the property owners within the developments, the funding of the maintenance of the open space should be shared by all current and future property owners within the developments in the GHAD's boundaries. Oversight of the actual physical maintenance responsibility for GHAD-owned parcels of open space has or will transfer to the GHAD, with the exception of the golf course in Gale Ranch Phase I. As defined in Section 3.3 of the Gale Ranch Annexation Agreement, Shapell and/or its successors shall retain responsibilities for performing GHAD activities on the golf course within Gale Ranch Phase I. It is also provided in Section 3.3 that the GHAD shall reimburse Shapell Homes and/or its successors for activities that are performed within the golf course subject to the approval of the GHAD and in accordance with the Plan of Control. Consistent with the Annexation Agreement, the GHAD shall have the right to undertake any construction, maintenance, or repair in the creek corridor or golf course which the GHAD determines has the potential to impact geologic stability outside of the golf course area.

Open Space within the GHAD, which includes the West Branch, Gale Ranch, and Windemere Old Ranch Summit and Silva properties, will be managed under the terms of:

1. The Memorandum of Understanding (MOU) between Contra Costa County, The City of San Ramon, Shapell Industries, and Windemere Ranch properties.
2. The Annexation Agreements between GHAD 1990-01 and Shapell Industries, Inc., between GHAD 1990-01 and Windemere Ranch Partners, LLC, and between GHAD 1990-01 and Davidon Homes, Inc.
3. The updated Plan of Control.

In addition, Mitigation and Monitoring Plans have been approved for creek corridors, ponds, and associated structures within both the Windemere and Gale Ranch sites. These plans provide that a conservation easement be established over open space in Phases 2 through 4 of Gale Ranch and all phases of Windemere, and that areas within the conservation easement be managed by a natural lands manager. The plans also require that certain success criteria for plant survival be met, and that maintenance and monitoring for these areas extend for up to 10 years following grading. These maintenance and monitoring functions are the responsibility of the individual developers or their successors, prior to transfer of responsibility to the natural lands manager.

Currently the GHAD owns open space parcels within the Old Ranch Summit development as shown on Figure 26. Monitoring responsibilities within the Old Ranch Summit development are shown in Appendix 3.

Responsibilities of the GHAD and others are summarized on Table 2-2.

TABLE 2-2

	Maintenance Item	Responsible Entity				
		GHAD	CSA-M29	Golf Course	HOA	Private
Creeks and Drainage Maintenance	Creek Banks	X		Within Golf Course		
	Creek Corridor (Vegetation and Drainage)		X	Within Golf Course		
	Sediment Removal (from detention basins)		X			
	Sediment Removal from water quality basins		X			
Open Space Maintenance	Erosion Repair	X				
	Major Landsliding	X				
	Revegetation for Erosion Control	X				
	Sediment Removal from V-ditches	On GHAD Owned Parcels	On City owned Land		On HOA Owned Parcels	On Private Parcels
	Slope Stabilization	X			On HOA Parcels where impacted area is limited to one parcel	On Private Parcels where impacted area is limited to one parcel
	Subdrain Outfall	X				
	V-ditch repair and replacement	On GHAD Owned Parcels			On HOA Owned Parcels	On Private Parcels
	Fire Break Mowing	On GHAD Owned Parcels	On City owned Land		In Gale Ranch within WZE, In Old Ranch on HOA owned Land	On Private Parcels
	Landscaping		In City Landscaped Areas and Easements		In HOA Landscaped Areas and Easements	
	Trail Maintenance		X			
	Geotechnical Instrumentation	X				
	Technical Consultants	X				
	GHAD Monitoring	X		Within Golf Course		
Note:	GHAD related activities on the golf course that are done in accordance with the Plan of Control and approved by the GHAD are subject to reimbursement by the GHAD.					

3. GEOLOGY

Regional Geology and Geologic Maps

GHAD 1990-01 is located within the Coast Ranges geologic province of California, a series of northwest-trending ridges and valleys. Bedrock in the province has been folded and faulted during regional uplift beginning in the Pliocene period, roughly 2.5 million years before present. Along with others, regional geologic maps of the area have been prepared by Dibblee (1980), Crane (1988) and Graymer (1994). The most recent regional map prepared by Graymer shows that the area within the GHAD is underlain by the Miocene-age and Pliocene-age Green Valley/Tassajara Group. The Green Valley/Tassajara Group rocks are described as non-marine sandstone, siltstone, claystone and conglomerate with volcanic tuff beds locally. In general, the bedrock within the GHAD area is poorly cemented, highly fractured and has low overall strength. Alluvium is mapped by Graymer along the major drainages throughout the Dougherty Valley area.

Nilsen (1975) has mapped surficial deposits within the District as part of a regional study. Alluvium and colluvium are mapped in and adjacent to a number of drainages within the limits of the GHAD. In addition, numerous landslides are shown by Nilsen throughout the area.

On the site, bedrock is generally mapped as striking to the northwest and steeply dipping. Regional geologic maps completed by Graymer show several faults crossing the site. The site is not located within a State of California Earthquake Fault Zone for active faults (CDMG, 1982). The active Calaveras fault is located approximately 1½ miles southwest of the western edge of the GHAD.

Site Geology

Field-verified geologic maps have been completed and published for the West Branch, Old Ranch Summit, Gale Ranch and Windemere developments including the Silva parcel. These maps are included in Appendix 1 of the Plan of Control. The geologic units mapped include engineered fill, landslide material, claystone, siltstone, sandstone and volcanic tuff beds.

Geologic Units

Near-surface materials have been extensively altered during the grading work that has been completed for the West Branch, Gale Ranch, Windemere and Old Ranch Summit development. In general, the earthwork completed within the GHAD limits consists of cuts on higher areas of these sites and placement of engineered fill to raise lower portions of the sites. Most of the grading work has been confined to areas with improvements, but grading has extended into open space areas as necessary to complete remedial grading.

In general, the alluvium, colluvium and landslide materials described below are exposed within the ungraded portions of the GHAD.

Engineered Fill. Engineered fill consists predominately of a mixture of excavated site materials including alluvium, colluvium, soil and rock fragments. The engineered fill depths range from less than 1 foot to over 100 feet in thickness. Engineered fill is located with planned fill areas as shown on the civil engineers' grading plans, areas of corrective grading and some cut areas.

Alluvium. Within the site, alluvium has been observed in and along channels, stock ponds and shallow drainages. As described, the alluvium consists of soft creek deposits with isolated areas of relatively high organic content. The alluvial materials are wet, relatively weak and potentially compressible.

Colluvium. Mantling the bedrock and filling swales are colluvial deposits. These sediments are derived from weathering of the underlying bedrock and consist mostly of a silty clay matrix with sand and rock fragments. This material generally is moderately to highly expansive and has low strength. Where colluvium is located on sloping ground, it may be characteristically unstable. Within swales, the colluvial deposits tend to be relatively thicker and may be subject to flow or slip downslope.

Landslides. Landslide deposits consist of masses of unconsolidated material and/or bedrock that have moved downslope by sliding, falling, or flowing. Landslides ranging in size from very small to relatively large occur on the site. The landslides include soil slips, earth flows, debris slides, areas of shallow slumps and gullying, large predominantly rotational slumps, and translational slides.

Bedrock. Bedrock at the site has been identified during previous exploration and site grading as claystone, siltstone, sandstone, conglomerate and volcanic tuff. In general, the bedrock has been described as weakly to moderately consolidated, closely fractured and highly weathered.

Groundwater

Several areas of springs and moisture-bearing bedrock units were mapped prior to site grading or exposed during earthwork on the Gale Ranch and Windemere sites. Bedrock geology of the site is a primary factor affecting the occurrence of seepage and springs. Claystone units tend to act as groundwater barriers and concentrate groundwater along the more permeable sandstone beds. Consequently, spring activity is more frequently encountered where sandstone beds are exposed. Springs are also frequently associated with landslide deposits.

During grading, the effects of potentially high groundwater conditions have been reduced through the use of conventional subsurface drains. Groundwater levels should be expected to vary due to seasonal rainfall conditions, and long-term irrigation patterns.

Seismic Sources

The nearest State of California-zoned, active¹ fault is the Calaveras fault located about 1½ miles southwest of the District. While the probability of ground rupture is considered low as described in previous geotechnical reports for the Gale Ranch, Windemere, Old Ranch Summit sites, there is a high probability that the site and any improvements will be subject to strong ground shaking during the lifetime of the project.

¹ An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 10,000 years) (Hart, 1994). The State of California has prepared maps designating zones for special studies that contain these active earthquake faults.

4. GEOLOGIC HAZARDS

Geologic hazards identified for the site in previous geotechnical exploration reports prepared for the GHAD area include the following:

- Slope instability
- Seismically induced ground shaking
- Creek channel erosion
- Expansive soils
- Compressible Soils

4.1 Slope Stability

4.1.1 Landslides. Slope stability is the primary geologic hazard of concern for the GHAD. In general, the stabilization of landslide masses will or has been undertaken only for landslides which may directly pose a threat to improvements. Landslides that do not have the potential to directly impact the proposed development have not been mitigated, as it has been considered neither practical nor desirable during development to remove all of the landslide hazards from the surrounding hillsides during mass grading.

In addition to the landslides mapped during the geotechnical explorations or geologic mapping completed during grading, areas of slope instability or landsliding will likely be identified during the life of the development. Since slope stability is the GHAD's prime geotechnical concern, this section describes several types of slope instability that may be within the GHAD's area of responsibility, subject to Section 6 of this Plan of Control. Slope instability is not unique to this project, but is of importance for hillside projects throughout the San Francisco Bay Area. Future stability of these areas depends on various factors, including any introduction of natural or artificial groundwater, future grading and earthquake ground shaking.

Landslides are a common geologic phenomenon and are part of the process of mass wasting. Weathered to fractured bedrock and soil are transported downslope over geologic time as a result of gravitational and hydrostatic forces. A landslide is a deposit of soil and/or bedrock moving downward from its original position under the influence of gravity. Landslides include a variety of morphologies and are further defined by type of materials, wetness, and mode of movement. They can consist of mass movements of earth materials which are primarily intact, and occur along discrete shear surfaces. These surfaces (shear or slip planes) can be rotational (conchoidal or concave), such as for earth slumps, or planar, as for transitional earth slide or bedrock glides. Most landslides are truly "complex landslides," sliding, falling and flowing with more than one type of movement and/or material.

Falls are an abrupt free-fall of earth materials off cliffs, steep cuts, or steep stream banks, while earth flows are mass movements of earth materials in which the type of movement is one of flowing. When composed of soil finer than gravel size, the flowing material is commonly called a mudflow. A debris flow/debris avalanche is composed of natural earth material, artificial fill,

and/or organic debris which flow downslope with speed. Most of the material is transported away from the area of initial ground failure.

Slope failures are also often triggered by increased pore water pressure due to the infiltration of rainwater. The resulting decrease of shear resistance (internal resistance to deformation by shearing) can cause the slope to move. The level of the groundwater table varies with the amount of rainfall for the area. If rainfall is higher than average during the winter season, the water table will be higher than average on a hillslope and groundwater pressures may become sufficiently high to activate hillside.

Landslides located within open space areas are natural landforms that do not require mitigation except where they affect man-made improvements as described further in Section 6, Areas of GHAD Responsibility. Debris catchment areas are the principal mitigation method used within the GHAD for areas between potentially unstable slopes and improvements. The debris catchment structures include debris benches, debris berms and runout areas. GHAD maintenance of the areas will be critical to maintain adequate protection for the site improvements. Maintenance and monitoring of these areas is described in Section 9. Potential mitigation and repair measures for GHAD areas near development are discussed in Section 7.

It is anticipated that field-verified geologic field mapping will be undertaken during future mass grading operations. The detailed maps showing bedrock structure, springs and landslide limits and repairs should be provided to the GHAD when available.

4.2 Soil Creep and Colluvium

Soil creep is the slow, often imperceptible, deformation of slope materials under low stress levels which normally affects the shallow portion of the slopes, but can be deep seated where a weak zone of soil or bedrock exists. It results from gravitational and seepage forces, and may be indicative of conditions favorable for landsliding. Creep can be caused by wetting and drying of clays, by solution and crystallization of salts, by the growth of roots, by burrowing animals, and by downslope movement of saturated ground. Colluvium refers to the mantle of loose soil and weathered bedrock debris that progresses down hillsides by gravity. Colluvial deposits typically occur in a weak, unconsolidated state and are noteworthy because of their susceptibility to landsliding.

4.3 Erosion and Sedimentation

The District shall also be concerned with erosion and sedimentation in open space or affecting established lots or improvements. Erosion is defined as the process by which earth materials are loosened and removed by running water on the ground surface or in the subsurface. Sedimentation is the depositing or settling of soil or rock particles from a state of suspension in a liquid.

Hilly terrain in open space, either in a natural condition or particularly on excavated slopes, can be subject to erosion. Landslide deposits which are sometimes in a loosened condition are particularly prone to erosion. Earth flow, debris flow and mud flow landslides typically have an

area of deposition or accumulation (sedimentation area) at their base. Graded slopes in the District, particularly those in excess of 20 feet in vertical height or those not sufficiently vegetated, can be subject to erosion, and therefore, a source of transported sediment.

4.3 Seismically Induced Ground Shaking

As identified in the geologic and geotechnical reports for projects within the Dougherty Valley area, an earthquake of moderate to high magnitude generated within the San Francisco Bay Region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, all structures should be designed using sound engineering judgment and the latest building code requirements, as a minimum.

Seismic slope stability analysis has been incorporated in the corrective plans for the graded portions of the site; however, seismically generated slope failures could occur in open-space areas outside the development limits. The proposed catchments, including debris benches, berms and run out areas, should be maintained to reduce the potential for impacts to the project from upslope failures. The GHAD's responsibility with regard to ground shaking is expected to be limited to response to seismically induced landslides or ground failures that impact public improvements as described in Section 6.

4.4 Creek Channel Erosion

As identified in previous geotechnical reports completed for Gale Ranch and Windemere, many of the slopes along unaltered creek channels are not stable. The banks have been oversteepened by erosion and consist of relatively weak materials resulting in a number of slope failures. Within the Windemere site, portions of several previously unstable creek channels have been relocated and reconstructed with engineered fill slopes. We anticipate that the potential for creek bank instability will be greatly reduced within the reconstructed areas.

As described in the Gale Ranch Annexation Agreement, Shapell and/or its successors shall retain responsibilities for performing GHAD activities on the Gale Ranch Phase I golf course including the creek corridors. Observation and reporting of the creek corridor conditions, as outlined in Section 10, should be provided to the GHAD a minimum of twice a year.

Outside of Gale Ranch Phase I, the GHAD will observe the creek channels periodically as described in Section 10. The GHAD's creek maintenance responsibilities are limited to the repair of substantial bank failures that directly damage or threaten actual site improvements (including buildings, utilities, trails and roads). Creek bank improvement projects, including armoring of channels with rock or other materials, may be undertaken by the GHAD as required.

4.5 Expansive Soils

Near-surface colluvium, alluvium, engineered fill and bedrock at the site could exhibit a moderate to high potential for expansion. These potentially expansive materials could impact the site development. Expansive soils shrink and swell as a result of moisture changes. This can cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow

foundations. The potential for expansive soils has been identified in previous reports for the property. Shrink and swell of expansive soils on slopes is a cause of creep movement which can result in shallow slope instability. Corrective grading or structural repairs should consider the potential impacts from expansive soils on the site. The GHAD is not expected to have any responsibility with regard to damages caused by expansive soils except to the extent that they may cause slope instability or impact public improvements.

4.6 Compressible Soils

Compressible soils have been identified in several areas within the GHAD boundaries. In addition, it is expected that some settlement of the thicker engineer fills will occur throughout the project. While it is anticipated that the total settlement will be within the tolerable limits of the site improvements, reading of existing or planned settlement monitoring devices should be included as recommended in Section 10.

5. FUNDING AND ACCEPTANCE OF RESPONSIBILITY BY GHAD

Property Owner Assessments

Funding for the GHAD is accomplished through a supplemental assessment of the property owners within the boundaries of the GHAD that derive benefits from its services. Although assessments were authorized separately for the West Branch, Gale Ranch, Old Ranch Summit and Windemere projects, it was the intent of the Board that the amount assessed and levied for all properties within the District be equal, and that all properties within the boundaries of the GHAD be provided equal treatment insofar as the provision of GHAD services are concerned. Assessments for the GHAD were first levied in the 1995/1996 fiscal year and are updated and approved annually by the GHAD Board. It is anticipated that up to approximately 11,756 units will be included within the GHAD when the developments are completed. It is projected that approximately 1,000,000 square feet of non-residential space, subject to GHAD assessment, will be constructed within the District.

All activities of the GHAD, as defined in this Plan of Control, assume and are subject to a continuation of the supplemental property tax assessments.

Transfer of Responsibility to the District

The process for transferring responsibility for maintenance, monitoring and repair activities to the GHAD is outlined in the respective Annexation Agreements shown on Table 5-1.

TABLE 5-1
GHAD 1990-01 Annexation Agreements

PARTY	DEVELOPMENT	DATE
Shapell Industries	Gale Ranch Phases 1 through 4	July 30, 1997
Windemere Ranch Partners	Windemere Phases 1 through 5	September 9, 1997
Windemere BLC Land Company, LLC	Silva Parcel	March 20, 2008
Davidon Homes	Old Ranch Summit	March 12, 2007

6. AREAS OF GHAD RESPONSIBILITY

Prevention, Mitigation, Abatement and/or Control of Geologic Hazards

Subject to the following exceptions, the primary mission of the GHAD shall be the prevention, mitigation, abatement, and/or control of geologic hazards within its boundaries that have damaged, or that pose a significant threat of damage to site improvements within the developed areas of the projects. As used herein, the term “site improvements” means buildings and outbuildings, roads, sidewalks, paths, utilities, improved trails, swimming pools, tennis courts, gazebos, cabanas, geologic stabilization features, or similar improvements.

The exclusions and limitations set forth herein do not apply to geologic hazards existing on open-space property owned by any homeowner’s associations or golf course property.

Exceptions

The GHAD may decline to prevent, mitigate, abate or control geologic hazards under the following circumstances:

1. Isolated or Remote Slope Instability: The GHAD shall not have responsibility or may place a low priority on its responsibility to monitor, abate, mitigate or control slope instability that does not involve damage to or pose a significant threat to damage site improvements.
2. Single Property: The GHAD will not prevent, mitigate, abate or control geologic hazards which are limited in area to a single parcel of property unless the geologic hazard has damaged, or poses a significant threat of damage, to site improvements located on other property within the GHAD boundaries.
3. Geologic Hazard Which Requires Expenditure in an Amount Exceeding the Value of the Threatened or Damaged Improvement: The GHAD will not prevent, mitigate, abate, or control a geologic hazard where, in the GHAD’s sole discretion, the anticipated expenditure required to be funded by the GHAD to prevent, mitigate, abate or control the geologic hazard will exceed the current value of the structure(s) and site improvement(s) threatened with damage or loss.
4. Damage Due to Seismically Induced Ground Shaking: The GHAD will not fund repairs or otherwise compensate for damage resulting from seismically induced ground shaking except for the following:
 1. Damage to public infrastructure within the GHAD boundaries, as authorized by the GHAD Board and subject to the availability of funds.
 2. Damage resulting from seismically induced landslides, as authorized by the GHAD Board, and subject to the availability of funds and the other restrictions included within this Plan of Control.

5. Damage Due to Expansive or Compressible Soils: The GHAD will not fund repairs or otherwise compensate for damage due to expansive or compressible soils except for the following:
 1. Damage to public infrastructure within the GHAD boundaries, as authorized by the GHAD Board and subject to the availability of funds.
 2. Damage resulting from landslides where the presence of expansive soils may be a contributing factor to the slide and as authorized by the GHAD Board and subject to the availability of funds and the other restrictions included within this Plan of Control.
6. GHAD Funding or Reimbursement for Damaged or Destroyed Structures or Site Improvements: In the event a residence or any other private structure, site improvement or landscape feature is damaged or destroyed as a result of a geologic hazard, the GHAD may fund or reimburse the property owner for the expenses necessary to repair or replace the damaged or destroyed structure, site improvement or landscaping with the exceptions noted above. Unless otherwise authorized by the Board of Directors, the dollar amount of the GHAD funding or reimbursement may not exceed ten percent (10%) of the costs incurred by the GHAD in preventing, mitigating, abating or controlling the geologic hazard causing the damage. In the event the geologic hazard damaged or destroyed a structure, site improvement or landscaping which violated any provisions of the Contra Costa County building code, City of San Ramon building code or City Ordinance Code, as applicable at the time of its installation or improvement, the GHAD may decline to provide any funding, or reimbursement to the property owner for repair or replacement of the damaged structure, improvement or landscaping.
7. No Reimbursement of Expenses Incurred by Property Owners: The GHAD will not be obligated to reimburse a property owner for expenses incurred for the prevention, mitigation, abatement, or control of a geologic hazard absent a written agreement between the property owner and the GHAD to that effect, which agreement has been executed prior to the property owner incurring said expenses, and following an investigation conducted by the GHAD.
8. Property Not Located within GHAD Boundaries: Except as herein provided, the GHAD shall not prevent, mitigate, abate or control geologic hazards located on property that is not located within the GHAD boundaries. In the event, however, that all or any portion of a geologic hazard existing on property located outside the GHAD boundaries has damaged or poses a significant risk of damage to site or other physical improvements located on property within the GHAD boundaries, the GHAD may prevent, mitigate, abate, or control the geologic hazard.

Any work conducted on property located outside of the GHAD boundaries shall be strictly limited to that which is necessary to prevent, mitigate or control the damage, or threat of damage, to property located within the boundaries of the GHAD. Should the GHAD be required to respond to a geologic hazard outside the boundaries of the GHAD, the GHAD may take such actions as may be appropriate to recover costs incurred as a result of preventing, mitigating, abating or controlling such geologic hazard from the responsible party, if any.

Geologic Hazards in Open Space and Maintenance of Open-Space Areas

The GHAD may prevent, mitigate, abate, or control the geologic hazards in open space areas and other unimproved areas within the boundaries of the GHAD if said geologic hazards have damaged or have the potential to damage site improvements located on properties within the boundaries of the GHAD (Figure 1). In conjunction with this responsibility, the open space management responsibilities allocated between the GHAD and the City of San Ramon (under County Service Area (CSA) M-29) are described in Section 2.

The GHAD's creek mitigation responsibilities are limited to the repair of substantial bank failures that directly damage or threaten actual site improvements (including buildings, utilities, trails and roads). Creek bank improvement projects, including armoring of channels with rock or other materials, may be undertaken by the GHAD as required.

Equipment maintenance and operations includes items of equipment related to geologic stabilization within the open space areas such as sump pumps.

The GHAD will monitor erosion and sedimentation in open space areas that affect developed lots and/or improvements. In addition, the GHAD may repair erosion gullies, etc. in open space areas.

As required, monitoring of geotechnical instruments (e.g. inclinometers, settlement monuments, etc.) within the entire GHAD limits including open space areas will be included within the operations of the GHAD. Section 10 describes the frequency and scope of the monitoring activities that should be provided.

Slope stabilization, including major landslide events, will be the responsibility of the GHAD provided they meet the criteria for repair listed above for the potential to impact site improvements. This also includes repair of minor landslides and debris flows.

The GHAD will be responsible for slope instability and erosion related to the unpaved trails. Trail maintenance is listed as a responsibility of CSA-M29.

Sediment removal from v-ditches and open-space catch basins on parcels owned by the GHAD is the responsibility of the GHAD. The GHAD is further authorized to maintain surface and subsurface drainage facilities and improvements located in open space areas, including, but not necessarily limited to, concrete v-ditches, storm drain inlets and outlets in open space and creek corridors and subdrain outlets. Occasionally, portions of v-ditches may require replacement due to cracking caused by expansive soils; this will be the responsibility of the GHAD.

The GHAD is not responsible for open space tasks which will be provided by the City of San Ramon under CSA M-29, including creek corridor vegetation maintenance, vegetation and landscape maintenance within landscaped areas, fire break mowing on City-owned open space and landscaped areas, maintenance of trail staging areas, sediment removal in detention and water quality basins and trail maintenance. The role of the GHAD with respect to the above

mentioned items is limited to overseeing and supervising the City's general physical maintenance as may be required to prevent, mitigate, control or abate erosion, sedimentation and potential landslide hazards.

Routine clearing of firebreaks and general maintenance of the open space (other than hazard abatement) is the responsibility of the City (as described in the MOU) subject to the review and approval of the GHAD. However, without waiving the obligation of the City of San Ramon these functions, the GHAD may perform these activities, at the discretion of the GHAD Manager and seek reimbursement from CSA-M29. The GHAD should review said activities for their potential to damage or interfere with the operation of any GHAD-maintained improvements; to cause an increase in erosion and/or sedimentation; or to in any manner aggravate or increase the potential of a landslide.

The GHAD may review and has the right to approve or disapprove physical construction, maintenance or repair activities proposed within the open space areas that, at the discretion of the GHAD, could increase erosion or sedimentation or otherwise impact or affect the geologic stability of the area. Should the GHAD be required to perform open-space maintenance activities that are otherwise the responsibility of others such as creek corridor vegetation maintenance, sediment removal from the detention or water quality basins to reduce potential erosion, sedimentation or the reduction in geologic stability of the area, the GHAD shall take such actions as may be required to recover costs incurred as a result of such activities from the responsible party.

7. GEOTECHNICAL TECHNIQUES FOR MITIGATION OF LANDSLIDE AND EROSION HAZARDS

Landslide Mitigation

The techniques the GHAD may employ to prevent, mitigate or abate landsliding or adverse erosion damage might include, but are not necessarily limited to:

- A. Removal of the unstable earth mass.
- B. Stabilization (either partial or total) of the landslide by removal and replacement with compacted drained fill.
- C. Construction of structures to retain or divert landslide material or sediment.
- D. Construction of erosion control devices such as gabions, rip rap, geotextiles, or lined ditches.
- E. Placement of drained engineered buttress fill.
- F. Placement of subsurface drainage devices (e.g. underdrains, or horizontal drilled drains).
- G. Slope correction (e.g. gradient change, biotechnical stabilization, and slope trimming or contouring).
- H. Construction of additional surface ditches and/or detention basins, silt fences, sediment traps, or backfill or erosion channels.

Potential landslide and erosion hazards can best be mitigated by controlling soil saturation and water runoff and by maintaining the surface and subsurface drainage systems. Maintenance shall be provided for lined surface drainage ditches and drainage terraces including debris benches or drop inlets.

8. BIOTECHNICAL RECOMMENDATIONS FOR PREVENTION AND MITIGATION OF EXISTING OR POTENTIAL EROSION HAZARDS

Fill slopes within the boundaries of the District are expected to be erodible as will cut slopes in bedrock; therefore, the maintenance of vegetative cover is especially important. Vegetation provides a protective role on soil and exposed rock. It absorbs the impact of raindrops, reduces the velocity of runoff, and retards erosion.

In many instances, adequate erosion protection for slopes can be accomplished with carefully selected and placed biological elements (plants) without the use of structures (e.g. brush layering and willow waddling).

In other areas, biotechnical slope protection may involve the use of mechanical elements or structures in combination with biological elements to provide erosion control and help prevent small-scale slope failures. Locally, crib walls, welded-wire walls, gabion walls, rock walls, rip-rap, and reinforced earth walls used in combination with carefully selected and planted vegetation can provide high quality slope protection. The vegetation may be planted on the slope above a low retaining structure or toe wall, or the interstices of the structure can be planted.

9. PRIORITY FOR GHAD-FUNDED REPAIRS

Emergency response and scheduled repair expenditures are to be prioritized by the GHAD Manager, utilizing his discretion, based upon available funds, a prudent reserve, the approved operating budget and consistent with the following guidelines and Section 6, Areas of GHAD Responsibility.

Should available funds not be sufficient to undertake all of the identified remedial and preventive stabilization measures, the expenditures shall be prioritized as follows in descending order of priority:

- A. The prevention, mitigation, abatement or control of geologic hazards that have either damaged or pose a significant threat of damage to critical structures (e.g. schools, fire station, residences, critical underground utilities or paved streets).
- B. The prevention, mitigation, abatement or control of geologic hazards that have either damaged or pose a significant threat of damage to clubhouse buildings, commercial structures and similar community buildings.
- C. The prevention, mitigation, abatement or control of geologic hazards that have either damaged or pose a significant threat of damage to private or community recreation facilities (e.g. pools, spas, tennis courts, etc.).
- D. The prevention, mitigation, abatement or control of geologic hazards that have either damaged or pose a significant threat of damage limited to loss of landscaping or other similar non-essential amenities.
- E. The prevention, mitigation, abatement or control of geologic hazards existing entirely on open-space property and which have neither damaged nor pose a significant threat of damage to any site improvements.

10. MAINTENANCE AND MONITORING SCHEDULE

Geologic features and GHAD-maintained facilities should be inspected on a regular basis. Budget permitting, inspections should be scheduled to occur a minimum of two times per year in normal years and four or more times per year in years of heavy rainfall. The inspections should be scheduled to take place in October, prior to the first significant rainfall; mid-winter as necessary during heavy rainfall years; and in early April at the end of the rainy season.

- Site slopes should be observed during scheduled site visits by a Geotechnical Engineer (GE) or Certified Engineering Geologist (CEG) for indications of slope instability, seeps or erosion.
- A GE and/or CEG should inspect the lined surface of concrete-lined drainage ditches within the GHAD boundaries on a regular schedule. The professional should check for sedimentation, cracking or shifting of the concrete-lined ditches. Repairs and maintenance should be performed on a regular schedule. Excess silt or sediment in ditches should be removed and cracked or broken ditches should be patched or repaired as required before the beginning of the next rainy season.
- Several types of debris catchment structures are located within the GHAD, including debris benches, berms and run out areas. Repairs and maintenance should be performed on a regular schedule. Excess debris should be removed to allow the improvements to maintain adequate capacity.
- Subsurface drain outlets and horizontal drilled drain outlets should be inspected on a regular schedule. Water flowing from these outlets should be measured and recorded during each inspection. Any suspicious interruption in flow should signal a need to unplug or clean by flushing the affected drain.
- Piezometers used to measure groundwater levels, or other instruments such as inclinometers and tiltmeters should be monitored on a regular schedule.
- Settlement monitoring devices should be monitored on a regular schedule. At the present time, two Sondex settlement monuments are located within Phase 1 of Gale Ranch. In the event of anomalous readings or excessive settlement, the monitoring frequency should be increased.
- Storm drain inlets, outfalls or trash racks must be kept free of debris and spillways maintained. Attention should be given to plantings or other obstructions which may interfere with access by power equipment.
- The portions of the creek corridor that are maintained by the GHAD should be inspected to monitor potential creek bank failures that could threaten or damage site improvements. The maintenance program should include the monitoring of the subdrain outfalls from the mass grading operations which outlet to the creek in a number of locations along the creek bank.

The GHAD should review its inspection schedule annually and assess the effectiveness of its preventive maintenance program on a regular basis. GHAD staff should prepare an annual report to the Board of Directors which summarizes activities within the previous year and which includes recommendations for special maintenance and/or repair projects or studies, as necessary.

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