

**ENGINEER'S REPORT**

for

**SANTIAGO GEOLOGIC HAZARD ABATEMENT DISTRICT  
ANAHEIM, CALIFORNIA**

**June 9, 2022**

**ATTORNEY-CLIENT PRIVILEGED – FOR BOARD REVIEW ONLY**

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## TABLE OF CONTENTS

<b>CERTIFICATION OF FILING</b> .....	<b>1</b>
<b>I. INTRODUCTION AND BACKGROUND</b> .....	<b>2</b>
<b>II. GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY</b> .....	<b>2</b>
<b>III. SERVICE LEVELS</b> .....	<b>2</b>
<b>IV. DESCRIPTION OF THE IMPROVEMENTS MAINTAINED BY THE GHAD</b> .....	<b>3</b>
<b>V. ASSESSMENT METHOD AND BENEFIT</b> .....	<b>3</b>
A. SPECIAL BENEFIT AND PROPORTIONALITY.....	3
B. GENERAL BENEFIT .....	4
C. ASSESSMENT METHOD.....	5
<b>VI. ASSESSMENT - BUDGET</b> .....	<b>7</b>
<b>EXHIBIT A</b> – Site Plan to Accompany Assessor’s Parcel Number and Assessment Limit List	
<b>EXHIBIT B</b> – Assessor’s Parcel Number and Assessment Limit List	
<b>EXHIBIT C</b> – Santiago GHAD Budget	
<b>EXHIBIT D</b> – Santiago GHAD Pro Forma Budget	

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## ENGINEER'S REPORT

SANTIAGO  
GEOLOGIC HAZARD ABATEMENT DISTRICT  
(Pursuant to the Public Resources Code of the State of California, Section 26500 et seq.)

### CERTIFICATION OF FILING

The GHAD provides monitoring and maintenance of improvements related to geologic hazard management within the District. The GHAD responsibilities, which are the subject of this report, are defined in the Plan of Control dated February 22, 1999, as any activity necessary, "...to mitigate risk of reactivation of the Santiago landslide, to direct and fund operation of the dewatering system, monitoring of groundwater elevations and landslide movements, and to evaluate landslide stability on a regular basis for the life of those improvements potentially impacted by any renewed landslide movement," and those additional items list in Section IV.

This report consists of six parts, as follows.

- I. INTRODUCTION AND BACKGROUND
- II. GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY
- III. SERVICE LEVELS
- IV. DESCRIPTION OF GHAD-MAINTAINED IMPROVEMENTS
- V. ASSESSMENT METHOD
- VI. ASSESSMENT LIMIT - BUDGET PROJECTION

The undersigned respectfully submits the enclosed Engineer's Report.

Date: June 13, 2022

By: ENGEO Incorporated

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## ENGINEER'S REPORT

for

### SANTIAGO GEOLOGIC HAZARD ABATEMENT DISTRICT ANAHEIM, CALIFORNIA for the ESTABLISHMENT OF AN ASSESSMENT LIMIT

#### I. INTRODUCTION AND BACKGROUND

The Anaheim City Council formed the Santiago Geologic Hazard Abatement District (GHAD) on March 16, 1999, under the authority of the California Public Resources Code, Division 17, Section 26500 et seq. with the approval of City of Anaheim Resolution 99R-50. Five property owners within the GHAD serve as the Board of Directors of the Santiago GHAD.

The Anaheim City Council approved the Santiago GHAD Plan of Control ("Plan of Control") to allow the Santiago GHAD to permanently monitor and maintain the Santiago landslide. The Santiago GHAD is funded through a settlement with the City of Anaheim ("GHAD Distribution"). The GHAD Distribution cannot be used to fund activities or facilities which do not materially and substantially promote the objective of stabilizing past, present, and future land movement of the Santiago landslide." In 1999, the initial GHAD Distribution was approximately \$3,500,000, and as of April 28, 2022, the fund balance was approximately \$568,297.

#### II. GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARY

The boundary for the Santiago GHAD is shown in the Site Plan to Accompany Assessor's Parcel and Assessment Limit List (Exhibit A). The parcels within the GHAD are identified on the Assessor's Parcel Number and Assessment Limit List (Exhibit B).

#### III. SERVICE LEVELS

The GHAD's activities are those that promote the objective of stabilizing past, present, and future land movement of the Santiago landslide; and the issuance and servicing of bonds issued to finance any of the foregoing.

The GHAD provides for the administration and review of facilities within the budgeted limits as described in the Plan of Control and includes the following services.

1. Oversight of GHAD operations, including reporting to the GHAD Board of Directors.
2. Setting the annual levying of assessments on the property tax rolls.
3. Engagement of technical professionals to perform the monitoring duties as described in the Plan of Control.
4. Performance of GHAD maintenance activities.
5. Preparation of annual GHAD budgets and other documents and reports for consideration by the GHAD Board of Directors.

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#### IV. DESCRIPTION OF THE IMPROVEMENTS MAINTAINED BY THE GHAD

The GHAD-maintained improvements in general include vertical production and observation wells, horizontal drains, and inclinometers.

#### V. ASSESSMENT METHOD AND BENEFIT

The improvements and GHAD responsibilities described in Section IV are distributed within the limits of the GHAD or immediately adjacent to the GHAD. The improvements described in this document allow protection from slope instability, a special benefit, to the assessed parcels. As provided in Section 5 of Resolution 99R-50, Approving Formation of the Santiago GHAD, “*The GHAD boundaries are larger than the Santiago landslide. The Plan of Control identifies potential geologic hazards for areas outlying the Santiago landslide other than those defined as existing for the Santiago landslide. Inclusion of the outlying properties in the GHAD is beneficial to those properties in that residents may have concerns regarding geologic hazards due to the proximity to the Santiago landslide, and the GHAD provides a mechanism to address and mitigate such future geologic hazards.*”

The improvements and responsibilities listed in Section IV provide specific benefits to the properties within the GHAD and the improvements are constructed for the benefit of those assessed as well as a minor general benefit to the general public. The subject parcels are only being assessed for the reasonable costs of the proportional specific benefits conferred on the parcels.

##### A. *Special Benefit and Proportionality*

The improvements described in this document will confer some or all of the following special benefits to the assessed parcels within the Santiago GHAD.

1. Protection from landsliding and ground deformation.
2. Protection from loss of street/transportation access.
3. Protection from loss of utilities an associated services.
4. Groundwater seepage management, providing protection for properties and improvements.
5. Consequential protection of properties and improvements from diminution of value resulting from manifestation of geologic instability.

Certain real properties within the GHAD are located within the limits of the Santiago landslide. These real properties, which would suffer damage from the primary effects of movement, receive a special benefit from the activities of the GHAD, which are intended to arrest movement of the landslide. Several real properties are located near the Santiago landslide and have been determined to be at risk of the secondary effects of landslide movement or ground-surface deformation, and therefore, receive a special benefit whose degree is equal to the benefit of real properties located within the limits of the Santiago landslide. Additionally, other real properties, located in the general vicinity of the Santiago landslide, are within a hydrogeologic zone within which groundwater levels are controlled via a pump and discharge system. These properties receive a proportional special benefit through the control of groundwater levels, which reduces

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the potential of distress to slopes and the ground, and reduces the potential for distress to structures and both surface and subsurface improvements. The degree of special benefit is lower than the special benefit to real properties proximate to the Santiago landslide or within the limits of the Santiago landslide. Still other real properties, outside of the limits of these three categories, receive a further diminished degree of special benefit related to the control of groundwater seepage. The control of groundwater seepage is beneficial, as it reduces the potential for distress to structures and both surface and subsurface improvements. The proportion of benefit with respect to each of these categories is presented below in the assessment allocation formula.

The mitigation of the aforementioned geologic and hydrologic issues minimize the potential for lost transportation facility and utility service access. These facilities consist of streets, sidewalks, and public utility conveyance systems (e.g., domestic potable water, wastewater sewerage, electrical conduits, natural gas lines, telecommunications systems). Minimization of the potential for interrupted service through the mitigation of geologic instability provides a special benefit to owners of real property within the district. Assignment of this special benefit is included with the allocations based on landsliding, ground deformation, groundwater level control, or groundwater seepage control.

Preservation of access to amenities and minimization of “stigma” associated with potential geologic instability within the GHAD has also been considered in the benefit calculations. Assignment of this special benefit is included with the allocations based on landsliding, ground deformation, groundwater level control or groundwater seepage control.

For each of these categories, real property owners derive special benefit based on proportional parcel area. Therefore, owners with greater parcel area derive greater special benefit than owners with lesser parcel area. The fraction of each respective parcel area has also been included and is presented below in the assessment allocation formula.

## **B. General Benefit**

The Project does convey general benefit to owners of properties outside of the district and to other members of the general public. The general benefits associated with transportation access have been identified as being conveyed to members of the public who do not own real property within the district. These include the following.

- The availability to use through streets that may be impacted by the effects of landsliding.

There is a general benefit conveyed to the owners of properties outside of the district and to other members of the general public, which consists of uninterrupted transportation access for 13 properties whose transportation access is provided by Avenida de Santiago. This benefit is relatively small compared to the special benefit conveyed to real property owners of the GHAD, and the cost to confer this general benefit will be accounted for by a 30 percent premium escalator on the City of Anaheim’s public right-of-way area-based assessment within the Santiago landslide. The 30 percent is equivalent to the ratio of the number of these outside-of-GHAD properties to the total number of outside-of-GHAD properties and inside-of-GHAD properties whose property access would be affected should the Santiago landslide re-activate. Additionally, other properties outside of the GHAD receive a general benefit by having access to streets within

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the GHAD boundaries, most notably Serrano Avenue. This general benefit is accounted for by an area-based assessment for streets levied to the City of Anaheim.

### C. Assessment Method

To allocate assessment in proportion to special benefit conferred on assessed parcels, a formula has been derived that estimates the special benefit conveyed by the Project. The formula includes several factors, which are weighted based on their relative effect on special benefit. Special benefit is derived considering the following factors, and weighting has been applied to each factor to note its relative importance as compared to other factors. Several factors have been incorporated into the analysis, including a respective parcel’s proximity to the delineated landslide, a respective parcel’s potential to experience geologic distress in the event of landslide mobilization, a landslide’s proximity to the hydrogeologic watershed area that feeds groundwater mitigated by the pump system, and other parcels that benefit from seepage control. Additionally, all residential parcels benefit from the mitigation of geologic hazards to provide continued transportation access, access to amenities, and reduction of the potential property devaluation that could occur in the event of mobilization and manifestation of geologic hazards within the GHAD. We applied our professional judgment to the factor values regarding the relative efficacy of protective devices and projections of the effects of the Project:

$$T_i = (M_i)(R)$$

$$M_i = \left( L \left( \frac{A_{Li}}{\sum_{i=1}^n (A_{Li})} \right) \right) + \left( G \left( \frac{A_{Gi}}{\sum_{i=1}^p (A_{Gi})} \right) \right) + \left( S \left( \frac{A_{Si}}{\sum_{i=1}^q (A_{Si})} \right) \right)$$

$T_i$  = Assessment at Parcel i

$M_i$  = Assessment Factor at Parcel i

$R$  = Total annual assessment-based revenue required to support the GHAD budget

$L$  = Landslide/Surface Damage Factor

$G$  = Groundwater Control Factor

$S$  = Seepage Control Factor

$A_{Li}$  = Area of Landslide/Surface Damage Parcel i

$A_{Gi}$  = Area of Groundwater Control Parcel i

$A_{Si}$  = Area of Seepage Control Parcel i

$\sum_{i=1}^n (A_{Li})$  = Summation Area of Landslide/Surface Damage Parcel i for Parcels i to n

$\sum_{i=1}^p (A_{Gi})$  = Summation Area of Groundwater Control Parcel i for Parcels i to p

$\sum_{i=1}^q (A_{Si})$  = Summation Area of Seepage Control Parcel i for Parcels i to q

- Santiago Landslide Siting – Real properties situated within the limits of the Santiago landslide (including City of Anaheim-owned streets), that would suffer damage from the primary effects of movement, receive a special benefit from the activities of the GHAD, which are intended to arrest movement of the landslide. The special benefit derived is in direct proportion to the area of each parcel. The mitigation activities provide the largest respective portion of special benefit to properties within the limits of the Santiago landslide. These properties have been assigned a weighting factor of 0.65 (measured on a scale of 0 to 1).

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- Potential Surface Damage Siting – As discussed, several real properties are located near the Santiago landslide and have been determined to be at risk of the secondary effects of landslide movement or ground surface deformation, and therefore, receive a special benefit whose degree is equal to the benefit of real properties located within the limits of the Santiago landslide. Given this net positive benefit conveyed, these properties (including City of Anaheim-owned streets) have been combined with the Santiago Landslide parcels and assigned a weighting factor of 0.65.
- Groundwater Management Area Siting – Select real properties located in the general vicinity of the Santiago landslide (including City of Anaheim-owned streets) are within a hydrogeologic zone within which groundwater levels are controlled via a pump and discharge system. These properties receive a proportional special benefit through the control of groundwater levels. The degree of special benefit is diminished as compared to the benefit of real properties located near or within the limits of the Santiago landslide. Because of the reduction of the special benefit, these lots have been assigned weighting factor of 0.20.
- Seepage Control Area Siting – The remaining properties within the GHAD (including City of Anaheim-owned streets) receive a further diminished degree of special benefit related to the control of groundwater seepage. The control of groundwater seepage is beneficial, as it reduces the potential for distress to structures and both surface and subsurface improvements. Because of the further reduction of the special benefit, these lots have been assigned weighting factor of 0.15.

The weighted values described above have been computed to reflect the relative importance of each factor in the judgment of the GHAD Manager and Assessment Engineer (ENGEO), then the resulting fractional value of the Geologic Assessment Factor is assigned to each parcel on a pro-rata basis based on respective area,  $A_{Li}$ ,  $A_{Gi}$ , or  $A_{Si}$  of their respective parcel areas in their assigned categories, Landslide/Surface Damage, Groundwater Control, or Seepage Control, which include allocations based on Transportation Factor, Amenities Factor, and Stigma Factor. An assessment level is determined for each parcel based on these factors. In overview, a large-area parcel located within the Santiago landslide area will derive the greatest special benefit and, therefore, is assessed the largest amount. A small-area parcel located well outside of the vicinity of the Santiago landslide receives the least special benefit and is therefore assessed the smallest amount. Other parcels will range between these extremes.

A financial analysis was performed to provide a framework for an operating budget for the ongoing abatement, mitigation, prevention, and control of geologic hazards within the GHAD. In preparation of the budget, several factors were considered including:

- Site geology
- Site hydrogeology
- Proximity of geologic hazards to residences and improvements
- Improvements or structures
- Site access considerations
- Elements requiring routine maintenance

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## VI. ASSESSMENT - BUDGET

The purpose of this Engineer's Report is to establish the assessment level and the apportionment of the assessment within the GHAD. The annual budget in each subsequent fiscal year will apprise the GHAD Board of Directors of the estimated budget for the upcoming year and recommend an appropriate levy to support those activities.

Based on the estimated expenses for ongoing operations, a budget was prepared for the purpose of estimating the revised assessment levels (Exhibit C). Exhibit D shows a 10-year pro-forma budget for the Santiago GHAD.

This Engineer's Report has determined a unique assessment using the formula described above for each parcel. The assessment limits will be adjusted annually to reflect the percentage change in the Los Angeles-Long Beach-Anaheim Consumer Price Index (CPI) for All Urban Consumers. The assessment limit will be adjusted annually using an initial date of June 2022 for the CPI. Each subsequent annual adjustment will be calculated using the 12-month period from June to June. The assessments are to be levied beginning in the first assessment cycle of the fiscal year 2022-2023.

While the assumptions and estimated expenses listed in Exhibit C were used to determine the assessment levels for the GHAD, they do not represent the actual budget for any one year of the GHAD's operation. The Engineer anticipates that the projected expense amounts will be reached over time and that these amounts will be inflation-adjusted in the year that the expenses occur.

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**EXHIBIT A**

**Site Plan to Accompany Assessor's Parcel Number  
and Assessment Limit List for  
Santiago GHAD**

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**EXHIBIT B**

**Assessor's Parcel Number and Assessment Limit List  
for Santiago GHAD**

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**EXHIBIT C**

**Santiago GHAD Budget**

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**EXHIBIT D**

**Santiago GHAD Pro Forma Budget**

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