GeoSoils, Inc.

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5741 Palmer Way • Carlsbad, California 92010 • (760) 438-3155 • FAX (760) 931-0915 • www.geosoilsinc.com

April 9, 2015

W.O. S6118-SC

Emprise Trust
1925 El Camino de la Luz
Santa Barbara, CA 93109

Attention: Mr. T. Felkay, Trustee

SUBJECT: Wave Runup & Coastal Hazard Analysis Update, 1925 El Camino de la Luz, Santa Barbara, Santa Barbara County, California (APN 045-100-024)

Reference: "Wave Runup & Coastal Hazard Analysis, 1925 El Camino de la Luz, Santa Barbara, Santa Barbara County, California (APN 045-100-024)," dated July 20, 2012, W.O. S6118-SC, by GeoSoils, Inc.

Dear Mr. Felkay:

At your request on behalf of the Emprise Trust, GeoSoils Inc. (GSI) has prepared the following update of our referenced 2012 wave runup and coastal hazards analysis for the subject parcel (site). The purpose of this update is to provide additional site-specific wave runup analysis in consideration of the evolved project design, site-relevant information, regulatory criteria, and sea level rise scenarios that have been variously produced and/or adopted subsequent to our July, 2012 report.

We note that the 1925 El Camino de la Luz residential reuse project team incorporated our 2012 report findings and recommendations in the project preliminary conceptual description/design (ABDS, 2013). It has in turn been reviewed by the City of Santa Barbara's Preliminary Review Team (PRT, 2013). GSI appreciates City staff's comment that our 2012 report "appears to adequately address issues related to wave runup and coastal hazards as required by the Safety Element of the General Plan (GP) and the requirements set forth in the City's Local Coastal Plan (LCP)." (PRT letter, 2013, page 5.)

We further note that evolved project plans (ABDS, Site Sections Sheet A0.02, June 14, 2014 and Site Plan Sheet A0.02, March 11, 2015) locate the finished floor elevation of the proposed lower house level at 97.5 feet MLLW (up from the previous 92 feet MLLW), and set the seaward (south) edge of the house back 169-181.5 feet from the surveyed upper termination (edge) of the coastal bluff on the parcel (an increase from the previous 169-172 feet setback). Evolved project grading plans (C.L. Grant/MFT, Sheet CG-1, March 28, 2014) locate the proposed sub-grade lower shear-pin row 192 feet (h) to landward of the coastal bluff toe and 159-165 feet (h) to landward of the coastal bluff

upper termination (edge).[1] In response to the PRT request for a storm runoff hydrology report to address existing and post-project completion runoff conditions at the parcel and the project structural development envelope, the evolved project also proposes a comprehensive storm water management system (SWMS). (CSA, Hydrology Report, April, 2015).

Section 1, below, summarizes the findings of this update wave runup/coastal hazards report. Section 2 describes the photo-documented current (March 7, 2015) back beach and coastal bluff conditions in comparison to the photo- documented conditions prior to our 2012 report (March 7, 2012). Section 3 addresses, with applicable quantitative analysis, sea level rise scenarios and associated coastal bluff position (retreat) rates, over the regulatory 75-year economic life of the replacement house (to 2090/2100), that have been put forward in the City's General Plan Safety Element (2013), Coastal Commission draft Sea Level Rise Guidance (2013), the IPPC's Fifth Climate Change Assessment (2014), and the United States National Climate Change Assessment (2014). Section 4 analyzes staff's "belief", that the upper termination (edge) of the coastal bluff on the parcel is located "at approximately the 127-foot contour", in light of the coastal-oceanographic processes that have shaped the coastal bluff edge and the applicable adopted California coastal program criteria that determine its location for regulatory purposes.(Exhibit A contains the adopted regulation, at Title 14, California Code of Regulations, Section 13577(h) that establishes the criteria.) Section 5 provides our additional recommendation for coastal bluff protection (conservation) against localized erosion from trespass by transients.

1. Executive Summary

Our updated wave runup and coastal hazards analysis finds that during the past three years:

(a) Wave runup and wave spray have episodically splashed the lower coastal bluff on the parcel and resulted in minor surficial erosion of the toe of the coastal bluff, but neither wave runup nor spray has affected the mid-upper coastal bluff face or overtopped it, and the upper termination (edge) of the coastal bluff remains unchanged from the "top of coastal bluff" line shown on the project topographic survey map.

(b) Quantitative analysis of the wave runup during 21st Century sea level rise (SLR) scenarios by the City, Coastal Commission staff, International Panel on Climate Change, and the US Academy of Sciences indicates that wave runup will not overtop the surveyed upper termination (edge) of the coastal bluff, and therefore the finished floor elevation of the house, its caisson-grade beam foundation, and shear pins will not be in danger of flooding by ocean water during a 100-year storm under those SLR scenarios.

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[1] As in the 2014 plans, the project neither requires nor proposes a shoreline/coastal bluff protective structure (seawall, revetment).

(c) Reported coastal-oceanographic conditions in the Santa Barbara Channel during the Hispano-American period and the geomorphology of the parcel render location of the upper termination (edge) of the coastal bluff at elevation 127 feet (at any published datum) a physical impossibility that "belief" cannot validly supersede under the criteria set forth in the controlling regulation at section 13577(h). No recorded wave run up, from any source, has locally exceeded ±30 feet MLLW during historic time, and none has reached elevation 127 feet (in any datum) to erode an elevated second coastal bluff, or "upper riser". Discharge of water from upslope/upgradient sources anthropogenically activated the February, 1978 "El Camino de la Luz landslide," and the City in 1978 graded its headscarp to near elevation 130 feet on the parcel to buttress the municipal Mesa Trunk Line Sewer trench and pipe (CSA, 2012, 2015). The historical as well as extant (on the ground) conditions, the processes that established them, and the criteria for the location of the upper termination (edge) of the coastal bluff simply do not support - and in fact directly contradict - staff's "belief" in the coastal bluff edge location near the 127 foot contour.

(d) Episodic wave runup/spray have continued since 2012 to locally erode (minor) the toe (base) of the coastal bluff along the rear of the persistent cobble field, as well as the lower, near vertical, 4-8 feet of the coastal bluff face. In addition, scaling, rilling, and ingress/ egress trespass by homeless persons along rilling channels have resulted in localized erosion and/or vegetation disturbance on the mid-upper coastal bluff face. These erosion rates remain less than the average 12 inches/year that we analyzed in our 2012 report.

(e) Scenarios for sea level rise (SLR) through the years 2050 and 2100 that have been adopted by the City (2013) and put forward by California Coastal Commission staff (CCC staff, 2013), the International Intergovernmental Program on Climate Change (IPCC, 2013, 2014), and the US National Climate Change Assessment (2014) either fall within the SLR scenario ranges that we analyzed in our 2012 report, or are quantitatively analyzed in this update report (Table I, 66 inch and Table II, 79 inch SLR scenarios). Under no scenario, however, will wave runup (or wave spray) overtop the upper termination (edge) of the coastal bluff (elevation near 52 feet MLLW) on the parcel, as it: (1) exists at present (March, 2015), or (2) is likely to evolve during the next 75 years, given the geomorphology of the parcel (CSA, 2012) and recommended avoidance of anthropogenic saturation of the landform (CSA, 2012, 2015; GSI, 2012).

2. Current Conditions

As of March 7, 2015, the upper termination (edge) of the California coastal program/City General Plan Safety Element coastal bluff at 1925 El Camino de la Luz, Santa Barbara remain substantially unchanged from its location as of March 7, 2012 and as depicted on the parcel topographic survey map (CSA, 2011). The only observed change has occurred in the toe of the coastal bluff, where as a result of erosion of previous back beach littoral sand deposits the present (April, 2015) toe of coastal bluff aligns with the persistent back beach cobble field. No El Niño Southern Oscillation (ENSO) storm events, which control

the persistent long-term position of the coastal bluff, have occurred at Santa Barbara since our 2012 report. At-grade photographs (Exhibit B) of the back beach and coastal bluff, acquired on March 7, 2012 and March 7, 2015, document and illustrate their previous and present conditions.

(a) Between March, 2012 and September, 2013, littoral beach sand accreted on, and largely covered, the persistent cobble field that reposes on the back beach plane in the area of the parcel. (Exhibit C, acquired on September 29, 2013. Used by permission, California Coastal Records Project/Adelman & Adelman.) Subsequent wave runup in 2014 and through March 7, 2015 removed most of that sand from the back beach and again exposed the cobble field to and along the toe of the coastal bluff. Littoral beach sand has continued during this period to cover, in whole or part, other cobbles and Monterey Formation outcrops on the mid-lower beach plane.

(b) Exhibit B location (1), near the westerly property line of the parcel with adjacent 1927 ECDLL, emergent oblique surficial caving in the lower coastal bluff face in 2012 extended to 4 feet (v), with observed horizontal stratigraphy, and a rilling erosional feature above the back beach cobbles that extended to 15 feet (v) above the back beach cobbles. By 2015, this erosional feature evolved into a slightly concave 3-8 feet wide feature that extends 12-15 feet (v) above the cobbles, and continues upslope 10-12 feet as a rilling erosional channel through adjacent persistent bluff scrub vegetation. A small debris talus at the base of this feature indicates both recent scaling erosion within it, as well as the absence of recent wave runup that reached this elevation (near 11 feet MLLW). Ingress/egress by transients on the coastal bluff between the beach and homeless encampments in the dense contiguous lemonade berry vegetation on the coastal bluff top (landward of the surveyed coastal bluff edge) has variously resulted (April, 2014, March, 2015) in excavated hand/foot holds, lost footwear, and localized erosion of the coastal bluff on the parcel, as well as on adjacent 1921 ECDLL.

(c) Exhibit B location (2), a 6- to 8-foot (h) slightly protruding knob of relatively erosion-resistant coastal bluff stratigraphy, with embedded cobbles, rises to 6-8 feet (v) above the back beach cobbles.

(d) Exhibit B location (3), the wrack line of marine debris and sloughed bluff vegetation along the rear cobbles fronts a shallow 25 feet (h, roughly East-West trending) concave feature, with low (1-1.5 feet [v]) emergent caving along the toe of the coastal bluff (March, 2015). The exposed stratigraphy, with locally extensively fractured and rotated/jumbled Monterey shale pieces displayed in this scalloped erosional feature, reaches 6-8 feet (v) above the back beach cobbles. By comparison, littoral beach sand also covered the coastal bluff toe-cobble contact in September, 2013, and wave-spray impacted coastal bluff scrub vegetation extended down the lower coastal bluff face to that contact line in March, 2012. By March, 2015, this vegetation on the lower coastal bluff had died, fallen to the back beach, and/or been carried away by episodic wave runup.

(e) Exhibit B location (4), an additional wave run-up scalloped erosional feature, 12-13 feet (v) and 10 feet (h) at its base, with distinct exposed stratigraphy, extends to near the easterly property line of 1925 ECDLL with 1921 ECDLL.

(f) Exhibit B location (5), immediately east of the 1925-1921 ECDLL property line and thus off site, episodic wave runup erosion has removed previously existing (2012, 2013) bluff scrub vegetation that extended in parts to just above (±0.5 feet [v]) the back beach cobbles (2012) or to the back beach sand level (2013).

(g) A fresh (2015) mid-upper coastal bluff, at Exhibit B location (6) to the east of, and downslope from, the relict drainage outfall on westerly 1921 ECDLL was already present in 2012, and has been renewed by scaling - associated with discharge of runoff from the reelect drainage swale on westerly 1921 ECDLL, rather than wave runup - during the interval. Distinct hand- and footholds, carved into the coastal bluff to access the homeless encampment adjacent to the U-shaped outfall of the relict (pre-1978) drainage swale on westerly 1921 ECDLL, are visible here.

Section A-A' (Exhibit D) illustrates the lower (near vertical, 71˚) and mid-upper (49˚) slopes of the coastal bluff, between elevations 11 feet and 52 feet MLLW. In contrast, the adjacent landward terrain profile between elevations 52 feet and 65-70 feet has slopes of 9˚ and 17˚; the City's 1978 landslide debris fill cover envelope, between elevations 65-70 feet and 80 feet, has slopes of 29˚ and 11˚; the City's (1978) earthen material excavation site, between elevations 80 feet and 90 feet, has slopes of 12˚ and 24˚; and the City's (1978) Mesa Trunk Line Sewer earthen buttress, between elevations 100 feet and 130 feet, has slopes of 85˚ and 31˚.[2]

3. Post-July, 2012 Sea Level Rise Projections, Scenarios, and Coastal Bluff Retreat Rates

3.1. City General Plan Safety Element (2013) and Related Provisions.

This section addresses the potential effects of the City's adopted General Plan Safety Element (2013) sea level rise scenario and coastal bluff retreat rate on the parcel and proposed residential reuse project at 1925 ECDLL.[3]

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[2] The small (≤2 feet v) 85˚ notch in the MTLS buttress near elevation 120 feet identifies the northerly edge of the geotechnical subsurface investigation deep borehole and current inclinometer/piezometer monitoring site SD-2 (2011). The small (≤2 feet v) 90˚ slope along the top of the City's graded buttress consists of the relict (1956-1978) house entry, carport driveway, and turnaround concrete/AC pavement and a thin layer of overlaying fill.

[3] GSI analyzed the average 8-inch/yr. coastal bluff retreat rate, provided in the CCC-certified City Local Coastal Plan, with regard to the parcel in our 2012 report. The project site plan (ABDS, 2015) maps both the 50-feet coastal bluff edge retreat line (75 years x 8 inches/yr) and the 75-feet coastal bluff edge retreat line (75 years x 12 inches/yr.) in plan view.

(a) Sea Level Rise Scenarios. The General Plan Safety Element (2013, page 38, by reference to the "City of Santa Barbara Sea Level Rise Vulnerability Study" [2012]), projects a mean sea level rise (SLR) of 14 inches by the Year 2050, and of 55 inches by the Year 2100.

In the Safety Element's scenario, relative mean sea level will not rise on the cobble back beach plane (or the seasonally accreted littoral beach sand profile) to the toe of the coastal bluff (elevations 11-12 feet MLLW). In 2050, when the current MSL of 2.79 feet MLLW + 1.17 feet SLR = 4.96 feet MLLW, mean sea level under this scenario will be 6.04-7.04 feet MLLW, below the current (2015) elevation of the toe of the coastal bluff. In 2100, when 2.79 feet current MSL + 4.58 feet SLR = 7.37 feet MLLW, mean sea level under this scenario will be 3.63-4.63 feet (v) below the current (2015) elevation of the toe of the coastal bluff.[4]

We conservatively address the Safety Element's 66 inch (5.5 feet) sea level rise scenario, to the Year 2100, in Table I, below. It indicates that maximum wave runup under such conditions will be to elevation 27 feet MLLW on the coastal bluff face, or 25 feet (v) below the present (2015) upper termination (edge) of the coastal bluff. A 5.5-foot sea level rise scenario will thus not overtop the coastal bluff at the parcel, either in its present (2015) or evolving geometry during the regulatory economic life of the replacement house, given the inclined hillside on the parcel.

TABLE I. WAVE RUNUP WITH 5.5 FEET (66 INCHES) SEA LEVEL RISE, 1925 EL CAMINO DE LA LUZ, SANTA BARBARA, CALIFORNIA

AUTOMATED COASTAL ENGINEERING SYSTEM ... Version 1.02 2/21/2014 12:39
Project: WAVE RUNUP 1925 EL CAMINO DE LA LUZ 5.5 FEET SLR

WAVE RUNUP AND OVERTOPPING ON IMPERMEABLE STRUCTURES

Item		Unit	Value	
Wave Height at Toe	Hi:	ft	10.000	Smooth Slope
Wave Period	T:	sec	20.000	Runup and
COTAN of Nearshore Slope			44.000	Overtopping
Water Depth at Toe	ds:	ft	12.800	
COTAN of Structure Slope			10.000	
Structure Height Above Toe	hs:	ft	40.000	
Deepwater Wave Height	H0:	ft	6.234	
Relative Height	(ds/H0):		2.053	
Wave Steepness	(H0/gT^2):		0.484E-03	
Wave Runup	R:	ft	14.339	
Onshore Wind Velocity	U:	ft/sec	16.878	
Overtopping Coefficient	Alpha:		0.700E-01	
Overtopping Coefficient	Qstar0:		0.700E-01	
Overtopping Rate	Q:	ft^3/s-ft	0.000	

(b) Coastal Flooding. The General Plan Safety Element (page 38) also references Figure 25 in Safety Element Technical Background Report Appendix J, to depict "areas that could be affected by coastal flooding caused by a 100-year storm plus

[4] Based on the City's average annualized 12-inch retreat rate (total of 85 feet [h]), over 85 years, and a Monterey Formation dip slope of 20° at the parcel (after CSA, 2012).

the effects of a 55-inch increase in sea level." (Technical Background Report, page 107/128, Figure 25). Figure 25 depicts, in a blue band, an illustrative 100-year coastal flood inundation area (under Year 2000 baseline conditions) that extends landward, when compared to the parcel topographic survey map (CSA, 2012), to elevations near 51-52 feet MLLW (i.e., near the upper termination [edge] of the surveyed coastal bluff on the parcel). Figure 25 further depicts, in an adjacent dark blue band, "future areas predicated for inundation by a 100-year coastal flood under a scenario of a 1.4-meter (55-inch) sea rise," that in the area of the subject parcel, when compared to the topographic survey map elevations, extend landward to 53-56 feet MLLW. Neither the Safety Element nor the Safety Element Technical Background Report contain any data or analysis that correlates still water levels or runup associated with a 100-year flood, storm waves, and/or sea level water levels with the current or Year 2100 terrain (topography) in the area of the parcel. As analyzed and discussed in Section 2, below, maximum runup in a 66-inch sea level rise scenario at the parcel by the Year 2100 will be to elevation 27 feet MLLW, 24-27 feet (v) below the erroneously illustrative 100-year flood elevation in a 55-inch sea level rise scenario.

(c) Coastal Bluff Retreat.

General Plan Safety Element (2013) Policy S24 projects an annualized average (coastal) bluff retreat rate of 12 inches, and provides for site-specific technical evaluation of coastal bluff retreat rates and of potential impacts of proposed projects on coastal bluffs.

Table I in our 2012 report addressed an inclusive set of average annualized coastal bluff retreat rates, including (1) 0.8-1.6 inches at the toe of coastal bluff, based on site-specific analysis between 1950 and 2010 that takes into account the landform distention brought on by the 1978 ECDLL landslide and subsequent marine and atmospheric erosional processes, (2) 4 inches at nearby 1837 1/2 ECDDL, but outside the 1978 ECDLL landslide envelope,[5] (3) 8 inches pursuant to the State-certified LCP top (upper termination) of bluff retreat rate, and (4) 12 inches on the basis of the coastal bluff top retreat rate in the then-updated (2011) General Plan, which has subsequently been incorporated in the Safety Element. An annualized average 12-inch coastal bluff top retreat rate thus encompasses the entire set of local coastal bluff retreat rates, including the historic (1950-2010) net retreat at the parcel.

The current project site plan (ABDS, Sheet A0.01, March, 2015) depicts both the Safety Element's projected 12-inch coastal bluff edge erosion line at the end of 75 years (75 feet in 75 years), as well as the line that reflects the State-certified Local Coastal Program annualized average bluff retreat rate of 8 inches (50 feet in 75 years). With the exception of locally minor erosion on the westerly 3-4 feet of the upper coastal bluff face induced by homeless trespass foot traffic near the 1925-

[5] Weaver/Pacific Materials Laboratory, 1978.

1927 ECDLL property line, no change has occurred in or near the upper termination (edge) of the coastal bluff on the parcel since 2012. As described in section 2.1, above, no toe of coastal bluff retreat outside the average annualized range in our 2012 analysis has occurred during the last three years on the parcel.

3.2. CCC Staff-Draft Sea Level Rise Policy Guidance (2013).

California Coastal Commission staff's draft Sea Level Rise Policy Guidance (2013) generally recommends application, for the California coast south of Cape Mendocino (40˚26.4' N, 124˚24.4'W), of the National Research Council's 2012 sea level rise (SLR) estimates of 16.56 inches to 65.76 inches over the time period from 2000 to 2100.[6] Table I, above, contains our quantified analysis of wave runup based on the highest recorded historical ocean water elevation at Santa Barbara and an additional 66 inches (5.5 feet) of sea level rise, which conservatively encompasses Coastal Commission staff's projected 58.7 inches of sea level rise during the 75-year economic life of the house through 2090.

This analysis shows that the maximum wave runup for the 75-year design conditions, with a SLR of 66 inches (5.5 feet), will be to elevation 27.14 feet MLLW. The distinct coastal bluff top (edge) presently occurs at or near elevation 52 feet MLLW on the subject parcel, and projected coastal bluff retreat at the parcel over the next 75 years may result in a coastal bluff edge that is located at or near elevation 65 feet MLLW. Therefore, the upper termination (edge) of the coastal bluff could not physically be overtopped in its location and geometry (including height) by extreme waves, or by wave spray, on a sea level modeled to rise 66 inches (or 5.5 feet) in the Year 2090, or at any time during the regulatory economic life of the project.

3.3. Projected SLR in the draft Fifth Climate Change Assessment of the International Panel on Climate Change (2014).

The International Panel on Climate Change's (IPCC) 5th assessment of climate change (draft, 2014) projects global mean sea level (GMSL) to rise by 0.28-0.98 meters (11-39 inches) by the year 2100. In context, the 5th Assessment report notes (page 4) that regional variations and local factors, including the "complex interrelationships between the geomorphological and ecological attributes of the coastal system," affect local sea level rise. The IPCC's sea level rise scenario range of increases in GMSL are within the sea level rise elevations analyzed in our 2012 report, and therefore not further addressed here.

The IPCC's draft 5th Assessment also notes that beach erosional response to sea level rise "could be more complex" (e.g., based on local bathymetry, lithology, fetch, and wave direction) than the "simple" landward retreat rate of 100 times the vertical rise in sea level posited by Bruun (1962). A simplistic linear application of Bruun's model would result in shoreline retreat in the area of the subject parcel by 550 feet in 2100 (or 66 inches of coastal bluff toe retreat per average year). However, the projected maximum SLR during

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[6] CCC staff has recently announced that a revised draft Sea Level Rise Guidance may be forthcoming in late spring/summer, 2015.

that time raises the mean still water level by 5.5 feet from 4.63 feet MLLW to 10.13 feet MLLW, below the current (2014) toe of the coastal bluff at the rear of the persistent cobble field that occupies the back beach. The landslide-impacted lower Monterey Formation coastal bluff stratigraphy on the parcel will thus not be submerged in ocean water, and hence in the Year 2090 (or the Year 2100) will not be subject to its in-situ dissolving capacity.

3.4. Projected SLR in the US National Climate Change Assessment (2015).

A review of the recent literature on climate-related drivers of coastal change, contained in the US Third National Climate Assessment (May, 2014), notes that while "global average sea level is rising and has been doing so for more than 100 years," "rates of sea level rise are not uniform along U.S. coasts and can be exacerbated locally by land subsidence or reduced by uplift." (Page 582.)

With regard to California, the Third National Climate Assessment indicates (page 585), "(s)ea level has risen approximately 7 inches from 1900 to 2005, and is expected to rise at growing rates in this [21st] century." The Assessment (2014) does not specifically analyze data from the Santa Barbara Channel or the subarea comprised of state tidelands that have been granted to the City. For an unspecified tide gauge on the open Pacific coast north of Pt Conception, the Assessment (2014, page 583) projects sea level rise without ice sheet melting of 0.3-0.7 feet (3.6-8.4 inches) by 2050, and with ice sheet melting, 1.0-1.3 feet (12-15.6 inches). These projected sea level rise increases are within the elevations analyzed in our 2012 report, and therefore not further addressed here.

The 2014 Assessment (page 44 ff.) combines estimated and observed sediment and other proxy data (1800-1890), partly overlapping tide gauge data (1880-2009), and satellite altimeter data (1993-2012) reviewed in technical studies to characterize a range of possible global sea level rise scenarios. The future scenarios, which the Assessment notes are *not* based on climate model simulations, extend to the year 2100 and range from 0.66 feet (~8 inches) to 6.6 feet (~79 inches). The Assessment (2014) summarizes that "Since the late 1880's, tide gauges throughout the world have shown that global sea level has risen by about 8 inches." With reference to North Atlantic Sea Level Change, the Assessment (page 45) indicates that a "new data set shows that this recent rise is much greater than at any time in at least the past 2000 years. Since 1992, the rate of global sea level rise measured by satellites has been roughly twice the rate observed over the last century, providing evidence of additional acceleration."

Table II, below, summarizes GSI's additional wave runup analysis that encompasses the Assessment's (2014) 6.6 feet (79 inches) eustatic (global) sea level rise sea level during the 75-year economic life of the house through 2090. Application of this scenario in the wave runup analysis for the subject parcel identifies a maximum wave runup elevation to 29.1 feet MLLW on the coastal bluff. Such wave runup, or associated wave spray, will not overtop the upper termination (edge) of the coastal bluff, reach, or inundate the finished floor elevation of the proposed residential reuse project, its caisson-grade beam foundation, or its lower (or upper) shear pins.

TABLE II. 6.6 FEET (79 INCHES) SLR RUNUP ANALYSIS AT 1925 EL CAMO DE LA LUZ, SANTA BARBARA

ACES	Mode: Single Case	Functional Area: Wave - Structure Interaction
Application: Wave Runup and Overtopping on Impermeable Structures		

Item		Unit	Value
Incident Wave Height	Hi:	ft	11.200
Wave Period	T:	sec	20.000
COTAN of Nearshore Slope	COT(ø):		44.000
Water Depth at Structure Toe	ds:	ft	13.900
COTAN of Structure Slope	COT(θ):		10.000
Structure Height Above Toe	hs:	ft	40.000
Wave Runup	R:	ft	15.175
Onshore Wind Velocity	U:	ft/sec	16.878
Deepwater Wave Height	H0:	ft	7.121
Relative Height	ds/H0:		1.952
Wave Steepness	H0/(gT^2):		0.000553
Overtopping Coefficient	α:		0.070000
Overtopping Coefficient	Qstar0:		0.070000
Overtopping Rate	Q:	ft^3/s-ft	0.000

Smooth Slope Runup and Overtopping

1925 CAMINO DE LA LUZ

6.6 FEET SLR

4. Regulatory Coastal Bluff Upper Termination ("Edge"): Coastal-Oceanographic Considerations.

City staff in its Preliminary Review Team comments on the preliminary project plans and description (2013) stated the "belief", without site-specific analysis or reference to any data or other documentation, that the edge (upper termination) of the California coastal regulatory program "coastal bluff" on the parcel is located at 127 feet, rather than at or near 52 feet MLLW as surveyed by CSA (2010, 2012) and observed by GSI staff at the site. The following analysis addresses the coastal-oceanographic forces that have sculpted the coastal bluff during historic time (locally, once 1782) in the area of the subject parcel.

(a) The coastal-oceanographic processes that physically control the location of the geomorphological coastal bluff on the parcel make it physically impossible for marine storm waves (including, but not limited to, during ENSO conditions) and/or a tsunami that originates regionally in the Pacific Ocean or locally in the Santa Barbara Channel to: (1) overtop the distinct break in slope that delineates the upper termination (edge) of the coastal bluff at/near elevation 52 feet MLLW, or (2) to reach (run up to) elevation 127 feet (in any datum), and thereby create an elevated second coastal bluff (or upper riser) on the parcel.

(b) As shown on Section A-A' (Exhibit D), the terrain of the 1978 ECDLL landslide, the City's subsequent (1978) excavation, buttress, and debris cover grading, and the present (2015) topography do not exhibit, as the adopted controlling regulation requires, an elevated second coastal bluff that has a "more or less continuous downward gradient of the surface that increases more or less continuously until it reaches the general gradient" of the precipitous coastal bluff (between elevations 11-12 feet and 52 feet MLLW). Rather, between elevation 127 feet (MSL or MLLW) and 52 feet MLLW, the surface along Section A-A' (which is representative of the parcel) consists of differing slopes (respectively from north to south, 90˚ (at 127 feet MSL/130 feet MLLW), and then 31˚, 85˚, 12˚, 24˚, 12˚. 11˚, 29˚ 23˚, 17˚ and 9˚), which plainly do not increase continuously in slope until the surface reaches the laid-back 49˚ slope of the mid-upper coastal bluff face, or the 71˚ slope of the lower bluff face.

5. Recommendations.

We emphasize that our 2012 recommendation for post-project completion coastal bluff conditions monitoring and reporting can, and should be, implemented through electronic filing of the recommended photo-documentation. In it, the southwesterly and southeasterly property corners, and the 25-feet on-center position on the seaward edge of the cobble field serve as the three photo origination points, looking landward (north) towards the coastal bluff. The photo-documentation should be marked with the date and time it was acquired (taken).

We recommend the following in light of (a) current/recent transient trespass on the coastal bluff, and resultant localized erosion of it, and (b) the potential of the remnant path through the contiguous lemonade berry vegetation near the 1925-1927 ECDLL property line to concentrate and direct storm water runoff to the coastal bluff on 1925 ECDLL immediately east of that proper line:

(a) That actions be taken to effectively stop the localized coastal bluff face erosion caused by utilization of the coastal bluff for ingress/egress by transient/homeless persons to and from their encampments in the dense contiguous lemonade berry vegetation.

(b) NE-to-SW oriented water bars should be installed across the north-south path through this vegetation, where it extends along and across the 1925-1927 ECDLL property line, from functioning as a storm water runoff conveyance during large rain storms, with rilling erosional effect on the coastal bluff face.

6. Limitations

Coastal engineering is characterized by uncertainty. Professional judgments presented herein are based partly on our evaluation of the technical information gathered, partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgments have been prepared in accordance with current

accepted standards of engineering practice; we do not guarantee the performance of the project in any respect. This warranty is in lieu of all other warranties express or implied.

Respectfully submitted,

GeoSoils, Inc.
David W. Skelly MS, PE
RCE#47857

EXHIBIT A

UPPER TERMINATION (EDGE) OF A COASTAL BLUFF

Title 14, Cal. Code of Regulations, section 13577(h) defines "coastal bluff" as part of the Coastal Commission's adopted jurisdictional, planning, and regulatory regulation for local coastal program implementation map requirement and boundary determination criteria:

"For purposes of Public Resources Code Sections 30519, 30600.5, 30601, 30603, and all other applicable provisions of the Coastal Act of 1976, the precise boundaries of the jurisdictional areas described therein shall be determined using the following criteria: […] (h) Coastal Bluffs. Measure 300 feet both landward and seaward from the bluff line or edge. Coastal bluff shall mean: (1) those bluffs, the toe of which is now or was historically (generally within the last 200 years) subject to marine erosion; and (2) those bluffs, the toe of which is not now or was not historically subject to marine erosion, but the toe of which lies within an area otherwise identified in Public Resources Code Section 30603(a)(1) or (a)(2). Bluff line or edge shall be defined as the upper termination of a bluff, cliff, or seacliff. In cases where the top edge of the cliff is rounded away from the face of the cliff as a result of erosional processes related to the presence of the steep cliff face, the bluff line or edge shall be defined as that point nearest the cliff beyond which the downward gradient of the surface increases more or less continuously until it reaches the general gradient of the cliff. In a case where there is a steplike feature at the top of the cliff face, the landward edge of the topmost riser shall be taken to be the cliff edge. The termini of the bluff line, or edge along the seaward face of the bluff, shall be defined as a point reached by bisecting the angle formed by a line coinciding with the general trend of the bluff line along the seaward face of the bluff, and a line coinciding with the general trend of the bluff line along the inland facing portion of the bluff. Five hundred feet shall be the minimum length of bluff line or edge to be used in making these determinations."

The City of Santa Barbara has incorporated these criteria in its updated General Plan Safety Element (2013).

EXHIBIT B

At-grade photographs of the back beach and coastal bluff, acquired on March 7, 2015 (Exhibit B1) and March 7, 2012 (Exhibit B2).

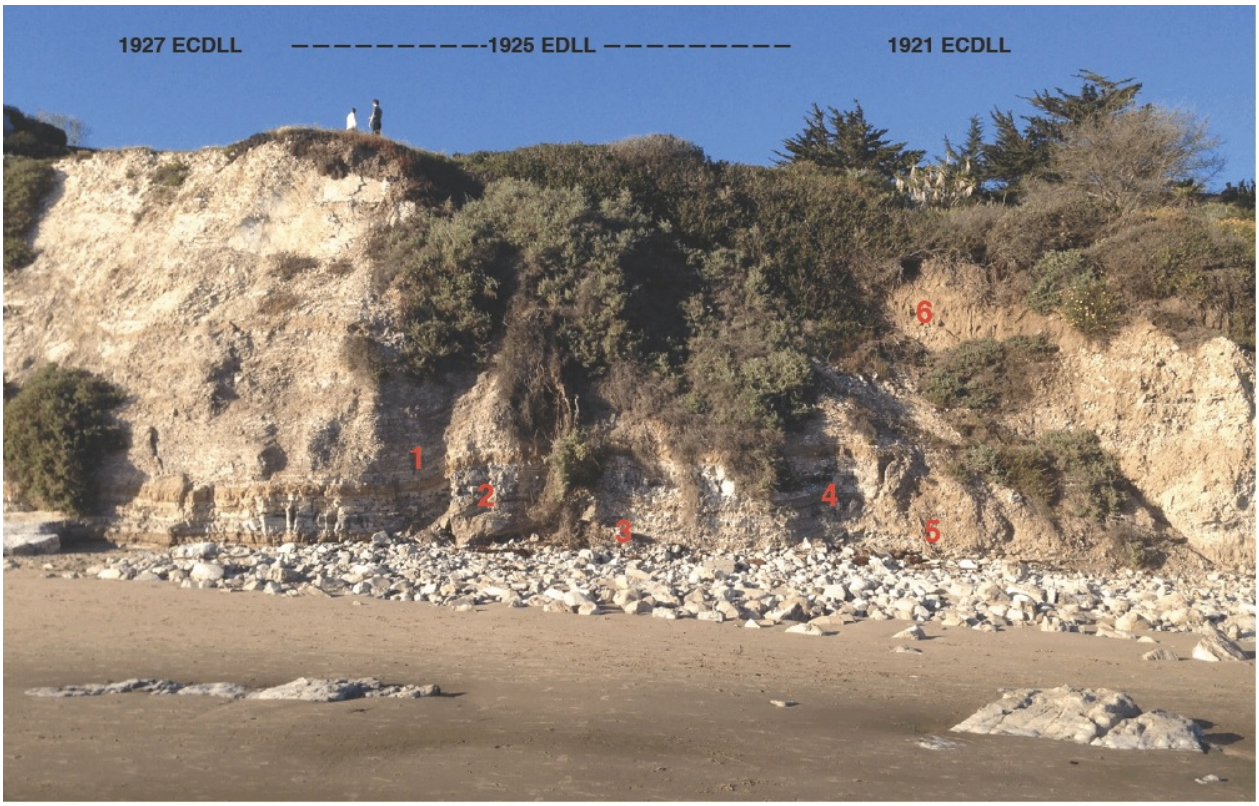


Exhibit B1. Site and adjacent parcels on March 7, 2015.

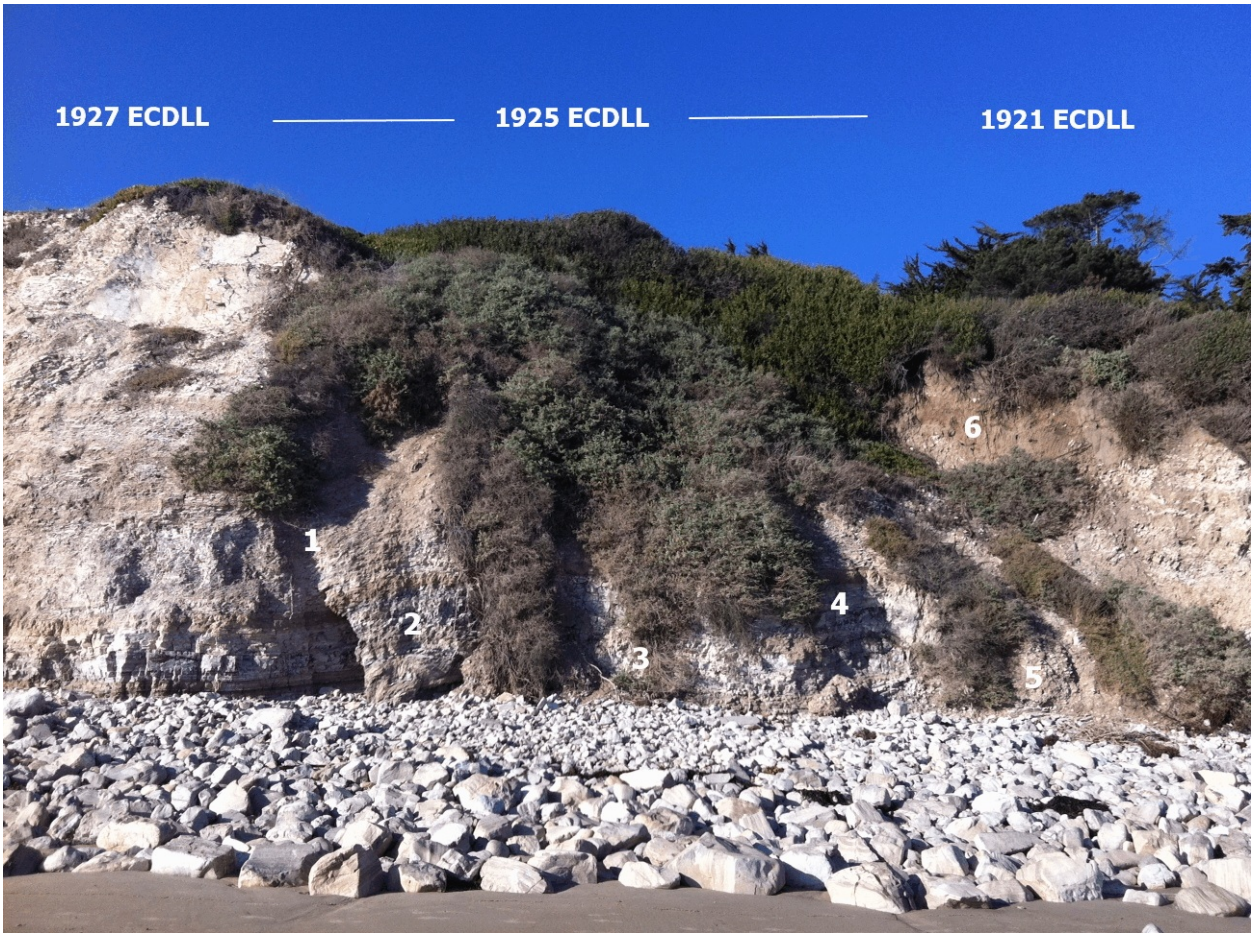


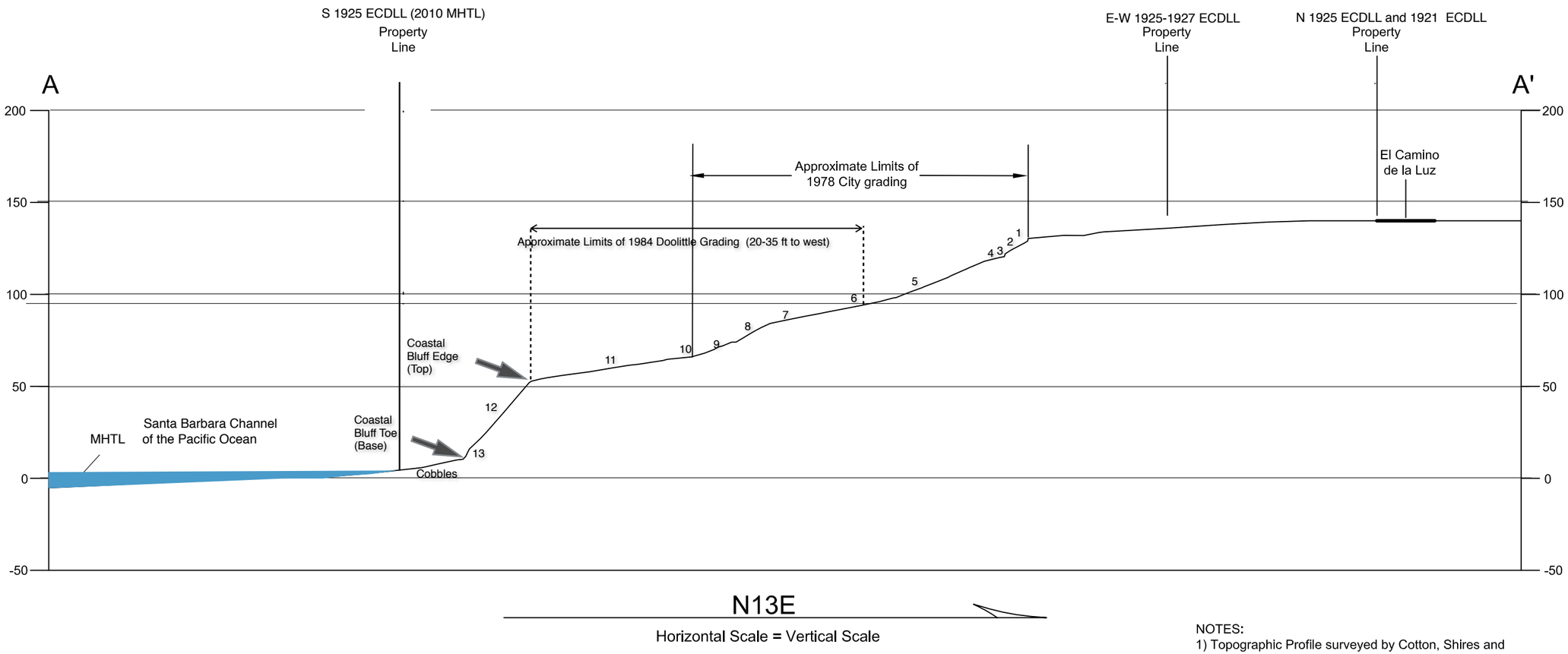
Exhibit B2. Site and adjacent parcels on March 7, 2012.

EXHIBIT C

September 29, 2013 California Coastal Records Project/Adelman & Adelman.

EXHIBIT D

Section A - A’



NOTES:
1) Topographic Profile surveyed by Cotton, Shires and Associates, on April 15 and April 16, 2010.
2) Mean Lower Low Water (MLLW) data obtained from National Oceanic and Atmospheric Administration (NOAA), April 2010 tidal predictions for the Santa Barbara Area.
3) MLLW datum is 2.788' lower than Mean Sea Level (MSL)

NOTES ON SLOPES/GRADIENTS 1-11

1. Rilling eroded slope, 2 feet (v, elevations 128-130 feet MLLW) below relict house entry, turnaround, lower driveway pavement, 90º
2. Scaled and rilling eroded upper City graded (1978) Mesa Trunk Line Sewer buttress, 31º
3. Northerly edge, 2 ft (v) of CSA SD-2 area, 85º
4. CSA SD-2 area on City (1978) MTLS buttress, 12º
5. City (1978) MTLS buttress and excavation area, 24º
6. City (1978) excavation area, 12º
7. City (1978) debris fill cover grading area, 11º
8. City (1978) toe of fill cover grading area, 29º
9. Landslide (1978)-impacted hillside, 23º
10. Landslide (1978)-impacted hillside, 17º
11. Landslide (1978)-impacted hillside (with dense contiguous lemonade berry stand cover), 9º
12. Mid-upper Coastal Bluff, 49º
13. Lower Coastal Bluff, 71º