COUNTY OF SANTA CRUZ	Planning Department

MEMORANDUM

Date: 2/4/2022 Revised 4/25/2022

To: CZU Rebuild Geotechnical Engineers-of-Record

From: Santa Cruz County - Environmental Planning

Re: Guidance for Preparation of Geotechnical Reports for Sites Within Identified CZU Debris Flow Hazard Areas

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This memo provides information and guidance for consideration by engineers preparing geotechnical reports for CZU rebuild sites within identified CZU Debris Flow Hazard Areas as depicted on the County of Santa Cruz Geographic Information System layer “CZU Potential Debris Flow Hazard Areas”.

1. Design for fire rebuilds in designated debris flow hazard areas should include debris flow hazard mitigation recommendations appropriate for the proposed building site. Geotechnical reports submitted to the County under the geologic pre-clearance application must have a signed and stamped *CZU Debris Flow Hazard – Geotechnical Engineer of Record Statement* attached to be accepted in compliance with Santa Cruz County Code (SCCC) Chapter 16.10. The form confirms that the engineer has reviewed this guidance document.

2. Geotechnical reports submitted for projects whose owner opts to take advantage of the CZU Rebuild Directive to waive the requirements of Chapter 16.10 of the County Code do not need to submit the *CZU Debris Flow Hazard – Geotechnical Engineer of Record statement* form. In that case, the geotechnical report will be submitted with the building permit application for review by the Recovery Permit Center for compliance with the California Building Code.

3. Requirement for an Engineering Geologic Report: The County determines when a geologic report is required through the pre-application Geologic Hazard Clearance process. If the County geologist determines that a geologic report is not required for the proposed rebuild, that does not preclude an engineer of record from requesting a geologic report be prepared in addition to their geotechnical report. The project geotechnical engineer is responsible for providing appropriate debris flow design recommendations that can be used by the project civil or structural engineer in preparing debris flow mitigation design, per the California Building Code.

4. The debris flow design should consider both fire-related and non-fire-related debris flow hazard. The areas designated as debris flow hazard areas lie in potential debris flow channels or on debris/alluvial fans made of up multiple older debris flow deposits. Consequently, debris flows, from any cause, may present significant life-safety risks at these sites and should be considered in geotechnical report debris flow mitigation recommendations.

5. Geotechnical engineers of record for projects within identified CZU Debris Flow Hazard Areas should review the Post-Burn Risk Analysis, CZU Lightning Complex Fire by Atkins – SNC - Lavalin, (Atkins Study) dated 8/31/2021, commissioned by the Community Foundation Santa

Cruz County. The Atkins Study model that was prepared to help evaluate debris flow risk in the CZU burn area is a standard HEC-RAS flood study that incorporated a 1.5x bulking factor to model the effect of up to 30% sediment content in the runoff from burn areas. The study provided flow depths and flow velocities over topography derived from a 2020 Lidar survey of an area that includes the burn scar. The Atkins Study model may underestimate flow thicknesses and velocities for higher sediment content flows. Modelling of higher sediment contents requires modelling runoff using non-Newtonian fluid dynamics, which was not part of the Atkins Study. In addition, the Atkins Study was intended to model the mechanics of fire-related debris flows and not landslide generated debris flows. See Atkins Study text for a discussion of the limits and assumptions of the modelling study.

6. The Atkins Study model is a useful index for evaluating the likely path, thickness, and velocity of debris flows within or adjacent to drainage channels subject to debris flow hazards. However, given the nature of the model, it is recommended that some safety factor be incorporated into the debris flow design. It should be noted that the Atkins Study model does not include thickness and velocity information for debris/alluvial fan surfaces adjacent to primary debris flow paths (referred to as "Uncertain Debris Flow Paths" in the Atkins Study); in these areas the geotechnical engineer of record should make an independent site-specific evaluation of likely debris flow thicknesses and velocity to develop mitigation recommendations. Note: The uncertain debris flow paths were included in the debris flow hazard areas because they encompass areas interpreted to be underlain by older debris flow deposits and may be subject to debris flow inundation in extreme events or in cases where the primary flow paths are occluded in a way that forces debris out onto the adjacent fan surfaces.

7. In addition to the qualifications on the debris flow model results discussed above, there is a potential in any debris flow for large objects such as tree trunks, very large boulders, and cultural artifacts to be inculcated into the debris flow. These objects have the potential to impact structures and to plug natural channels and culverts, diverting the flow away from natural channels. These effects should be included in any geotechnical debris flow mitigation recommendations.

8. Debris flows can be highly erosive and may cause deep scour in the bottoms and sides of debris flow channels. Debris flow design must also consider the potential for vertical and lateral scour at sites located within primary or uncertain debris flow areas.

9. Any debris flow mitigation design that includes measures to divert the debris flow material must ensure that the design does not divert debris onto adjacent structures or building sites.