



July 10, 2025

PLUS: Permit & Land Use Services LLC
Attn: Marianne Stover
11553 Palatine Ave N,
Seattle, WA 98133
Via: Email

RE: **CA025-005** Review Letter 2; 7615 East Mercer Way, Mercer Island, WA 98040

Dear Ms. Stover,

The City of Mercer Island Community Planning and Development Department has completed a review for compliance with the zoning code, Title 19 of the Mercer Island City Code (MICC) for the above critical area review 2 application. The following issues must be addressed in your resubmission:

Geotechnical Review:

1. The applicant shall address all the comments provided by the City's third-party reviewer attached to this letter. The applicant shall provide a complete response to all comments at the next submittal.

The City's processing of the critical area review 2 application has been put on hold until these issues are resolved. Pursuant to MICC 19.15.110, all requested information must be submitted within 60 days or a request for extension is requested. The deadline for a complete response or request for extension is September 8, 2025. If a complete response is not received or an extension response has not been received prior to that date, the application will expire and be canceled for inactivity. No additional notification regarding this deadline or the expiration of the application will be provided.

Best regards,

Ryan Harriman

Ryan Harriman, EMPA, AICP – Planning Manager
City of Mercer Island Community Planning and Development
Email: ryan.harriman@mercerisland.gov
Phone: (206) 275-7717

Responding and Resubmitting: [Click for More Detailed Instructions](#)

1. Reply to all review comments within the review letter.
2. Update your drawings, and any necessary supplemental documents or forms.
3. Upload updated drawings to the [Mercer Island Permit Submittal Portal](#).

Having Trouble? Please Review the Following:

[Accessing, Reviewing, and Responding to MlePlan Comments](#)

[Troubleshooting MlePlan](#)

[MlePlan Overview](#)

Thank you for your participation in the MlePlan review process.

June 24, 2025

Mr. Ryan Harriman
Planning Manager
Community Planning and Development (CPD)
City of Mercer Island

Re: CAO25-005, SUB 2 Comments

7615 East Mercer Way
Mercer Island, Washington

SUB 1 responses by ESNW, the geotechnical engineer of record, to the SUB 1 review comments were provided in a letter dated June 17, 2025. This letter presents remaining review comments to be addressed. To provide continuity, the original comments are provided along with the responses and new SUB 2 review comments.

Although the reviewer continues to disagree with the foundation design proposed, our review comments on what still needs to be addressed are provided so that an independent third-party reviewer, if requested, has the information needed to conduct their own review.

MI SUB 1 Review Comment 1:

The statement of risk on page 5 of the report indicates: *“The development is so minor as not to pose a threat to the public health, safety and welfare.”* The reviewer does not agree with this statement of risk when the potential impact of failure of the steep slope to the west and potential post-seismic impacts to the property and structure are considered. Please consider an alternate statement of risk available in MICC 19.07.160.B.3.

ESNW Response to Review Comment 1:

In our opinion, based on site conditions and slope stability analyses attached to this report, **“The landslide hazard area or seismic hazard area will be modified or the development has been designed so that the risk to the site and adjacent property is eliminated or mitigated such that the site is determined to be safe” (19.07.160.B.3.b).** As noted in the

Project Description, the new construction will essentially replace the same footprint area as the existing structure and will be of similar height; therefore, no significant increase in loading is expected from the project. Improved drainage controls will improve the overall stability of this site. Further discussion regarding landslide susceptibility is provided in the *Slope Stability Analysis* section of this response.

MI SUB 2 Review Comment 1:

This comment is provided as a placeholder to review the statement of risk following completion of all comments being addressed. An updated statement of risk will be required upon final approval of the building permit plan set.

MI SUB 1 Review Comment 6:

Please show on the slope stability cross-sections the locations and subsurface information (SPT, soil type and groundwater condition) of the borings used to generate the stratigraphy shown on the sections. Please provide discussion on the stratigraphic changes from one section to another and how the groundwater level was determined across the sections.

ESNW Response to SUB 1 Review Comment 6:

Requested information included in updated SlopeW output attached. We updated the soil layers to include additional saturated sandy layers. This analysis does not account for the gradation between layers and related 'fabric' of the soil underlying this site. With respect to groundwater, while the soil logs report groundwater, it is not within a consistent layer or zone on this site, rather, it's reported within the sandier deposits that vary across the slope. The updated SlopeW analysis applies a groundwater condition under the entire slope. Comparing the updated SlopeW analysis to the version previously submitted, it appears that minimum factor of safety (FOS) values are relatively consistent and suggest that, while there may be isolated areas of instability, such as within the slope to the west, global site stability does not pose an increased threat to the property. We applied a relatively thick layer of silty sand soil to the western slope, as a conservative approach given the limited amount of subsurface data. We expect much of the core of this slope to be comprised of dense/hard silt deposits. The slope stability modeling focused on the soil and groundwater conditions under the proposed building. It is acknowledged that soil, groundwater and terrain vary across this site, including the existing DADU. On this basis, in our opinion, the overall stability of the site is acceptable from a geotechnical standpoint. This analysis further supports the use of a structural fill mat and woven geotextile under new

foundations, that will provide a uniform support and help reduce the potential for differential settlement that may cause the building to collapse. As is standard for any site located on a slope, should a maximum credible earthquake event occur and trigger movement, the goal is to prevent structural collapse, while acknowledging that severe damage to the overall site may occur. This is supported by the age of the existing building that was subjected to the Nisqually earthquake in 2001 and shows little to no signs of obvious foundation settlement or displacement. The recommended foundation support approach will provide a significantly more robust and resilient support system for the new building.

MI SUB 2 Review Comment 6:

In the response above, the "...isolated areas of instability, such as within the slope to the west..." will require mitigation recommendations to meet the requirements of the statement of risk provided by the geotechnical engineer. The proposed development should not focus solely on the proposed building, but the entire property, i.e. not only the potential impact of the development on the slope, but the impact of the slope on the development.

The Nisqually earthquake produced lower ground motions than those anticipated with the current IBC earthquake loading used for the design of this project. So although the site response after the Nisqually earthquake "shows little to no signs of obvious foundation settlement or displacement", that response is not indicative of how the site will respond under current IBC earthquake design loading.

MI SUB 1 Review Comment 7:

Please review the soil strength values assigned under seismic loading conditions and provide supporting information for their use. An increase in cohesion while maintaining the same effective friction angle would result in a higher factor of safety against slope instability under seismic loading which would not be expected. Please revise soil strengths and slope stability analyses.

ESNW Response to Review Comment 7:

The local standard for modeling seismic soil conditions includes an apparent cohesion value to account for negative pore pressure and other related soil characteristics in a dynamic loading condition. This is consistent with local standards and based on published recommendations for values, including FHWA.

MI SUB 2 Review Comment 7:

From FHWA-NHI-11-032 (see Reference citation at the end of this letter):

“While there is some limited information to indicate that the shear strength of soil increases with increasing strain rate, the peak shear strength of soil subjected to cyclic loading is generally assumed to be equal to or less than the peak static strength. If the soil is dry, the static drained shear strength may be used. If the soil is saturated, even if the soil is relatively free draining, the undrained shear strength should be used for seismic analyses because of the rapid nature of earthquake loading. For cohesive soils of low to intermediate sensitivity, the static shear strength of the soil may be reduced by 10-15% when subjected to large magnitude earthquakes ($M > 7$) to account for a potential reduction in shear strength due to cyclic loading.”

This FHWA reference does not support the geotechnical engineer of record’s response that use of a higher strength under seismic loading is “consistent with local standards and based on published recommendations for values...”. In reviewing slope stability analyses submitted by local geotechnical engineers for projects on Mercer Island, the use of higher soil strengths under seismic loading is not the standard of practice.

Please revise slope stability analyses to conform to local standard of practice and to the FHWA reference that indicates that “the peak shear strength is generally assumed to be equal or less than the peak static strength”.

MI SUB 1 Review Comment 8:

Unless otherwise determined, it should be assumed that the residence may be impacted by a future landslide since a landslide reached the garage in 1997. Please provide mitigation recommendations. Please consider all types of landslide failures.

ESNW Response to Review Comment 8:

Based on recent information/clarification, it appears the reviewer was referring to the address number along West Mercer Way or some other lot, not the subject site. During review exchanges, there has been some confusion related to which address the event in this comment occurred. In any case, ESNW provides an assessment of potential natural geologic hazards and mitigation recommendations (where applicable) below.

Slope stability modeling attached does not include a slope reduction in horizontal acceleration forces for dynamic loading, which has been identified and discussed in numerous professional publications, including the 2011 FHWA-NHI-11-032 Seismic

Design manual (Chapter 6). This publication provides a clear acknowledgement that a ‘factored’ horizontal acceleration is recommended for slope stability modeling to account for ‘spatial incoherence’ effects. While this approach is not codified, and not included in this response, even a minor reduction in horizontal acceleration results in minimum FOS of 1.1 for the western slope.

Debris Flows

There is a steeply ascending natural slope off the west side of the residence. The most common mode of failure on this slope is related to shallow debris flow, where the upper zone of weathered soil becomes saturated and loses internal strength. This is a common occurrence on similar sloped terrain in the area. The current slope condition is vegetated with a dense understory and mature trees. This condition suggests the slope is stable in the current condition and configuration. No modification is proposed for this slope; therefore, the stability will not be adversely impacted by the project. The current proposal includes enhanced surface and interflow capture and conveyance of water near this slope. A CIP retaining wall will be constructed along most of the western project limits and the new residence will be set back at least 40 feet from the ascending slope. In this respect, no additional mitigation is warranted to protect the new residence in our opinion.

Lateral Spread

While there is a descending slope off the east side of the residence, it is relatively low height and slope stability modeling does not suggest a particularly high susceptibility to lateral spread even with groundwater in the soil layers. Typically, lateral spread occurs where a slope is in direct contact with open water. In our opinion, this risk is low.

MI SUB 2 Review Comment 8:

Please provide the calculation for the slope height reduction factor and the average peak acceleration that takes into account spatial incoherence. Please provide revised slope stability analyses using this average peak acceleration to verify that the FOS is a minimum of 1.1 for the western slope as indicated in ESNW response above.

From the debris flow discussion above:

“This condition suggests the slope is stable in the current condition and configuration. No modification is proposed for this slope; therefore, the stability will not be adversely impacted by the project.”

Although no direct impact of the proposed development on the stability of the existing

slope to the west is anticipated, the impact of the slope on the proposed development must be assessed. Therefore, not only the current condition, but future stability of the slope must be considered. If slope stability analyses indicate unstable conditions (e.g. under seismic loading conditions), please provide mitigation recommendations.

MI SUB 1 Review Comment 9:

Please assess the potential for liquefaction at the site and estimate post-liquefaction settlement, lateral spreading or flow failures as required by IBC using a peak ground acceleration associated with a 2% probability of exceedance in 50 years earthquake. Please include liquefaction assessment calculations, any post-liquefaction settlement calculations, residual strength determinations and associated stability analyses and/or lateral deformation calculations for review.

ESNW Response to Review Comment 9:

Included as an attachment. The groundwater conditions on this slope are highly variable and discontinuous, as are the soil gradations. In this respect, while saturated clean sandy soil that are loose may liquefy, the extent of this phenomenon is expected to be discontinuous across the site and may not adversely impact the overall site response as the estimated magnitude suggests. Based on the soil variability on this site, we would expect the effects of liquefaction to be isolated and variable as well. Therefore, overall site or site global effects would likely be discontinuous.

MI SUB 2 Review Comment 9:

Based on the variability of the soil conditions encountered at the site, worse or better conditions could be expected. This is the unknown associated with the site given the range of conditions encountered in the subsurface explorations. As such, a different conclusion that considers the range of conditions could be made. For example, post-liquefaction differential settlement could approach the maximum estimated post-liquefaction settlement value and that value may be greater if the subsurface explorations have not encountered the worst condition at the site.

Please provide maximum total and differential post-liquefaction settlement estimates so that the structural engineer can assess the potential associated damage and/or life safety issues. Please provide calculations for review to support the post-liquefaction settlement estimates given.

The groundwater conditions in borings B-6 and B-7, located to the west and north of the proposed structure seem to be very similar. The effects of liquefaction indicated for the

B-7 conditions should be considered in the stability analyses. Please provide residual strength estimates for the liquefiable layers for review and include those strengths in revised stability analyses. Please provide an assessment for lateral spreading and/or debris flow failures using these residual strengths. Please provide associated calculations of lateral spreading and/or debris flow deformations. Please include mitigation recommendations for potential post-liquefaction effects. For example, if debris flow failures are anticipated, please determine debris flow volumes and runout and determine whether the proposed structure could be physically impacted by the debris flow. If so, please provide mitigation measures or provide impact loading values for the structural engineer to consider in the structural design. On the downslope side of the residence, please indicate whether lateral spreading or debris flow would undermine the structure and provide mitigation recommendations.

Please provide these results to other project members (e.g. the structural engineer and architect) so that the project team can provide a coordinated design that addresses these deformations without the potential for building collapse.

Please have the structural engineer state potential post-liquefaction settlement and lateral deformations in the design criteria section of the General Notes- Structural Design plan sheet.

Please have the structural engineer provide a statement on the General Notes- Structural Design plan sheet indicating the design approach used to accommodate the estimated post-liquefaction deformations and whether the proposed structural design can withstand these deformations without building collapse.

MI SUB 1 Review Comment 11:

The proposed foundation design as discussed on page 7 of the report, involves the use of shallow foundations “bearing on undisturbed competent native soil, recompacted native soil, or new structural fill.” The recommendation goes on to indicate “Based on conditions observed during the fieldwork, we recommend new foundations be supported on a structural fill mat consisting of at least two feet of crushed rock structural fill placed on a woven geotextile (Mirafi 500X or approved alternative) that is underlain by a firm subgrade.” It is the opinion of the reviewer that the reported site conditions do not warrant the use of shallow foundations for support of the proposed structure. On page 3 of the report, “Native soils observed at the exploration sites chiefly consisted of loose to medium dense colluvial and ancient landslide deposits that were characterized as sand (USCS: SM, SP-SM and SP) and silt (USCS: ML) ... The upper soils were described as colluvium due to chaotic texture and the presence of organic debris.”

Reviewing logs for borings B-6 and B7, the thickness of what would be considered unsuitable soils for support of shallow foundations extends at least 25 feet below existing grade. Floating shallow foundations on landslide debris is not considered in conformance with the local geotechnical engineering standard of practice. Due to the “chaotic texture and presence of organic debris” it is unrealistic to accurately estimate foundation settlements over the lifespan of the structure. In addition, the presence of potentially liquefiable soils could result in post-earthquake differential ground surface settlement and/or lateral spreading or debris flow failure. These post-earthquake effects could significantly impact the structural integrity of the proposed structure. The associated life safety issue would require mitigation recommendations before a building permit could be approved.

Since the reviewer’s opinion on the appropriate foundation design for the structure differs significantly from the geotechnical engineer of record, an independent third-party review can be requested by the applicant. Please contact the Mercer Island Building Official (gareth.reece@mercergov.org).

ESNW Response to Review Comment 11

Based on review of the soil logs in borings B-1 and B-2, which are the closest explorations within the building footprint, soils are reported to consist of non- to slightly plastic silt (USCS: ML). While conditions reported at locations B-6 and B-7 are texturally different than those in B-1 and B-2, in our opinion, the difference does not pose an elevated risk for long term settlement, particularly since the existing house foundations show no unusual signs of settlement and have been in service since 1970. The new house will occupy a similar footprint and will not impose significant additional loading. Our recommendations and analysis recognize the diminished depth of foundation loading that occurs within a soil column below foundations. A simple calculation suggests the new building will impose approximately 250 psf new loading on the soil beneath the foundations. Within a depth of about 4B (where B = footing width), the additional loading on soil is 10 percent of the foundation load, predicted using the Boussinesq pressure calculations. The structural fill mat will effectively reduce or otherwise attenuate potential differential settlement and provide a uniform support conditions for this lightly loaded structure. It is important to recognize that foundation loads decrease with depth; therefore, while there are looser soils at depth on this site, the actual increase in loading from the new building is very low and diminishes with depth. This analysis further supports the use of a structural fill mat and woven geotextile under new foundations, that will provide a uniform support and help reduce potential for differential settlement that may cause the building to collapse. As is

standard for any site located on a slope, should a maximum credible earthquake event occur and trigger movement, the goal is to prevent structural collapse, while acknowledging that severe damage to the overall site may occur. This is supported by the age of the existing building that was subjected to the Nisqually earthquake in 2001 and shows little to no signs of obvious foundation settlement or displacement. The 'chaotic' nature of soil deposits on this site will tend to attenuate dynamic forces in a larger aerial context compared to continuous zones of different soil types. The recommended foundation support approach will provide a significantly more robust support for the new building. This approach has been approved for use on many residential projects in the Puget Sound in settings that present high liquefaction hazard and is considered an adequate form of mitigation for protecting foundations and reducing differential settlement to preserve life-safety. Our analysis acknowledges that there are zones of soil on this site at depth that may be susceptible to liquefaction and potential instability in the design earthquake event and the approach provides a viable alternative mitigation to approaches such as pile support or other deep foundation systems.

MI SUB 2 Review Comment 11:

The foundation mitigation proposed must meet the requirements of MICC 19.07.160.B.3. Otherwise, the statement of risk required from the geotechnical engineer of record for building and critical area permit approval cannot be made.

Since the reviewer's opinion on the appropriate foundation design for the structure continues to differ significantly from the geotechnical engineer of record, an independent third-party review can be requested by the applicant. Please contact the Mercer Island Building Official (gareth.reece@mercergov.org).

ESNW comment:

Plan Review

As part of this response preparation, the referenced submittal plans were reviewed and conform to the recommendations provided by ESNW during the design process. During the design process, cast-in-place retaining walls were developed for portions of the east and west sides of the project are to provide more useable space. The retaining walls range in height up to about five and one-half feet (exposed). The wall proposed along the western edge of the project will require excavation into a natural, moderately inclined slope (outside regulated steep slope hazard areas). ESNW provided sloped earth pressures to the structural engineering consultant for design purposes and those values

are reflected in the current submittal package.

MI SUB 2 Comment:

Reviewing the structural calculations provided, the active lateral earth pressure used in the wall design appears to be 29.6 pcf rather than the 49 pcf indicated on the structural drawing, Sheet S1.0. The 49 pcf appears to be included incorrectly as a 49 psf uniform surcharge load. The 49 pcf loading should replace the 29.6 pcf loading used in the calculations. Please revise structural calculations and resubmit for review. Please modify structural wall design as needed.

Please note that there are additional review comments included in the building permit (2503-130) review that have not been addressed in the June 17, 2025 response letter from ESNW. Those additional comments should be addressed in responding to the building permit review comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Michele Lorilla". The signature is fluid and cursive, with a long horizontal stroke at the end.

Michele Lorilla, P.E.

City of Mercer Island

Geotechnical Engineering Peer Reviewer

REFERENCE:

FHWA-NHI-11-032, August 2011 (Rev1), LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations, NHI Course No. 130094 Reference Manual, Geotechnical Engineering Circular No. 3.