CITY OF GEARHART

Staff Report

For City Council Meeting - 10/5/2022

Subject - Visitors - Civil West Engineering - Chris Janigo - SRAMP Q&A

Synopsis: Civil West Engineering penned the City's Seismic Resiliency and Mitigation Plan (SRAMP) along with the update to the City's Water Conservation Plan, which is scheduled to be presented to Council in November. Chris Janigo is attending the Council meeting, available for Council questions and/or concerns. He is the Project Manager for Civil West. The Council has seen the plan with a May date. A few minor edits have been made and noted on the attached document. Additionally, public correspondence comments submitted right before the September Council meeting have been addressed and are attached. The plan itself is on the agenda for adoption under old business. Chris wanted to be available to the Council prior to plan adoption.

Recommended Motion: N/A

Legal Analysis: N/A

Financial Analysis: N/A

Respectfully Submitted,

Chad

Seismic Resiliency & Mitigation Plan FINAL EDITS

MAY 2022 VS. NOVEMBER 2022

PAGE 10

BEFORE: 2.2.2 Liquefaction (last sentence)

Low lying areas where the ground is completely saturated ~~pose a higher risk of liquefaction. Areas below 50 ft consisting of dense saturated sand also displayed characteristics of not being susceptible to liquefaction~~. (James K. Maitland)

AFTER:

Low lying areas where the ground is completely saturated consisting of loose sandy soils pose a higher risk of liquefaction. (James K. Maitland)

PAGE 11

BEFORE: 2.2.5 Subsidence (last sentence)

There is a higher probability of land movement for properties adjacent to waterbodies such as Neacoxie Creek and Neawanna Creek which may suffer from subsidence due to saturated soils.

AFTER:

There is a higher probability of land movement for properties adjacent to waterbodies, wetlands and drainages such as Neacoxie Creek and Neawanna Creek, which may suffer from the compounded effects of subsidence and liquefaction due to saturated soils.

PAGE 13

BEFORE: 2.3.1 Water Supply / Sources, Groundwater Source (1st pp)

There are 8 drilled wells implemented within the system with pumping equipment with a total of 14 permitted. (Chris R. Hyatt, RG, LHG,)

AFTER:

The City has 8 wells drilled with approval of potentially 16 wells in the well field area. Eight wells are implemented within the system with pumping equipment. (Chris R. Hyatt, RG, LHG,) *note – the 16 is incorrect and will be changed back to 14; otherwise this sentence remains the edited version

PAGE 14

BEFORE: 2.3.1 Water Supply / Sources, Ground Water Intake and Storage

Ground Water ~~Intake and~~ Storage

AFTER:

Ground Water Storage (heading title amended, and the entire

paragraph was moved to the bottom of the section – no other changes)

PAGE 15

BEFORE: 2.3.2 Water Treatment Plant (1st pp)

…standards were upgraded. It is recommended the City hire a structural engineer to review the construction plans and the codes that were applied at the time of construction to assess what retrofits may be necessary to get the facility up to current code.

AFTER:

…standards were upgraded. The City's one-half million-gallon concrete clearwell is situated on the west side of the water treatment plant under public tennis courts. It is recommended the City hire a structural engineer to review the construction plans and the codes that were applied at the time of construction to assess what retrofits may be necessary to get the facility up to current code.

ADDITIONAL EDITS

As noted in the attached responses to Shultz's September Late Correspondence comment…

September 5, 2022

Dear Gearhart City Hall:

Following are my comments on the Seismic Resiliency and Mitigation Plan to be discussed at the September 7 City Council meeting. I've commented only in areas where I have expertise, which relate to the tsunami inundation and evacuation maps and their interpretation, and the City's tsunami hazard overlay zone and related ordinances.

There are several basic errors in this document, relating to the elevations of tsunami inundation in Gearhart and the content of Gearhart's ordinance relating to the Tsunami Hazard Overlay Zone. These are easily verified by reference to the DOGAMI inundation maps and the Gearhart's ordinance text.

I believe that the document should not be approved until these errors are corrected. Approval without correction makes Gearhart's City Council and staff look like it does not know the content of its own city ordinance, the elevation of its own optional assembly areas, or how to read and interpret its own tsunami inundation map.

Following are detailed comments referenced to the page of the document.

Sincerely,
Stewart Schultz
140 NW 20th
Rockaway Beach, OR

== Schultz comments follow

The text and legend in Figure 2-1 are not readable because the resolution is too low. Figures need to be re-inserted in full resolution in order to have any information value to the reader. Figure 2-1 moved to end of document and referenced as Attachment A for better resolution.

p. 7 *"CSZ megathrust events generated along the boundary between the subducting Juan de Fuca plate and the overriding North American plate."*

This is not a sentence. edited, by removing "d" in generated

p. 8 *"The potential for a CSZ earthquake has an estimated probability of occurrence off the Oregon Coast on the order of 16 to 22 percent over the next 50 years."*

This statement is incorrect, as it does not include the probability of a southern event (including southern Oregon coast), which brings the total probability up to over 35 percent. Also "on the order of" is incorrect, as it means mathematically within an order of magnitude, a concept inapplicable here. Also, the word "potential" is meaningless.

The statement should be corrected to read *"A full-rupture CSZ earthquake has an estimated probability of occurrence of 16 to 22 percent over the next 50 years."* *Revised and sited to an Oregon Emergency Management Report*

p. 8 *"The prepared inundation limit by the City has been established at 49 feet above sea level."*

This is incorrect and confused. Nowhere in city ordinances has an elevation of 49 feet been established or stated as any kind of flood limit or standard. Gearhart has a Tsunami Hazard Overlay Zone which is equivalent to the DOGAMI Tsunami Hazard Zone which extends up to 80 feet elevation at the oceanfront of Gearhart, and up to 60 feet elevation inland. This is clear in Figure 2-3 in the document.

Gearhart additionally has a Prohibited Uses clause in Section 3.1450 of the city ordinance which restricts certain uses below the inundation of the "L" event scenario as mapped in the Tsunami Inundation Map Series. *"In areas identified as subject to inundation from the "L" magnitude local source tsunami event as set forth on the Tsunami Inundation Map Series (TIMs), the following uses are prohibited:"* (THO-3, Gearhart city ordinance)

The prohibited use limit is therefore not defined by any elevation, rather it is defined by the limits of the "L" flood event, which has a different elevation in different areas of the city, and nowhere is it 49 feet. At the oceanfront it ranges from 59 to 62 feet, and inland from 36-40 feet depending on the location. This is clear from the inundation map, and from Figure 2-3 in the document, which shows the "L" event (dark mustard color) as flooding to 60 feet at the oceanfront, and 40 feet inland.

Therefore the statement should be corrected to read *"The prohibited use limit by the City has been established at the L inundation scenario"* or something similar and any references to "49" feet should be eliminated as this elevation does not exist in Gearhart city ordinance or in any "L" flood limit in any DOGAMI analysis of Gearhart.

The elevation of 49 feet is used due to the City optional assembly area per the green delineation outline in the Seaside and Gearhart, Oregon Tsunami Evacuation Map. This was specifically lowered per City request on earlier draft to establish the prepardness elevation applicable to the assembly areas. The green delineation on the Evacuation Map overlays in line with the 49 ft elevation per elevation datum NAD83, which is based on mean sea level.

49 ft elevation is not referencing a DOGAMI hazard area or land use Prohibited Use Clause. It is specific to the City of Gearhart's preparedness level for mitigation against an CSZ event.

p. 9 *"Current research indicates the region is "past due" based on historic and prehistoric recurrence intervals documented in the ocean sediments."*

This is an incorrect statement. First, the purpose of this document is to prepare for a magnitude 9 or full-rupture CSZ earthquake. The recurrence interval for a full-rupture earthquake is roughly 500 years. The last full rupture event was in 1700, therefore if the recurrence interval is the average of 500 years, the next would be predicted to occur in 2200. An earthquake predicted to occur in 2200 is not
"past due," it is due in roughly another 200 years.

Second, even if we consider a partial (southern) rupture event, the statement is still not true. This is because an earthquake is "due" at the 50% probability level. A partial rupture event has a probability of 35% in the next 50 years. Therefore, a partial rupture event is "due," statistically, in over 50 years. An event due in over 50 years is not "past due."

To understand this better, consider a different context: we do not say that an 80-year-old woman is "past due for death" even though the average female longevity when she was born was less than 80 years. The average 80-year-old woman in the US lives for another 9 years; i.e. the probability of death in 9 years is 50%. She is not "due" for death, statistically, for another 9 years. Similarly, the probability of another CSZ event in 50 years is 35%, indicating that another CSZ event is not due, statistically, for more than 50 years. Or, stated differently, the probability of death, conditional on being alive and female at age 80, is 50% in nine years. And, the probability of a partial rupture CSZ earthquake, conditional on being quiescent for the 322 years since 1700, is 35% in 50 years.

Therefore, for the earthquake considered in this document, we are not "past due" in any sense of the word. I realize that

pregnant" but these people are not statisticians and do not understand the concept of conditional probability.

The correct sentence should read *"Current research indicates the region is due for another event in approximately 50 to 200 years"*. The phase "past due" is commonly used, no correction advised.

p. 10. Why does this report reference the "proposed Police/Fire station" in the Highlands in its discussion of liquefaction? This site is outside Gearhart city limits, outside the legal boundaries of the area covered in this document. Further, there have been many "proposed" locations of the station, within city limits, with liquefaction risk already estimated for them in submitted City geologic reports. Why not refer to those, rather than a location outside city limits? Further, there was no analysis done in that geotechnical report to conclude there was no liquefaction risk at that site; the author simply stated that in his experience the ground surface of a site such as this is rarely if ever water saturated, and more detailed study is necessary to know for certain at this particular location, including wells monitored during the winter rainy season. There are many hardpan areas just below the surface at this site that cause standing water into the summer season. Information was directly referenced, no declarations were stated. The statement cited is applicable to many areas consistent with the condition "Low lying areas where the ground is completely saturated consisting of loose sandy soils pose a higher risk of liquefaction." No correction needed as this is a textbook phrase describing soil mechanics

p. 11 It is not true that "Subsidence" is an issue additional to the tsunami inundation maps. The maps take the estimated subsidence into account in calculating the flood elevations. All the issues in section 2.2.5 have already been taken into account in the DOGAMI tsunami inundation maps. The document's audience is intended for the general public. It is worth educating the average person what subsidence means, and what is expected after an event. Though taken into account, the DOGAMI maps do not provide information about the permanent subsidence of an area.

p. 11 *"The optional high ground areas will be able to endure a "L" tsunami up to 49 ft above mean sea level."* No correction advised as this is an established preparedness level by the City based on the evacuation map and does not correlate to the "L" Tsunami elevation range. The elevations used below at 41-46 ft elevation suggests an out of date NGVD29 Datum instead of the current standard NAVD84 datum for mean sea level, but I think we are close to the same understanding. In both case, these are arbitrary numbers for a preparedness gathering elevation and thus should not stop people evacuating once they reach the 41-46 ft elevation. 49 ft elevation is a more accurate and conservative arbitrary elevation and still meets the City's outlined green optional evacuation elevation delineation per mean sea level. We are using mean sea level instead of NAVD84 due to the general public as the audience. 0 foot level is not a datum.

This statement is wrong and incoherent. The datum in all the maps is the 0 foot level, not mean sea level. The elevation of the "L" tsunami is different in different areas in Gearhart, roughly 60 feet at the oceanfront and 40 feet inland. And the areas dry in an "L" tsunami are above this elevation not "up to" the elevation. The correct statement should be: *"The optional high ground areas will be able to endure an "L" tsunami, which floods to approximately 60 feet above the 0 datum at the oceanfront and 40 feet inland from the first dune ridge"*. Nowhere in Gearhart does the "L" tsunami flood to 49 feet, and nowhere in City ordinance is an elevation of 49 feet mentioned. Also worth pointing out that this is the estimated mean tsunami height in theoretical models. The tsunami from a real "L" earthquake could be anywhere from 20 feet to over 100 feet in wave height.

Also, the optional assembly areas in Gearhart are not above 49 feet elevation as stated here. The City GIS shows the LIDAR elevations of each assembly area. The LIDAR elevations of the four optional assembly areas in Gearhart are 46, 41, 41, and 46 feet elevation above 0, clockwise from Gearhart Lane. None of the optional assembly areas are above 49 feet elevation. They of course do not need to be above 49 feet to be above the "L" tsunami, because the "L" tsunami floods only to about 36 to 40 feet over most of Gearhart, as can be easily seen from the DOGAMI inundation map.