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RECEIVED

FEB 02 2016

City of Beaverton  
Planning Services

February 2, 2016

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## VIA EMAIL

Ms. Mimi Doukas, Chair  
City of Beaverton Planning Commission  
The Beaverton Building  
12725 SW Millikan Way  
Beaverton, OR 97076-4755

**Re: South Cooper Mountain Application; File Numbers CU2015-0006, DR2015-0071,  
LD2015-0013, TP2015-0008 and ZMA2015-0006  
Response to Radon Issue**

Dear Ms. Doukas and Members of the Beaverton Planning Commission:

This office represents the Applicant, West Hills Development ("West Hills"). I am writing to respond to the issue raised at the January 20, 2016 public hearing regarding radon.

Prior to the close of the public hearing, Mr. Squires raised the general issue of radon. He asserted that development of the site would release radon into the ground water and that radon presents a general hazard to the public.

First, his issue is unrelated to the approval criteria for the South Cooper Mountain application and he did not cite any approval criterion during his presentation. Accordingly, his issue has no basis for decision making by the Planning Commission.

Second, **Exhibit 1** to this letter is a letter dated February 1, 2016 from Mr. Scott Hardman dispelling the concern about radon on this site. Mr. Hardman, a registered engineer in the state of Oregon, explains that the site has normal soil conditions and is not expected to cause an unusual release of radon.

Finally, **Exhibit 2** to this letter is a letter from Tualatin Fire and Rescue District ("TFRD") dated June 18, 2015 concludes that radon is not expected to be a hazard at this site.

The Planning Commission can find that substantial evidence is contrary to that presented by Mr. Squires and, in any event, the issue is unrelated to approval criteria for this application.

I have asked Ms. Monsalvé-Freund to place this letter in the official Planning Department file for this application and before you at the continued hearing on February 3, 2016.

37165-0056/129713338.1

Ms. Mimi Doukas, Chair  
February 2, 2016  
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Very truly yours,



Michael C. Robinson

MCR:rsr  
Enclosures

cc: Ms. Sandra Monsalvé -Freund (via email) (w/encls.)  
Mr. Dan Grimberg (via email) (w/encls.)  
Mr. Mike Peebles (via email) (w/encls.)  
Mr. Glen Bolen (via email) (w/encls.)  
Mr. Don Hanson (via email) (w/encls.)  
Mr. Scott Hardman (via email) (w/encls.)  
Ms. Miriam Wilson (via email) (w/encls.)

February 1, 2016  
HGSI Project No. 15-1827

Dan Grimberg  
**West Hills Development**  
735 SW 158<sup>th</sup> Street  
Beaverton, Oregon 97006

Submitted digitally (pdf format); hard copies can be mailed on request

Subject: **GEOTECHNICAL CONSULTATION REGARDING RADON GAS  
SOUTH COOPER MOUNTAIN HEIGHTS  
BEAVERTON, OREGON**

At your request, Hardman Geotechnical Services Inc. (HGSI) provides this brief consultation regarding radon gas. We understand concerns have been expressed regarding potential impacts of the proposed project on the generation and migration of radon gas in the area. HGSI previously performed a geotechnical investigation for the project; results of that study are presented in our geotechnical report (HGSI, 2015).

The project site and surrounding areas are underlain at depth by the Boring Lava lithologic unit which consists of basaltic and basaltic andesite lava flows erupted from a series of local volcanic vents during Plio-Pleistocene time (about 600,000 to 2.6 million years ago) (Madin, 1990; Ma et al., 2012). The upper surface of the bedrock unit is generally weathered to clayey silt to silty clay "residual soil." In turn, the weathered basalt bedrock and residual soil materials are generally overlain by a more recent silt unit.

Basaltic bedrock materials are known to generate radon gas. In bedrock aquifers, radon gas can be present in the water in either a dissolved or gaseous phase. Radon gas can become a significant health hazard in homes, within basements or poorly ventilated crawlspaces where the gas can accumulate. Homes constructed under the current building code must be built with ventilation systems to prevent the accumulation of radon gas. All new homes within the proposed development will be constructed with radon ventilation systems in conformance with 2014 Oregon Residential Specialty Code (ORSC), Appendix F.

While radon gas can migrate through the soil profile, the zone of gas migration is generally limited. Radon gas will tend to migrate through the soil profile in response to changes in gas concentration, a very slow geologic process. As the gas migrates, some of it is taken back into the soil by a process known as adsorption. The processes in soil controlling the final entry of radon to indoor environments take place in the "zone of influence," defined as the soil within which vapor transport is governed by a lower air pressure inside the building. Although the complex transport mechanisms occurring in this soil zone are not fully understood, the depth of the advective zone of influence is reported to range from about 3 to 6 feet below a building (USEPA, 2004; 2005).

Local water wells are generally several hundred feet below the ground surface. The proposed development is located a sufficient distance away from existing aquifers and homes that potential impacts to the occurrence and migration of radon gas will in our opinion be very low to nonexistent. It should be noted that the

February 1, 2016  
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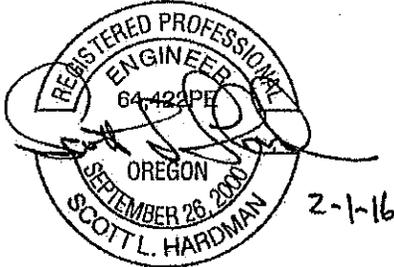
potential for radon gas at the site is no greater than surrounding areas, and much of the Portland metro area. The occurrence of radon gas is not unusual, is considered in development and can be mitigated by adhering to current building codes.



We appreciate this opportunity to be of service.

Sincerely,

**HARDMAN GEOTECHNICAL SERVICES INC.**



EXPIRES: 06-30-2017

Scott L. Hardman, G.E., P.E.  
Principal Geotechnical Engineer



**REFERENCES**

Hardman Geotechnical Services Inc. (HGSI), 2015, Geotechnical Engineering Report, South Cooper Mountain, SW Scholls Ferry Road and SW 175<sup>th</sup> Avenue/Roy Rogers Road, Beaverton, Oregon; consultant report dated May 27.

Ma, L., Madin, I.P., Duplantis, S., and Williams, K.J., 2012, Lidar-based surficial geologic map and database of the greater Portland, Oregon, area, Clackamas, Columbia, Marion, Multnomah, Washington and Yamhill Counties, Oregon, and Clark County, Washington, 2012: Oregon Department of Geology and Mineral Industries Geological Map O-12-02.

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

United States Environmental Protection Agency (USEPA), 2004, User's guide for evaluating subsurface vapor intrusion into buildings: Washington, D.C. 20460.

USEPA, 2005, Review of recent research on vapor intrusion: Washington, D.C.



June 18, 2015

RE: Aquifer and Radon Questions with Staff Response

Dear Eric:

You recently posed several questions to the Commissioners regarding radon and the District's aquifer storage and recovery (ASR) facilities. The following memo provides a brief background and response to your questions. I would be happy to meet with you to follow up on these or other related questions you may have on radon, or the District's aquifer storage and recovery (ASR) facilities in general.

**1) Was radon noted in the aquifer?**

Yes, radon has been detected in water tested at our Grabhorn ASR site on Cooper Mountain but only at relatively low levels since TVWD began collecting data back in 2010. This is common for the geology of the Pacific Northwest, in general, and specifically the Cooper Mountain area since this is a volcanic-rock aquifer dominated by basalt formations. Results from testing of recovered ASR water have ranged from approximately 200 to 600 picocuries per liter (pCi/L) with an average result of 411 pCi/L. To provide some context to these values, recently published data from the United States Geological Survey (USGS, 2011) indicate that this is a common occurrence across the United States within similar aquifers, with the highest results exceeding 1300 pCi/L. In addition, data from Portland's Columbia South Shore Well Field in 2012 indicated an average radon detection of 370 pCi/L.

**2) Does the gas absorb in the water?**

Radon may be present in either a dissolved or gaseous phase in water pumped from the aquifer during ASR operations. This depends on a variety of factors, such as the levels historically noted in the aquifer before ASR activities began, how long water is stored in the aquifer before being pumped out and how long pumping operations last, to highlight a few examples. In short, radon will transition between either phase in water within the aquifer and conversely, can be decreased relatively quickly through aeration once the water is no longer confined (i.e., when it becomes exposed to the atmosphere).

**3) Might the gas be displaced by the aquifer into nearby homes?**

The short answer to this question is that the District has no information to suggest that ASR recharge contributes to radon release into nearby homes. As I'm sure you are aware, radon can be a considerable risk within a home but this is a result of the natural breakdown of radioactive material, specifically uranium, in the ground beneath a home rather than gases originating from the aquifer itself.

It's important to note that ASR activities on Cooper Mountain occur several hundred feet below the surface, within a confined aquifer bounded by geologic materials that restrict groundwater movement. In turn, this restricts the possibility of displacing radon into the surrounding

Aquifer and Radon Inquiry

06/18/15

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atmosphere. To that point, the Copper Mountain area is considered low to moderate risk based on data collected from indoor air quality. More information on this topic along with some useful interactive maps can be found on the Oregon Health Authority's site at the following link:

<https://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/RadonGas/Pages/zipcode.aspx>

The District plans on continuing the monitoring efforts for radon to further the understanding of its occurrence within the aquifer and the subsequent impact to ASR operations. In fact, TVWD staff has already budgeted for additional assessment and consultation services specifically for this topic in the 2015-2017 Budget. While the data collected over the past several years indicates that radon levels are relatively low in comparison with other similar aquifers, the District continues to be committed to delivering the highest quality water to our customers.

I appreciate your inquiry regarding this important and complex topic. Please let me know if you have any additional questions or would like to discuss this topic in even greater detail. I can be reached at 503-848-3019 or [joel.cary@tvwd.org](mailto:joel.cary@tvwd.org). I would be happy to sit down with you and explain our radon monitoring efforts and the results that we've seen to date.

Sincerely,

Joel A. Cary  
Water Quality Technician

Cc: John Tyner  
Mark Knudson  
Peter Boone  
Frank Reed