

CLEARWATER HYDROLOGY

Consultants in Hydrology
and Water Resources

Watershed Management

Stream and Wetland
Restoration

Wetland Delineation
and Permit Acquisition

Stormwater Drainage
and Flooding

2974 Adeline St.
Berkeley, CA 94703
Tel: 510 841 1836
Fax: 510 841 1610

Dec. 18, 2021

To: Leila Moncharsh, Esq.

From: William Vandivere, M.S., P.E., Principal

RE: Technical memorandum on hydrologic and engineering assessment and CEQA documentation review- Head Royce School Planned Unit Development Permit Project, Oakland CA

Thank you for inviting Clearwater Hydrology (CH) to comment on the referenced project's CEQA assessment and supporting analyses. I have reviewed the CEQA documentation you provided on the project, including the Hydrology and Water Quality section of the DEIR (Nov. 2021), the final civil plan set issued in 2019 and the project Stormwater Supplemental Form (Sherwood Design Engineers 2019), the geotechnical investigation for due diligence evaluation (Rockridge Geotechnical 2012) and the peer review of the stormwater control plan prepared by ENGEO (2020). While I have not walked the project site, I have viewed it from adjoining properties both along Alita Court and Laguna Ave. and have spoken to residents of two of the neighboring properties (Purcell, 21 Alida Ct., and Boe, 4235 Laguna Ave.) regarding historical conditions of flooding and saturated hillslope soils affecting their properties. These site inspections were conducted in Feb. 2020. I have also reviewed a summary document prepared by the Alida Ct. and Laguna Ave. neighbors, and compiled by Mr. Boe, outlining the past instances of surface water and/or excessive ground water seepage leading to varying levels of active management of these conditions, e.g. sump pump, French drain installations, gravel bag barriers to runoff etc.

Historical Impacts of Existing Head Royce Site Conditions on Neighboring Properties

The existing, modified topography of the project site (South Campus) drains both to the north toward the Whittle Ave. Branch of Sausal Creek and to the south toward the Laguna Creek Branch of Peralta Creek. Two of the Alida Ct. homeowners at 26 and 27 Alida Ct have experienced surface flooding from runoff moving west from the campus area. Judy Sigars (26 Alida Ct) reported damaging overland flooding down her backyard slope and onto Alida Ct. below in the winter of 2013-2014. Head Royce did initiate a swale diversion which alleviated the surface flooding. Other properties along both Alida Ct. and Laguna Avenue, including those belonging to Purcell and Boe, have reported excessive groundwater seepage, which created saturated intervening hillslopes and either basement flooding or partial slope failures. In Mr. Boe's case, the saturated soils and high winds toppled an oak tree at the top of the slope and caused post-collapse increases in hillslope seepage in the winter of 2016. The Claassens' who own the residence to the west of Boe (4229 Laguna Ave) installed an upslope French drain system after the 2015-2016 winter to manage the impacts of seepage on their back slope area.

Assessment of Proposed Stormwater Control Plan and Related Hydrologic Design for Head Royce PUD

The City of Oakland Stormwater Supplemental Form prepared for the proposed project by Sherwood Design Engineers (SDE) indicated that based on their stormwater control plan hydromodification measures are not required. Our independent review of the assignment of Drainage Management Areas (DMAs) on the site and the estimated pre-project and post-project peak flow rates and for the design 10-yr. recurrence interval storm supports that conclusion, with the important caveat that no design details were provided for most of the hydraulic detention and runoff treatment or conveyance measures.

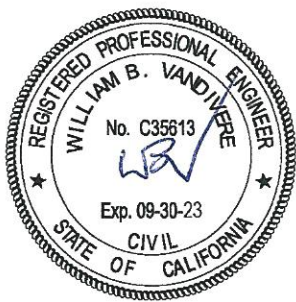
The inclusion of a main storm drain line under the paved and impermeable access road paralleling the western property boundary, in conjunction with the planned subdrain outlet from the upgradient bioretention area, should alleviate surface flooding issues for the Alida Ct. properties, *as long as a standard curb and gutter system is incorporated*. Provision of these stormwater conveyance features should also reduce the volume of water infiltrating into the terrain upgradient of the Alida Ct. backyards, and will likely reduce groundwater seepage problems historically experienced the 21 and 26 Alida Ct. properties.

However, given the lack of provided design detailing for the proposed bioretention (e.g. bioswale) measures, we have significant concerns regarding potential hillslope erosion and slope stability impacts of the implemented site stormwater control plan on hydrologic conditions on the aforementioned properties along Laguna Avenue. Our main concern relates to the four bioretention facilities that the stormwater plan has sited along the southern property line, upslope from the properties along the north side of Laguna Ave, including those of Boe and Claassen. These retention facilities receive runoff from areas to the north-northwest of Building 9, including some cross-basin diversions, as well as large portions of the perimeter access road and the southern portion of the site. The difference from the existing condition is the creation of new impervious areas within the encompassed DMAs. Furthermore, each of the bioretention ponds that receive this runoff discharges to a single, continuous surface swale that parallels the top of bank adjoining the steep transition hillslope above the Laguna backyards. The extent of potential impact from these facilities would depend on their ultimate design capacities (vis a vis higher magnitude storm events > 10-yr. recurrence interval) and whether they have open, permeable bottoms or are lined at some shallow depth. If all of the facilities were free to infiltrate ponded waters and then discharge overflows to the top of bank, presumably earthen swale, the cumulative effect could be more substantial seepage pressure on that slope, which is seasonally already very wet and has induced the Claassen's to install a top of slope french drain system to control the seeped conditions.

Figure 8-6 of the DEIR mapped the immediate zone upslope of the Boe and Claassen residences as geologic unit Qaf, artificial fill soils. As Section 6.5, p. 13 of the Rockridge 2012 report noted for similar fill soils placed atop native soils south of Building 9: “The fill was likely placed without engineering control and may not meet current geotechnical engineering standards.” An adjacent Rockridge Boring B-7 is mapped as drilled in colluvium (Qc). The boring log for Boring B-7, drilled in April 2012, describes the upper four feet of the soil profile as comprising stiff to very stiff mottled clay with presence of oxidized root tracks. Such features denote a seasonally wet substrate, perhaps associated with a perched water condition. Below the 4 ft. depth, the boring encountered deeply weathered shale bedrock. While the Qaf unit to the east was not sampled, the relatively shallow bedrock position noted for Boring B-7 is likely present at that location as well. Thus, soils near the top of the intervening slope between the Laguna back yards and the line of bioretention facilities and their connecting swales could be vulnerable to erosion or other instabilities due to heightened seepage pressures. In Section 7.4 (p.21) of the same Rockridge report, the following recommendation was made:

“If storm water treatment systems (infiltration basins, rain gardens, bio-retention systems, vegetated swales, flow-through planters, etc.) are considered in future improvements to the site, they should be provided with underdrains, as well as impermeable liners. Due to the low permeability of the near-surface soil and rock, these systems should not be designed for exfiltration in to the subgrade.”

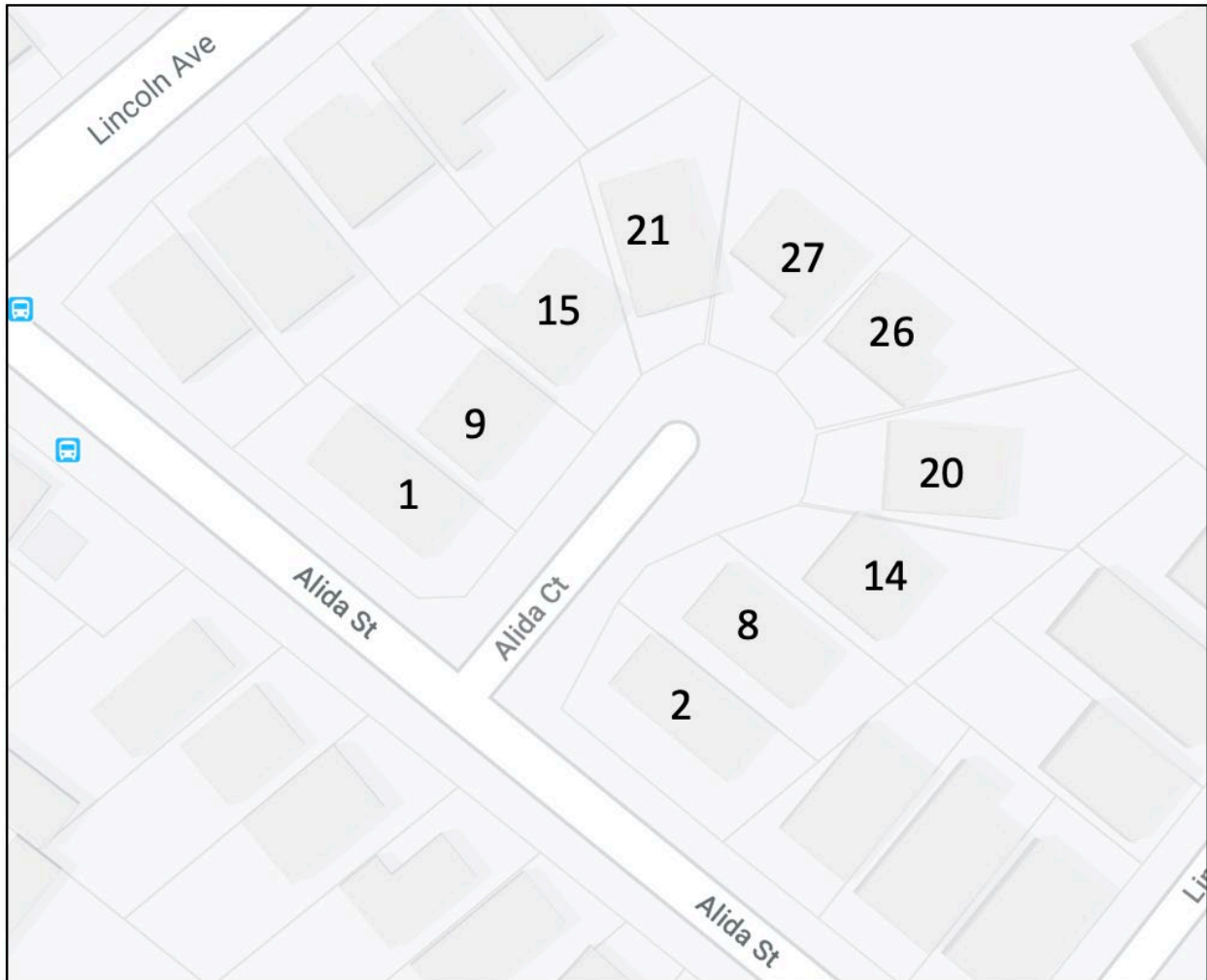
We strongly support this recommendation to minimize aggravating the historically detrimental effects of site seepage on the Laguna Ave. properties.



REFERENCES

- City of Oakland 2021. *Head Royce School Planned Unit Development Permit (PUD) Project, Draft Environmental Impact Report*, SCH #2019029032, Prepared by Lamphier-Gregory for the City of Oakland, Nov. 2021.
- City of Oakland 2021. *Head Royce School Planned Unit Development Permit (PUD) Project, Draft Environmental Impact Report- Technical Appendices 8A through 16B*, SCH #2019029032, Prepared by Lamphier-Gregory for the City of Oakland, Nov. 2021.
- ENGEO 2020. Peer Review of Stormwater Control Plan as prepared by SOM and Sherwood Design Engineers, Feb. 4, 2020. (Appendix 11B of PUD Appendices)
- Rockridge Geotechnical 2012. *Geotechnical Investigation to Support Due Diligence Evaluation, Lincoln Child Center, 4368 Lincoln Avenue, Oakland, California*, Project 12-412, May 7, 2012.
- Sherwood Design Engineers 2019. *City of Oakland Stormwater Supplemental Form for Head Royce School*, April 9, 2019. (Exhibit E of Appendix 11A of PUD Appendices)

Alida Court Map and Summary of Water Issues from Uphill



Randy & Lori Morris 1 Alida Court
Think they installed drainage a long time ago and have no active issues – checking with homeowner.

Marie Coronfly 9 Alida Court
Installed sump pump in last few years, checking with homeowner for details.

Steve Lewis & Christine Palmer 15 Alida Court
Think previous owner installed drainage a long time ago and have no active issues – checking with homeowner.

Anne Purcell 21 Alida Court

History of minor basement water intrusion during rainy season that we soak up with towels daily. Installed drainage in yard behind basement to mitigate. Continued to have minor problem through last winter and have been contemplating sump pump. No leaking this year so far. (We've only gotten about 6 of average 21 inches of rain so far this season, but since we bought house in 2012, there has been some leaking after the first series of storms until this winter.)

Veronica Riedel 27 Alida Court

History of similar runoff from campus as 26 Alida Court issues (see below). Believe no active issues. House is not owner occupied – checking with owner to confirm status.

Judy Sigars 26 Alida Court

History of significant water runoff from campus behind house, that sluices down toward house and front of property. Initially, communications with Lincoln Child Center were initiated prior to July, 2013 following an incidence of a broken water pipe on the LLC property causing damage to recent landscaping on my property. The gravel and sandbags that were installed to remediate the problem proved insufficient during the heavy rains the following year. Large piles of gravel were pushed through my fence and deposited in my yard causing destruction to plants. Eventually, under HRS ownership and management, a “channel” and fence were built on the HRS property to divert the water with no further incidence.

Gayle Miller 20 Alida Court

History of significant water runoff from campus behind house, believe no current issues. Confirming details.

Kathy Simon 14 Alida Court

Current owner has not had any issues.

Nina Floro & Roger Walker (8 Alida Ct.)

We rarely have any water intrusion in our home. On the rare occasion that it does happen, it occurs in our sub-area during usual, sustained, extremely heavy rains. I believe the water that comes into the subarea is excess storm water that runs from our eastern side yard (the side where Kathy's house is) into a drainpipe that leads to a sump pump system that was installed in our subarea by the previous owners. The sump pump then diverts the little amount of water there is to our back yard. We also took precautions to put sandbags around the sump pump in case the system should ever fail for any reason (power, malfunction, etc.). We have not had any drainage issues or problems with water entering from the subarea of home; our subarea tends to remain relatively dry, despite heavy rains.

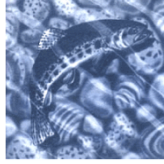
Nikki & Tatsu Yamamoto 2 Alida Court

Following up to see if they've had any issues.

Monthly Total Precipitation for OAKLAND MUSEUM, CA

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|
| 2000 | 7.13 | 9.94 | 2.45 | 1.01 | 1.21 | 0.18 | 0.00 | 0.00 | 0.26 | 2.75 | 0.70 | 0.77 | 26.40 |
| 2001 | 3.27 | 7.39 | 1.27 | 1.69 | 0.00 | 0.07 | 0.00 | 0.00 | 0.26 | 0.54 | 4.41 | 9.40 | 28.30 |
| 2002 | 1.64 | 1.78 | 2.61 | 0.21 | 0.88 | M | 0.00 | 0.00 | 0.00 | 0.00 | M | 11.87 | M |
| 2003 | 1.36 | 1.92 | 1.98 | 2.48 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.42 | 7.48 | 17.22 |
| 2004 | 2.71 | 6.07 | M | M | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 | 3.10 | 1.69 | 6.84 | M |
| 2005 | 3.93 | 4.24 | 4.58 | 1.69 | M | 0.33 | 0.00 | 0.00 | 0.00 | 0.23 | 2.08 | 10.51 | M |
| 2006 | 2.62 | 2.26 | 8.38 | 3.89 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 1.67 | 3.77 | 23.82 |
| 2007 | 0.55 | 5.06 | 0.44 | 1.57 | 0.38 | 0.00 | 0.00 | 0.00 | 0.14 | 1.99 | M | 3.28 | M |
| 2008 | 11.51 | 2.13 | 0.43 | 0.15 | 0.09 | 0.00 | 0.00 | M | 0.00 | 0.63 | 3.04 | 2.54 | M |
| 2009 | 0.90 | 7.41 | 2.76 | 0.41 | 1.29 | 0.02 | 0.00 | 0.00 | 0.38 | 4.98 | 0.51 | 2.43 | 21.09 |
| 2010 | 6.25 | 3.10 | 2.77 | 3.25 | 1.59 | 0.00 | 0.00 | 0.00 | 0.02 | 1.42 | 3.41 | 8.67 | 30.48 |
| 2011 | 1.39 | 4.73 | 7.69 | 0.35 | 1.25 | 2.70 | 0.00 | 0.00 | 0.00 | 1.33 | M | 0.11 | M |
| 2012 | 2.83 | 0.81 | 7.18 | 2.61 | 0.02 | 0.11 | 0.02 | 0.00 | 0.00 | 1.37 | 5.04 | 7.06 | 27.05 |
| 2013 | 0.39 | 0.49 | 0.70 | 1.21 | 0.04 | 0.22 | 0.00 | 0.00 | 0.34 | 0.00 | 0.57 | 0.15 | 4.11 |
| 2014 | 0.04 | 4.64 | 2.57 | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.62 | 2.67 | 10.49 | 22.40 |
| 2015 | 0.00 | 1.88 | 0.05 | M | 0.06 | M | 0.06 | 0.01 | 0.05 | 0.00 | 0.96 | 4.70 | M |
| 2016 | 7.46 | 0.49 | 5.92 | M | M | 0.00 | 0.00 | M | M | 3.74 | 1.85 | 4.89 | M |
| 2017 | M | M | M | M | M | M | M | M | M | M | M | M | M |
| 2018 | M | M | M | M | M | M | 0.00 | 0.00 | 0.00 | 0.05 | 4.07 | 1.89 | M |
| 2019 | 4.20 | 7.14 | 4.16 | 0.35 | 2.37 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 | 0.92 | 3.26 | 22.70 |
| 2020 | 2.16 | 0.00 | 1.11 | 0.99 | 0.54 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.19 | 1.58 | 6.59 |
| 2021 | M | M | 1.70 | 0.07 | 0.00 | 0.00 | 0.00 | T | 0.01 | 6.92 | 1.30 | M | M |
| Mean | 3.18 | 3.76 | 3.09 | 1.34 | 0.61 | 0.20 | 0.00 | 0.00 | 0.14 | 1.44 | 2.03 | 5.08 | 20.92 |
| Max | 11.51 2008 | 9.94 2000 | 8.38 2006 | 3.89 2006 | 2.37 2019 | 2.70 2011 | 0.06 2015 | 0.02 2020 | 0.59 2004 | 6.92 2021 | 5.04 2012 | 11.87 2002 | 30.48 2010 |
| Min | 0.00 2015 | 0.00 2020 | 0.05 2015 | 0.07 2021 | 0.00 2021 | 0.00 2021 | 0.00 2021 | 0.00 2019 | 0.00 2020 | 0.00 2020 | 0.19 2020 | 0.11 2011 | 4.11 2013 |

William Vandivere
M.S., P.E., QSD, Principal



CLEARWATER Consultants in Hydrology and Water Resources
HYDROLOGY 2974 Adeline St. Berkeley, CA 94703
Tel: (510) 841-1836 Fax: (510) 841-1610

William B. Vandivere, P.E. is a CA.-registered civil engineer (#35613) and has been consulting in the fields of hydrology, fluvial geomorphology and water resources engineering in the SF Bay area since 1980. He received his B.S. in Civil Engineering (Water Resources) from the University of Illinois at Urbana and an M.S. in Watershed Management (Hydrology) from the University of Arizona- Tucson. Mr. Vandivere has acted as Principal of Clearwater Hydrology, a hydrology and water resources consulting firm now based in Berkeley, since 1996. Prior to starting CH, he directed the Hydrology and Water Resources Division at H.T. Harvey & Associates in Alviso, CA. (1988-1993). While employed at HT Harvey, he worked closely with staff wildlife biologists and botanists on multidisciplinary habitat mitigation and restoration projects. From 1981 to 1986, he was an associate with Philip Williams & Associates, Ltd. (PWA) in San Francisco.

In more than 30 years of consulting experience, Mr. Vandivere has developed a multi-disciplinary expertise in the areas of watershed hydrology, hydraulic assessment and water resource engineering, tidal and watershed flooding, perennial and seasonal wetland hydrologic assessment, stream- groundwater interaction, fluvial geomorphology, trail and watershed sediment yield assessments, stormwater conveyance and treatment, and stream and wetland restoration design. He has designed and supervised field construction of more than sixty stream stabilization and restoration projects, highlighting biotechnical techniques, since 1988. Mr. Vandivere has also completed hydrologic designs for numerous seasonal, tidal and muted tidal wetland restoration projects, including the first seasonal wetland mitigation bank (Wikiup) accepted for implementation by the U.S. Army Corps of Engineers in Santa Rosa, the Lin Livermore 24-acre seasonal pond mitigation in North Livermore and the 640-acre Baumberg Tract tidal restoration in Hayward for the CA. Dept. of Fish and Wildlife. In 2013, Mr. Vandivere led the CH effort to develop a conceptual meadow restoration plan for Bean Creek, a degraded high-elevation meadow complex in Tuolumne County (southern Sierra).

Mr. Vandivere is experienced in the use of public domain hydrologic and hydraulic (flood) flood models, including HEC-HMS, HEC-RAS, and USEPA SWMMM and has trained in the use of the two-dimensional Adaptive Hydraulics (AdH) model, developed by the US Army Corps of Engineers. He has provided expert witness testimony in cases involving channel maintenance and stabilization, flooding and the hydraulic behavior of floodflows, wetland hydrogeology, stormwater drainage, and septic system performance. He has also conducted trail erosion and sediment yield assessments for Lafferty Ranch (Sonoma Co.), Gravel Creek watershed (Olema Ck. tributary, Marin Co.), Devil's Gulch (Marin Co.) and Cascade Canyon, also in Marin. He has also conducted the hydrology, drainage and water quality sections for more than 50 EIR's, including for the Marin Countywide Plan, the Tiburon General Plan, the San Rafael General Plan, and the Mount Tamalpais Vegetation Management Plan.

WILLIAM VANDIVERE, M.S., P.E. (Cont'd)

Education

1980- M.S. Watershed Management, University of Arizona, Tucson

1975- B.S. Civil Engineering (Water Resources), University of Illinois, Urbana

Post-Graduate Training

- Short Course in use of the USACE Adaptive Hydraulics (AdH) two-dimensional flow model for channel/floodplain and estuarine water, sediment and constituent transport applications, US Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory, Vicksburg, MS, May 2012.
- Short Course in Applied Fluvial Geomorphology, Wildland Hydrology Consultants, Pagosa Springs, CO 1991.
- Short Course in “Wetland Soils and Hydrology”, Wetland Training Institute, Seattle, WA., 1990.
- Short Course in “River Mechanics”, Colorado State University, Department of Civil Engineering, 1985.

Professional Affiliations

Member, American Society of Civil Engineers (ASCE)

Member, American Geophysical Union (AGU)

Selected Publications

Hydrologic Analysis of the Colorado River Floods of 1983 (co-authored with P. Vorster).
GeoJournal, Vol. 9, No.4, 1984.

Sediment Yield Prediction for Black Mesa Coal Spoils (co-authored with M.M. Fogel and L.H. Heckman). Presented at the 1979 Winter Meeting of the American Society of Agricultural Engineers, New Orleans, LA, December 14, 1979.

Uncertainty in Sedimentation Pond Design (co-authored with D.R. Davis).
Presented at the 1979 Winter Meeting of the American Society of Agricultural Engineers, New Orleans, LA, December 12, 1979.

Impact of Development on Stream Flows (co-authored with P.D. Trotta and J.J. Rogers).
Proceedings of the Arizona Section, American Water Resources Association, Vol. 9, Tucson, AZ 1979.