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October 20, 2023

Avenue 55, LLC
601 Union Street, Suite 2930
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Attention: Ben Varin

Subject: Report Addendum 3
Geotechnical Engineering Services
DuPont-West
DuPont, Washington
File No. 26421-001-00

INTRODUCTION AND PROJECT UNDERSTANDING

This report addendum (Addendum 3) presents geotechnical recommendations and considerations for the proposed DuPont-West project and is intended to provide supplemental geotechnical design recommendations to our previous studies at the site. The purpose of this addendum is to reflect the updated site plan layout described below and provide discussion on critical areas, specifically geologically hazardous areas consisting of landslide and erosion hazards near the site. The site is located at 1700 Center Drive in DuPont, Washington. An overview of the property and its surrounding area is shown on the Figure 1, Vicinity Map.

Our experience at the site includes involvement with the previous owner, Dupont Station Partners, LLC for the proposed DuPont Industrial Warehouse (also referred to as Lot “Y” Industrial Park). We understand Avenue 55, LLC has been given permission by Dupont Station Partners, LLC to have the full use of studies held by GeoEngineers, Inc. (GeoEngineers) and as related to the site address. Our previous geotechnical deliverables for the site include:

- “Geotechnical Engineering Services, Lot ‘Y’ Industrial Park, DuPont, Washington” dated October 10, 2011 (2011 Report). As part of our services, we advanced 22 test pit explorations in the project area to develop an understanding of subsurface conditions. The 2011 Report presents a summary of our findings, conclusions, and recommendations regarding geotechnical engineering aspects of the proposed industrial park development.
- “Report Addendum, Geotechnical Engineering Services, DuPont Industrial Warehouse, DuPont, Washington” dated May 11, 2018 (2018 Addendum), which includes our review of a proposed development site plan and updated recommended seismic design parameters.

- Report Addendum, Geotechnical Engineering Services, DuPont Industrial Park, DuPont, Washington”, dated November 8, 2022 (November 2022 Addendum).
- “Revised Report Addendum 2, Geotechnical Engineering Services, DuPont 243, DuPont, Washington” dated August 1, 2023 (August 2023 Addendum), which includes our review of an updated development site plan and confirmation of previously provided geotechnical design recommendations.

We have also reviewed the following document by GeoEngineers, prepared for others, nearby:

- GeoEngineers, Inc. 2011. Stream Habitat Assessment Summary, Creekside Village Development, DuPont, Washington. Prepared for Creekside DuPont Partners, LLC, on October 12, 2011. (GeoEngineers File No. 16785-002-01).

Our understanding of the current project is based on discussions and correspondence with Avenue 55, LLC and review of an updated site plan sheet A0.1 “SEPA Site Plan” dated July 11, 2023 (Site Plan). The project will include construction of a 256,800-square-foot, dock-high slab, warehouse building, referred to as Building A. Surrounding improvements will include paved parking and driveway areas, hardscaping, new utility installation, landscaping, and stormwater management facilities, including a 21,930-square-foot stormwater pond (inferred from above Site Plan). A relatively short retaining wall (up to 6 feet tall) is proposed along the west parking lot and adjacent to the west property boundary. The site development features are shown on the attached Figure 2, Site Plan.

The south property boundary runs near parallel and above a southward facing slope that leads down to Sequalitchew Creek Trail and Sequalitchew Creek. The slope is typically in excess of 25 feet tall, with height increasing up to or even greater than 50 feet toward the west. The slope is inclined downward from the site between about 1H:1V (horizontal:vertical) and 3½H:1V. Some local areas are on the order of ¾H:1V. The Sequalitchew Creek Trail bisects the approximate center of the slope and runs approximately parallel with the top of the slope. The eastern half of the trail varies in elevation and essentially rises near the elevation of the top of the slope.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to complete a limited slope reconnaissance and to provide discussion on critical areas (geologically hazardous areas) at the site. The terms of our services have been provided in accordance with our signed agreement with Avenue 55, LLC (signed October 17, 2022). We have been requested to address the City of DuPont Comments provided in their review letter dated September 22, 2023, as follows: “Provide a letter from the geotechnical engineer that address the City’s Geologic Hazard assessment requirements, makes a recommendation for a protective buffer, and depict the protective buffer on the plans.”



LITERATURE REVIEW AND ASSESSMENT

Geology Review

We include our geology literature review from our past studies (2011 Report) which states:

“Based on review of the Geologic Map of the Nisqually 7.5 Minute Quadrangle, Thurston and Pierce Counties, Washington (Walsh et al., 2003). Vashon recessional outwash sand and gravel is the dominant, near-surface, geologic material mapped in the immediate project area. This material is commonly known as Steilacoom gravel. Vashon recessional outwash was deposited by melt water streams in front of the most recent glacier during its retreat from the Puget Sound region approximately 10,000 to 15,000 years ago. These deposits generally consist of permeable sand, or sand and gravel. Cobbles and boulders can also be encountered in this deposit, depending on the depositional history. Glacial till and/or advance outwash is commonly encountered at depth below the recessional outwash.”

We also provide the following contained in our 2011 report: “The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey of Pierce County Area, Washington, maps the project area as Spanaway gravelly sandy loam (41A). This soil unit is described as being formed in glacial outwash. It is further described as somewhat excessively drained with moderately rapid permeability, slow surface runoff and little erosion hazard.”

Based on our current review and studies, it is our opinion that the soil descriptions in the published literature documents are still appropriate for this project.

Washington State DNR Geologic Information Portal

We reviewed the Washington State Department of Natural Resources (Washington State DNR) Geologic Information Portal (accessed October 16, 2023), which provides maps of landslides and areas susceptible to landslides. Based on our review, the southward facing slope near the southern property boundary is mapped as having a susceptibility to shallow landsliding. No active landslides appear to be mapped in the project vicinity.

DuPont Municipal Code

General

We reviewed the City of DuPont “DuPont Municipal Code” (DMC). Specifically, we reviewed Chapter 25.105 “Critical Areas” of the DMC which provides criteria for Geologically Hazardous Areas consisting of Landslide and Erosion Hazards. Seismic design and opinions have been provided in our past studies. In summary, we concluded that seismic hazards (liquefaction, lateral spreading, surface fault ruptures) do not appear to be present at this site and in our opinion, are at a low risk of occurring.

Landslide Hazard Areas

Based on our review of the Site Plan and understanding of the site, the southward facing slope meets the following criteria provided in the DMC for landslide hazard areas based on the following:

- Slope is mapped by the Washington State DNR as having a susceptibility to shallow landsliding.
- A majority of the slope grade is 40 percent or steeper and has vertical relief of 10 feet or more.



Erosion Hazard Areas

Per the DMC, the southward facing slope would be designated as an erosion hazard area, primarily because it is associated with the Sequilitchew Creek “channel migration zone”. The DMC states that “Channel migration zones, also known as riverine erosion areas, are defined as the areas along a river or stream within which the channel(s) can be reasonably predicted to migrate over time. This is a result of natural and normally occurring geomorphic, hydrological, and related processes when considered with the characteristics of the river or stream and its surroundings, and in consideration of river and stream management plans. Channel migration hazard areas shall include potential channel migration, channel avulsion, bank erosion, and stability of slopes along the river or stream”.

Slope Reconnaissance

We completed a limited slope reconnaissance on October 12, 2023, of the southward facing slope between the upland part of the site and Sequilitchew Creek. Our slope reconnaissance was focused primarily on the central to western half of the site, where the slope is generally steepest and closest to proposed parking and building improvements. Our observations were made from hiking the top of the slope and at the approximate midline-base of the slope along the Sequilitchew Creek Trail.

The slope is generally forested with deciduous and coniferous trees, and densely vegetated with underbrush (i.e., small shrubs and trees, sword ferns, etc.). “Horse tails”, plant vegetation typically formed in the presence of constant wet surface water, were also observed in isolated, clustered sections (approximately 50 feet or less in length) along the northern edge of the Sequilitchew Creek trail below the project area. The ground appeared wet where horse tails were present, and intermittently outside of areas containing horse tails. We did not observe the presence of groundwater seepage flow in this area during our reconnaissance.

We probed the slope surfaces around the trail area, primarily to north of the trail, with a ½-inch diameter steel probe rod and through forest duff and/or vegetative matter, where accessible and as needed. Typical probe depths were generally less than 6 inches, with isolated locations between 12 and 18 inches, before firmer underlying soil conditions were encountered. Similarly, near the top of the slope, probe depths were generally between about 12 and 18 inches before reaching firm soil conditions.

Natural soil along the slope surfaces was observed to be intermittently exposed and generally consisted of sand and gravel with varying silt content. Probe depths were generally less than 2 inches in these exposed soils and were noted to be in a dense condition. We interpret the soil conditions, where exposed, along the slope surfaces to generally be consistent with the glacial recessional outwash deposits recorded in our 2011 Report and the overall geologic conditions reported in the project vicinity. Some of the exposures could be indicative of a glacial till or glacial drift material, and generally comprised very dense, glacially consolidated silty sand with gravel. It is common for glacial till and drift materials to underly recessional outwash deposits in the project area.

Where accessible, we did not observe tension cracks or signs of movement near the top of the slope. Periodic and isolated “pistol butting” of tree trunks, at their base, were observed along the slope faces, but were typically surrounded by well-established mature trees growing vertically. Pistol butting of trees can indicate past or current slope movements; however, based on the soil conditions observed and the vertical growth patterns for surrounding trees, the pistol butting observed is, in our opinion, likely attributed to the tree germinating on a slope, potential damage incurred early in the tree’s life, and/or due to slow colluvial creep of the duff and upper weathered soil zone. In some isolated areas of exposed soil, we observed minor surface raveling, shallow surficial slumps, and sloughing.



We consider the surface raveling, shallow surficial slumps, and sloughing observed to be associated with minor erosion and surficial failures common to natural slopes in the project vicinity and region. We did not observe any indications of significant seepage or global slope instability. Since our field efforts were completed in 2011, and in some instances prior to 2011 (studies completed for nearby projects), we have not observed any indications of landsliding or received reports of soil movements within the slope below the project area.

CONCLUSIONS AND RECOMMENDATIONS

General

Except as modified in this addendum, the conclusions and recommendations presented in our 2011 Report and subsequent addenda are appropriate for geotechnical project design and construction. In this addendum, we provide additional geotechnical considerations for the project, specifically relating to geologically hazardous areas south of the proposed development.

Based on definitions presented in the DMC, it is our opinion that the southward facing slope can be designated as both a landslide hazard and erosion hazard area due to characteristics of a steep slope, shallow landslide potential, and its association with the channel migration zone of Sequalitchew Creek. Per the DMC, setbacks for each hazard should be based on the findings of a qualified professional. We provide additional discussion on each hazard, including an overview of current setbacks in the sections below.

Landslide Hazard

Soil conditions at the site, including the steep slope areas, comprise dense glacial deposits. Typically, deep-seated failures on these types of glacial slopes inclined at about $\frac{3}{4}$ H:1V, or shallower, are rare. Based on our studies, explorations, and site experience, it is our opinion that there is a low risk of large-scale global instability occurring on the southward facing slope below the proposed development. It is also our opinion that landslide hazards designated at this site should not be considered a limiting factor for the proposed development, provided that proper design, setbacks, and engineering controls are implemented.

The southward facing steep slope will be at risk for relatively shallow sloughing, slow “creep” movement and/or local surficial failures. We observed evidence of these features, as described above. These are natural processes that occur with or without development. Mitigation measures are often limited to appropriate setbacks and monitoring and maintenance. The amount and magnitude of sloughing is typically due to natural processes that can include weathering, seepage, saturation during heavy rain events, decay of roots, downed trees, and activity of burrowing animals. The addition of human design elements, such as fill scattering, mis-directed stormwater sheet flow, and irrigation, can also increase this risk.

Site plans reviewed indicate the closest improvement to the top of the steep slope will be the paved parking and driveway areas, which are 50 feet away. Proposed Building A is shown to be setback more than 100 feet from the top of the slope. The stormwater pond proposed is at least 100 feet away from the top of the slope. It should be noted that this pond location is consistent with the 100-foot setback guidance as described in Volume V, Section 1.2 of the 2019 Washington State Department of Ecology’s Stormwater Management Manual for Western Washington.



Based on our studies, we recommend a non-improvement area/buffer/setback of 50 feet be established and maintained from the top of the slope to address landslide hazard considerations described. Review of the project Site Plan indicates that this recommended setback has been established as a part of the project design, and as such we take no issue with this. Other requirements presented in the DMC related to development near landslide hazard areas, such as construction methods, erosion control, site disturbance, etc., should also be considered, and incorporated, where necessary.

Erosion Hazard

Based on our studies, it is our opinion that there is the potential for shallow erosion and surficial failures/sloughing within the south slope face, particularly in areas where vegetation is sparse or non-existent. We observed these features during our site visit and should be expected to continue. These are natural processes that occur with or without development. Areas with thicker weathered and organic or forest duff materials that have undergone several weather cycles are also subject to shallow erosion and surficial failures, especially if it becomes oversaturated. Areas of the slope that are more exposed and contain less vegetation are more likely subject to erosion, compared to areas that contain denser vegetation.

Based on our studies, it is our opinion that erosion hazards, as defined in the DMC, as well as the other potential erosion hazards described above, should not be considered a limiting factor for the proposed development. It is our opinion that the 50-foot setback buffer established for the project is adequate to protect structures and improvements from the erosion hazards expected at this site. We further conclude that the risk of toe erosion caused by significant stream meandering of Sequilitchew Creek along base of slope is low. This creek appears to be relatively dry for most of the time of the year, contains a relatively large channel, has a linear alignment through the project area, and overall, not expected to develop stream velocities that would compromise the toe of the slope.

Temporary and permanent site development should include provisions to protect steep slopes from erosion. Engineering controls to mitigate erosion by limiting soil disturbance in steep slope areas, controlling surface water management, and re-establishment of ground cover and vegetation should be included in design and planning. Stormwater facilities and other site drainage should be designed such that they do not discharge directly over or within the buffers and the steep slope areas. Other provisions in the DMC for development in erosion hazard areas should also be considered during design and planning. In addition, discussions on erosion control have been provided in the “Erosion and Sedimentation Control” section of our 2011 Report and should be considered as a part project development and design.

LIMITATIONS

We have prepared this report for Avenue 55, LLC, for the DuPont-West project located at 1700 Center Drive in DuPont, Washington and is intended to provide supplemental geotechnical design recommendations to our previous studies at this site for this project. Avenue 55, LLC may distribute copies of this report to authorized agents and regulatory agencies as may be required for the project.



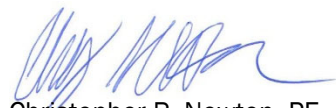
Our services were provided to assist in the design of foundations for a planned structure to be located on or near sloping property. Our recommendations are intended to improve the overall stability of the site and to reduce the potential for future property damage related to earth movements, drainage, or erosion. Qualified engineering and construction practices can help mitigate the risks inherent in construction on slopes, although those risks cannot be eliminated completely. Favorable performance of structures in the near term is useful information for anticipating future performance, but it cannot predict or imply a certainty of long-term performance, especially under conditions of adverse weather or seismic activity.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment, and experience. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table and/or figure), if provided, and any attachments should be considered a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" provided in our "Revised Report Addendum 2, Geotechnical Engineering Services, DuPont 243, DuPont, Washington" dated August 1, 2023 (August 2023 Addendum) for additional limitations and information pertaining to use of this report. The recommendations, limitations, and information presented in the August 2023 Addendum also apply to this letter. Except as modified herein, our August 2023 letter is still applicable and should be considered a part of this study and reviewed for our complete geotechnical recommendations.

Sincerely,
GeoEngineers, Inc.


Christopher R. Newton, PE
Geotechnical Engineer



10/20/23


Dennis (DJ) Thompson, PE
Associate

CRN:DJT:atk

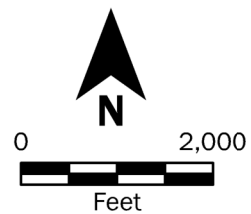
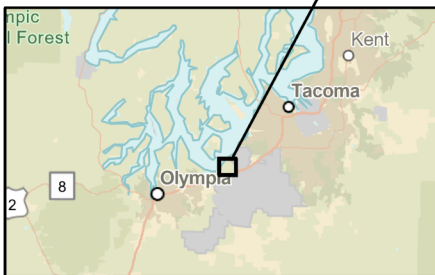
Attachments

Figure 1. Vicinity Map

Figure 2. Site Plan



10/20/23



Source(s):
• ESRI

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

Vicinity Map

DuPont - West
DuPont, Washington



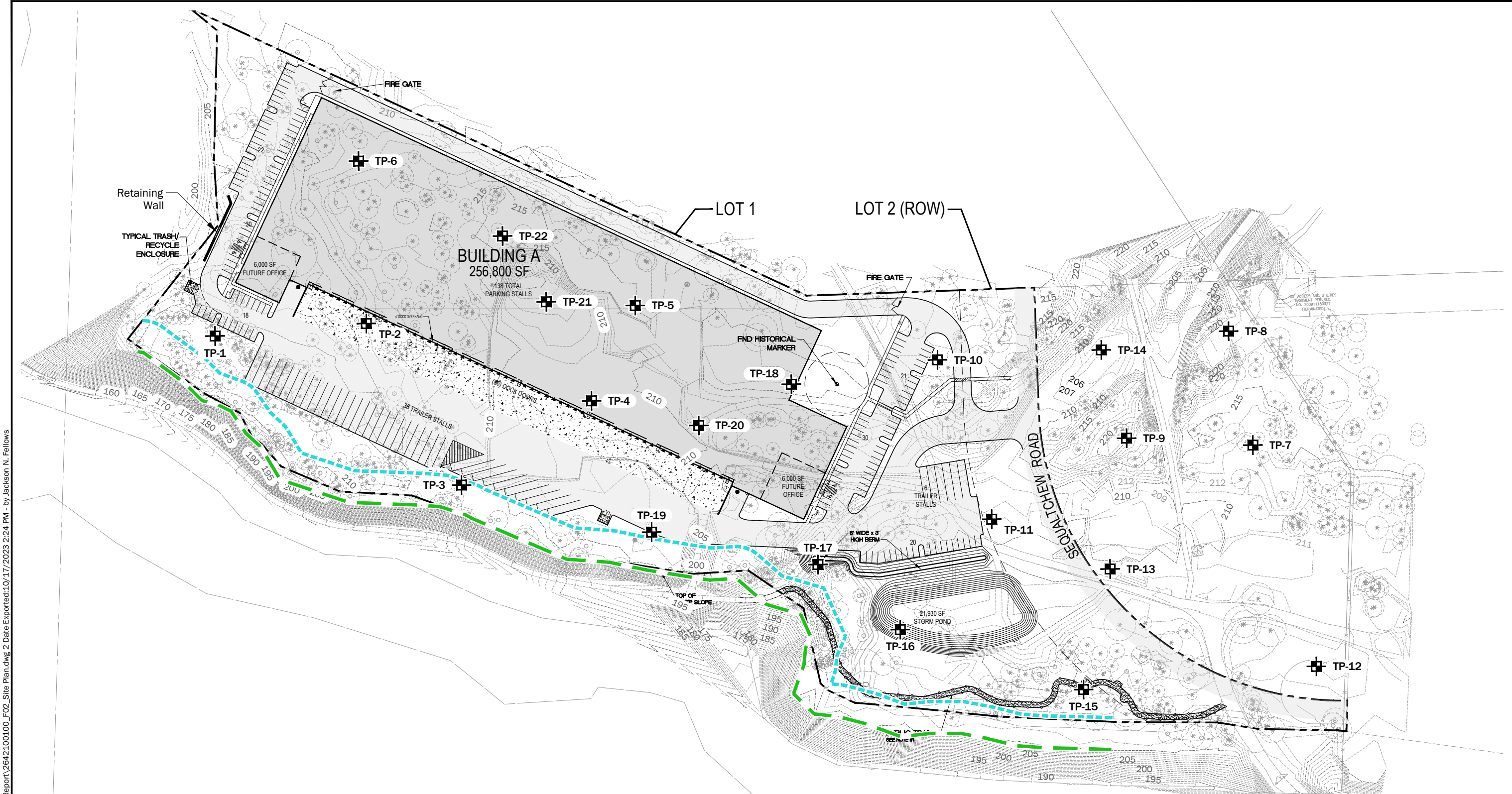
Figure 1

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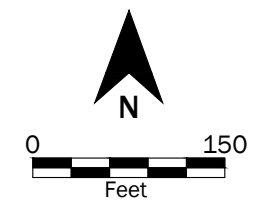
Source(s):
• Survey from Barghausen Consulting Engineers Inc., dated 6/5/2018
• Proposed site features from Innova Architects, dated 7/17/2022

Projection: WA State Plane, North Zone, NAD83, US Foot

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- Legend**
- Top of slope
 - 50' Setback from Top of Slope
 - TP-1 Test Pit by GeoEngineers, Inc., 2011



Site Plan	
DuPont - West DuPont, Washington	
	Figure 2