

11/12/2020

WSECU
Scott Liljedahl
330 Union Avenue SE
Olympia, WA 98501

Subject: WSECU Chehalis – Updated Geotechnical Investigation
Parcel # 005605082015, NW Louisiana Ave, Chehalis, WA
QG Project # QG20-063

Dear Mr. Liljedahl:

At your request, Quality Geo, PLLC (QG) has completed a geotechnical investigation of the above referenced project. The investigation was performed in accordance with our proposal for geotechnical services.

We would be pleased to continue our role as your geotechnical consultant of record during the project planning and construction phases, as local inspection firms have not been found to be as familiar or reliably experienced with geotechnical design. This may include soil subgrade inspections, periodic review of special inspection reports, or supplemental recommendations if changes occur during construction. We will happily meet with you at your convenience to discuss these and other additional *Time & Materials* services.

We thank you for the opportunity to be of service on this project and trust this report satisfies your project needs currently. QG wishes you the best while completing the project.

Respectfully Submitted,

Quality Geo, PLLC

Luke Preston McCann, L.G.
Principal Licensed Geologist

UPDATED GEOTECHNICAL REPORT

WSECU CHEHALIS
PARCEL # 005605082015
NW LOUISIANA AVE, CHEHALIS, WA

WSECU
Scott Liljedahl
330 Union Avenue SE
Olympia, WA 98501

Prepared by:



11/12/2020

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11/12/2020

QG Project # QG20-063

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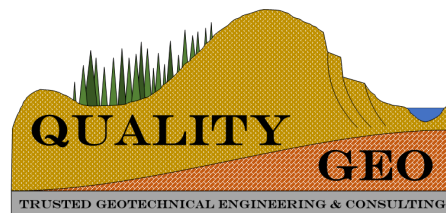


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1.0 INTRODUCTION

This report presents the findings and recommendations of Quality Geo’s (QG) geotechnical investigation and engineering conducted in support of new developments, facility design, and construction.

1.1 PROJECT DESCRIPTION

QG understands the project mainly entails the design and construction of a new bank branch office and associated surface improvements. Exterior improvements are anticipated to include infrastructure for auto access and parking, flatworks, and other necessary site amenities. QG has been contracted to perform a geotechnical investigation of the proposed site to provide foundation and site development recommendations. Exploration locations were chosen by QG as needed to avoid excessive site disturbance and existing utilities.

QG understands that the proposed structure is anticipated to employ conventional shallow foundation in support of tower construction. It is anticipated that loads will be typical for the type and materials of construction and that no unusually large, industrial, or vibratory loads are expected.

1.2 FIELD WORK

Site exploration activities were performed on 10/21/2020. Exploration locations were marked in the field by an QG Project Geologist with respect to the provided map and cleared for public conductible utilities. Our exploration locations were selected by an QG Project Geologist prior to field work to provide safest access to relevant soil conditions. The geologist directed the advancement of 2 excavated test pits (TP). The test pits were advanced within the vicinity of the anticipated development footprint areas, to depths up to 10.0 feet below present grade (BPG) in general accordance with the specified contract depth.

During explorations QG logged each soil horizon we encountered, and field classified them in accordance with the Unified Soil Classification System (USCS). Representative soil samples were collected from each unit, identified according to boring location and depth, placed in plastic bags to protect against moisture loss, and were transported to the soil laboratory for supplemental classification and other tests.

Region & vicinity maps are included in Appendix A. Exploration locations are shown in Appendix B.

2.0 EXISTING SITE CONDITIONS

2.1 LITERATURE REVIEW

QG was provided with an existing geotechnical report performed by Materials Testing & Consulting, Inc. dated 3/20/2014 (herein referred to as “the 2014 report”). The report included thorough review of subsurface soil conditions and recommended for site soil improvements. Our review of the report concludes that the evaluation was conducted to the same current standards with which modern geotechnical investigations are now done.

The report recommends site wide improvements be made to stabilize surface soils and protect foundations. The reports recommended solution mostly concerns the installation of 24 inches of structural fill beneath any solid structures.

Additionally, QG was provided existing recent inspection reports regarding the installation of a 24” thick structural fill pad across the subject site surface. Reports appear to indicate the fill was placed in conformance with project plans and the geotechnical report, with a layer of sturdy fabric separating the fill from the native soil. Soils are reported to have been compacted to a firm and unyielding condition.

The 2014 report should be attached as a supplementary piece for submission, to be reviewed in conjunction with this report.

2.2 SITE & SURFACE CONDITIONS

On our visit, it was observed that the project area is relatively flat, near the same elevation as the adjacent roadways. The site is entirely covered in a *5/8-inch minus* imported gravel. Two catch basins were observed within the eastern side of the site, and they appear to tie into the street side stormwater system.

2.3 SOIL CONDITIONS

Site soils were generally consistent across the property. The structural fill cover was noted to consistently extend to a depth of 24 inches, with geofabric separating it from the underlying soils. The fill was noted to be in a firm and unyielding condition across the site. Beneath structural fill soils, the native silt was observed in a soft and wet condition. Additional details of the native soil can be found in the 2014 report.

3.0 GEOTECHNICAL RECOMMENDATIONS

3.1 DISCUSSION

In general, the site appears in an adequate condition, with fill having successfully bridged over the soft native soils. The fill is expected to protect the site from differential settlement over time. Certain additional building foundation recommendations will still need to be observed in order to offer similar protections.

QG recommends earthwork activities take place during the summer dry season. If earthwork and concrete/asphalt placement occur during the wet season, foundation recommendations may need to be altered.

3.2 FLATWORKS

The structural fill across the site appears in a suitable condition to bear surface improvements and flatworks such as pavement, sidewalks, and concrete slabs. To maintain the required 24 inches of structural fill beneath, new surface improvements will have to be placed at an elevation near or above current grade in order to avoid decreasing the fill thickness. Existing fill may remain directly beneath these flatworks. Concrete and asphalt may be placed directly over this fill without the need for installation of any additional structural fill base beneath, unless excessive loads are anticipated. Slabs may still require the installation of vapor barriers, depending on the project designers' considerations.

3.2.1 SLAB ON GRADE

QG anticipates that slab-on-grade floors are planned for the interior of the proposed building. Based on typical construction practices, we assume finished slab grade will be similar to or marginally above present grade for the below recommendations. If floor grades are planned to be substantially raised or lowered from existing grade, QG should be contacted to provide revised or alternative recommendations.

- **Capillary Break:**

A capillary break will be helpful to maintain a dry slab floor and reduce the potential for floor damage resulting from shallow perched water inundation. To provide a capillary moisture break, a 6-inch thick, properly compacted granular mat consisting of open-graded, free-draining angular aggregate is recommended below floor slabs.

- **Vapor Barrier:**

During selection of flooring products for slabs on grade, consideration should be made for compatibility with a vapor retarding membrane, such as 10 mil polyethylene film placed

beneath floor slabs, to prevent transmission of moisture where floor coverings may be affected. Care should be taken during construction not to puncture or damage the membrane. To protect the membrane, a layer of sand no more than 2 inches thick may be placed over the membrane if desired. If excessive relict organic fill material is discovered at any location, additional sealant or more industrial gas barriers may be required to prevent off-gassing of decaying material from infiltrating the new structure. These measures shall be determined by the structural engineer to meet local code requirements as necessary.

- **Structural Design Considerations:**

QG assumes design and specifications of slabs will be assessed by the project design engineer. We suggest a minimum unreinforced concrete structural section of 4.0 inches be considered to help protect against cracking and localized settlement, especially where larger equipment or localized loads are anticipated. It is generally recommended that any floor slabs and annular exterior concrete paving subject to vehicular loading be designed to incorporate reinforcing. Additionally, some level of reinforcing, such as a fiber or wire mesh may be desirable to prolong slab life due to the overwhelming presence of such poor underlying soils. It should be noted that QG does not express any guarantee or warranty for proposed slab sections.

3.2.2 RIGID PAVEMENT AND FLATWORKS

Detailed pavement recommendations are provided in the 2014 report and should be referenced therein.

Rigid pavement components are commonly utilized for portions of accesses and ancillary exterior improvements. The project civil designer may re-evaluate the below general recommendations for pavement thicknesses and base sections, if necessary, to ensure proper application to a given structure and use. QG recommends that we be contacted for further consultation if the below sections are proposed to be reduced.

Concrete driveway aprons and curb alignments, if utilized, should consist of a minimum 6-inch thickness of unreinforced concrete pavement over structural base fill. For heavy traffic zones, we recommend the incorporation of reinforcing steel in the concrete.

Concrete sidewalks, walkways and patios if present may consist of a minimum 4-inch section of plain concrete (unreinforced). Flatworks should employ frequent joint controls to limit cracking potential.

3.3 SHALLOW FOUNDATION RECOMMENDATIONS

For general foundation design considerations, QG recommends referring to guidelines and parameters of the International Building Code (IBC, 2015; or most recent edition at the time of construction).

3.3.1 FOUNDATIONS OVER EXISTING GRADE

If foundations are to bear directly over the existing 24 inches of fill without reduction of the base, no further soil amendments will be required, other than raising the exterior grade by backfilling over footings to achieve the minimum required embedment. We recommend following the other recommendations for foundations provided in the 2014 report, in order to maintain the desired 1500PSF bearing capacity.

3.3.2 FOUNDATIONS PENETRATING BENEATH EXISTING GRADE

Concrete foundations penetrating into the existing fill will have an elevated risk of settlement due to the presence of shallow soft native soils. For foundations penetrating into the existing structural fill soils, the following preparations will be required in order to maintain adequate bearing conditions:

- **Subgrade Preparation**

QG recommends overexcavating 24 inches beneath the depth where foundations will penetrate, to, and benching the final bottom of subgrade elevation flat.

Excavations should be performed with a smooth blade bucket to limit disturbance of subgrade soils. Vibratory compaction of the native soils should be avoided where possible to limit the degradation of soil consistency. Manual or non-vibratory compaction alternatives may be considered.

- **Structural Fill**

A minimum 24-inch thick structural fill base composed of either gravel borrow per WSDOT Specification 9-03.14(1), or crushed surfacing per WSDOT Specification 9-03.9(3), or an approved alternative. This structural fill shall be separated from underlying and surrounding soils by a layer of rugged nonwoven permeable geofabric, with 12-inch overlaps at joints, to allow for water to escape and prevent the accumulation of fine-grained soils within the void space.

Note: For lateral and bearing support, structural fill placement below footings shall extend at minimum a 1H:1V distance past each edge of the base of the footing equal to the depth of structural fill placed below the footing [e.g., for a 2.0-foot wide footing, fills placed to

approximately 1.5 feet below footing grade will require a minimum backfill width of 5.0 feet (1.5 feet each side plus 2.0-foot width of footing)]

- **Footing Drains:**

Due to relatively impermeable subgrade conditions and the known seasonally saturated soils, footing drains should be incorporated to maintain dry foundation conditions. QG recommends footing drains employ 4-inch minimum perforated pipe. Footing drains shall be backfilled with free-draining material wrapped in filter fabric. Footing drains should be tightlined separately from roof drains to a catch basin system or to a permanent discharge point at least 10 feet from the structure.

3.4 INFILTRATION FEASIBILITY

QG understands design of on-site stormwater controls are pending the results of this study to confirm design parameters.

During test pit excavations for general site investigation, QG additionally collected representative samples of native soil deposits among potential infiltration strata and depths. We understand the project will be subject to infiltration design based on the Washington Department of Ecology Stormwater Management Manual for Western Washington (DoE SMMWW). For initial site infiltration characterization within the scope of this study, laboratory gradation analyses were completed including sieve and hydrometer tests for stormwater design characterization and rate determination to supplement field observations.

Based on our field observations, we conclude that infiltration on site is not feasible due to the presence of shallow fine-grained soils. QG recommends the facility designer review these results and stated assumptions per reference literature to ensure applicability with the proposed development, level of anticipated controls, and long-term maintenance plan. It may be permissible for stormwater controls to be tied into the existing municipal stormwater systems if approved by the local permitting authority.

4.0 CONSTRUCTION RECOMMENDATIONS

4.1 EARTHWORK & GENERAL CONSTRUCTION

QG recommends the design team and contractors follow the construction recommendations provided in the original geotechnical report by MTC and dated 3/20/2014. QG has reviewed the original report and confirms the recommendations are suitable for current construction.

5.0 SPECIAL INSPECTION

The recommendations made in this report assume that an adequate program of tests and observations will be made throughout construction to verify compliance with these recommendations. Testing and observations performed during construction should include, but not necessarily be limited to, the following:

- Geotechnical plan review and engineering consultation as needed prior to construction phase,
- Observations and testing during site preparation, earthwork, structural fill, and pavement section placement,
- Consultation on temporary excavation cutslopes and shoring if needed,
- Consultation as necessary during construction.

QG recommends that a local and reputable materials testing & inspection firm be retained for construction phase testing and observation in accordance with the local code requirements. We also strongly recommend that QG be retained as the project Geotechnical Engineering Firm of Record (GER) during the construction of this project to perform periodic supplementary geotechnical observations and review the special inspectors reports during construction.

Our knowledge of the project site and the design recommendations contained herein will be of great benefit in the event that difficulties arise and either modifications or additional geotechnical engineering recommendations are required or desired. We can also, in a timely fashion observe the actual soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

We would be pleased to meet with you at your convenience to discuss the *Time & Materials* scope and cost for these services.

6.0 LIMITATIONS

Upon acceptance and use of this report, and its interpretations and recommendations, the user shall agree to indemnify and hold harmless QG, including its owners, employees and subcontractors, from any adverse effects resulting from development and occupation of the subject site. Ultimately, it is the owner's choice to develop and live in such an area of possible geohazards (which exist in perpetuity across the earth in one form or another), and therefore the future consequences, both anticipated and unknown, are solely the responsibility of the owner. By using this report for development of the subject property, the owner must accept and understand that it is not possible to fully anticipate all inherent risks of development. The recommendations provided above are intended to reduce (but may not eliminate) such risks.

This report does not represent a construction specification or plan and shall not be used or referenced as such. The information included in this report should be considered supplemental to the requirements contained in the project plans & specifications and should be read in conjunction with the above referenced information. The selected recommendations presented in this report are intended to inform only the specific corresponding subjects. All other requirements of the above-mentioned items remain valid, unless otherwise specified.

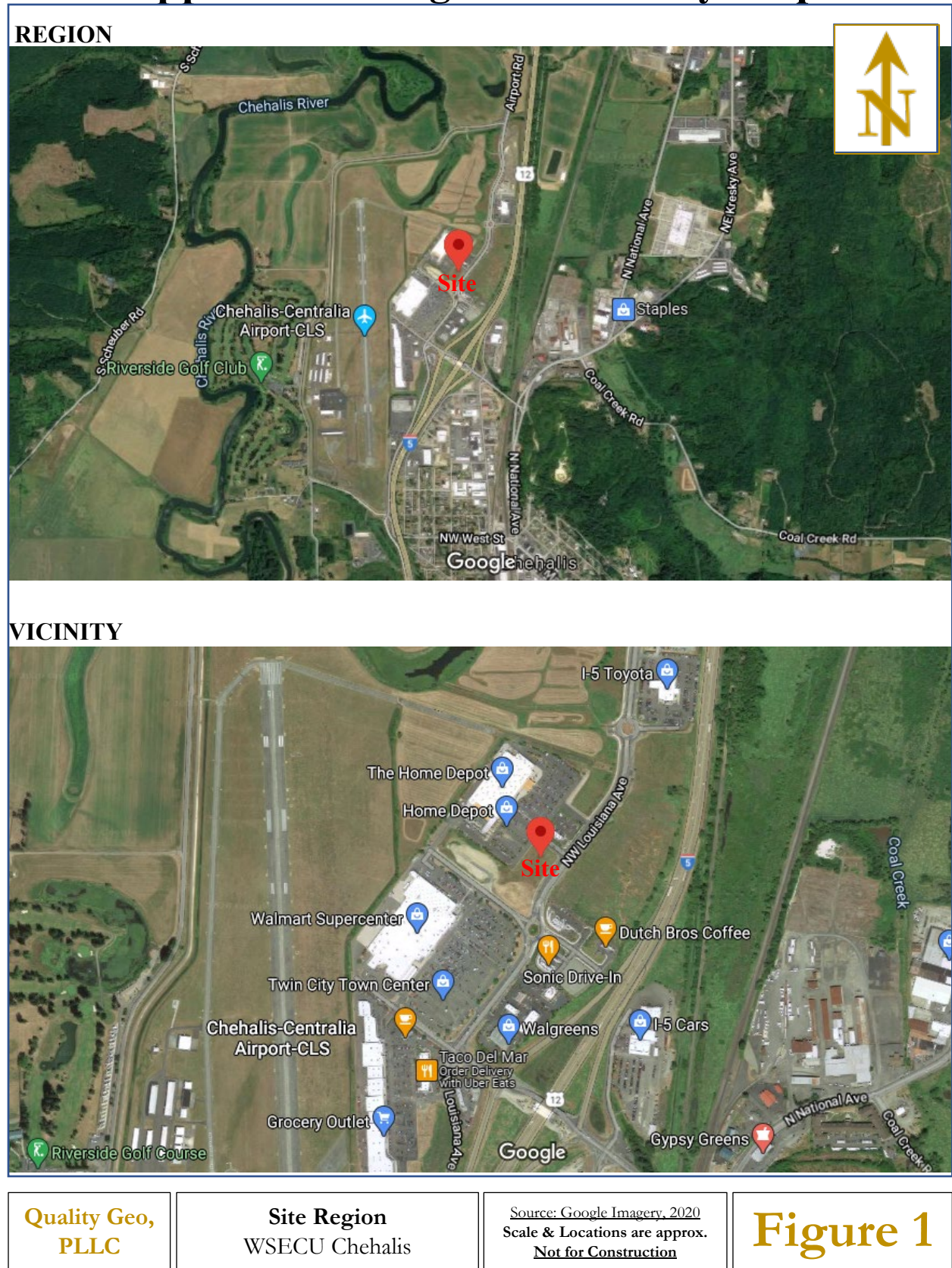
Recommendations contained in this report are based on our understanding of the proposed development and construction activities, field observations and explorations, and laboratory test results. It is possible that soil and groundwater conditions could vary and differ between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, or If the scope of the proposed construction changes from that described in this report, QG should be notified immediately in order to review and provide supplemental recommendations.

The findings of this study are limited by the level of scope applied. We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the subject region. No warranty, expressed or implied, is made. The recommendations provided in this report assume that an adequate program of tests and observations will be conducted by a WABO approved special inspection firm during the construction phase in order to evaluate compliance with our recommendations.

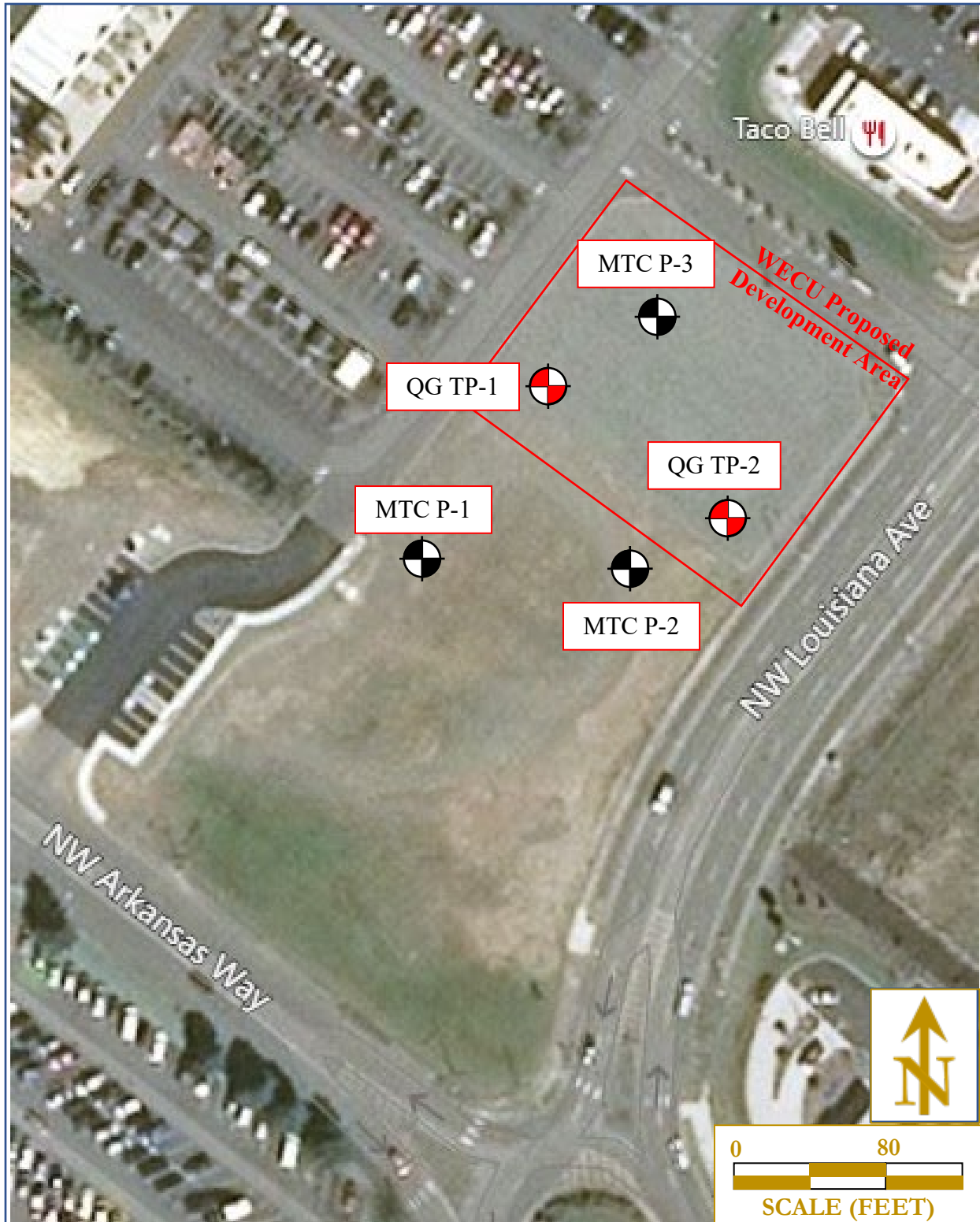
This report may be used only by the Client and their design consultants and only for the purposes stated within a reasonable time from its issuance, but in no event later than 18 months from the date of the report. It is the Client's responsibility to ensure that the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. Note that if another firm assumes Geotechnical Engineer of Record responsibilities, they need to review this report and either concur with the findings, conclusions, and recommendations or provide alternate findings, conclusions and recommendation.

Land or facility use, on- and off-site conditions, regulations, or other factors may change over time, and additional work may be required. Based on the intended use of the report, QG may recommend that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release QG from any liability resulting from the use of this report. The Client, the design consultants, and any unauthorized party, agree to defend, indemnify, and hold harmless QG from any claim or liability associated with such unauthorized use or non-compliance. We recommend that QG be given the opportunity to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted. We assume no responsibility for misinterpretation of our recommendations.

Appendix A. Region & Vicinity Maps



Appendix B. Exploration Map



Quality Geo,
PLLC

Site Map
WSECU Chehalis

Source: Microsoft Imagery, 2020
Scale & Locations are approx.
Not for Construction

Figure 2