



May 1, 2024

**Brannon Finney**

2933 Lindbergh Avenue  
Bellingham, WA 98225

**SUBJECT:** Coal Mine Hazard Evaluation for a Short Plat  
2933 Lindbergh Avenue (Parcel 380223 519114)  
Bellingham, Washington

Dear Brannon Finney:

This report presents the results of our coal mine hazard evaluation for the proposed two-lot short plat located at the above-referenced address. Our services were completed in general accordance with our proposal dated April 22, 2024.

**PURPOSE**

We understand that there are plans to subdivide the 0.25 acre lot located at 2933 Lindbergh Avenue in Bellingham, Washington into two residential lots. The project also includes constructing a new driveway/parking area and a pedestrian path for the existing single-family residence. Please refer to the Vicinity Map (Figure 1) for the approximate location of the project site and the Site Plan (Figure 2) for the proposed short plat configuration.



The photo above faces to the south and shows the front of the existing residence and detached garage.

The project site is located above the Bellingham Coal Mine (Bellingham No.1 Mine) shown on the City of Bellingham’s Geologic Hazards Map and therefore may be at risk from subsidence or other potential mine hazards. The purpose of our evaluation was to identify any mine hazard areas, as defined by Bellingham Municipal Code (BMC) 16.44.420, within the vicinity of the project site, to

evaluate potential risks and recommend appropriate mitigation, if necessary, to prevent adverse impacts to life or property.

**BACKGROUND**

In 1984, Tetra Tech, Inc. conducted a mine hazard study titled *Final Report Bellingham Abandoned Mine Land Survey* for the United States Department of Interior, Office of Surface Mining. The purpose of their evaluation was to identify and evaluate all potential hazards to life, health and property as a result of underground coal mining in the Bellingham area. Tetra Tech’s study included evaluations of the Sehome Mine (Bellingham Bay Mine) and the Bellingham No. 1 Mine. The subject property is located above the Bellingham No. 1 Mine.

According to the Tetra Tech report, the Bellingham Coal Mine Company operated the Bellingham No. 1 Mine from 1918 until 1955 and produced over 5.5 million tons of coal. The mine entries are at an elevation of approximately 94 feet above sea level and are located approximately 1/4 mile to the northeast of the Birchwood Avenue and Northwest Avenue intersection. The entries were backfilled upon closing the mine and are currently covered by a parking lot and shopping center. The coal seam has an average thickness of approximately 14 feet and approximately 8 to 9 feet of it was mined. This coal seam dips down generally to the southwest at approximately 10 degrees down to a maximum depth of approximately 1,000 feet below sea level. It is estimated that there are approximately 200 to 300 feet of unconsolidated glacial deposits that overlie the coal-bearing Chuckanut Formation bedrock. Drilling and blasting were used to mine until that technique was replaced by continuous miners in 1952. The Bellingham No. 1 Mine was developed using a bord and pillar configuration. Miners would extract the coal through tunnels (bords) and the coal between the bords would act as pillars to hold up the roof. The outer pillars could then be mined to control the collapse of the roof.

There is only one known case of subsidence above the Bellingham No. 1 Mine that caused damage to houses. A 2.4 acre area approximately centered on the Maplewood Avenue and Walnut Street intersection experienced settlement issues that included large cracks and fissures, heaving of pavement and damage to several houses on April 22, 1930. Tetra Tech proposed that the mine workings in this area may have been too close to the subcrop (contact between the bedrock and overlying glacial deposits) which caused eventual subsidence from roof collapse and glacial materials flowing into the mine.

The mine workings are at a depth of approximately 990 feet below the elevation of the project site, and the area of historic subsidence is approximately 1.0 mile to the northeast of the site. Please refer to the Mine Hazard Map (Figure 3) to review the approximate location of the subsidence near the Maplewood Avenue and Walnut Street intersection.

## **SITE GEOLOGY**

According to the *Geologic Map of Western Whatcom County, Washington* (Easterbrook, 1976), the project site is mapped as Outwash Sand and Gravel (Qso) of the Sumas Stade. This soil unit is a former glacial outwash plain consisting of gravel with cobbles and boulders near the Canadian border and grades southwestward to sand near Lynden. Outwash Sand and Gravel deposits are generally well-sorted and stratified with a unit thickness that may exceed 50 feet.

Outwash Sand and Gravel deposits overlie Bellingham Drift (Qb) of the Everson Interstade. Bellingham Drift is described as blue-gray, unsorted, unstratified, pebbly, sandy silt and pebbly clay, and locally contains marine mollusks and wood. Bellingham Drift was derived from rock debris melted out of floating ice and deposited on the sea floor, and has a maximum thickness of approximately 70 feet.

Easterbrook identified at least three soil units between the Bellingham Drift and the Chuckanut Formation bedrock. Deming Sand (Qd) of the Everson Interstade lies below Bellingham Drift and consists of brown, stratified, well-sorted, medium to coarse sand with occasional layers of silt, clay and gravel, and has a unit thickness of approximately 30 feet. Kulshan Drift (Qk) of the Everson Interstade lies below Deming Sand and consists of blue-gray, unsorted and unstratified mixture of sand, silt, clay and pebbles, and has a unit thickness ranging from approximately 15 to 25 feet. Vashon Till (Qvt) of the Vashon Stade lies below Kulshan Drift and consists of a compact, poorly-sorted matrix

of silt, clay and sand with occasional pebbles and cobbles, and has a unit thickness ranging from approximately 10 to 30 feet.

## **SURFACE OBSERVATIONS**

At the time of our site visit on April 25, 2024, the subject property was developed with a single-family residence, detached garage, paved driveway and fences. The adjacent properties were developed with single-family residences and associated improvements. Vegetation on the property consisted of occasional trees, shrubs, hedges, garden plants and lawn. The topography on the property was relatively flat with grades estimated to typically range from approximately 1 to 2 percent. Surface water was not observed at the site during our fieldwork.



The photo above faces to the north and shows the rear of the existing detached garage and residence.

We did not observe any obvious evidence of subsidence within the vicinity of the project site based on our fieldwork or review of aerial photos and Light Detection and Ranging (LiDAR) imagery. Geomorphic features that could indicate the presence of subsidence may include but are

not necessarily limited to: sinkholes; subsidence troughs and basins; portal collapse; cracks and fissures; linear sinks; and hummocky or uneven terrain (Johnson, 2013). In addition, we did not observe large settlement cracks in the existing building foundations or nearby paved surfaces. The client indicated that they are not aware of existing settlement issues or any mine-related features, such as entries, portals, adits, shafts or spoil piles on the property.

## **CONCLUSIONS**

Based on the results of our evaluation, it is our opinion that there appears to be a low potential for subsidence to occur at the site from the Bellingham No. 1 Coal Mine.

Bellingham Municipal Code (BMC) 16.55.410 states that, “*geologically hazardous areas include areas susceptible to erosion, landslide, rock fall, subsidence, earthquake, or other geological events. They pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard.*”

The subject property appears to be located above the Bellingham No. 1 Mine and therefore may lie within a potential mine hazard area. According to BMC 16.55.420, a potential mine hazard area is defined as follows:

*Mine hazard areas are those areas underlain by or affected by mine workings such as adits, gangways, tunnels, drifts, or airshafts, and those areas of probable sink holes, gas releases, or subsidence due to mine workings. Specific areas of known and suspected historical mining activity and hazards include:*

1. Areas depicted as coal mine hazard areas within the Geologic Hazard Areas Map Folio, Bellingham, Washington, 1991. [Ord. 2016-02-005, 28; Ord. 2010-08-050; Ord. 2008-04-037; Ord. 2005-11-092].

Please refer to the Mine Hazard Map (Figure 3) for the approximate locations and elevations of the mine workings for the Bellingham No. 1 Mine, entrances, subcrop line, and the approximate area of historic subsidence at the Maplewood Avenue and Walnut Street intersection. The 2007 City of Bellingham's Coal Mine Plan Layout and Depth Profile Map was used for the base map.

The Tetra Tech report includes a subsidence analysis used to develop Subsidence Classification Maps that identify zones of potential subsidence. Their subsidence analysis concluded that most of the Bellingham No. 1 Mine is stable. They identified two areas of possible subsidence: 1) mine areas which can have glacial till in-wash into the mine; and, 2) mine areas of possible pillar instability. The mine areas which can have glacial till in-wash were determined by including any area of the mine that approaches the subcrop, areas where the solid rock overburden is less than the estimated variation in glacial till thickness, and areas where the solid rock overburden is less than the pressure arch height. The mine areas defined by possible pillar instability were determined by an analysis that showed the pillars not capable of supporting the overburden (depths greater than 790 feet). More than one pillar would need to fail in this area to cause surface disturbance.

Based on our review of Tetra Tech's Subsidence Classification Maps, it appears that the project area is mapped within a 'Mine Area of Stability Due to Arching'. This area is where pillars, barrier pillars, and sections where coal has not been mined are stable enough to support a major arch that can bridge an area of mine openings and weak pillars.

The site also appears to be located within a 'Surface Area Which Can Be Affected By Pillar Instability'. 'Mine Areas of Possible Pillar Instability' are areas where Tetra Tech's analysis showed that the pillars are not capable of supporting the overburden; however, it would require the failure of more than one pillar for surface disturbance to occur.

The project site does not appear to lie within a 'Mine Area Which Can Have Glacial Till In-Wash into Mine', or within 'Surface Areas of Possible Property Damage Due to Till In-Wash', or within a 'Surface Area Affected By Till In-Wash (No Property Damage Expected)'. In addition, the site is not mapped within a 'Mine Area of Possible Pillar Instability' according to Tetra Tech's Subsidence Classification Maps.

It is our opinion that the proposed subdivision of the property and the construction of future residential improvements are feasible because there appears to be a relatively low risk of damage and low risk to life from the Bellingham No. 1 Coal Mine based on the following observations:

1. The only known case of historic subsidence above the Bellingham No. 1 Mine that damaged houses is located approximately 1.0 mile to the northeast of the site at the Maplewood Avenue and Walnut Street intersection.
2. We did not observe any obvious geomorphic indicators of subsidence or other mine-related features within the vicinity of the project site.
3. The Tetra Tech report does not map the project site within areas that are at a significant risk of being adversely affected from subsidence resulting from glacial till in-wash.

4. The project site is mapped within a 'Mine Area of Stability Due to Arching'. This is an area where the mine is stable enough to support a major arch and no subsidence is expected.
5. Although the project site is mapped within a 'Surface Area Which Can Be Affected By Pillar Instability', it would require the failure of more than one pillar for surface disturbance to occur.

Due to the relatively low potential for subsidence to occur from the Bellingham No. 1 Coal Mine, it is our opinion that mitigation is not needed for coal mine hazards for the project.

### **Alteration Requirements**

According to BMC 16.55.450 Performance standards - General requirements, A., *alterations of geologically hazardous areas or associated buffers may only occur for activities that:*

1. *Will not increase the threat of the geological hazard to adjacent properties beyond predevelopment conditions;*
2. *Will not adversely impact other critical areas;*
3. *Are designed so that the hazard to the project is eliminated or mitigated to a level equal to or less than predevelopment conditions; and*
4. *Are certified as safe as designed and under the anticipated conditions by a qualified engineer or geologist, licensed in the state of Washington.*

According to BMC 16.55.460 Performance Standards - Specific Hazards, C, 1., *alteration of a mine hazard area and/or buffer are allowed, as follows:*

- a. *All alterations are permitted within a mine hazard area with a low potential for subsidence.*
- b. *Within a mine hazard area with a moderate potential for subsidence and at coal mine byproduct stockpiles, all alterations are permitted subject to a mitigation plan to minimize risk of structural damage using appropriate criteria to evaluate the proposed use, as recommended in the hazard analysis.*
- c. *Within a mine hazard area with a severe potential for subsidence, no structural activities shall be permitted without an effective settlement mitigation strategy.*

Based on the results of our evaluation, and due to the relatively low potential for subsidence to occur from the Bellingham No. 1 Coal Mine, it is our opinion that the project will meet BMC 16.55.450 Performance standards - General requirements.

In addition, because it is our opinion that there is a low potential for subsidence, alterations to the mine hazard area from the project should be permitted.

### **Subdivision Requirements**

According to BMC 16.55.460 Performance Standards - Specific Hazards, *the division of land in mine hazard areas and associated buffers is subject to the following:*

- a. *Land that is located within 200 feet of a mine hazard area with severe potential for subsidence may not be subdivided. Land that is located partially within a mine hazard area may be divided; provided, that each resulting lot has sufficient buildable area that is 200 feet away from the mine*

*hazard area with a severe potential for subsidence. Land that is located within a mine hazard area with low or moderate potential for subsidence may be subdivided.*

Based on our assessment, the proposed subdivision of the property appears feasible because there appears to be a relatively low potential for subsidence to occur at the site from the Bellingham No. 1 Coal Mine.

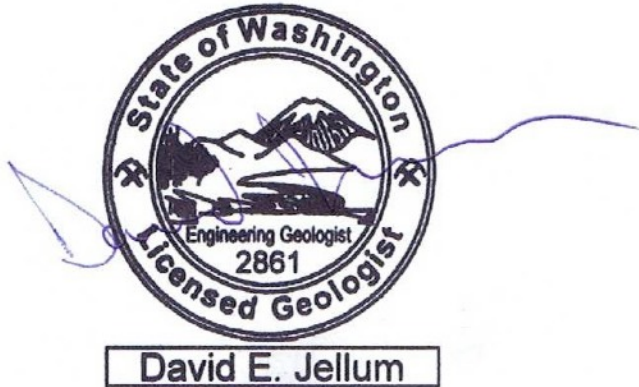
## **LIMITATIONS**

This report was prepared for the sole use of Brannon Finney and her authorized agents for the proposed short plat project located at 2933 Lindbergh Avenue in Bellingham, Washington. The conclusions and recommendations contained in this report are based on our visual reconnaissance of the project site in April of 2024, research and map review, and our experience working on similar projects. In the event the scope of the project changes or unanticipated conditions are encountered, we should be contacted to reevaluate our conclusions accordingly.

Our services were accomplished within the generally accepted practices of the geologic profession at the time this report was prepared under the limitations of scope, budget and schedule. It should be understood that no guarantee or warranty, suggested or expressed, is included with the professional opinions or recommendations contained in this report.

Thank you for the opportunity to work on your project. Please contact us at (360) 306-6171 or [soundgeology@gmail.com](mailto:soundgeology@gmail.com) if you have any questions regarding this report or if we can be of further assistance.

Sincerely,  
**Sound Geology, LLC**



David Jellum, LEG  
*Licensed Engineering Geologist*

#### **Attachments**

Figure 1            Vicinity Map  
Figure 2            Site Plan  
Figure 3            Mine Hazard Map

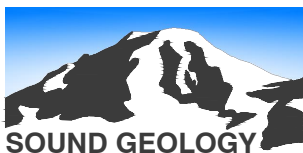
#### **References**

- Easterbrook, D.J. 1976. *Geologic Map of Western Whatcom County, Washington*. United States Geological Survey. Map I-854-B.
- Johnson, C.P. 2013. *A Guide to Surface Features Related to Underground Coal Mining*. University of Washington. MESSAGE Technical Report Number: 007.
- Tetra Tech, Inc. 1984. *Final Report Bellingham Abandoned Mine Land Survey*. United States Department of the Interior Office of Surface Mining. Denver, Colorado. TC-3920.





Reference: City of Bellingham Geologic Hazards Map 2022



360.306.6171  
www.soundgeology.com

Date 4-26-2024

File No. 24032

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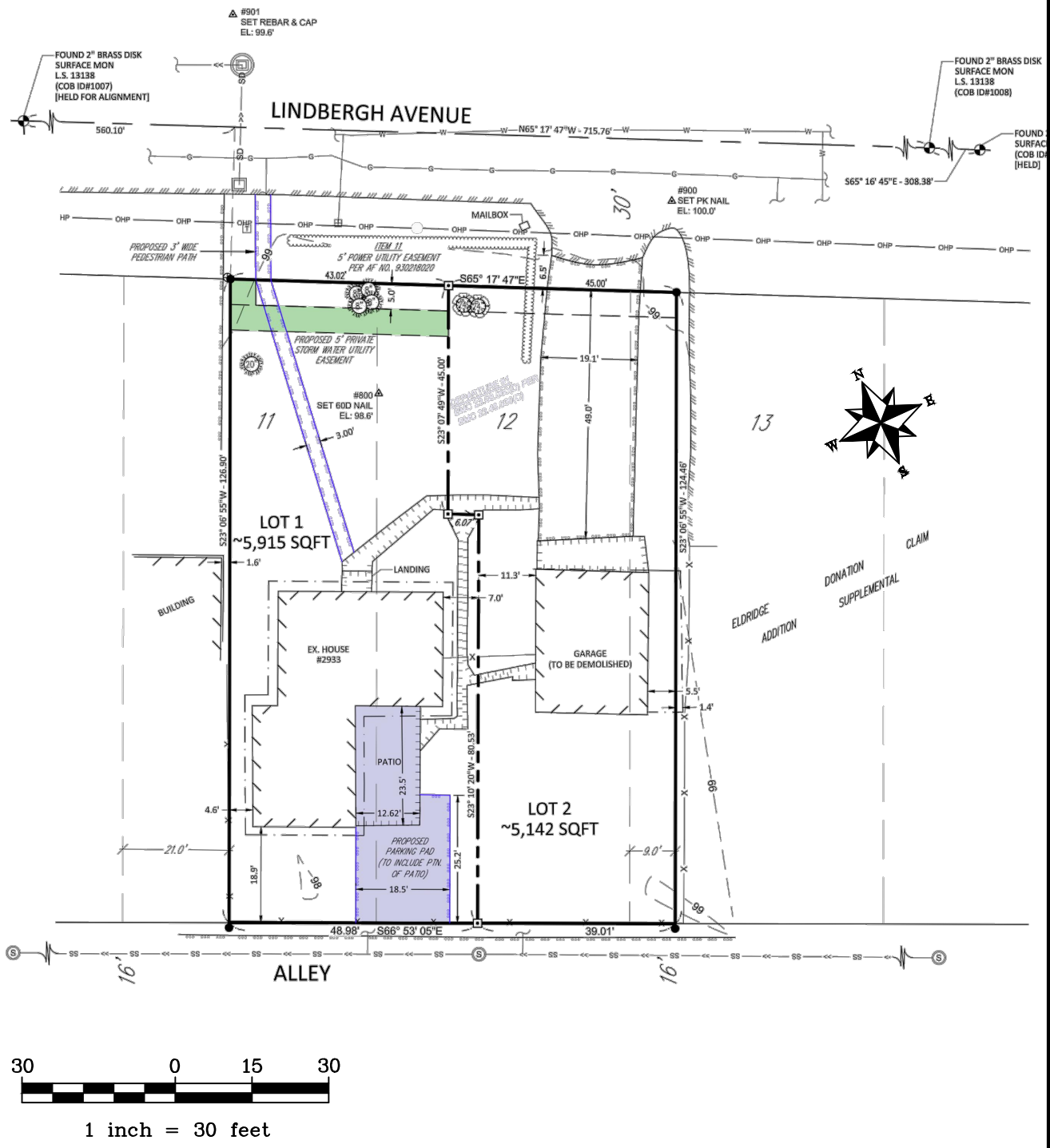
Scale None

**Vicinity Map**  
Proposed Short Plat  
2933 Lindbergh Avenue (Parcel 380223 519114)  
Bellingham, Washington

FIGURE

**1 of 3**





Reference: Preliminary Finney Short Plat map by Jepson & Associates.



Date 4-26-2024

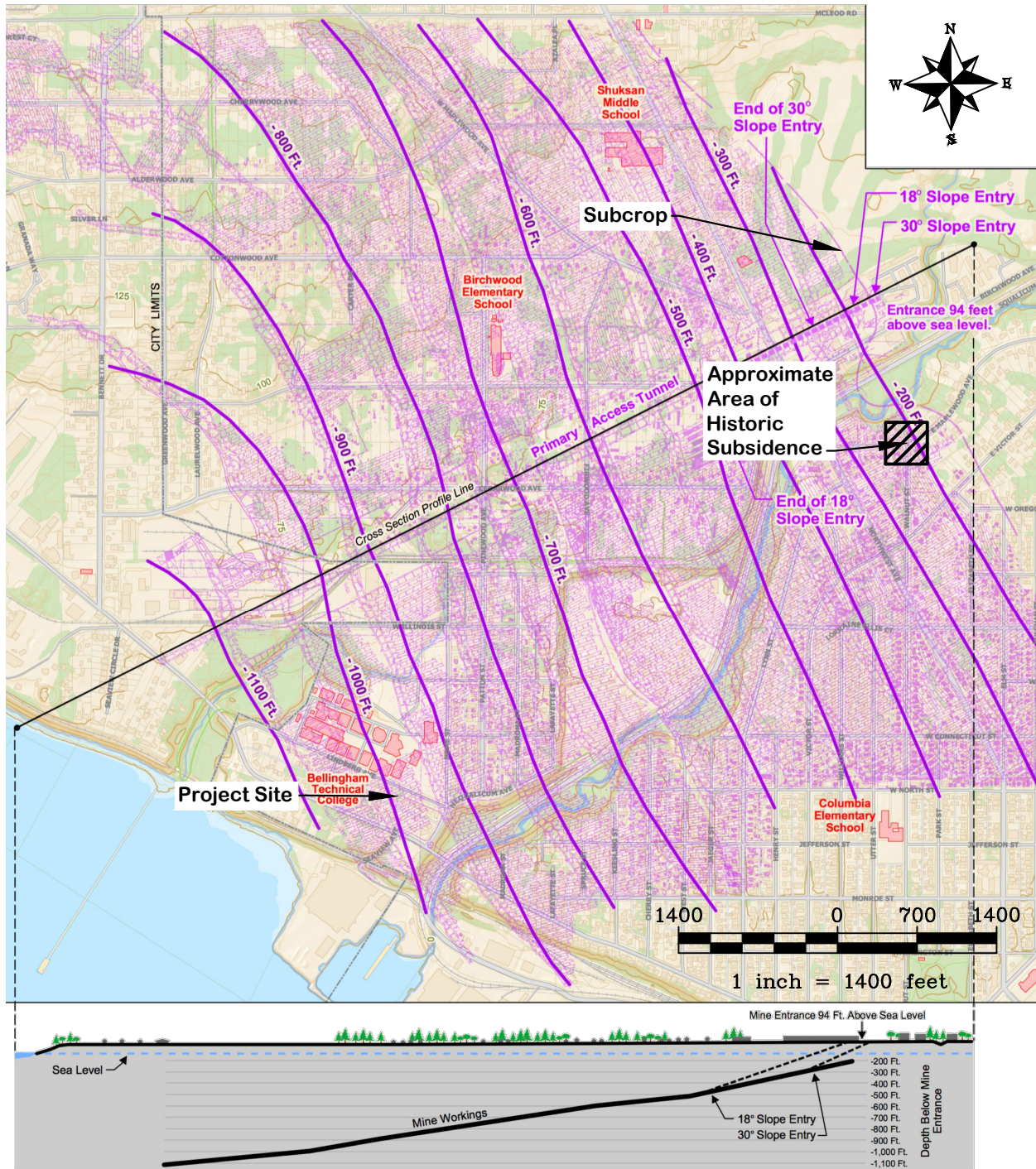
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Scale 1" = 30'

**Site Plan**  
Proposed Short Plat  
2933 Lindbergh Avenue (Parcel 380223 519114)  
Bellingham, Washington

**FIGURE**  
**2 of 3**



**Notes:** Based upon the 2007 City of Bellingham's Coal Mine Plan Layout and Depth Profile Map. The approximate area of historic subsidence is based upon descriptions from Tetra Tech's 1984 Final Report Bellingham Abandoned Mine Land Survey. The project site is mapped within a 'Mine Area of Stability Due to Arching' and within a 'Surface Area Which Can Be Affected by Pillar Instability', as shown on Figures 7B-1 and 7B-2 of the Bellingham No. 1 Mine - Subsidence Classification Map (Tetra Tech, 1984). No obvious visual indications of coal mine related subsidence were observed within the vicinity of the project site. Please refer to the report for more details.

 <p><b>SOUND GEOLOGY</b> 360.306.6171 www.soundgeology.com</p>	Date 4-26-2024	<p><b>Mine Hazard Map</b> Proposed Short Plat 2933 Lindbergh Avenue (Parcel 380223 519114) Bellingham, Washington</p>	<p><b>FIGURE</b>  <b>3 of 3</b></p>
	File No. 24032		
	Drawn By DEJ		
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