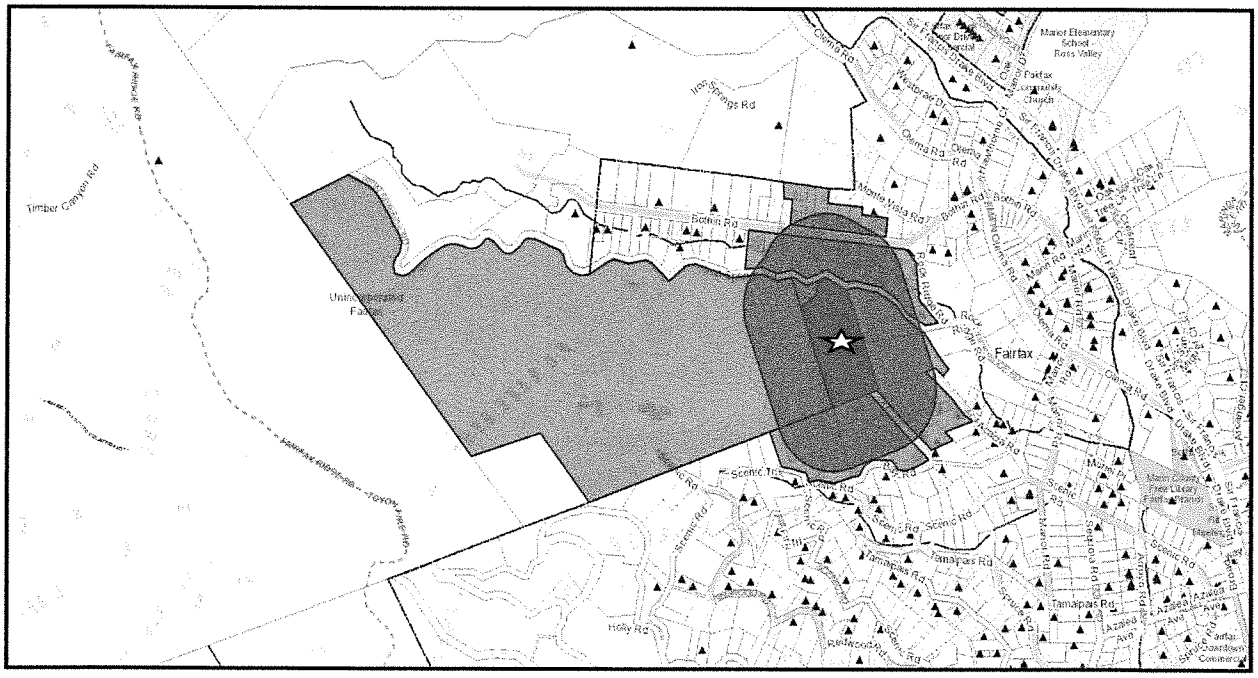
TOWN OF FAIRFAX
STAFF REPORT
Department of Planning and Building Services

TO:	Fairfax Planning Commission
DATE:	December 19, 2019
FROM:	Linda Neal, Principal Planner
LOCATION:	78 Bay Road; Assessor's Parcel No. 001-093-21
PROJECT:	New single-family residence and existing driveway improvements
ACTION:	Hill Area Residential Development, Excavation and Design Review permits; Application # 19-16
APPLICANT:	Leyla Hilmi, Designer
OWNER:	Ann Lockhart and Ted Bender
CEQA STATUS:	Categorically exempt, §15303(a)



78 BAY ROAD

AGENDA ITEM # 2

DESCRIPTION

Applications were submitted for Hill Area Residential Development, Excavation and Design Review permits on March 25, 2019. The project was declared complete on November 15, 2019.

The proposed project consists of the following: a) construction of a 3-story, 28-foot 9-inch tall, 2,954 square-foot residential structure with 1,400 square feet on the (upper) main floor, 676 square feet on the middle floor and 399 square feet of living space on the lower floor along with 479 square feet of unconditioned storage area; b) 458 s.f. deck off the living room; c) an approximately 465 square-foot living roof over the storage room on the lower floor and d) improvement of the existing driveway to a width that varies from 14 to 16 feet and including an expanded area to provide parking for 3 vehicles on the southwest side of the proposed residence. The driveway improvements and width expansion would result in retaining walls on either side of portions of the driveway that would vary from 1 foot to 6 feet in height. The total proposed project grading consists of 978 cubic yards of cut and 371 cubic yards of fill, for a net off-haul of 607 cubic yards.

The proposed residential structure would contain 3 bedrooms, 2 ½ bathrooms, an unconditioned storage room, family room, laundry room, living room, dining room, kitchen and office.

The existing 374 square-foot studio residence would be converted into an accessory dwelling unit through the building permit process and is not subject to this planning application. The existing detached storage shed will be retained while the detached wooden deck west of the studio unit will be removed.

The residence complies with the regulations set forth in the Residential Single-family RS-6 Zone District as follows:

	Front Setback	Rear Setback	Combined Front/rear Setback	Side Setbacks	Combined Side Setbacks	FAR	Lot Coverage	Height
Required/ Permitted	**6 ft.**	**12 ft.**	**35 ft.**	**5 ft. & 5 ft.**	**20 ft.**	**.40**	**.35**	**35 ft., 3 stories**
Existing	**366**	**107**	**473**	**49 ft. & 125 ft**	**174 ft.**	**.004**	**.01**	**12 ft., 1 story**
Proposed	**366 ft.**	**31 ft.**	**397 ft.**	**49 ft. 60 ft**	**109 ft.**	**.02**	**.02**	**28"-9", 3 stories**

BACKGROUND

The roughly 139,768 square-foot site is located at the terminus of Bay Road where it slopes down at an average rate of 47% to Iron Springs Road, which runs along a portion of the northern rear property line. The site is developed with a 374 square-foot residential studio structure that was constructed in 1916 and is accessed by an approximately 245 foot-long driveway, portions of which are surfaced intermittently with dirt, gravel and pavement. Roughly 30 feet into the property a narrow rough road extends steeply upwards towards the southeast, leading eventually to a Marin Municipal Water District (MMWD) tank site.

The site is identified as being within stability zone 4 on the "Observation of the Interpretation Map of the Relative Slope Stability of the Upper Ross Valley Area" prepared by Smith, Rice and Strand of the California Division of Maines and Geology in 1976.

The property file for the site documents a past slide on the site occurring in 1995 along the access driveway that was 15 to 20 feet in width and extended roughly 25 feet up the slope from the driveway that was repaired with rip-rap by the previous owner. The Town Engineer noted during their site inspection "local evidence of recent instability above the driveway and in the northern portion of the lot, above and along Iron Springs Road".

There was no sliding reported on the site during the severe weather events of 1982 and 1997-98.

REQUIRED DISCRETIONARY PERMITS

The project requires the approval of a Hill Area Residential permit, Excavation permit and a Design Review permit. The required discretionary permits and analysis of project compliance with the related sections of the Town Code and Zoning Ordinance are found below.

The project does not require the approval of a parking variance because it provides the required 3 parking spaces per Town Code § 17.052.030(A)(1) and (2) and is exempt from the covered parking requirement due to the site's 47% slope per Town Code § 17.052.020(D). The project will require a pipeline extension from the end of MMWD's existing facilities, for which the applicant must enter a pipeline extension agreement for the installation of the necessary facilities and receive approval by MMWD's Board of Directors. All costs associates with the extension shall be borne by the applicant, though the applicant may apply for a variance to these requirements, a copy of the building permit must be provided to MMWD along with the required applications and fees, the foundation must be completed within 120 days of the date of application, all indoor and outdoor requirements or District Code Title 13, Water Conservation must be complied with, any landscaping plans must be reviewed and approved by the MMWD, backflow prevention requirements must be met and Ordinance 420, requiring

installation of grey water recycling system when practicable, must be incorporated into the project building permit plans or an exemption letter from MMWD must be provided to the Town, all of MMWD's rules and regulations if effect at the time service is requested must be complied with.

Hill Area Residential Development

The purpose of the Hill Area Residential Development Permit is to encourage the maximum retention of natural topographic features, minimize grading of hillside areas, provide a safe means of ingress and egress to and within hillside areas, minimize water run-off and soils erosion during and after construction, prevent loss of life, reduce injuries and property damage and minimize economic dislocations from geologic hazards, and to ensure that infill development on hillside lots is of a size and scale appropriate to the property and is consistent with other properties in the vicinity under the same zone classification [Town Code sections 17.072.010(A) and (B)].

Town Code §17.072.090(C)(1) requires graded slopes to be sculptured and contoured to blend with the natural terrain and Town Code §17.072.090(C)(3) requires that the height of retaining walls be minimized within the Hill Area Residential Development Overlay Zones. The location of the house at the center of the site in the area already disturbed with retaining walls, pathways and a concrete driveway, accessory to the existing studio residence, will minimize site disturbance. The improvement of the existing driveway accessing the studio and the proposed new residence will be a benefit to existing and proposed development on the site, stabilizing the existing driveway and adjacent cut bank slopes. Both the project geotechnical engineer and the Town Engineer agree the areas above and below the existing driveway are currently potentially unstable along with the swale on the site, in the center of which the existing residential cottage is located.

Town Code § 17.072.090(D) indicates that projects within the Hill Area Residential Development Overlay Zone shall be designed to minimize disruptions of existing ecosystems. The proposal will result in modest widening of the existing driveway to provide adequate access for emergency vehicles into the already developed site with additional widening adjacent to the proposed new residence to provide the 3 parking spaces required in Town Code § 17.052.030(A)(1)(d) and (A)(2). The only other site disturbance will occur in the area of the proposed house itself in an area that already serves as improved yard area and driveway for the existing studio residence.

The widening of the roadway to 16 feet, with a small portion as approved by the Ross Valley Fire Department reduced to 14 feet to minimize the impacts on an existing redwood grove, would provide access to the required parking and residence entry with minimal impacts to the site. The drawings show the 14-foot section being narrowed on both sides but staff has spoken with the applicant's representative who agrees that the narrowing should all occur on the redwood grove side of the driveway. Staff has included this as condition of approval in the resolution recommending approval of the project.

The Fire Department has also indicated that access to the site by their firefighting apparatus will not be adversely affected by the existing extremely tight-radius intersection of Scenic Road and Bay Road.

The property is within ¼ mile of a known Northern Spotted Owl nesting site. Therefore, construction may not occur or must be minimized and/or monitored to be kept below certain noise levels to limit negative impacts to the birds during the nesting season which runs from February 1st through July 1st. Acts that result in the disturbance or death of Northern Spotted owns are a federal offense.

Drainage and Slope Stability

The Town Engineers have reviewed the entire body of information provided by the applicants on the project including the project engineering and architectural plans as well as the geotechnical report by Herzog Engineering dated 10/29/07 and the addendum dated 4/22/18, the response to the Town Engineers original project comments dated 7/10/19 by Adobe Associates, Inc. dated 10/9/19 (C1 through C3). After completing their review and visiting the site on 7/7/18, they have determined that the project can be constructed as proposed without creating any significant geologic or hydrologic hazards for adjacent public or private properties as long as certain conditions are met.

The original submittal proposed dispersal of surface run-off by level spreaders set above steep slopes along the downslope side of the driveway with the slopes below the driveway being described in the project geotechnical report(s) as being susceptible to instability. To address concerns about this type of design, and the impacts on such a drainage system of a 100 year flood, the project engineers have redesigned the drainage system relocating surface run-off discharge locations to avoid areas of previous landslide activity and have incorporated an erosion control and sediment control plan (sheet C3.0) into the project plans to provide storm-water best management practices (details provided on plan sheet C4.0). The drainage on the lower portion of the site will be directed to planter areas and residence downspouts will be directed to storm-drain pipes that spill into existing vegetation.

The Town Engineers have approved the proposed drainage redesign.

Due to the instability of the existing hillside behind the existing cottage, the Town Engineers are requiring that the building plans incorporate a debris catchment wall for the existing cottage that will become the ADU, as well as an underpinning retrofit or stitch piers to ensure stability of that portion of the side which is immediately adjacent to the proposed new residence.

House Siting and Design

As indicated above, the siting of the proposed house is in an area already disturbed by the existing residential development of the site. Most of the trees being removed are

being removed to facilitate improvement and widening of the private driveway from the terminus of Bay Road.

Design Review

Town Code §17.020.030(A) requires that the design of new residences be reviewed and approved by the Fairfax Planning Commission for compliance with the design review criteria contained in Town Code §17.020.040.

These criteria include but are not limited to the following:

"The proposed development shall create a well composed design harmoniously related to other facilities in the immediate area and to the total setting as seen from hills and other key vantage points in the community".

"The size and design of the structure shall be considered for the purpose of determining that the structure is in proportion to its building site and that it has balance and unity among its external features so as to present a harmonious appearance".

"The extent to which natural features, including trees, shrubs, creeks and rocks and the natural grade of the site are to be retained".

The proposed structure complies with the Design Review Criteria. The structure conforms to the general character of other structures in the vicinity, will require minimal disturbance to the 139,768 square-foot site for grading of the house pad and driveway improvements. The construction will require the removal of 10 Bays, 1 Coast Live Oak, 1 Coast Redwood, 2 Black Acacia, 1 Pacific Madrone and 1 Douglas Fir to comply with the fire safety, fire access and defensible space requirements of the Ross Valley Fire Department. The vegetative management plan was approved by the Fire Department on March 6, 2019 and the number of trees being removed matches those identified in the Tree Protection Plan by Dr. Kent Julin, dated 9/24/19 which was submitted to the Tree Committee with the tree removal permit application which was approved by the Fairfax Tree Committer on May 21, 2019 subject to the condition that tree # 14 (the Coast Live Oak) be retained if possible (Attachments D1A and D2).

The exterior of the structure will be well articulated through the use of board-and-batten siding on the main mass of the structure alternating with vertical siding proposed on the lower floor storage family portion of the building. The siding will be Hardie panel with a smooth finish in artic white for the upper floor, Hardie panel with a smooth finish in pearl grey for the middle floor and Hardie panel with a smooth finish in night gray for the lowest floor. The roof will be a Taylor metal roof (MS100) in charcoal grey, the walkway and deck railings will be a dark color called "raccoon fur" which will be very similar to the dark, almost black color of the window trim labeled " bronze" (see color and materials board). The upper level roof will support solar panels while the lower level roof over the storage room will be a living roof.

The site is very large by Fairfax standards - 139,768 square feet - and the house will not have a significant visual impact on any of the neighboring residences due to the large setbacks it will maintain from the property lines. Additionally, the house has a relatively small footprint, 3,089 square-feet, in relation to the site size, with a maximum height of 28 feet, 9 inches and the remainder of the site will be retained in its natural state.

78 Bay Road – SIMILAR PROPERTIES DEVELOPMENT							
APN #	ADDRESS	LOT SIZE	HOUSE SIZE	# BEDROOMS	# BATHS	GARAGE	FAR
001-031-42	464 Scenic	19625	2885	3	2 1/2	558	.15
001-051-01	434 Scenic	9000	2928	5	4	0	.33
001-051-02	429 Scenic	11927	4824	4	2 1/2	0	.40
001-052-30	309 Scenic	10961	3078	3	4	400	28
001-064-01	300 Tamalpais	18200	3219	5	3 1/2	400	.18
001-064-07	290 Tamalpais	35000	2812	3	3 1/2	0	.08
001-122-33	119 Scenic	7707	3340	4	3		.43
001-122-34	42 Tamalpais	12000	3038	6	4	324	.25
DEVELOPMENT OF PROPERTIES IN THE IMMEDIATE NEIGHBORHOOD ON BAY ROAD							
001-111-17		49222	1964	1	1	0	.04
001-111-16		7750	1348	4	2	0	.17
001-111-18		16800	1693	3	2	320	.10
001-112-15		8800	2028	4	1 1/2	0	.23
001-112-47		11770	1938	4	3 1/2	0	.16
001-112-09		6325	1886	4	2	0	.30
001-112-41		11700	1263	2	2	252	.11
001-112-49		13981	2557	5	4	500	.18
001-112-03		10925	1304	2	1	0	.12
78 Bay Road		139,768	2,975	3	2 ½	0	.02

The house has been designed to be in scale with the project site and similar in size to other structures in the neighborhood and on similar sized and sloped sites throughout the hillsides of Fairfax.

Excavation

Town Code §12.20.080 requires that an Excavation Permit be obtained from the Planning Commission for excavation and fill amounts of over 100 cubic yards. In order to approve an Excavation Permit the Commission must be able to find that the health, safety and welfare of the public will not be adversely affected, that adjacent properties are adequately protected by project investigation and design from geologic and hydrologic problems, that the amount of excavation or fill proposed is not more that is required to allow the owner substantial use of his or her property, that the visual and

scenic enjoyment of the area by others will not be adversely affected by the project more than is necessary, that natural landscaping will not be removed by the project more than is necessary and that the time of year during which the construction will take place is such that the work will not result in excessive siltation from storm run-off nor prolonged exposure of unstable slopes.

In the original submittal the project projected excavation/fill was 978 cubic yards of excavation and 24 cubic yards of fill. The Town Engineer was concerned about the proposed amount of off-haul from the site due to the constraints of the public access roads that would be used to access the site particularly the steep, tight-radius curve at the intersection of Scenic Road and Bay Road. At the recommendation of the Town Engineer the off-haul amount was reduced by utilizing 371 cubic yards of the excavated material to backfill non-storage crawl space areas and elevated patios around the house which has significantly decreased the amount of off-haul from 978 cubic yards to 607 cubic yards. Given limitations on the size of the haul trucks that can access the site, there will be roughly 60 truck loads to accommodate the grading off-haul.

The excavation proposed to install the drainage improvements and supply lines for the residence, parking and driveway improvements are the minimum necessary to allow construction, per the Town Engineers' recommendations to ensure slope stability throughout the project site and to comply with building and fire codes.

The Town Engineers have indicated that the site can be developed without causing adverse geologic or hydrologic problems for adjacent properties as long as the following conditions are complied with, and the plans are reviewed and approved by them, prior to issuance of the project building permit (Attachment B1):

1. The geotechnical report shall be updated with updated seismic and other design criteria and recommendations for construction of the residential structure.

2. The building plans will incorporate the recommended debris catchment improvements near the ADU structure as well as new foundation work (underpinning retrofit or stich piers as outlined in the October 29, 2007 Herzog report) (Attachment C2).

3. The building permit submittal for the driveway improvements shall incorporate deep foundation support, adequate debris catchment freeboard, and other elements as recommended in the recent geotechnical report dated April 22, 2019 by Herzog Geotechnical Engineering (Attachment C1).

OTHER DEPARTMENT/AGENCY COMMENTS/CONDITIONS

Ross Valley Fire Department (RVFD)

RVFD submitted written requirements which have been incorporated into conditions of approval in the attached resolution and are summarized as follows:

All vegetation and construction materials are to be maintained away from the residence during construction, the fire department access driveway shall be paved and shown to take the imposed vehicle weight of not less than 40,000 pounds, the building permit plans shall indicate whether the proposed hydrant is to be public or private and what type of hydrant shall be installed, a fire sprinkler system shall be installed throughout the entire building, smoke detectors shall be installed throughout the entire building and be provided with AC power and be interconnected for simultaneous alarm, carbon monoxide alarms shall be provided outside each sleeping area in the immediate vicinity of the bedrooms and address numbers at least 4 " tall visible from the street and internally illuminated or illuminated by and adjacent light controlled by a photocell and switched off only by a breaker so it will remain illuminated all night shall be installed.

Marin Municipal Water District (MMWD)

MMWD submitted written requirements which have been incorporated into conditions of approval in the attached resolution and are summarized as follows:

The site does not meet the conditions for service which include the property being fronted by a water main and the structure must be within 125 feet of that main. The project will require a pipeline extension from the end of MMWD's existing facilities, for which the applicant must enter a pipeline extension agreement for the installation of the necessary facilities and receive approval by MMWD's Board of Directors. All costs associates with the extension shall be borne by the applicant, though the applicant may apply for a variance to these requirements, a copy of the building permit must be provided to MMWD along with the required applications and fees, the foundation must be completed within 120 days of the date of application, all indoor and outdoor requirements or District Code Title 13, Water Conservation must be complied with, any landscaping plans must be reviewed and approved by the MMWD, backflow prevention requirements must be met and Ordinance 420, requiring installation of grey water recycling system when practicable, must be incorporated into the project building permit plans or an exemption letter from MMWD must be provided to the Town, all of MMWD's rules and regulations if effect at the time service is requested must be complied with.

Ross Valley Sanitary District (RVSD)

RVSD submitted written requirements which have been incorporated into conditions of approval in the attached resolution and are summarized as follows:

The project will require a connection permit from the District, the size of the sewer lateral will depend on the fixture count calculated during the permitting process, if the lateral meets the size requirement of the fixture count, the applicant has the option of installing a new lateral or, the old sewer lateral must be tested in the presence of a District Inspector and found to meet all current District Requirements.

Building and Public Works Departments

The Building Official/Public Works Manager is concerned about how access and egress to the site will be accomplished for deliveries, off-haul, and construction equipment and vehicles.

The applicants have submitted a construction management plan that includes the following to address the Building Official's concerns:

1. All large trucks with more than 2 axles accessing the site construction will be limited to the hours of 9 AM to 3 PM.

2. To make the turn from Scenic onto Bay trucks will pull one truck length on Scenic Road beyond the turn to Bay Road and then will reverse up Bay Road to 78 Bay Road. When leaving the site they will reverse down Bay Road, back one truck length onto Scenic Road and head front first down Scenic from that point.

3. Trucks removing off-haul will be limited to 10-yard dump trucks.

Staff has added the following additional conditions to the resolution recommending approval of the project:

1. The driveway improvement shall be completed and be signed off by the Town Engineer, the Building Official and the Ross Valley Fire Department before construction on the house begins.

2. Road closures shall be noticed in the field a minimum of 5 days prior to the event and individual written notifications shall be delivered to each resident on Bay Road.

3. A flag person shall precede any vehicles accessing or leaving the site in reverse until they are positioned to proceed vehicle front-first either down the private driveway or heading southeast down Scenic Road towards Sir Francis Drake Boulevard.

Also of concern is the possibility that construction of the recently approved house at 251 Scenic will conflict with the construction of the proposed house at 78 Bay Road if it is approved since they will be using the same access roads. Staff has added a condition to the resolution that the contractor on the 78 Bay Road job shall coordinate with the contractor on the 251 Scenic Road job to minimize impacts/conflicts to/with the residents of both roadways.

Fairfax Police

The Fairfax Police Department did not comment on the project.

RECOMMENDATION

1. Conduct the public hearing.
2. Move to approve application 19-16 by adopting Resolution No. 2019-21, attachment A, setting forth the findings and conditions for project approval

The narrowing of the driveway adjacent to the existing redwood grove shall occur entirely on the redwood grove side of the driveway improvements.

The property is within ¼ mile of a known Northern Spotted Owl nesting site. Therefore, construction may not occur or must be minimized and/or monitored to be kept below certain noise levels to limit negative impacts to the birds during the nesting season which runs from February 1st through July 1st. Acts that result in the disturbance or death of Northern Spotted Owls are a federal offense.

ATTACHMENTS

Attachment A – Resolution No. 2019-21
Attachment B1- Town Engineer's final report on project
Attachment B2 – Town Engineer's original report on project
Attachment C1- 4/22/19 Herzog Geotechnical report
Attachment C2 -10/29/07 Herzog Geotechnical report
Attachment C3 – 10/9/19 Adobe Associates report
Attachment D1 – Tree Committee letter of recommendation
Attachment D2 – 9/24/19 Tree Protection Report by Dr. Kent Julin

RESOLUTION NO. 2019-21

A Resolution of the Fairfax Planning Commission Approving Application No. 19-16 for a Hill Area Residential Development Permit, Excavation Permit, and Design Review Permit for a Residence at 78 Bay Road

WHEREAS, the Town of Fairfax has received an application from Ann Lockhart and Ted Bender to build a 3-story, 2,954 square-foot, 3 bedroom, 2½ bathroom single-family residence with an attached 479 square-foot internally connected storage room March 25, 2019; and

WHEREAS, the Planning Commission held a duly noticed Public Hearing on December 19, 2019 at which time the Planning Commission determined that the project complies with the Hill Area Residential Development Overlay Ordinance, Excavation Ordinance and Design Review Regulations; and

WHEREAS, based on the plans and other documentary evidence in the record the Planning Commission has determined that the applicant has met the burden of proof required to support the findings necessary to approve the Hill Area Residential Development, Excavation and Design Review Permits; and

WHEREAS, the Commission has made the following findings:

The project is consistent with the 2010-2030 Fairfax General Plan as follows:

Policy LU-7.1.5: New and renewed residential development shall preserve and enhance the existing character of the Town's neighborhoods in diversity, architectural character, size and mass.

Policy LU-7.2.2: To the extent feasible natural features including the existing grade, mature trees and vegetation shall be preserved for new and renewed development.

Policy LU-4.1.4: New and renewed development shall be designed to minimize run-off in a manner that does not cause undue hardship on neighboring properties.

Policy S-3.1.3: Maximize access and egress for emergency response vehicles.

Hill Area Residential Development

The proposed development is consistent with the General Plan and the Residential Single-family RS 6 Zone regulations.

1. The site planning preserves identified natural features as much as possible while also complying with other agencies' regulations.

2. Vehicular access and parking are adequate.

3. The proposed development harmonizes with surrounding residential development and meets the design review criteria contained in Town Code § 17.020.040.

4. The approval of the Hill Area Residential Development permit for one single-family residence and one accessory dwelling unit on this 139,768 square-foot parcel shall not constitute a grant of special privilege and shall not contravene the doctrines of equity and equal treatment.

5. The development and use of property as approved under the Hill Area Residential Development Permit will not cause excessive or unreasonable detriment to adjoining properties or premises, or cause adverse physical or economic effects thereto, or create undue or excessive burdens in the use and enjoyment thereof, or any or all of which effects are substantially beyond that which might occur without approval or issuance of the use permit.

6. Approval of the proposed Hill Area Residential Development permit is not contrary to those objectives, goals or standards pertinent to the particular case and contained or set forth in any Master Plan, or other plan or policy, officially adopted by the City.

7. Approval of the Hill Area Residential Development permit will result in equal or better development of the premises than would otherwise be the case.

Excavation Permit

8. The Town Engineers have reviewed the following plans and reports and have determined the project can be constructed, with certain conditions of approval, without creating any hazards:

    a. Architectural plans by Leyla Hilmi Design, pages A0.0 through A0.7, A1.0 through A1.3, A2.0 through A2.2, A3.0 and A3.1, A.7.0 and A9.0 dated received 10/10/19, lighting plans MEP 1.0 and 1.1 dated received 10/10/19, landscaping plan L1.0 dated received 10/10/19, sheets C1.0, C2.0, C2.1, C3.0 and C4.0 by Adobe Associates, Inc. dated 10/9/19, topographic map by J.L. Engineering dated September 2019, Tree Removal and Protection Plan sheet by Arborscience, LLC dated 9/24/19.

9. Based on the Town Engineer's review and recommendation that the project can be safely constructed, the Planning Commission finds that:

10. The health safety and welfare of the public will not be adversely affected;

11. Adjacent properties are adequately protected by project investigation and design from geologic hazards as a result of the work;

12. Adjacent properties are adequately protected by project design from drainage and erosion problems as a result of the work;

13. The amount of the excavation or fill proposed is not more than that required to allow the property owner substantial use of his or her property;

14. The visual and scenic enjoyment of the area by others will not be adversely affected by the project more than is necessary;

15. Natural landscaping will not be removed by the project more than is necessary; and

16. Town code § 17.072.090(c)(4) prohibits grading of hillside properties from October 1st through April 1st of each year. Therefore, the time of year during which construction will take place is such that work will not result in excessive siltation from storm runoff nor prolonged exposure of unstable excavated slopes.

17. Construction may not occur or must be minimized and/or monitored to be kept below certain noise levels to limit negative impacts to the Northern Spotted Owls during the nesting season which runs from February 1st through July 1st

WHEREAS, the Commission has approved the project subject to the applicant's compliance with the following conditions:

18. The project is approved per the following plans and documents: Architectural plans by Leyla Hilmi Design, pages A0.0 through A0.7, A1.0 through A1.3, A2.0 through A2.2, A3.0 and A3.1, A.7.0 and A9.0 dated received 10/10/19, lighting plans MEP 1.0 and 1.1 dated received 10/10/19, landscaping plan L1.0 dated received 10/10/19, sheets C1.0, C2.0, C2.1, C3.0 and C4.0 by Adobe Associates, Inc. dated 10/9/19, topographic map by J.L. Engineering dated September 2019, Tree Removal and Protection Plan sheet by Arborscience, LLC dated 9/24/19.

19. Prior to issuance of any of the building permits for the project the applicant or his assigns shall:

    a. Submit a construction plan to the Public Works Department which may include but is not limited to the following:

        I. Construction delivery routes approved by the Department of Public Works.
        II. Construction schedule (deliveries, worker hours, etc.)
        III. Notification to area residents
        IV. Emergency access routes

b. The applicant shall prepare, and file with the Public Works Director, a video tape of the roadway conditions on the public construction delivery routes (routes must be approved by Public Works Director).

c. Submit a cash deposit, bond or letter of credit to the Town in an amount that will cover the cost of grading, weatherization and repair of possible damage to public roadways. The applicant shall submit contractor's estimates for any grading, site weatherization and improvement plans for approval by the Town Engineer. Upon approval of the contract costs, the applicant shall submit a cash deposit, bond or letter of credit equaling 100% of the estimated construction costs.

d. The foundation and retaining elements shall be designed by a structural engineer certified as such in the state of California. Plans and calculations of the foundation and retaining elements shall be stamped and signed by the structural engineer and submitted to the satisfaction of the Town Structural Engineer.

e. The grading, foundation, retaining, and drainage elements shall also be stamped and signed by the site geotechnical engineer as conforming to the recommendations made by the project Geotechnical Engineer.

f. Prior to submittal of the building permit plans, the applicant shall secure written approval from the Ross Valley Fire Authority, Marin Municipal Water District and the Ross Valley Sanitary District noting the development conformance with their recommendations.

g. Submit 3 copies of the record of survey with the building permit plans.

h. All retaining walls that are visible from the street and are constructed of concrete shall be heavily textured or colorized in a manner approved by planning staff prior to issuance of the building permit. This condition is intended to mitigate the visual impact of the proposed walls.

i. Three copies of the Tree Protection/Preservation Plan by Arborscience, LLC dated 9/24/19 shall be submitted with the building permit application and all recommendations included in this report shall be conditions of the project approval including but not limited to recommendations for the treatment of multi-stemmed trees and tree protection fencing, trunk and limb protection and soil armoring. All the inspections contained in the inspection schedule on page 4 of the report shall be made by the project arborist who shall provide the Town with written verification after each inspection that the work is progressing in compliance with the recommendations and conditions of the arborist.

j. Prior to the removal of any trees not approved by the Planning

Commission through this action, the applicant shall secure a tree cutting permit, if required, from the Fairfax Tree Committee prior to removal of any on-site trees subject to a permit under Town Code Chapter 8.36. To further minimize impacts on trees and significant vegetation, the applicant shall submit plans for any utility installation (including sewer, water and drainage) which incorporates the services of the project arborist to prune and treat trees having roots 2 inches or more in diameter that are disturbed during the construction, excavation or trenching operations. In particular, cross country utility extensions shall minimize impacts on existing trees. Tree root protection measures may include meandering the line, check dams, rip rap, hand trenching, soil evaluation and diversion dams. Any pruning shall take place during the winter when trees are dormant for deciduous species and during July to August for evergreen species.

k. If deemed necessary by the Town Engineers, the applicants shall prepare a drainage system maintenance agreement including a recordable exhibit of the proposed drainage system in its entirety including a maintenance schedule to be approved by the Town Engineer. The maintenance agreement will have to be signed by the owner, notarized and recorded at the Marin County Recorder's office prior to issuance of the building permit.

20. During the construction process the following shall be required:

a. The geotechnical engineer and the project arborist shall be on-site during the grading process and both shall submit written certification to Town Staff that the grading and tree protection measures have been completed as recommended prior to installation of foundation and/or retaining forms and drainage improvements, piers and supply lines.

b. Prior to the concrete form inspection by the building official, the geotechnical and structural engineers shall field check the forms of the foundations and retaining elements and provide written certification to Town staff that the work to this point has been completed in conformance with their recommendations and the approved building plans.

c. The Building Official shall field check the concrete forms prior to the pour.

d. All construction-related vehicles including equipment delivery, cement trucks and construction materials shall be situated off the travel lane of the adjacent public right(s)-of-way at all times. This condition may be waived by the Building Official on a case-by-case basis with prior notification from the project sponsor.

e. Any proposed temporary closures of a public right-of-way shall require prior approval by the Fairfax Police Department and any necessary traffic

control, signage or public notification shall be the responsibility of the applicant or his/her assigns. Any violation of this provision will result in a stop work order being placed on the property and issuance of a citation.

21. Prior to issuance of an occupancy permit the following shall be completed:

    a. The geotechnical engineer shall field check the completed project and submit written certification to Town Staff that the foundation, retaining, grading and drainage elements have been installed in conformance with the approved building plans and the recommendations of the soils report.

    b. The Planning Department and Town Engineer shall field check the completed project to verify that all planning commission conditions and required engineering improvements have been complied with including installation of landscaping and irrigation prior to issuance of the certificate of occupancy.

22. Excavation shall not occur between October 1st and April 1st of any year. The Town Engineer has the authority to waive this condition depending upon the weather.

23. The roadways shall be kept free of dust, gravel and other construction materials by sweeping them, daily, if necessary.

24. Any changes, modifications, additions or alterations made to the approved set of plans will require a modification of Application # 19-16. Modifications that do not significantly change the project, the project design or the approved discretionary permits ***may*** be approved by the Planning Director. Any construction based on job plans that have been altered without the benefit of an approved modification of Application 19-16 will result in the job being immediately stopped and red tagged.

25. Any damages to the public portions of Bay Rd., Scenic Road, or other public roadway used to access the site resulting from construction-related activities shall be the responsibility of the property owner.

26. The applicant and its heirs, successors, and assigns shall, at its sole cost and expense, defend with counsel selected by the Town, indemnify, protect, release, and hold harmless the Town of Fairfax and any agency or instrumentality thereof, including its agents, officers, commissions, and employees (the "Indemnitees") from any and all claims, actions, or proceedings arising out of or in any way relating to the processing and/or approval of the project as described herein, the purpose of which is to attack, set aside, void, or annul the approval of the project, and/or any environmental determination that accompanies it, by the Planning Commission, Town Council, Planning Director, Design Review Board or any other department or agency of the Town. This indemnification shall include,

but not be limited to, suits, damages, judgments, costs, expenses, liens, levies, attorney fees or expert witness fees that may be asserted or incurred by any person or entity, including the applicant, third parties and the Indemnitees, arising out of or in connection with the approval of this project, whether or not there is concurrent, passive, or active negligence on the part of the Indemnitees. Nothing herein shall prohibit the Town from participating in the defense of any claim, action, or proceeding. The parties shall use best efforts, acting in good faith, to select mutually agreeable defense counsel. If the parties cannot reach agreement, the Town may select its own legal counsel and the applicant agrees to pay directly, or timely reimburse on a monthly basis, the Town for all such court costs, attorney fees, and time referenced herein, provided, however, that the applicant's duty in this regard shall be subject to the Town's promptly notifying the applicant of any said claim, action, or proceeding.

27. The applicant shall comply with all applicable local, county, state and federal laws and regulations. Local ordinances which must be complied with include, but are not limited to: the Noise Ordinance, Chapter 8.20, Polystyrene Foam, Degradable and Recyclable Food Packaging, Chapter 8.16, Garbage and Rubbish Disposal, Chapter 8.08, Urban Runoff Pollution Prevention, Chapter 8.32 and the Americans with Disabilities Act.

28. Conditions placed upon the project by outside agencies or by the Town Engineer may be eliminated or amended with that agency's or the Town Engineer's written notification to the Planning Department prior to issuance of the building permit.

29. Conditions placed upon the project by the project arborist may be amended or eliminated by the approval of the Planning Director after receiving a request for the elimination/amendment in writing from the project arborist.

30. The building permit plans shall be reviewed and approved by the Town Engineer, at the expense of the applicant, prior to issuance of the building permit. The project shall be inspected by the Town Engineer prior to issuance of the occupancy permit for the residential structures for compliance with the engineering plans.

Ross Valley Fire Department

31. Project has been deemed a "substantial remodel" and as such requires installation of a fire sprinkler system that complies with the National Fire Protection Association regulation 13-D and local standards. The system will require a permit from the Fire Department and the submittal of plans and specifications for a system submitted by an individual or firm licensed to design and/or design-build sprinkler systems.

32. The property is located within the Wildland Urban Interface Area for Fairfax and the new construction must comply with Chapter 7A of the California Building Code or equivalent.

33. All smoke detectors in the residence shall be provided with AC power and be interconnected for simultaneous alarm. Detectors shall be located in each sleeping room, outside of each sleeping room in a central location in the corridor and over the center of all stairways with a minimum of 1 detector on each story of the occupied portion of the residence.

34. Carbon monoxide alarms shall be provided in existing dwellings when a permit is required for alterations, repairs, or addition and the cost of the permit exceeds $1,000.00. Carbon monoxide alarms shall be located outside of each sleeping area in the immediate vicinity of the bedrooms and on every level of the dwelling, including basements.

35. Address numbers at least 4 inches tall must be in place adjacent to the front door. If not clearly visible from the street, additional numbers must be placed in location that is visible from the street. The numbers must be internally illuminated or illuminated by and adjacent light controlled by a photocell that can be switched off only by a breaker so it will remain illuminated all night.

36. Alternative materials or methods may be proposed for any of the above conditions in accordance with Section 104.9 of the Fire Code.

37. All approved alternatives requests, and their supporting documentation, shall be included in the plan sets submitted for final approval by the Fire Department.

38. The proposed hydrant shall be identified as either private or public and the type shall be specified in the building permit submittal plans.

Marin Municipal Water District (MMWD)

39. The project will require a pipeline extension from the end of the District's existing facilities, the applicant must enter a pipeline extension agreement for the installation of the necessary facilities and said agreement must be approved by the District's Board of Directors. All costs associated with the extension shall be borne by the applicant though the applicant may apply for a variance to these requirements

40. A copy of the building permit must be provided to the district along with the required applications and fees.

41. The foundation must be completed within 120 days of the date of application.

42. All indoor and outdoor requirements or District Code Title 13, Water Conservation must be complied with.

43. Any landscaping plans must be reviewed and approved by the District.

44. Backflow prevention requirements must be met.

45. Ordinance 420, requiring installation of grey water recycling system when practicable, must be incorporated into the project building permit plans or an exemption letter from the District must be provided to the Town.

46. All of the District's rules and regulations if effect at the time service is requested must be complied with.

Ross Valley Sanitary District (RVSD)

47. The project will require a connection permit from the District.

48. The size of the sewer lateral will depend on the fixture count calculated during the permitting process.

49. If the lateral meets the size requirement of the fixture count, the applicant has the option of installing a new lateral or, the old sewer lateral must be tested in the presence of a District Inspector and found to meet all current District Requirements.

Fairfax Building and Public Works Departments

50. All large trucks with more than 2 axels accessing the site for construction will be limited to the hours of 9 AM to 3 PM.

51. To make the turn from Scenic onto Bay road trucks will pull one truck length on Scenic Road beyond the turn to Bay Road and then will reverse up Bay Road to 78 Bay Road. When leaving the site, they will reverse down Bay Road, back one truck length onto Scenic Road and head front first down Scenic from that point.

52. Trucks removing off-haul will be limited to 10-yard dump trucks.

53. The driveway improvements shall be completed and be signed off by the Town Engineer, the Building Official/Public Works Managers and the Ross Valley Fire Department before construction on the house begins.

54. Road closures shall be noticed in the field a minimum of 5 days prior to the event and individual written notifications shall be delivered to each resident on Bay Road.

55. A flag person shall precede any vehicles accessing or leaving the site in reverse until they are positioned to proceed "front end" either down the private driveway or heading southeast down Scenic Road towards Sir Francis Drake Boulevard.

56. The contractor shall coordinate with the contractor on the 251 Scenic Road job to minimize impacts/conflicts to/with the residents of both Bay and Scenic Road.

Miscellaneous

57. Construction shall be prohibited during the Northern Spotted Owl nesting season from February 1st through July 1st.

NOW, THEREFORE BE IT RESOLVED, the Planning Commission of the Town of Fairfax hereby finds and determines as follows:

The approval of the Hill Area Residential Development Permit, Excavation Permit, and Design Review Permit are in conformance with the 2010 – 2030 Fairfax General Plan, the Fairfax Town Code and the Fairfax Zoning Ordinance, Town Code Title 17; and

Construction of the project can occur without causing significant impacts on neighboring residences and the environment.

The foregoing resolution was adopted at a regular meeting of the Planning Commission held in said Town, on the 19th day of December 2019 by the following vote:

AYES:
NOES:
ABSTAIN:

_____
Chair, Swift

Attest:

_____
Ben Berto, Director of Planning and Building Services

MILLER PACIFIC ENGINEERING GROUP

October 31, 2019
File: 201.181bltr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: Second Planning-Level Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residential Development
78 Bay Road (APN 001-093-21)
Fairfax, California

Introduction

In response to your request and in accordance with our agreement dated March 20, 2018, we have performed a second review of updated project plans and supporting documentation for the proposed new single-family residence and associated improvements at 78 Bay Road (APN 001-093-21) in Fairfax, California. The purpose of our services is to review the submitted documents, comment on the completeness and adequacy of the submittal in consideration of Town requirements, and to provide a recommendation to Town Planning and Building staff regarding project approval.

The scope of our services includes:

- A site reconnaissance to observe existing conditions and review proposed development features;
- Review of provided project documents for conformance to the Town of Fairfax Hill Area Residential Development Ordinance, specifically Town Code Sections 17.072.080(B), (C), (E), and (F), and Section 17.072.110 (C).
- Development of opinions regarding project compliance with applicable Town Code requirements; and
- Development of recommendations to Town staff as to whether the project may be safely constructed in consideration of any geologic, hydrologic, or geotechnical hazards.

It should be noted that the scope of our review is limited solely to geologic, geotechnical, and civil portions of the project, and does not include review of structural, architectural, mechanical, or other items beyond the scope of our qualifications. We recommend that non-geotechnical aspects of the plans be reviewed by suitably qualified professionals.

Project Description

The project generally consists of constructing a new, approximately 2,954 square-foot, 3-level residence on a single assessor's parcel. The new residence structure will apparently be constructed largely at-grade, incorporating supported floors over interior crawl spaces, and utilizing new site retaining walls to accommodate expanded level terrace and yard areas. Footprints of the 3 floors are offset such that the structure ranges to a maximum of 2-stories high

504 Redwood Blvd., Suite 220 ■ Novato, California 94947 ■ T (415) 382-3444 F (415) 382-3450

ATTACHMENT B1

at any point. An existing cottage will remain and be converted to an ADU. Exterior terraces and landscape areas will be accommodated by new backfilled site walls. Ancillary site improvements will include a new widened, asphalt-surfaced driveway and associated retaining walls, site drainage, landscape and erosion-control improvements, and other items. Several large trees are proposed for removal to accommodate the widened driveway.

The approximately rectangular parcel is generally elongated in the northwest-southeast direction and slopes down to the north and east at inclinations locally between about 3:1 (H:V) and 1:1. The parcel is bounded by (asphalt-surfaced) Iron Springs Road to the north (downslope), with vehicle access provided by a long descending gravel driveway extending from Bay Road at the southeast (upslope) end of the parcel. Downslope properties to the north and east (along Iron Springs Road and Rock Ridge Road) are developed with existing residences. An MMWD water tank is sited on the ridgeline southwest of the site, and is accessed via a dirt road within a semi-circular, 30-foot easement which extends off the gravel driveway in the southern part of the property.

Project Review

We performed a brief site reconnaissance on July 7, 2019 to observe existing conditions at the site. Additionally, we have reviewed the following documents provided by the Town:

- William Schroeder & Associates (1997), "Record of Survey, Lands of Richardson", Sheet 1 of 1, recorded February 3, 1997.
- Herzog Geotechnical (2007), "Report, Geotechnical Investigation, 78 Bay Road, Fairfax, California", Project Number 2193-01-07, dated October 29, 2007.
- J.L. Engineering (2019), "Topographic Survey, Bender & Lockhart Residence – 78 Bay Road (AP No. 001-093-21), Fairfax, Marin County, California", Sheet 2 of 2, Job No. 2017-097, dated February 2019.
- Adobe Associates, Inc. (2019), "Stormwater Control Plan for Small Projects/Single-Family Homes (for) 78 Bay Road, Fairfax, CA, APN 001-093-21", Job Number 18050, dated March 5, 2019.
- Town of Fairfax (2019), "Re: 78 Bay Road Planning Application" (Notice of Incomplete Application), dated April 5, 2019.
- J.L. Engineering (2019), "Topographic Survey, Bender & Lockhart Residence – 78 Bay Road (AP No. 001-093-21), Fairfax, Marin County, California", Sheet 3 of 4, Job No. 2017-097, dated May 2019.
- First American Title Company (2019), "Condition of Title", Guarantee Number 5026900-5938832, dated May 3, 2019.
- Ted Bender and Amy Lockhart (Applicants), Town of Fairfax Application For Tree Removal or Alteration (including cover letter), dated May 6, 2019.

- Adobe Associates, Inc. (2019), "Preliminary Driveway Plan, Lands of Lockhart and Bender" (Preliminary Plans, Site Profiles, and Sections), Sheets C1.0 through C2.1, Job Number 18050, dated June 17, 2019.

- Adobe Associates, Inc. (2019), "Stormwater Control Plan for Small Projects/Single-Family Homes (for) 78 Bay Road, Fairfax, CA, APN 001-093-21", Job Number 18050, dated June 17, 2019.

- Leyla Hilmi Design (2019), "78 Bay Road, 001-093-21" (Architectural, MEP, and Landscape Plans), Sheets A0.0 through A3.1, MEP 1.0 and 1.1, and L1.0, Revision 1 Planning Set dated June 17, 2019.

- Hilmi Design (2019), "RE: 78 Bay Road Planning Application" (Cover letter addressing response to Town comments), dated June 18, 2019.

More recently, we revised and revised the following documents in response to comments contained in our first review letter dated July 10, 2019:

- Herzog Geotechnical (2019), "Geotechnical Investigation, Driveway Retaining Walls, 78 Bay Road, Fairfax, California", Project Number 2193-02-19, dated April 22, 2019.

- JLH Engineering Inc. (2019), "78 Bay Road, Fairfax, Bender Residence, Response to Town of Fairfax Comments (7/16/2019)", Job No. 2017-097, dated August 7, 2019.

- Adobe Associates (2019), email summary of correspondence between Aaron Smith, PLS and Town Engineer regarding survey and title report discrepancies, various dates between August 12 and August 22, 2019.

- J.L. Engineering (2019), "Topographic Survey, Bender & Lockhart Residence – 78 Bay Road (AP No. 001-093-21), Fairfax, Marin County, California", Sheets 1 through 3, Job No. 2017-097, dated September, 2019.

- Arborscience, LLC (2019), "Tree Protection Plan, 78 Bay Road, Fairfax, California", dated September 24, 2019.

- Leyla Hilmi Design (2019), "78 Bay Road, 001-093-21" (Architectural, MEP, and Landscape Plans), Sheets A0.0 through A3.1, MEP 1.0 and 1.1, and L1.0, Revision 1 Planning Set dated September 30, 2019.

- Adobe Associates, Inc. (2019), "Preliminary Driveway Plan, Lands of Lockhart and Bender" (Preliminary Plans, Site Profiles, and Sections), Sheets C1.0 through C4.0, Job Number 18050, dated October 9, 2019.

- Adobe Associates, Inc. (2019), "Town of Fairfax 1st Plan Check Response BLD18, 78 Bay Road, Fairfax", JN18050, dated October 9, 2019.

- Herzog Geotechnical (2019), "Geotechnical Responses to Planning-Level Comments, 78 Bay Road, Fairfax, California", Project Number 2193-01-07, dated October 9, 2019.

Conclusions

Based on our site reconnaissance and document review, we judge that the critical planning-level geologic, geotechnical, and civil engineering issues have been suitably addressed.

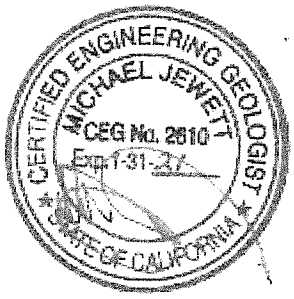
Recommendations

We recommend that project processing be continued. We wish to note that, as discussed in our first review letter, we expect an updated geotechnical report to be submitted at the building level, which contains updated seismic and other design criteria and recommendations for the residential portion of the project. We also anticipate that building plans will incorporate recommended debris-catchment improvements near the ADU as well as new foundation work (underpinning/retrofit or stitch piers as outlined in Herzog's response to comment letter). Finally, we note that driveway retaining walls shown on current plans are conceptual only, and anticipate that building-level submittals will incorporate deep foundation support, adequate debris catchment freeboard, and other elements as recommended in the current geotechnical report.

We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY:



Mike Jewett
Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/21)

Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/21)

MILLER PACIFIC ENGINEERING GROUP

July 10, 2019
File: 201.181altr.doc

Town of Fairfax
Planning and Building Services Department
142 Bolinas Avenue
Fairfax, California 94930

Attn: Ms. Linda Neal, Principal Planner

Re: First Planning-Level Geologic, Geotechnical, and Civil Engineering Review
New Single-Family Residential Development
78 Bay Road (APN 001-093-21)
Fairfax, California

Introduction

In response to your request and in accordance with our agreement dated March 20, 2018, we have reviewed project plans and supporting documentation for the proposed new single-family residence and associated improvements at 78 Bay Road (APN 001-093-21) in Fairfax, California. The purpose of our services is to review the submitted documents, comment on the completeness and adequacy of the submittal in consideration of Town requirements, and to provide a recommendation to Town Planning and Building staff regarding project approval.

The scope of our services includes:

- A site reconnaissance to observe existing conditions and review proposed development features;
- Review of provided project documents for conformance to the Town of Fairfax Hill Area Residential Development Ordinance, specifically Town Code Sections 17.072.080(B), (C), (E), and (F), and Section 17.072.110 (C).
- Development of opinions regarding project compliance with applicable Town Code requirements; and
- Development of recommendations to Town staff as to whether the project may be safely constructed in consideration of any geologic, hydrologic, or geotechnical hazards.

It should be noted that the scope of our review is limited solely to geologic, geotechnical, and civil portions of the project, and does not include review of structural, architectural, mechanical, or other items beyond the scope of our qualifications. We recommend that non-geotechnical aspects of the plans be reviewed by suitably qualified professionals.

Project Description

The project generally consists of constructing a new, approximately 2,954 square-foot, 3-level residence on a single assessor's parcel. The new residence structure will apparently be constructed largely at-grade, incorporating supported floors over interior crawl spaces, and utilizing new site retaining walls to accommodate expanded level terrace and yard areas. Footprints of the 3 floors are offset such that the structure ranges to a maximum of 2-stories high at any point. An existing cottage will remain and be converted to an ADU. Exterior terraces and

ATTACHMENT B2

landscape areas will be accommodated by new backfilled site walls. Ancillary site improvements will include a new widened, asphalt-surfaced driveway and associated retaining walls, site drainage, landscape and erosion-control improvements, and other items. Several large trees are proposed for removal to accommodate the widened driveway.

The approximately rectangular parcel is generally elongated in the northwest-southeast direction and slopes down to the north and east at inclinations locally between about 3:1 (H:V) and 1:1. The parcel is bounded by (asphalt-surfaced) Iron Springs Road to the north (downslope), with vehicle access provided by a long descending gravel driveway extending from Bay Road at the southeast (upslope) end of the parcel. Downslope properties to the north and east (along Iron Springs Road and Rock Ridge Road) are developed with existing residences. An MMWD water tank is sited on the ridgeline southwest of the site, and is accessed via a dirt road within a semi-circular, 30-foot easement which extends off the gravel driveway in the southern part of the property.

Project Review

We performed a brief site reconnaissance on July 7, 2018 to observe existing conditions at the site. Additionally, we have reviewed the following documents provided by the Town:

- William Schroeder & Associates (1997), "Record of Survey, Lands of Richardson", Sheet 1 of 1, recorded February 3, 1997.
- Herzog Geotechnical (2007), "Report, Geotechnical Investigation, 78 Bay Road, Fairfax, California", Project Number 2193-01-07, dated October 29, 2007.
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- Adobe Associates, Inc. (2019), "Stormwater Control Plan for Small Projects/Single-Family Homes (for) 78 Bay Road, Fairfax, CA, APN 001-093-21", Job Number 18050, dated June 17, 2019.

- Leyla Hilmi Design (2019), "78 Bay Road, 001-093-21" (Architectural, MEP, and Landscape Plans), Sheets A0.0 through A3.1, MEP 1.0 and 1.1, and L1.0, Revision 1 Planning Set dated June 17, 2019.

- Hilmi Design (2019), "RE: 78 Bay Road Planning Application" (Cover letter addressing response to Town comments), dated June 18, 2019.

Conclusions

Based on our site reconnaissance and document review, the following submittal items required by the Town of Fairfax Hill Area Residential Development Ordinance remain outstanding:

Hill Area Residential Development Ordinance

- Section 17.072.080(B) – Topographic and Boundary Survey

1) The submitted topographic and boundary survey (J.L. Engineering, February and May 2019) and recorded Record of Survey (William Schroeder & Associates, recorded 1997) contain several minor discrepancies between property boundary distances and directions. Distances and dimensions are not shown at all on J.L. Engineering's Sheet 2 of 2. The Title Report generally appears to reflect information as presented on the recorded Record of Survey, but does not appear to reflect the boundaries along Lands of Jackson (39 Iron Springs Road), and reflects significantly different eastern and western property line distances than shown on the recorded Record of Survey. It is apparent that some or all of these may relate to longstanding errors in the original property deed descriptions and subdivison maps.

   At minimum, a brief explanation should be provided by the Surveyor and/or Title Company regarding the nature and potential effects of such discrepancies, as well as an indication of and explanation for which of the various boundary configurations is reflected on the project plans. Most importantly, property line distances and configurations in the northwestern part of the site, above 39 Iron Springs Road, should be rectified for the purpose of consistency between project plans and construction staking, and for clarity regarding actual setbacks and other effects of the proposed improvements. If the recorded Record of Survey is determined to be erroneous, then a new survey should be recorded and copies thereof provided for review.

2) The submitted topographic and boundary survey does not include all boundary distances and dimensions. Complete boundary information must be shown as reflected on the recorded Record of Survey, or at least as determined following consideration of and

response to Comment #1 above for consistency between plan dimensions, Town setback and related regulations, and field staking/layout control.

- Section 17.072.080(C) – Site Plan

3) The Site Plan (Sheets A0.1 and A0.2) shows property boundaries but does not show distances or dimensions. The Site Plan must be underlain by the correct Topographic and Boundary Survey as determined by consideration of and response to Comments #1 and #2 above.

- Section 17.072.080(E) – Geotechnical Report

The submitted geotechnical report was prepared in 2007 and explicitly limits validity of the recommendations to a period of 18 months before an update is required. The report includes description of surface conditions and subsurface exploration and laboratory testing, including three borings within the proposed building envelope. Borings were extended to maximum depths between 4- and 7-feet, and bottomed 1- to 3-feet into weathered sandstone rock. The report indicates the site lies within a large mapped earthflow landslide complex and that slopes above and below the driveway are generally susceptible to instability.

In the 12 years since the geotechnical report as prepared, several historic or significant rainy seasons have resulted in significant slope instability and damage in the general vicinity of the project site. During our reconnaissance, we observed local evidence of recent instability above the driveway and in the northern portion of the lot, above and along Iron Springs Road. Several significant trees will be removed along the downslope side of the driveway, which is indicated by the report to be over-steepened and susceptible to instability. Plans do not indicate any stabilization or retaining systems along the downslope side of the driveway, as appears to have been recommended by the Geotechnical Engineer. The Stormwater Control Plan and Preliminary Grading Plan also indicates dispersal of runoff from significant new impervious areas across steep slopes above the existing cottage and residences at 9 and 39 Iron Springs Road, as well as the public Iron Springs Road ROW. Additionally, the report contains outdated seismic design criteria, and will need to be updated for project structural design and eventual building submittal.

4) At the planning/feasibility level, the Geotechnical Engineer should review current site conditions and comment on the project's exposure to slope instability and related hazards in consideration of the planned driveway grading, tree removal, and overall site drainage plans. Specific concerns include:

- Potential for instability from upslope sources to impact the residence and ADU;
- Potential for instability from onsite sources to impact downslope residences at 9 and 39 Iron Springs Road and/or the Iron Springs right-of-way; and
- Potential for damage to the planned improvements or the ADU due to instability on the downhill side of the residence.

Preliminary/conceptual mitigation recommendations and associated design criteria, if warranted, should be provided at minimum.

5) At the Building submittal level, the Geotechnical Engineer should prepare an updated Geotechnical Investigation report including updated geotechnical recommendations for structural and civil design as appropriate. He should also review the project civil and structural plans and provide a letter indicating they conform to the intent of his recommendations.

- Section 17.072.080(F) – Grading and Erosion-Control Plan

6) The Preliminary Grading Plan indicates surface runoff throughout the site will be dispersed via level spreaders set above steep slopes along the downhill side of the driveway, which are described in the Geotechnical Report as being generally susceptible to instability. No erosion-control measures are shown, and no drainage improvements are indicated in the lower driveway/building envelope area.

   All drainage improvements need to be designed (sized) to accommodate runoff from 100-year storm event. Hydrologic calculations should be submitted indicating that the site drainage system has been designed in accordance with Town standards and to result in no net increase in peak flow rate during a 100-year storm. Plans should be revised to indicate how drainage will be handled and dispersed in the lower portion of the property, in consultation with the Geotechnical Engineer.

7) Sheet C1.0 indicates significant grading (978 CY cut and 24 CY fill) will be performed, primarily consisting of excavation for widening of the driveway alignment, and resulting in a net offhaul of 954CY. Additional material is expected to be generated from foundation and utility excavations. Given the proposed import/off-haul quantities and the confined access along Bay Road, the applicants should submit a detailed Construction Management Plan outlining means and methods of reducing neighborhood impacts due to the large quantity of materials moving to and from the site. Mitigation should be provided for any anticipated impacts to Bay Road, insofar as post-construction conditions should be equal to or better than current. Such a plan should consider apporpriate traffic and material handling, material storage, and stockpile locations to minimize impacts to neighboring properties and use of the MMWD water tank easement.

   We note that it appears offhaul quantities could possibly be reduced signiifcantly by backfilling portions of the planned (non-storage) crawl space areas. Additionally, if retaining walls are required to improve stability along the outboard edge of the driveway and/or reduce impact risks imposed on the cottage, some of the planned offhaul could be used to backfill these walls.

- Section 17.072.110(C) – Geotechnical Report Adequacy

Based on our review of the provided materials, it is our opinion that the project soils report generally addresses potential erosion and slope instability hazards, but lacks specificity regarding potential effects on neighboring properties and exposure of the new house and ADU to instability originating upslope of the project site in areas of apparent historic landsliding. Seismic design criteria are also 20-years out of date. Plans indicate dispersal

of nearly all new impervious runoff across slopes described in the report as susceptible to instability.

As noted in Comment #5, an updated Geotechnical Investigation report should be provided at the building submittal level based on new site reconnaissance and, if needed, subsurface exploration and laboratory testing data. At a minimum, the updated report should provide seismic design criteria in accordance with the latest edition of the California Building Code, as well as discussion and supporting documentation in response to Comment #4. Following response to comments and development of final plans, the Geotechnical Engineer should review the project plans for conformance to the intent of his recommendations.

Recommendations

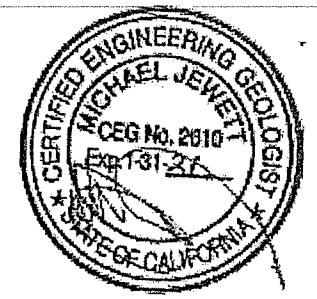
We recommend that project processing be delayed until the aforementioned materials are submitted for review. Initial items to be resolved/addressed include 1) property line discrepancies between the submitted Site Plans, Topographic Survey, and Record of Survey, and confirming accurate information is reflected on the title report and deed; 2) performance of an updated Geotechnical Investigation due to passage of time, and 3) revision of preliminary architectural and civil drawings to reflect correct and consistent survey information as well as the intent of the Geotechnical Engineer's updated recommendations. In our opinion, each of those items is required to warrant further processing.

Other items, including review of design-level Grading, Drainage, and Erosion control plans, review of Structural and Construction Management plans, and review of hydrologic calculations can be handled at the Building Permit submittal level with minimal anticipated impact.

We trust that this letter contains the information you require at this time. If you have any questions, please call. We will directly discuss our comments with the applicant's consultants if they wish to do so.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY:



Mike Jewett
Town of Fairfax Contract Geologist
Engineering Geologist No. 2610
(Expires 1/31/21)

Scott Stephens
Town of Fairfax Contract Engineer
Geotechnical Engineer No. 2398
(Expires 6/30/21)

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

April 22, 2019
Project Number 2193-02-19

Ted Bender and Ann Lockhart
26 Blachford Court
Oakland, California 94611

RE: Geotechnical Investigation
Driveway Retaining Walls
78 Bay Road
Fairfax, California

This presents the results of our geotechnical investigation for proposed retaining walls to support driveway cuts at 78 Bay Road in Fairfax, California. We previously performed a geotechnical investigation for a proposed residence at the site and summarized results in our report dated October 29, 2007. The scope of our current work was to review selected geologic references, observe exposed site conditions, drill five test borings, perform engineering analyses, and develop geotechnical recommendations for the design and construction of the driveway walls. Our scope of work was outlined in our professional services agreement dated March 21, 2019.

PROJECT DESCRIPTION

The project will consist of widening the existing driveway by excavating along the upslope side. Corresponding retained cuts along the upslope side of the driveway are anticipated to range to about 6 feet high. The driveway alignment is shown on Sheet C1.0 of the plan by Adobe Associates dated March 5, 2019.

WORK PERFORMED

We reviewed the following information as part of our work:

- Davenport, C.W., 1984, *An Analysis of Slope Failures in Eastern Marin County, California, Resulting From the January 3 & 4, 1982 Storm,* California Department of Conservation, Division of Mines and Geology DMG Open-File Report 84-22.

- Herzog Geotechnical, October 29, 2007, *Geotechnical Investigation: 78 Bay Road, Fairfax, California,* Project Number 2193-01-07.

ATTACHMENT C1

- Rice, S.J., Smith, T.C., and Strand, R.G., 1976, *Geology for Planning: Central and Southeastern Marin County, California,* California Department of Conservation, Division of Mines and Geology, DMG Open File Report 76-2.

- USGS, 1999, *Map Showing Locations of Damaging Landslides in Marin County, California, Resulting From 1997-1998 El Nino Rainstorms.*

We explored the subsurface conditions along the upslope edge of the driveway on April 2, 2019 to the extent of five test borings ranging between approximately 2-1/2 and 8-1/2 feet deep and extending into bedrock. The test borings were drilled with portable drilling equipment at the approximate locations shown on Plate 1.

Our personnel observed the drilling, logged the subsurface conditions encountered, and collected soil samples for visual examination and laboratory testing. Samples were retrieved using Sprague and Henwood and Standard Penetration Test samplers driven with a 70-pound hammer. Penetration resistance blow counts were obtained by dropping the hammer through a 30-inch free fall. The number of blows was recorded for each 6 inches of sampler penetration. These blow counts were then correlated to equivalent standard penetration resistance blow counts. The blows per foot recorded on the boring logs represent the accumulated number of correlated standard penetration blows that were required to drive the sampler the last 12 inches or fraction thereof.

Logs of the test borings are presented on Plates 2 through 6. The soils encountered are described in accordance with the criteria presented on Plate 7. Bedrock is described in accordance with the *Engineering Geology Rock Terms* presented on Plate 8. The logs depict our interpretation of subsurface conditions on the date and at the depths indicated. The stratification lines on the logs represent the approximate boundaries between soil types; the actual transitions may be gradational.

Selected samples were laboratory tested to determine their moisture content and dry density. Laboratory test results are posted on the boring logs in the manner described on the *Key to Test Data*, Plate 7.

FINDINGS

Site Conditions

The property is located at the northwestern terminus of Bay Road in Fairfax, California. An existing cottage at the site is accessed by an unpaved driveway which was created by excavating into the hillside along the upslope (southwest) side, and by placing fill beneath the downslope

portion. The resultant cut bank for the driveway ranges to approximately 10 feet high, and is inclined between approximately 1/2:1 (horizontal:vertical) and near-vertical. The cut bank generally exposes varying thicknesses of colluvium (slopewash) and slide deposits overlying highly weathered sandstone and shale bedrock. The cut bank has experienced previous sloughing and instability, and a previous failure within the cut bank has been stabilized with rock rip-rap. Two swale areas above the cut display topography indicative of previous landsliding (see Plate 1). The hillside above the cut bank extends up towards the southwest at approximately 2:1.

The fill bank downslope of the roadway ranges to about 10 feet high and is inclined at about 1:1. Below the fill bank, a continuation of a large swale extends down towards the northeast at between approximately 2:1 and 3:1. This swale appears to be the lower portion of one of the slides visible above the driveway, and extends down to the existing cottage. Evaluation of the fill bank, swale area and cottage were not included within our current scope of work.

Subsurface Conditions

The site is within the Coast Range Geomorphic Province which includes San Francisco Bay and the northwest-trending mountains that parallel the coast of California. These features were formed by tectonic forces resulting in extensive folding and faulting of the area. Previous geologic mapping by Rice, Smith and Strand (1976) indicates that most of the site is blanketed by earthflow slide deposits. The mapping indicates underlying bedrock within the eastern portion of the site has been mapped previously (Rice, 1976) as consisting of Jurassic to Cretaceous aged sandstone and shale of the Franciscan Assemblage. Underlying bedrock within the western portion of the site has been mapped as consisting of material of the Franciscan Melange. The Franciscan Melange unit typically consists of a heterogeneous mixture of sandstone, sheared shale, metavolcanic rock, serpentinite and chert.

Our test borings encountered slide debris, colluvium and residual soils overlying bedrock. The slide debris encountered generally consists of soft to medium stiff sandy and gravelly clay. The colluvium encountered generally consists of soft sandy silt and clay and of loose clayey sand. The residual soils encountered consist of loose to medium dense clayey sand derived from the in-place weathering of the underlying parent bedrock. The soils encountered are relatively weak and compressible. Portions of the soils encountered are expansive. Expansive soils undergo changes in volume with changes in moisture content, can cause lightly loaded foundations to heave and crack, and exert increased pressures on retaining walls. Bedrock encountered in the borings generally consists of firm to moderately hard sandstone with interbedded shale.

The approximate test boring locations are shown on the *Site Plan* (Plate 1). The test borings encountered the following profiles:

	Depth (feet)			
Boring	Slide Debris	Colluvium	Residual Soil	Bedrock
B-1	---	0-0.8	---	0.8-2.5+
B-2	0-5.0	---	5.0-7.5	7.5-8.5+
B-3	0-1.0	---	1.0-3.5	3.5-4.5+
B-4	0-1.0	1.0-4.0	---	4.0-6.0+
B-5	---	0-4.5	---	4.5-6.0+

Descriptions of the subsurface conditions encountered are presented on the boring logs.

Groundwater

Groundwater was encountered in Boring 5 at a depth of at a depth of approximately 1 foot. Groundwater did not develop in our remaining borings at the time of our investigation. Groundwater levels at the site are expected to fluctuate over time due to variations in rainfall and other factors. Rainwater percolates through the relatively porous surface soils. On hillsides, the water typically migrates downslope in the form of seepage within the porous soils, at the interface of the soil/bedrock contact, and within the upper portions of the weathered and fractured bedrock.

Mapped Landsliding

Regional mapping by Rice (1976) indicates that most of the project area lies within a large earthflow landslide complex which encompasses most of the northeast-facing hillside in the area. As mapped, the slide complex ranges to several thousand feet wide, and ranges to approximately 600 horizontal feet in length. Maps of slope failures resulting from the severe 1982 storms (Davenport, 1984) and of slope failures resulting from the heavy 1997/1998 storms (USGS, 1999) do not indicate that sliding was reported at the site at either of those times.

CONCLUSIONS

Our investigation indicates that most of the cuts for the driveway widening will expose weak soils and highly weathered bedrock which are subject to sloughing and instability. In addition, portions of the cuts are situated below landslides which may be subject to reactivated movement. However the northernmost 80 feet of the cut bank exposes less disturbed bedrock. Provided that occasional erosion and sloughing will be acceptable to the owner, we judge that this portion of the driveway cut bank can feasibly be laid back to an inclination of 1-1/2:1 (horizontal:vertical). It will be necessary to plant and maintain vegetation to reduce erosion, and to intercept surface water runoff at the top of the cut with a concrete lined swale. It would be prudent to also provide slough catchment at the base of the cut to reduce the risk of material extending onto the driveway.

It will be necessary to support the remainder of driveway cuts with engineered retaining walls in order to reduce the risk of instability. It will be necessary to support the retaining walls on drilled, cast-in-place, reinforced concrete piers which extend through the weak deposits and into bedrock. We anticipate that hard drilling or coring may be required to achieve required bedrock penetrations. Supporting bedrock within portions of the alignment is relatively deep, and it may be difficult to achieve necessary bedrock embedments for cantilever piers. It may therefore be necessary to generate additional lateral resistance utilizing drilled tieback anchors extending into bedrock. The walls should be provided with adequate backdrainage to prevent hydrostatic buildup. Existing slopes above the walls may be subject to sloughing and to possible larger scale instability which may overtop the walls and deposit material onto the driveway. If this risk will not be acceptable, we should be contacted to develop recommendations for repair of the landslides above the driveway.

As outlined in our original soils report, the fill bank along the downslope side of the driveway is overly steep, and our recent test borings indicate that portions of the fills are underlain by weak native soils and old landslide deposits. We judge that the fill bank may be subject to instability, particularly as a result of earthquake shaking, heavy rainfall, and/or time-dependent material strength loss. The risk to the proposed inboard retaining walls will be mitigated by extending foundation support into bedrock and designing foundations to resist lateral pressures imposed by potentially unstable deposits above the bedrock. If the risk of fill bank instability will not be acceptable, it will be necessary to retain the bank with engineered retaining walls founded in bedrock.

As outlined previously, the site lies within a mapped earthflow landslide which encompasses much of the hillside in the vicinity. We judge that the measures outlined in this report will reduce the risk of localized cut bank instability. However, it will be necessary for the owner to accept the risk of slide-related damage in the event of reactivated landsliding in the area.

RECOMMENDATIONS

Retaining Walls

Temporary Slopes

Temporary slopes should be laid back or shored in conformance with OSHA standards. All demolition, temporary slopes, shoring and the protection of improvements during construction should be contractually established as solely the responsibility of the Contractor.

Lateral Pressures

The retaining walls should be designed to resist active lateral earth pressures equivalent to those

exerted by a fluid weighing 45 pounds per cubic foot (pcf) where the backslope is level, and 60 pcf for backfill at a 2:1 slope. Retaining walls restrained with tiebacks should be designed to resist an "at-rest" equivalent fluid pressure of 60 pcf for level backfill and 75 pcf for backfill at a 2:1 slope. For intermediate slopes, interpolate between these values. Wall facing should extend at least 12 inches below undisturbed downslope grade, and active pressures should be assumed to act to from the top of the wall down to the bottom of the facing. Retaining wall located below the slide areas delineated on Plate 1 should be designed to resist an active lateral earth pressure of 75 pcf acting on the wall facing and over two diameters of the portion of piers located within 5 feet of the surface or above the bedrock, whichever is shallower. A minimum factor of safety against instability of 1.5 should be used to evaluate static stability of retaining walls.

Seismic wall stability may be evaluated based on a uniform lateral earth pressure of 12xH psf (where H is the height of the wall in feet). This pressure is in addition to the active equivalent fluid pressures presented in the report. The factor of safety against instability under seismic loading should be at least 1.1.

Drilled Piers

Drilled piers for support of the walls should be at least 18 inches in diameter and should extend at least 7 feet into competent bedrock. For planning purposes, supporting bedrock may be estimated based on the boring logs. Required pier depths should be calculated by the Project Structural Engineer using the criteria presented below. The depth to bedrock should be evaluated by our representative in the field during drilling. The sidewalls of pier holes allowed to remain open may be subject to desiccation and deterioration, which adversely impacts skin friction capacity. If concrete is not placed in pier holes within 72 hours of drilling, we should be notified to reevaluate the holes to determine if they need to be reamed out or re-drilled.

The portion of piers extending into competent bedrock can impose a passive equivalent fluid pressure of 400 pcf acting over 2 pier diameters, and vertical dead plus real live loads of 1000 pounds per square foot (psf) in skin friction. End bearing should be neglected due to the uncertainty of mobilizing end bearing and skin friction simultaneously.

Groundwater may be encountered, in which case it will be necessary to dewater the holes and/or to place concrete by the tremie method. If caving soils are encountered, it will be necessary to case the holes. Hard drilling or coring will likely be required to achieve required bedrock penetrations.

Tiebacks

Tiebacks may be used to generate additional lateral resistance. It will be necessary to obtain appropriate easements if tiebacks will extend off of the property. Tiebacks should be inclined downward at an angle of at least 15 degrees from the horizontal. Tiebacks should have minimum

unbonded lengths of 10 and 15 feet for bars and strands, respectively. Tiebacks should have minimum bonded lengths of 12 feet in bedrock. For design purposes, the location of the bedrock surface may be estimated based on the boring logs assuming the bedrock slopes up towards the southwest at approximately 2:1 (horizontal:vertical). The allowable skin friction of tiebacks will depend upon drilling method, grout installation pressure, and workmanship. For estimating purposes, the portion of tiebacks grouted into bedrock may be assumed to impose a skin friction value of 2000 pounds per square foot (psf). The contractor should be responsible for determining the actual length of tiebacks necessary to resist design loads based on their familiarity with the installation method utilized. Our field engineer should be present to observe conditions during drilling.

Tieback materials, installation, corrosion protection and testing should conform to *Recommendations for Prestressed Rock and Soil Anchors* (Post-Tensioning Institute, latest edition). The tieback bars or strands should be double corrosion protected. The bars or strands should be positioned in the center of the holes, and the bonded length grouted in place from the bottom. If a frictionless sleeve is used over the unbonded length, the bars or strands may be initially grouted over their entire length. When the grout has attained the required compressive strength, the anchors should be proof tested to 1.33 times the design load as outlined by the Post-Tensioning Institute. Proof test loads should be held for 10 minutes, and the deflection at test load between the 1 and 10 minute readings should not exceed 0.04 inches. After testing, the tension in the anchor should be reduced to the design load and locked off. Replacement tiebacks should be installed for tiebacks that fail the load testing.

Wall Backdrains

The retaining walls should be fully backdrained. The backdrains should consist of clean, free-draining crushed rock or gravel wrapped in filter fabric such as Mirafi 140N or equivalent. Alternatively, Caltrans Class 2 Permeable Material may be used, in which case the filter fabric can be omitted. The backdrain should be continuous, at least 1 horizontal foot thick, and should extend from the base of the exposed wall face to within 1 foot of the ground surface. The upper 1 foot should be backfilled with compacted soil to exclude surface water. If free drainage is not provided through the face of the walls, a 4-inch diameter rigid perforated pipe should be provided at the base of the drain rock. The pipe should be PVC Schedule 40 or ABS with an SDR of 35 or better, and should be sloped to drain at least 1 percent by gravity to an approved erosion resistant outlet. Accessible backdrain cleanouts should be provided and maintained on a routine basis. Sweeps or sanitary wyes should be used to prevent pipe damage during future maintenance. Surface drainage must be maintained entirely separate from retaining wall backdrains.

Where migration of moisture through the retaining walls would be detrimental or undesirable, the walls should be waterproofed as specified by the wall designer, and the top of the backdrain pipe should be located at least 8 inches below lowest adjacent downslope grade.

Wall Backfill

With the exception of organic topsoils and expansive soils, we anticipate that the on-site soils will generally be suitable for reuse as wall backfill, although moisture conditioning of materials may be required. Expansive soils, organic material, and lumps greater than 4 inches in largest dimension and perishable materials should be removed, and the fill materials should be approved by Herzog Geotechnical prior to use. Imported fill should have a plasticity index of 15 or less, a liquid limit of 40 or less, and should be free of organic matter and of rocks larger than 4 inches. Herzog Geotechnical should observe and approve fill material prior to importing.

Wall backfill should be placed in level lifts not exceeding 8 inches in loose thickness. Each lift should be brought to within 3 percent of optimum moisture content and compacted to at least 90 percent relative compaction. Relative compaction refers to the in-place dry density of a soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 test procedure. Optimum moisture content is the water content of the soil (percentage by dry weight) corresponding to the maximum dry density. Backfilling should be performed only with hand operated equipment to avoid over-stressing the walls.

Finished backfill slopes should be constructed at an inclination no steeper than 2:1. Backfill slopes should be overbuilt, and trimmed back as necessary to expose a well-compacted surface. Routine maintenance of slopes should be anticipated. Fill slopes and areas disturbed during construction should be planted with vegetation to resist erosion. If vegetation is not established prior to rains, exposed slopes should be protected with an erosion control matting such as North American Green SC150, or equivalent. Erosion that occurs must be repaired promptly before it can enlarge.

Northern Cut Bank

Provided that the risk of periodic maintenance and/or repair of erosion and sloughing is acceptable, we judge that cuts for the northernmost 80 feet of the driveway may be laid back at an inclination of 1-1/2:1 (horizontal:vertical) or flatter in lieu of a retaining wall. Our personnel should inspect conditions exposed during excavation to evaluate whether modifications are required. The top of the cut slope should be rounded and compacted to reduce the risk of erosion, and the slope should be planted with vegetation to reduce erosion. Surface water runoff should be intercepted and diverted away from the top of the cut slope with a reinforced concrete lined swale.

It would be prudent to provide slough catchment at the base of the cut to reduce the risk of material flowing onto the driveway. The catchment should be at least 3 feet high, and should consist of either a wall or fencing designed for an equivalent fluid impact pressure of 75 pounds per cubic foot (pcf). Clear storage space should be provided and maintained upslope of the

catchment. The catchment area behind the barrier should be cleaned out following each debris episode, and annually prior to the winter rains.

Surface Drainage

Positive drainage should be provided away from walls and slopes. Drop inlets should be provided at low points as necessary to prevent ponding of surface water. Runoff should be intercepted with lined swales at the tops of cuts and retaining walls. Surface drains should be connected to non-perforated conduits which discharge at an approved erosion resistant outlet well away from slopes, walls or improvements. Conduit should consist of rigid PVC or ABS pipe which is Schedule 40, SDR 35 or equivalent. Surface drains should be maintained entirely separate from wall backdrains.

Supplemental Services

Our conclusions and recommendations are contingent upon Herzog Geotechnical being retained to review the project plans and specifications to evaluate if they are consistent with our recommendations, and being retained to provide intermittent observation and testing during cut bank excavation, pier drilling, tieback drilling and load testing, retaining wall backdrain installation, and backfill placement and compaction to evaluate if subsurface conditions are as anticipated and to check for conformance with our recommendations. Alignment, steel, concrete, shoring, temporary slopes, planting and surface drainage should be inspected by the appropriate party, and are not part of our scope of work.

If during construction subsurface conditions different from those described in this report are observed, or appear to be present beneath excavations, we should be advised at once so that these conditions may be reviewed and our recommendations reconsidered. The recommendations made in this report are contingent upon our being notified to review changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, the recommendations of this report may no longer be valid or appropriate. In such case, we recommend that we review this report to determine the applicability of the conclusions and recommendations considering the time elapsed or changed conditions. The recommendations made in this report are contingent upon such a review.

We should be notified at least 48 hours before the beginning of each phase of work requiring our observation, and upon resumption after interruptions. These services are performed on an as-requested basis and are in addition to this geotechnical reconnaissance. We cannot provide comment on conditions, situations or stages of construction that we are not notified to observe.

LIMITATIONS

This report has been prepared for the exclusive use of Ted Bender and Ann Lockhart and their consultants for the project described in this report. Our services consist of professional opinions and conclusions developed in accordance with generally-accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided us regarding the proposed construction, the results of our field exploration and laboratory testing programs, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

The test boring logs represent subsurface conditions at the locations and on the dates indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration and may not necessarily be the same or comparable at other times. The locations of the test borings were established in the field by reference to existing features, and should be considered approximate only.

There is an inherent risk of instability associated with all hillside construction, and the risk of slope instability at this site is higher than for typical Marin County hillsides due to the presence of mapped landsliding. We recommend that the owner obtains the appropriate landslide and earthquake insurance. We judge that the measures outlined in this report will reduce the risk of localized cut bank instability. However, it will be necessary for the owner to accept the risk of slide-related damage in the event of reactivated large-scale sliding in the area.

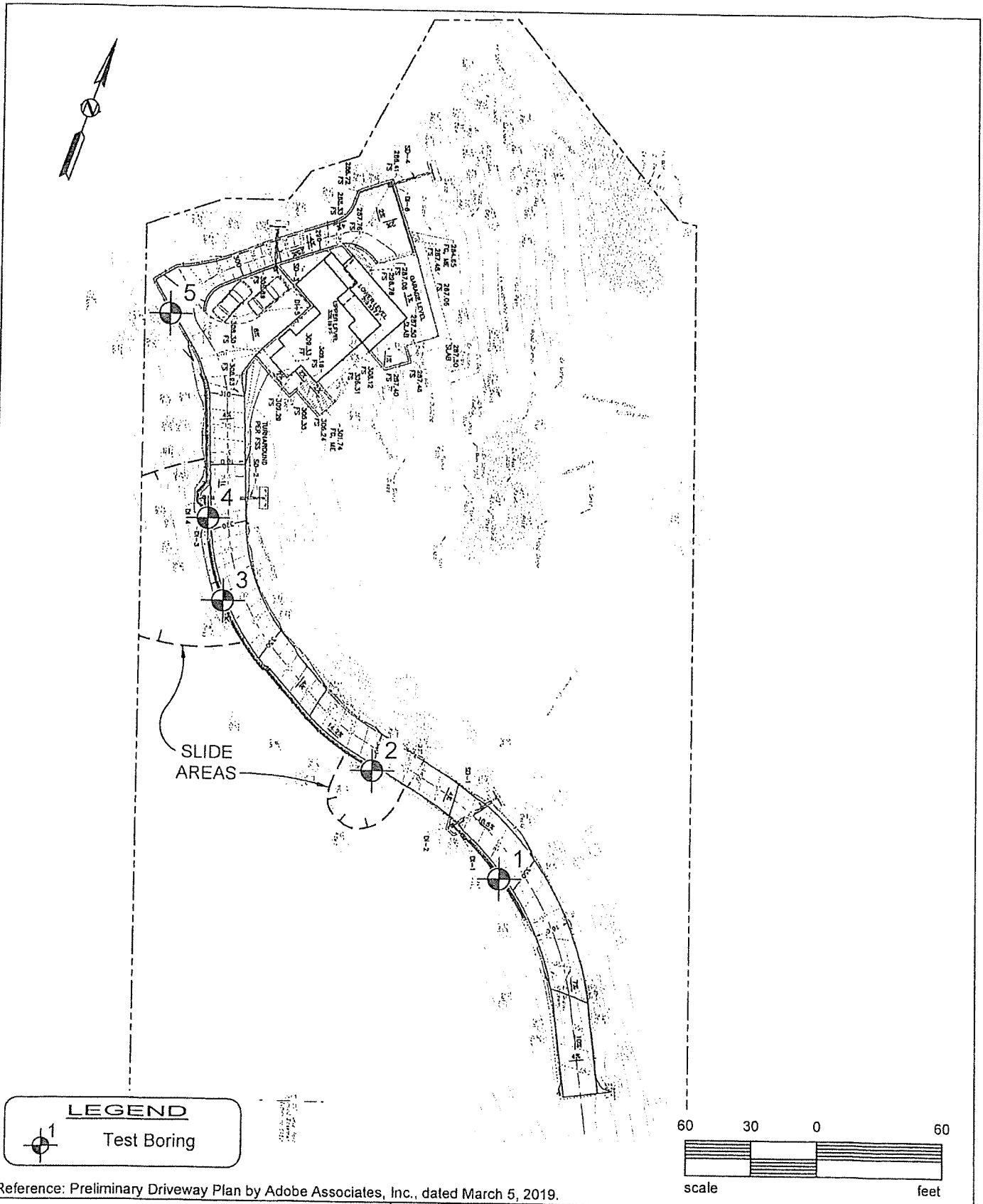
Our current work only addressed the proposed driveway cut bank, and did not include an evaluation of other items/areas. Our investigation did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic or corrosive materials in the soil, surface water, ground water or air, on or below, or around the site, nor did it include an evaluation or investigation of the presence or absence of wetlands.

We appreciate the opportunity to be of service to you. If you have any questions, please call us at (415) 388-8355.

Sincerely,
HERZOG GEOTECHNICAL

Craig Herzog, G.E.
Principal Engineer

Attachments: Plates 1 - 8



Reference: Preliminary Driveway Plan by Adobe Associates, Inc., dated March 5, 2019.

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job. No: 2193-02-19
Appr:
Drwn: LPDD
Date: APR 2019

SITE PLAN

78 Bay Road

Fairfax, California

PLATE

1

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY CLAY (CH), soft, wet, with roots
		11.9	117		26		1	ORANGE-BROWN SANDSTONE, firm, friable, highly weathered
					43		2	becomes moderately hard at 2'
								BOTTOM OF BORING 1 @ 2.5 FEET No Free Water Encountered

EQUIPMENT: 4" Flight Auger ELEVATION: **

LOGGED BY: G.M. START DATE: 4-2-19

FINISH DATE: 4-2-19

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19

Appr:

Drwn: LPDD

Date: APR 2019

LOG OF BORING 1

78 Bay Road

Fairfax, California

PLATE 2

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot * Sample	DEPTH (FEET)
						0
		22.1	100		9	1
						2
					9	3
						4
						5
					12	6
						7
					46	8

EQUIPMENT: 4" Flight Auger

LOGGED BY: G.M.

ELEVATION: **

START DATE: 4-2-19

FINISH DATE: 4-2-19

BROWN SANDY SILT (ML), soft, wet, with roots (Slide Debris)

BROWN GRAVELLY CLAY (CL/CH), soft, moist, with roots (Slide Debris)

MOTTLED ORANGE-GRAY-BROWN SANDY CLAY (CL), soft to medium stiff, moist, with roots (Slide Debris)

ORANGE-BROWN CLAYEY SAND (SC), medium dense, moist (Residual Soil)

ORANGE-BROWN SANDSTONE WITH INTERBEDDED SHALE, moderately hard, weak, highly weathered

BOTTOM OF BORING 2 @ 8.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19

Appr:

Drwn: LPDD

Date: APR 2019

LOG OF BORING 2

78 Bay Road

Fairfax, California

PLATE 3

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	EQUIPMENT: 4" Flight Auger	ELEVATION: **
								LOGGED BY: G.M.	START DATE: 4-2-19
									FINISH DATE: 4-2-19
							0	ORANGE-BROWN GRAVELLY CLAY (CL), medium stiff, wet (Slide Debris)	
		16.5	112		7		1	ORANGE-GRAY-BROWN CLAYEY SAND (SC), loose, moist (Residual Soil)	
							2		
					32		3		
							4	ORANGE-BROWN SANDSTONE, moderately hard, weak, highly weathered	
								BOTTOM OF BORING 3 @ 4.5 FEET No Free Water Encountered	

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19

Appr:

Drwn: LPDD

Date: APR 2019

LOG OF BORING 3

78 Bay Road

Fairfax, California

PLATE 4

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN GRAVELLY CLAY (CH), soft, wet (Slide Debris)
		18.6	104		7		1	MOTTLED ORANGE-GRAY CLAYEY SAND (SC), loose, moist
		22.9	92		18		4	MOTTLED ORANGE-GRAY SANDSTONE, firm to moderately hard, weak, highly weathered
					40		5	
							6	BOTTOM OF BORING 4 @ 6 FEET No Free Water Encountered

EQUIPMENT: 4" Flight Auger

LOGGED BY: G.M.

ELEVATION: **

START DATE: 4-2-19

FINISH DATE: 4-2-19

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19

Appr:

Drwn: LPDD

Date: APR 2019

LOG OF BORING 4

78 Bay Road

Fairfax, California

PLATE 5

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 4-2-19
FINISH DATE: 4-2-19

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	DARK BROWN SANDY SILT (ML), soft, moist
								free water encountered at 1'
							1	MOTTLED LIGHT BROWN CLAYEY SAND (SC), loose, saturated
							2	
					8			
							3	
							4	
					46			ORANGE-BROWN SANDSTONE, firm, weak, highly weathered
							5	
							6	BOTTOM OF BORING 5 @ 6 FEET

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19
Appr:
Drwn: LPDD
Date: APR 2019

LOG OF BORING 5

78 Bay Road

Fairfax, California

PLATE 6

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

			Shear Strength, psf / Confining Pressure, psf	
Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◪	Standard Penetration Test	Perm	Permeability	
⊠	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-02-19
Appr:
Drwn: LPDD
Date: APR 2019

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

78 Bay Road

Fairfax, California

PLATE 7

ROCK SYMBOLS

 SHALE OR CLAYSTONE

 CHERT

 SERPENTINITE

 SILTSTONE

 PYROCLASTIC

 METAMORPHIC ROCKS

 SANDSTONE

 VOLCANIC

 DIATOMITE

 CONGLOMERATE

 PLUTONIC

 SHEARED ROCKS

LAYERING

MASSIVE	Greater than 6 feet
THICKLY BEDDED	2 to 6 feet
MEDIUM BEDDED	8 to 24 inches
THINNLY BEDDED	2-1/2 to 8 inches
VERY THINNLY BEDDED	3/4 to 2-1/2 inches
CLOSELY LAMINATED	1/4 to 3/4 inches
VERY CLOSELY LAMINATED	Less than 1/4 inch

JOINT, FRACTURE, OR SHEAR SPACING

VERY WIDELY SPACED	Greater than 6 feet
WIDELY SPACED	2 to 6 feet
MODERATELY SPACED	8 to 24 inches
CLOSELY SPACED	2-1/2 to 8 inches
VERY CLOSELY SPACED	3/4 to 2-1/2 inches
EXTREMELY CLOSELY SPACED	Less than 3/4 inch

HARDNESS

SOFT - Pliable; can be dug by hand

FIRM - Can be gouged deeply or carved with a pocket knife

MODERATELY HARD - Can be readily scrached by a knife blade; scratch leaves heavy trace of dust and is readily visable after the powder has been blown away

HARD - Can be scratched with difficulty; scratch produces little powder and is often faintly visable

VERY HARD - Cannot be scratched with pocket knife; leaves a metallic streak

STRENGTH

PLASTIC - Capable of being molded by hand

FRIABLE - Crumbles by rubbing with fingers

WEAK - An unfractured specimen of such material will crumble under light hammer blows

MODERATELY STRONG - Specimen will withstand a few heavy hammer blows before breaking

STRONG - Specimem will withstand a few heavy ringing hammer blows and usually yields large fragments

VERY STRONG - Rock will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

DEGREE OF WEATHERING

HIGHLY WEATHERED - Abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thourough discoloration, rock disintegration, mineral decomposition

MODERATELY WEATHERED - Some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition

SLIGHTLY WEATHERED - A few stained fractures, slight discoloration, little or no effect on cementation, no mineral decomposition

FRESH - Unaffected by weathering agents, no appreciable change with depth

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

October 9, 2019
Project Number 2193-02-19

Ted Bender and Ann Lockhart
26 Blachford Court
Oakland, California 94611

RE: Geotechnical Responses to Planning-Level Comments
78 Bay Road
Fairfax, California

This presents the results of our geotechnical responses to planning-level review comments in connection with the proposed residence and driveway at 78 Bay Road in Fairfax, California. We previously performed a geotechnical investigation at the site and summarized results in our report dated October 29, 2007. Supplemental recommendations for the support of cuts along the upslope side of the driveway were summarized in our report dated April 22, 2019.

PLAN CHECK RESPONSES

The following presents our responses to geotechnical planning-level issues raised in Miller Pacific Engineering Group's July 10, 2018 *First Planning Level Geologic, Geotechnical, and Civil Engineering Review:*

Item	Response
4(a)	The driveway fill bank and landslide deposits on the site are subject to future sloughing and instability, particularly as a result of earthquake shaking, heavy rainfall, and/or time-dependent material strength loss. In order to reduce the risk of debris impacting the ADU, it will be necessary to provide debris catchment upslope of the structure. The catchment should be at least 3 feet high and should consist of either a structural wall or fencing designed for an equivalent fluid impact pressure of 125 pounds per cubic foot (pcf). The catchment wall or fencing should be founded on pier foundations designed in accordance with the soils report. The catchment barrier should be periodically inspected for damage, and maintained and repaired as necessary. Clear storage space should be provided and maintained upslope of the barrier. The catchment area behind the barrier should be cleaned out following each slide episode, and annually prior to the winter rains. In addition, it may be necessary to remove fines that migrate through the barrier.

Item **Response**

4(b) The site and the adjacent downslope properties at 9 and 39 Iron Springs Road have experienced previous erosion and landsliding, and we observed evidence of recent instability within and upslope of the cut banks along Iron Springs Road. In order to avoid exacerbating the risk of future instability, we recommend that driveway runoff and roof drainage for the project be conducted to a rip-rap dissipater installed at the base of the hillside. It will be necessary to site the dissipater away from existing slide deposits, and to upgrade the existing inboard swale along Iron Springs Road as necessary to prevent water from flowing across the roadway. The final location of the dissipater should be as recommended by our personnel in the field during construction. Where feasible, pipes extending down to the dissipater should be raised out-of-ground to reduce the risk of pull-apart by differential downslope movement, and to allow for visual damage inspection. The pipe should be constructed with a high tensile-capacity material. Supports for pipes will be subject to downslope creep and possible instability. In order to prevent differential movement of supports from stressing the pipes, the supports should be provided with open cradles or other features to accommodate differential movement.

4(c) The risk to the residence and ADU as a result of instability downhill of the structures be mitigated by extending foundation support into bedrock and designing foundations to resist lateral pressures imposed by the soils above the bedrock as outlined in the soils report. If the ADU foundations are not to be retrofitted as part of the project, closely-spaced soldier piers should be installed along the downslope side of the ADU to support upslope materials. Geotechnical design criteria for this alternative should be developed as part of a design-level investigation submitted prior to development of building permit-level submittals for the project.

5 Following planning approval, an updated geotechnical will be prepared containing design-level foundation, drainage, and seismic design criteria.

GEOTECHNICAL PLAN REVIEW

We reviewed Sheets C1-0 through C5.0 of the planning-level civil plans by Adobe Associates, Inc. revised October 9, 2019. Based on our review, we conclude that these plans are in general conformance with the intent of our geotechnical recommendations.

SUPPLEMENTAL SERVICES

We should be retained to review the project structural and permit-level grading and drainage plans to evaluate if they are consistent with our recommendations. We should also be retained to

provide observation and appropriate field and laboratory testing during site preparation and grading, pier drilling, footing excavation, tieback drilling and load testing, slab and pavement subgrade overexcavation and compaction, wall backfilling, pavement subgrade and baserock compaction, and subdrainage installation to evaluate if subsurface conditions are as anticipated and to evaluate conformance with our geotechnical recommendations. We cannot provide comment on conditions, situations or stages of construction that we are not notified to observe.

LIMITATIONS

Services performed by Herzog Geotechnical have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession practicing in the same locality under similar conditions at the time the services were provided. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this letter or in any opinion, documented or otherwise. Verification of our conclusions and recommendations is subject to our review of building permit-level submittals and our observation of construction.

We trust this provides the information required at this time. If you should have further questions, please call.

Sincerely,
HERZOG GEOTECHNICAL

Craig Herzog, G.E.
Principal Engineer

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

October 29, 2007
Project Number 2193-01-07

Ted Bender and Ann Lockhart
26 Blachford Court
Oakland, California 94611

RE: Report
Geotechnical Investigation
78 Bay Road
Fairfax, California

This presents the results of our geotechnical investigation for the proposed residence at 78 Bay Road in Fairfax, California. The scope of our investigation was to review selected geologic references, observe exposed site conditions, drill seven test borings in two potential project areas, perform laboratory testing and engineering analyses, and develop geotechnical conclusions and recommendations for the project. Our scope of work was outlined in our proposal dated October 11, 2007.

PROJECT DESCRIPTION

We understand that the project will consist of constructing an approximately 2,500 square foot, single-family residence at the site. The residence will either be situated northwest of the existing cottage, or within the southern portion of the property adjacent to the Marin Municipal Water District (MMWD) tank access road. The potential project locations were delineated by the client at the time of our field investigation. Project plans have not yet been developed.

WORK PERFORMED

Prior to performing our investigation we reviewed our previous work near the site along with selected geologic references. We explored the subsurface conditions in the two alternate project areas on October 16, 2007 to the extent of seven test borings ranging in depth between approximately 3 and 7 feet, and extending into bedrock. The test borings were drilled with portable drilling equipment at the approximate locations shown on the attached *Site Plan*, Plate 1.

Our Consulting Project Engineer observed the drilling, logged the subsurface conditions encountered, and collected soil samples for visual examination and laboratory testing. Samples were retrieved using Sprague and Henwood and Standard Penetration Test samplers driven with a 70-pound hammer. Penetration resistance blow counts were obtained by dropping the hammer through a 30-inch free fall. The samplers were driven 18 inches, and the number of blows was recorded for each 6 inches of penetration. These blow counts were then correlated to equivalent standard penetration resistance blow counts. The blows per foot recorded on the boring logs represent the accumulated number of correlated standard penetration blows that were required to drive the sampler the last 12 inches or fraction thereof.

Logs of the test borings are presented on Plates 2 through 8. The soils encountered are described in accordance with the criteria presented on Plate 9. Bedrock is described in accordance with the *Engineering Geology Rock Terms* presented on Plate 10. The logs depict our interpretation of subsurface conditions on the date and at the depth indicated. The stratification lines on the logs represent the approximate boundaries between soil types; the actual transitions may be gradational.

Selected samples were laboratory tested to determine their moisture content and dry density. Laboratory test results are posted on the boring logs in the manner described on the *Key to Test Data*, Plate 9.

FINDINGS

Site Conditions

The property is located at the northwestern terminus of Bay Road in Fairfax, California. The existing cottage at the site is accessed by an unpaved driveway which was created by excavating into the hillside along the upslope side, and by placing fill beneath the downslope portion. The resultant cut bank for the driveway ranges to approximately 10 feet high, and is inclined between approximately 1:2:1 and near-vertical. The cut bank generally exposes varying thicknesses of colluvium (slopewash) overlying highly weathered sandstone and shale bedrock. Portions of the cut bank have experienced instability, and rock rip-rap has been utilized to buttress portions of the cut. The hillside above the cut bank extends up towards the southwest at approximately 2:1, and displays evidence of gradual downslope creep. The fill bank downslope of the roadway ranges to about 10 feet high and is inclined at about 1:1 (horizontal:vertical). Below the fill bank, a large swale extends down towards the northeast at between approximately 2:1 and 3:1. The swale displays hummocky topography indicative of previous landsliding, and the existing cottage is situated within the central portion of this swale. An evaluation of stabilization for the swale area and cottage was not included within our current scope of work. A broad northeast-trending ridge is situated northwest of the swale. The ridge crest is generally inclined at about

3:1 to 4:1, and is terraced with low stone retaining walls. A rough graded driveway extends along the northeast flank of the ridge, and then crosses the ridge to access the cottage.

Within the southeastern portion of the site, an asphalt paved access road extends up to the top of a broad knoll located on an east-west trending ridge. The road accesses a Marin Municipal Water District water tank located southwest of the subject property. The portion of the road extending across the site was constructed as a full bench cut into the northeast-facing ridge flank. Resultant cut banks for the access road range to approximately 6 feet high, and generally expose silty sand colluvium and residual soils overlying sandstone and shale bedrock. These banks have experienced erosion and slumping. The slopes adjacent to the roadway are generally inclined at between 3:1 and 1-1/2:1, and are heavily vegetated. Runoff from the access road is conducted to an inboard ditch which extends down the main driveway, and discharges into an eroded ravine near the east corner of the property.

Subsurface Conditions

The site is within the Coast Range Geomorphic Province, which includes San Francisco Bay and the northwest-trending mountains that parallel the coast of California. These features were formed by tectonic forces resulting in extensive folding and faulting of the area. Bedrock within the eastern portion of the project has been mapped previously (Rice, 1976) as consisting of Jurassic to Cretaceous aged sandstone and shale of the Franciscan Assemblage. Bedrock within the western portion of the site has been mapped as consisting of material of the Franciscan Melange. The Franciscan Melange unit typically consists of a heterogeneous mixture of sandstone, sheared shale, metavolcanic rock, serpentinite and chert.

Our test borings encountered topsoil and colluvium (slopewash) overlying bedrock. The topsoil encountered ranged to about a foot thick, and consisted of soft and organic sandy silt. The colluvial soils encountered consisted of loose silty sand, and of soft to medium stiff gravelly silt. The soils encountered are of low expansion potential, are relatively weak and compressible, and are subject to downslope creep as is typical on hillsides in the area. Bedrock was encountered in the borings at depths ranging between approximately 2 and 3-1/2 feet, and consisted of firm to moderately hard sandstone and shale. Descriptions of the subsurface conditions encountered are presented on the boring logs.

Groundwater

Free groundwater did not develop in the borings at the time of our investigation. Groundwater levels at the site are expected to fluctuate over time due to variations in rainfall and other factors. Rainwater percolates through the relatively porous surface soils. On hillsides, the water typically migrates downslope in the form of seepage within the porous soils, at the interface of the soil/bedrock contact, and within the upper portions of the bedrock.

GEOLOGIC AND SEISMIC HAZARDS

Landsliding

Regional mapping by Rice (1976) indicates that with the exception of the narrow east-west-trending ridge extending across the southern corner of the site, the property lies within a large earthflow landslide complex which encompasses most of the northeast-facing hillside in the area. As mapped, the slide complex ranges to several thousand feet wide, and ranges to approximately 600 horizontal feet in length. A map by Davenport (1984) of slope failures resulting from the severe 1982 storms does not indicate that sliding was reported at the site at that time. The east-west trending ridge crest lies within Slope Stability Zone 2 as defined in *"Geology for Planning: Central and Southeast Marin County"* (Rice, 1976). Zone 2 includes narrow ridge and spur crests that are underlain by relatively competent bedrock, but which are flanked by steep, potentially unstable slopes. The remainder of the site lies within Slope Stability Zone 4, which includes areas of existing active or inactive landslides and areas subject to downslope creep. The zones range from 1 to 4, with Zone 4 being least stable.

We did not observe evidence of landsliding within either of the two proposed house sites during our investigation. However, we noted topography indicative of old earthflow-type landsliding downslope of the driveway within the swale area containing the cottage, and erosion and slumping of the cut banks for the driveway and the MMWD access road. In addition, the fill banks supporting the driveway are overly-steep and may be subject to instability. We judge that the proposed house sites are adequately offset away from the limits of unstable areas. Mitigating the risk of cut bank instability along the driveway and MMWD access road would necessitate retaining these banks with engineered retaining walls. Mitigating the risk of fill bank instability would necessitate retaining these fills with buried soldier pier walls extending into bedrock. If desired, we can be contacted to perform subsurface investigation and analyses to develop design recommendation for these elements.

Fault Rupture

The property is not within a current Alquist-Priolo Earthquake Fault Zone (EFZ) and we did not observe geomorphic features that would suggest the presence of an active fault extending through the site. As such, we judge the risk of ground rupture along a fault trace at this site is low.

Ground Shaking

The San Francisco Bay Region has experienced several historic earthquakes from the San Andreas and other associated active faults. Mapped active faults (those experiencing surface rupture within the past 11,000 years) nearest the site are summarized in the following table.

Fault	Distance		Upper Bounds Magnitude[1]	Acceleration (g's)[2] M (M+1)
	Miles	Kilometers		
San Andreas (Northern)	6.8	10.9	7.9	0.45 (0.69)
Seal Cove San Gregorio	8.0	12.9	7.3	0.33 (0.51)
Hayward	11.1	17.9	7.1	0.23 (0.36)
Healdsburg/Rodgers Creek	15.1	24.3	7.0	0.17 (0.25)

(1) Estimated Moment Magnitudes from CDMG (1996) Open File Report 96-08).
(2) M: Peak ground acceleration (mean), random horizontal component from Abrahamson and Silva (1997) for rock site.
M+1: Peak ground acceleration (mean+1) random horizontal component from Abrahamson and Silva (1997) for rock site.

Deterministic information generated for the site considering the proximity of active faults and estimated bedrock accelerations are presented in the table above. The estimated ground accelerations were derived from mean attenuation relationship presented by Abrahamson and Silva (1997; Rock Site) and are based on the published estimated Maximum Credible Earthquake moment magnitudes (MCE) for each fault (Petersen, 1996), the shortest distance between the site and the respective fault, the type of faulting, and the estimated shear wave velocities of the on-site soils. The MCE, also referred to as the Upper Bounds Earthquake, is defined as the maximum earthquake that appears capable of occurring under the presently known tectonic framework. The deterministic evaluation of the potential for ground shaking assumes that a maximum magnitude earthquake produces fault rupture at the closest proximity to the site. This evaluation does not take recurrence intervals or other probabilistic effects into consideration.

Data presented by the Working Group on California Earthquake Probabilities (USGS, 2003) estimates the chance of one or more large earthquakes (Magnitude 6.7 or greater) in the San Francisco Bay region within the next 30 years to be 62 percent. Consequently, we judge that the site will likely be subject to strong earthquake shaking during the life of the improvements.

Liquefaction

During ground shaking from earthquakes, liquefaction can occur in saturated, loose, cohesionless sands. The occurrence of this phenomenon is dependent on many factors, including the intensity and duration of ground shaking, soil density and particle size distribution, and position of the ground water table (Seed and Idriss, 1982). The soils encountered in our test borings contained a high percentage of fine grained materials (silt and clay). Thus, we judge that the likelihood of liquefaction during ground shaking is low.

Densification

During earthquakes, densification can occur in low density, uniformly-graded sandy soils above the groundwater table. We judge that significant densification is unlikely to occur in the areas explored because of the high silt and clay content of the soils encountered in the test borings.

CONCLUSIONS

Based on the results of our investigation, we conclude that both proposed building sites are feasible for residential development from a geotechnical standpoint provided the recommendations presented in this report are incorporated into the project. The primary geotechnical concerns are discussed below.

Foundation Support

Our investigation indicates that both sites are generally blanketed by a few feet of relatively weak and compressible soils which are subject to settlement under foundation loads, and to gradual downslope creep as is typical on hillsides. In order to mitigate differential settlement and creep, improvements should be supported on spread footings or drilled piers which extend into undisturbed bedrock. Spread footings will be feasible in areas where planned cuts will expose bedrock, while drilled piers could be used everywhere. It will be necessary to design foundations on or near slopes to resist lateral forces imposed by creeping soils above the bedrock. We estimate that differential settlements of foundations designed in accordance with the recommendations contained in this report will be on the order of half an inch.

Slab and Pavement Support

To reduce differential settlements, slabs-on-grade and pavements should be either founded on bedrock, or on properly compacted and retained fill founded on bedrock. Alternatively, slabs should be designed to structurally span between foundations supported on bedrock. Driveway pavements may be subject to distress in areas where adjacent fill banks are not stabilized.

Geotechnical Drainage

Perimeter subdrains and slab underdrains should be provided to reduce water infiltration beneath the residence, and roofs should be provided with gutters and downspouts. In order to avoid erosion and reducing instability, it will be necessary to extend drain outlets to approved erosion resistant areas well downslope of improvements.

RECOMMENDATIONS

Seismic Design

Based on the results of our investigation, the following seismic design criteria were developed in accordance with the *Uniform Building Code* (1997):

Seismic Zone Factor (Z)	0.4
Seismic Source Type	"A"
Soil Profile Type	S_C
Near Source Factor N_a	1.00
Near Source Factor N_v	1.16
Seismic Coefficient C_a	0.40
Seismic Coefficient C_v	0.65

Based on the results of our investigation, the following seismic design criteria were developed in accordance with the *International Building Code* (2006):

Site Class	C
Site Coefficient F_a	1.0
Site Coefficient F_v	1.3
0.2 sec Spectral Acceleration S_S	1.500
1.0 sec Spectral Acceleration S_1	0.673
0.2 sec Max Spectral Response S_{MS}	1.500
1.0 sec Max Spectral Response S_{M1}	0.875

Site Preparation and Grading

Clearing

Areas to be developed should be cleared of deleterious material, and then stripped of the upper soils containing root growth and organic matter. The cleared materials and strippings should be removed from the site. Tree roots, abandoned utility vaults, pipes, septic tanks, leach fields and other buried objects should be removed, and the resultant voids cleaned and backfilled as outlined below.

Overexcavation

In areas of planned fills, slabs-on-grade and pavements, overexcavation of on-site soils should be performed as necessary to create level benches in bedrock. Overexcavation should extend at least 3 horizontal feet beyond the edges of planned slabs or pavements. Along the downslope

edges of unretained slabs or pavements, overexcavation should also extend as necessary to encompass an imaginary 2:1 plane projected down from the slab or pavement edge to the overexcavated bedrock surface. The depth and extent of required over-excavation should be approved in the field by the geotechnical engineer prior to placement of fill or improvements.

Temporary Slopes

Temporary slopes should be laid back or shored in conformance with OSHA standards. All temporary slopes and shoring design and construction should be contractually established as solely the responsibility of the contractor.

Keyway Excavation

Keyways should be excavated at the downslope edges of planned unretained fills. The keyways should slope inward, should be at least 12 feet wide, and should extend at least 18 inches into competent bedrock along the downslope edge. The downslope edge of the keyway should be located beyond a 1:1 line projected down from the planned toe of the fill slope. The final dimensions and depths of keyways should be evaluated by our representative in the field during construction.

Subdrainage

A chimney subdrain should be installed along the rear of the keyways. A heavy-walled rigid perforated pipe should be placed on a 2-inch thick basal layer of drain rock (1/2 to 3/4 inch diameter) or Caltrans Class II Permeable Material. The PVC or ABS pipe should be 4 inches in diameter and should be Schedule 40 or have an SDR of 35 or equivalent. The pipe should be covered by a 1.5 horizontal foot thick (minimum) chimney of drain rock that extends at least 5 feet up the rear wall of the keyway excavation. If clean drain rock is used, the drain rock should be entirely wrapped with a layer of geotextile filter cloth (Mirafi 140-N or equivalent). If Caltrans Class II Permeable Material is used, the filter cloth may be eliminated. A capped cleanout riser should be provided for all subdrains. The perforated pipe should outlet into a solid line that discharges at an approved outlet. Additional subdrains should be installed along the upper boundary of planned fills and where evidence of seepage is observed, as recommended by the our representative in the field during construction. Subdrains should be constructed in a manner similar to that of the keyway chimney drain.

Material for Fill

With the exception of organic material and debris, we anticipate that the on-site soils will be suitable for reuse as general engineered fill. Lumps greater than 4 inches in largest dimension and perishable materials should be removed, and the fill materials should be approved by Herzog Geotechnical prior to use.

Imported fill should have a plasticity index of 15 or less, a liquid limit of 40 or less, and should be free of organic matter and of rocks larger than 4 inches. Herzog Geotechnical should observe and approve fill material prior to importing.

Compaction of Fill

Fill should be placed in level lifts not exceeding 8 inches in loose thickness. Each lift should be brought to within 3 percent of optimum moisture content, and compacted to at least 90 percent relative compaction. Relative compaction refers to the in-place dry density of a soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 test procedure. Optimum moisture content is the water content of the soil (percentage by dry weight) corresponding to the maximum dry density. As the fill continues upslope, it should be continually benched and keyed into bedrock as recommended by our representative in the field during construction.

Finished Slopes

Finished fill slopes should be no steeper than 2:1. All cuts should be retained for their full height. Fill slopes should be overbuilt, and trimmed back as necessary to expose a well-compacted surface. Routine maintenance of slope sloughing and erosion should be anticipated. New and disturbed slopes should be planted with vegetation to reduce erosion. Surface water runoff should be intercepted and diverted away from slopes.

Foundations

Spread Footings

Spread footings should only be used where excavations expose bedrock at least 7 feet away from slopes. Spread footings should be at least 16 inches wide, should be bottomed at least 12 inches into competent bedrock, and should extend at least 12 and 18 inches below lowest adjacent finished grade for 1 and 2 story structures, respectively. Footings should be stepped as necessary to produce level tops and bottoms, and should be deepened as necessary to provide at least 5 feet of horizontal clearance in rock between the portion of footings designed to impose passive pressures and the face of the nearest slope or wall. Spread footings extending into competent bedrock can be designed to impose dead plus code live load bearing pressures and total design load bearing pressures of 3000 and 4000 pounds per square foot (psf), respectively.

Resistance to lateral pressures can be obtained in rock from passive pressures against the face of footings and friction along the base of footings. We recommend the following criteria for design:

Passive Pressures*	=	400 pounds per cubic foot (pcf) equivalent fluid pressure
Friction Factor	=	0.40 times net vertical dead load

* Neglect passive pressure in the top 12 inches where the surface is not confined by slabs or pavements.

Drilled Piers

Drilled piers should be at least 18 inches in diameter and should extend at least 8 feet into competent bedrock. Required pier depths and diameters should be calculated by the Project Structural Engineer using the criteria presented below. For planning purposes, the depth to supporting bedrock may be estimated based on the boring logs. The materials encountered in pier excavations should be evaluated by our representative in the field during drilling. Drill spoils should be removed from the site, or placed as properly retained and compacted fill.

Piers should be interconnected with grade beams to support structural loads and to redistribute stresses imposed by the creeping soils. Piers and grade beams located on slopes steeper than 5:1, or within 15 feet of the top of such slopes, should be designed and reinforced to resist creep forces acting from the ground surface to the top of the rock, and exerting an active equivalent fluid pressure of 60 pounds per cubic foot (pcf). For piers, this pressure should be assumed to act on 2 pier diameters.

The portion of piers extending into competent bedrock at least 1 foot below finished grade can impose a passive equivalent fluid pressure of 400 pcf acting over 2 pier diameters, and vertical dead plus real live loads of 1000 pounds per square foot (psf) in skin friction. These values may be increased by 1/3 for seismic and wind loads, but decreased by 1/3 in determining uplift resistance. Confining overburden for passive pressure calculations should be assumed to begin at the bedrock surface. End bearing should be neglected due to the uncertainty of mobilizing end bearing and skin friction simultaneously.

If groundwater is encountered, it may be necessary to dewater the holes and/or to place concrete by the tremie method. If caving soils are encountered, it may be necessary to case the holes. Hard drilling or coring in resistant cobbles and/or bedrock will likely be required to achieve required penetrations.

Slab Support

Slabs should be designed by the project structural engineer. All non-structural slabs-on-grade should be founded on bedrock, or on properly compacted fill founded on bedrock as previously described. Slab-on-grade subgrade should be rolled to provide a firm, unyielding surface.

Subgrade for interior or garage slabs should be sloped to drain into 12 inch deep trenches excavated in the downslope direction beneath the middle of each slab. The trenches should be lined completely with a filter fabric such as Mirafi 140N, or equivalent. A 4-inch diameter rigid-perforated PVC or ABS (Schedule 40, SDR 35 or equivalent) pipe should be placed on a 1-inch layer of drain rock at the bottom of the trenches with perforations down. The pipes should be sloped to drain by gravity to non-perforated pipes which discharge at an approved outlet. The trenches should be backfilled with drain rock up to slab subgrade elevation. The filter fabric should be wrapped over the top of the drain rock. The trenches for the non-perforated pipes should be backfilled with properly compacted soil.

Interior and garage slabs should be underlain by a capillary moisture break consisting of at least 4 inches of free-draining, crushed rock or gravel (slab base rock) at least 1/4 inch, and no larger than 3/4 inch, in size. Moisture vapor detrimental to floor coverings or stored items will condense on the undersides of slabs. A moisture vapor barrier should therefore be installed over the capillary break. The barrier should be specified by the slab designer. It should be noted that conventional concrete slab-on-grade construction is not waterproof. The local standard under-slab construction of crushed rock and vapor barrier will not prevent moisture transmission through slab-on-grade. Where moisture sensitive floor coverings are to be installed, a waterproofing expert and/or the flooring manufacturer should be consulted for their recommended moisture and vapor protection measures, including moisture barriers, concrete admixtures and/or sealants.

Slabs-on-grade should be at least 5 inches thick, and should be reinforced at least with #4 reinforcing bars spaced at 12 inches on-center each way to accommodate differential settlements and to control cracking. Control joints should be provided as determined by the Structural Engineer. Reinforcement should be continuous across joints.

Retaining Walls

Retaining walls should be supported in rock on spread footing or drilled pier foundations designed in accordance with the recommendations presented in this report. A minimum factor of safety of 1.5 against overturning and sliding should be used in the design of retaining walls.

Free-standing retaining walls should be designed to resist active lateral earth pressures equivalent to those exerted by a fluid weighing 45 pounds per cubic foot (pcf) where the backslope is level, and 60 pcf for backfill at a 2:1 slope. Retaining walls restrained from movement at the top should be designed to resist an "at-rest" equivalent fluid pressure of 60 pcf for level backfill and 75 pcf for backfill at a 2:1 slope. For intermediate slopes, interpolate between these values. Where wall backfill will be subject to automobile loading, a traffic surcharge equivalent to 2 feet of additional backfill should also be added.

In addition to lateral earth pressures, retaining walls must be designed to resist horizontal pressures that may be generated by uphill retaining walls and foundation loads. Where an imaginary 1-1/2:1 (horizontal:vertical) plane projected downward from the base of an upslope retaining wall intersects the downslope wall, that portion of the downslope wall below the intersection should be designed for an additional horizontal uniform pressure equivalent to the maximum calculated lateral earth pressure at the base of the upslope wall. Where an imaginary 1-1/2:1 plane projected downward from the outermost edge of a surcharge load or footing intersects a retaining wall, we should be contacted to provide appropriate lateral surcharge criteria.

The seismic stability of walls should be evaluated based on an additional uniform lateral earth pressure of 20xH psf (where H is the height of the wall in feet). The factor of safety against instability under seismic loading should be at least 1.1.

Retaining walls should be fully backdrained. The backdrains should consist of 4-inch diameter, rigid perforated pipe surrounded by a drainage blanket. The top of the drain pipe should be at least 8 inches below lowest adjacent downslope grade. The pipe should be PVC Schedule 40 or ABS with an SDR of 35 or better, and the pipe should be sloped to drain at least 1 percent by gravity to an approved outlet. Accessible subdrain cleanouts should be provided, and should be maintained on a routine basis. The drainage blanket should consist of clean, free-draining crushed rock or gravel wrapped in a filter fabric such as Mirafi 140N. Alternatively, the drainage blanket could consist of Caltrans Class 2 "Permeable Material", in which case the filter fabric may be omitted. A prefabricated drainage structure such as Mirafi Miradrain may also be used provided that the backdrain pipe is embedded in at least 1 cubic foot of Class 2 Permeable Material or fabric-wrapped crushed rock per lineal foot of pipe. The drainage blanket should be at least 1 foot in width and should extend to within 1 foot of the surface. The uppermost 1 foot should be backfilled with compacted soil to exclude surface water.

Where migration of moisture through retaining walls would be detrimental or undesirable, retaining walls should be waterproofed as specified by the Project Architect or Structural Engineer.

Wall backfill should be spread in level lifts not exceeding 8 inches in thickness, brought to near the optimum moisture content, and compacted to at least 90 percent relative compaction. Retaining walls will yield slightly during backfilling. Therefore, walls should be backfilled prior to building onto or adjacent to the walls, and should be properly braced during the backfilling operations. Backfilling adjacent to walls should be performed only with hand-operated equipment to avoid over-stressing the walls.

Even well compacted backfill will settle about 1 percent of its thickness. Therefore, slabs and other improvements crossing the backfill should be designed to span or to accommodate this settlement.

Driveway Pavements

Driveway pavements should be underlain by bedrock or by properly compacted retained or keyed fill founded on bedrock as outlined in the *Site Preparation and Grading* section of this report. The upper 6 inches of subgrade should be moisture conditioned and compacted to at least 95 percent relative compaction, and should be smooth and unyielding. Aggregate baserock should be compacted to at least 95 percent relative compaction and should be smooth unyielding surface. Characteristics and placement of asphalt concrete and aggregate base, and preparation for the subgrade should conform to the *California Department of Transportation Standard Specifications*, latest edition, except that the test method for compaction should be determined by ASTM D1557.

We assume that vehicle loading for this project will be light, consisting of automobiles and light trucks. Based on our experience with similar projects, we recommend that a pavement section of 3 inches of asphalt concrete over 6 inches of Class 2 Aggregate Base be used for planning purposes. These thicknesses are the recommended minimum. Increasing asphalt concrete thickness would increase the life and durability of pavements. If desired, a project specific pavement section can be developed based on an R-value of the pavement subgrade and a traffic index (TI) provided by the Project Civil Engineer. If pavements will be subjected to construction truck traffic, the pavement thickness should be increased as recommended by the Project Civil Engineer.

Geotechnical Drainage

Positive drainage should be provided away from foundations, slopes and retaining walls. Ponding of surface water should not be allowed. Roofs should be provided with gutters and downspouts. Downspouts should be connected into closed conduits which discharge at an approved erosion resistant area well away from improvements, banks, or the swale area. Conduit should consist of rigid PVC or ABS pipe and which is Schedule 40, SDR 35 or equivalent. Downspouts, surface drains and subsurface drains should be checked for blockage and cleared and maintained on a regular basis. Surface drains and downspouts should be maintained entirely separate from retaining wall backdrains and foundation drains.

Foundation drains should be installed adjacent to the perimeter foundations. Perimeter retaining wall backdrains may be substituted for foundation drains. The foundation drains should consist of trenches which extend 18 inches deep, or 12 inches below lowest adjacent interior or crawl space grade, whichever is deeper, and which are sloped to drain at least 1 percent by gravity. The trenches should be lined completely with a filter fabric such as Mirafi 140N, or equivalent. A 4-inch diameter rigid perforated PVC or ABS pipe (Schedule 40, SDR 35 or equivalent) should be placed on a 1-inch thick layer of drain rock at the bottom of the trenches with perforations down. The pipes should be sloped to drain at least 1 percent by gravity to a non-perforated pipe (Schedule 40, SDR 35 or equivalent) which discharges at an approved outlet. The trench for the

perforated pipe should be backfilled to within 6 inches of the ground surface with drain rock. The filter fabric should be wrapped over the top of the drain rock. The upper 6 inches of the trenches should be backfilled with compacted clayey soil to exclude surface water. The trench for the non-perforated outlet pipe should be completely backfilled with compacted soil.

Exposed slopes in the crawl spaces should be graded to create a smooth surface, and covered with an approved pre-fabricated drainage material such as Mirafi Miradrain 6000. A 4-inch diameter, perforated Schedule 40 or SDR 35 pipe should be provided in a gravel filled trench at the base of the crawl space. The trench should extend 18 inches deep or 12 inches below lowest adjacent interior grade, whichever is deeper, and should be sloped to drain at least 1 percent by gravity. The trench should be completely lined with Mirafi 140N filter fabric, or equivalent. The perforated pipe should slope to drain at least 1 percent to a non-perforated Schedule 40 or SDR 35 pipe which discharges at an approved outlet. The slope and trench should then be covered with reinforced gunite.

Supplemental Services

Our conclusions and recommendations are contingent upon Herzog Geotechnical being retained to review the project plans and specifications to evaluate if they are consistent with our recommendations, and being retained to provide intermittent observation and appropriate field and laboratory testing during site preparation and grading, pier drilling, footing excavation, slab and pavement subgrade overexcavation and compaction, wall backfilling, pavement subgrade and baserock compaction, and subdrainage installation to evaluate if subsurface conditions are as anticipated and to check for conformance with our recommendations. We should also be notified to observe the completed project. Steel, concrete, slab moisture barriers and/or waterproofing should be inspected by the appropriate party, and are not part of our scope of work.

If during construction subsurface conditions different from those described in this report are observed we should be advised at once so that these conditions may be reviewed and our recommendations reconsidered. The recommendations made in this report are contingent upon our notification and review of changed conditions. If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, the recommendations of this report may no longer be valid or appropriate. In such case, we recommend that we review this report to determine the applicability of the conclusions and recommendations considering the time elapsed or changed conditions. The recommendations made in this report are contingent upon such a review.

We should be notified at least 48 hours before the beginning of each phase of work requiring our observation, and upon resumption after interruptions. These services are performed on an as-requested basis and are in addition to this geotechnical investigation. We cannot provide comment on conditions, situations or stages of construction that we are not notified to observe.

LIMITATIONS

This report has been prepared for the exclusive use of Ted Bender and Ann Lockhart and their consultants for the proposed project described in this report. Our services consist of professional opinions and conclusions developed in accordance with generally-accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided us regarding the proposed construction, the results of our field exploration and laboratory testing programs, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

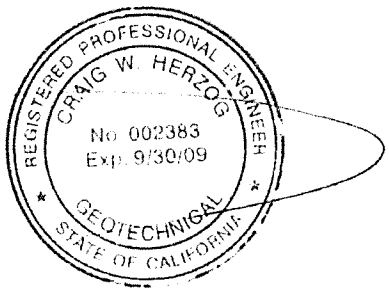
The test boring logs represent subsurface conditions at the locations and on the dates indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration and may not necessarily be the same or comparable at other times. The locations of the test borings were established in the field by reference to existing features, and should be considered approximate.

There is an inherent risk of instability associated with all hillside construction. For houses constructed on hillsides, we recommend that the owner obtains the appropriate landslide and earthquake insurance. Our current work did not address stabilization of the cottage area, stabilization of mapped large scale slides within the swale area, or stabilization of driveway cuts and fills. If desired, we can be contacted to perform subsurface investigation and analyses to develop design recommendation for these elements.

Our investigation did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic or corrosive materials in the soil, surface water, ground water or air, on or below, or around the site, nor did it include an evaluation or investigation of the presence or absence of wetlands. Our work also did not address the evaluation or mitigation of mold hazard at the site.

We appreciate the opportunity to be of service to you. If you have any questions, please call us at (415) 388-8355.

Sincerely,
HERZOG GEOTECHNICAL



Craig Herzog, G.E.
Principal Engineer

Attachments: References and Plates 1 - 10

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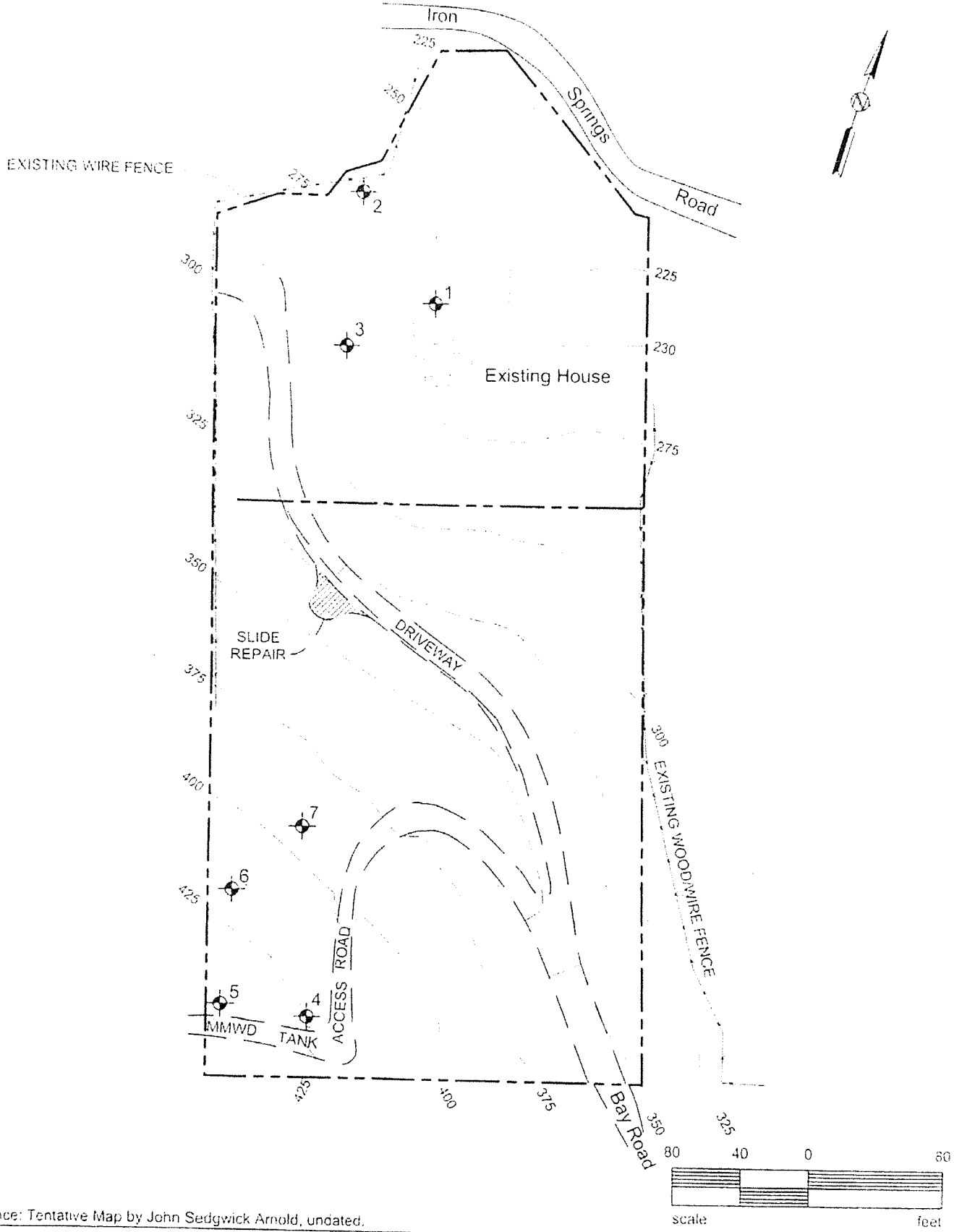

Reference: Tentative Map by John Sedgwick Arnold, undated.

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job. No. 2193-01-07
Appr:
Drwn: LPDD
Date: OCT 2007

BORING LOCATION PLAN

78 Bay Road

Fairfax, California

PLATE 1

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows Per Foot *	Sample	DEPTH (FEET)	
							0	ORANGE-BROWN SANDY SILT (ML), medium stiff, moist
							1	
		6.1	107		8		2	YELLOW-BROWN GRAVELLY CLAY (CL), soft, dry to moist
							3	
		7.1	114		24		4	ORANGE-BROWN SANDSTONE, firm, friable to weak, highly weathered
					35		5	
							6	becomes moderately hard, moderately strong at 6 feet

BOTTOM OF BORING 1 @ 6.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193.01.07
Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 1

78 Bay Road

Fairfax, California

PLATE 2

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: * *
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (t.s.f.)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft, moist (Fill)
							1	RED-BROWN GRAVELLY CLAY (CL), soft, dry, porous, with roots
		8.7	94		6		2	
							3	
		7.9	117		27		4	ORANGE-BROWN SANDSTONE, firm, friable to weak, highly weathered
							5	
					36		6	becomes moderately hard, moderately strong at 6 feet
							7	BOTTOM OF BORING 2 @ 7 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

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Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 2

78 Bay Road

Fairfax, California

PLATE 3

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 Sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft, moist
							1	RED-BROWN GRAVELLY CLAY (CL), soft to medium stiff, dry to moist, porous
		10.5	94		11		2	
							3	YELLOW-BROWN SANDSTONE, moderately hard, moderately strong, highly weathered
		9.1	108		21		4	BOTTOM OF BORING 3 @ 4 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

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Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 3

78 Bay Road

Fairfax, California

PLATE 4

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.

ELEVATION: **
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft, moist, with roots
		10.3	103		15		1	RED-BROWN GRAVELLY CLAY (CL), medium stiff, dry to moist
					49		2	
							3	ORANGE-YELLOW-BROWN SHALE, firm, friable, highly weathered

BOTTOM OF BORING 4 @ 3.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

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CONSULTING ENGINEERS

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Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 4

78 Bay Road

Fairfax, California

PLATE 5

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.

ELEVATION: **
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft, moist, with roots
							1	RED-BROWN GRAVELLY CLAY (CL), medium stiff, dry to moist, slightly porous
		7.6	103		15			
					56		2	
							3	LIGHT ORANGE-BROWN SANDSTONE, firm, friable, highly weathered

BOTTOM OF BORING 5 @ 3.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193.01-07
Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 5

78 Bay Road

Fairfax, California

PLATE 6

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.

ELEVATION: * *
START DATE: 10-16-07
FINISH DATE: 10-16-07

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	
							0	BROWN SANDY SILT (ML), soft, moist, with roots
							1	ORANGE-BROWN SANDY CLAY (CL), medium stiff, moist
							2	
								ORANGE-BROWN SANDSTONE, firm, friable, highly weathered
							3	BOTTOM OF BORING 6 @ 3 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
* * Existing ground surface at time of drilling.

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Job No: 2193-01-07
Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 6

78 Bay Road

Fairfax, California

PLATE 7

Other Laboratory Tests	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)
							0
							1
							2
							3

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.

ELEVATION: **
START DATE: 10-16-07
FINISH DATE: 10-16-07

BROWN SANDY SILT (ML), soft, moist, with roots

ORANGE-BROWN SANDY CLAY (CL), medium stiff, moist

YELLOW-BROWN SANDSTONE, firm, friable, highly weathered

BOTTOM OF BORING 7 @ 3 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of drilling.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-01-07
Appr:
Drwn: LPDD
Date: OCT 2007

LOG OF BORING 7

78 Bay Road

Fairfax, California

PLATE 8

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL SAND
			GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL SAND SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL SAND CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

			Shear Strength, psf / Confining Pressure, psf.	
Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5 inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◣	Standard Penetration Test	Perm	Permeability	
▨	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

Job No: 2193-01 07
Appr:
Drwn: LPDD
Date: OCT 2007

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

78 Bay Road

Fairfax, California

PLATE 9

ROCK SYMBOLS


SHALE OR CLAYSTONE


CHERT


SERPENTINITE


SILTSTONE


PYROCLASTIC


METAMORPHIC ROCKS


SANDSTONE


VOLCANIC


DIATOMITE


CONGLOMERATE


PLUTONIC


SHEARED ROCKS

LAYERING

MASSIVE	Greater than 6 feet
THICKLY BEDDED	2 to 6 feet
MEDIUM BEDDED	8 to 24 inches
THINNLY BEDDED	2 1/2 to 8 inches
VERY THINNLY BEDDED	3/4 to 2-1/2 inches
CLOSELY LAMINATED	1/4 to 3/4 inches
VERY CLOSELY LAMINATED	Less than 1/4 inch

JOINT, FRACTURE, OR SHEAR SPACING

VERY WIDELY SPACED	Greater than 6 feet
WIDELY SPACED	2 to 6 feet
MODERATELY SPACED	8 to 24 inches
CLOSELY SPACED	2-1/2 to 8 inches
VERY CLOSELY SPACED	3/4 to 2-1/2 inches
EXTREMELY CLOSELY SPACED	Less than 3/4 inch

HARDNESS

SOFT - Pliable; can be dug by hand

FIRM - Can be gouged deeply or carved with a pocket knife

MODERATELY HARD - Can be readily scrached by a knife blade; scratch leaves heavy trace of dust and is readily visable after the powder has been blown away

HARD - Can be scratched with difficulty; scratch produces little powder and is often faintly visable

VERY HARD - Cannot be scratched with pocket knife; leaves a metallic streak

STRENGTH

PLASTIC - Capable of being molded by hand

FRIABLE - Crumbles by rubbing with fingers

WEAK - An unfractured specimen of such material will crumble under light hammer blows

MODERATELY STRONG - Specimen will withstand a few heavy hammer blows before breaking

STRONG - Specimem will withstand a few heavy ringing hammer blows and usually yields large fragments

VERY STRONG - Rock will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

DEGREE OF WEATHERING

HIGHLY WEATHERED - Abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thourough discoloration, rock disintegration, mineral decomposition

MODERATELY WEATHERED - Some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition

SLIGHTLY WEATHERED - A few stained fractures, slight discoloration, little or no effect on cementation, no mineral decomposition

FRESH - Unaffected by weathering agents, no appreciable change with depth

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October 9, 2019
JN 18050

TOWN OF FAIRFAX
OCT 1 _ 2019
RECEIVED

Linda Neal
Principal Planner
Town of Fairfax
142 Bolinas Road
Fairfax, CA 94930

HAND DELIVER

Re: Town of Fairfax 1st Plan Check Response BLD18-
Project Name:
Site Address: 78 Bay Road, Fairfaz
APN 001-093-21

Dear Ms. Neal,

The building and planning plan check comments on your letter dated July 16, 2019 have been reviewed and the plans and reports updated accordingly. Below please see the response to comments.

Attached for your review and approval please find:

- 7 sets revised building plans (24"x36") DATED OCTOBER 9, 2019
- 1 set revised building plans (11"17")

Comments and Response:

Town of Fairfax Engineering Information

6) The preliminary grading plan shows surface runoff being dispersed by level | spreaders set above steep slopes on the downhill side of the driveway in areas 1 described in the project geotechnical report as being susceptible to instability. The submitted plans shall be revised to address the Town Engineers' concerns.
Response: Surface runoff discharge locations have been modified to avoid areas of previous landslide activity. We have coordinated with the geotechnical engineer regarding the discharge locations and have obtained approval.

7) A detailed construction management plan shall be provided detailing the means and methods that will be implemented to minimize the impacts of the removal of the proposed 954 cubic yards of off-haul on the neighborhood and on public roadways

ATTACHMENT C3

accessing the site including but not limited to Bay Road and the hairpin turn at the intersection of Scenic Road and Bay Road.

Response: A detailed construction management plan shall be prepared during the Building Permit phase of the project, as requested in the Conclusions section of the review letter from Miller Pacific, dated July 10, 2019.

Miller Pacific Section 17.072.080E –Geotechnical Report

The submitted geotechnical report was prepared in 2007 and explicitly limits validity of the recommendations to a period of 18 months before an update is required. The report includes description of surface conditions and subsurface exploration and laboratory testing, including three borings within the proposed building envelope. Borings were extended to maximum depths between 4- and 7-feet, and bottomed 1- to 3-feet into weathered sandstone rock. The report indicates the site lies within a large mapped earthflow landslide complex and that slopes above and below the driveway are generally susceptible to instability.

In the 12 years since the geotechnical report as prepared, several historic or significant rainy seasons have resulted in significant slope instability and damage in the general vicinity of the project site. During our reconnaissance, we observed local evidence of recent instability above the driveway and in the northern portion of the lot, above and along Iron Springs Road. Several significant trees will be removed along the downslope side of the driveway, which is indicated by the report to be over-steepened and susceptible to instability. **Plans do not indicate any stabilization or retaining systems along the downslope side of the driveway, as appears to have been recommended by the Geotechnical Engineer. The Stormwater Control Plan and Preliminary Grading Plan also indicates dispersal of runoff from significant new impervious areas across steep slopes above the existing cottage and residences at 9 and 39 Iron Springs Road, as well as the public Iron Springs Road ROW.** Additionally, the report contains outdated seismic design criteria, and will need to be updated for project structural design and eventual building submittal.

Response: The preliminary grading plan has been updated to include pier-foundation retaining walls with tie-backs on both sides of the road per the geotechnical engineering recommendations. Retaining walls are shown in plan view on C1.0, in sections on C2.0 and C2.1, and a typical road section with retaining walls is provided as detail 4 on C4.0.

Miller Pacific Section 17.072.080(f) – Grading and Erosion-Control Plan

6) The Preliminary Grading Plan indicates surface runoff throughout the site will be dispersed via level spreaders set above steep slopes along the downhill side of the driveway, which are described in the Geotechnical Report as being generally susceptible to instability. No erosion-control measures are shown, and no drainage improvements are indicated in the lower driveway/building envelope area.
All drainage improvements need to be designed (sized) to accommodate runoff from 100-year storm event. Hydrologic calculations should be submitted indicating that the site drainage system has been designed in accordance with Town standards and to result in no net increase in peak flow rate during a 100-year storm. Plans should be revised to indicate how drainage will be handled and dispersed in the lower portion of the property, in consultation with the Geotechnical Engineer.
Response: *Surface runoff discharge locations have been modified to avoid areas of previous landslide activity. We have coordinated with the geotechnical engineer regarding the discharge locations and have obtained approval. We have included an erosion and sediment control plan as sheet C3.0 to provide stormwater best management practices (Details provided on C4.0).*

Drainage in the lower portion of the property has been handled by the addition of Keynote 2 to C1.0 that directs the contractor to direct planter area and residence downspouts to storm drain pipes that outfall into existing vegetation.

7) Sheet C1.0 indicates significant grading (978 CY cut and 24 CY fill) will be performed, primarily consisting of excavation for widening of the driveway alignment, and resulting in a net offhaul of 954CY. Additional material is expected to be generated from foundation and utility excavations. Given the proposed import/off-haul quantities and the confined access along Bay Road, the applicants should submit a detailed Construction Management Plan outlining means and methods of reducing neighborhood impacts due to the large quantity of materials moving to and from the site. Mitigation should be provided for any anticipated impacts to Bay Road, insofar as post-construction conditions should be equal to or better than current. Such a plan should consider appropriate traffic and material handling, material storage, and stockpile locations to minimize impacts to neighboring properties and use of the MM WD water tank easement.

We note that it appears offhaul quantities could possibly be reduced significantly by backfilling portions of the planned (non-storage) crawl space areas. Additionally, if retaining walls are required to improve stability along the outboard edge of the driveway

and/or reduce impact risks imposed on the cottage, some of the planned offhaul could be used to backfill these walls.

Response: The total amount of cut has been revised to 631 cubic yards by estimating backfill for planned non-storage crawl space areas.

A detailed construction management plan shall be prepared during the Building Permit phase of the project, as requested in the Conclusions section of the review letter from Miller Pacific, dated July 10, 2019.

Recommendations

We recommend that project processing be delayed until the aforementioned materials are submitted for review. Initial items to be resolved/addressed **include 1) property line discrepancies between the submitted Site Plans, Topographic Survey, and Record of Survey, and confirming accurate information is reflected on the title report and deed;** 2) performance of an updated Geotechnical Investigation due to passage of time, and **3) revision of preliminary architectural and civil drawings to reflect correct and consistent survey information as well as the intent of the Geotechnical Engineer's updated recommendations.** In our opinion, each of those items is required to warrant further processing.

Other items, including review of design-level **Grading, Drainage, and Erosion control plans, review of Structural Construction Mangement plans, and review of hydrologic calculations can be handled at the Building Permit submittal level with minimal anticipated impact.**

Response: The Preliminary Grading and Drainage Plan has been updated to identically match the property lines called out on the Topographic Survey, and an Erosion and Sediment Control Plan has been added to address your concerns. Other items, including an update for the Stormwater Control Plan for Small Projects/Single Family Homes and the Construction Management Plan shall be prepared during the Building Permit phase of the project.

Should you have any questions or require additional information do not hesitate to contact our office.

Sincerely,

Timothy L. Schram
Principal Engineer
tschram@adobeinc.com

Stormwater Control Plan For Small Projects/Single Family Homes

For

78 Bay Road
Fairfax, CA
APN 001-093-21

JN 18050
June 17, 2019

Prepared for:
Ann Lockhart & Ted Bender
78 Bay Road
Fairfax, CA 94930
Ablockhart2003@yahoo.com
tbender@gmail.com

Timothy L. Schram, RCE 67890
My license expires 6/30/2019

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY LEE SCHRAM
No. C67890
Exp. 06/30/21
CIVIL
STATE OF CALIFORNIA

Prepared by:

adobe associates, inc.
civil engineering | land surveying | wastewater
1220 N. Dutton Ave., Santa Rosa, CA 95401
P. (707) 541-2300 F. (707) 541-2301
Website: www.adobeinc.com

Prepared By: BMW
Checked By: TLS

Table of Contents

Appendices

Stormwater Control Plan for Small Projects/Single Family Homes
For
78 Bay Road, Fairfax, California

I. Project Data Form

Project Name	78 Bay Road
Application Submittal Date	February 22, 2019
Project Location	78 Bay Road, Fairfax, CA, 94930
Project Phase No.	N/A
Project Type and Description	Single Family Residence
Total Project Site Area	0.46 acres
Total New and Replaced Impervious Area	13,264 SF (0.30 acres)
Total Pre-Project Impervious Surface Area	5,025 SF (0.12 acres)
Total Post-Project Impervious Surface Area	18,289 SF (0.42 acres)
Runoff Reduction Measures Selected	Disperse Runoff to Vegetated Area

II. Project Setting

A. Nature and Purpose

The project proposes to construct a new single family residence with an improved driveway. The disturbed area of the project is approximately 0.46 acres, with a total of 0.30 acres of proposed impervious area. Anticipated cut and fill quantities are 978 CY and 24 CY respectively for a total of 954 CY of excess cut.

B. Existing Site Features and Conditions

The existing site is located northwest of the Town of Fairfax, see **Vicinity Map** in **Appendix A**. The existing parcel is 2.76 acres with slopes of 5 to 120%. The soil type belongs to hydrologic Soil Group B, see **Soil Analysis** in **Appendix C.** The site has various trees scattered throughout.

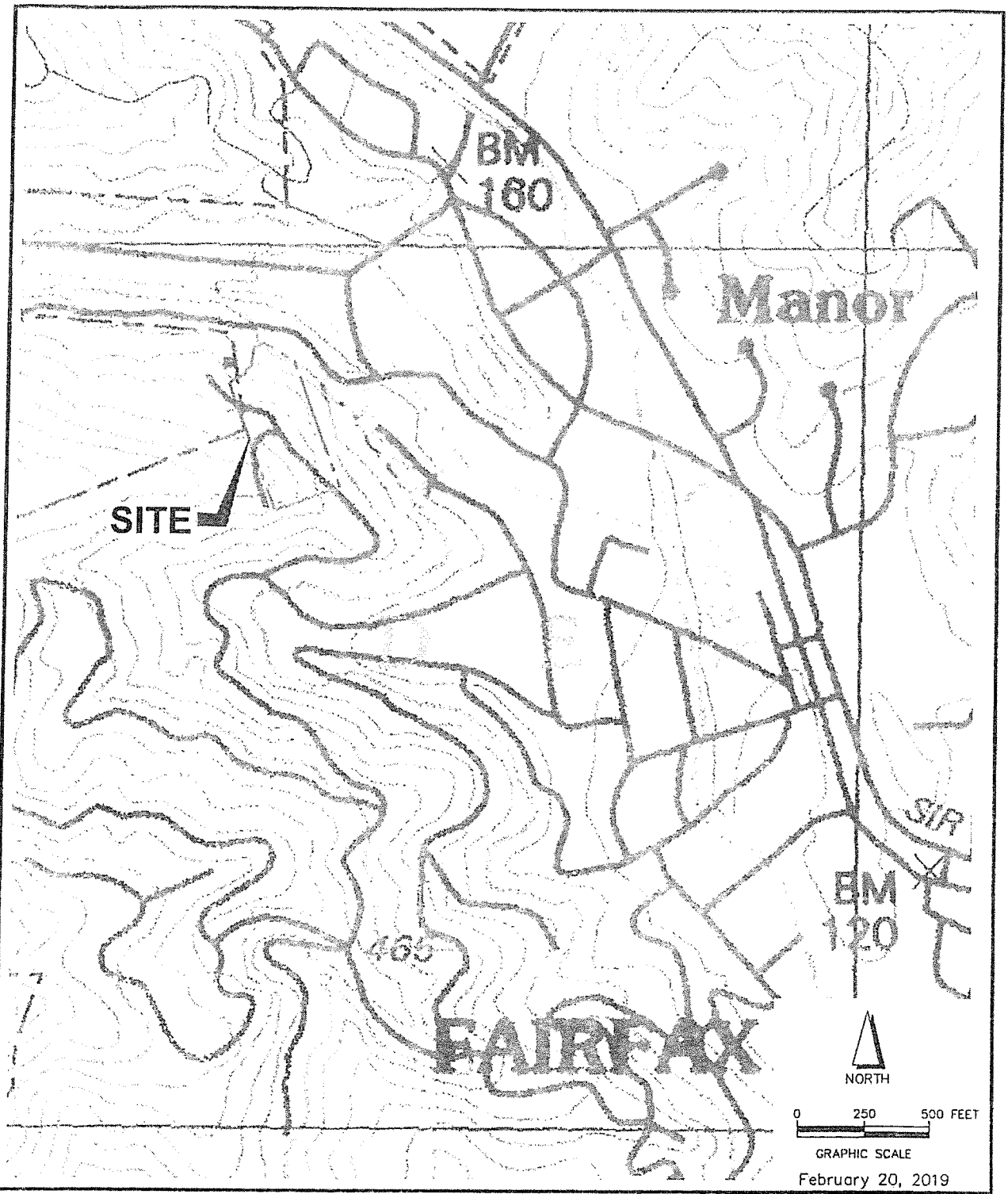
C. Runoff Reduction Measures and Stormwater Control

Pursuant to the BASMAA Post – Construction Manual, this project is classified as a small project/single family home. This type of projects is creating or replacing impervious area. Runoff will be directed from impervious surfaces to vegetated areas, see **Storm Water Control Pan (SWCP) Exhibit in Appendix B.**

The runoff from the six DMA's presented in the SWCP will be directed to vegetated areas along existing flow paths. The ratio of the proposed impervious areas to vegetated pervious areas is less than 2:1.

APPENDIX A

Vicinity Map



February 20, 2019

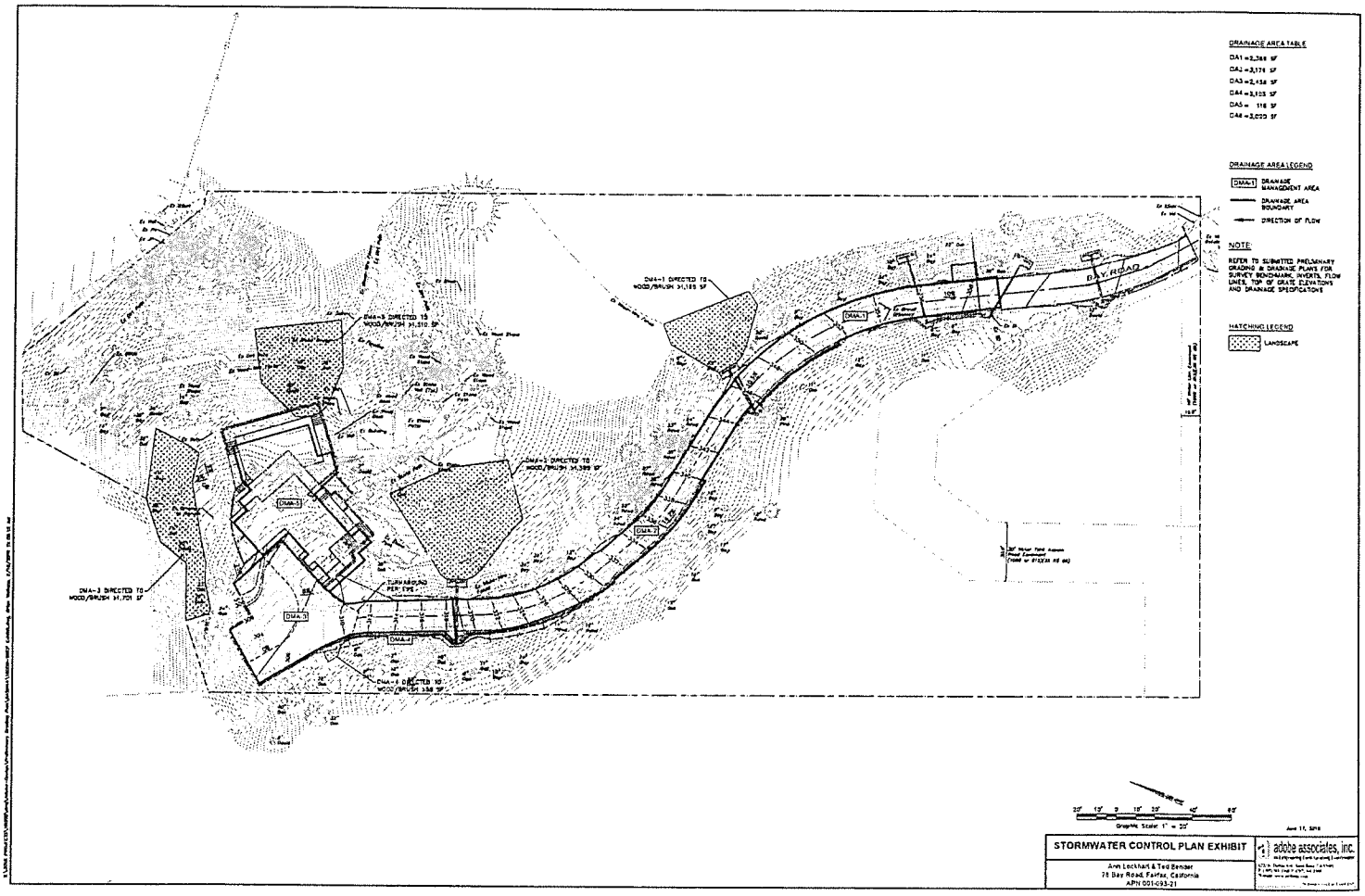
VICINITY MAP

BAY ROAD RESIDENCE
78 Bay Road, Fairfax, CA
APN 001-093-21

adobe associates, inc.
civil engineering | land surveying | wastewater
1220 N. Dutton Ave., Santa Rosa, CA 95401
P. (707) 541-2300 F. (707) 541-2301
Website: www.adobeinc.com
"A Service You Can Count On!"

APPENDIX B

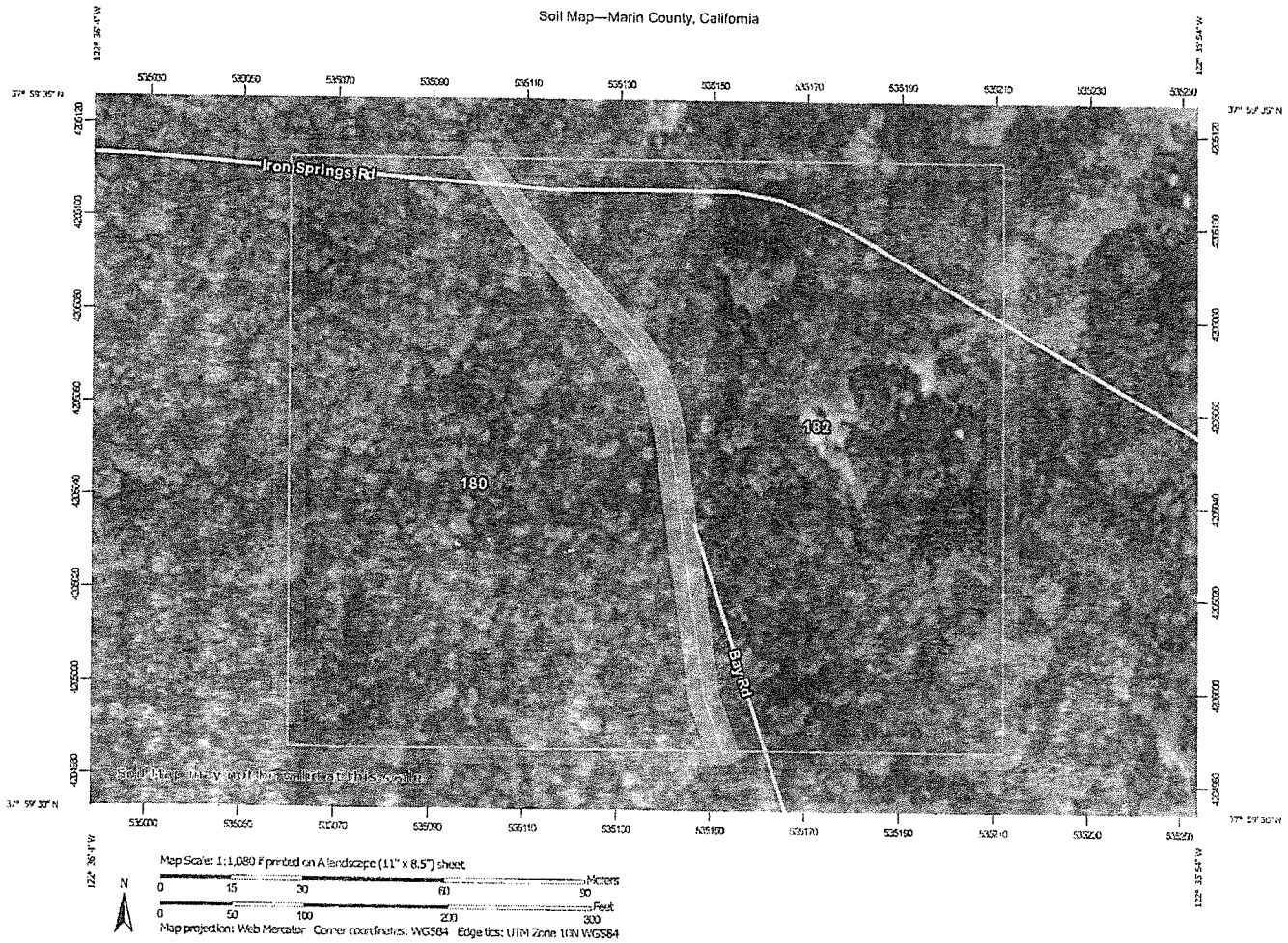
Stormwater Control Plan Exhibit


DRAINAGE AREA TABLE
DA1 = 2,344 SF
DA2 = 2,174 SF
DA3 = 2,434 SF
DA4 = 3,103 SF
DA5 = 116 SF
DA6 = 2,020 SF
DRAINAGE AREA LEGEND
DMA-1 DRAINAGE MANAGEMENT AREA
DRAINAGE AREA BOUNDARY
DIRECTION OF FLOW
NOTE:
REFER TO SUBMITTED PRELIMINARY GRADING & DRAINAGE PLANS FOR SURVEY BENCHMARK, INVERTS, FLOW LINES, TOP OF GRATE ELEVATIONS AND DRAINAGE SPECIFICATIONS
HATCHING LEGEND
LANDSCAPE
BAY ROAD
DA4-1 DIRECTED TO WOOD/BRUSH 31,193 SF
DA4-2 DIRECTED TO WOOD/BRUSH 31,310 SF
DA4-3 DIRECTED TO WOOD/BRUSH 31,721 SF
DA4-4 DIRECTED TO WOOD/BRUSH 31,369 SF
DA4-5 DIRECTED TO WOOD/BRUSH 336 SF
TURN AROUND PER FIRE
DMA-1
DMA-2
DMA-3
DMA-4
DMA-5
DMA-6
Graphic Scale: 1" = 20'
STORMWATER CONTROL PLAN EXHIBIT
Ann Lockhart & Ted Bender
78 Bay Road, Fairfax, California
APN 001-093-21
adobe associates, inc.

APPENDIX C

Soil Analysis

Soil Map—Marin County, California



USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marin County, California
Survey Area Data: Version 12, Sep 17, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009---Oct 31, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
180	Tocaloma-McMullin complex, 50 to 75 slopes	2.1	49.5%
182	Tocaloma-McMullin-Urban land complex, 30 to 50 percent slopes	2.4	50.5%
Totals for Area of Interest		4.8	100.0%

Marin County, California

180—Tocaloma-McMullin complex, 50 to 75 slopes

Map Unit Setting

National map unit symbol: hf3p
Elevation: 50 to 1,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 55 to 61 degrees F
Frost-free period: 290 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Tocaloma and similar soils: 40 percent
Mcmullin and similar soils: 35 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tocaloma

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 19 inches: loam
H2 - 19 to 39 inches: very gravelly loam
H3 - 39 to 43 inches: weathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Mcmullin

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from conglomerate

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 18 inches: gravelly loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Saurin

Percent of map unit: 5 percent
Hydric soil rating: No

Bonnydoon

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, deep

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, shallow

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Maymen
Percent of map unit: 2 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 12, Sep 17, 2018

Marin County, California

182—Tocaloma-McMullin-Urban land complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hf3r
Elevation: 10 to 1,500 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 250 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Tocaloma and similar soils: 40 percent
Mcmullin and similar soils: 20 percent
Urban land: 20 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tocaloma

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 19 inches: loam
H2 - 19 to 39 inches: very gravelly loam
H3 - 39 to 43 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Hydric soil rating: No

Description of Mcmullin

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from conglomerate

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 18 inches: gravelly loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat):
Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): 8
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Xerorthents

Percent of map unit: 2 percent
Hydric soil rating: No

Saurin
Percent of map unit: 2 percent
Hydric soil rating: No

Dipsea
Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, shallow
Percent of map unit: 2 percent
Hydric soil rating: No

Slopes less than 30 percent
Percent of map unit: 2 percent
Hydric soil rating: No

Slopes more than 50 percent
Percent of map unit: 2 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 12, Sep 17, 2018

TOWN OF FAIRFAX
142 BOLINAS ROAD, FAIRFAX, CALIFORNIA 94930
(415) 453-1584/FAX (415) 453-1618

Date: May 21, 2019

Permit 19-T-35

NOTICE OF TREE COMMITTEE ACTION

Request for a tree permit to remove: (10) Bay
(1) Coast Live Oak
(1) Coast Redwood
(2) Black Acacia
(1) Pacific Madrone
(1) Douglas Fir

Address of Tree(s) to be removed: 78 Bay Rd

Applicant's Phone: Theodore (Ted) Bender (415) 810-3895

On May 21, 2019 the Fairfax Tree Committee took the following action on the above referenced tree permit application:

NEW HOME – FOR RECOMMENDATIONS ONLY FROM TREE COMMITTEE – RECOMMENDATIONS TO BE FORWARDED TO PLANNING DEPARTMENT FOR APPROVALS THROUGH PLANNING COMMISSION.

____X_____ APPROVED - Applicant present. The Committee reviewed and discussed the arborist report. The Committee discussed the possibility of keeping tree #15 (coast redwood) and tree #14 (coast live oak). Applicant stated that tree #15 would encroach into new road width as required by the Ross Valley Fire Department. Applicant also stated that they are going to try and keep tree #14 if it was possible.
Richardson-Mack made a motion to approve the application with the condition that it is recommended that tree #14 (Coast live Oak) try and be saved; the motion was seconded by Romaidis and voted on.
Vote:
Benson- Aye
Flores- Aye
Richardson Mack- Aye
Romaidis- Aye Item #6 Vote: Ayes- 4, Noes- 0

_____ CONTINUED

_____ DENIED

ATTACHMENT D1

TREE-PROTECTION PLAN

78 Bay Road
Fairfax, California
(APN: 001-093-21)

Prepared for:
Ann and Theodore Lockhart
78 Bay Road
Fairfax, CA 94930
ablockhart2003@yahoo.com

Prepared by:
Dr. Kent Julin
ISA Certified Arborist
California Professional Forester
ARBORSCIENCE, LLC

September 24, 2019

P.O. Box 111 • Woodacre, CA 94973-0111
Office: 415.419.5197 • Field: 415.419.6960 • PayPal: kent.julin@gmail.com
Web: http://arborscientist.com

ATTACHMENT D2

ASSIGNMENT

Ann and Theodore Lockhart hired ARBORSCIENCE, LLC to prepare this arborist report and tree-protection plan for proposed improvements to their Fairfax property at 78 Bay Road. I conducted my inspection on April 30, 2019 and considered the proposed Site Plan dated September 20, 2019 by Adobe Associates, Inc.

SITE DESCRIPTION AND CONTEXT

The subject trees are part of a young forest that developed following land-clearing and fire disturbances over the last 100 years. This mixed evergreen forest is dominated by California bay (*Umbellularia californica*), coast redwood (*Sequoia sempervirens*), and coast live oak (*Quercus agrifolia*). Other trees present include Pacific madrone (*Arbutus menziesii*) and California buckeye (*Aesculus californica*). The 17 subject trees grow along the driveway that serves a cabin at 78 Bay Road. This property was developed in 1916; a new home is planned for the property. Ross Valley Fire Department Fire Inspector Robert Bastianon has required that a 16-foot-wide driveway be developed to access the home.

SUBJECT TREE DESCRIPTIONS AND PROJECT IMPACTS

All of the 74 subject trees are healthy and present low- to moderate-failure risks (Table 1, Figure 1). The Ross Valley Fire Department is requiring the existing driveway to be improved to a width of 16' (except where the driveway passes the large redwoods) and that all California bays within 10' of the edge of pavement to be removed. In addition, 1 oak near the proposed new home would be removed for defensible space clearance (Tree 14). As a result, 16 of the subject trees would be removed (Trees 1-4, 6, 11-17, 72-74; including 7 heritage trees), 1 dead madrone (Tree 45) would be removed for safety reasons. The two fairy rings of redwoods along the driveway will retained and protected (Trees 7-10, 29-33, 35-37). All of the other trees on the property are planned for retention.

TREE-PROTECTION MEASURES

Applicable project design and construction requirements related to the protection of trees shall be implemented in accordance with International Society of Arboriculture Best Management Practices for Managing Trees During Construction, unless modified or waived by the Town planner in consultation with the Town arborist. Following are specific tree-protection measures and considerations:

1. The project arborist will be Kent Julin through the entire length of the project. Any change of arborist will require a new arborist report from the new project arborist.

2. Before the start of any clearing, excavation, construction, or other work on the site, or the issuance of a building or demolition permit, subject trees near proposed work shall be securely fenced-off at the non-intrusion zone, or other limit as may be delineated in approved plans. Such fences shall remain

continuously in place for the duration of the work undertaken in connection with the development. Tree protection signage will be hung on all fences that indicate the trees are protected; project arborist contact information will be provided.

3. Tree protection measures for the coast redwoods (Trees 7-10, 29-33, 35-37) will include trunk armoring (strapped 2" x 4" x 8' lumber facing the driveway) and high visibility orange fencing at the edge of the road. Tree protection fencing will also be installed along the northwestern edge of development and surrounding Tree 38.

4. The project arborist shall attend a pre-construction meeting with the contractor and Town of Fairfax representatives.

5. If the proposed development will encroach upon the non-intrusion zone of a subject tree, special measures shall be applied, as approved by the project arborist, to allow the roots to obtain necessary oxygen, water, and nutrients. The project arborist shall be onsite during any project grading associated with the installation of the foundation or any excavation to occur within any designated "Non-Intrusion Zone."

6. Underground trenching shall avoid the major support and absorbing tree roots of the subject trees. If avoidance is impractical, hand excavation undertaken under the supervision of the project arborist is required. Trenches shall be consolidated as much as possible.

7. Artificial irrigation shall not occur within the root zone of oaks, unless deemed appropriate on a temporary basis by the project arborist to improve tree vigor or mitigate root loss.

8. Compaction of the soil within the non-intrusion zone of the subject trees shall be avoided. Use of bridging/protective materials such as layered mulch, trench plates, plywood or rubber mats is encouraged within non-intrusion zones. The existing turf subgrade will adequately protect trees along the driveway from compaction.

9. Any excavation, cutting, or filling of the existing ground surface within the non-intrusion zone shall be minimized and subject to such conditions as the project arborist may impose.

10. Burning or use of equipment with an open flame near or within the non-intrusion zone shall be avoided. All brush, earth, and other debris shall be removed in a manner that prevents injury to the subject trees.

11. Oil, gas, paint, cement, chemicals, or other substances that may be harmful to trees shall not be stored or dumped within the non-intrusion zone of any subject tree, or at any other location on the site from which such substances might enter the non-intrusion zone of a subject tree.

12. Construction materials shall not be stored within the non-intrusion zone of a subject tree. On-site parking shall be kept outside non-intrusion zones.

13. The project arborist shall report any tree damage and steps to correct damage to the Town of Fairfax immediately, then oversee corrective work.

14. The project arborist shall be present during excavation for the utility trenches, cellar, and foundation work near the subject trees. Any roots encountered that are larger than 4" in diameter shall be retained if possible. Smaller roots will be cut with a clean, sharp saw under direction of the arborist.

15. Watering trees may be done at the direction of the project arborist as needed.

16. Any change in the construction project will require review and approval of the project arborist *and* the Town of Fairfax.

17. The site supervisor must provide advance notice notifying the Town of Fairfax Arborist including the project arborist during critical construction operations within root-protection zones identified in the arborist report so that they can be present to monitor intrusion in the root zone.

SCHEDULE OF INSPECTIONS

Following are the inspections that will be completed as needed for the project:

1. Before Equipment Mobilization, Delivery of Materials, Tree Removal, Site Work. The project arborist will meet with the general contractor and owners to review tree-protection measures, designated tree removals, identify and mark tree-protection zone fencing, specify equipment access routes and storage areas, and review existing conditions of trees to provide any additional necessary protection measures.

2. Following Installation of Tree-Protection Fencing and Armoring. The project arborist will inspect the site to ensure that all protection measures are properly installed. Review contractor requests for access within tree-protection zones. Assess changes in tree health since previous inspection.

3. During Soil Excavation or Work Potentially Affecting Protected Trees. The project arborist will inspect the site during any work within non-intrusion zones of protected trees and document implemented recommendations. Assess changes in tree health since previous inspection.

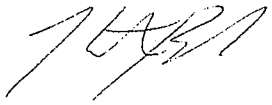
4. Final Site Inspection. The project arborist will inspect tree health and provide necessary recommendations to promote tree health and longevity. A letter report will be provided to the Town of Fairfax that summarizes the project arborist's findings and conclusions.

CERTIFICATION

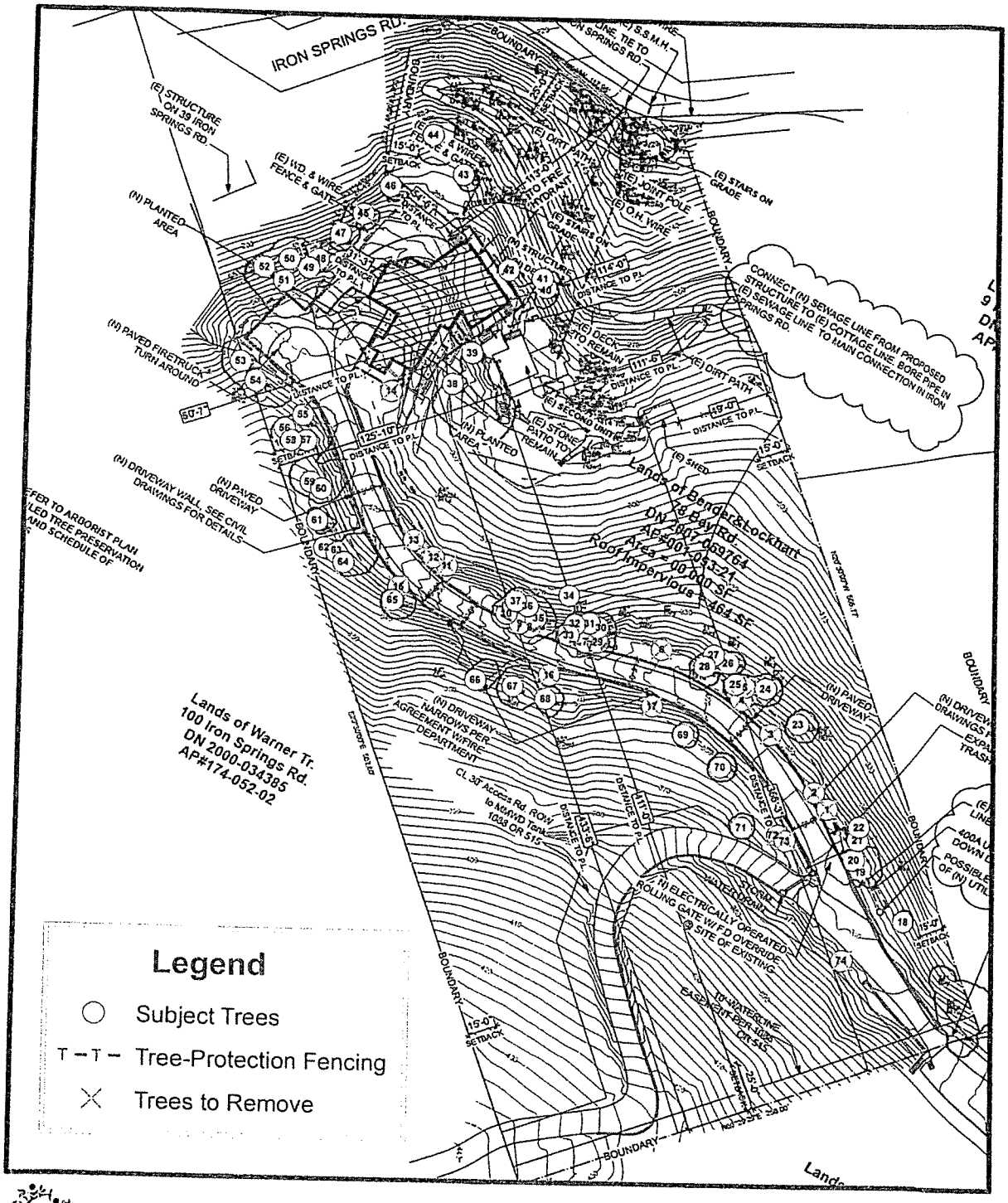
I certify that the tree-protection measures described above will help maintain the systemic health and stability of trees planned for retention.

Sincerely,

ARBORSCIENCE, LLC



Dr. Kent R. Julin
ISA Certified Arborist #WE-8733A
ISA Tree Risk Assessor Qualified
California Registered Professional Forester #2648



ARBORSCIENCE, LLC

Sound Tree Advice

ARBORGIS 2019

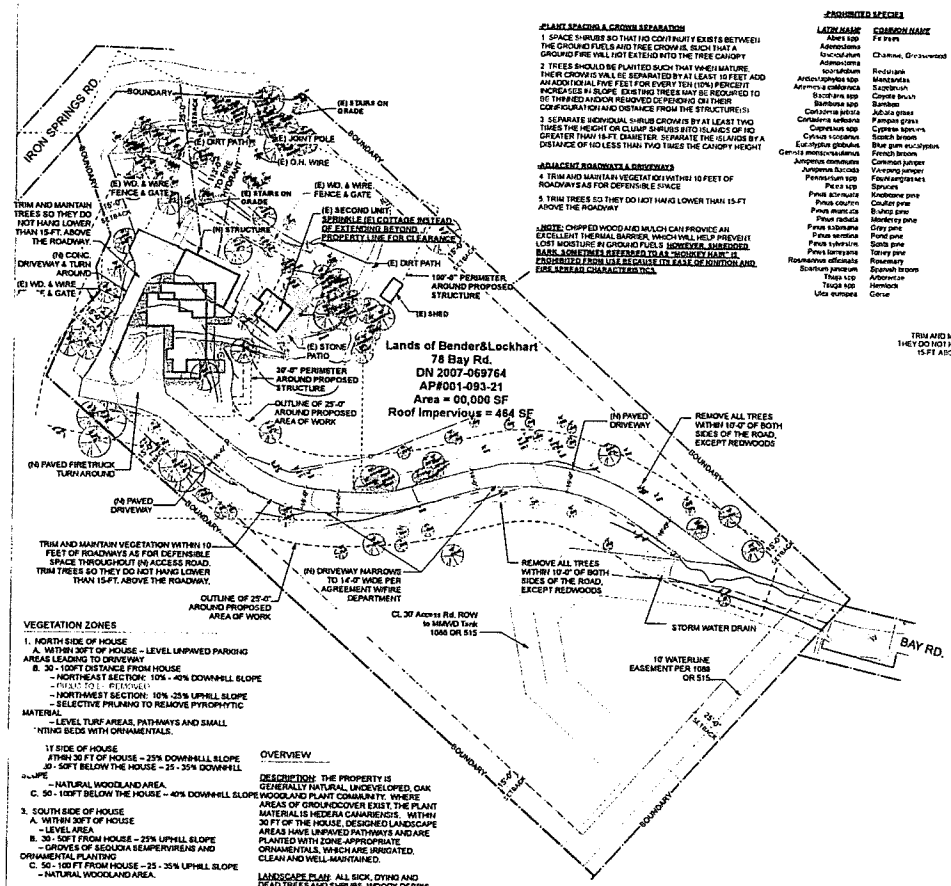
Figure 1
78 Bay Road
Fairfax, California

Table 1. Subject trees growing at 78 Bay Road in Fairfax.

Tree No.	Common Name	Scientific Name	Trunk Dia. (in.)	Condition* Rating (removals)	Status**	Action
1	California bay	*Umbellularia californica*	19	4	Heritage	Remove, Fire Access
2	California bay	*Umbellularia californica*	7-19 (4)	4	Heritage	Remove, Fire Access
3	California bay	*Umbellularia californica*	9	4	-	Remove, Fire Access
4	California bay	*Umbellularia californica*	7	4	-	Remove, Fire Access
5	California bay	*Umbellularia californica*	9, 9		-	Retain and Protect
6	California bay	*Umbellularia californica*	22	4	Heritage	Remove, Fire Access
7	Coast redwood	*Sequoia sempervirens*	28		Heritage	Retain and Protect
8	Coast redwood	*Sequoia sempervirens*	26		Heritage	Retain and Protect
9	Coast redwood	*Sequoia sempervirens*	22		Heritage	Retain and Protect
10	Coast redwood	*Sequoia sempervirens*	20		Heritage	Retain and Protect
11	California bay	*Umbellularia californica*	11	4	-	Remove, Fire Access
12	California bay	*Umbellularia californica*	8, 9	4	-	Remove, Fire Access
13	California bay	*Umbellularia californica*	10, 13	4	Heritage	Remove, Fire Access
14	Coast live oak	*Quercus agrifolia*	8, 12	4	Heritage	Remove, Defensible space
15	Coast redwood	*Sequoia sempervirens*	14	4	Heritage	Remove, Fire Access
16	Black acacia	*Acacia melanoxylon*	15	4	Undesirable	Remove, Fire Access
17	Douglas-fir	*Pseudotsuga menziesii*	21	4	Heritage	Remove, Fire Access
18	California bay	*Umbellularia californica*	19		Heritage	Retain
19	Coast live oak	*Quercus agrifolia*	18		Heritage	Retain
20	Coast live oak	*Quercus agrifolia*	19		Heritage	Retain
21	California bay	*Umbellularia californica*	10		-	Retain
22	Coast live oak	*Quercus agrifolia*	13		Heritage	Retain
23	California buckeye	*Aesculus californica*	5		-	Retain
24	California bay	*Umbellularia californica*	9		-	Retain
25	California buckeye	*Aesculus californica*	9		Heritage	Retain
26	California bay	*Umbellularia californica*	9		-	Retain
27	California bay	*Umbellularia californica*	6		-	Retain
28	California buckeye	*Aesculus californica*	8, 8		Heritage	Retain
29	Coast redwood	*Sequoia sempervirens*	24		Heritage	Retain
30	Coast redwood	*Sequoia sempervirens*	26		Heritage	Retain
31	Coast redwood	*Sequoia sempervirens*	28		Heritage	Retain
32	Coast redwood	*Sequoia sempervirens*	17		Heritage	Retain
33	Coast redwood	*Sequoia sempervirens*	21		Heritage	Retain
34	Coast redwood	*Sequoia sempervirens*	18		Heritage	Retain
35	Coast redwood	*Sequoia sempervirens*	22		Heritage	Retain
36	Coast redwood	*Sequoia sempervirens*	24		Heritage	Retain
37	Coast redwood	*Sequoia sempervirens*	25		Heritage	Retain

Tree No.	Common Name	Scientific Name	Trunk Dia. (in.)	Condition* Rating (removals)	Status**	Action
38	Coast live oak	*Quercus agrifolia*	28		Heritage	Retain
39	Hawthorne	*Crataegus phaenopyrum*	3, 7		-	Retain
40	Coast live oak	*Quercus agrifolia*	10		Heritage	Retain
41	California buckeye	*Aesculus californica*	8		Heritage	Retain
42	California buckeye	*Aesculus californica*	4-7 (4)		Heritage	Retain
43	California buckeye	*Aesculus californica*	6, 8		Heritage	Retain
44	Coast live oak	*Quercus agrifolia*	34		Heritage	Retain
45	Pacific madrone	*Arbutus menziesii*	dead	1	-	Remove for safety
46	Coast live oak	*Quercus agrifolia*	13		Heritage	Retain
47	Coast live oak	*Quercus agrifolia*	16		Heritage	Retain
48	Coast live oak	*Quercus agrifolia*	17		Heritage	Retain
49	Coast live oak	*Quercus agrifolia*	23		Heritage	Retain
50	Coast live oak	*Quercus agrifolia*	22		Heritage	Retain
51	Coast live oak	*Quercus agrifolia*	24		Heritage	Retain
52	Coast live oak	*Quercus agrifolia*	18		Heritage	Retain
53	Coast live oak	*Quercus agrifolia*	11-16 (3)		Heritage	Retain
54	Coast live oak	*Quercus agrifolia*	13, 16		Heritage	Retain
55	Coast live oak	*Quercus agrifolia*	8		Heritage	Retain
56	Coast live oak	*Quercus agrifolia*	8		Heritage	Retain
57	Coast live oak	*Quercus agrifolia*	6		-	Retain
58	Coast live oak	*Quercus agrifolia*	9		Heritage	Retain
59	Coast live oak	*Quercus agrifolia*	18		Heritage	Retain
60	Coast live oak	*Quercus agrifolia*	5-12 (3)		Heritage	Retain
61	Coast live oak	*Quercus agrifolia*	7		-	Retain
62	Coast live oak	*Quercus agrifolia*	10		Heritage	Retain
63	Coast live oak	*Quercus agrifolia*	8		Heritage	Retain
64	California bay	*Umbellularia californica*	15		-	Retain
65	Coast redwood	*Sequoia sempervirens*	16		Heritage	Retain
66	Coast live oak	*Quercus agrifolia*	14		Heritage	Retain
67	California bay	*Umbellularia californica*	10		-	Retain
68	Black acacia	*Acacia melanoxylon*	9		Undesirable	Retain
69	California bay	*Umbellularia californica*	9		-	Retain
70	Coast live oak	*Quercus agrifolia*	9		Heritage	Retain
71	Coast live oak	*Quercus agrifolia*	13		Heritage	Retain
72	California bay	*Umbellularia californica*	6	4	-	Remove, Fire Access
73	California bay	*Umbellularia californica*	9	4	-	Remove, Fire Access
74	Black acacia	*Acacia melanoxylon*	10	4	Undesirable	Remove, Fire Access

* Condition ratings on a scale of 1 to 5 where 1 = poor and 5 = excellent. Table 5.2 Matheny & Clark (1998) Trees and Development a Technical Guide to Preservation of Trees During Land Development.
** Fairfax Town Code (§ 8.36.020)



Vegetation Management Plan - Proposed 1

1/32" = 1'-0"

PLANT SPACING & CROWN SEPARATION

1. SPACE SHRUBS SO THAT NO CONTINUITY EXISTS BETWEEN THE GROUND FUELS AND TREE CROWNS, SUCH THAT A GROUND FIRE WILL NOT EXTEND INTO THE TREE CANOPY
2. TREES SHOULD BE PLANTED SUCH THAT WHEN MATURE THEIR CROWNS WILL BE SEPARATED BY AT LEAST 10 FEET. ADD AN ADDITIONAL FIVE FEET FOR EVERY TEN (10%) PERCENT INCREASE IN SLOPE. EXISTING TREES MAY BE REQUIRED TO BE THINNED AND/OR REMOVED DEPENDING ON THEIR CONFIGURATION AND DISTANCE FROM THE STRUCTURE(S).
3. SEPARATE INDIVIDUAL SHRUB CROWNS BY AT LEAST TWO TIMES THE HEIGHT OR CLUMP SHRUBS INTO ISLANDS OF NO GREATER THAN 10-FT. DIAMETER. SEPARATE THE ISLANDS BY A DISTANCE OF NO LESS THAN TWO TIMES THE CANOPY HEIGHT

ADJACENT ROADWAYS & DRIVEWAYS

4. TRIM AND MAINTAIN VEGETATION WITHIN 10 FEET OF ROADWAYS AS FOR DEFENSIBLE SPACE
5. TRIM TREES SO THEY DO NOT HANG LOWER THAN 15-FT ABOVE THE ROADWAY

NOTE: CHIPPED WOOD AND MULCH CAN PROVIDE AN EXCELLENT THERMAL BARRIER, WHICH WILL HELP PREVENT LOST MOISTURE IN GROUND FUELS. HOWEVER, SHREDDED BARK, SOMETIMES REFERRED TO AS "MONKEY HAIR" IS PROHIBITED FROM USE BECAUSE ITS EASE OF IGNITION AND FIRE SPREAD CHARACTERISTICS.

PROHIBITED SPECIES

LATIN NAME	COMMON NAME
Acer spp	Maple
Adenostoma fasciculatum	Chamise, Greasewood
Adenostoma sparsifolium	Red shank
Arctostaphylos spp	Manzanitas
Artemisia californica	Sagebrush
Baccharis spp	Coyote brush
Bambusa spp	Bamboo
Cedrus spp	Deodar
Cortaderia jubata	Jubata grass
Cortaderia selloana	Pampas grass
Cupressus spp	Cypress species
Cytisus scoparius	Scotch broom
Eucalyptus globulus	Blue gum eucalyptus
Genista monspessulanus	French broom
Juniperus communis	Common juniper
Juniperus sabinoides	Mahogany juniper
Pennisetum spp	Fountaingrasses
Picea spp	Spruces
Pinus attenuata	Knobcone pine
Pinus coulteri	Coulter pine
Pinus muricata	Bishop pine
Pinus radiata	Monterey pine
Pinus sabiniana	Gray pine
Pinus serotina	Pond pine
Pinus sylvestris	Scots pine
Pinus torreyana	Torrey pine
Rosmarinus officinalis	Rosemary
Spartium junceum	Spanish broom
Thuja spp	Arborvitae
Tsuga spp	Hemlock
Ulex europea	Gorse

VEGETATION ZONES

1. NORTH SIDE OF HOUSE
   A. WITHIN 30FT OF HOUSE – LEVEL UNPAVED PARKING AREAS LEADING TO DRIVEWAY
   B. 30 - 100FT DISTANCE FROM HOUSE
      – NORTHEAST SECTION: 10% - 40% DOWNHILL SLOPE
      – PINUS SP.(S) - REMOVED
      – NORTHWEST SECTION: 10% -25% UPHILL SLOPE
      – SELECTIVE PRUNING TO REMOVE PYROPHYTIC MATERIAL
      – LEVEL TURF AREAS, PATHWAYS AND SMALL NITING BEDS WITH ORNAMENTALS.

1T SIDE OF HOUSE
ITHIN 30 FT OF HOUSE – 25% DOWNHILL SLOPE
30 - 50FT BELOW THE HOUSE – 25 - 35% DOWNHILL SLOPE
– NATURAL WOODLAND AREA.
C. 50 - 100FT BELOW THE HOUSE – 40% DOWNHILL SLOPE WOODLAND PLANT COMMUNITY. WHERE

3. SOUTH SIDE OF HOUSE
   A. WITHIN 30FT OF HOUSE
      – LEVEL AREA
   B. 30 - 50FT FROM HOUSE – 25% UPHILL SLOPE
      – GROVES OF SEQUOIA SEMPERVIRENS AND ORNAMENTAL PLANTING
   C. 50 - 100 FT FROM HOUSE – 25 - 35% UPHILL SLOPE
      – NATURAL WOODLAND AREA.

4. WEST SIDE OF HOUSE
   A. WITHIN 30FT OF HOUSE – 30% UPHILL SLOPE
      – DESIGNED LANDSCAPE AREAS
   B. 30 - 50FT FROM HOUSE
      – LEVEL UNPAVED AREA
      – 25% UPHILL TERRACED SLOPE WITH PATHWAYS THROUGH THE TREES.
      – DESIGNED LANDSCAPE AREA
      – PARTIALLY IRRIGATED
   C. 50 - 100FT FROM HOUSE
      – 25% UPHILL SLOPE LEADING TO LEVEL DRIVEWAY

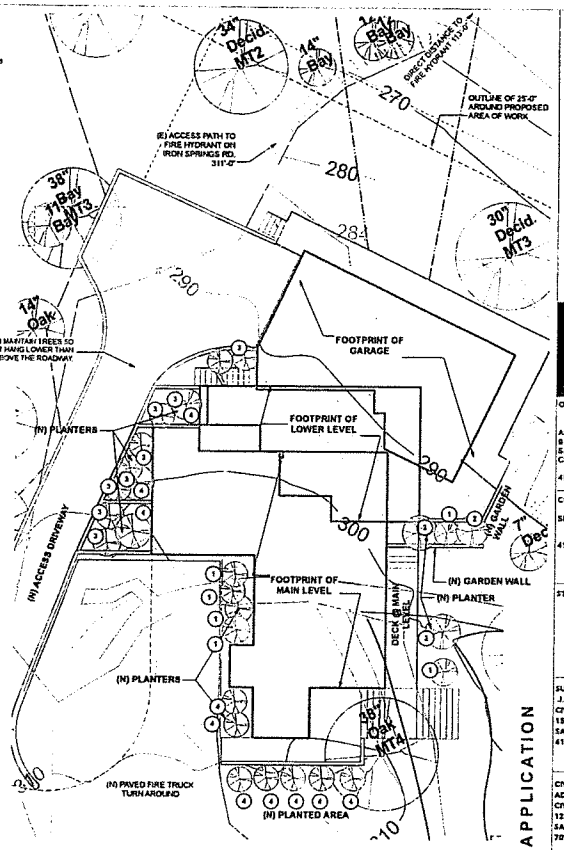
NOTES:
NOT FOR CONSTRUCTION UNTIL APPROVED BY THE CITY OF FAIRFAX
FIELD CHECK ALL DIMENSIONS & REPORT ANY DISCREPANCIES
REPORT ANY DISCREPANCIES BETWEEN CONSULTANTS DRAWINGS

OVERVIEW

DESCRIPTION: THE PROPERTY IS GENERALLY NATURAL, UNDEVELOPED, OAK WOODLAND PLANT COMMUNITY. WHERE AREAS OF GROUNDCOVER EXIST, THE PLANT MATERIAL IS HEDERA CANARIENSIS. WITHIN 30 FT OF THE HOUSE, DESIGNED LANDSCAPE AREAS HAVE UNPAVED PATHWAYS AND ARE PLANTED WITH ZONE-APPROPRIATE ORNAMENTALS, WHICH ARE IRRIGATED, CLEAN AND WELL-MAINTAINED.

LANDSCAPE PLAN: ALL SICK, DYING AND DEAD TREES AND SHRUBS, WOODY DEBRIS AND OTHER PYROPHYTIC MATERIALS ARE TO BE REMOVED. REMAINING HEALTHY TREES SHALL BE THINNED TO ENSURE 20FT SPACING BETWEEN CROWNS. ALL TREES SHALL BE LIMBED UP TO A MINIMUM OF 10FT. AT THIS TIME, THERE ARE NO PLANS TO MAKE ANY CHANGES TO THE EXISTING PLANTING SCHEME. TREES TO BE REMOVED ARE INDICATED IN AG.1 EXISTING SITE PLAN.

IRRIGATION: ALL SHRUB AND TURF AREAS AROUND THE HOUSE ARE IRRIGATED. TURF AREAS HAVE POP-UP SPRINKLERS AND OTHER AREAS HAVE DRIP IRRIGATION. THE WOODLANDS BEYOND THE GARDEN AREAS ARE NOT IRRIGATED.



PROPOSED PLANT LIST		
TAG	SCIENTIFIC NAME	COMMON NAME
(1)	ROSACEAE SPP / ROSA GRANDIFLORA	ROSE
(2)	CITRUS LIMON DWARF	LEMON
(3)	POLYSTICHUM MUNITUM	FERN
(4)	ALOE ARBORESCENS	SUCCULENT

Enlarged Vegetation Management Plan - Proposed 1

1/8" = 1'-0"

032519-PLANNING APPLICATION

LEYLA HILMI DESIGN
P.O. BOX 684, SAN ANSELMO, CA 94979
leyla@hilmidesign.com 415-686-1878

78 BAY RD.
001-093-21

OWNER:
ANN LOCKHART & TED BENDER
8 SCENIC AVENUE
SAN ANSELMO
CA 94960
415 810 3305

CONTRACTOR:
SHANE DEAL
415 497 1178

STRUCTURAL ENGINEER:

SURVEYOR:
J.L. ENGINEERING
CIVIL ENGINEERS
1339 FOURTH ST.
SAN RAFAEL, CA. 94901
415.457.6447

CIVIL ENGINEER:
ADOBE ASSOCIATES, INC.
CIVIL ENGINEERING
1220 N. DUTTON AVE.
SANTA ROSA, CA 95401
707.541.2300

TITLE 24:

DATE: 02.13.19

SHEET #:
VEGETATION MANAGEMENT PLAN
L1.0