Preliminary Arborist Report

1125 North Gate Road
Walnut Creek, CA

PREPARED FOR:
Calibr Ventures
115 Jennifer Court
Alamo, CA 94507

PREPARED BY:
HortScience | Bartlett Consulting
2550 Ninth Street, Suite 112
Berkeley, CA 94710

July 2024

HORT SCIENCE
BARTLETT CONSULTING
Divisions of The F.A. Bartlett Tree Expert Company

Preliminary Arborist Report

1125 North Gate Road
Walnut Creek, CA

Table of Contents

List of Tables

Attachments

Preliminary Arborist Report
1125 North Gate Road
Walnut Creek, CA

Introduction and Overview
Calibr Ventures is planning to develop property located at 1125 North Gate Road in Walnut Creek, California. HortScience | Bartlett Consulting (Divisions of The F.A. The Bartlett Expert Tree Company) was asked to prepare an **Arborist Report** for the site in preparation for development. The site was vacant of any structures. A few remnant orchard trees were present.

This report provides the following information:

1. An assessment of each tree's health, structure, suitability for preservation and protected status within and adjacent to the proposed project area.
2. A preliminary evaluation of impacts to trees based on plans provided by Calibr Ventures.
3. Preliminary guidelines for tree preservation throughout the planned demolition and construction phases of the project.

Assessment Methods
Trees were assessed on June 21, 2024. Tree assessment included all trees located on or overhanging the 1125 North Gate property with at least one trunk over 9 inches in diameter at 54 inches above grade. The assessment procedure consisted of the following steps:

1. Identifying the tree species.
2. Verifying or tagging trees and recording locations on a map.
3. Measuring the trunk diameter at 54 inches above grade.
4. Evaluating the health and structural condition using a scale of 1 – 5:
   - ***5*** - A healthy, vigorous tree, reasonably free of signs and symptoms of disease, with good structure and form typical of the species.
   - ***4*** - Tree with slight decline in vigor, small amount of twig dieback, minor structural defects that could be corrected.
   - ***3*** - Tree with moderate vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that might be mitigated with regular care.
   - ***2*** - Tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated.
   - ***1*** - Tree in severe decline, dieback of scaffold branches and/or trunk; most of foliage from epicormics; extensive structural defects that cannot be abated.
5. Rating the suitability for preservation as "high", "moderate" or "low". Suitability for preservation considers the health, age and structural condition of the tree, and its potential to remain an asset to the site for years to come.

   High: Trees with good health and structural stability that have the potential for longevity at the site.

   Moderate: Trees with somewhat declining health and/or structural defects than can be abated with treatment. The tree will require more intense management and monitoring, and may have shorter life span than those in 'high' category.

   Low: Trees in poor health or with significant structural defects that cannot be mitigated. Tree is expected to continue to decline, regardless of treatment. The species or individual may have characteristics that are undesirable for landscapes, and generally are unsuited for use areas.

Description of Trees

Fifty-two (52) trees (numbered #1001 to 1052) were assessed, representing 14 species (Table 1). The three most frequently assessed species (California black walnut, coast live oak, and valley oak) are native to the area. Many were likely indigenous to the site. Most of the trees and associated canopy cover lined the driveway and bordered the adjacent properties. Overall, 24 trees were in good condition, 14 were in fair condition, and 14 were in poor condition (Table 1). All the coast redwoods were dead. Descriptions of each tree can be found in the ***Tree Assessment Form*** and approximate locations are shown on the ***Tree Inventory Map*** (see *Attachments*).

Table 1: Condition ratings and frequency of occurrence of trees 1125 North Gate Road Walnut Creek, CA

Common Name	Scientific Name	Condition				Total
		Dead	Poor (1-2)	Fair (3)	Good (4-5)	
Deodar cedar	*Cedrus deodara*	-	-	-	1	**1**
California black walnut	*Juglans hindsii*	-	2	7	-	**9**
Paradox walnut	Juglans × paradox	-	2	-	-	**2**
Coast live oak	*Quercus agrifolia*	-	1	2	16	**19**
Valley oak	*Quercus lobata*	1	-	4	4	**8**
California pepper	*Schinus molle*	-	-	1	2	**3**
Coast redwood	*Sequoia sempervirens*	8	-	-	-	**-**
Chinese elm	*Ulmus parvifolia*	-	-	-	1	**1**
Total		**9**	**5**	**14**	**24**	**52**

The most commonly assessed species was coast live oak with 19 trees. Sixteen (16) trees were in good condition. Tree #1044 was in excellent condition growing in the open area with no other trees around (Photo 1). Trees #1036 and 1039 were in fair condition. Tree #1013 was in poor condition with codominant trunks that were separating with the eastern trunk beginning to fail a(Photos 2 and 3, next page). The coast live oaks ranged in maturity from semi-mature with 9-inch trunks as was the case for trees #1005, 1009, 1013, and 1017 to over mature, in the case of #1039 with a 48-inch trunk diameter. Mature coast live oaks #1039 and 1040 were growing in the creek and both had impressive spreading crowns. While suppressing other trees.

Photo 1: Coast live oak #1044 was mature with 24-inch trunk diameter. The tree was largely defect free and was growing in a field with no impediments to its growth.

Photo 2 and 3: The codominant trunks of coast live oak #1013 were separating.

Nine valley oaks were assessed. Four trees were in good condition, four were fair condition, and tree #1035 was dead. As a group the valley oaks were mature, with only trees #1002 and 1035 having diameters under 15 inches. The valley oaks were growing in groups, where they were either the largest tree suppressing other trees or were being suppressed by a larger tree.

Eleven walnuts were assessed. Two paradox walnuts and nine California black walnuts. None of the walnuts were in good condition. Seven were in fair condition and four (#1032, 1042, 1047, and 1048) were mostly dead with only epicormic growth (Photo 4). Many of the walnuts appeared to be fallow orchard trees.

Eight completely dead coast redwoods were included in the assessment (Photo 5).

Photo 4. (left): California black walnut #1032 was mostly dead. Only growth was epicormic.

Photo 5. (right): Coast redwoods 1014, 1015, and 1016 were completely dead.

Three California pepper trees were evaluated. All three were mature in development with trunks exceeding 20 inches in diameter. Trees #1045 and 1051 were in good condition and tree #1046 was in fair condition. This group of trees had healthy crowns.

One Chinese elm and one deodar cedar were assessed. Both trees were in good condition. Chinese elm #1033 had a 12-inch diameter. Deodar ceder #1049 had a 30-inch diameter. The deodar had upright form with a single trunk and horizontal branching attached to the main stem. By contrast the Chinese elm had codominant trunks with irregular branching. Both typical of the species.

Suitability for Preservation

Before evaluating the impacts that will occur during development, it is important to consider the quality of the tree resource itself, and the potential for individual trees to function well over an extended length of time. Trees that are preserved on development sites must be carefully selected to make sure that they may survive development impacts, adapt to a new environment and perform well in the landscape. Our goal is to identify trees that have the potential for long-term health, structural stability and longevity within the proposed development.

Evaluation of suitability for preservation considers several factors:

- **Tree health**
  Healthy, vigorous trees are better able to tolerate impacts such as root injury, demolition of existing structures, changes in soil grade and moisture, and soil compaction than are non-vigorous trees. For example, the coastal redwoods were dead and should be removed.

- **Structural integrity**
  Trees with significant amounts of wood decay and other structural defects that cannot be corrected are likely to fail. Such trees should not be preserved in areas where damage to people or property is likely. For instance, the codominant trunks of coast live oak #1013 were separating. Removal of the failing trunk will likely exceed the tree's tolerance.

- **Species response**
  There is a wide variation in the response of individual species to construction impacts and changes in the environment. For example, Chinese hackberry and Canary Island pine are relatively tolerant of construction impacts. Coast live oak and coast redwood are tolerant of construction impacts. Valley oak is moderately tolerant. Both California black walnut and paradox walnut are intolerant.

- **Tree age and longevity**
  Old trees, while having significant emotional and aesthetic appeal, have limited physiological capacity to adjust to an altered environment. Young trees are better able to generate new tissue and respond to change.

- **Invasiveness**
  Species that spread across a site and displace desired vegetation are not always appropriate for retention. This is particularly true when indigenous species are displaced. The California Invasive Plant Inventory Database (http://www.cal-ipc.org/paf/) lists species identified as being invasive. Walnut Creek is part of the Central West Floristic Province. For species at this site, California pepper is rated as "Limited".

Each tree was rated for suitability for preservation based upon its age, health, structural condition and ability to safely coexist within a development environment (Table 2). We consider trees with high suitability for preservation to be the best candidates for preservation. We do not recommend retention of trees with low suitability for preservation in areas where people or property will be present. Retention of trees with moderate suitability for preservation depends upon the intensity of proposed site changes.

Table 2: Tree suitability for preservation
1125 North Gate Road Walnut Creek, CA

High	Trees in this category had good health and structural stability that have the potential for longevity at the site. Eleven trees had high suitability for preservation.
Moderate	Trees in this category have fair health and/or structural defects that may be abated with treatment. Trees in this category require more intense management and monitoring and may have shorter lifespans than those in the "high" category. Twenty-three (23) had moderate suitability for preservation.
Low	Trees in this category are in poor health or have significant defects in structure that cannot be abated with treatment. These trees can be expected to decline regardless of management. The species or individual tree may possess either characteristics that are undesirable in landscape settings or be unsuited for use areas. Nine trees had low suitability for preservation.

Note: Eight coast redwoods and valley oak #1035 were dead, and thus excluded from this evaluation.

Estimate of Value

To estimate the reproduction cost of the tree, I used the cost approach, reproduction method, trunk formula technique, as described in the ***Guide for Plant Appraisal***, 10th edition (International Society of Arboriculture, Champaign IL, 2018). In addition, I referred to ***Species Classification and Group Assignment*** (2004), a publication of the Western Chapter of the International Society of Arboriculture.

When estimating reproduction cost, the trunk formula technique considers four factors: size, condition, functional limitations and external limitations. Size is measured as trunk diameter, normally 54 inches above grade. Condition reflects the health and structural integrity of the tree. Functional limitations reflect constraints to tree development based on the site and species. I noted no external limitations.

I estimated the reproduction cost for individual trees to range from $700 to $46,150 for a total of $388,200 for all trees. The reproduction cost for trees planned to be preserved was $137,150 and for those proposed for removal was $203,250. Individual values are described in the Estimated Appraisal of Value & Disposition Table (*see Attachments*).

Preliminary Evaluation of Impacts and Recommendations

Appropriate tree retention requires a practical match between the location and intensity of construction activities with the quality and health of trees. The tree assessment was the reference point for tree condition and quality. Impacts from the proposed project were assessed using the *Preliminary Grading and Utility Plan* dated July 3, 2024 and prepared by DK Engineering. Plans included surveyed trunk locations. However, plans were preliminary, as such, the report is considered preliminary.

Plans detail a full development of the site, complete with 19 units, a new street, street furniture, landscaping, and bioretention areas. Tree preservation is possible within the creek area. Trees along the roadway corridor are within 5 feet of the proposed road, curb, and gutter making preservation unlikely for most trees. Off site trees will be impacted.

Based on my assessment of the plans, 11 trees can be preserved. These trees were in the creek area away from the proposed development or at least 15 feet from proposed impacts as was the case for tree #1010.

Impacts will be beyond the tolerance of 41 trees. Trees were located in areas either in the footprint of the proposed improvements or are located in such close proximity to development that impacts will be beyond the tolerance of the tree, requiring removal. Six trees are within 5 feet of the road and the depth of excavation will be to a depth of 2.7 to 9 ft. Trees are not likely to tolerate impacts.

The 11 trees growing near the creek basin can be preserved. Some will require **Tree Protection Zones** (TPZ), and construction activities will need to be limited in these areas. **Tree Preservation Guidelines** are detailed below.

Preliminary Tree Preservation Guidelines

The goal of tree preservation is not merely tree survival during development but maintenance of tree health and beauty for many years. Trees retained on sites that are either subject to extensive injury during construction or are inadequately maintained become a liability rather than an asset. The response of individual trees will depend on the amount of excavation and grading, the care with which demolition is undertaken, and the construction methods. Coordinating any construction activity inside the **TREE PROTECTION ZONE** can minimize these impacts.

The following recommendations will help reduce impacts to trees from development and maintain and improve their health and vitality through the clearing, grading and construction phases. Plans for redevelopment have not yet been finalized. Trees with high suitability for preservation should be preserved where possible.

Tree should be preserved in groups where possible. Trees planted in raised boxes or with asphalt surrounding them should be preserved in the planter. The following are recommendations for design and construction phases that will assist in successful tree preservation.

Design recommendations

1. Any changes to the plans affecting the trees should be reviewed by the Project Arborist regarding tree impacts. These include, but are not limited to, site plans, improvement plans, utility and drainage plans, grading plans, landscape and irrigation plans, and demolition plans.
2. Plan for tree preservation by designing adequate space around trees to be preserved. This area is called the **TREE PROTECTION ZONE:** No grading, excavation, construction or storage of materials should occur within that zone. Areas of the **TREE PROTECTION ZONE** should be fenced to minimize impacts and staging in the **TREE PROTECTION ZONE**.

3. Tree Preservation Guidelines prepared by the Project Arborist, which include specifications for tree protection during demolition and construction, should be included on all plans.
4. Ensure adequate but not excessive water is supplied to trees; in most cases, occasional irrigation will be required. Avoid directing runoff toward trees.
5. Reevaluate disposition of the six trees within 5 feet of the road (#1004 – 1009) when plans become available detailing the depth of excavation near the trees. Final disposition may not be determinable until excavation begins, and the presence and size of roots may be evaluated in situ.

Trees on adjacent properties
Trees on adjacent properties may be impacted by construction activities. The key to tree preservation is to minimize adverse impacts near trees to be retained. The following are recommendations for design and construction phases that will assist in successful tree preservation.

1. The **TREE PROTECTION ZONE** shall be the project property line. The project's security fence will serve as the tree protection fencing.
2. Off-site trees may require pruning to provide vertical clearance for construction. All pruning shall be completed by a Certified Arborist or Tree Worker and adhere to the latest edition of the ANSI Z133 and A300 standards as well as the Best Management Practices -- Tree Pruning published by the International Society of Arboriculture.
3. On-site trees to be removed that have branches extending into the canopy of off-site trees to remain must be removed by a qualified arborist and not by construction contractors. The qualified arborist shall remove the tree in a manner that causes no damage to the trees and understory to remain.

Pre-demolition and pre-construction treatments and recommendations

1. The demolition and construction superintendents shall meet with the Project Arborist before beginning work to review all work procedures, access routes, storage areas, and tree protection measures.
2. Portions of the **TREE PROTECTION ZONE** should be fenced. Trees planted in concrete planters can be fenced at the edge of concrete. Trees adjacent to demolition may require limb and trunk protections. This may be accomplished using foam wrapped with waddle and orange snow fencing to protect the areas where the limb (or trunk) is exposed to incidental contact.
3. Prune trees to be preserved to clean the crown of dead branches 1 inch and larger in diameter, raise canopies as needed for construction activities. All pruning shall be done by a State of California Licensed Tree Contractor (C61/D49). All pruning shall be done by Certified Arborist or Certified Tree Worker in accordance with the Best Management Practices for Pruning (International Society of Arboriculture, 2002) and adhere to the most recent editions of the American National Standard for Tree Care Operations (Z133.1) and Pruning (A300). The Project Arborist will provide pruning specifications prior to site demolition.
4. All tree work shall comply with the Migratory Bird Treaty Act as well as California Fish and Wildlife code 3503-3513 to not disturb nesting birds. To the extent feasible tree pruning and removal should be scheduled outside of the breeding season. Breeding bird surveys should be conducted prior to tree work. Qualified biologists should be involved in establishing work buffers for active nests.
5.

Recommendations for tree protection during construction

1. Any approved grading, construction, demolition or other work within the **TREE PROTECTION ZONE** should be monitored by the Project Arborist.
2. All contractors shall conduct operations in a manner that will prevent damage to trees to be preserved.
3. Tree protection devices are to remain until all site work has been completed within the work area. Fences or other protection devices may not be relocated or removed without permission of the Project Arborist.
4. Construction trailers, traffic and storage areas must remain outside **TREE PROTECTION ZONE** at all times.
5. Any root pruning required for construction purposes shall receive the prior approval of and be supervised by the Project Arborist. Roots should be cut with a saw to provide a flat and smooth cut. Removal of roots larger than 2 inches in diameter should be avoided.
6. If roots 2 inches and greater in diameter are encountered during site work and must be cut to complete the construction, the Project Arborist must be consulted to evaluate effects on the health and stability of the tree and recommend treatment.
7. Spoil from trench, footing, utility or other excavation shall not be placed within the **TREE PROTECTION ZONE**, neither temporarily nor permanently.
8. All grading within the dripline of trees shall be done using the smallest equipment possible. The equipment shall operate perpendicular to the tree and operate from outside the **TREE PROTECTION ZONE**. Any modifications must be approved and monitored by the Project Arborist.
9. If injury should occur to any tree during construction, it should be evaluated as soon as possible by the Project Arborist so that appropriate treatments can be applied.
10. No excess soil, chemicals, debris, equipment or other materials shall be dumped or stored within the **TREE PROTECTION ZONE**.
11. Any additional tree pruning needed for clearance during construction must be performed by a Certified Arborist and not by construction personnel or certified tree climber.

Maintenance of impacted trees

Trees should be monitored and inspected annually and after major storms to identify conditions requiring treatment to manage risk associated with tree failure.

Preserved trees will experience a physical environment different from that of pre-development. As a result, tree health and structural stability should be monitored. Occasional pruning, fertilization, mulch, pest management, replanting and irrigation may be required. In addition, provisions for monitoring both tree health and structural stability following construction must be made a priority. Inspect trees annually and following major storms to identify conditions requiring treatment to manage risk associated with tree failure.

Our procedures included assessing trees for observable defects in structure. This is not to say that trees without significant defects will not fail. Failure of apparently defect-free trees does occur, especially during storm events. Wind forces, for example, can exceed the strength of defect-free wood causing branches and trunks to break. Wind forces coupled with rain can saturate soils, reducing their ability to hold roots, and blow over defect-free trees. Although we cannot predict all failures, identifying those trees with observable defects is a critical component of enhancing public safety.

Furthermore, trees change over time. Our inspections represent the condition of the tree at the time of inspection. As trees age, the likelihood of failure of branches or entire trees increases. Annual tree inspections are recommended to identify changes to tree health and structure. In addition, trees should be inspected after storms of unusual severity to evaluate damage and structural changes. Initiating these inspections is the responsibility of the client and/or tree owner.

If you have any questions regarding my observations or recommendations, please contact me.

HortScience | Bartlett Consulting

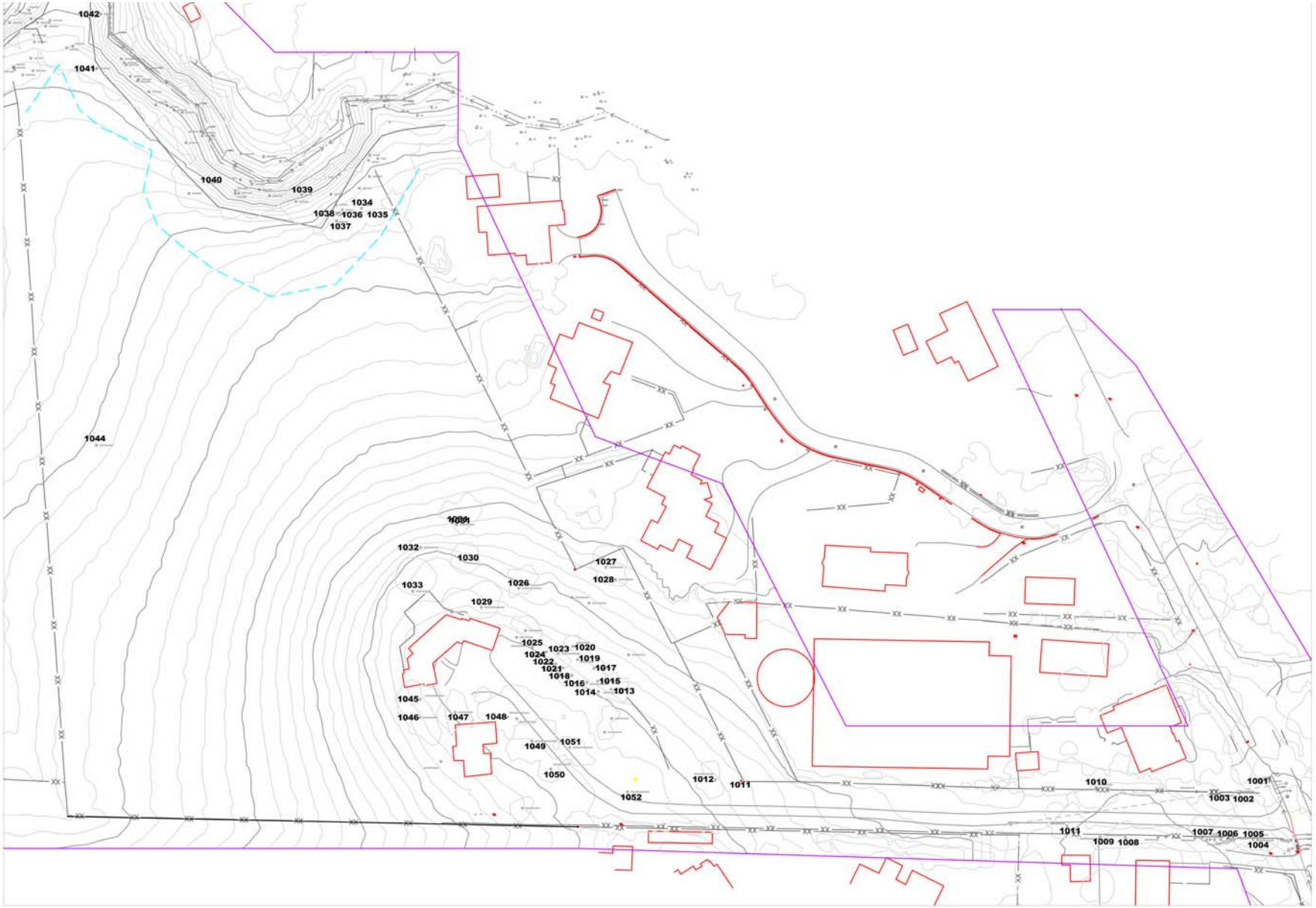
Darya Barar, Managing Consulting Urban Forester and Arborist
ISA Certified Arborist No. WE-6757A
Registered Consulting Arborist #693
ISA Tree Risk Assessment Qualified

Attachments

Tree Inventory Map

Tree Assessment

Estimated Appraisal of Values & Disposition



1125 North Gate Road
Walnut Creek, CA

Prepared for:
Calibr Ventures
Alamo, CA

June 2024

N

No Scale

Notes:
Base map provided by:
DK Engineering
Walnut Creek, CA

Numbered tree locations with no survey point were approximately located in the field.

Trees assessed were 9" in diameter and larger.

HORT SCIENCE
BARTLETT CONSULTING
Divisions of The I.A. Bartlett Tree Expert Company

2550 Ninth Street, Suite 112
Berkeley, CA 94710
Phone 925.484.0211
Fax 925.484.0596
www.hortscience.com

Tree Assessment

1125 North Gate Rd.
Walnut Creek, CA
June 2024

HORT SCIENCE
BARTLETT CONSULTING
Divisions of The F.A. Bartlett Tree Expert Company

Tree No.	Species	Trunk Diameter (in.)	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
1001	Valley oak	27	4	Moderate	Off-site; codominant and multiple attachments arise from 3,5,&7'; narrow attachments with seems to the base in several places; twig and branch dieback.
1002	Valley oak	10	3	Moderate	Leans west at 7' bows east; twig dieback.
1003	Valley oak	18	4	Moderate	Multiple trunks arise form 10'; Good form; twig die back.
1004	Valley oak	18,5	4	High	Off-site; overhangs property by 15'; multiple trunks arise from 2&5'; suppressed north by overhead wires; suppressing tree #1005.
1005	Coast live oak	9	4	High	Off-site; overhangs property by 15'; multiple trunks arise from 2&5'; suppressed north by overhead wires; suppressed by tree #1004.
1006	Valley oak	21	4	High	Codominant trunks arise from 6'; seem to base; upright vase shaped crown; twig dieback.
1007	Valley oak	16	3	Moderate	Off-site; overhangs property by 20'; multiple trunks arise from 10'; crown bows north.
1008	Coast live oak	18	4	Moderate	Off-site; codominant trunks arise from 5'; seem in attachment; sap sucker damage; healthy crown.
1009	Coast live oak	9,8	4	Moderate	Off-site; codominant trunks arise from 4'; sap; healthy crown.
1010	Valley oak	16	3	Moderate	Off-site; overhangs property by 20'; multiple trunks arise from 10'; crown bows north.
1011	Valley oak	19	3	Moderate	Off-site; overhangs property by 25'; multiple trunks arise from high in crown; crown bows north away from wires.
1012	California black walnut	17,11	3	Moderate	Codominant trunks arise from 1'; leans north; branch dieback; embedded fence; burrowing at base.
1013	Coast live oak	9,9	2	Low	Codominant trunks, cracking, and separating; leaning heavily east.
1014	Coast redwood	14	-	-	Dead.
1015	Coast redwood	9	-	-	Dead.

Tree Assessment

1125 North Gate Rd.
Walnut Creek, CA
June 2024

Tree No.	Species	Trunk Diameter (in.)	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
1016	Coast redwood	10	-	-	Dead.
1017	Coast live oak	9	4	High	Upright crown; codominant trunks from 11’; somewhat thin.
1018	Coast live oak	16	4	High	Slight sweep at base north; upright crown; sap sucker damage.
1019	Coast live oak	14	4	High	Upright crown; healthy dense crown.
1020	Coast live oak	10	4	High	Upright crown but suppressed north; healthy dense crown.
1021	Coast redwood	10	-	-	Dead.
1022	Coast redwood	10	-	-	Dead.
1023	Coast redwood	8	-	-	Dead.
1024	Coast redwood	10	-	-	Dead.
1025	Coast redwood	12	-	-	Dead.
1026	California black walnut	10,9,7,6	3	Moderate	Multiple trunk arise from base; twig and branch back; most branches on northeast.
1027	California black walnut	12,11,4	3	Moderate	Multiple trunk arise from base; leans south; twig and branch back.
1028	California black walnut	12,11,4	3	Moderate	Multiple trunk arise from base; leans south; twig and branch back.
1029	California black walnut	18,17,16	3	Low	Multiple trunk arise from 2’; leans south; east stem is mostly dead; twig and branch back.
1030	California black walnut	14,13	3	Low	Codominant trunks arise from base; twig and branch dieback.
1031	California black walnut	10,10,9,9, 8,7,7,6,5	3	Low	Multiple drunks, arise from base; and branch back; over extended limb north.
1032	California black walnut	16,15	1	Low	Some epic growth; mostly dead.
1033	Chinese elm	12	4	Moderate	Multiple trucks arise from 6‘; round crown; history of branch failure.
1034	Coast live oak	16,15,13	5	High	Multiple trunks arise from 2’; full dense crown.

Tree Assessment

1125 North Gate Rd.
Walnut Creek, CA
June 2024

HORT SCIENCE
BARTLETT CONSULTING

Tree No.	Species	Trunk Diameter (in.)	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
1035	Valley oak	9,5,5	-	-	Completely dead; multiple trunks arise from 1'; heavily suppressed; crown mostly south.
1036	Coast live oak	12	3	Moderate	Heavenly suppressed leaning and bowing south; growth only at top; .
1037	Coast live oak	17	4	Moderate	Multiple trunks arise from 6'; healthy crown.
1038	Coast live oak	14	4	Moderate	Heavenly suppressed leaning and bowing south; healthy crown;
1039	Coast live oak	48	3	Moderate	Mature specimen tree; natural open form; hallow collum of decay; open decayed cavity; sap sucker evidence in upper crown.
1040	Coast live oak	42	5	High	Open spreading form; excellent structure; on slope.
1041	Coast live oak	19	4	Moderate	Upright with a slight lean south; sparse crown; evidence of sycamore borer.
1042	Coast live oak	26,16	4	High	Codominant trunk arise from 1'; somewhat thin crown; open form.
1043	Coast live oak	26,16	4	Moderate	Codominant trunk arise from 4'; drip line outside base; fuse, crossing branch; somewhat thin crown.
1044	Coast live oak	24	5	High	Multiple trunk arise from 3'; buried root collar; dense full healthy crown.
1045	California pepper	26,20	4	Moderate	Codominant trunks arise from 1'; leans South.
1046	California pepper	20,11	3	Low	Codominant trunk arise from 2'; heavily suppressed under the crown of #1045.
1047	Paradox walnut	26	2	Low	Multiple trunks arise from 10'; mostly dead upper crown; growth is mostly epicormic.
1048	Paradox walnut	22	1	Low	Completely dead.
1049	Deodar cedar	30	4	Moderate	Typical form and structure; sparse; history of branch failure.
1050	Coast live oak	10,10	4	Moderate	Codominant trunk arise from 3&5'; sapsucker evidence and upper crown; good dense crown.

Tree Assessment

1125 North Gate Rd.
Walnut Creek, CA
June 2024

Tree No.	Species	Trunk Diameter (in.)	Condition 1=poor 5=excellent	Suitability for Preservation	Comments
1051	California pepper	35	4	Moderate	Cavity in trunk from 6” to 3’ good reaction wood; upright form; somewhat thin.
1052	California black walnut	12,7	1	Low	Codominant trunk arise from 3’; mostly dead.

Estimated Value

HORT SCIENCE
BARTLETT CONSULTING
Divisions of The F.A. Bartlett Tree Expert Company

Tree No.	Species	Trunk Diameter (in.)	Estimated Value	Disposition	
1001	Valley oak	27	$ 21,650	Remove	plans show remain
1002	Valley oak	10	$ 2,300	Remove	
1003	Valley oak	18	$ 9,750	Remove	
1004	Valley oak	18,5	$ 10,450	Remove	remain on plans
1005	Coast live oak	9	$ 1,600	Remove	remain on plans
1006	Valley oak	21	$ 13,200	Remove	remain on plans
1007	Valley oak	16	$ 5,600	Remove	remain on plans
1008	Coast live oak	18	$ 5,800	Remove	remain on plans
1009	Coast live oak	9,8	$ 2,700	Remove	remain on plans
1010	Valley oak	16	$ 5,600	Preserve	1010 ok
1011	Valley oak	19	$ 7,800	Remove	
1012	California black walnut	17,11	$ 5,300	Remove	
1013	Coast live oak	9,9	$ 1,400	Remove	
1014	Coast redwood	14	-	Remove	
1015	Coast redwood	9	-	Remove	
1016	Coast redwood	10	-	Remove	
1017	Coast live oak	9	$ 1,850	Remove	
1018	Coast live oak	16	$ 5,400	Remove	
1019	Coast live oak	14	$ 4,150	Remove	
1020	Coast live oak	10	$ 2,250	Remove	
1021	Coast redwood	10	-	Remove	
1022	Coast redwood	10	-	Remove	
1023	Coast redwood	8	-	Remove	
1024	Coast redwood	10	-	Remove	
1025	Coast redwood	12	-	Remove	
1026	California black walnut	10,9,7,6	$ 2,800	Remove	
1027	California black walnut	12,11,4	$ 4,050	Remove	
1028	California black walnut	12,11,4	$ 4,050	Remove	
1029	California black walnut	18,17,16	$ 9,050	Remove	
1030	California black walnut	14,13	$ 5,500	Remove	
1031	California black walnut	10,10,9,9,8,7,7,6,5	$ 3,100	Remove	
1032	California black walnut	16,15	$ 1,600	Remove	
1033	Chinese elm	12	$ 5,150	Remove	
1034	Coast live oak	16,15,13	$ 12,750	Preserve	
1035	Valley oak	9,5,5	-	Preserve	
1036	Coast live oak	12	$ 2,300	Preserve	
1037	Coast live oak	17	$ 6,050	Preserve	
1038	Coast live oak	14	$ 4,150	Preserve	
1039	Coast live oak	48	$ 33,550	Preserve	
1040	Coast live oak	42	$ 46,150	Preserve	
1041	Coast live oak	19	$ 7,500	Preserve	

Estimated Value

Tree No.	Species	Trunk Diameter (in.)		Estimated Value	Disposition
1042	Coast live oak	26,16	$	19,100	Preserve
1043	Coast live oak	26,16	$	19,100	Preserve
1044	Coast live oak	24	$	21,650	Remove
1045	California pepper	26,20	$	18,900	Remove
1046	California pepper	20,11	$	6,650	Remove
1047	Paradox walnut	26	$	5,250	Remove
1048	Paradox walnut	22	$	1,400	Remove
1049	Deodar cedar	30	$	15,800	Remove
1050	Coast live oak	10,10	$	3,650	Remove
1051	California pepper	35	$	21,450	Remove
1052	California black walnut	12,7	$	700	Remove
			$	**388,200**	

BIOLOGICAL RESOURCES REPORT FOR THE SUBDIVISION AND DEVELOPMENT OF 1125 NORTHGATE ROAD PROJECT, WALNUT CREEK, CALIFORNIA

July 2024

Prepared for:

Calibr Ventures
115 Jennifer Court
Alamo, CA 94507

Prepared by:

MOSAIC ASSOCIATES
3817 PAINTED PONY ROAD
RICHMOND, CA 94803

AND

COAST RANGE BIOLOGICAL, LLC
P.O. BOX 1238
SANTA CRUZ, CA 95061

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYMS

CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNPS	California Native Plant Society
CNDDB	California Natural Diversity Data Base
CTS	California tiger salamander
CWA	Clean Water Act
EPA	Environmental Protection Agency
ESA	Endangered Species Act (Federal)
HCP	Habitat Conservation Plan
MBTA	Migratory Bird Treaty Act
NMFS	National Marine Fisheries Service
NPPA	Native Plan Protection Act
RWQCB	Regional Water Quality Control Board
SSC	Species of Special Concern
SWRCB	State Water Resources Control Board
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WBWG	Western Bat Working Group
WDR	Waste Discharge Requirements
WEF	Wildlife exclusion fencing

1.0 Introduction

This report contains the findings of a biological resources assessment that was conducted for the development of a residential subdivision on an approximately 9.8-acre parcel (APN 131-180-002) with an existing single-family residence and additional structures. The Study Area is located at 1125 North Gate Road in unincorporated Walnut Creek, Contra Costa County CA (Figure 1), approximately 0.5 miles south of the Walnut Creek city limits.

Land uses surrounding the Study Area consist of low-density rural residential development to the north, a Contra Costa County Flood Control basin to the west, and private agricultural land and East Bay Regional Park District lands and Mt. Diablo State Park to the south. The Study Area is fenced but not grazed, while lands to the south are seasonally grazed by livestock.

The purpose of this biological resources report is to update the biological assessment prepared in 2011 (Mosaic Associates 2011) for an earlier residential development proposal for the property. The current report characterizes the habitats that are present within the Study Area, evaluates the impact of the Proposed Project on biological resources, and describes mitigation measures to reduce potential impacts of the project on sensitive biological resources. This report is suitable for review and inclusion in a California Environmental Quality Act (CEQA) evaluation of the Project's effects on biological resources by the Contra Costa County Conservation and Development Department as the lead agency. The Project Sponsor is Calibr Ventures.

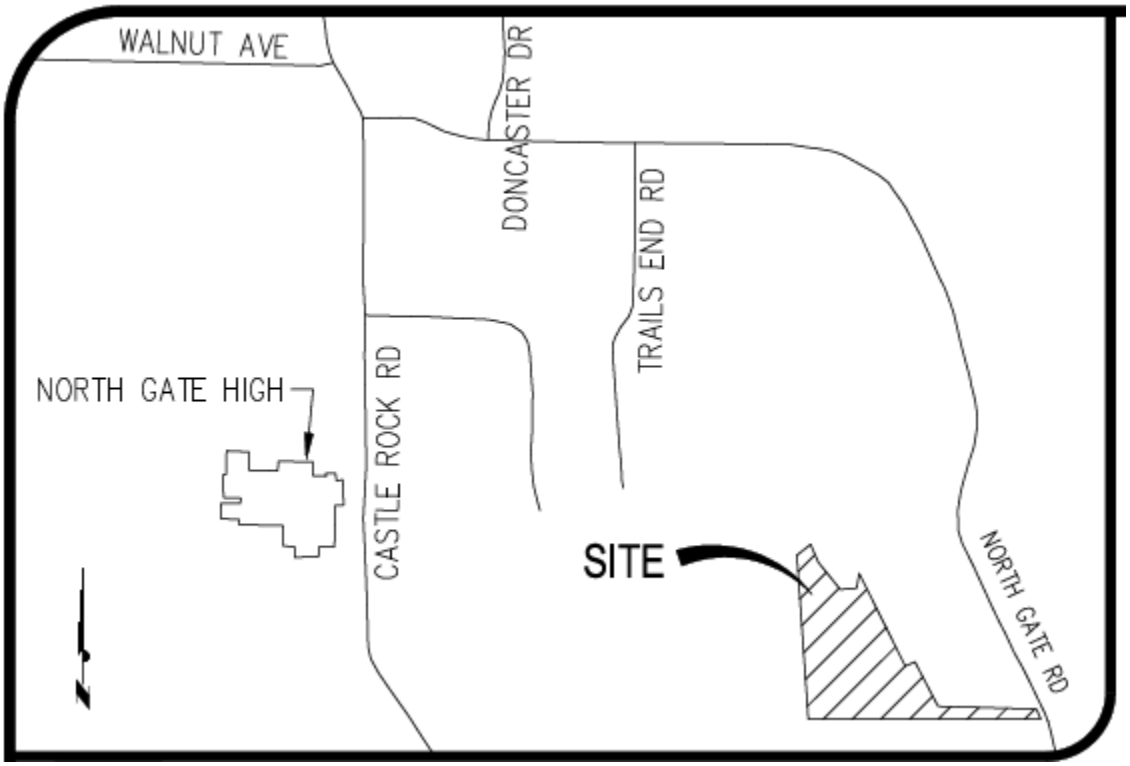


Figure 1. Vicinity Map (not to scale)

2.0 Project Description

The Proposed Project consists of the subdivision of the existing parcel, demolition of the existing structures, removal of 35 trees (including eight dead coast redwoods), grading and the development of 19 single-family residential units. Appendix A contains engineered plans of the Proposed Project. Sixteen of the lots (Lots 1-16), sized between 10,288 and 84,322 square feet will line a new street that terminates in a cul de sac near the north end of the Study Area, while three (Lots 17-19) sized between 3,597 and 8,999 square feet will be closely spaced near the entry road on the east side of the property. The development will be connected to municipal sewer and water. Storm water runoff from the development will be conveyed to 10 bio-basins located throughout the development, and two underground storage vaults near the north side of the property. Following bio-filtration and detention in the storage vaults, runoff from the development will discharge to an existing off-site storm drain outfall northeast of the proposed development. No earthwork or other development is proposed below the Walker Creek top of bank or within the riparian area surrounding Walker Creek.

3.0 Methods and Limitations

Background literature searches and reconnaissance-level surveys were conducted to determine whether special-status species have potential to inhabit the Study Area based on documented occurrences, range distribution and suitable habitat. Special-status species include: (1) all plants and animals that are listed under the Federal or State Endangered Species Acts as rare, threatened or endangered; (2) all federal and state candidates for listing; (3) California Department of Fish and Wildlife (CDFW) Species of Special Concern; (4) plants that qualify under the definition of "rare" in the California Environmental Quality Act (CEQA), section 15380; (5) all plants with a Rare Plant Rank of 1 and 2 (and Lists 3 and 4 when they meet the CEQA definition of “rare”) in California Native Plant Society (2020); (6) animal species that are “fully protected” in California Fish and Game Codes 3511, 4700, 5050, and 5515, (7) migratory nongame birds of management concern listed by the U.S. Fish and Wildlife Service; (8) CDFW Special Animals; and (9) bat species that are designated on the Western Bat Working Group’s (WBWG) Regional Bat Species Priority Matrix as “Red or High”.

Information sources included the California Natural Diversity Data Base (CNDDB) (CDFW 2024) for the Clayton 7.5’ USGS quad and eight surrounding quads, the online California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2024a), the U.S. Fish and Wildlife Service (USFWS) list of threatened or endangered species (USFWS 2024b) and the USFWS Critical Habitat Mapper (USFWS 2024a). Special-status species were analyzed for their potential to occur in the Study Area based on the availability of suitable habitat. Appendix B (plants) and Appendix C (wildlife) describe special-status species documented to occur in the Study Area region and describes the potential for occurrence within the project site.

Reconnaissance-level surveys of the Study Area were conducted by wetland scientist and botanist Tom Mahony of Coast Range Biological on May 2, 2024, and biologist Judy Bendix of Mosaic Associates on March 25, 2024. Mr. Mahony mapped vegetation communities, and updated taxonomy and the list of rare plants known from the region (Appendix B), while Ms.

Bendix documented existing conditions, updated the list of special-status wildlife known from the region (Appendix C) and assessed potential biological impacts associated with the Proposed Project. Rare plant surveys conducted in 2006 and focused surveys for California red-legged frogs (*Rana draytonii*) in 2009 were reviewed to assess findings and consistency with current standards and focal species (rare plant surveys). The 2006 rare plant and California red-legged frog (CRF) surveys were negative; no rare plants or CRF were detected. Since those surveys were conducted consistent with current protocols and existing conditions are unchanged from when the surveys were conducted, it was concluded that the surveys do not need to be repeated to rule out the presence of rare plants and California red-legged frog.

The 2024 surveys were conducted on foot during daylight hours, documenting habitat conditions and assessing the potential occurrence of special-status plant and wildlife species. The suitability of habitat conditions in the Study Area to support special-status species was assessed based on the presence of habitat characteristics, documented records from the region updated for 2024 and the surveyor's knowledge of the habitat requirements of target species.

The analysis of impacts on biological resources is based on implementation of the Project as described in Section 2 and the plans included in Appendix A.

4.0 Regulatory Background

The following sections describe the relevant regulatory context for this biological resources assessment, including applicable laws and regulations that were applied to the field investigation and the analysis of potential impacts of the Project on biological resources.

4.1 Federal and State Threatened and Endangered Species Acts

State and federal legislation has provided the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) with mechanisms for conserving and protecting plant and animal species of limited distribution and/or low or declining populations. The Federal Endangered Species Act (FESA) protects listed animal species from harm or "take" which is broadly defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Take can also include habitat modification or degradation that results in death or injury to a listed species. The USFWS has jurisdiction over federally listed threatened and endangered wildlife and plant species under FESA. The NMFS has jurisdiction over marine and anadromous fish species.

The California Endangered Species Act (CESA) prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. "Take" is defined by the state of California as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill". The CDFW has jurisdiction over State-listed species, and also maintains lists of "Species of Special Concern" that are defined as species that appear to be vulnerable to

extinction because of declining populations, limited ranges, and/or continuing threats. California also protects animals classified as Fully Protected from take. Most but not all fully protected species are also listed under CESA.

Authorization may be required from the USFWS, NMFS and/or CDFW if activities associated with a proposed project will result in the "take" of a listed species. Federal authorization for incidental take of a listed species is afforded through the Section 7 or the Section 10 process. The Section 7 consultation process applies to actions taken by federal agencies that are considering authorization of discretionary projects. Section 7 is by and between the USFWS and/or the NMFS and the federal agency contemplating a discretionary approval (i.e. the "federal nexus agency"), such as the USACE for Section 404 permits to authorize the discharge of fill into waters of the U.S. The Section 7 consultation process is triggered by a determination of the "action agency" – that is, the federal agency that is carrying out, funding, or approving a project - that the project "may affect" a listed species or critical habitat. If an action is likely to adversely affect a listed species or designated critical habitat, formal consultation between the nexus agency and the USFWS/NMFS is required. The USFWS and/or NMFS may resolve any issues informally with the nexus agency or may prepare a formal Biological Opinion assessing whether the proposed action would be likely to result in "jeopardy" to a listed species or if it could adversely modify designated critical habitat. Biological Opinions contain either a "jeopardy" or "non-jeopardy" decision. If the USFWS and/or NMFS concludes that a proposed project would result in adverse modification of critical habitat or would jeopardize the continued existence of a federal listed species (i.e. a jeopardy decision), the nexus federal agency would be unlikely to authorize its discretionary permit. If a "non-jeopardy" Biological Opinion is prepared, the nexus federal agency may authorize the discretionary permit making all conditions of the Biological Opinion conditions of its discretionary permit. A non-jeopardy Biological Opinion constitutes an "incidental take" permit that allows applicants to "take" federally listed species while otherwise carrying out legally sanctioned projects.

For non-federal entities, Section 10 provides the mechanism for obtaining take authorization through USFWS and/or NMFS approval of an applicant-prepared Habitat Conservation Plan (HCP). An HCP specifies the impacts to federally listed species that are likely to occur as a result of the proposed action, the measures the applicant will undertake to minimize and mitigate such impacts, and funding that will be available to implement those actions.

The basis for incidental take authorization under CESA is described in Section 2081 (b) and (c) of California Fish and Game Code, while Section 2080.1 provides for a consistency determination when a federal incidental take statement has been issued pursuant to Section 7 or Section 10 of FESA.

The Study Area is located approximately 0.43 miles west of Unit 4- Mount Diablo-Black Hills federally designated Critical Habitat for one species, the State and Federally threatened Alameda whipsnake (*Masticophis lateralis euryxanthus*). No Habitat Conservation Plans or Natural Communities Conservation Plans encompass the Study Area.

4.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) generally requires state and local government agencies to inform decision makers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. The laws and rules governing the CEQA process are contained in the CEQA statute (Public Resources Code Section 21000 and following), the CEQA Guidelines (California Code of Regulations, Title 14, Section 15000 and following), published court decisions interpreting CEQA, and locally adopted CEQA procedures.

A "project" is defined as a "whole action" subject to a public agency's discretionary funding or approval that has the potential to either (1) cause a direct physical change in the environment or (2) cause a reasonably foreseeable indirect physical change in the environment. "Projects" include discretionary activity by a public agency, a private activity that receives any public funding, or activities that involve the public agency's issuance of a discretionary approval and is not statutorily or categorically exempt from CEQA. (Pub. Res. Code § 21065.)

Contra Costa County Conservation and Development Department will act as the lead agency for the proposed project. To determine whether the proposed development is a project subject to CEQA, it will:

1) Determine whether the project falls under a statutory or categorical exemption from CEQA;
2) If the project is not exempt, prepare an initial study to determine whether the project might result in significant environment effects; and
3) Prepare a negative declaration, mitigated negative declaration, or Environmental Impact Report (EIR) depending on the initial study.

The CDFW is a responsible agency under the California Environmental Quality Act (CEQA). It has the responsibility to review CEQA documents in order to determine the adequacy of their treatment of endangered species issues and to make project-specific recommendations for their conservation.

4.3 Native Plant Protection Act

The California Native Plant Protection Act (NPPA) was enacted in 1977 and allows the Fish and Game Commission to designate plants as rare or endangered. There are 64 species, subspecies, and varieties of plants that are protected as rare under the NPPA (Fish and Game Code section 1900 et seq.). The NPPA prohibits take of endangered or rare native plants, but includes some exceptions for agricultural and nursery operations; emergencies; and after properly notifying CDFW for vegetation removal from canals, roads, and other sites, changes in land use, and in certain other situations.

4.4 Sensitive Natural Communities

Sensitive natural communities are those that are considered rare in the region, support special-status plant or wildlife species, or receive regulatory protection (*i.e.,* Section 404 and 401 of the Clean Water Act, the CDFW Section1600 *et seq.* of the California Fish and Game Code, and/or the Porter-Cologne Act). In addition, the California Natural Diversity Data Base (CNDDB) has designated a number of communities as rare; these communities are given the highest inventory priority (Holland 1986, Sawyer et al. 2009). Project impacts to Sensitive Natural Communities could be considered significant under CEQA (CDFW 2023). No Sensitive Natural Communities are present within the Study Area.

4.5 Migratory Birds

State and federal law protect most bird species. The Migratory Bird Treaty Act (MBTA: 16 U.S.C., scc. 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, their occupied nests and eggs.

Migratory birds are likely to be present and nest in or near the Study Area.

4.6 California Fish and Game Code

Under California Fish and Game Code 3503, it is unlawful to "take, possess, or needlessly destroy the nest or eggs of any bird", except as otherwise provided under Fish and Game Code or regulation.

Birds of prey are protected in California under provisions of the State Fish and Game Code, Section 3503.5 (1992), which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFW.

Birds of prey may be present and nest in or near the Study Area.

4.7 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C., scc. 668-668c) prohibits the take of bald or golden eagles, including their parts, nests, or eggs, unless authorized under a federal permit. The act prohibits any disturbance that directly affects an eagle or an active eagle nest as well as any disturbance caused by humans around a previously used nest site during a time when eagles are not present such that it agitates or bothers an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

Suitable habitat for golden eagle foraging and nesting is present in the vicinity of the Study Area.

4.8 Waters of the U.S. and State

Section 404 of the Clean Water Act (CWA) of 1972 regulates activities that result in the discharge of dredged or fill material into waters of the U.S., including wetlands. On January 18, 2023, the Environmental Protection Agency (EPA) and the Department of the Army published the "Revised Definition of 'Waters of the United States, 88 FR 3004. On September 8, 2023, these agencies published the "Revised Definition of 'Waters of the United States'; Conforming", which amended the 2023 Rule to conform to the 2023 Supreme Court decision in *Sackett v. EPA*, 598 U.S., 13 S. Ct. 1222 (2023) (Sackett). In brief, the Revised Definition narrowed the definition of Waters of the U.S. to relatively permanent, standing or continuously flowing bodies of water and wetlands with a continuous surface connection to a jurisdictional water.

Pursuant to Section 401 of the Clean Water Act, an applicant for a federal permit to conduct any activity which may result in discharge into waters of the U.S. must provide a certification from the Regional Water Quality Control Board (RWQCB) or SWRCB that such discharge will comply with the state water quality standards (Cal. Code Regs. Tit. 23, §§3830 *et seq*.). A Section 401 certification is not required for the project because no waters of the U.S. are in the project work area.

Under the Porter-Cologne Water Quality Control Act (Cal. Water Code §§13000-14920), the RWQCB is authorized to regulate the discharge of waste that could affect the quality of the State's waters. "Waste" is broadly defined by the Porter-Cologne Act to include "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature…." (Cal. Water Code §13050).

On April 2, 2019, the SWRCB adopted a *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Procedures), for inclusion in the *Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California* (SWRCB 2019). The Procedures took effect May 28, 2020. The Procedures consist of four major elements: (1) a wetland definition; (2) a framework for determining if a feature that meets the wetland definition is a water of the state; (3) wetland delineation procedures; and (4) procedures for the submittal, review and approval of applications for Water Quality Certifications and Waste Discharge Requirements for dredge or fill activities.

The CDFW exercises jurisdiction over wetland and riparian resources associated with rivers, streams, and lakes under California Fish and Game Code Section 1602. CDFW has the authority to regulate work that will substantially divert, obstruct, or change the natural flow of a river, stream, or lake; substantially change the bed, channel, or bank of a river, stream, or lake; or use material from a streambed. Areas subject to CDFW's jurisdiction over rivers, streams, creeks or lakes are usually bounded by the top-of-bank or the outermost edges of riparian vegetation.

California Fish and Game Code Sections 5650 and 5652 generally prohibit disposal of waste within 150 feet of the top of bank, or placement where they may pass into waters of the state.

Walker Creek, an intermittent tributary to Pine Creek is located at the northern edge of the Study Area. The creek conveys flows seasonally, drying out during the summer and fall. It is confined to a deeply incised open channel, discharging into Pine Creek and the Contra Costa County Flood Control District detention basin approximately 0.25 miles west of the Study Area. The creek is the only feature on site that supports potential waters of the U.S. and State. A formal aquatic resource delineation was not conducted. Since the proposed project does not require the discharge of fill material into potential waters of the U.S. or state, permits from the Army Corps of Engineers pursuant to Section 404 of the CWA, RWQCB pursuant Section 401 of the CWA or Cal. Water Code §§13000-14920, and CDFW California Fish and Game Code under Section 1602 are not required.

4.9 Local Policies

Contra Costa County has identified certain goals and policies relating to the protection of natural resources in the General Plan 2005-2020 (January 2005). Vegetation and Wildlife Policies from the Conservation Element of the General Plan that are relevant to the proposed project are listed below. The proposed project lies within the North Gate Specific Plan area, and thus, goals, policies and development regulations provided in that plan which was adopted on June 25, 1991 are described below. Additionally, a Tree Ordinance which requires a tree removal permit if heritage trees, significant groupings of trees (groves of four or more trees) or protected trees (native trees with a circumference of 20 inches or more) are to be removed in unincorporated areas of the County.

Contra Costa County General Plan

Vegetation and Wildlife Policies

8-6 Significant trees, natural vegetation, and wildlife populations generally shall be preserved.

8-10 Any development located or proposed within significant ecological resource areas shall ensure that the resource is protected.

8-13 The critical ecological and scenic characteristics of rangelands, woodlands, and wildlands shall be recognized and protected.

8-14 Existing vegetation, both native and non-native, and wildlife habitat areas shall be retained in the major open space areas sufficient for the maintenance of a healthy balance of wildlife populations.

8-28 All efforts shall be made to identify and protect the County's mature native oak, bay, and buckeye trees.

Policies to Protect and Maintain Riparian Zones

8-78 Where feasible, existing natural waterways shall be protected and preserved in their natural state, and channels which already are modified shall be restored. A natural waterway is defined as a waterway which can support its own environment of vegetation, fowl, fish and reptiles, and which appears natural.

8-79 Creeks and streams determined to be important and irreplaceable natural resources shall be retained in their natural state whenever possible to maintain water quality, wildlife diversity, aesthetic values and recreation opportunities.

8-80 Wherever possible, remaining natural watercourses and their riparian zones shall be restored to improve their function as habitats.

Policies for New Development Along Natural Watercourses

8-86 Existing native riparian habitat shall be preserved and enhanced by new development unless public safety concerns require removal or habitat for flood control or other public purposes.

8-89 Setback areas shall be provided along natural creeks and streams in areas planned for urbanization. The setback areas shall be of a width adequate to allow maintenance and to prevent damage to adjacent structures and the loss of private property. The setback area shall be a minimum of 100 feet; 50 feet on each side of the centerline of the creek.

8-90 Deeded development rights for lands within established setback areas along creeks or streams shall be sought to assure creek preservation and to protect adjacent structures and the loss of private property.

8-91 Grading, filling and construction activity near watercourses shall be conducted in such a manner as to minimize impacts from increased runoff, erosion, sedimentation, biochemical degradation, or thermal pollution.

8-92 Revegetation of a watercourse shall employ native vegetation, providing the type of vegetation is compatible with the watercourse's maintenance program and does not adversely alter channel capacity.

North Gate Specific Plan

Goal: Protect natural features such as heritage quality trees, creeks, knolls, ridgelines and rock outcroppings.

Policies:

1. Preserve to the extent feasible, creeks and riparian vegetation in the area. Enhance creeks and riparian corridors by revegetating creeks with native riparian vegetation from local seed stock.
3. Preserve healthy trees and maintain significant tree masses consistent with the requirements of the Walnut Creek Tree Preservation Ordinance.

The North Gate Specific Plan also specifies development regulations, including one that requires that applications for residential development "shall be required to provide, as part of the application submittal, a creek preservation and enhancement plan, which outlines the methods of protecting and enhancing this resource. This plan shall include, at a minimum, re-vegetation of the creeks with native riparian vegetation from local seed stock."

These goals and policies were considered in the evaluation of impacts of the Proposed Project on biological resources.

5.0 Study Area Description

The Study Area is located at 1125 North Gate Road, Walnut Creek, Contra Costa County, an unincorporated area. Residential neighborhoods and equestrian properties are located to the north, east and west of the site. Contra Costa County Flood Control District's Pine Creek detention basin is located approximately 0.25-mile to the west. Lands to the south of the site are generally undeveloped and used for livestock grazing. Mt. Diablo State Park is located approximately two miles to the south, while Shell Ridge Open Space, Diablo Foothills Regional Park and Castle Rock Recreation Area are less than one mile to the southwest. Walker Creek, located at the northern edge of the site, discharges to the detention basin approximately 0.25 mile west of the property. Former land use on this property included agricultural cultivation and livestock grazing. Current land use surrounding the property is mixed suburban residential, equestrian, and cattle pasture. Appendix D contains photos of the Study Area.

Two residential structures are located in the southeast corner of the property. The larger house is occupied, while the smaller structure to the south is vacant. An existing road provides access to these structures from North Gate Road. The western side of the property consists of sloping non-native annual grassland with scattered planted trees.

The Walker Creek corridor on the north side of the property is densely wooded.

5.1 Vegetation

Four vegetation types are present on the Study Area: Non-native Grassland, Coast Live Oak Woodland and Forest, Planted Woodland and Developed/Ruderal (Figure 2).

Non-Native Grassland, composed of the *Avena* spp. - *Bromus* spp. Herbaceous Semi-Natural Alliance[1], covers 7.15-acres on the study area. Non-Native Grassland consists primarily of non-native grasses and forbs adapted to disturbance, including slender wild oat (*Avena barbata*[2]), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), barley (*Hordeum murinum* subsp. *leporinum*), Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum*), Italian ryegrass (*Festuca perennis*), bristly ox-tongue (*Helminthotheca echioides*), yellow star-thistle (*Centaurea solstitialis*), purple star-thistle (*Centaurea calcitrapa*), Italian thistle (*Carduus pycnocephalus*), artichoke thistle (*Cynara cardunculus*), prickly sow thistle (*Sonchus asper* subsp. *asper*), summer mustard (*Hirschfeldia incana*), mustard (*Brassica* spp.), bur clover (*Medicago polymorpha*), field bindweed (*Convolvulus arvensis*), field hedge-parsley (*Torilis arvensis*), common dandelion (*Taraxacum officinale*), rose clover (*Trifolium hirtum*), and cutleaf geranium (*Geranium dissectum*). Native shrubs and herbaceous species are widely scattered throughout the grassland, including coyote brush (*Baccharis pilularis*), fiddleneck (*Amsinckia menziesii*), and goose grass (*Galium aparine*).

[1] Alliance nomenclature follows *A Manual of California Vegetation* (Sawyer et al. 2009) and nomenclatural updates in CNPS (2024).
[2] Botanical nomenclature follows Baldwin et al. (2012) and taxonomic updates in the *Jepson eFlora* (Jepson Flora Project 2024).

Insert Figure 2

Coast Live Oak Woodland and Forest, composed primarily of the *Quercus agrifolia* Forest and Woodland Alliance, covers 0.73-acres on the study area and forms a riparian woodland along Walker Creek. Coast Live Oak Woodland and Forest is dominated by a canopy of coast live oak (*Quercus agrifolia*) and occasional valley oak (*Quercus lobata*), with a subcanopy of California buckeye (*Aesculus californica*), blue elderberry (*Sambucus nigra*), sweet almond (*Prunus dulcis*), and walnut (*Juglans* sp.). The understory consists of shrubs and herbaceous species, including native species such as coyote brush, goose grass, poison oak (*Toxicodendron diversilobum*), soap plant (*Chlorogalum pomeridianum*), blue dicks (*Dipterostemon capitatus*), blue wildrye (*Elymus glaucus*), Pacific sanicle (*Sanicula crassicaulis*), and hedge nettle (*Stachys* sp.). Non-native herbaceous species include field hedge-parsley, Italian ryegrass, Italian thistle, and vetch (*Vicia sativa*). Herbaceous hydrophytic species are scattered along the Walker Creek channel, including water cress (*Nasturtium officinale*), tall flatsedge (*Cyperus eragrostis*), seep monkeyflower (*Erythranthe guttata*), and spiny-fruit buttercup (*Ranunculus muricatus*).

Planted Woodland, conforming to no recognized vegetation classification system, covers 0.55-acres in and around Developed/Ruderal habitat in the southern portion of the study area. Planted Woodland consists of remnant orchard species such as walnut and sweet almond, tree species native to the region but not the study area, such as redwood (*Sequoia sempervirens*), native planted or remnant naturally occurring species such as coast live oak, and planted ornamental species such as deodar cedar (*Cedrus deodara*), pepper tree (*Schinus molle*), and olive (*Olea* sp.).

Developed/Ruderal habitat, Developed/Ruderal habitat, conforming to no recognized vegetation classification system, covers 1.40-acres on the southern portion of the study area. Developed/Ruderal habitat consists of developed areas (including the existing residence and outbuildings, gravel driveway, and associated infrastructure) along with ornamental landscaping. In addition, this habitat includes ruderal areas consisting of bare ground or non-native grasses and forbs adapted to disturbance, including those described above for Non-Native Grassland, along with mallow (*Malva* sp.), stinkwort (*Dittrichia graveolens*), Bermuda buttercup (*Oxalis pes-caprae*), and periwinkle (*Vinca major*).

Vegetation communities in the Study Area are quantified in Table 1.

Table 1. Vegetation Types in the Study Area

Vegetation Type	Sensitive Natural Community	Acres on Study Area
Non-Native Grassland	No	7.15
Coast Live Oak Woodland and Forest	No	0.73
Planted Woodland	No	0.55
Developed/Ruderal	No	1.40

5.2 Geology and Soils

Elevations in the gently sloped Study Area range from 310 feet on the hill in the southeast corner of the site to 229 feet in the creek bed at the northern edge of the property.

A single soil type has been mapped on the study area in the Web Soil Survey (NRCS 2024):

CaA—Capay clay, 0-3 percent slopes, MLRA 17

Capay clay 0-3 percent slope is in basins or on low benches. Runoff is very slow, and there is no hazard of erosion where the soil is tilled and exposed. Roots can penetrate to a depth of more than 60 inches. The available water capacity is 8.5 to 10 inches.

5.3 Hydrology

The principal hydrologic sources for the study area are direct precipitation, surface sheet flow, shallow near-surface flow from surrounding uplands, and concentrated, intermittent flow in Walker Creek along the northern boundary of the Study Area.

6.0 Results

6.1 Special-status Plants

Fifty-six special-status plant species have been documented in the Study Area region based on the background literature search discussed in Section 3. A list of these species is included in Appendix B. Figure 3 is a map of special-status plants documented to occur in the region. Rare plant surveys were conducted in 2006 during the blooming period for all potentially occurring species. No rare plants were observed in the Study Area nor have any newly identified rare plant species with blooming periods outside the dates of the 2006 surveys been identified. Given the results of the 2006 surveys, rare plants are not present within the Study Area, and no further surveys are warranted.

6.3 Special-status Wildlife

Based on the site reconnaissance, review of available databases and literature, and familiarity with local fauna, a total of 68 special-status wildlife species were considered as part of this assessment (USFWS 2024 b,c); CDFW 2024 a,b,c) and are detailed in Appendix C. Figure 4 is a map of special-status wildlife documented to occur in the region. Of these, 39 taxa were ruled out based on the lack of suitable habitat, local range restrictions, regional extirpations, lack of connectivity between areas of suitable or occupied habitat, lack of secondary sign, absence of host plants, and/or incompatible land use and habitat degradation/alteration of on-site or adjacent lands. An additional 14 are not expected to occur on site based on lack of specific habitat features such as rock outcroppings and chaparral, burrows or a suitable prey base, while 14 others were determined to have some potential of occurrence based on the absence of observable nests and middens at the time of the field reconnaissance. One species, oak titmouse was observed in the Study Area.

Insert Figure 3

Insert Figure 4

While numerous records of the federally threatened California red-legged frog are recorded in the CNDDB to the south and east of the Study Area, this species was not detected in 2009 during focused surveys of the Study Area or the Pine Creek Detention Basin to the west of the Study Area, and further surveys are not warranted. Another federally and state-listed threatened species with numerous CNDDB occurrences in the vicinity of the Study Area, the Alameda whipsnake, is not expected to occur in the Study Area due to the lack of suitable habitat (rock outcroppings, scrub/chaparral habitat, limited riparian corridor).

For the purpose of this report, only special-status species and nesting migratory birds and raptors that were observed or with potential to occur on site and be directly or indirectly affected by Project activities are discussed in more detail below.

Federal/State Listed, Proposed, Candidate or Fully Protected Fish and Wildlife Species

Based on the field investigations, review of available databases and literature, familiarity with local flora, and assessment of habitat suitability, two federally- or State-listed, Proposed, Candidate, or Fully Protected wildlife species have the potential to occur within the Study Area (USFWS 2024c; CDFW 2024b). A brief description of these species, habitat requirements, and local occurrences are discussed below.

Western Bumble Bee

The western bumble bee is historically a very common bee species in the western U.S. and western Canada, but populations from British Columbia to Central California have become extirpated or are severely declining. Food plants consist of *Melilotus*, *Cirsium*, *Trifolium*, *Centaurea*, *Chrysothamnus*, and *Eriogonum* species. It is an important pollinator for various flowering plants and commercial food crops including avocados, peppers, tomatoes, cranberries, and various other berry crops. The western bumble bee was advanced to candidacy for listing as an invertebrate (under the definition of "fish" as defined by §45 of the California Fish and Game Code) by the Fish and Game Commission in June 2019, subsequently removed in 2021 by a trial court decision, and reinstated for candidacy listing as endangered under the California ESA on September 30, 2022 by the California Supreme Court (*Almond Alliance of California et al*. v. *Fish and Game Commission et al*., and *Xerces Society for Invertebrate Conservation et al*., C093542).

Habitat Assessment and Occurrence in the Project Vicinity

As a generalist forager, the study area supports suitable habitat for the western bumble bee in the non-native grasslands, including food plants bull thistle (*Circium vulgare*), yellow and purple star thistle (*Centaurea solstititalis, C. calcitrapa*), and rose clover (*Trifolium hirtum*) among others. One non-specific occurrence has been reported approximately 0.1 mile west of the Study Area. Bumble bee species are underrepresented in the CNDDB and the absence of occurrence data may not accurately reflect their absence in the project region.

White-Tailed Kite

The white-tailed kite is designated as a fully protected species by §3511 of the California Fish and Game Code. This species receives additional protection under the Migratory Bird Treaty Act

and California Fish and Game Code §3503. White-tailed kites inhabit open grasslands and savannahs, and breed in a variety of habitats, including grasslands, cultivated fields, oak woodlands and suburban areas where prey is abundant. Nests are built in trees typically near a water source and may occur in suburban areas with adjacent open areas with abundant prey. Breeding occurs between February and July and the species can be double-brooded in some years (Baicich and Harrison, 2005). During the non-breeding season, white-tailed kites may roost communally (Dunk, 1995). White-tailed kites prey on small mammals, reptiles and occasionally, birds.

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present among the mature trees on site and suitable foraging habitat is present in the non-native grassland in the Study Area. Evidence of small mammal activity was observed on site, including California ground squirrel activity. No records of white-tailed kite nesting within three miles of the study area are reported. Despite the paucity of nesting data, white-tailed kites are known from the area and likely to forage and have potential to nest in the vicinity of the Study Area.

6.4 Sensitive Species

Based on the field investigations, review of available databases and literature, familiarity with local fauna, and on-site habitat suitability, 13 species designated as rare, sensitive, declining, locally endemic, special concern, high priority, or having limited or restricted distribution are considered to have the potential to occur within the Study Area (Appendix C). A brief description of these species, their habitat requirements, and local occurrences are discussed below.

Obscure Bumble Bee

The obscure bumble bee ranges along the Pacific Coast from British Columbia to Southern California. Some occurrences have been reported from the eastern side of the Central Valley. Food plants include *Baccharis*, *Cirsium*, *Lupinus*, *Lotus*, *Grindelia*, and *Phacelia* species. This species has been recorded from Alameda, Contra Costa, Del Norte, Humboldt, Marin, Mendocino, Monterey, San Luis Obispo, San Mateo, Santa Barbara, and Sonoma counties.

Habitat Assessment and Occurrence in the Project Vicinity

The study area supports suitable habitat for the obscure bumble bee and associated food plants present on site include the coyote bush (*Baccharis pilularis*) and bull thistle. No occurrences have been documented within three miles of the Study Area (CDFW 2024a). Bumble bee species are underrepresented in the CNDDB and the absence of occurrence data does may not accurately reflect their absence in the project region.

Bridge's Coast Range Shoulderband

The Bridge's Coast Range shoulderband snail is listed a Special Animal by the CDFW. Bridge's Coast Range shoulderband (snail) typically inhabits rock piles, thistles and weedy grasslands on open hillsides, and have also been found under woody debris in streamside oak woodland habitat as well as ruderal habitat. Their known range includes Contra Costa County and northern

Alameda County; recorded in the west slope of Berkeley Hills, Marsh Creek Canyon, Marsh Creek Springs, Tilden Park, Point Isabel.

Habitat Assessment and Occurrence in the Project Vicinity

Suitable grassland and woodland habitat is present within the Study Area with characteristic host plants including Italian thistle (*Carduus pycnocephalus*), bull thistle, and artichoke thistle *(Cynara cardunculus)* as well as small woody debris. There are no CNDDB records within three miles of the Study Area. These species are considered underrepresented on CNDDB, and absence of recent recorded occurrences may accurately reflect their potential for occurrence within the study area.

Cooper's Hawk

The Cooper's hawk is on the CDFW Watch List. It is a medium-sized Accipiter that ranges from southern Canada to Mexico. It inhabits dense stands of oak woodlands, riparian deciduous forests, or other forest habitats often near water and suburban areas (Baicich & Harrison 2005). This woodland raptor hunts in broken woodlands, along forest edges and suburban areas for medium-sized birds and mammals (Curtis et al. 2006). Typical nest site selection is characterized by mature trees with significant canopy cover; although, species will nest in suburban areas in a variety of trees (Curtis et al. 2006). Breeding begins in April and are single-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data

Cooper's hawks utilize the same nesting habitat as white-tailed kites. The mature trees on site provide suitable nesting habitat and suitable foraging habitat is present throughout the Study Area. There are no CNDDB nesting occurrences reported within three miles of the Study Area (CDFW 2024a). Cooper's hawks are relatively common throughout Contra Costa County and have the potential to nest or forage on site.

Sharp-Shinned Hawk

The sharp-shinned hawk is on the CDFW Watch List. It is widespread across North America and a year-round resident in the Bay Area. This accipiter prefers north-facing slopes in dense stands of deciduous, conifer and mixed hardwood trees, including ponderosa pine, black oak, and Jeffrey pines, preferably in riparian areas; also known to nest in suburban areas. Species attracted to rural and suburban areas especially near bird feeders often during winter months (Bildstein and Meyer 2000). It forages primarily for small birds along woodland edges and openings, hedgerows, brushy pastures, and shorelines, but will also prey on small mammals, reptiles, and insects. Breeding begins in April and is single-brooded (Baicich and Harrison 2005).

Habitat Assessment and Occurrence in the Project Vicinity

Sharp-shinned hawks utilize the same nesting habitat as white-tailed kites. The mature trees on site provide suitable nesting habitat and suitable foraging habitat is present throughout the study area. No CNDDB occurrences are reported within three miles of the study area. Sharp-shinned hawks are less common than Cooper's hawks but have the potential to nest or forage on site.

Oak Titmouse

The oak titmouse is on the USFWS list of Bird Species of Conservation Concern. Oak titmouse occurs throughout California, southern Oregon and Baja California wherever oak woodlands are found. They are year-round residents in most of their range. They move branch to branch feeding on seeds as well as insects. While among the most common birds of oak woodland, the population has declined, primarily due to habitat loss and fragmentation.

Habitat Suitability and Occurrence Data
The Coast Live Oak Woodland and Forest on the Study Area provides suitable foraging and habitat for this species. A cavity nester, nesting habitat is likely present in some of the large oaks along Walker Creek. Oak titmouse were observed on site during the March 25, 2024 site visit.

Ferruginous Hawk

The ferruginous hawk is on the CDFW Watch List. It is the largest Buteo species in North America. They breed in the northern states and Canada and winters south from California and Texas to Mexico. Wintering habitat consists of open grasslands, deserts and cultivated fields (Baicich & Harrison 2005). This species is a California winter resident from August to early March but do not nest locally. Ferruginous hawks feed primarily on rabbits, ground squirrels, prairie dogs, and gophers (Bechard and Schmutz 1995). Breeding begins in April and are single-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data
Overwintering ferruginous hawk utilize a variety of open grassland, agricultural, and desert habitats. The grasslands and edge habitat along the woodlands within the study area provide suitable overwintering and foraging habitat. No CNDDB overwintering records have been reported within three miles of the Study Area (CDFW 2024a). Overwintering species are infrequently reported and are underrepresented in the CNDDB. Based on the location of the project amidst a larger matrix of grasslands and woodlands with abundant prey, ferruginous hawks have the potential to overwinter, roost, and forage within the Study Area.

Northern Harrier

The northern harrier (*Circus hudsonius*; nesting; California Species of Special Concern) is a medium-sized raptor with long wings and tail and a distinctive white rump patch. Distributed throughout North America, breeding in the northern lands of Alaska, Canada and northern continental United States (Macwhirter and Bildstein 1996). They migrate long distances and winters in the southern states, Mexico and Central America. The northern harrier is a year-round resident of coastal California and the Central Valley (Macwhirter and Bildstein 1996). Inhabits both freshwater and saltwater marshes and adjacent upland grasslands. Nests on the ground in tall grasses or clumps of tall vegetation in grasslands and meadows (Macwhirter and Bildstein 1996). Breeds from Late March through September; single-brooded (Baicich & Harrison 2005). Northern harriers forage on the wing in low flight in marshes, prairies, heavily grazed grasslands, and harvested fields primarily for voles (*Microtus* spp.), but also feeds opportunistically on other small mammals, reptiles, amphibians and small birds (Macwhirter and Bildstein 1996).

Habitat Suitability and Occurrence Data
Suitable foraging habitat is present in the grassland in the Study Area although disking to abate fire hazard reduces the suitability of the site for nesting as this species is known to nest in areas of tall grass, among other vegetation communities. No CNDDB occurrences of nesting northern harrier are reported within three miles of the Study Area.

Nuttall's Woodpecker

The Nuttall's woodpecker, a small black-and-white woodpecker with a barred back and red cap is on the USFWS list of Bird Species of Special Concern. It is resident from northern California south to northwestern Baja California, generally west of deserts and the Sierra Divide. It occurs primarily in oak woodlands but is also found in riparian woodlands and rarely in conifer forests. It nests in cavities excavated in soft wood. Its diet consists mostly of insects.

Habitat Suitability and Occurrence Data
Suitable foraging and nesting habitat is present in the Coast Live Oak Woodland and Forest along Walker Creek. No CNDDB occurrences of nesting Nuttall's woodpecker are reported within three miles of the Study Area.

Western Screech Owl

The western screech owl is on the USFWS list of Bird Species of Special Concern. This owl occurs in a wide variety of wooded habitats ranging from arid woodland in southern areas to conifer-dominated forests in the Pacific Northwest, with its range extending from southeast Alaska to Baja and central Mexico. It is tolerant of humans and often nests and hunts in residential areas and suburban parks if suitable trees for nesting and roosting are available. It eats a diverse array of small animals. A cavity nester, individuals may be attracted to nest boxes. Habitat loss due to high-density housing and forest clear-cutting have had localized negative population impacts.

Habitat Suitability and Occurrence Data
Suitable foraging habitat is present in the Study Area and nesting habitat is likely present in cavities in the Coast Live Oak Woodland. No CNDDB occurrences have been recorded within three miles of the Study Area.

Pallid Bat

The pallid bat is designated as a California Species of Special Concern by the CDFW and a High Priority species by the Western Bat Working Group (CDFW 2024a). It is a relatively large, light-colored bat ranging throughout the southwestern United States from interior British Columbia to Mexico (Hermanson and O'Shea 1983, Sherwin and Rambaldini 2005). They inhabit foothills and lowlands near water throughout California below 2,000 meters (6,560 feet) in elevation, but are most abundant in arid deserts and grasslands particularly in areas with rock outcrops near water (Hermanson and O'Shea 1983). Pallid bats typically roost in small groups in a variety of habitat features including bridges, buildings, tree hollows in coast redwoods, bole cavities in oaks, exfoliating bark, rock crevices in outcrops and cliffs, caves and mines as both day and

night roosts (Sherwin and Rambaldini 2005). Roost sites may change seasonally and are typically reused for a few days to weeks. Pallid bats primarily feed on a variety of arthropods typically capturing prey on the ground or gleaning from surfaces near the ground, and forage over shrub-steppe grasslands, oak savannah grasslands, open Ponderosa pine forests, talus slopes, gravel roads, orchards and vineyards. Parturition varies with latitude, but generally occurs from late-April to August; maternal colonies disperse by October (Hermanson and O'Shea 1983). Overwintering is common along the California coast, but individuals may migrate short distances between winter and summer roosts (Sherwin and Rambaldini 2005).

Habitat Assessment and Occurrence in the Project Vicinity

The Study Area supports suitable roost habitat in the mature trees with hollows, bole cavities and exfoliating bark in the coast live oak woodland and forest vegetation community. The entire property provides suitable foraging habitat. One non-specific occurrence from 1917 in Pine Canyon is reported in the CNDDB within three miles of the Study Area.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is designated a High Priority species by the Western Bat Working Group (CDFW 2024c). It is an uncommon, year-round resident of California inhabiting a variety of habitats except alpine and subalpine, but most common in mesic environments. This species is a moth specialist and roosts in caves, mines, bridges, building, rock crevices and tree hollows in coastal lowlands, cultivated valleys and nearby hills characterized by mixed vegetation below 3,300 meters. Townsend's bats exhibit high site fidelity and are highly sensitive to disturbance. Maternity roosts typically comprise less than 100 individuals in mines, caves, buildings and tunnels. They forage by gleaning insects from trees and shrubs along edge habitats near water. Foraging bouts peak in late evening and may travel long distances outings. Winter hibernacula are used from October to April.

Habitat Assessment and Occurrence in the Project Vicinity

The Study Area supports suitable roost habitat in the mature trees with hollows, bole cavities and exfoliating bark in the coast live oak woodland and forest vegetation community. The entire property provides suitable foraging habitat although the species is likely to seek foraging areas along the riparian habitat surrounding Walker Creek. One non-specific occurrence from 1926 is located approximately two miles southeast of the Study Area.

Hoary Bat

The hoary bat is designated a Medium Priority species by the Western Bat Working Group (CDFW 2024c). Hoary bats are ubiquitous but uncommon throughout California and roost solitarily in the foliage in primarily evergreens (pine, redwood, hemlock and spruce) and secondarily in deciduous trees, particularly in edge habitat exhibiting a preference for oak, maple, elder, and ash trees (Jackson 1961, Bolster 2005). They forage in small to large groups on large prey such as moths, beetles, crickets, and dragonflies (Barclay 1985). They emerge up to 5 hours after sunset to forage and employ a long-range foraging strategy using fast straight-line paths (Barclay 1985). They may remain at summer habitats and hibernate overwinter in lower latitudes but typically migrate to warmer climates in the winter. Hoary bats have delayed

implantation, mating from late summer to early fall, and give birth the following June (Barclay 1989).

Habitat Suitability and Occurrence Data
Suitable roosting habitat is present among the mature trees particularly along the edge habitat between the woodlands and grassland. No records of detections within three miles of the Study Area have been reported in the CNDDB.

Western Red Bat

The western red bat (*Lasiurus blossevillii*; California Species of Special Concern; Western Bat Working Group High Priority) is primarily riparian obligate species with a widespread distribution extending from British Columbia to Argentina (Bolster 2005). They are ubiquitous throughout most of California except the northern Great Basin region. The red bat is easily distinguished by its distinctive reddish coloration. Roosting typically occurs individually in dense clumps of tree foliage in riparian areas, especially willows, cottonwoods and sycamores, and within orchards and suburban areas in trees and shrubs. Roosts are often hidden from view and only access from below (Bolster 2005). Red bats are primarily moth specialists, but individuals will forage for a variety of other insects. Individuals have been observed foraging around street lamps and flood lights in suburban areas (Bolster 2005). The western red bat migrates long distances, but has been reported to overwinter in the Bay Area with interspersed winter foraging bouts on warm days (Bolster 2005).

Habitat Suitability and Occurrence Data
Suitable roosting habitat is present in dense tree foliage in the coast live oak woodland and forest along Walker Creek. No records of detections within three miles of the Study Area have been reported in the CNDDB.

7.0 Potential Impacts and Mitigation Measures

Impacts of the Project and suggested mitigation measures are listed below. Impacts of the Project would be rendered less-than-significant with implementation of the mitigation measures described below.

7.1 Significance Criteria

CEQA Guidelines section 15065 creates certain “mandatory findings of significance” that function as significance thresholds affecting certain biological resources. Pursuant to that section, a project will have a significant environmental effect if the project would:

- Substantially reduce the habitat of a fish or wildlife species
- Cause a fish or wildlife population to drop below self-sustaining levels
- Threaten to eliminate a plant or animal community
- Substantially reduce the number or restrict the range of an endangered, rare or threatened species.

In addition, based upon the criteria presented in Appendix G of the *CEQA Guidelines,* implementation of the proposed project would have a significant impact if it were to cause any of the following:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any special-status species identified as a candidate, sensitive, or special-status species in local or regional plans, policies or regulations, or by the CDFW or USFWS.
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS.
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

The impact analysis contained in this section assumes that the site will be developed in a manner and scale substantially similar to the Project description in Section 2, and the Appendix A plans. The assessment of potential impacts included consideration of both direct (i.e. construction related impacts) and indirect (e.g. those reasonably certain to occur at a later time) impacts. Impacts are described, followed by mitigation measures where warranted.

7.2 Impacts to Special-status Plants

Rare plant surveys conducted in 2006 determined that no rare plants were present within the Study Area. Existing conditions have not changed and the negative findings from the 2006 surveys are adequate to conclude that rare plants are not present in the Study Area. The proposed project therefore would have no impact on rare plants and no mitigation is required.

7.3 Impacts to Sensitive Natural Communities

Impact 1. Construction-related Impacts to Sensitive Natural Communities and Tree Removal

The Project impacts on vegetation communities are shown in Table 2. No sensitive natural communities are present in the Study Area. Approximately 8.23 acres of the site would be permanently impacted by the project, including 1.32 acres of Developed/Ruderal, 0.51 acres of Planted Woodland and 6.40 acres of Non-native Grassland. Construction activities avoid any direct impacts to riparian habitat in the Coast Live Oak Woodland and Forest surrounding Walker Creek. The development of 8.23 acres of Developed/Ruderal, Planted Woodland, and Non-native Grassland would not be considered a significant impact due to the lack of unique

habitat features, relative abundance in the Study Area region and dominance of common, non-native species in these communities. No mitigation is required.

Fifty-two trees are present within the Study Area. Of the 35 trees proposed for removal, 20 Protected Trees as classified under Chapter 816-6 of the Contra Costa County Tree Protection and Preservation Ordinance are to be removed to facilitate development. An additional 15 trees not protected under the County ordinance will be removed. Protected trees scheduled for removal include three valley oaks, nine California black walnuts, and eight coast live oaks. None of the Protected Trees scheduled for removal provide unique habitat characteristics that are not already abundant in the Coast Live Oak Woodland and Forest on the Study Area or in the vicinity of the project. Removal of the 20 Protected Trees would not be considered a significant impact. No mitigation is required.

Table 2. Project Impacts on Vegetation Communities

Vegetation Community	Sensitive Natural Community	Area of Impact (acres)	
		Permanent Impact	Temporary Impact
Coast Live Oak Woodland & Forest	No	0	0
Developed/Ruderal	No	1.32	0
Planted Woodland	No	0.51	0
Non-native Grassland	No	6.40	0
Total		**8.23**	**0**

Construction of the Proposed Project would not impact Sensitive Natural Communities. Removal of Protected Trees is not considered a significant impact. No mitigation is required.

7.4 Impacts to Special-status Wildlife

The assessment of potential impacts of the Proposed Project on special-status and sensitive wildlife species is detailed below. The assessment included consideration of both direct (i.e., construction related impacts) and indirect (e.g., those reasonably certain to occur at a later time and date) impacts. Impacts are described by species, followed by species-specific mitigation measures where needed. Where mitigation measures would be applicable and appropriate to more than one species, the appropriate measure is listed but the text is not duplicated.

Impact 2. Construction-related Impacts to Special-status Wildlife and Habitat
Construction-related vegetation removal described in Impact 1 may result in the permanent and temporary loss of special-status species habitat including food and host plants for crotch, western and obscure bumble bees such as coyote bush, bull thistle, yellow and purple star thistle and rose clover. The aforementioned food plants easily repopulate areas and removal of these host plants combined with the abundance of similar host plants on neighboring parcels will not appreciably diminish the overall habitat value of the property. Construction may also result in the permanent and temporary loss of foraging habitat for white-tailed kites, Cooper's hawks, sharp-shinned hawks, ferruginous hawks, northern harriers, hoary bats, western red bats, pallid bats, and

Townsend's western big-eared bats. The project may result in direct impacts to individual animals (e.g., mortality, injury or harassment, roost/nest disturbance or abandonment, disrupt breeding, foraging, migration, dispersal and/or normal movement activities within a species home range, and/or alter normal behaviors) and/or indirect impacts (e.g., roost/nest/habitat avoidance, modified foraging behaviors, noise or light pollution, etc.). This would be considered significant, but implementation of Mitigation Measure 2 (a-g) described below would reduce or compensate for this impact to be less than significant.

Mitigation Measure 2(a). Prior to the start of construction, a biologist experienced in biology and ecology potentially occurring special-status wildlife shall conduct an educational training program for all construction personnel including subcontractors. The training shall include, at a minimum, a description of special-status wildlife with potential to occur in the Study Area; sensitive habitats within the study area; an explanation of the status and protection under state and federal laws; the avoidance and minimization measures to be implemented to reduce the potential for construction-related impacts; communication and work stoppage protocols in case a special-status species is observed within the study area; and an explanation of the environmentally sensitive areas and wildlife exclusion fencing and the importance of maintaining these structures. A fact sheet conveying this information shall be prepared and distributed to all construction personnel. Upon completion of the program, personnel shall sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of the governing environmental regulations.

Mitigation Measure 2(b). Prior to the start of construction, environmentally sensitive areas (ESAs)—defined as areas containing sensitive habitats adjacent to or within construction work areas where physical disturbance is not allowed— shall be clearly delineated using highly visible fencing; one fence can serve as both wildlife exclusion fencing (WEF – see below) and ESA fencing. Construction work areas include the active construction site and all vehicle parking and staging areas. The qualified biologist shall work with the applicant and contractor to determine where ESA fencing will be installed. The ESA fencing shall remain in place while construction activities are ongoing, and be regularly inspected and fully maintained at all times.

Mitigation Measure 2(c). Prior to the start of vegetation removal and construction, WEF shall be installed around the construction footprint. A WEF Plan shall be prepared by the qualified biologist detailing the location, fencing and installation specifications, monitoring, and repair criteria. Vegetation shall be cleared at least 3 feet from the non-Project side of the WEF and kept clear for the duration of the Project. Jump-outs or one-way exists shall be incorporated in the WEF design to allow wildlife to exit if present within the active construction site. One fence can serve as both wildlife exclusion fencing and ESA fencing. The WEF shall remain in place throughout the duration of the Project and be regularly inspected and fully maintained. Repairs to the WEF shall be made the same day of discovery to the extent feasible. Upon Project completion the WEF shall be completely removed, the area cleaned of debris and trash, and returned to natural conditions.

Mitigation Measure 2(d). To prevent wildlife from becoming entangled or trapped in erosion control materials, plastic mono-filament netting (i.e., erosion control matting) or similar material shall not be used within the Project footprint. This includes products that use photodegradable or

biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include tackified hydroseeding compounds and natural fibers such as burlap, jute, or twine with a wide aperture mesh.

Mitigation Measure 2(e). Immediately prior to the initiation of any vegetation clearing, grubbing, grading, cut and fill, or other ground-disturbing activities, the biologist with qualifications described MM 3(a) shall conduct a clearance survey for special-status wildlife.

Mitigation Measure 2(f). To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 1-foot deep shall be covered with plywood or similar materials at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The qualified biologist shall inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All staged materials, equipment, and vehicles shall be inspected by the biologist prior to moving.

Mitigation Measure 2(g). The following construction site management practices shall be implemented to avoid or minimize effects on special-status wildlife and their habitat:

1. A speed limit of 15 miles per hour (mph) in the Project footprint in unpaved areas shall be enforced to reduce dust and excessive soil disturbance.
2. Construction access, staging, storage, and parking areas, shall be located outside of any designated ESA or in areas environmentally cleared by the contractor. Access routes and the number and size of staging and work areas shall be limited to the minimum necessary to construct the proposed Project. Routes and boundaries of roadwork shall be clearly marked prior to initiating construction or grading.
3. All food and food-related trash items shall be enclosed in sealed trash containers daily and properly disposed of off-site.
4. No pets from Project personnel shall be allowed anywhere in the Project area during construction.
5. No firearms shall be allowed on the Project site except for those carried by authorized security personnel, or local, State or Federal law enforcement officials.
6. A Spill Response Plan shall be prepared. Hazardous materials such as fuels, oils, solvents, etc. shall be stored in sealable containers in a designated location that is at least 50 feet from hydrologic features.
7. All equipment will be properly maintained and free of leaks. Servicing of vehicles and construction equipment including fueling, cleaning, and maintenance shall occur at least 50 feet from any hydrologic features unless it is an existing gas station.

With implementation of Mitigation Measures 2(a-g), the impact of the Proposed Project on special-status wildlife habitat will be reduced to less than significant.

Impact 3. Construction-related impacts to white-tailed kite, Cooper's hawk, sharp-shinned hawk, oak titmouse, ferruginous hawk, northern harrier, Nuttall's woodpecker, western screech owl, and nesting migratory birds

The Project would not result in the loss of known nests or nest trees. Construction-related activities and vegetation removal described in Impact 1 may result in direct impacts to individual white-tailed kites, Cooper's hawks, sharp-shinned hawks, ferruginous hawks, California horned larks, and nesting migratory birds (e.g., nest disturbance or abandonment during incubation, nestling or fledging stages, roost abandonment, harassment, or temporary avoidance of nesting, roosting or foraging habitat) and/or indirect impacts (e.g., modified foraging patterns or territories, noise or light pollution, winter roost abandonment, etc.). This would be considered significant, but implementation of the mitigation measures described below would reduce or compensate for this impact to be less than significant.

Mitigation Measure 3(a). Implement Mitigation Measures 2(a,b,e,g) with the intended purpose of protecting white-tailed kites, Cooper's hawks, sharp-shinned hawks, ferruginous hawks, northern harriers, Nuttall's woodpecker, western screech owl and nesting migratory birds.

Mitigation Measure 3(b). Tree removal, pruning, or grubbing activities should be conducted during the non-breeding season (i.e., between September 1 and January 31), if possible, to avoid impacts to nesting migratory birds.

Mitigation Measure 3(c). If Project construction begins during the breeding season (February 1 to August 31), preconstruction nesting bird surveys should be conducted within 300 feet of the Study Area by a qualified biologist no more than seven (7) days prior to the initiation of any construction activities, including ground disturbing activities and tree removal. If no active nests are found, no further mitigation is necessary.

Mitigation Measure 3(d). If active nests (i.e., nests with eggs or young birds present) are found, non-disturbance buffers should be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance, and the type/duration of potential disturbance, typically 75 feet for passerine species and 250 feet for raptors. The non-disturbance zone may be reduced if a qualified biologist is present to educate workers about the sensitivity of working in proximity to active nests and be on site to monitor the nest during work adjacent to the buffer to determine if Project activities are causing nest disturbance. The qualified biologist should conduct regular monitoring visits to document nest phenology and potential for disturbance during the different nest stages. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work should cease immediately and the CDFW and the USFWS Migratory Bird Regional Permit Office should be contacted for further guidance.

With implementation of Mitigation Measures 3(a-d), the impact of the Proposed Project on white-tailed kite, Cooper's hawk, sharp-shinned hawk, oak titmouse, ferruginous hawk, northern harrier, Nuttall's woodpecker, western screech owl, and nesting migratory birds will be reduced to less than significant.

Impact 4. Construction-related impacts to hoary, pallid, western red, and Townsend's big-eared bat

Construction-related activities and vegetation removal described in Impact 1 may result in direct impacts to individual hoary, pallid, western red and Townsend's big-eared bats (e.g., mortality,

injury or loss of roosting habitat including mature trees with hollows, bole cavities and exfoliating bark in the coast live oak woodland and forest vegetation community) and/or indirect impacts (e.g., temporary loss of habitat, roost site avoidance, shift in foraging behaviors, noise or light pollution, etc.). This would be considered significant, but implementation of the mitigation measures described below would reduce or compensate for this impact to be less than significant.

Mitigation Measure 4(a). Implement Mitigation Measures 2(a,b,e,g) with the intended purpose of protecting hoary, pallid, western red and Townsend's big-eared bats.

Mitigation Measure 4(b). Preconstruction surveys shall be conducted by a qualified biologist for all areas that provide suitable bat roosting habitat including snags, rotten stumps, decadent trees with broken limbs, exfoliating bark, bole cavities or hollows, dense foliage, etc. Sensitive habitat areas and roost sites shall be avoided to the maximum extent practicable. If no suitable roost sites are identified, no further mitigation measures are necessary.

Mitigation Measure 4(c). If potential roost sites (trees, snags, etc.) are to be removed or trimmed, limbs smaller than 3 inches in diameter shall be cut and the tree left overnight to allow any bats that may be using the tree/snag time locate another roost. A qualified biologist shall be present during the trimming or removal of trees, snags, or stumps.

Mitigation Measure 4(d). Prior to building demolition, tree removal or trimming, a qualified biologist shall conduct a preconstruction clearance survey to identify if any bats are roosting within the structures or trees. If bats are roosting within the structures or trees, bat exclusion measures shall be implemented that allow bats to freely leave the structure, but prevents them from returning.

Mitigation Measure 4(e). If roosting bats are detected in the work area, work should not proceed if the qualified biologist determines if they will be directly impacted by Project activities. A non-disturbance buffer zone of 50 feet should be established until guidance from CDFW is obtained.

With implementation of Mitigation Measures 4(a-e), the impact of the Proposed Project on hoary, pallid, western red, and Townsend's big-eared bats will be reduced to less than significant.

7.5 Interference with Movement of Native Fish, Wildlife, Established Wildlife Corridors

The Project would not interfere or impede in the movement of other native wildlife. The Study Area is located in a matrix of low-density rural residential development and undeveloped oak woodland, riparian, grassland, and scrub habitat. The scope and footprint of the Project are small compared to the surrounding available habitat. The Project does not appreciably increase the footprint of developed habitat or modify existing wildlife movement corridors. Species can freely move between habitat types and avoid the Study Area during the construction phase.

The Project would not result in significant impacts to the movement of native fish, wildlife or established wildlife corridors. No mitigation is required.

7.6 Conflict with Local Policies or Ordinances

The Proposed Project was designed to be consistent with the Contra Costa County General Plan Natural Resource Goals and Policies and the North Gate Specific Plan described in Section 4.9. The Project minimizes impacts to sensitive natural communities and would implement mitigation measures to ensure that impacts to special-status species would be avoided during construction. Through careful design, construction of the Proposed Project would protect habitat for rare and endangered wildlife species and would not impede the mobility of terrestrial wildlife.

Based on consideration of the relevant local goals and policies from the Natural Resources Element of the Contra Costa County General Plan and the North Gate Specific Plan, the Proposed Project does not conflict with local policies or ordinances related to biological resources. No mitigation is required.

7.7 Conflict with Local, Regional or Statewide Habitat Conservation Plans

No local, regional or statewide habitat conservation plans have been adopted for the area in which the Proposed Project is located; therefore, there is no conflict. No mitigation is required.

8.0 References

American Ornithologists' Union. 1983. Check-list of North American Birds. Sixth edition. American Ornithologists' Union, Washington, DC, USA.

Baicich, P.J. and C.J.O. Harrison. 2005. Nests, Eggs, and Nestlings of North American Birds. Second Edition. Princeton University Press. Princeton, New Jersey. 347 pp.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Barclay, R. 1989. The effect of reproductive condition on the foraging behavior of female hoary bats , Lasiurus cinereus. Behavioral Ecology and Sociobiology. 24: 31-37.

Barclay, R. M. R. 1985. Long-Versus Short-Range Foraging Strategies of Hoary (Lasiurus cinereus) and Silver-Haired (Lasionycteris noctivagans) Bats and the Consequences for Prey Selection. Can. J. Zoo. 63(11):2507-2515.

Bechard, M.J., and J.K. Schmutz. 1995. Ferruginous Hawk (Buteo regalis). In The Birds of North America, No. 172 (A. Poole and F. Gill, eds.). Tha Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington D.C. https://doi.org/10.2173/tbna.172.p

Bildstein, Keith L. and Ken Meyer. 2000. Sharp-Shinned Hawk (Accipiter striatus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/482.

Birds of the World. 2024. Queried April 22. https://birdsoftheworld.org/bow/species/oaktit/cur/habitat#breedhab

Bolster, B.C. 2005. Hoary Bat (Lasiurus cinereus). Species Account. Western Bat Working Group. http://wbwg.org/species_accounts.htm#LABL.

Bolster, B.C. 2005. *Western Red Bat* (Lasiurus blossevillii). Species Account. Western Bat Working Group. http://wbwg.org/species_accounts.htm#LABL.

California Department of Fish and Wildlife. 2024a. California natural diversity database. Query for the Las Trampas Ridge, Walnut Creek, Clayton, Diablo, Vine Hill, Honker Bay, Antioch North, Antioch South, and Tassajara USGS 7 ½ Minute Quads. Queried on May 20. California Department of Fish and Wildlife, Sacramento, CA.

California Department of Fish and Wildlife. 2024b. *State and Federally Listed Endangered and Threatened Animals of California*. Biogeographic Data Branch, Natural Diversity Database. May 20. 41 pp. Available online at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109405&inline

California Department of Fish and Wildlife. 2024c. *Special Animals List*. Natural Diversity Database. April. 136 pp. Available online at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline

California Department of Fish and Wildlife. 2023. *California Natural Community List*. Biogeographic Data Branch, Natural Diversity Database. June 1. 93 pp. Available online at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline

California Native Plant Society. 2024a. Inventory of Rare and Endangered Plants (online edition). California Native Plant Society. Sacramento, CA.

California Native Plant Society. 2024b. A manual of California vegetation, online edition: http://www.cnps.org/cnps/vegetation/. California Native Plant Society, Sacramento, CA.

California State Water Resources Control Board. 2019. State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), for inclusion in the Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California. April 2.

Contra Costa County General Plan. 2005. https://www.contracosta.ca.gov/4732/General-Plan

Curtis, Odette E., R. N. Rosenfield and J. Bielefeldt. 2006. Cooper's Hawk (Accipiter cooperii), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/075.

Dunk, J. R. 1995. White-tailed Kite (Elanus leucurus). In The Birds of North America, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Gaines, D. (1988). Birds of Yosemite and the East Slope. Artemisia Press, Lee Vining, CA, USA.

Garrett, K., and J. Dunn (1981). Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, CA, USA.

Hermanson, J.W., and T.J. O'Shea. 1983. Antrozous pallidus. American Society of Mammalogists. Mammalian Species. No. 213. December 15.

Holland, R. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* California Department of Fish and Game, The Resources Agency. 156 pp.

Howell, S. N. G., and S. Webb (1995). A Guide to the Birds of Mexico and Northern Central America. Oxford University Press, New York, New York, USA.

Jackson, H. 1961. Mammals of Wisconsin. The University of Wisconsin Press, Madison, Wisconsin, USA.

Jepson Flora Project (eds.) 2024. Jepson eFlora, http://ucjeps.berkeley.edu/eflora/.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.

Jepson Flora Project (eds.) 2024. Jepson eFlora, http://ucjeps.berkeley.edu/eflora/.

MacWhirter, B., and K.L. Bildstein. 1996. Northern Harrier (Circus cyaneus). No. 210 in The birds of North America, No. 210, A. Poole and F. Gill, eds. The Academy of Natural Sciences and the American Ornithologists' Union, Philadephia, Penn., and Washington, D.C.

Mayer, K.E., and Laudenslayer, Jr. W.F. 1988. A Guide to Wildife Habitats of California. State of California, Resources Agency, Department of Fish and Game, Sacramento, CA. 166 pp.

Mosaic Associates. 2011. Biological Resources Report 1125 North Gate Road, Unincorporated Walnut Creek, Contra Costa County. Revised January.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evans. 2009. A manual of California vegetation, second edition. California Native Plant Society. Sacramento, CA.

Sherwin, R., and D.A. Rambaldini. 2005. Pallid Bat (Antrozous pallidus). Species Account. Western Bat Working Group. http://wbwg.org/speciesinfo/species_accounts/species_accounts.html.

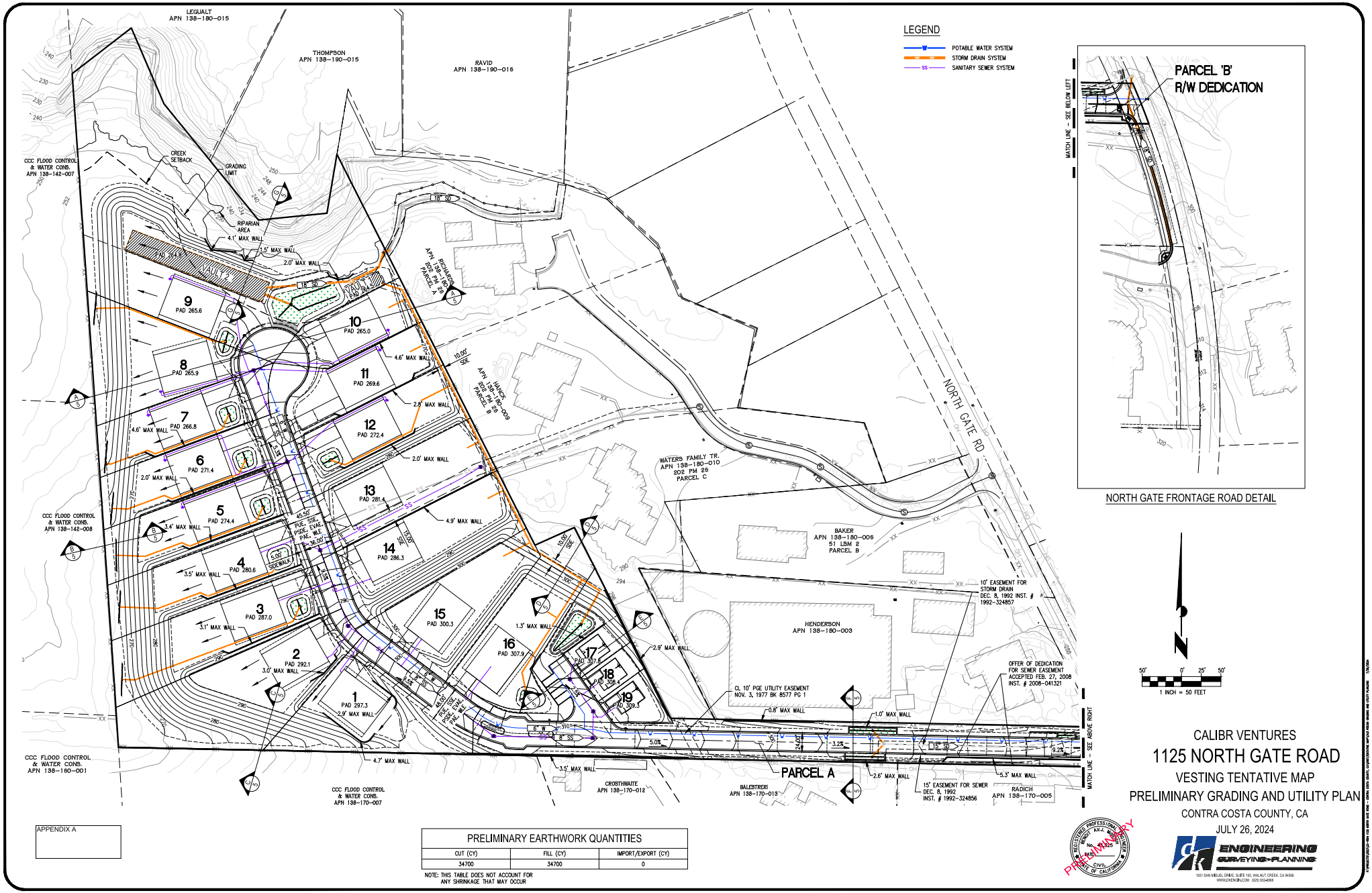
Stebbins, R.C. and S.M. McGinnis. 2012. Field Guide to Amphibians and Reptiles of California. Revised Edition. California Natural History Guides. University of California Press, Berkeley, California. 538 pp.

U.S. Department of Agriculture Natural Resources Conservation Service. 2024. Web Soil Survey. Accessed May 20 https://websoilsurvey.nrcs.usda.gov/app/

U.S. Fish and Wildlife Service. 2024a. Critical habitat portal. Accessed at http://ecos.fws.gov/crithab.

U.S. Fish and Wildlife Service. 2024b. Endangered and Threatened Wildlife and Plants; Review of Species That Are Candidates for Listing as Endangered or Threatened; Annual Notification of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule. 50 CFR Part 17 Vol. 87 (85): 41560-41585. June 27.
https://www.federalregister.gov/documents/2023/06/27/2023-13577/endangered-and-threatened-wildlife-and-plants-review-of-species-that-are-candidates-for-listing-as

U.S. Fish and Wildlife Service. 2024c. IPaC Trust Resource List of Threatened and Endangered Species that May Occur and/or Be Affected by the Proposed Project. Report generated on May 20, 2024 at https://ecos.fws.gov/ipac/.



APPENDIX A

PRELIMINARY EARTHWORK QUANTITIES		
CUT (CY)	FILL (CY)	IMPORT/EXPORT (CY)
34700	34700	0

NOTE: THIS TABLE DOES NOT ACCOUNT FOR ANY SHRINKAGE THAT MAY OCCUR

CALIBR VENTURES

1125 NORTH GATE ROAD

VESTING TENTATIVE MAP

PRELIMINARY GRADING AND UTILITY PLAN

CONTRA COSTA COUNTY, CA

JULY 26, 2024

PRELIMINARY

ENGINEERING SURVEYING + PLANNING

1601 SAN MIGUEL DRIVE, SUITE 100, WALNUT CREEK, CA 94596 WWW.DKENGINEERING.COM (925) 930-6868

dk JOB# 23-1064-10

Appendix B Special-status Plant Species Documented to Occur in the Study Area Region

List compiled from searches of the CNDDB (CDFW 2024) records for the Las Trampas Ridge, Walnut Creek, Clayton, Diablo, Vine Hill, Honker Bay, Antioch North, Antioch South, and Tassajara CA 7.5' USGS quadrangles, the CNPS Inventory of Rare and Endangered Plants (CNPS 2024a), and IPaC (USFWS 2024).

Species	Status	Typical Habitat	Habitat Assessment of the Study Area
Amsinckia grandiflora large-flowered fiddleneck	FT, SE, 1B.1	Cismontane woodland, valley and foothill grassland, 270-550 m. Blooms April-May.	Marginal suitable habitat present on the study area in Non-Native Grassland. Not observed on study area during 2006 surveys.
Amsinckia lunaris bent-flowered fiddleneck	1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill grassland, 3-500 m. Blooms March-June.	Marginal suitable habitat present on the study area in Non-Native Grassland. Not observed on study area during 2006 surveys.
Arctostaphylos auriculata Mt. Diablo manzanita	1B.3	Chaparral (sandstone), cismontane woodland, 135-650 m. Blooms January-March.	No *Arctostaphylos* observed on the study area.
Arctostaphylos manzanita subsp. *laevigata* Contra Costa manzanita	1B.2	Chaparral, coastal prairie, coastal scrub (serpentinite outcrop), 45-215 m. Blooms February-March.	No *Arctostaphylos* observed on the study area.
Astragalus tener var. *tener* alkali milk-vetch	1B.2	Playas, valley and foothill grassland (adobe clay), vernal pools (alkaline), 1-60 m. Blooms March-June.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Atriplex depressa brittlescale	1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools (alkaline, clay), 1-320 m. Blooms April-October.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Blepharizonia plumosa big tarplant	1B.1	Valley and foothill grassland (usually clay), 30 - 505 m. Blooms July-October.	Marginal suitable habitat present on the study area in Non-Native Grassland. Not observed on study area during 2006 surveys.
Calochortus pulchellus Mt. Diablo fairy-lantern	1B.2	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland, 30-840 m. Blooms April-June.	Suitable habitat present on the study area in Non-Native Grassland and Coast Live Oak Woodland and Forest. Not observed on study area during 2006 surveys.
Centromadia parryi subsp. *congdonii* Congdon's tarplant	1B.1	Valley and foothill grassland (alkaline), 0-230 m. Blooms May-November.	Marginal suitable habitat present on the study area in Non-Native Grassland, though alkaline habitat not observed. Not observed on study area during 2006 surveys.
Chloropyron molle subsp. *molle* soft salty bird's-beak	FE, SR, 1B.2	Marshes and swamps (coastal salt), 0-3 m. Blooms June-November.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Cicuta maculata var. *bolanderi* Bolander's water-hemlock	2B.1	Marshes and swamps (brackish, coastal, freshwater), 0-200 m. Blooms July-September.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.

Species	Status	Typical Habitat	Habitat Assessment of the Study Area
Cordylanthus nidularius Mt. Diablo bird's-beak	SR, 1B.1	Chaparral (serpentinite), 600-800 m. Blooms June-August.	No suitable serpentinite habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Cryptantha hooveri Hoover's cryptantha	1A	Inland dunes, valley and foothill grassland (sandy), 9-150 m. Blooms April-May.	No suitable sandy habitat present on the study area. Not observed on study area during 2006 surveys.
Delphinium californicum subsp. *interius* Hospital Canyon larkspur	1B.2	Chaparral (openings), cismontane woodland (mesic), coastal scrub, 195-1,095 m. Blooms April-June.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Downingia pusilla dwarf downingia	2B.2	Valley and foothill grassland (mesic), vernal pools, 1-445 m. Blooms March-May.	No suitable mesic or vernal pool habitat present on the study area. Not observed on study area during 2006 surveys.
Eriastrum ertterae Lime Ridge eriastrum	CE, 1B.1	Chaparral (edges, openings; sometimes alkaline, sandy), 200-290 m. Blooms June-July.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Eriogonum nudum var. *psychicola* Antioch Dunes buckwheat	1B.1	Inland dunes, 0-20 m. Blooms July-October.	No suitable dune habitat present on the study area. Not observed on study area during 2006 surveys.
Eriogonum truncatum Mt. Diablo buckwheat	1B.1	Chaparral, coastal scrub, valley and foothill grassland, 3-350 m. Blooms April-September.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Eryngium jepsonii Jepson's coyote-thistle	1B.2	Valley and foothill grassland, vernal pools (clay), 3-300 m. Blooms April-August.	Marginal suitable habitat present on the study area in mesic areas of Non-Native Grassland. Not observed on study area during 2006 surveys.
Erysimum capitatum var. *angustatum* Contra Costa wallflower	FE, SE, 1B.1	Inland dunes, 3-20 m. Blooms March-July.	No suitable dune habitat present on the study area. Not observed on study area during 2006 surveys.
Eschscholzia rhombipetala diamond-petaled California poppy	1B.1	Valley and foothill grassland (alkaline, clay), 0-975 m. Blooms March-April	Marginal suitable habitat present on the study area in Non-Native Grassland, though alkaline habitat not observed. Not observed on study area during 2006 surveys.
Extriplex joaquinana San Joaquin spearscale	1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland (alkaline), 1-835 m. Blooms April-October.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Fritillaria liliacea fragrant fritillary	1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland (often serpentinite), 3-410 m. Blooms February-April.	Some marginal habitat components present in Non-Native Grassland but serpentinite lacking. Not observed on study area during 2006 surveys.
Grimmia torenii Toren's grimmia	1B.3	Chaparral, cismontane woodland, cower montane coniferous forest (carbonate, openings, rocky, volcanic), 325–1,160 m.	No suitable habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.

Species	Status	Typical Habitat	Habitat Assessment of the Study Area
Helianthella castanea Diablo helianthella	1B.2	Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland (usually rocky, axonal soils, often in partial shade), 60-1,300 m. Blooms March-June.	Suitable habitat present on the study area in undisturbed areas of Coast Live Oak Woodland and Forest. Not observed on study area during 2006 surveys.
Hesperolinon breweri Brewer's western flax	1B.2	Chaparral, cismontane woodland, valley and foothill grassland, 30-945 m. Blooms May-July.	Marginal suitable habitat present on the study area in Non-Native Grassland. Not observed on study area during 2006 surveys.
Hibiscus lasiocarpos var. *occidentalis* woolly rose-mallow	1B.2	Marshes and swamps (freshwater; often in riprap on sides of levees), 0-120 m. Blooms June-September.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Hoita strobilina Loma Prieta hoita	1B.1	Chaparral, cismontane woodland, riparian woodland (usually serpentinite, mesic), 30-860 m. Blooms May-October.	No suitable serpentinite habitat present on the study area. Not observed on study area during 2006 surveys.
Isocoma arguta Carquinez goldenbush	1B.1	Valley and foothill grassland (alkaline), 1-20 m. Blooms August-December.	No suitable habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Lasthenia conjugens Contra Costa goldfields	FE, 1B.1	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools (mesic), 0-470 m. Blooms March-June.	Marginal suitable habitat present on the study area in mesic areas of Non-Native Grassland, though alkaline habitat not observed. Not observed on study area during 2006 surveys.
Lathyrus jepsonii var. *jepsonii* Delta tule pea	1B.2	Marshes and swamps (brackish, freshwater), 0-5 m. Blooms May-July.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Lilaeopsis masonii Mason's lilaeopsis	SR, 1B.1	Marshes and swamps (brackish, freshwater), riparian scrub, 0-10 m. Blooms April-November.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Limosella australis Delta mudwort	2B.1	Marshes and swamps (brackish, freshwater), riparian scrub, 0-3 m. Blooms May-August.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Madia radiata showy golden madia	1B.1	Cismontane woodland, valley and foothill grassland, 25-1,215 m. Blooms March-May.	Marginal suitable habitat present on the study area in Non-Native Grassland. Not observed on study area during 2006 surveys.
Malacothamnus hallii Hall's bush-mallow	1B.2	Chaparral, coastal scrub, 10-760 m. Blooms May-September.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Micropus amphibolus Mt. Diablo cottonweed	3.2	Broadleafed upland forest, chaparral, cismontane woodland, valley and foothill grassland (rocky), 45-825 m. Blooms March-May.	Marginal suitable habitat present on the study area in Non-Native Grassland, though rocky habitat not observed. Not observed on study area during 2006 surveys.

Species	Status	Typical Habitat	Habitat Assessment of the Study Area
Monolopia gracilens woodland woollythreads	1B.2	Broadleafed upland forest (openings), chaparral (openings), cismontane woodland, North Coast coniferous forest (openings), valley and foothill grassland (serpentine), 100-1,200 m. Blooms March-July.	Marginal suitable habitat present in Non-Native Grassland, but no suitable serpentinite habitat present on the study area. Not observed on study area during 2006 surveys.
Navarretia gowenii Lime Ridge navarretia	1B.1	Chaparral, 180-305 m. Blooms May-June.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Navarretia nigelliformis subsp. *radians* shining navarretia	1B.2	Cismontane woodland, valley and foothill grassland, vernal pools (sometimes clay), 65-1,000 m. Blooms April-July.	Marginal suitable habitat present on the study area in mesic areas of Non-Native Grassland. Not observed on study area during 2006 surveys.
Oenothera deltoides subsp. *howellii* Antioch Dunes evening-primrose	FE, SE, 1B.1	Inland dunes, 0-30 m. Blooms March-September.	No suitable dune habitat present on the study area. Not observed on study area during 2006 surveys.
Phacelia phacelioides Mt. Diablo phacelia	1B.2	Chaparral, cismontane woodland, 500-1,370 m. Blooms April-May.	No suitable habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Plagiobothrys hystriculus bearded popcornflower	1B.1	Valley and foothill grassland (mesic), vernal pools (margins), 0-274 m. Blooms April-May.	Marginal suitable habitat present on the study area in mesic areas of Non-Native Grassland. Not observed on study area during 2006 surveys.
Puccinellia simplex California alkali grass	1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools (alkaline flats, lake margins, vernally mesic), 2-930 m. Blooms March-May.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Ravenella exigua chaparral harebell	1B.2	Chaparral (rocky, usually serpentinite), 275-1,250 m. Blooms May-June.	No suitable serpentinite habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Sanicula saxatilis rock sanicle	SR, 1B.2	Broadleafed upland forest, chaparral, valley and foothill grassland, (rocky, scree, talus), 620-1,175 m. Blooms April-May.	No suitable rocky habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Senecio aphanactis chaparral ragwort	2B.2	Chaparral, cismontane woodland, coastal scrub (sometimes alkaline), 15-800 m. Blooms January-May.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Sidalcea keckii Keck's checkerbloom	FE, 1B.1	Cismontane woodland, valley and foothill grassland (clay, serpentine), 75-650 m. Blooms April-May.	No suitable serpentinite habitat present on the study area. Not observed on study area during 2006 surveys.
Spergularia macrotheca var. *longistyla* long-styled sand-spurrey	1B.2	Meadows and seeps, marshes and swamps (alkaline), 0-255 m. Blooms February-May.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.

Species	Status	Typical Habitat	Habitat Assessment of the Study Area
Streptanthus albidus subsp. *peramoenus* most beautiful jewelflower	1B.2	Chaparral, cismontane woodland, valley and foothill grassland (serpentinite), 95-1,000 m. Blooms March-October.	No suitable serpentine habitat present on the study area. Not observed on study area during 2006 surveys.
Streptanthus hispidus Mt. Diablo jewelflower	1B.3	Chaparral, valley and foothill grassland (rocky), 365-1,200 m. Blooms March-June.	No suitable rocky habitat present on the study area. Out of elevational range. Not observed on study area during 2006 surveys.
Stuckenia filiformis subsp. *alpina* slender-leaved pondweed	2B.2	Marshes and swamps (assorted shallow freshwater), 300-2,150 m. Blooms May-July.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Symphyotrichum lentum Suisun Marsh aster	1B.2	Marshes and swamps (brackish, freshwater), 0-3 m. Blooms May-November.	No suitable marsh habitat present on the study area. Not observed on study area during 2006 surveys.
Trifolium hydrophilum saline clover	1B.2	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools, 0-300 m. Blooms April-June.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Triquetrella californica coastal triquetrella	1B.2	Coastal bluff scrub, coastal scrub, 10-100 m.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Tropidocarpum capparideum caper-fruited tropidocarpum	1B.1	Valley and foothill grassland (alkaline hills), 1-455 m. Blooms March-April.	No suitable alkaline habitat present on the study area. Not observed on study area during 2006 surveys.
Viburnum ellipticum oval-leaved viburnum	2B.3	Chaparral, cismontane woodland, lower montane coniferous forest, 215-1,400 m. Blooms May-June.	No suitable habitat present on the study area. Not observed on study area during 2006 surveys.
Key to Status:			
FE	Federal Endangered		
FT	Federal Threatened		
SE	State Endangered		
SR	State Rare		
CE	State Candidate Endangered		
1A	CNPS Rare Plant Rank of plants presumed extirpated in California and either rare or extinct elsewhere		
1B	CNPS Rare Plant Rank of plants rare, threatened, or endangered in California and elsewhere		
2	CNPS Rare Plant Rank of plants rare, threatened, or endangered in California but more common elsewhere		
3	CNPS Rare Plant Rank of plants about which more information is needed		
.1/.2/.3	Seriously endangered in California/Fairly endangered in California/ Not very endangered in California		

APPENDIX C SPECIAL STATUS FISH AND WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY[1]

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
FEDERAL/STATE LISTED, PROPOSED, CANDIDATE AND/OR FULLY PROTECTED SPECIES				
INVERTEBRATES:				
Bombus crotchii Crotch bumble bee	Fed: None CA: SCE	A bumble bee native to California and Baja, Mexico, but also reported from western Nevada. Inhabits the Mediterranean region, Pacific Coast, Western Desert, Great Valley, and adjacent foothills through most of southwestern California (USDA, 2012). Food plants consist of *Antirrhinum*, *Phacelia*, *Clarkia*, *Dendromecon*, *Eschscholzia*, and *Eriogonum*.	Preferred food plants not detected during rare plant surveys in 2006 or reconnaissance surveys in 2024. No reported occurrences within 3 miles of the Study Area	Not expected
Bombus occidentalis Western bumble bee	Fed: None CA: SCE	Historically a very common bee species in the western United States and western Canada, but populations from British Columbia to Central California have become extirpated or are severely declining. Food plants consist of *Melilotus*, *Cirsium*, *Trifolium*, *Centaurea*, *Chrysothamnus*, and *Eriogonum*.	Suitable habitat present on site within all habitat types supporting suitable food plants. Nonspecific location reported ~ 0.1 mi to the west of Study Area.	Possible
Branchinecta conservation Conservancy fairy shrimp	Fed: FE CA: None	Endemic to the grasslands of the northern two-thirds of the Central Valley; found in large, turbid pools. Inhabits astatic pools located in swales formed by old, braided alluvium filled by winter/spring rains, last until June.	No suitable habitat present in the Study Area. No reported occurrences within 10 miles of the Study Area.	None
Branchinecta lynchi Vernal pool fairy shrimp	Fed: FT CA: None	Inhabits clear to tea-colored freshwater vernal pools in grass or mud bottomed swales or basalt flow depression pools in unplowed grasslands (59 FR 48136, Eriksen and Belk, 1999). There are 32 known populations in the Central Valley from Shasta to Tulare counties, and along the Central and South Coast Ranges from Solano to San Benito counties (USFWS, 1994). Often occur in low densities and rarely co-occur with other branchiopod species (Eng et al., 1990, Simovich et al., 1992). Designated critical habitat encompasses 35 units totaling 597,821 acres in Jackson County in Oregon, and Alameda, Amador, Butte, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, Napa, Placer, Sacramento, San Benito, San Joaquin, Alameda, Amador, Butte, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, Napa, Placer, Sacramento, San Benito, San Joaquin counties in California (71 FR 7118).	No suitable habitat present on site. No reported occurrences within 10 miles of the Study Area.	None

[1] Nine quad search query for the Las Trampas Ridge, Walnut Creek, Clayton, Diablo, Vine Hill, Honker Bay, Antioch North, Antioch South, and Tassajara USGS 7 ½ Minute Quads, and IPaC (USFWS 2024)

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Lepidurus packardi *Vernal pool tadpole shrimp*	Fed: FE State: None	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass-bottomed wales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	No suitable habitat present on site. No reported occurrences within 10 miles of the Study Area.	None
FISHES:				
Acipenser medirostris pop. 1 Green sturgeon Southern DPS	Fed: FT, CH CA: SSC AFS-V	The green sturgeon, southern DPS, is an anadromous fish that is found in marine waters from the Bering Sea to Ensenada, Mexico. The southern DPS includes all spawning populations south of the Eel River (exclusive), principally including the Sacramento River population; NMFS "Special Concern" designation refers to the northern DPS which includes spawning populations north of the Eel River (inclusive) (71 FR 17757). Locally, green sturgeon inhabit Suisun, San Pablo, and San Francisco bays, and coastal bays and estuaries from Monterey Bay north to Puget Sound. Spawning occurs in the Sacramento River between March and June; it may extend slightly longer, into July, in the Klamath River. Critical habitat includes coastal California waters from Monterey Bay, California, North to Cape Flattery, Washington; San Francisco Bay; Sacramento River and lower Feather River; Eastern reaches of the Sacramento-San Joaquin Delta; specified bays and estuaries in California, Oregon and Washington (74 FR 52300). Critical habitat does not include any freshwater tributaries feeding into these water bodies (74 FR 52300).	No suitable aquatic habitat on site.	None
Hypomesus transpacificus Delta smelt	Fed: FT CA: SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay. Seldom found at salinities >10 ppt. Most often at salinities < 2 ppt.	No suitable aquatic habitat on site.	None.
Oncorhynchus mykiss irideus pop.11 Steelhead – Central Valley DPS	Fed: FT CA: SSC	Populations in the Sacramento and San Joaquin Rivers and their tributaries.	No suitable aquatic habitat on site.	None
Spirinchus thaleichthys Longfin smelt	Fed: FC CA: ST, SSC	An anadromous fish that inhabits coastal bays, estuaries and waters near the coastline from Prince William Sound in Alaska to the Sacramento-San Joaquin Delta. Spawning occurs in freshwater streams from December – February. Federal Candidate status is for the San Francisco Bay-Delta DPS of the longfin smelt	No suitable aquatic habitat on site.	None
AMPHIBIANS:				
Ambystoma californiense pop. 1 California tiger salamander Central California DPS	Fed: FT, CH CA: ST, WL	A large terrestrial salamander that inhabits seasonal/semi-permanent water sources (3-4 months in duration) and adjacent upland habitat with small fossorial mammal activity in lowland grasslands, oak savannah and mixed woodlands. Range includes the Central Valley and Central Coast ranges from Colusa County south to San Luis Obispo and Kern counties from sea level to 3,460 feet (1,054 meters) in elevation with two disjunct populations within Sonoma County and Santa Barbara County. Species have been documented traveling distances up to 1 mile (1.6 km) (Austin and Shaffer, 1992). Designated critical habitat encompasses 199,109 acres in 20 counties and is grouped into 4 regions: Central Valley, Southern San Joaquin, East Bay and	No suitable aquatic habitat on site. No reported occurrences within three miles of the Study Area. Three ponds with potential aquatic habitat are less than one mile from the Study Area (0.3 and 0.9 mi to the east, and 0.7 mi to the southeast).	Not expected

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
		Central Coast (70 FR 49380). The East Bay Region includes Alameda County, south to Santa Benito and Santa Clara counties, and west to the eastern portions of San Joaquin and Merced counties (70 FR 49380). Primary constituent elements include: (1) standing bodies of fresh water that support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall; (2) upland habitats adjacent and accessible to breeding ponds that contain small mammal burrows or other underground habitat; and (3) accessible upland dispersal habitat between occupied locations that allow for movement between such sites (70 FR 49380).		
Rana boylii pop. 4 Foothill yellow-legged frog Central Coast DPS	Fed: FPT CA: SE	The foothill yellow-legged frog ranges from the Cascade Mountains in Oregon south to the Transverse Ranges in Los Angeles County, and from the coast to western Sierra Nevada foothills (Stebbins and McGinnis 2012, CDFG 2010). It inhabits small to moderately-sized, perennial streams with characterized by cobble-rocky substrate and shallow, flowing water in valley-foothill riparian, hardwood-conifer, mixed conifer, coastal scrub, mixed chaparral and wet meadow communities (Hayes and Jennings 1988, Jennings 1988). Larvae feed on algae, while adults feed primarily on terrestrial and aquatic insects (Fitch 1938). Reproduction occurs between March and June, and requires 15 weeks to reach metamorphosis typically between July and September (Storer 1925, Jennings 1988).	No suitable aquatic habitat on site. Walker Creek flows seasonally, drying in the summer. No reported occurrences within three miles of the Study Area.	None
Rana draytonii California red-legged frog	Fed: FT, CH CA: SSC	A medium-sized frog that inhabits lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation up to 4,921 feet (1,500 meters) in elevation (Jennings and Hayes 1994, Bulger et al. 2003, Stebbins and McGinnis 2012). Range extends from Redding to Baja California, Mexico with hybridization occurring with the California red-legged frog from the Oregon border to Marin County. Breeding occurs between November and April in standing or slow moving water with emergent vegetation, such as cattails (Typha spp.), tules (Scirpus spp.) or overhanging willows (Salix spp.) (Hayes and Jennings 1988). Larvae undergo metamorphosis 3 ½ to 7 months following hatching (Jennings and Hayes 1984, 1994). Designated critical habitat encompasses 1,636,609 acres in 20 counties and is grouped into 4 regions: Central Valley, Southern San Joaquin, East Bay and Central Coast (75 FR 12816).	No suitable aquatic breeding is present in the Study Area. Three records are documented within ~1.9 miles to the south and east of the Study Area, with an additional five records within three miles of the Study Area. Low density residential development and roadways between breeding ponds in the area and the Study Area, as well as the absence of suitable aquatic breeding habitat make it unlikely that red-legged frogs would be found on site. No red-legged frogs were observed during focused surveys conducted in the Study Area and at the Pine Creek Detention Basin in 2009.	Not expected.

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
REPTILES:				
Thanmophis gigas Giant garter snake	Fed: FT CA: ST	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. This is the most aquatic of the gartersnakes in California.	No suitable aquatic habitat is present in the Study Area. No reported occurrences within 10 miles of the site.	None.
Masticophis lateralis euryxanthus Alameda whipsnake	Fed: FT, CH CA: ST	The Alameda whipsnake is a subspecies of the California whipsnake, Masticophis lateralis, which inhabits the foothills and mixed deciduous and pine forests of the Sierra Nevada and Coast Range mountains from Siskiyou County in northern California to the flatland desert in Cañon de Los Reyes in southern Baja California (Stebbins, 2003). The Alameda whipsnake inhabits the inner Coast Ranges in western and central Contra Costa and Alameda counties (Jennings, 1983; McGinnis, 1992; Swaim, 1994). Habitat fragmentation has restricted its range into five recognized subpopulations: Tilden-Briones population, Oakland-Las Trampas population, Hayward-Pleasanton Ridge population, Mount Diablo-Black Hills population, and Sunol-Cedar Mountain population. Designated critical habitat encompasses 154,834 acres in Alameda, Contra Costa and Santa Clara counties (71 FR 58176). Primary constituent elements include: (1) scrub/shrub communities with a mosaic of open and closed canopy; (2) woodland or annual grassland plant communities contiguous to lands containing PCE 1; and (3) lands containing rock outcrops, talus, and small mammal burrows within or adjacent to PCE 1 and or PCE 2 (71 FR 58176).	No rock outcroppings, scrub/chaparral habitat is present in Study Area and wooded corridor along Walker Creek is too narrow, sparse and isolated to support a population of Alameda whipsnakes. Numerous occurrences have been reported within three miles of the study area (CDFW 2024) in Mt. Diablo State Park and Lime Ridge Regional Park. The nearest occurrence is roughly 1.3 miles to the NE miles of the Study Area.	Not expected
BIRDS:				
Agelaius tricolor Tricolored blackbird (nesting)	Fed: None CA: ST, SSC USFWS: BCC	Highly colonial species, most numerous in central valley & vicinity. Largely endemic to California. Nest in emergent vegetation within aquatic and riparian habitats. Breeds from mid-March through early August; double-brooded (Baicich & Harrison, 2005; Shuford and Gardali, 2008).	No suitable nesting habitat in the Study Area.	None
Aquila chrysaetos Golden eagle (nesting & wintering)	Fed: None CA: WL, FP USFWS: BCC	A large diurnal raptor that nests on cliffs and in large trees in open areas. Forages in open terrain including grasslands, deserts, savannahs and early successional stages of forest and shrub habitats (Kochert et al., 2002). A year-round resident in the greater Bay Area. Breeding begins in February to late May; single-brooded (Baicich & Harrison, 2005)	Suitable foraging habitat present in the grassland; however, no tall, large trees typical of nest selection are present in the Study Area. Suitable foraging habitat throughout grasslands.	Not expected
Buteo swainsoni Swainson's hawk	Fed: None CA: ST	A gregarious summer resident that inhabits open grasslands, shrublands, woodlands, and agricultural areas throughout the Central Valley and the valleys of the Sierra Nevada in Inyo and Mono counties (England et al. 1997). Nests are built in a variety of trees and shrubs; breeding occurs from March to August and are single brooded (Baicich & Harrison 2005).	Site is west of the species nesting range. One non-specific nesting record at Mt. Diablo summit from 1898; no other nests recorded within five miles of the Study Area.	None

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Charadrius alexandrinus nivosus Western snowy plover (nesting)	Fed: FT, CH CA: SSC NABCI:RWL	Inhabits beaches, mud flats, estuaries, salt evaporation ponds and inland river channels with banks for foraging. Breeds on sandy beaches, dunes, levees, river banks and dry salt evaporation beds along the California coastline typically in areas with minimal human disturbance. San Francisco Bay is within USFWS Recovery Unit 3 (USFWS, 2007). Breeding begins in March; double-brooded (Baicich & Harrison, 2005). Federal listing applies only to the Pacific coastal population that nests within 50 miles of the Pacific Ocean on the mainland coast, peninsulas, offshore islands, bays, estuaries, or rivers of the U.S. and Baja, CA; "Species of Special Concern" designation refers to both the coastal & interior populations (USFWS, 2007). Critical habitat was revised on June 19, 2012 and encompasses 4 units and 6,077 acres in Washington, 9 units and 2,112 acres in Oregon, and 47 units and 16,337 acres in California. Counties in California with designated critical habitat include: Del Norte, Humboldt, Mendocino, Marin, Napa, Alameda, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange and San Diego Counties (77 FR 36728).	No suitable habitat present. Project is outside the species known range. The study area is not located within designated critical habitat.	None
Elanus leucurus White-tailed kite (nesting)	Fed: None CA: FP	Inhabits grasslands, agriculture fields, oak woodlands, savannah and riparian habitats in rural and urban areas. Feeds primarily on California voles. Year-round resident of Central and Coastal California. Breeding begins in February; sometimes double-brooded (Baicich & Harrison, 2005).	Suitable nesting habitat present among the mature trees and suitable foraging habitat throughout study area.	Possible
Haliaeetus leucocephalus Bald eagle	Fed: Delisted State: SE, FP	Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within one mile of water. Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	No suitable nesting habitat is present within the Study Area.	None
Laterallus jamaicensis coturniculus California black rail	Fed: None CA: ST, FP NABCI:RWL	Smallest of the rails; inhabits tidal marshes, freshwater wetlands and marshes. Wintering habitat similar to breeding habitat. A year-round resident of the San Francisco Bay Area. Breeding begins in March; sometimes double-brooded (Baicich & Harrison, 2005).	No suitable habitat present. Project is outside the species known range.	None
Rallus obsoletus obsoletus California Ridgway's rail (=California clapper rail)	Fed: FE CA: SE, FP NABCI:RWL	One of four subspecies from the obsoletus group, restricted to the San Francisco Bay Area. Inhabits coastal wetlands dominated by pickleweed (*Salicornia* spp.) and cordgrass (*Spartina* spp.). Wintering habitat similar to breeding habitat. Breeding begins in March; single-brooded (Baicich & Harrison, 2005).	No suitable habitat present. Project is outside the species known range.	None
Sternula antillarum browni California least tern (nesting colony)	Fed: FE CA: SE, FP NABCI:RWL	Breeds in colonies on bare soil, sand and mudflats along the California coast and the San Francisco Bay Area. Winters south to Mexico. Breeding begins in May; single-brooded (Baicich & Harrison, 2005).	No suitable habitat present. Project is outside the species known range.	None

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
MAMMALS:				
Reithrodontomys raviventris Salt-marsh harvest mouse	Fed: FE CA: SE, FP	A small endemic, pickleweed (*Salicornia* spp.) obligate species of tidal marshes of the San Francisco Bay Area. Requires adjacent upland tidal zones for escape cover during floods. Two recognized subspecies, *R. r. halicoetes* that inhabits San Pablo and Suisun bays and *R. r. raviventris* that inhabits the South San Francisco Bay including Corte Madera and Richmond marshes.	No suitable habitat present. Project is outside the species known range.	None
Vulpes macrotis mutica San Joaquin kit fox	Fed: FE CA: ST	The smallest North American canid, the kit fox inhabits valley bottom and foothills from southern Kern County north to Contra Costa, Alameda, and San Joaquin Counties on the west, and near La Grange, Stanislaus County on the east side of the Central Valley and some of the larger scattered islands of natural land on the Valley floor in Kern, Tulare, Kings, Fresno, Madera, and Merced Counties (USFWS 1998). Species occupies habitats with open or low vegetation with loose soils. In the northern portion of their range, they occupy grazed grasslands and to a lesser extent valley oak woodlands (USFWS 1998). Kit fox are also found in grazed grasslands including areas adjacent to tilled or fallow fields, and suburban settings (USFWS 1998). Requires loose-textured sandy soils for burrowing, and a suitable prey base.	No suitable habitat present.	None
SENSITIVE AND LOCALLY RARE SPECIES				
INVERTEBRATES:				
Bombus caliginosus Obscure bumble bee	Fed: None CA: SA	The obscure bumble bee is known to occur in coastal areas, utilizing *Baccharis*, *Cirsium*, *Lupinus*, *Lotus*, *Grindelia* and *Phacelia* spp. Recorded from Alameda, Contra Costa, Del Norte, Humboldt, Marin, Mendocino, Monterey, San Luis Obispo, San Mateo, Santa Barbara and Sonoma counties.	Suitable habitat is present among the host plants, *Lupinus* spp., *Baccharis* and *Cirsium*. No reported occurrences within 3 miles of the Study Area.	Possible
Helminthoglypta nickliniana bridgesi Bridges' coast range shoulderband (snail)	Fed: None CA: SA	Inhabits rock piles, thistles and weedy grasslands on open hillsides. Recorded in Alameda and Contra Costa counties, on the west slope of Berkeley Hills, Marsh Creek Canyon, Marsh Creek Springs, Tilden Park and Point Isabel (Roth, 1999).	Suitable habitat is present among the grasslands. No reported occurrences within 3 miles of the Study Area.	Possible
Linderiella occidentalis California linderiella	Fed: None CA: SA	An aquatic crustacean in the Anostroca family, smaller than the vernal pool fairy shrimp with distinctive red eyes. Inhabits small, clear-water vernal pools and lakes, earth slumps, grassed swales and basal-flow depression pools. Fairly tolerant of high water temperatures and turbidity. Most common fairy shrimp in the Central Valley.	No suitable habitat present on site. No reported occurrences within 10 miles of the Study Area.	None
FISHES:				
Archoplites interruptus Sacramento perch	Fed: None CA: SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	No suitable aquatic habitat on site.	None

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Pogonichthys macrolepidotus Sacramento splittail	Fed: None CA: SSC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay and associated marshes. Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning and foraging for young.	No suitable aquatic habitat on site.	None.
AMPHIBIANS: NONE				
REPTILES:				
Anniella pulchra Northern California legless lizard	Fed: None CA: SSC	Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential. They prefer soils with high moisture content.	No suitable habitat present; sandy or loose loamy soils are not present in the Study Area.	None
Arizona elegans occidentalis California glossy snake	Fed: None CA: SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transvers, and Peninsular Ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	Suitable habitat present in the grassland habitat although loose and sandy soils are absent from the Study Area.	Not expected.
Emys marmorata Western pond turtle	Fed: FPT CA: SSC	A moderate sized freshwater turtle that inhabits permanent or nearly permanent bodies of water and low gradient slow moving streams below 6,000 feet elevation. Needs basking sites and sandy banks or grassy open fields in upland areas for egg-laying. Range extends from Washington to the northern Bay Area counties along the Pacific slope drainages.	No suitable aquatic habitat is present in Walker Creek. Nearby ponds to the east and southeast may provide suitable aquatic habitat. Suitable upland habitat is present in the Study Area.	Not expected.
Phrynosoma blainvillii Coast horned lizard	Fed: None CA: SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial and abundant supply of ants and other insects.	No suitable habitat (friable soils, lack of native any colonies) is present in the Study Area.	None
BIRDS				
Accipiter cooperii Cooper's hawk (nesting)	Fed: None CA: WL	Inhabits dense stands of oak woodlands, riparian deciduous forests, or other forest habitats often near water & suburban areas. Hunts in broken woodlands & along forest edges. Breeding begins in April; single-brooded (Baicich & Harrison, 2005).	Suitable nesting habitat present among mature trees on site.	Possible
Accipiter striatus Sharp-shinned hawk (nesting)	Fed: None CA: WL	Inhabits north-facing slopes in conifers, including ponderosa pine, black oak, & Jeffrey pines, preferably in riparian areas. Forages primarily for small birds along woodland edges & openings, hedgerows, brushy pastures, & shorelines. Breeding begins in April; single-brooded (Baicich & Harrison, 2005).	Suitable nesting habitat present among mature trees on site.	Possible
Asio flammeus Short-eared owl	Fed: None CA: SSC USFWS: BCC	Found in swamp lands, both fresh and salt; lowland meadows, irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.	Suitable nesting habitat is not present in the Study Area.	None.
Athene cunicularia Burrowing owl (burrow sites & some wintering sites)	Fed: None CA: SSC USFWS: BCC	Valley bottoms and foothills with low vegetation and fossorial mammal activity. Listing includes wintering observations with/without a burrow in San Francisco, Ventura, Sonoma, Marin, Napa and Santa Cruz counties. Breeding begins in March; single-brooded (Baicich & Harrison, 2005).	Suitable burrow habitat present in small ground squirrel colony north of main house. Tall grass height in annual grassland however is unsuitable for owl	Not expected

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
			occupancy due to hampered visibility for predator avoidance.	
Baeolophus inornatus Oak titmouse	Fed: None CA: None USFWS: BCC	Breeds and winters in warm, dry oak or oak-pine woodlands from northern Mexico, throughout California, and into southwest Oregon (Birds of the World 2024).	Coast live oak woodland provides suitable foraging habitat and cavities in mature trees provides nesting habitat. Oak titmouse were observed during 3/25/24 site visit.	Present
Buteo regalis Ferruginous hawk	Fed: None CA: WL	Breeds in the northern states and Canada; winters south from California and Texas to Mexico. Wintering habitat consists of open grasslands, deserts and cultivated fields. Breeding begins in April; single-brooded (Baicich & Harrison 2005).	Suitable wintering habitat throughout the study area. Species does not breed in the region.	Possible
Chamaea fasciata Wrentit	Fed: None CA: None USFWS: BCC	Year-round from sea level to near 2,300 m in cismontane scrub (Garrett and Dunn 1981, Gaines 1988). Highest density occurs in coastal sage scrub, northern coastal scrub, coastal hard and montane chaparral. Distribution is limited to the west coast of North America from Baja California, central and coastal California, north to the Columbia River.	Suitable scrub habitat is limited to a few coyote bush shrubs northeast of the existing residence.	Not expected.
Circus hudsonius Northern harrier	Fed: None CA: SSC, USFWS: BCC	Inhabits both freshwater and saltwater marshes and adjacent upland grasslands. Nests on the ground in tall grasses in grasslands and meadows. Breeding begins in March; single-brooded (Baicich & Harrison, 2005).	Suitable foraging habitat is present in the Study Area. Disking limits suitability of grassland for nesting.	Possible
Contopus cooperi Olive-sided flycatcher	Fed: None CA: None USFWS: BCC	Breeds primarily in montane and northern coniferous forests from near sea level to mid-to high-elevation forest. Uses greater diversity of habitats during migration. Wintering habitat similar to that on breeding grounds; forest edges and forest openings (AOU 1983).	No suitable breeding habitat is present.	None
Coturnicops noveboracensis Yellow rail	Fed: None CA: SSC USFWS: BCC NABCI:RWL	The smallest rail in North America. Primarily distributed across central/eastern Canada and the central states, wintering along the southern and southeastern coastlines from Texas to North Carolina. A disjunct population overwinters along the California coast from Humboldt County to Riverside County and eastward to Mono County (Leston and Bookhout, 2015). In the San Francisco Bay it inhabits primarily tidal and freshwater marshes. Prefers drier vegetation such as cordgrass *Spartina* spp. and *Distichlis* spp. in coastal marshes.	No suitable habitat present.	None
Dryobates nuttallii Nuttall's woodpecker	Fed: None CA: None USFWS: BCC	Primarily found in oak woodlands and riparian woodlands; rarely in conifer forests. Resident from northern California southward to northwestern Baja California, generally west of deserts and Sierra divide.	Suitable habitat is present in the oak woodland and planted woodland in the Study Area.	Possible.
Eremophila alpestris actia California horned lark	Fed: None CA: WL	Common, abundant resident in a variety of open habitats, usually where large trees and shrubs are absent, ranging from low-elevation grasslands and deserts to dwarf shrub habitats above tree line. Found throughout much of the state. Less common in mountainous areas of the north coast and in conifer and chaparral habitats. Breeding begins in late-February; double to treble-brooded (Baicich & Harrison 2005).	Marginal foraging and nesting habitat present in the grassland although tall grass height is a constraint.	Not expected

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Falco mexicanus Prairie falcon	Fed: None CA: WL	Nests on cliffs & at times in old raven or eagle stick nests on cliff, bluff, or rock outcrop. Inhabits perennial grasslands, savannahs, rangeland, some agricultural fields, & desert scrub communities. Breeding begins in April; single-brooded (Baicich & Harrison 2005).	No suitable nesting habitat is present in the Study Area. Suitable foraging habitat present and nesting has been documented to the southeast in Mt. Diablo State Park.	None (nesting)
Geothlypis trichas sinuosa Saltmarsh common yellowthroat	Fed: None CA: SSC USFWS: BCC	Year-round resident of the San Francisco Bay Area. Inhabits dense vegetation in wetlands, marshes, estuaries, prairies and riparian areas of San Francisco and San Pablo bays, and along the coastal areas of Marin, San Francisco, and San Mateo counties (Shuford and Gardali, 2008). Breeds from mid-March to late July; double-brooded (Baicich & Harrison, 2005; Shuford and Gardali, 2008).	No suitable nesting habitat present.	None
Icterus bullock Bullock's oriole	Fed: None CA: None USFWS: BCC	Breeds in riparian and oak woodlands in California. Especially where trees are large and well spaced or in isolated clumps. Sycamores, cottonwoods, willows and deciduous oaks seem favored for nesting, but nesting also observed in live oaks, orchard trees and conifers. Breeds throughout western U.S. into eastern Britich Columbia, wintering in western mainland, central and southern Mexico.	Marginal habitat is present in the oak woodlands, but wooded cover is more dense than typical habitat.	Not expected
Larus californicus California gull	Fed: None CA: None USFWS: BCC	Open habitats in Great Basin, northern intermountain region and northern Great Plains. Breeding colonies nearly always on islands on natural lakes or rivers. Nonbreeding range is similar, except marine habitats used along west coast. Distributed throughout western U.S., British Columbia to the Northwest Territories in Canada, Baja and western mainland Mexico.	No suitable habitat present.	None
Larus occidentalis Western gull	Fed: None CA: None USFWS: BCC	Nests predominantly on islands including offshore islands, rocky islets, abandoned piers, channel markers and dikes separating ponds in commercial salt flats. Outside of breeding season, birds associated with foraging habitats along and offshore the Pacific Coast.	No suitable habitat present.	None
Megascops kennicottii cardonensis Western screech owl	Fed: None CA: None USFWS: BCC	Use a wide variety of habitats, but most associated with riparian habitats and deciduous trees over much of its range. Restricted to western North America.	Suitable habitat is present in the oak woodland.	Possible.
Melospiza melodia maxillaris Suisun song sparrow	Fed: None CA: SSC	Resident of brackish water marshes surrounding Suisun Bay. Inhabits cattails, tules and other sedges, and *Salicornia*; also known to frequent tangles. Bordering sloughs.	No suitable habitat is present in the Study Area. Project is outside the species known range.	None
Melospiza melodia pop. 1 Song sparrow (Modesto pop.)	Fed: None CA: SSC	A medium-sized sparrow that inhabits marshes cord grass (*Spartina* spp.), pickleweed (*Salicornia virginica*), gumplant (*Grindelia stricta*), rushes (*Juncus* spp.); also known to frequent tangles bordering sloughs. One of four subspecies in the San Francisco Bay Area. Endemic to the southern San Francisco Bay tidal marshlands. Species prefers a balanced mix of tidally-influenced vegetation with suitable height for cover and breeding, and bare ground for foraging. Species rarely strays from areas of suitable tidal marsh habitat. Breeding begins in April; often triple-brooded (Baicich & Harrison, 2005).	No suitable nesting habitat present. Project is outside the species known range.	None

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Nannopterum auritum Double-crested cormorant	Fed: None CA: WL	Occurs on ponds, lakes, artificial impoundments, slow-moving rivers, lagoons, estuaries, and open coastlines. Widely distributed in North America but not beyond.	No suitable habitat is present in the Study Area.	None
Passerculus sandwichensis Belding's savannah sparrow	Fed: None CA: None USFWS: BCC	Rare subspecies of the savannah sparrow, common on the marshes of San Diego Bay and Tijuana Slough National Wildife Refuge.	No suitable habitat is present. Sub-species is outside Project is outside the sub-species known range. Individuals of local race observed on 3/25/24.	None
Selasphorus sasin Allen's hummingbird	Fed: None CA: None USFWS: BCC	Breeds in moist narrow coastal belt affected by summer fog along Oregon and California coast. Winters in forest edge, scrub clearings with flowers (Howell and Webb 1995).	No suitable nesting nesting habitat. Project is outside the breeding range. Could occur during migration.	None
Spinus lawrencei Lawrence's goldfinch	Fed: None CA: None USFWS: BCC	Typically occupies arid and open woodlands near chaparral, tall annual weed fields and a water source. Live oaks and blue oaks are predominantly used for nesting. Generally restricted to California west of the Sierra Nevada-Cascade axis, with nonbreeding distribution into northern Baja California, southern Arizona and southeastern New Mexico.	Marginal habitat is present.	Not expected
Toxostoma redivivum California thrasher	Fed: None CA: None USFWS: BCC	Core habitat is chaparral in coastal ranges and interior foothills. Endemic to California Biotic Province	No suitable habitat is present in the Study Area.	None
Tringa semipalmata Willet	Fed: None CA: None USFWS: BCC	Western population breeds in short, sparse wetland cover in prairies and asemiarid plains near bodies of water, shallow wetlands. During non-breeding season, found in diverse California coastal types including mudflats, marsh, sandy beach and rocky coast (Mendenhall 1970).	Non suitable habitat is present in the Study Area.	None.
MAMMALS:				
Antrozous pallidus Pallid bat	Fed: None CA: SSC WBWG-H	Inhabits rocky terrain in open areas in lowlands, foothills and mountainous areas near water throughout California below 2,000 meters. Roost alone or in small numbers (<200) in caves, rock crevices, mines, hollow trees (e.g. coast redwoods, giant sequoias, oaks, exfoliating Ponderosa pine and valley oak bark, and fruit trees), buildings and bridges in arid regions. Pallid bats are opportunistic generalists that eat a variety of insects, small lizards and rodents.	Suitable roosting habitat is present in the larger trees in the Study Area, and suitable foraging habitat throughout entire site. Non-specific historic record (1917) from Pine Canyon is approximately 0.5 mile to the south of Study Area	Possible
Corynorhinus townsendii Townsend's big-eared bat	Fed: None CA: SSC WBWG-H	Inhabits caves and mines, but may also infrequently use bridges, buildings, rock crevices and hollows of large trees in coniferous forests, mixed mesophytic forests, deserts, native prairies, riparian communities, coastal lowlands, cultivated valleys and nearby hills characterized by mixed vegetation throughout California below 3,300 meters (10,825 feet). Exhibits high site fidelity and is highly sensitive to disturbance. As a moth specialist, this species forages along edge habitats near water; may travel long distances during foraging bouts.	Marginal roosting habitat is present in the larger trees in the Study Area, and suitable foraging habitat throughout entire site. Non-specific historic record (1926) is approximately 2 miles southeast of Study Area	Possible

SPECIES NAME COMMON NAME	LISTING STATUS*	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
Lasiurus cinereus Hoary bat	Fed: None CA: SA WBWG-M	Ubiquitous throughout California. A solitary foliage rooster that prefers evergreens, but will use deciduous trees in forested habitats, particularly in edge habitat (Bolster, 2005a). May forage in small to large groups. Feeds primarily on moths, but will eat a variety of other insects. Migrates great distances.	Suitable roosting habitat is present among mature trees in the woodlands along edge habitat. No records within 3 miles of Study Area.	Possible
Lasiurus blossevillii Western red bat	Fed: None CA: SSC, WBWG-H	Primarily riparian habitat with widespread distribution extending from British Columbia to Argentina (Bolster 2005). Roosts typically in dense clumps of tree foliage in riparian areas.	Suitable habitat is present in the oak woodland of the Study Area. No records within 3 miles of Study Area.	Possible
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	Fed: None CA: SSC	One of eleven recognized subspecies. Inhabits oak and riparian woodlands with a well-developed understory in the San Francisco Bay Area. They exhibit high site fidelity and may live in the same nest community for generations. Nest structures are key indicator of their presence and are easily identified by their conical appearance.	Suitable habitat present among the oak woodlands. No nest middens observed on site during reconnaissance-level survey. No records within 3 miles of Study Area.	Not expected
Nyctinomops macrotis Big free-tailed bat	Fed: None CA: SSC	Low-lying arid areas in southern California. Needs high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	No suitable habitat present in the Study Area.	None
Perognathus inornatus inornatus San Joaquin pocket mouse	Fed: None CA: SA	Endemic to California. Inhabits friable soils in the foothills and valley bottoms of the Central Valley from the Marysville Buttes to the Carrizo Plain. Eats insects and seeds of various grasses, forbs and shrub including Artemisia and Atriplex spp., has fur-lined cheek pouches, and experiences daily torpor. Breeding occurs from March to July; two litters are typical (Jameson and Peeters 2004).	No suitable habitat present. Project is outside the species known range.	None
Taxidea taxus American badger	Fed: None CA: SSC	A large mustelid that inhabits open areas with friable soils within woodland, grassland, savannah and desert habitats. A fossorial mammal that preys predominately on ground squirrels (*Ammospermophilus* and *Spermophilus* spp.) and pocket gophers (*Thomomys* spp.). Mating occurs in late summer; young are born in March and April (Jameson and Peeters, 2004).	Marginal habitat present. Paucity of small mammal burrows observed throughout site). No badger burrows observed during 3/25/24 site visit.	Not expected

* **Explanation of State and Federal Listing Codes**

Federal listing codes:

- FC Federal Candidate Species
- FE Federally listed as Endangered
- FT Federally listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FPD Federally proposed for delisting
- FC Federal candidate species (former Category 1 candidates)
- SC Species of Concern (NMFS regulated species only)
- CH Critical Habitat (Proposed or Final) is designated
- SSC Species of Special Concern designated by the Marine Mammal Commission

California listing codes:

- SE State listed as Endangered
- ST State listed as Threatened
- SCE State candidate for listing as Endangered
- SCT State candidate for listing as Threatened
- SCD State candidate for delisting
- SSC California Species of Special Concern
- FP Fully Protected
- WL Watch List

AFS American Fisheries Society identifies marine, estuarine and diadromous fish species that are at risk of extinction in North America. The AFS has designated the following four classifications in order of conservation importance EN – Endangered, TH – Threatened, VU – Vulnerable, and CD – Conservation Dependent.

BCC U.S. Fish and Wildlife Service Birds of Conservation Concern. List of migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service's highest conservation priorities.

NABCI North American Bird Conservation Initiative: The North American Bird Conservation Initiative is a coalition of government agencies and private organizations that works to ensure the long-term health North America's native bird populations. They publish an annual State of the Birds report which includes a watch list of bird species in need of conservation help. Species on the list are assigned to either the RWL - Red Watch List for species with extremely high vulnerability, or YWL - Yellow Watch List for species that may be range restricted or may be more widespread but with declines and high threats. More information is available at: http://stateofthebirds.org.

SA "Special Animals" is a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species". The Department of Fish and Game considers the taxa on this list to be those of greatest conservation need.

WBWG The Western Bat Working Group. H – High Priority indicates species that are imperiled or are at high risk of imperilment based on available information on distribution, status, ecology and known threats; M – Medium Priority indicates a lack of information to assess the species' status; L – Low Priority indicates relatively stable populations based on available data.

Entry driveway looking west. Vacant house in center, with occupied residence in the background on the right. The southern property line follows the fence on the left (3/25/24)

Non-native grassland, view to the west. Fence on the left is the southern property line. (3/25/24)

View to the north with western property line on the left side of photo. Coast live oak woodland along Walker Creek in the Study Area is in the background. (3/25/24)

View to the east with residence in the background. Developed/ruderal vegetation surrounds the residence (3/25/24)

View of Walker Creek in the Study Area, Creek is deeply incised and top of bank is well-defined. Surface flow was present on 3/25/24.

View to the north with coast live oak woodland along Walker Creek in the background and neighboring residence on the upper right. (3/25/24)

Non-native grassland east of residence and off-site barn. View is to the east. (3/25/24)

Developed/ruderal vegetation surrounds the residence, which is in the upper left of photo. (3/25/24)

Project No.
12014.001.001

July 24, 2024

Mr. Andy Byde
Calibr Ventures, LLC
115 Jennifer Lane
Alamo, CA 94507

Subject: 1125 North Gate Road
Walnut Creek, California

GEOTECHNICAL RECOMMENDATIONS UPDATE

References:
1. ENGEO. 2015. Geotechnical Report Update, 1125 North Gate, Walnut Creek, California. October 20, 2015; Revised November 11, 2015. Project No. 12014.000.000.
2. dk Engineering. 2024. Vesting Tentative Map, Preliminary Grading and Utility Plan, 1125 North Gate Road, Contra Costa County, California. July 3, 2024. Project No. 23-1064-10. Sheet 4 of 10.

Dear Mr. Byde:

At your request, we prepared this geotechnical recommendations update for the subject site in Walnut Creek, California. The purpose of this geotechnical recommendations update is to confirm that the referenced geotechnical report update (Reference 1) is still valid for the current proposed development, to provide seismic design parameters per the 2022 California Building Code, and provide updated geotechnical foundation design criteria based on laboratory testing from a surface soil sample collected at the site. For our use, we reviewed existing ENGEO geotechnical documents.

PROJECT DESCRIPTION

Based on our discussion and review of the site plan provided (Reference 2), we understand that the following site improvements are proposed.

1. Grading for building pads, bioretention basins, and roadways. Earthwork cut and fill up to approximately 20 feet and 18 feet, respectively.
2. Nineteen single-family, wood-framed residential structures.
3. Paved access road and adjoining driveways.
4. Utilities and other infrastructure improvements.
5. Retaining walls up to approximately 5 feet in exposed height.
6. Detention basins and underground storm water storage vaults.
7. Landscaping.

PREVIOUS GEOTECHNICAL EXPLORATION

We previously completed a geotechnical report update for the subject site in 2015 (Reference 1). This report was prepared for the development of a single-family residential subdivision. The report update included geotechnical borings and laboratory testing performed by Jensen-Van Lienden Associates, Inc. (2006). Our geotechnical report update (Reference 1) concluded that the site is suitable for residential development, provided that the geotechnical recommendations presented in the report are properly incorporated into the design plans and specifications for the project. The primary geotechnical concerns stated in the report that could affect development on the site are expansive soil, differential fill thicknesses, seismic hazards, and rock excavatability.

SITE RECONNAISSANCE AND SUPPLEMENTAL SAMPLING AND TESTING

On July 10, 2024, our geologist performed a field reconnaissance of the site. Based on the observations during field reconnaissance, the site conditions appear relatively unchanged since 2015. During the site visit, we collected a near-surface soil sample from the site, as reported in the attached laboratory testing data. The sample was transported to our laboratory and tested for determination of sulfate in soil, Atterberg limit, and gradation for updating the foundation design criteria. The test results indicate that the site soil has a moderate to very high expansive potential with a plasticity index (PI) of 35. Individual test results are attached.

2022 CBC SEISMIC DESIGN CRITERIA

The 2022 California Building Code (CBC) utilizes seismic design criteria established in the ASCE/SEI Standard “Minimum Design Loads and Associated Criteria for Buildings and Other Structures,” (ASCE 7-16). Based on the subsurface conditions at the site, we characterized the site as Site Class C. We provide the following seismic design parameters provided in Table 1, which includes design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration parameters.

TABLE 1: 2022 CBC Seismic Design Parameters (Latitude: 37.905722 Longitude: -121.997775)

PARAMETER	VALUE
Site Class	C
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	2.43
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	0.749
Site Coefficient, F_a	1.2
Site Coefficient, F_v	1.4
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	2.916
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	1.049
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.944
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	0.699
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.985
Site Coefficient, F_{PGA}	1.2
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	1.182
Long period transition-period, T_L (sec)	8

* ASCE 7-16 Section 11.4.8

We recommend that we collaborate with the structural Engineer-of-Record to further evaluate the effects of taking the exceptions on the structural design and evaluate the need for performing a site-specific seismic-hazard analysis. We can provide a scope for site-specific seismic-hazard analysis and groundmotion study under separate cover, if needed.

FOUNDATION RECOMMENDATIONS

Post-tensioned (PT) mat foundations are appropriate for the proposed single-family residential structures. The following recommendations are based on our review of the referenced documents and the recent results of the laboratory testing performed at the subject site.

We recommend that post-tensioned mats be 10 inches thick or greater and have a thickened edge at least 2 inches greater than the mat thickness. The structural engineer should determine the actual post-tensioned mat thickness using the geotechnical recommendations in this letter report; we defer to the professional judgment of the structural engineer on the necessary mat thickness. We should be retained to review the post-tensioned mat foundation design. We recommend that the thickened edge be at least 12 inches wide.

The post-tensioned mat soil design parameters presented in Table 2 were developed according to methods recommended in “Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soil and Stable Soils” (PTI DC10.5-19) by the Post-Tensioning Institute.

TABLE 2: Post-Tensioned Mat Design Parameters

CONDITION	CENTER LIFT	EDGE LIFT
Edge Moisture Variation Distance, e_m (feet)	7.9	4.1
Differential Soil Movement, y_m (inches)	1.2	1.8

The PT mats can be designed to impose an average allowable bearing pressure of 1,000 pounds per square foot (psf) for dead-plus-live loads, with maximum localized bearing pressure of 1,500 psf at column or wall loads. Allowable bearing pressures can be increased by one-third for short-term loads, including wind or seismic.

The PT mats should be underlain by a moisture reduction system, as recommended in Reference 1. In addition, the pads should be moisture conditioned to a moisture content of at least 4 percentage points above optimum prior to foundation construction and maintained until concrete placement.

Perimeter foundation embedment should achieve at least 10 horizontal feet to the nearest free slope face where graded slopes are greater than 3 feet in total height, and primarily for rear yard and side yard conditions. If 10 horizontal feet to slope face cannot be achieved, alternative structural solutions can be considered, such as a deepened perimeter edge.

SOIL CORROSION POTENTIAL

A soil sample was collected during our recent site visit and submitted to our laboratory for determination of sulfate concentration.

The 2022 CBC references the 2019 American Concrete Institute Manual, ACI 318-19, Section 19.3.1 for concrete durability requirements. ACI Table 19.3.1.1 provides the following exposure categories and classes, and Table 19.3.2.1 provides requirements for concrete in contact with soil based upon the exposure class.

TABLE 3: ACI Table 19.3.1.1: Sulfate Exposure Classes

CATEGORY	CONDITION	CLASS	WATER-SOLUBLE SULFATE IN SOIL % BY WEIGHT*
S Sulfate	Not Applicable	S0	$SO_4 < 0.10$
	Moderate	S1	$0.10 \leq SO_4 < 0.20$
	Severe	S2	$0.20 \leq SO_4 \leq 2.00$
	Very severe	S3	$SO_4 > 2.00$

* Percent sulfate by mass in soil determined by ASTM C1580

The test results indicate that sulfate in the tested soil sample is not detectable (ND). In accordance with the criteria presented in the above table, the soil tested can be categorized as 'Not Applicable' and is within the S0 sulfate exposure class. Considering a 'Not Applicable' sulfate exposure, there is no requirement for cement type or water-cement ratio; however, a minimum concrete compressive strength of 2,500 pounds per square inch (psi) is specified by the building code. For this sulfate range, we recommend Type II cement and a concrete mix design for foundations and building slabs-on-grade that incorporate a minimum concrete compressive strength of 3,000 psi and a maximum water-cement ratio of 0.50. It should be noted, however, that the structural engineering design requirements for concrete may result in more stringent concrete specifications.

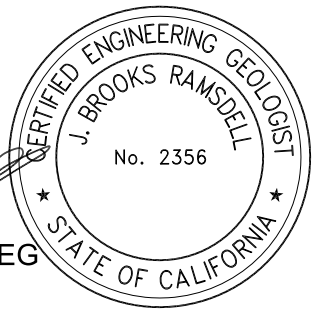
CLOSING

Based on our review of our geotechnical report update (Reference 1), and the current vesting tentative map (Reference 2), we conclude that the previous 2015 report update is still valid for the current proposed residential development at the site, provided that the supplemental recommendations contained herein are incorporated into the design and construction of the project. The design parameters provided herein supersede and supplement those provided in the referenced geotechnical report update (Reference 1).

If you have any questions or comments regarding this letter, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated



J. Brooks Ramsdell, CEG

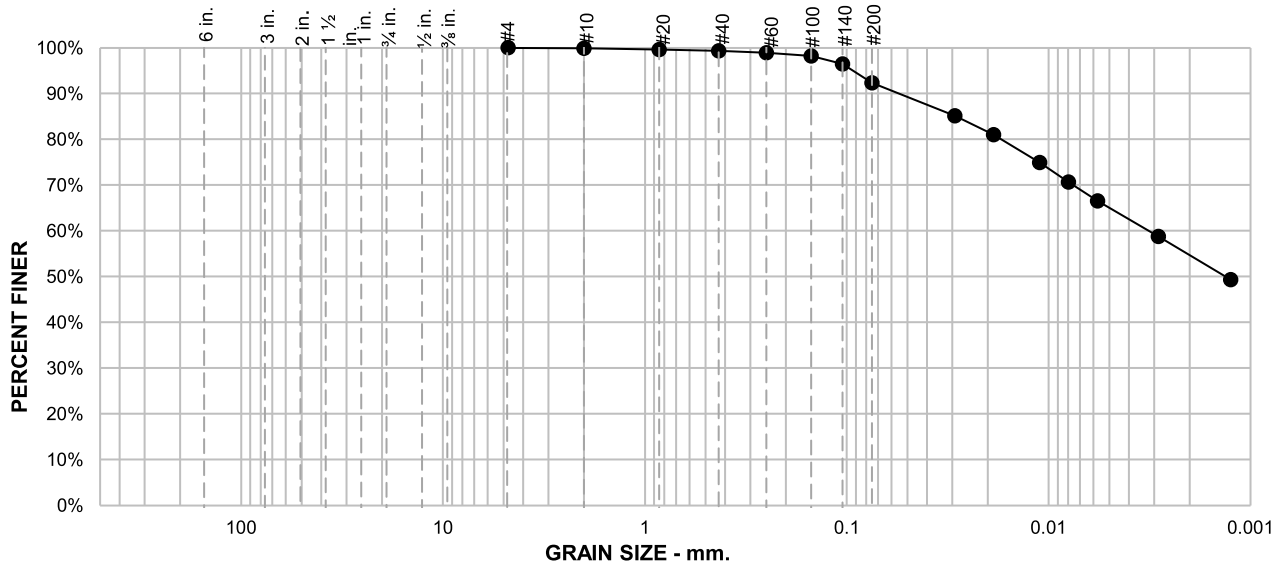
Macy Tong, GE

jbr/mt/cb

Attachments: Laboratory Test Results

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D422



SAMPLE ID: Near Lot 12 OG

DEPTH (ft): OG

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
			0.1	0.6	7.0	37.6	54.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.6		
#40	99.3		
#60	98.9		
#100	98.2		
#140	96.4		
#200	92.3		
0.0291 mm.	85.1		
0.0188 mm.	81.0		
0.0111 mm.	74.9		
0.0080 mm.	70.7		
0.0057 mm.	66.5		
0.0029 mm.	58.8		
0.0013 mm.	49.3		

SOIL DESCRIPTION

Very dark grayish brown fat CLAY

ATTERBERG LIMITS

PL = 17 LL = 52 PI = 35

COEFFICIENTS

D_{90} = 0.0555 mm D_{85} = 0.0288 mm D_{60} = 0.0032 mm

D_{50} = 0.0013 mm D_{30} = D_{15} =

D_{10} = C_u = C_c =

CLASSIFICATION

USCS = CH

REMARKS

Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Calibr Ventures

PROJECT NAME: 1125 Northgate Road

PROJECT NO: 12014.001.001 PH001

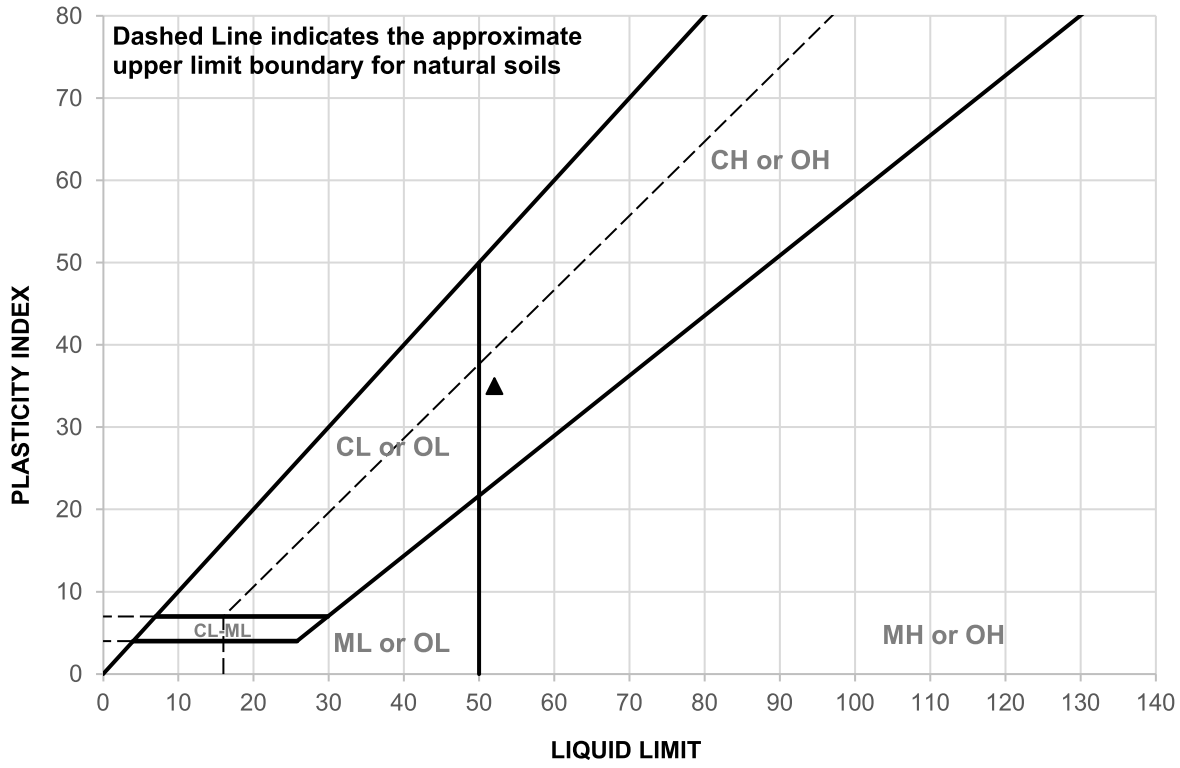
PROJECT LOCATION: Walnut Creek, CA

REPORT DATE: 7/17/2024

TESTED BY: G. Criste

REVIEWED BY: D. Seibold

LIQUID AND PLASTIC LIMITS TEST REPORT
ASTM D4318



	SAMPLE ID	DEPTH (ft)	MATERIAL DESCRIPTION	LL	PL	PI
▲	Near Lot 12 OG	OG	Very dark grayish brown fat CLAY	52	17	35

	SAMPLE ID	TEST METHOD	REMARKS
▲	Near Lot 12 OG	PI: ASTM D4318, Wet Method	

ENGEO
Expect Excellence

CLIENT: Calibr Ventures
PROJECT NAME: 1125 Northgate Road
PROJECT NO: 12014.001.001 PH001
PROJECT LOCATION: Wlanut Creek, CA
REPORT DATE: 7/17/2024
TESTED BY: G. Criste
REVIEWED BY: D. Seibold

WATER-SOLUBLE SULFATE IN SOIL

ASTM C1580

SAMPLE NO.	SAMPLE ID.	DEPTH (Ft.)	MATERIAL DESCRIPTION	SAMPLE LOCATION	WATER SOLUBLE SULFATE % BY MASS [1]
1	Baggie	OG	Very dark grayish brown fat CLAY	Near Lot 12 OG	ND

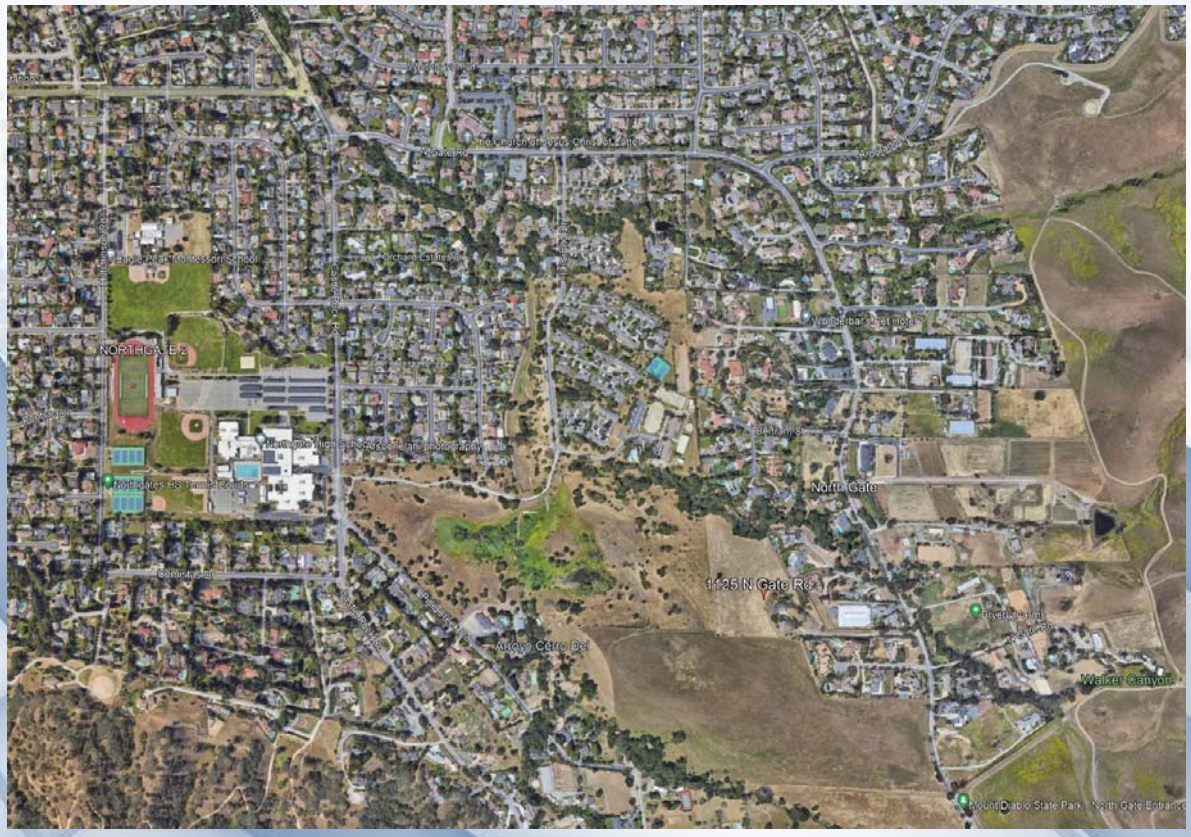
[1] Per the test method, results are reported to the nearest 0.01% by weight or 100 ppm. Results less than 0.01% or 50 ppm will be reported as ND (Not Detectable)

ENGEO
Expect Excellence

CLIENT: Calibr Ventures
PROJECT NAME: 1125 Northgate Road
PROJECT NO: 12014.001.001 PH001
PROJECT LOCATION: Walnut Creek, CA
REPORT DATE: 7/16/2024
TESTED BY: G. Criste
REVIEWED BY: D. Seibold

1125 North Gate Road
Stormwater Control Plan

Developer:
CALIBR VENTURES
Permit # xx-xxx
JULY 2024



Prepared for:
CONTRA COSTA COUNTY

ENGINEERING
SURVEYING • PLANNING
Designing forward.

1931 San Miguel Drive, Suite 100, Walnut Creek, California 94596 / (925) 932-6868
www.dkEngin.com

PRELIMINARY STORMWATER CONTROL PLAN

for

1125 North Gate Road

July 2024

Calibr Ventures
Andy Byde
(925) 683-5493

prepared by:

dk Engineering
1931 San Miguel Dr., Suite 100
(925) 932-6868

TABLE OF CONTENTS

Tables

Attachments

I. PROJECT DATA

Table 1. Project Data

Project Name/Number	1125 North Gate Road
Application Submittal Date	April 08, 2024
Project Location	Walnut Creek, CA 94598
Name of Developer	Calibr Ventures
Project Phase No.	NA
Project Type and Description	Residential with 19 single family homes
Project Watershed	Walnut Creek Watershed
Total Project Site Area (acres)	9.83 acres
Total Area of Land Disturbed (acres)	8.24 acres
Total New Impervious Surface Area (sq. ft.)	120,410 sf
Total Replaced Impervious Surface Area	7,450 sf
Total Pre-Project Impervious Surface Area	7,450 sf
Total Post-Project Impervious Surface Area	127,860 sf
50% Rule[*]	Applies
Project Density	Approximately 1.9 units/net acre
Applicable Special Project Categories [Complete even if all treatment is LID]	None.
Percent LID and non-LID treatment	100% LID
HM Compliance [†]	Applies

[*50% rule applies if:
Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area]

[†HM required (unless project meets one of the exemptions on *Guidebook* p. 9) if:
(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre]

II. SETTING

II.A. Project Location and Description

As shown on the Vicinity Map (Attachment A) the 1125 North Gate Road project is in unincorporated Contra Costa County, in the North Gate neighborhood of Walnut Creek, California on North Gate Road. The proposed site will be subdivided into 19 lots for single-family residential homes. 10 bioretention basins are proposed throughout the site for stormwater treatment. Refer to the Vicinity Map in Appendix A and the Site Plan in Appendix B for exact locations.

The site is designed to drain all improvements such as sidewalks, streets, and private lots into bioretention basins. The site will have an impervious surface area greater than 1 acre and will be subject to Hydromodification Compliance bioretention basin sizing; therefore, the basin is sized to reduce flows post runoff peak flows down to pre-development levels.

II.B. Existing Site Features and Conditions

The existing on-site improvements include two houses serviced by a long gravel driveway. The existing site drains towards the north at a +/-10% gradient. An existing creek runs roughly along the northern property line and collects stormwater runoff from the subject and neighboring properties. The existing impervious area of the site is 6,909 sf (0.16 ac) and the existing pervious area is 118,374 sf (2.72 ac).

II.C. Opportunities and Constraints for Stormwater Control

The constraints include the clay soils which tend to have low impermeability. There is also limited usable area for bioretention due to site slopes.

The project will utilize disconnected impervious areas and landscape features including bioretention to treat and manage stormwater. The location of the bioretention basins will be placed in low points allowing for gravity flow of stormwater runoff.

III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

III.A. Optimization of Site Layout

The proposed drainage patterns will allow the stormwater runoff to flow through the storm drain system as depicted in Attachment C- Stormwater Control Plan. The developed portion of the site has been designed to drain towards various bioretention basins located throughout the site. The stormwater runoff will be treated by the bioretention areas before it connects with the existing storm drain system Northeast of the site.

There will be ten bioretention basins to treat the stormwater runoff. Site runoff from impervious areas will be directed to the bioretention areas (as shown on Attachment C). The basins have been placed in such a way that will increase the aesthetics of the project as well as meet the stormwater requirement demand.

III.A.1. Limitation of Development Envelope

Hardscape is minimized to house footprints and areas that require pedestrian access. The remaining areas will be landscaped or private yards.

III.A.2. Preservation of Natural Drainage Features

The northern boundary of the site has an existing creek which collects runoff from a portion of the project site and some neighboring parcels. Development has been kept out of the creek. A small portion of the undeveloped site will continue to drain to this creek.

III.A.3. Setbacks from Creeks, Wetlands, and Riparian Habitats

The existing drainage creek has been delineated as an area of riparian habitat. The proposed development limits encroachment into this area.

III.A.4. Minimization of Imperviousness

The proposed development limits the impervious areas to streets, curb and gutter, sidewalks, house footprints, and driveways. The remainder of the site will be private landscape yards.

III.A.5. Use of Drainage as a Design Element

The bioretention basin locations can be seen in Appendix B. The basins will be landscaped and serve as an aesthetic feature for the site.

III.B. Use of Permeable Pavements

Permeable pavers are not proposed on this project.

III.C. Dispersal of Runoff to Pervious Areas

Runoff from the street, sidewalk, driveways and house rooftops are directed to the proposed bioretention areas. The runoff will pond and infiltrate into the soil below.

III.D. Bioretention or other Integrated Management Practices

Bioretention is the proposed IMP facility that is used to treat this site. The bioretention IMPs are located throughout the site; their locations can be seen in the site plan in Appendix B.

IV. DOCUMENTATION OF DRAINAGE DESIGN

IV.A. Descriptions of each Drainage Management Area

IV.A.1. Table of Drainage Management Areas

Table 2. Drainage Management Areas

DMA Name	Area (SF)	Surface Type/Description	DMA Type/Drains to
RDMA 1	3,110 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 1
GDMA 1	4,572 sf	Concrete and asphalt	Bioretention/Drains to IMP 1
LDMA 1	7,467 sf	Landscaping	Bioretention/Drains to IMP 1
RDMA 2	4,131 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 2

LDMA 2	2,947 sf	Landscaping	Bioretention/Drains to IMP 2
RDMA 3	4,131 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 3
LDMA 3	3,031 sf	Landscaping	Bioretention/Drains to IMP 3
RDMA 4	4,131 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 4
LDMA 4	3,059 sf	Landscaping	Bioretention/Drains to IMP 4
RDMA 5	4,074 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 5
LDMA 5	4,086 sf	Landscaping	Bioretention/Drains to IMP 5
RDMA 6	29,411 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 6
GDMA 6	34,283 sf	Concrete and asphalt	Bioretention/Drains to IMP 6
LDMA 6	32,395 sf	Landscaping	Bioretention/Drains to IMP 6
RDMA 7	3,775 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 7
LDMA 7	3,738 sf	Landscaping	Bioretention/Drains to IMP 7
RDMA 8	7,384 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 8
LDMA 8	1,889 sf	Landscaping	Bioretention/Drains to IMP 8
RDMA 9	4,147 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 9
LDMA 9	2,704 sf	Landscaping	Bioretention/Drains to IMP 9
RDMA 10	4,147 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 10
LDMA 10	2,012 sf	Landscaping	Bioretention/Drains to IMP 10
RDMA 11	1,034 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 11
GDMA 11	6,249 sf	Concrete and asphalt	Bioretention/Drains to IMP 11
LDMA 11	8,826 sf	Landscaping	Bioretention/Drains to IMP 11
GDMA 12	5,865 sf	Concrete and asphalt	Bioretention/Drains to IMP 12
LDMA 12	2,142 sf	Landscaping	Bioretention/Drains to IMP 12
RDMA 13	901 sf	Impervious roof and concrete driveways	Bioretention/Drains to IMP 13
GDMA 13	6,514 sf	Concrete and asphalt	Bioretention/Drains to IMP 13
LDMA 13	7,564 sf	Landscaping	Bioretention/Drains to IMP 13

IV.A.2. Drainage Management Area Descriptions

RDMA 1, totaling 3,110 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 1 drains towards bioretention area IMP 1.

GDMA 1, totaling 4,572 square feet, encompasses a portion of the project's impervious asphalt streets and concrete sidewalks. GDMA 1 drains towards bioretention area IMP 1.

LDMA 1, totaling 7,467 square feet, encompasses a portion of the project's landscaped areas. LDMA 1 drains towards bioretention area IMP 1.

RDMA 2, totaling 4,131 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 2 drains towards bioretention area IMP 2.

LDMA 2, totaling 2,947 square feet, encompasses a portion of the project's landscaped areas. LDMA 2 drains towards bioretention area IMP 2.

RDMA 3, totaling 4,131 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 3 drains towards bioretention area IMP 3.

LDMA 3, totaling 3,031 square feet, encompasses a portion of the project's landscaped areas. LDMA 3 drains towards bioretention area IMP 3.

RDMA 4, totaling 4,131 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 4 drains towards bioretention area IMP 4.

LDMA 4, totaling 3,059 square feet, encompasses a portion of the project's landscaped areas. LDMA 4 drains towards bioretention area IMP 4.

RDMA 5, totaling 4,074 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 5 drains towards bioretention area IMP 5.

LDMA 5, totaling 4,086 square feet, encompasses a portion of the project's landscaped areas. LDMA 5 drains towards bioretention area IMP 5.

RDMA 6, totaling 29,411 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 6 drains towards bioretention area IMP 6.

GDMA 6, totaling 34,283 square feet, encompasses a portion of the project's impervious asphalt streets and concrete sidewalks. GDMA 6 drains towards bioretention area IMP 6.

LDMA 6, totaling 32,395 square feet, encompasses a portion of the project's landscaped areas. LDMA 6 drains towards bioretention area IMP 6.

RDMA 7, totaling 3,775 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 7 drains towards bioretention area IMP 7.

LDMA 7, totaling 3,738 square feet, encompasses a portion of the project's landscaped areas. LDMA 7 drains towards bioretention area IMP 7.

RDMA 8, totaling 7,384 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 8 drains towards bioretention area IMP 8.

LDMA 8, totaling 1,889 square feet, encompasses a portion of the project's landscaped areas. LDMA 8 drains towards bioretention area IMP 8.

RDMA 9, totaling 4,147 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 9 drains towards bioretention area IMP 9.

LDMA 9, totaling 2,704 square feet, encompasses a portion of the project's landscaped areas. LDMA 9 drains towards bioretention area IMP 9.

RDMA 10, totaling 4,147 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 10 drains towards bioretention area IMP 10.

LDMA 10, totaling 2,012 square feet, encompasses a portion of the project's landscaped areas. LDMA 10 drains towards bioretention area IMP 10.

RDMA 11, totaling 1,034 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 11 drains towards bioretention area IMP 11.

GDMA 11, totaling 6,249 square feet, encompasses a portion of the project's impervious asphalt streets and concrete sidewalks. GDMA 11 drains towards bioretention area IMP 11.

LDMA 11, totaling 8,826 square feet, encompasses a portion of the project's landscaped areas. LDMA 11 drains towards bioretention area IMP 11.

GDMA 12, totaling 5,865 square feet, encompasses a portion of the project's impervious asphalt streets and concrete sidewalks. GDMA 12 drains towards bioretention area IMP 12.

LDMA 12, totaling 2,142 square feet, encompasses a portion of the project's landscaped areas. LDMA 12 drains towards bioretention area IMP 12.

RDMA 13, totaling 901 square feet, encompasses a portion of the project's roofs and concrete driveways. RDMA 13 drains towards bioretention area IMP 13.

GDMA 13, totaling 6,514 square feet, encompasses a portion of the project's impervious asphalt streets and concrete sidewalks. GDMA 13 drains towards bioretention area IMP 13.

LDMA 13, totaling 7,564 square feet, encompasses a portion of the project's landscaped areas. LDMA 13 drains towards bioretention area IMP 13.

IV.A.3. Self-treating Areas

Table 3. Self-treating Areas

DMA Name	Area (SF)	Surface Type/Description
ST 1	172,127 sf	Open Space, Pervious landscaping

IV.B. Integrated Management Practice Descriptions

Runoff from the site will be routed to bioretention areas as shown in Appendix B. Each of the facilities will be designed and constructed according to the criteria outlined in the Stormwater C.3 Guidebook, 9th Edition, including the following features:

- Each layer built flat, level, and to the elevations specified in the plans:
    - Bottom of Gravel Later
    - Top of Gravel Layer
    - Top of Soil Layer
    - Overflow Grate
    - Facility Rim

- 18 inches of bioretention soil mix per appendix B of Contra Costa Clean Water Program Stormwater C.3 Guidebook97th Edition
- 12 inches of Class 2 Permeable
- 4" diameter PVC SDR 35 perforated pipe subdrain, installed with the invert at the top of the Class 2 permeable layer with perforations facing down, and connected to the overflow structure at that same elevation.
- 6" deep reservoir between the top of soil elevation and overflow grate elevation.
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain.
- Plantings selected for suitability to climate and location. Bioretention soil media (well-drained, low fertility) and for water conservation. Tabulation and Sizing Calculations

Another stormwater control measure used on-site is the hydromodification vaults. Each of the facilities will be designed and constructed according to the criteria outlined in the Stormwater C.3 Guidebook, 9th Edition, including the following features:

- Below-ground, rectangular storage facility.
- Has an outlet structure to control outflow to meet hydromodification standards.
- Can allow infiltration.

IV.C. Tabulation and Sizing Calculations

See Attachment D for the 1125 North Gate Road BAHM model results.

For pre and post construction drainage areas, see Attachment B.

V. SOURCE CONTROL MEASURES

V.A. Site activities and potential sources of pollutants

The proposed development will create a few potential sources of stormwater pollutants. Sources to be controlled include:

- Potential dumping of wash-water or other liquids into storm drain inlets.
- Need for future indoor or structural pest control.
- Fertilizers and pesticides used in yard maintenance.
- Miscellaneous drain or wash water.
- Refuse will be handled by individual trash cans for each homeowner. Each homeowner will be required to store their cans in a covered area.

V.B. Source Control Table

Table 4. Source Controls

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
On-site dumping into storm drain inlets	All accessible on-site inlets require stainless steel markers with statement "No Dumping – Drains to Bay"	Markings will be periodically replaced. Inlets and pipes conveying stormwater to BMPs will be inspected and maintained as part of BMP Operation and Maintenance Plan.
Need for future indoor or structural pest control		Integrated Pest Management (IPM) information will be provided wo property owners.
Landscape/outdoor pesticide use	Final landscape plans will: Be designed to minimize irrigation and runoff and to minimize use of fertilizers and pesticides that can contribute to stormwater pollution. Specific plantings within bioretention areas and swales that are tolerant of the sandy loam soil and periodic inundation. Include pest-resistant plants. Include plantings appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Landscape will be maintained using minimum or no pesticides. IPM information will be provided to property owners
Streets and Sidewalks		Sweep streets and sidewalks to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer, not to the storm drain.

V.C. Features, Materials, and Methods of Construction of Source Control BMPS

VI. STORMWATER FACILITY MAINTENANCE

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The bioretention facilities and vaults will be located on Lot 9, with access from the private proposed street. The Homeowner's Association (HOA) will be responsible for maintenance of the facilities. The applicant accepts responsibility for interim operation and maintenance of stormwater treatment facilities until such time as this responsibility is formally transferred to subsequent owner.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The bioretention facilities receive runoff from impervious and pervious areas of the site via surface flow. The runoff briefly floods the surface of the treatment area and then percolates through an active soil layer to drain rock below. Typical routine maintenance consists of the following:

- Examine the overflow pipe to make sure that it can safely convey excess flows to a storm drain. Repair or replace any damaged or disconnected piping.
- Check the underdrain piping to make sure it is intact and unobstructed.
- Observe the structure of the box and fix any holes, cracks, rotting, or failure.
- Check that the soil is at the appropriate depth to allow a reservoir above the soil surface and is sufficient to effectively filter stormwater. Remove any accumulations of sediment, litter, and debris. Till or replace soil as necessary. Confirm that soil is not clogging and that the planter will drain 3-4 hours after a storm event.
- Determine whether the vegetation is dense and healthy. Replace dead plants. Prune or remove any overgrown plants or shrubs that may interfere with planter operation. Clean up fallen leaves or debris and replenish mulch. Remove any nuisance or invasive vegetation.
- Abate any potential vectors by filling holes in the ground in and around the swale and by ensuring that there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact the Contra Costa Mosquito and Vector Control District for information and advice. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.

The proposed storage vaults allow for flow control of the site. Typical routine maintenance consists of the following:

- As needed removal of sediment and debris from vault chamber when the sediment zone is full.
- Quarterly inspections of subsurface vault and control structures
- Quarterly inspection of floating debris and accumulated petroleum products should be removed.
- Ongoing maintenance records of all inspections and maintenance activities.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

Table 5. Construction Plan C.3 Checklist

Stormwater Control Plan Page #	BMP Description	See Plan Sheet #s
Attachment C	Drainage from impervious and pervious areas directed towards their numbered IMPs.	Sheet 10

VIII. CERTIFICATIONS

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2015-0049.

Benoit McVeigh, P.E.

C# 43325

Print Name

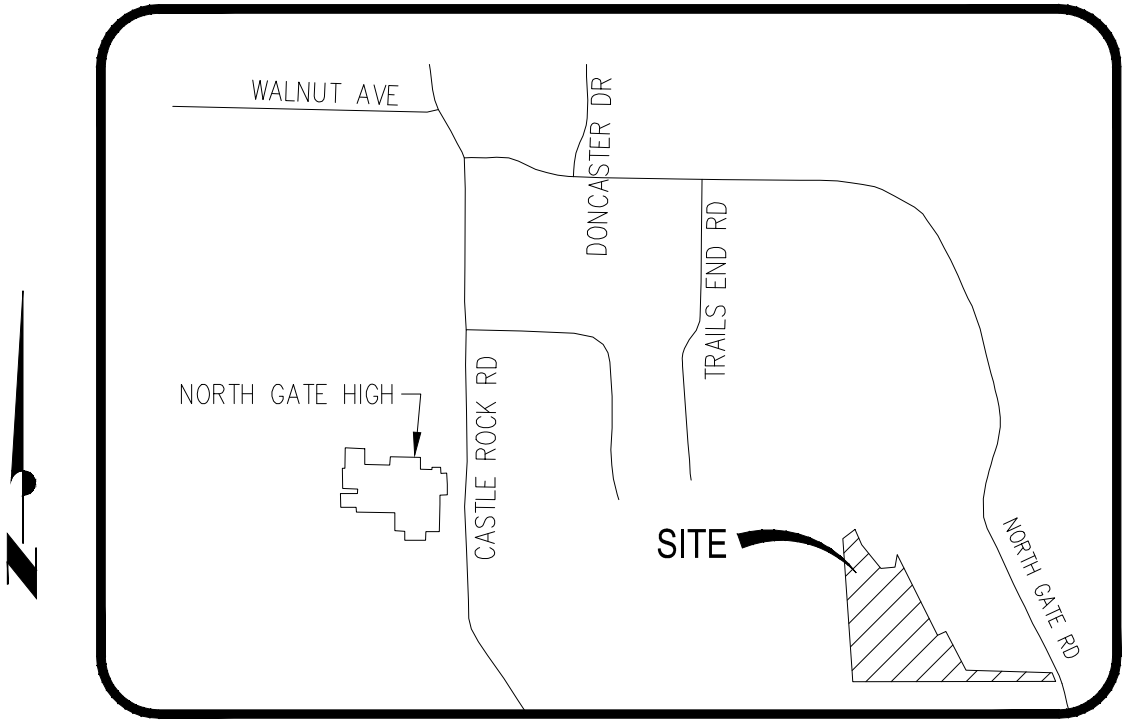
ATTACHMENT A
VICINITY MAP

CALIBR VENTURES

1125 NORTH GATE ROAD

VICINITY MAP

CONTRA COSTA COUNTY, CALIFORNIA



VICINITY MAP

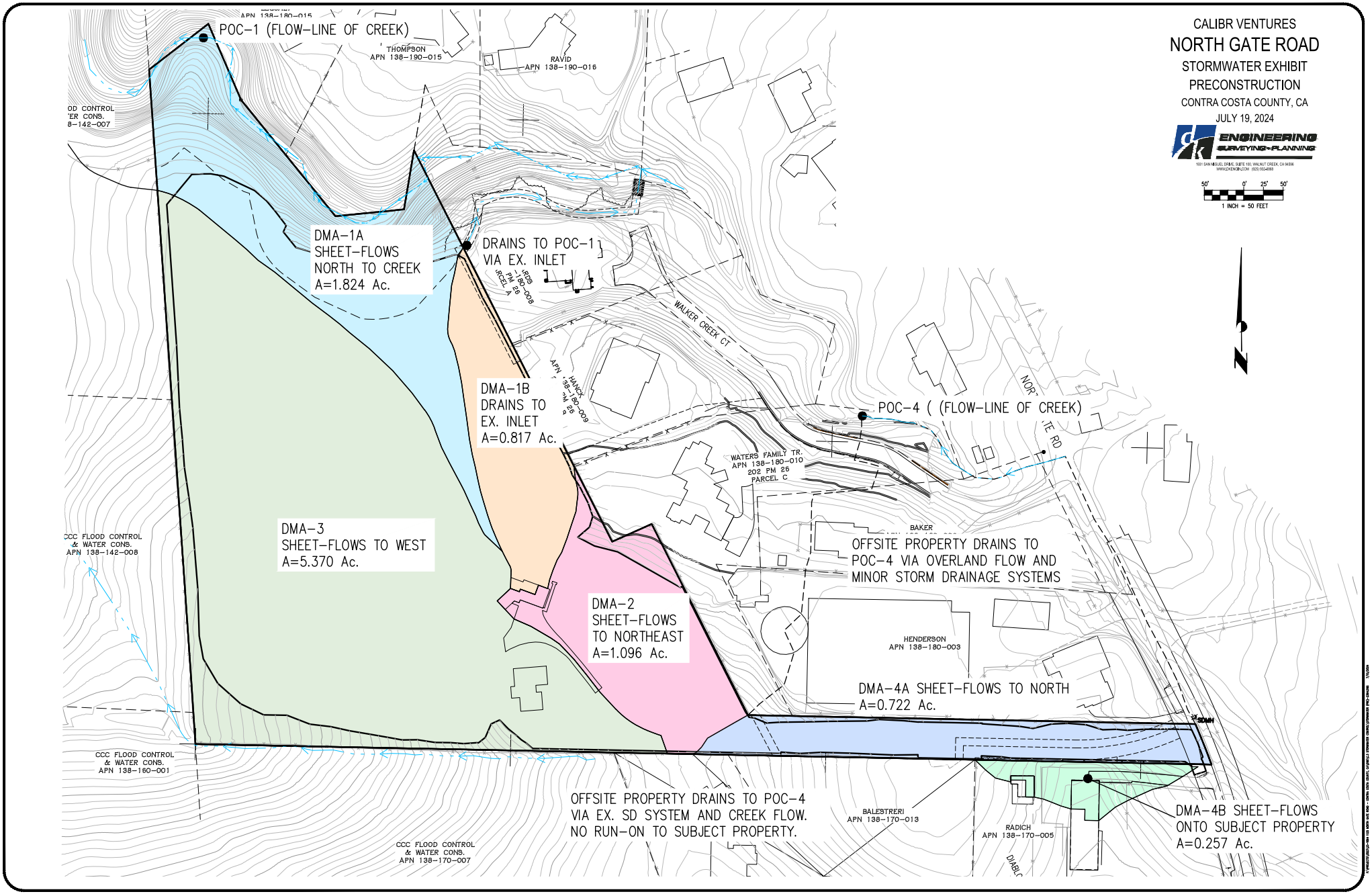
NOT TO SCALE

ENGINEERING
SURVEYING • PLANNING
1931 SAN MIGUEL DRIVE, SUITE 100, WALNUT CREEK, CA 94596
WWW.DKENGIN.COM (925) 932-6868

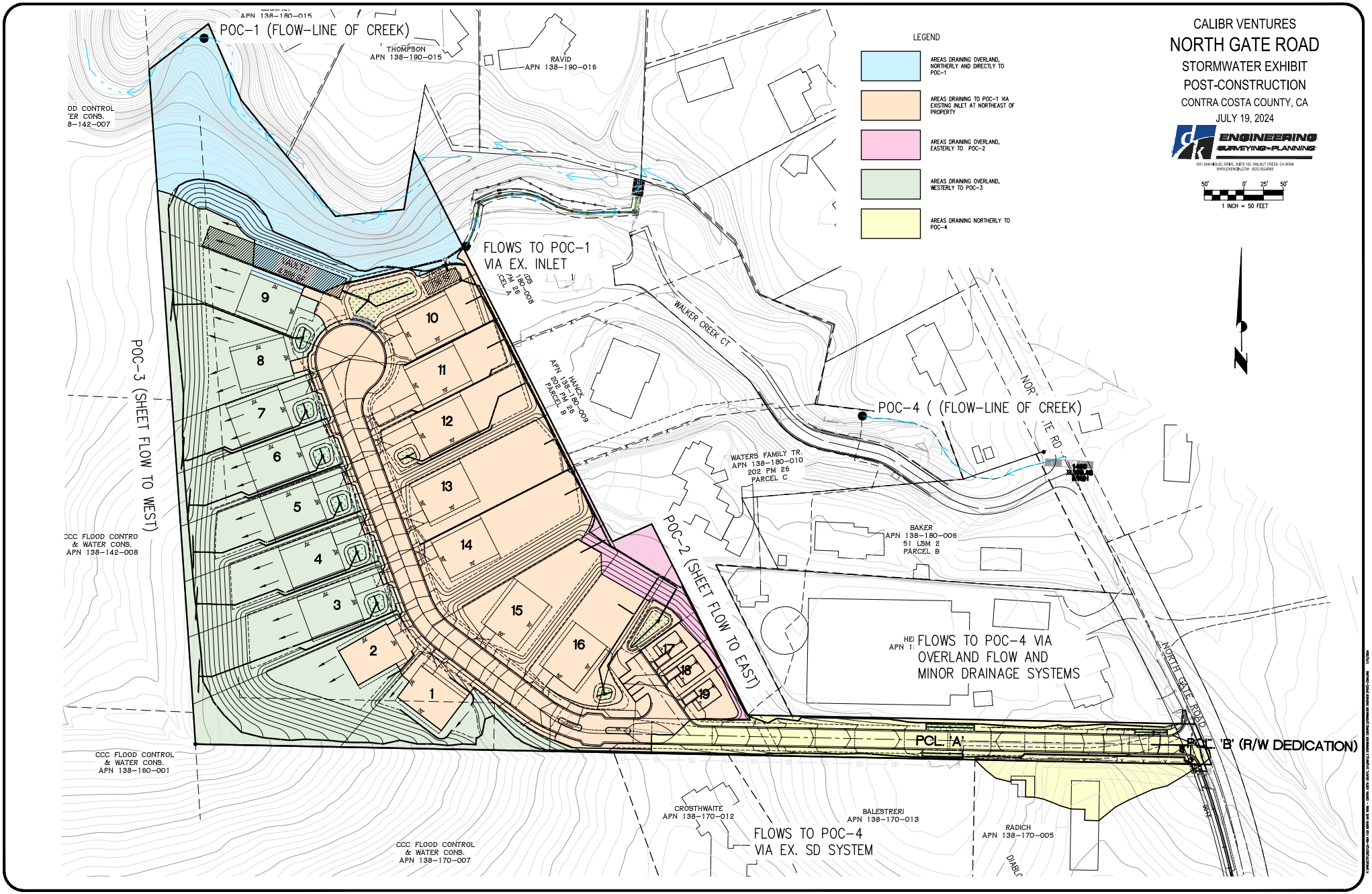
dk JOB# 23-1064

ATTACHMENT B

PRE AND POST CONSTRUCTION DRAINAGE AREAS

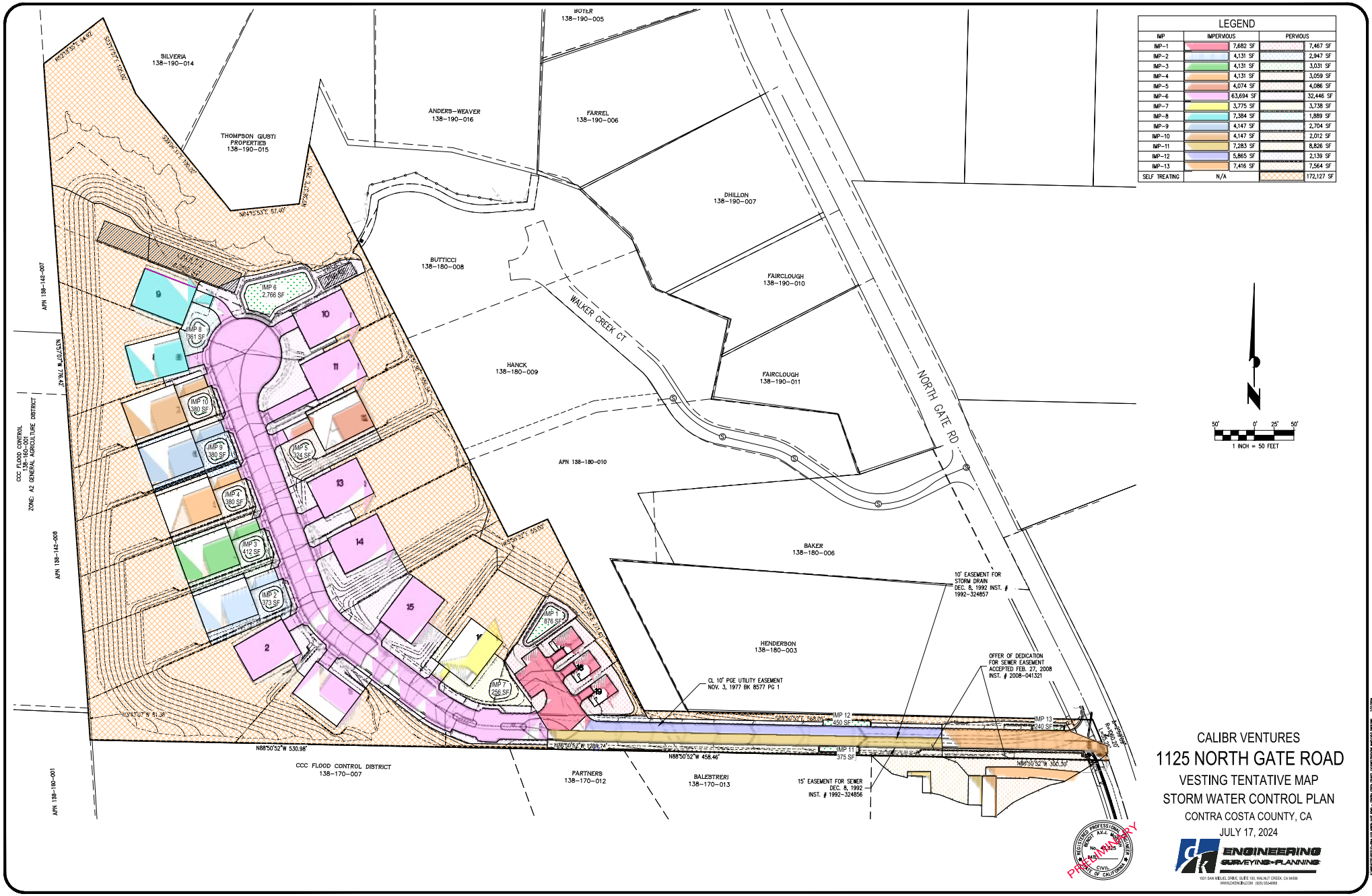


dk JOB# 23-1064-10



dk JOB# 23-1064-10

ATTACHMENT C
STORMWATER CONTROL PLAN



dk JOB# 23-1064-10

ATTACHMENT D
BAHM CALCULATOR OUTPUT

BAHM2023

PROJECT REPORT

General Model Information

BAHM2023 Project Name: North Gate Road BAHM-2364

Site Name:	North Gate Road
Site Address:	1125 North Gate Road
City:	Walnut Creek (Unincorporated)
Report Date:	7/12/2024
Gage:	St Marys
Data Start:	1972/10/01
Data End:	2021/09/30
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2024/01/22

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year
Low Flow Threshold for POC2:	10 Percent of the 2 Year
High Flow Threshold for POC2:	10 Year
Low Flow Threshold for POC3:	10 Percent of the 2 Year
High Flow Threshold for POC3:	10 Year
Low Flow Threshold for POC4:	10 Percent of the 2 Year
High Flow Threshold for POC4:	10 Year

Landuse Basin Data

Pre-Project Land Use

Existing 1A & 1B to POC-1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Grass,Ste(10-20)	0.807
C D,Shrub,Very(>20%)	1.824
Pervious Total	2.631

Impervious Land Use	acre
Roof Area	0.01
Impervious Total	0.01
Basin Total	2.641

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:
POC 1

Existing 2 to Northeast

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Grass,Ste(10-20)	1.029
Pervious Total	1.029

Impervious Land Use	acre
Roads,Flat(0-5%)	0.043
Roof Area	0.024
Impervious Total	0.067
Basin Total	1.096

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 2

Existing 3 to West

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Grass,Ste(10-20)	5.241
Pervious Total	5.241

Impervious Land Use	acre
Roads,Flat(0-5%)	0.039
Roof Area	0.09
Impervious Total	0.129
Basin Total	5.37

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 3

Existing 4A & 4B to POC-4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Mod(5-10%)	0.892
Pervious Total	0.892

Impervious Land Use	acre
Roads,Flat(0-5%)	0.01
Roads,Mod(5-10%)	0.033
Roof Area	0.044
Impervious Total	0.087
Basin Total	0.979

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 4

Mitigated Land Use

DMA1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.219
Pervious Total	0.219

Impervious Land Use	acre
Roads,Flat(0-5%)	0.12
Roof Area	0.057
Impervious Total	0.177
Basin Total	0.396

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:
Surface retention 1

DMA2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.068
Pervious Total	0.068

Impervious Land Use	acre
Roads,Flat(0-5%)	0.014
Roof Area	0.08
Impervious Total	0.094
Basin Total	0.162

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface retention 2	Surface retention 2	

DMA3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.07
Pervious Total	0.07

Impervious Land Use	acre
Roads,Flat(0-5%)	0.014
Roof Area	0.08
Impervious Total	0.094
Basin Total	0.164

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	3

DMA4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.07
Pervious Total	0.07

Impervious Land Use	acre
Roads,Flat(0-5%)	0.014
Roof Area	0.08
Impervious Total	0.094
Basin Total	0.164

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	4

DMA5

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.094
Pervious Total	0.094

Impervious Land Use	acre
Roads,Flat(0-5%)	0.013
Roof Area	0.08
Impervious Total	0.093
Basin Total	0.187

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	5

DMA6

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.742
Pervious Total	0.742

Impervious Land Use	acre
Roads,Flat(0-5%)	0.35
Roads,Mod(5-10%)	0.55
Roof Area	0.562
Impervious Total	1.462
Basin Total	2.204

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	6

DMA7

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.078
Pervious Total	0.078

Impervious Land Use	acre
Roads,Flat(0-5%)	0.015
Roof Area	0.08
Impervious Total	0.095
Basin Total	0.173

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	7

DMA8

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.043
Pervious Total	0.043

Impervious Land Use	acre
Roads,Flat(0-5%)	0.009
Roof Area	0.161
Impervious Total	0.17
Basin Total	0.213

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	8

DMA16 East Self-Treating

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Very(>20%)	0.242
Pervious Total	0.242
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.242

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:
POC 2

DMA15A & B North & Northeast Self-Treating

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C D,Shrub,Very(>20%)	1.236
C D,Shrub,Flat(0-5%)	1.131
Pervious Total	2.367
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.367

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1

Northeast Self-Treating

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Flat(0-5%)	1.078
Pervious Total	1.078
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.078

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:
Vault 1

DMA17 West Self-Treating

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Ste(10-20)	2.37
Pervious Total	2.37
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.37

Element Flow Componants:
Surface Interflow Groundwater
Componant Flows To:
POC 3

DMA9

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.062
Pervious Total	0.062

Impervious Land Use	acre
Roads,Flat(0-5%)	0.015
Roof Area	0.08
Impervious Total	0.095
Basin Total	0.157

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface retention	9

DMA10

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.046
Pervious Total	0.046

Impervious Land Use	acre
Roads,Flat(0-5%)	0.015
Roof Area	0.08
Impervious Total	0.095
Basin Total	0.141

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface etention	10

DMA11

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.203
Pervious Total	0.203

Impervious Land Use	acre
Roads,Flat(0-5%)	0.143
Roof Area	0.024
Impervious Total	0.167
Basin Total	0.37

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface etention 11	Surface etention 11	

DMA12

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.049
Pervious Total	0.049

Impervious Land Use	acre
Roads,Flat(0-5%)	0.135
Impervious Total	0.135
Basin Total	0.184

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface etention	12	Surface etention	12

DMA13

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.14
Pervious Total	0.14

Impervious Land Use	acre
Roads,Flat(0-5%)	0.117
Roads,Mod(5-10%)	0.033
Roof Area	0.02
Impervious Total	0.17
Basin Total	0.31

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Surface etention 13	Surface etention 13	

DMA14 Entry Self-Treating

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Ste(10-20)	0.103
Pervious Total	0.103
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.103

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 4	POC 4

Routing Elements
Pre-Project Routing

Mitigated Routing

Bioretention 1

Bottom Length:	29.60 ft.
Bottom Width:	29.60 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	2
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	20.711
Total Volume Through Riser (ac-ft.):	0.061
Total Volume Through Facility (ac-ft.):	25.704
Percent Infiltrated:	80.58
Total Precip Applied to Facility:	1.946
Total Evap From Facility:	1.138
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	21
Flow Through Underdrain (ac-ft.):	4.932
Total Outflow (ac-ft.):	25.704
Percent Through Underdrain:	19.19
Discharge Structure	
Riser Height:	0.83 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Vault 1	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0291	0.0000	0.0000	0.0000
0.0549	0.0201	0.0011	0.0000	0.0000
0.1099	0.0201	0.0022	0.0000	0.0000
0.1648	0.0201	0.0033	0.0000	0.0000
0.2198	0.0201	0.0044	0.0000	0.0000
0.2747	0.0201	0.0055	0.0000	0.0000
0.3297	0.0201	0.0066	0.0000	0.0000
0.3846	0.0201	0.0077	0.0024	0.0024
0.4396	0.0201	0.0088	0.0041	0.0041
0.4945	0.0201	0.0099	0.0041	0.0041
0.5495	0.0201	0.0110	0.0041	0.0041
0.6044	0.0201	0.0122	0.0041	0.0041
0.6593	0.0201	0.0133	0.0041	0.0041
0.7143	0.0201	0.0144	0.0041	0.0041
0.7692	0.0201	0.0155	0.0041	0.0041
0.8242	0.0201	0.0166	0.0041	0.0041
0.8791	0.0201	0.0177	0.0041	0.0041
0.9341	0.0201	0.0188	0.0041	0.0041

0.9890	0.0201	0.0199	0.0041	0.0041
1.0440	0.0201	0.0210	0.0041	0.0041
1.0989	0.0201	0.0221	0.0041	0.0041
1.1538	0.0201	0.0232	0.0041	0.0041
1.2088	0.0201	0.0243	0.0041	0.0041
1.2637	0.0201	0.0254	0.0041	0.0041
1.3187	0.0201	0.0265	0.0041	0.0041
1.3736	0.0201	0.0276	0.0041	0.0041
1.4286	0.0201	0.0287	0.0041	0.0041
1.4835	0.0201	0.0298	0.0041	0.0041
1.5385	0.0201	0.0309	0.0041	0.0041
1.5934	0.0201	0.0320	0.0041	0.0041
1.6484	0.0201	0.0331	0.0041	0.0041
1.7033	0.0201	0.0343	0.0041	0.0041
1.7582	0.0201	0.0354	0.0041	0.0041
1.8132	0.0201	0.0365	0.0041	0.0041
1.8681	0.0201	0.0376	0.0041	0.0041
1.9231	0.0201	0.0387	0.0041	0.0041
1.9780	0.0201	0.0398	0.0041	0.0041
2.0330	0.0201	0.0409	0.0041	0.0041
2.0879	0.0201	0.0420	0.0041	0.0041
2.1429	0.0201	0.0431	0.0041	0.0041
2.1978	0.0201	0.0442	0.0041	0.0041
2.2527	0.0201	0.0453	0.0041	0.0041
2.3077	0.0201	0.0464	0.0041	0.0041
2.3626	0.0201	0.0475	0.0041	0.0041
2.4176	0.0201	0.0486	0.0041	0.0041
2.4725	0.0201	0.0497	0.0041	0.0041
2.5275	0.0201	0.0508	0.0041	0.0041
2.5824	0.0201	0.0519	0.0041	0.0041
2.6374	0.0201	0.0530	0.0041	0.0041
2.6923	0.0201	0.0541	0.0041	0.0041
2.7473	0.0201	0.0552	0.0041	0.0041
2.8022	0.0201	0.0564	0.0041	0.0041
2.8571	0.0201	0.0575	0.0041	0.0041
2.9121	0.0201	0.0586	0.0041	0.0041
2.9670	0.0201	0.0597	0.0041	0.0041
3.0220	0.0201	0.0608	0.0041	0.0041
3.0769	0.0201	0.0619	0.0041	0.0041
3.1319	0.0201	0.0630	0.0041	0.0041
3.1868	0.0201	0.0641	0.0041	0.0041
3.2418	0.0201	0.0652	0.0041	0.0041
3.2967	0.0201	0.0663	0.0041	0.0041
3.3516	0.0201	0.0674	0.0041	0.0041
3.4066	0.0201	0.0685	0.0041	0.0041
3.4615	0.0201	0.0696	0.0041	0.0041
3.5165	0.0201	0.0707	0.0000	0.0000

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.5165	0.0291	0.0707	0.0000	0.1014	0.0000
3.5714	0.0201	0.0718	0.0000	0.1014	0.0000
3.6264	0.0201	0.0729	0.0000	0.1099	0.0000
3.6813	0.0201	0.0740	0.0000	0.1136	0.0000
3.7363	0.0201	0.0751	0.0000	0.1174	0.0000
3.7912	0.0201	0.0762	0.0000	0.1211	0.0000
3.8462	0.0201	0.0773	0.0000	0.1248	0.0000
3.9011	0.0201	0.0785	0.0000	0.1285	0.0000

3.9560	0.0201	0.0796	0.0000	0.1322	0.0000
4.0110	0.0201	0.0807	0.0000	0.1359	0.0000
4.0659	0.0201	0.0818	0.0000	0.1396	0.0000
4.1209	0.0201	0.0829	0.0000	0.1434	0.0000
4.1758	0.0201	0.0840	0.0000	0.1471	0.0000
4.2308	0.0201	0.0851	0.0000	0.1508	0.0000
4.2857	0.0201	0.0862	0.0000	0.1545	0.0000
4.3407	0.0201	0.0873	0.0000	0.1582	0.0000
4.3956	0.0201	0.0884	0.0000	0.1619	0.0000
4.4505	0.0201	0.0895	0.0000	0.1656	0.0000
4.5055	0.0201	0.0906	0.0000	0.1693	0.0000
4.5604	0.0201	0.0917	0.0000	0.1731	0.0000
4.6154	0.0201	0.0928	0.0000	0.1768	0.0000
4.6703	0.0201	0.0939	0.0000	0.1805	0.0000
4.7253	0.0201	0.0950	0.0000	0.1842	0.0000
4.7802	0.0201	0.0961	0.0000	0.1879	0.0000
4.8352	0.0201	0.0972	0.0000	0.1916	0.0000
4.8901	0.0201	0.0983	0.0000	0.1953	0.0000
4.9451	0.0201	0.0994	0.0000	0.1991	0.0000
5.0000	0.0201	0.1005	0.0000	0.2028	0.0000
5.0549	0.0201	0.1017	0.0000	0.2065	0.0000

Bioretention 2

Bottom Length:	19.31 ft.
Bottom Width:	19.31 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.481
Total Volume Through Riser (ac-ft.):	0.061
Total Volume Through Facility (ac-ft.):	12.692
Percent Infiltrated:	51.06
Total Precip Applied to Facility:	0.847
Total Evap From Facility:	0.395
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	6.15
Total Outflow (ac-ft.):	12.692
Percent Through Underdrain:	48.46
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0086	0.0000	0.0000	0.0000
0.0440	0.0086	0.0001	0.0000	0.0000
0.0879	0.0086	0.0003	0.0000	0.0000
0.1319	0.0086	0.0004	0.0000	0.0000
0.1758	0.0086	0.0006	0.0000	0.0000
0.2198	0.0086	0.0007	0.0000	0.0000
0.2637	0.0086	0.0009	0.0000	0.0000
0.3077	0.0086	0.0010	0.0000	0.0000
0.3516	0.0086	0.0011	0.0000	0.0000
0.3956	0.0086	0.0013	0.0000	0.0000
0.4396	0.0086	0.0014	0.0017	0.0017
0.4835	0.0086	0.0016	0.0017	0.0017
0.5275	0.0086	0.0017	0.0017	0.0017
0.5714	0.0086	0.0019	0.0017	0.0017
0.6154	0.0086	0.0020	0.0017	0.0017
0.6593	0.0086	0.0021	0.0017	0.0017
0.7033	0.0086	0.0023	0.0017	0.0017
0.7473	0.0086	0.0024	0.0017	0.0017
0.7912	0.0086	0.0026	0.0017	0.0017
0.8352	0.0086	0.0027	0.0017	0.0017

0.8791	0.0086	0.0029	0.0017	0.0017
0.9231	0.0086	0.0030	0.0017	0.0017
0.9670	0.0086	0.0031	0.0017	0.0017
1.0110	0.0086	0.0033	0.0017	0.0017
1.0549	0.0086	0.0034	0.0017	0.0017
1.0989	0.0086	0.0036	0.0017	0.0017
1.1429	0.0086	0.0037	0.0017	0.0017
1.1868	0.0086	0.0039	0.0017	0.0017
1.2308	0.0086	0.0040	0.0017	0.0017
1.2747	0.0086	0.0041	0.0017	0.0017
1.3187	0.0086	0.0043	0.0017	0.0017
1.3626	0.0086	0.0044	0.0017	0.0017
1.4066	0.0086	0.0046	0.0017	0.0017
1.4505	0.0086	0.0047	0.0017	0.0017
1.4945	0.0086	0.0049	0.0017	0.0017
1.5385	0.0086	0.0050	0.0017	0.0017
1.5824	0.0086	0.0052	0.0017	0.0017
1.6264	0.0086	0.0053	0.0017	0.0017
1.6703	0.0086	0.0055	0.0017	0.0017
1.7143	0.0086	0.0056	0.0017	0.0017
1.7582	0.0086	0.0058	0.0017	0.0017
1.8022	0.0086	0.0060	0.0017	0.0017
1.8462	0.0086	0.0061	0.0017	0.0017
1.8901	0.0086	0.0063	0.0017	0.0017
1.9341	0.0086	0.0064	0.0017	0.0017
1.9780	0.0086	0.0066	0.0017	0.0017
2.0220	0.0086	0.0067	0.0017	0.0017
2.0659	0.0086	0.0069	0.0017	0.0017
2.1099	0.0086	0.0070	0.0017	0.0017
2.1538	0.0086	0.0072	0.0017	0.0017
2.1978	0.0086	0.0074	0.0017	0.0017
2.2418	0.0086	0.0075	0.0017	0.0017
2.2857	0.0086	0.0077	0.0017	0.0017
2.3297	0.0086	0.0078	0.0017	0.0017
2.3736	0.0086	0.0080	0.0017	0.0017
2.4176	0.0086	0.0081	0.0017	0.0017
2.4615	0.0086	0.0083	0.0017	0.0017
2.5000	0.0086	0.0084	0.0017	0.0017

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0086	0.0084	0.0000	0.0444	0.0000
2.5440	0.0088	0.0088	0.0000	0.0444	0.0001
2.5879	0.0090	0.0092	0.0000	0.0482	0.0001
2.6319	0.0093	0.0096	0.0000	0.0509	0.0002
2.6758	0.0095	0.0100	0.0000	0.0536	0.0002
2.7198	0.0098	0.0104	0.0000	0.0565	0.0003
2.7637	0.0100	0.0109	0.0000	0.0576	0.0003
2.8077	0.0103	0.0113	0.0000	0.0576	0.0004
2.8516	0.0105	0.0118	0.0000	0.0576	0.0005
2.8956	0.0108	0.0123	0.0000	0.0576	0.0005
2.9396	0.0111	0.0127	0.0000	0.0576	0.0006
2.9835	0.0113	0.0132	0.0000	0.0576	0.0006
3.0275	0.0116	0.0137	0.0000	0.0576	0.0007
3.0714	0.0119	0.0142	0.0000	0.0576	0.0007
3.1154	0.0121	0.0148	0.0000	0.0576	0.0008
3.1593	0.0124	0.0153	0.0000	0.0576	0.0008
3.2033	0.0127	0.0159	0.0000	0.0576	0.0009

3.2473	0.0130	0.0164	0.0000	0.0576	0.0010
3.2912	0.0133	0.0170	0.0000	0.0576	0.0010
3.3352	0.0136	0.0176	0.0000	0.0576	0.0011
3.3791	0.0139	0.0182	0.0000	0.0576	0.0011
3.4231	0.0142	0.0188	0.0000	0.0576	0.0012
3.4670	0.0145	0.0195	0.0000	0.0576	0.0013
3.5110	0.0148	0.0201	0.0000	0.0576	0.0013
3.5549	0.0151	0.0208	0.0000	0.0576	0.0014
3.5989	0.0154	0.0214	0.0000	0.0576	0.0014
3.6429	0.0157	0.0221	0.0000	0.0576	0.0015
3.6868	0.0160	0.0228	0.0000	0.0576	0.0016
3.7308	0.0164	0.0235	0.0000	0.0576	0.0016
3.7747	0.0167	0.0242	0.0000	0.0576	0.0017
3.8187	0.0170	0.0250	0.0000	0.0576	0.0018
3.8626	0.0173	0.0257	0.0000	0.0576	0.0018
3.9066	0.0177	0.0265	0.0000	0.0576	0.0019
3.9505	0.0180	0.0273	0.0000	0.0576	0.0020
3.9945	0.0184	0.0281	0.0000	0.0576	0.0020
4.0000	0.0184	0.0282	0.0000	0.0576	0.0012

Bioretention 3

Bottom Length:	20.30 ft.
Bottom Width:	20.30 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.474
Total Volume Through Riser (ac-ft.):	0.054
Total Volume Through Facility (ac-ft.):	12.154
Percent Infiltrated:	53.27
Total Precip Applied to Facility:	0.882
Total Evap From Facility:	0.414
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	5.626
Total Outflow (ac-ft.):	12.154
Percent Through Underdrain:	46.29
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0095	0.0000	0.0000	0.0000
0.0440	0.0095	0.0002	0.0000	0.0000
0.0879	0.0095	0.0003	0.0000	0.0000
0.1319	0.0095	0.0005	0.0000	0.0000
0.1758	0.0095	0.0006	0.0000	0.0000
0.2198	0.0095	0.0008	0.0000	0.0000
0.2637	0.0095	0.0009	0.0000	0.0000
0.3077	0.0095	0.0011	0.0000	0.0000
0.3516	0.0095	0.0013	0.0000	0.0000
0.3956	0.0095	0.0014	0.0000	0.0000
0.4396	0.0095	0.0016	0.0019	0.0019
0.4835	0.0095	0.0017	0.0019	0.0019
0.5275	0.0095	0.0019	0.0019	0.0019
0.5714	0.0095	0.0021	0.0019	0.0019
0.6154	0.0095	0.0022	0.0019	0.0019
0.6593	0.0095	0.0024	0.0019	0.0019
0.7033	0.0095	0.0025	0.0019	0.0019
0.7473	0.0095	0.0027	0.0019	0.0019
0.7912	0.0095	0.0028	0.0019	0.0019
0.8352	0.0095	0.0030	0.0019	0.0019

0.8791	0.0095	0.0032	0.0019	0.0019
0.9231	0.0095	0.0033	0.0019	0.0019
0.9670	0.0095	0.0035	0.0019	0.0019
1.0110	0.0095	0.0036	0.0019	0.0019
1.0549	0.0095	0.0038	0.0019	0.0019
1.0989	0.0095	0.0039	0.0019	0.0019
1.1429	0.0095	0.0041	0.0019	0.0019
1.1868	0.0095	0.0043	0.0019	0.0019
1.2308	0.0095	0.0044	0.0019	0.0019
1.2747	0.0095	0.0046	0.0019	0.0019
1.3187	0.0095	0.0047	0.0019	0.0019
1.3626	0.0095	0.0049	0.0019	0.0019
1.4066	0.0095	0.0051	0.0019	0.0019
1.4505	0.0095	0.0052	0.0019	0.0019
1.4945	0.0095	0.0054	0.0019	0.0019
1.5385	0.0095	0.0055	0.0019	0.0019
1.5824	0.0095	0.0057	0.0019	0.0019
1.6264	0.0095	0.0059	0.0019	0.0019
1.6703	0.0095	0.0061	0.0019	0.0019
1.7143	0.0095	0.0062	0.0019	0.0019
1.7582	0.0095	0.0064	0.0019	0.0019
1.8022	0.0095	0.0066	0.0019	0.0019
1.8462	0.0095	0.0068	0.0019	0.0019
1.8901	0.0095	0.0069	0.0019	0.0019
1.9341	0.0095	0.0071	0.0019	0.0019
1.9780	0.0095	0.0073	0.0019	0.0019
2.0220	0.0095	0.0074	0.0019	0.0019
2.0659	0.0095	0.0076	0.0019	0.0019
2.1099	0.0095	0.0078	0.0019	0.0019
2.1538	0.0095	0.0080	0.0019	0.0019
2.1978	0.0095	0.0081	0.0019	0.0019
2.2418	0.0095	0.0083	0.0019	0.0019
2.2857	0.0095	0.0085	0.0019	0.0019
2.3297	0.0095	0.0086	0.0019	0.0019
2.3736	0.0095	0.0088	0.0019	0.0019
2.4176	0.0095	0.0090	0.0019	0.0019
2.4615	0.0095	0.0092	0.0019	0.0019
2.5000	0.0095	0.0093	0.0019	0.0019

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0095	0.0093	0.0000	0.0489	0.0000
2.5440	0.0097	0.0097	0.0000	0.0489	0.0001
2.5879	0.0100	0.0102	0.0000	0.0531	0.0002
2.6319	0.0102	0.0106	0.0000	0.0560	0.0002
2.6758	0.0105	0.0111	0.0000	0.0582	0.0003
2.7198	0.0107	0.0115	0.0000	0.0582	0.0003
2.7637	0.0110	0.0120	0.0000	0.0582	0.0004
2.8077	0.0113	0.0125	0.0000	0.0582	0.0004
2.8516	0.0115	0.0130	0.0000	0.0582	0.0005
2.8956	0.0118	0.0135	0.0000	0.0582	0.0005
2.9396	0.0121	0.0140	0.0000	0.0582	0.0006
2.9835	0.0124	0.0146	0.0000	0.0582	0.0006
3.0275	0.0126	0.0151	0.0000	0.0582	0.0007
3.0714	0.0129	0.0157	0.0000	0.0582	0.0008
3.1154	0.0132	0.0163	0.0000	0.0582	0.0008
3.1593	0.0135	0.0168	0.0000	0.0582	0.0009
3.2033	0.0138	0.0174	0.0000	0.0582	0.0009

3.2473	0.0141	0.0181	0.0000	0.0582	0.0010
3.2912	0.0144	0.0187	0.0000	0.0582	0.0011
3.3352	0.0147	0.0193	0.0000	0.0582	0.0011
3.3791	0.0150	0.0200	0.0000	0.0582	0.0012
3.4231	0.0153	0.0206	0.0000	0.0582	0.0012
3.4670	0.0156	0.0213	0.0000	0.0582	0.0013
3.5110	0.0160	0.0220	0.0000	0.0582	0.0014
3.5549	0.0163	0.0227	0.0000	0.0582	0.0014
3.5989	0.0166	0.0235	0.0000	0.0582	0.0015
3.6429	0.0169	0.0242	0.0000	0.0582	0.0016
3.6868	0.0173	0.0249	0.0000	0.0582	0.0016
3.7308	0.0176	0.0257	0.0000	0.0582	0.0017
3.7747	0.0179	0.0265	0.0000	0.0582	0.0018
3.8187	0.0183	0.0273	0.0000	0.0582	0.0018
3.8626	0.0186	0.0281	0.0000	0.0582	0.0019
3.9066	0.0190	0.0289	0.0000	0.0582	0.0020
3.9505	0.0193	0.0298	0.0000	0.0582	0.0021
3.9945	0.0197	0.0306	0.0000	0.0582	0.0021
4.0000	0.0197	0.0307	0.0000	0.0582	0.0013

Bioretention 4

Bottom Length:	19.49 ft.
Bottom Width:	19.49 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.159
Total Volume Through Riser (ac-ft.):	0.06
Total Volume Through Facility (ac-ft.):	12.119
Percent Infiltrated:	50.82
Total Precip Applied to Facility:	0.817
Total Evap From Facility:	0.384
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	5.9
Total Outflow (ac-ft.):	12.119
Percent Through Underdrain:	48.68
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0087	0.0000	0.0000	0.0000
0.0440	0.0087	0.0001	0.0000	0.0000
0.0879	0.0087	0.0003	0.0000	0.0000
0.1319	0.0087	0.0004	0.0000	0.0000
0.1758	0.0087	0.0006	0.0000	0.0000
0.2198	0.0087	0.0007	0.0000	0.0000
0.2637	0.0087	0.0009	0.0000	0.0000
0.3077	0.0087	0.0010	0.0000	0.0000
0.3516	0.0087	0.0012	0.0000	0.0000
0.3956	0.0087	0.0013	0.0000	0.0000
0.4396	0.0087	0.0015	0.0018	0.0018
0.4835	0.0087	0.0016	0.0018	0.0018
0.5275	0.0087	0.0017	0.0018	0.0018
0.5714	0.0087	0.0019	0.0018	0.0018
0.6154	0.0087	0.0020	0.0018	0.0018
0.6593	0.0087	0.0022	0.0018	0.0018
0.7033	0.0087	0.0023	0.0018	0.0018
0.7473	0.0087	0.0025	0.0018	0.0018
0.7912	0.0087	0.0026	0.0018	0.0018
0.8352	0.0087	0.0028	0.0018	0.0018

0.8791	0.0087	0.0029	0.0018	0.0018
0.9231	0.0087	0.0031	0.0018	0.0018
0.9670	0.0087	0.0032	0.0018	0.0018
1.0110	0.0087	0.0034	0.0018	0.0018
1.0549	0.0087	0.0035	0.0018	0.0018
1.0989	0.0087	0.0036	0.0018	0.0018
1.1429	0.0087	0.0038	0.0018	0.0018
1.1868	0.0087	0.0039	0.0018	0.0018
1.2308	0.0087	0.0041	0.0018	0.0018
1.2747	0.0087	0.0042	0.0018	0.0018
1.3187	0.0087	0.0044	0.0018	0.0018
1.3626	0.0087	0.0045	0.0018	0.0018
1.4066	0.0087	0.0047	0.0018	0.0018
1.4505	0.0087	0.0048	0.0018	0.0018
1.4945	0.0087	0.0050	0.0018	0.0018
1.5385	0.0087	0.0051	0.0018	0.0018
1.5824	0.0087	0.0053	0.0018	0.0018
1.6264	0.0087	0.0054	0.0018	0.0018
1.6703	0.0087	0.0056	0.0018	0.0018
1.7143	0.0087	0.0058	0.0018	0.0018
1.7582	0.0087	0.0059	0.0018	0.0018
1.8022	0.0087	0.0061	0.0018	0.0018
1.8462	0.0087	0.0062	0.0018	0.0018
1.8901	0.0087	0.0064	0.0018	0.0018
1.9341	0.0087	0.0065	0.0018	0.0018
1.9780	0.0087	0.0067	0.0018	0.0018
2.0220	0.0087	0.0069	0.0018	0.0018
2.0659	0.0087	0.0070	0.0018	0.0018
2.1099	0.0087	0.0072	0.0018	0.0018
2.1538	0.0087	0.0073	0.0018	0.0018
2.1978	0.0087	0.0075	0.0018	0.0018
2.2418	0.0087	0.0077	0.0018	0.0018
2.2857	0.0087	0.0078	0.0018	0.0018
2.3297	0.0087	0.0080	0.0018	0.0018
2.3736	0.0087	0.0081	0.0018	0.0018
2.4176	0.0087	0.0083	0.0018	0.0018
2.4615	0.0087	0.0085	0.0018	0.0018
2.5000	0.0087	0.0086	0.0018	0.0018

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0087	0.0086	0.0000	0.0452	0.0000
2.5440	0.0090	0.0090	0.0000	0.0452	0.0001
2.5879	0.0092	0.0094	0.0000	0.0491	0.0001
2.6319	0.0094	0.0098	0.0000	0.0518	0.0002
2.6758	0.0097	0.0102	0.0000	0.0546	0.0002
2.7198	0.0099	0.0106	0.0000	0.0575	0.0003
2.7637	0.0102	0.0111	0.0000	0.0581	0.0003
2.8077	0.0105	0.0115	0.0000	0.0581	0.0004
2.8516	0.0107	0.0120	0.0000	0.0581	0.0005
2.8956	0.0110	0.0125	0.0000	0.0581	0.0005
2.9396	0.0112	0.0130	0.0000	0.0581	0.0006
2.9835	0.0115	0.0135	0.0000	0.0581	0.0006
3.0275	0.0118	0.0140	0.0000	0.0581	0.0007
3.0714	0.0121	0.0145	0.0000	0.0581	0.0007
3.1154	0.0123	0.0150	0.0000	0.0581	0.0008
3.1593	0.0126	0.0156	0.0000	0.0581	0.0008
3.2033	0.0129	0.0162	0.0000	0.0581	0.0009

3.2473	0.0132	0.0167	0.0000	0.0581	0.0010
3.2912	0.0135	0.0173	0.0000	0.0581	0.0010
3.3352	0.0138	0.0179	0.0000	0.0581	0.0011
3.3791	0.0141	0.0185	0.0000	0.0581	0.0011
3.4231	0.0144	0.0192	0.0000	0.0581	0.0012
3.4670	0.0147	0.0198	0.0000	0.0581	0.0013
3.5110	0.0150	0.0204	0.0000	0.0581	0.0013
3.5549	0.0153	0.0211	0.0000	0.0581	0.0014
3.5989	0.0156	0.0218	0.0000	0.0581	0.0015
3.6429	0.0159	0.0225	0.0000	0.0581	0.0015
3.6868	0.0163	0.0232	0.0000	0.0581	0.0016
3.7308	0.0166	0.0239	0.0000	0.0581	0.0017
3.7747	0.0169	0.0246	0.0000	0.0581	0.0017
3.8187	0.0172	0.0254	0.0000	0.0581	0.0018
3.8626	0.0176	0.0262	0.0000	0.0581	0.0019
3.9066	0.0179	0.0269	0.0000	0.0581	0.0019
3.9505	0.0183	0.0277	0.0000	0.0581	0.0020
3.9945	0.0186	0.0286	0.0000	0.0581	0.0020
4.0000	0.0186	0.0287	0.0000	0.0581	0.0012

Bioretention 5

Bottom Length:	18.00 ft.
Bottom Width:	18.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	2
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	7.213
Total Volume Through Riser (ac-ft.):	0.062
Total Volume Through Facility (ac-ft.):	12.776
Percent Infiltrated:	56.46
Total Precip Applied to Facility:	0.707
Total Evap From Facility:	0.314
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	21
Flow Through Underdrain (ac-ft.):	5.501
Total Outflow (ac-ft.):	12.776
Percent Through Underdrain:	43.06
Discharge Structure	
Riser Height:	0.83 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Vault 1	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0074	0.0000	0.0000	0.0000
0.0549	0.0074	0.0002	0.0000	0.0000
0.1099	0.0074	0.0003	0.0000	0.0000
0.1648	0.0074	0.0005	0.0000	0.0000
0.2198	0.0074	0.0006	0.0000	0.0000
0.2747	0.0074	0.0008	0.0000	0.0000
0.3297	0.0074	0.0009	0.0000	0.0000
0.3846	0.0074	0.0011	0.0009	0.0009
0.4396	0.0074	0.0012	0.0015	0.0015
0.4945	0.0074	0.0014	0.0015	0.0015
0.5495	0.0074	0.0016	0.0015	0.0015
0.6044	0.0074	0.0017	0.0015	0.0015
0.6593	0.0074	0.0019	0.0015	0.0015
0.7143	0.0074	0.0020	0.0015	0.0015
0.7692	0.0074	0.0022	0.0015	0.0015
0.8242	0.0074	0.0023	0.0015	0.0015
0.8791	0.0074	0.0025	0.0015	0.0015
0.9341	0.0074	0.0026	0.0015	0.0015
0.9890	0.0074	0.0028	0.0015	0.0015
1.0440	0.0074	0.0030	0.0015	0.0015

1.0989	0.0074	0.0031	0.0015	0.0015
1.1538	0.0074	0.0033	0.0015	0.0015
1.2088	0.0074	0.0034	0.0015	0.0015
1.2637	0.0074	0.0036	0.0015	0.0015
1.3187	0.0074	0.0037	0.0015	0.0015
1.3736	0.0074	0.0039	0.0015	0.0015
1.4286	0.0074	0.0040	0.0015	0.0015
1.4835	0.0074	0.0042	0.0015	0.0015
1.5385	0.0074	0.0044	0.0015	0.0015
1.5934	0.0074	0.0045	0.0015	0.0015
1.6484	0.0074	0.0047	0.0015	0.0015
1.7033	0.0074	0.0049	0.0015	0.0015
1.7582	0.0074	0.0050	0.0015	0.0015
1.8132	0.0074	0.0052	0.0015	0.0015
1.8681	0.0074	0.0054	0.0015	0.0015
1.9231	0.0074	0.0055	0.0015	0.0015
1.9780	0.0074	0.0057	0.0015	0.0015
2.0330	0.0074	0.0059	0.0015	0.0015
2.0879	0.0074	0.0061	0.0015	0.0015
2.1429	0.0074	0.0062	0.0015	0.0015
2.1978	0.0074	0.0064	0.0015	0.0015
2.2527	0.0074	0.0066	0.0015	0.0015
2.3077	0.0074	0.0067	0.0015	0.0015
2.3626	0.0074	0.0069	0.0015	0.0015
2.4176	0.0074	0.0071	0.0015	0.0015
2.4725	0.0074	0.0072	0.0015	0.0015
2.5275	0.0074	0.0074	0.0015	0.0015
2.5824	0.0074	0.0076	0.0015	0.0015
2.6374	0.0074	0.0078	0.0015	0.0015
2.6923	0.0074	0.0079	0.0015	0.0015
2.7473	0.0074	0.0081	0.0015	0.0015
2.8022	0.0074	0.0083	0.0015	0.0015
2.8571	0.0074	0.0084	0.0015	0.0015
2.9121	0.0074	0.0086	0.0015	0.0015
2.9670	0.0074	0.0088	0.0015	0.0015
3.0220	0.0074	0.0089	0.0015	0.0015
3.0769	0.0074	0.0091	0.0015	0.0015
3.1319	0.0074	0.0093	0.0015	0.0015
3.1868	0.0074	0.0095	0.0015	0.0015
3.2418	0.0074	0.0096	0.0015	0.0015
3.2967	0.0074	0.0098	0.0015	0.0015
3.3516	0.0074	0.0100	0.0015	0.0015
3.4066	0.0074	0.0101	0.0015	0.0015
3.4615	0.0074	0.0103	0.0015	0.0015
3.5000	0.0074	0.0104	0.0015	0.0015

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.5000	0.0074	0.0104	0.0000	0.0389	0.0001
3.5549	0.0077	0.0108	0.0000	0.0389	0.0001
3.6099	0.0080	0.0113	0.0000	0.0432	0.0002
3.6648	0.0083	0.0117	0.0000	0.0463	0.0002
3.7198	0.0086	0.0122	0.0000	0.0495	0.0003
3.7747	0.0089	0.0127	0.0000	0.0529	0.0003
3.8297	0.0092	0.0131	0.0000	0.0563	0.0004
3.8846	0.0095	0.0137	0.0000	0.0578	0.0005
3.9396	0.0098	0.0142	0.0000	0.0578	0.0005
3.9945	0.0101	0.0147	0.0000	0.0578	0.0006

4.0495	0.0104	0.0153	0.0000	0.0578	0.0007
4.1044	0.0107	0.0159	0.0000	0.0578	0.0007
4.1593	0.0111	0.0165	0.0000	0.0578	0.0008
4.2143	0.0114	0.0171	0.0000	0.0578	0.0009
4.2692	0.0117	0.0177	0.0000	0.0578	0.0009
4.3242	0.0121	0.0184	0.0000	0.0578	0.0010
4.3791	0.0124	0.0191	0.0000	0.0578	0.0011
4.4341	0.0128	0.0198	0.0000	0.0578	0.0012
4.4890	0.0132	0.0205	0.0000	0.0578	0.0012
4.5440	0.0135	0.0212	0.0000	0.0578	0.0013
4.5989	0.0139	0.0220	0.0000	0.0578	0.0014
4.6538	0.0143	0.0227	0.0000	0.0578	0.0015
4.7088	0.0146	0.0235	0.0000	0.0578	0.0015
4.7637	0.0150	0.0243	0.0000	0.0578	0.0016
4.8187	0.0154	0.0252	0.0000	0.0578	0.0017
4.8736	0.0158	0.0260	0.0000	0.0578	0.0018
4.9286	0.0162	0.0269	0.0000	0.0578	0.0019
4.9835	0.0166	0.0278	0.0000	0.0578	0.0019
5.0000	0.0167	0.0281	0.0000	0.0578	0.0010

Bioretention 6

Bottom Length:	51.25 ft.
Bottom Width:	51.25 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	3
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	81.016
Total Volume Through Riser (ac-ft.):	5.27
Total Volume Through Facility (ac-ft.):	173.909
Percent Infiltrated:	46.59
Total Precip Applied to Facility:	5.899
Total Evap From Facility:	2.705
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	6
Offset (in.):	33
Flow Through Underdrain (ac-ft.):	87.623
Total Outflow (ac-ft.):	173.909
Percent Through Underdrain:	50.38
Discharge Structure	
Riser Height:	0.83 ft.
Riser Diameter:	12 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Vault 6	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0603	0.0000	0.0000	0.0000
0.0659	0.0603	0.0015	0.0000	0.0000
0.1319	0.0603	0.0030	0.0000	0.0000
0.1978	0.0603	0.0045	0.0000	0.0000
0.2637	0.0603	0.0060	0.0000	0.0000
0.3297	0.0603	0.0076	0.0000	0.0000
0.3956	0.0603	0.0091	0.0038	0.0038
0.4615	0.0603	0.0106	0.0122	0.0122
0.5275	0.0603	0.0121	0.0122	0.0122
0.5934	0.0603	0.0136	0.0122	0.0122
0.6593	0.0603	0.0151	0.0122	0.0122
0.7253	0.0603	0.0166	0.0122	0.0122
0.7912	0.0603	0.0181	0.0122	0.0122
0.8571	0.0603	0.0196	0.0122	0.0122
0.9231	0.0603	0.0212	0.0122	0.0122
0.9890	0.0603	0.0227	0.0122	0.0122
1.0549	0.0603	0.0242	0.0122	0.0122
1.1209	0.0603	0.0257	0.0122	0.0122
1.1868	0.0603	0.0272	0.0122	0.0122
1.2527	0.0603	0.0287	0.0122	0.0122

1.3187	0.0603	0.0302	0.0122	0.0122
1.3846	0.0603	0.0317	0.0122	0.0122
1.4505	0.0603	0.0332	0.0122	0.0122
1.5165	0.0603	0.0349	0.0122	0.0122
1.5824	0.0603	0.0365	0.0122	0.0122
1.6484	0.0603	0.0382	0.0122	0.0122
1.7143	0.0603	0.0398	0.0122	0.0122
1.7802	0.0603	0.0415	0.0122	0.0122
1.8462	0.0603	0.0431	0.0122	0.0122
1.9121	0.0603	0.0448	0.0122	0.0122
1.9780	0.0603	0.0464	0.0122	0.0122
2.0440	0.0603	0.0481	0.0122	0.0122
2.1099	0.0603	0.0497	0.0122	0.0122
2.1758	0.0603	0.0514	0.0122	0.0122
2.2418	0.0603	0.0530	0.0122	0.0122
2.3077	0.0603	0.0547	0.0122	0.0122
2.3736	0.0603	0.0563	0.0122	0.0122
2.4396	0.0603	0.0580	0.0122	0.0122
2.5055	0.0603	0.0596	0.0122	0.0122
2.5714	0.0603	0.0613	0.0122	0.0122
2.6374	0.0603	0.0629	0.0122	0.0122
2.7033	0.0603	0.0646	0.0122	0.0122
2.7692	0.0603	0.0662	0.0122	0.0122
2.8352	0.0603	0.0679	0.0122	0.0122
2.9011	0.0603	0.0695	0.0122	0.0122
2.9670	0.0603	0.0712	0.0122	0.0122
3.0330	0.0603	0.0728	0.0122	0.0122
3.0989	0.0603	0.0745	0.0122	0.0122
3.1648	0.0603	0.0761	0.0122	0.0122
3.2308	0.0603	0.0778	0.0122	0.0122
3.2967	0.0603	0.0794	0.0122	0.0122
3.3626	0.0603	0.0811	0.0122	0.0122
3.4286	0.0603	0.0827	0.0122	0.0122
3.4945	0.0603	0.0844	0.0122	0.0122
3.5604	0.0603	0.0860	0.0122	0.0122
3.6264	0.0603	0.0877	0.0122	0.0122
3.6923	0.0603	0.0893	0.0122	0.0122
3.7582	0.0603	0.0910	0.0122	0.0122
3.8242	0.0603	0.0926	0.0122	0.0122
3.8901	0.0603	0.0943	0.0122	0.0122
3.9560	0.0603	0.0959	0.0122	0.0122
4.0220	0.0603	0.0976	0.0122	0.0122
4.0879	0.0603	0.0992	0.0122	0.0122
4.1538	0.0603	0.1009	0.0122	0.0122
4.2198	0.0603	0.1025	0.0122	0.0122
4.2857	0.0603	0.1042	0.0122	0.0122
4.3516	0.0603	0.1058	0.0122	0.0122
4.4176	0.0603	0.1075	0.0122	0.0122
4.4835	0.0603	0.1091	0.0122	0.0122
4.5000	0.0603	0.1096	0.0122	0.0122

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
4.5000	0.0603	0.1096	0.0000	0.3088	0.0002
4.5659	0.0612	0.1136	0.0000	0.3088	0.0004
4.6319	0.0622	0.1176	0.0000	0.3411	0.0006
4.6978	0.0631	0.1218	0.0000	0.3603	0.0008
4.7637	0.0641	0.1260	0.0000	0.3799	0.0010

4.8297	0.0651	0.1302	0.0000	0.4000	0.0012
4.8956	0.0660	0.1345	0.0000	0.4206	0.0013
4.9615	0.0670	0.1389	0.0000	0.4417	0.0015
5.0275	0.0680	0.1434	0.0000	0.4633	0.0017
5.0934	0.0690	0.1479	0.0000	0.4723	0.0019
5.1593	0.0700	0.1525	0.0000	0.4723	0.0022
5.2253	0.0710	0.1571	0.0000	0.4723	0.0024
5.2912	0.0720	0.1618	0.0000	0.4723	0.0026
5.3571	0.0730	0.1666	0.0000	0.4723	0.0028
5.4231	0.0740	0.1715	0.0000	0.4723	0.0030
5.4890	0.0751	0.1764	0.0000	0.4723	0.0032
5.5549	0.0761	0.1814	0.0000	0.4723	0.0034
5.6209	0.0772	0.1864	0.0000	0.4723	0.0036
5.6868	0.0782	0.1915	0.0000	0.4723	0.0038
5.7527	0.0793	0.1967	0.0000	0.4723	0.0040
5.8187	0.0804	0.2020	0.0000	0.4723	0.0043
5.8846	0.0814	0.2073	0.0000	0.4723	0.0045
5.9505	0.0825	0.2127	0.0000	0.4723	0.0046
6.0000	0.0833	0.2168	0.0000	0.4723	0.0041

Bioretention 7

Bottom Length:	16.00 ft.
Bottom Width:	16.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	2
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.274
Total Volume Through Riser (ac-ft.):	0.118
Total Volume Through Facility (ac-ft.):	12.371
Percent Infiltrated:	50.72
Total Precip Applied to Facility:	0.572
Total Evap From Facility:	0.252
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	21
Flow Through Underdrain (ac-ft.):	5.979
Total Outflow (ac-ft.):	12.371
Percent Through Underdrain:	48.33
Discharge Structure	
Riser Height:	0.83 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	
Vault 1	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0059	0.0000	0.0000	0.0000
0.0549	0.0059	0.0001	0.0000	0.0000
0.1099	0.0059	0.0002	0.0000	0.0000
0.1648	0.0059	0.0004	0.0000	0.0000
0.2198	0.0059	0.0005	0.0000	0.0000
0.2747	0.0059	0.0006	0.0000	0.0000
0.3297	0.0059	0.0007	0.0000	0.0000
0.3846	0.0059	0.0009	0.0007	0.0007
0.4396	0.0059	0.0010	0.0012	0.0012
0.4945	0.0059	0.0011	0.0012	0.0012
0.5495	0.0059	0.0012	0.0012	0.0012
0.6044	0.0059	0.0013	0.0012	0.0012
0.6593	0.0059	0.0015	0.0012	0.0012
0.7143	0.0059	0.0016	0.0012	0.0012
0.7692	0.0059	0.0017	0.0012	0.0012
0.8242	0.0059	0.0018	0.0012	0.0012
0.8791	0.0059	0.0020	0.0012	0.0012
0.9341	0.0059	0.0021	0.0012	0.0012
0.9890	0.0059	0.0022	0.0012	0.0012
1.0440	0.0059	0.0023	0.0012	0.0012

1.0989	0.0059	0.0025	0.0012	0.0012
1.1538	0.0059	0.0026	0.0012	0.0012
1.2088	0.0059	0.0027	0.0012	0.0012
1.2637	0.0059	0.0028	0.0012	0.0012
1.3187	0.0059	0.0029	0.0012	0.0012
1.3736	0.0059	0.0031	0.0012	0.0012
1.4286	0.0059	0.0032	0.0012	0.0012
1.4835	0.0059	0.0033	0.0012	0.0012
1.5385	0.0059	0.0034	0.0012	0.0012
1.5934	0.0059	0.0036	0.0012	0.0012
1.6484	0.0059	0.0037	0.0012	0.0012
1.7033	0.0059	0.0038	0.0012	0.0012
1.7582	0.0059	0.0040	0.0012	0.0012
1.8132	0.0059	0.0041	0.0012	0.0012
1.8681	0.0059	0.0043	0.0012	0.0012
1.9231	0.0059	0.0044	0.0012	0.0012
1.9780	0.0059	0.0045	0.0012	0.0012
2.0330	0.0059	0.0047	0.0012	0.0012
2.0879	0.0059	0.0048	0.0012	0.0012
2.1429	0.0059	0.0049	0.0012	0.0012
2.1978	0.0059	0.0051	0.0012	0.0012
2.2527	0.0059	0.0052	0.0012	0.0012
2.3077	0.0059	0.0053	0.0012	0.0012
2.3626	0.0059	0.0055	0.0012	0.0012
2.4176	0.0059	0.0056	0.0012	0.0012
2.4725	0.0059	0.0057	0.0012	0.0012
2.5275	0.0059	0.0059	0.0012	0.0012
2.5824	0.0059	0.0060	0.0012	0.0012
2.6374	0.0059	0.0061	0.0012	0.0012
2.6923	0.0059	0.0063	0.0012	0.0012
2.7473	0.0059	0.0064	0.0012	0.0012
2.8022	0.0059	0.0065	0.0012	0.0012
2.8571	0.0059	0.0067	0.0012	0.0012
2.9121	0.0059	0.0068	0.0012	0.0012
2.9670	0.0059	0.0069	0.0012	0.0012
3.0220	0.0059	0.0071	0.0012	0.0012
3.0769	0.0059	0.0072	0.0012	0.0012
3.1319	0.0059	0.0073	0.0012	0.0012
3.1868	0.0059	0.0075	0.0012	0.0012
3.2418	0.0059	0.0076	0.0012	0.0012
3.2967	0.0059	0.0077	0.0012	0.0012
3.3516	0.0059	0.0079	0.0012	0.0012
3.4066	0.0059	0.0080	0.0012	0.0012
3.4615	0.0059	0.0081	0.0012	0.0012
3.5000	0.0059	0.0082	0.0012	0.0012

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.5000	0.0059	0.0082	0.0000	0.0309	0.0000
3.5549	0.0061	0.0086	0.0000	0.0309	0.0001
3.6099	0.0064	0.0089	0.0000	0.0345	0.0002
3.6648	0.0066	0.0093	0.0000	0.0371	0.0002
3.7198	0.0069	0.0096	0.0000	0.0398	0.0003
3.7747	0.0072	0.0100	0.0000	0.0427	0.0003
3.8297	0.0074	0.0104	0.0000	0.0456	0.0004
3.8846	0.0077	0.0108	0.0000	0.0460	0.0004
3.9396	0.0080	0.0113	0.0000	0.0460	0.0005
3.9945	0.0083	0.0117	0.0000	0.0460	0.0005

4.0495	0.0085	0.0122	0.0000	0.0460	0.0006
4.1044	0.0088	0.0126	0.0000	0.0460	0.0007
4.1593	0.0091	0.0131	0.0000	0.0460	0.0007
4.2143	0.0094	0.0137	0.0000	0.0460	0.0008
4.2692	0.0098	0.0142	0.0000	0.0460	0.0008
4.3242	0.0101	0.0147	0.0000	0.0460	0.0009
4.3791	0.0104	0.0153	0.0000	0.0460	0.0010
4.4341	0.0107	0.0159	0.0000	0.0460	0.0010
4.4890	0.0110	0.0165	0.0000	0.0460	0.0011
4.5440	0.0114	0.0171	0.0000	0.0460	0.0012
4.5989	0.0117	0.0177	0.0000	0.0460	0.0012
4.6538	0.0121	0.0184	0.0000	0.0460	0.0013
4.7088	0.0124	0.0190	0.0000	0.0460	0.0014
4.7637	0.0128	0.0197	0.0000	0.0460	0.0015
4.8187	0.0131	0.0204	0.0000	0.0460	0.0015
4.8736	0.0135	0.0212	0.0000	0.0460	0.0016
4.9286	0.0139	0.0219	0.0000	0.0460	0.0017
4.9835	0.0142	0.0227	0.0000	0.0460	0.0017
5.0000	0.0143	0.0229	0.0000	0.0460	0.0009

Bioretention 8

Bottom Length:	19.00 ft.
Bottom Width:	19.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	7.123
Total Volume Through Riser (ac-ft.):	0.399
Total Volume Through Facility (ac-ft.):	18.792
Percent Infiltrated:	37.9
Total Precip Applied to Facility:	0.804
Total Evap From Facility:	0.379
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	11.27
Total Outflow (ac-ft.):	18.792
Percent Through Underdrain:	59.97
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0083	0.0000	0.0000	0.0000
0.0440	0.0083	0.0001	0.0000	0.0000
0.0879	0.0083	0.0003	0.0000	0.0000
0.1319	0.0083	0.0004	0.0000	0.0000
0.1758	0.0083	0.0006	0.0000	0.0000
0.2198	0.0083	0.0007	0.0000	0.0000
0.2637	0.0083	0.0008	0.0000	0.0000
0.3077	0.0083	0.0010	0.0000	0.0000
0.3516	0.0083	0.0011	0.0000	0.0000
0.3956	0.0083	0.0012	0.0000	0.0000
0.4396	0.0083	0.0014	0.0000	0.0017
0.4835	0.0083	0.0015	0.0000	0.0017
0.5275	0.0083	0.0017	0.0000	0.0017
0.5714	0.0083	0.0018	0.0000	0.0017
0.6154	0.0083	0.0019	0.0000	0.0017
0.6593	0.0083	0.0021	0.0000	0.0017
0.7033	0.0083	0.0022	0.0000	0.0017
0.7473	0.0083	0.0024	0.0000	0.0017
0.7912	0.0083	0.0025	0.0000	0.0017
0.8352	0.0083	0.0026	0.0000	0.0017

0.8791	0.0083	0.0028	0.0000	0.0017
0.9231	0.0083	0.0029	0.0000	0.0017
0.9670	0.0083	0.0030	0.0000	0.0017
1.0110	0.0083	0.0032	0.0000	0.0017
1.0549	0.0083	0.0033	0.0000	0.0017
1.0989	0.0083	0.0035	0.0000	0.0017
1.1429	0.0083	0.0036	0.0000	0.0017
1.1868	0.0083	0.0037	0.0000	0.0017
1.2308	0.0083	0.0039	0.0000	0.0017
1.2747	0.0083	0.0040	0.0000	0.0017
1.3187	0.0083	0.0042	0.0000	0.0017
1.3626	0.0083	0.0043	0.0000	0.0017
1.4066	0.0083	0.0044	0.0000	0.0017
1.4505	0.0083	0.0046	0.0000	0.0017
1.4945	0.0083	0.0047	0.0000	0.0017
1.5385	0.0083	0.0049	0.0000	0.0017
1.5824	0.0083	0.0050	0.0000	0.0017
1.6264	0.0083	0.0052	0.0000	0.0017
1.6703	0.0083	0.0053	0.0000	0.0017
1.7143	0.0083	0.0055	0.0000	0.0017
1.7582	0.0083	0.0056	0.0000	0.0017
1.8022	0.0083	0.0058	0.0000	0.0017
1.8462	0.0083	0.0059	0.0120	0.0017
1.8901	0.0083	0.0061	0.0181	0.0017
1.9341	0.0083	0.0062	0.0191	0.0017
1.9780	0.0083	0.0064	0.0211	0.0017
2.0220	0.0083	0.0065	0.0221	0.0017
2.0659	0.0083	0.0067	0.0243	0.0017
2.1099	0.0083	0.0068	0.0266	0.0017
2.1538	0.0083	0.0070	0.0278	0.0017
2.1978	0.0083	0.0071	0.0303	0.0017
2.2418	0.0083	0.0073	0.0329	0.0017
2.2857	0.0083	0.0074	0.0342	0.0017
2.3297	0.0083	0.0076	0.0370	0.0017
2.3736	0.0083	0.0077	0.0384	0.0017
2.4176	0.0083	0.0079	0.0398	0.0017
2.4615	0.0083	0.0080	0.0416	0.0017
2.5000	0.0083	0.0082	0.0540	0.0017

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0083	0.0082	0.0000	0.0430	0.0000
2.5440	0.0085	0.0085	0.0000	0.0430	0.0001
2.5879	0.0088	0.0089	0.0000	0.0467	0.0001
2.6319	0.0090	0.0093	0.0000	0.0493	0.0002
2.6758	0.0092	0.0097	0.0000	0.0520	0.0002
2.7198	0.0095	0.0101	0.0000	0.0548	0.0003
2.7637	0.0097	0.0105	0.0000	0.0557	0.0003
2.8077	0.0100	0.0110	0.0000	0.0557	0.0004
2.8516	0.0102	0.0114	0.0000	0.0557	0.0004
2.8956	0.0105	0.0119	0.0000	0.0557	0.0005
2.9396	0.0107	0.0123	0.0000	0.0557	0.0005
2.9835	0.0110	0.0128	0.0000	0.0557	0.0006
3.0275	0.0113	0.0133	0.0241	0.0557	0.0007
3.0714	0.0115	0.0138	0.0996	0.0557	0.0007
3.1154	0.0118	0.0143	0.1943	0.0557	0.0008
3.1593	0.0121	0.0148	0.2845	0.0557	0.0008
3.2033	0.0124	0.0154	0.3503	0.0557	0.0009

3.2473	0.0127	0.0159	0.3877	0.0557	0.0009
3.2912	0.0129	0.0165	0.4249	0.0557	0.0010
3.3352	0.0132	0.0171	0.4559	0.0557	0.0011
3.3791	0.0135	0.0177	0.4848	0.0557	0.0011
3.4231	0.0138	0.0183	0.5122	0.0557	0.0012
3.4670	0.0141	0.0189	0.5381	0.0557	0.0012
3.5110	0.0144	0.0195	0.5629	0.0557	0.0013
3.5549	0.0147	0.0201	0.5866	0.0557	0.0014
3.5989	0.0150	0.0208	0.6094	0.0557	0.0014
3.6429	0.0153	0.0215	0.6313	0.0557	0.0015
3.6868	0.0157	0.0221	0.6526	0.0557	0.0016
3.7308	0.0160	0.0228	0.6731	0.0557	0.0016
3.7747	0.0163	0.0236	0.6931	0.0557	0.0017
3.8187	0.0166	0.0243	0.7125	0.0557	0.0017
3.8626	0.0170	0.0250	0.7313	0.0557	0.0018
3.9066	0.0173	0.0258	0.7497	0.0557	0.0019
3.9505	0.0176	0.0265	0.7677	0.0557	0.0019
3.9945	0.0180	0.0273	0.7852	0.0557	0.0020
4.0000	0.0180	0.0274	0.8024	0.0557	0.0012

Bioretention 9

Bottom Length:	19.49 ft.
Bottom Width:	19.49 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.169
Total Volume Through Riser (ac-ft.):	0.05
Total Volume Through Facility (ac-ft.):	11.953
Percent Infiltrated:	51.61
Total Precip Applied to Facility:	0.816
Total Evap From Facility:	0.384
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	5.734
Total Outflow (ac-ft.):	11.953
Percent Through Underdrain:	47.97
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0087	0.0000	0.0000	0.0000
0.0440	0.0087	0.0001	0.0000	0.0000
0.0879	0.0087	0.0003	0.0000	0.0000
0.1319	0.0087	0.0004	0.0000	0.0000
0.1758	0.0087	0.0006	0.0000	0.0000
0.2198	0.0087	0.0007	0.0000	0.0000
0.2637	0.0087	0.0009	0.0000	0.0000
0.3077	0.0087	0.0010	0.0000	0.0000
0.3516	0.0087	0.0012	0.0000	0.0000
0.3956	0.0087	0.0013	0.0000	0.0000
0.4396	0.0087	0.0015	0.0000	0.0018
0.4835	0.0087	0.0016	0.0000	0.0018
0.5275	0.0087	0.0017	0.0000	0.0018
0.5714	0.0087	0.0019	0.0000	0.0018
0.6154	0.0087	0.0020	0.0000	0.0018
0.6593	0.0087	0.0022	0.0000	0.0018
0.7033	0.0087	0.0023	0.0000	0.0018
0.7473	0.0087	0.0025	0.0000	0.0018
0.7912	0.0087	0.0026	0.0000	0.0018
0.8352	0.0087	0.0028	0.0000	0.0018

0.8791	0.0087	0.0029	0.0000	0.0018
0.9231	0.0087	0.0031	0.0000	0.0018
0.9670	0.0087	0.0032	0.0000	0.0018
1.0110	0.0087	0.0034	0.0000	0.0018
1.0549	0.0087	0.0035	0.0000	0.0018
1.0989	0.0087	0.0036	0.0000	0.0018
1.1429	0.0087	0.0038	0.0000	0.0018
1.1868	0.0087	0.0039	0.0000	0.0018
1.2308	0.0087	0.0041	0.0000	0.0018
1.2747	0.0087	0.0042	0.0000	0.0018
1.3187	0.0087	0.0044	0.0000	0.0018
1.3626	0.0087	0.0045	0.0000	0.0018
1.4066	0.0087	0.0047	0.0000	0.0018
1.4505	0.0087	0.0048	0.0000	0.0018
1.4945	0.0087	0.0050	0.0000	0.0018
1.5385	0.0087	0.0051	0.0000	0.0018
1.5824	0.0087	0.0053	0.0000	0.0018
1.6264	0.0087	0.0054	0.0000	0.0018
1.6703	0.0087	0.0056	0.0000	0.0018
1.7143	0.0087	0.0058	0.0000	0.0018
1.7582	0.0087	0.0059	0.0000	0.0018
1.8022	0.0087	0.0061	0.0000	0.0018
1.8462	0.0087	0.0062	0.0120	0.0018
1.8901	0.0087	0.0064	0.0191	0.0018
1.9341	0.0087	0.0065	0.0201	0.0018
1.9780	0.0087	0.0067	0.0211	0.0018
2.0220	0.0087	0.0069	0.0233	0.0018
2.0659	0.0087	0.0070	0.0256	0.0018
2.1099	0.0087	0.0072	0.0280	0.0018
2.1538	0.0087	0.0073	0.0293	0.0018
2.1978	0.0087	0.0075	0.0319	0.0018
2.2418	0.0087	0.0077	0.0332	0.0018
2.2857	0.0087	0.0078	0.0360	0.0018
2.3297	0.0087	0.0080	0.0374	0.0018
2.3736	0.0087	0.0081	0.0404	0.0018
2.4176	0.0087	0.0083	0.0419	0.0018
2.4615	0.0087	0.0085	0.0448	0.0018
2.5000	0.0087	0.0086	0.0563	0.0018

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0087	0.0086	0.0000	0.0452	0.0000
2.5440	0.0090	0.0090	0.0000	0.0452	0.0001
2.5879	0.0092	0.0094	0.0000	0.0491	0.0001
2.6319	0.0094	0.0098	0.0000	0.0518	0.0002
2.6758	0.0097	0.0102	0.0000	0.0546	0.0002
2.7198	0.0099	0.0106	0.0000	0.0575	0.0003
2.7637	0.0102	0.0111	0.0000	0.0581	0.0003
2.8077	0.0105	0.0115	0.0000	0.0581	0.0004
2.8516	0.0107	0.0120	0.0000	0.0581	0.0005
2.8956	0.0110	0.0125	0.0000	0.0581	0.0005
2.9396	0.0112	0.0130	0.0000	0.0581	0.0006
2.9835	0.0115	0.0135	0.0000	0.0581	0.0006
3.0275	0.0118	0.0140	0.0241	0.0581	0.0007
3.0714	0.0121	0.0145	0.0996	0.0581	0.0007
3.1154	0.0123	0.0150	0.1943	0.0581	0.0008
3.1593	0.0126	0.0156	0.2845	0.0581	0.0008
3.2033	0.0129	0.0162	0.3503	0.0581	0.0009

3.2473	0.0132	0.0167	0.3877	0.0581	0.0010
3.2912	0.0135	0.0173	0.4249	0.0581	0.0010
3.3352	0.0138	0.0179	0.4559	0.0581	0.0011
3.3791	0.0141	0.0185	0.4848	0.0581	0.0011
3.4231	0.0144	0.0192	0.5122	0.0581	0.0012
3.4670	0.0147	0.0198	0.5381	0.0581	0.0013
3.5110	0.0150	0.0204	0.5629	0.0581	0.0013
3.5549	0.0153	0.0211	0.5866	0.0581	0.0014
3.5989	0.0156	0.0218	0.6094	0.0581	0.0015
3.6429	0.0159	0.0225	0.6313	0.0581	0.0015
3.6868	0.0163	0.0232	0.6526	0.0581	0.0016
3.7308	0.0166	0.0239	0.6731	0.0581	0.0017
3.7747	0.0169	0.0246	0.6931	0.0581	0.0017
3.8187	0.0172	0.0254	0.7125	0.0581	0.0018
3.8626	0.0176	0.0262	0.7313	0.0581	0.0019
3.9066	0.0179	0.0269	0.7497	0.0581	0.0019
3.9505	0.0183	0.0277	0.7677	0.0581	0.0020
3.9945	0.0186	0.0286	0.7852	0.0581	0.0020
4.0000	0.0186	0.0287	0.8024	0.0581	0.0012

Bioretention 10

Bottom Length:	19.49 ft.
Bottom Width:	19.49 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	6.142
Total Volume Through Riser (ac-ft.):	0.03
Total Volume Through Facility (ac-ft.):	11.42
Percent Infiltrated:	53.78
Total Precip Applied to Facility:	0.814
Total Evap From Facility:	0.384
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	5.248
Total Outflow (ac-ft.):	11.42
Percent Through Underdrain:	45.95
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	6 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0087	0.0000	0.0000	0.0000
0.0440	0.0087	0.0001	0.0000	0.0000
0.0879	0.0087	0.0003	0.0000	0.0000
0.1319	0.0087	0.0004	0.0000	0.0000
0.1758	0.0087	0.0006	0.0000	0.0000
0.2198	0.0087	0.0007	0.0000	0.0000
0.2637	0.0087	0.0009	0.0000	0.0000
0.3077	0.0087	0.0010	0.0000	0.0000
0.3516	0.0087	0.0012	0.0000	0.0000
0.3956	0.0087	0.0013	0.0000	0.0000
0.4396	0.0087	0.0015	0.0000	0.0018
0.4835	0.0087	0.0016	0.0000	0.0018
0.5275	0.0087	0.0017	0.0000	0.0018
0.5714	0.0087	0.0019	0.0000	0.0018
0.6154	0.0087	0.0020	0.0000	0.0018
0.6593	0.0087	0.0022	0.0000	0.0018
0.7033	0.0087	0.0023	0.0000	0.0018
0.7473	0.0087	0.0025	0.0000	0.0018
0.7912	0.0087	0.0026	0.0000	0.0018
0.8352	0.0087	0.0028	0.0000	0.0018

0.8791	0.0087	0.0029	0.0000	0.0018
0.9231	0.0087	0.0031	0.0000	0.0018
0.9670	0.0087	0.0032	0.0000	0.0018
1.0110	0.0087	0.0034	0.0000	0.0018
1.0549	0.0087	0.0035	0.0000	0.0018
1.0989	0.0087	0.0036	0.0000	0.0018
1.1429	0.0087	0.0038	0.0000	0.0018
1.1868	0.0087	0.0039	0.0000	0.0018
1.2308	0.0087	0.0041	0.0000	0.0018
1.2747	0.0087	0.0042	0.0000	0.0018
1.3187	0.0087	0.0044	0.0000	0.0018
1.3626	0.0087	0.0045	0.0000	0.0018
1.4066	0.0087	0.0047	0.0000	0.0018
1.4505	0.0087	0.0048	0.0000	0.0018
1.4945	0.0087	0.0050	0.0000	0.0018
1.5385	0.0087	0.0051	0.0000	0.0018
1.5824	0.0087	0.0053	0.0000	0.0018
1.6264	0.0087	0.0054	0.0000	0.0018
1.6703	0.0087	0.0056	0.0000	0.0018
1.7143	0.0087	0.0058	0.0000	0.0018
1.7582	0.0087	0.0059	0.0000	0.0018
1.8022	0.0087	0.0061	0.0000	0.0018
1.8462	0.0087	0.0062	0.0120	0.0018
1.8901	0.0087	0.0064	0.0191	0.0018
1.9341	0.0087	0.0065	0.0201	0.0018
1.9780	0.0087	0.0067	0.0211	0.0018
2.0220	0.0087	0.0069	0.0233	0.0018
2.0659	0.0087	0.0070	0.0256	0.0018
2.1099	0.0087	0.0072	0.0280	0.0018
2.1538	0.0087	0.0073	0.0293	0.0018
2.1978	0.0087	0.0075	0.0319	0.0018
2.2418	0.0087	0.0077	0.0332	0.0018
2.2857	0.0087	0.0078	0.0360	0.0018
2.3297	0.0087	0.0080	0.0374	0.0018
2.3736	0.0087	0.0081	0.0404	0.0018
2.4176	0.0087	0.0083	0.0419	0.0018
2.4615	0.0087	0.0085	0.0448	0.0018
2.5000	0.0087	0.0086	0.0563	0.0018

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0087	0.0086	0.0000	0.0452	0.0000
2.5440	0.0090	0.0090	0.0000	0.0452	0.0001
2.5879	0.0092	0.0094	0.0000	0.0491	0.0001
2.6319	0.0094	0.0098	0.0000	0.0518	0.0002
2.6758	0.0097	0.0102	0.0000	0.0546	0.0002
2.7198	0.0099	0.0106	0.0000	0.0575	0.0003
2.7637	0.0102	0.0111	0.0000	0.0581	0.0003
2.8077	0.0105	0.0115	0.0000	0.0581	0.0004
2.8516	0.0107	0.0120	0.0000	0.0581	0.0005
2.8956	0.0110	0.0125	0.0000	0.0581	0.0005
2.9396	0.0112	0.0130	0.0000	0.0581	0.0006
2.9835	0.0115	0.0135	0.0000	0.0581	0.0006
3.0275	0.0118	0.0140	0.0241	0.0581	0.0007
3.0714	0.0121	0.0145	0.0996	0.0581	0.0007
3.1154	0.0123	0.0150	0.1943	0.0581	0.0008
3.1593	0.0126	0.0156	0.2845	0.0581	0.0008
3.2033	0.0129	0.0162	0.3503	0.0581	0.0009

3.2473	0.0132	0.0167	0.3877	0.0581	0.0010
3.2912	0.0135	0.0173	0.4249	0.0581	0.0010
3.3352	0.0138	0.0179	0.4559	0.0581	0.0011
3.3791	0.0141	0.0185	0.4848	0.0581	0.0011
3.4231	0.0144	0.0192	0.5122	0.0581	0.0012
3.4670	0.0147	0.0198	0.5381	0.0581	0.0013
3.5110	0.0150	0.0204	0.5629	0.0581	0.0013
3.5549	0.0153	0.0211	0.5866	0.0581	0.0014
3.5989	0.0156	0.0218	0.6094	0.0581	0.0015
3.6429	0.0159	0.0225	0.6313	0.0581	0.0015
3.6868	0.0163	0.0232	0.6526	0.0581	0.0016
3.7308	0.0166	0.0239	0.6731	0.0581	0.0017
3.7747	0.0169	0.0246	0.6931	0.0581	0.0017
3.8187	0.0172	0.0254	0.7125	0.0581	0.0018
3.8626	0.0176	0.0262	0.7313	0.0581	0.0019
3.9066	0.0179	0.0269	0.7497	0.0581	0.0019
3.9505	0.0183	0.0277	0.7677	0.0581	0.0020
3.9945	0.0186	0.0286	0.7852	0.0581	0.0020
4.0000	0.0186	0.0287	0.8024	0.0581	0.0012

Vault 1

Width: 16 ft.
Length: 46 ft.
Depth: 4 ft.
Infiltration On
Infiltration rate: 0.2
Infiltration reduction factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 10.081
Total Volume Through Riser (ac-ft.): 44.72
Total Volume Through Facility (ac-ft.): 54.802
Percent Infiltrated: 18.4
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 3.5 ft.
Riser Diameter: 8 in.
Orifice 1 Diameter: 6.000 in. Elevation:1 ft.
Orifice 2 Diameter: 1.500 in. Elevation:2 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.016	0.000	0.000	0.000
0.0444	0.016	0.000	0.000	0.003
0.0889	0.016	0.001	0.000	0.003
0.1333	0.016	0.002	0.000	0.003
0.1778	0.016	0.003	0.000	0.003
0.2222	0.016	0.003	0.000	0.003
0.2667	0.016	0.004	0.000	0.003
0.3111	0.016	0.005	0.000	0.003
0.3556	0.016	0.006	0.000	0.003
0.4000	0.016	0.006	0.000	0.003
0.4444	0.016	0.007	0.000	0.003
0.4889	0.016	0.008	0.000	0.003
0.5333	0.016	0.009	0.000	0.003
0.5778	0.016	0.009	0.000	0.003
0.6222	0.016	0.010	0.000	0.003
0.6667	0.016	0.011	0.000	0.003
0.7111	0.016	0.012	0.000	0.003
0.7556	0.016	0.012	0.000	0.003
0.8000	0.016	0.013	0.000	0.003
0.8444	0.016	0.014	0.000	0.003
0.8889	0.016	0.015	0.000	0.003
0.9333	0.016	0.015	0.000	0.003
0.9778	0.016	0.016	0.000	0.003
1.0222	0.016	0.017	0.145	0.003
1.0667	0.016	0.018	0.252	0.003
1.1111	0.016	0.018	0.325	0.003
1.1556	0.016	0.019	0.385	0.003
1.2000	0.016	0.020	0.436	0.003
1.2444	0.016	0.021	0.483	0.003
1.2889	0.016	0.021	0.525	0.003

1.3333	0.016	0.022	0.564	0.003
1.3778	0.016	0.023	0.600	0.003
1.4222	0.016	0.024	0.634	0.003
1.4667	0.016	0.024	0.667	0.003
1.5111	0.016	0.025	0.698	0.003
1.5556	0.016	0.026	0.728	0.003
1.6000	0.016	0.027	0.756	0.003
1.6444	0.016	0.027	0.784	0.003
1.6889	0.016	0.028	0.810	0.003
1.7333	0.016	0.029	0.836	0.003
1.7778	0.016	0.030	0.861	0.003
1.8222	0.016	0.030	0.885	0.003
1.8667	0.016	0.031	0.909	0.003
1.9111	0.016	0.032	0.932	0.003
1.9556	0.016	0.033	0.955	0.003
2.0000	0.016	0.033	0.976	0.003
2.0444	0.016	0.034	1.011	0.003
2.0889	0.016	0.035	1.037	0.003
2.1333	0.016	0.036	1.062	0.003
2.1778	0.016	0.036	1.086	0.003
2.2222	0.016	0.037	1.108	0.003
2.2667	0.016	0.038	1.131	0.003
2.3111	0.016	0.039	1.152	0.003
2.3556	0.016	0.039	1.173	0.003
2.4000	0.016	0.040	1.194	0.003
2.4444	0.016	0.041	1.214	0.003
2.4889	0.016	0.042	1.234	0.003
2.5333	0.016	0.042	1.254	0.003
2.5778	0.016	0.043	1.273	0.003
2.6222	0.016	0.044	1.292	0.003
2.6667	0.016	0.045	1.311	0.003
2.7111	0.016	0.045	1.329	0.003
2.7556	0.016	0.046	1.347	0.003
2.8000	0.016	0.047	1.365	0.003
2.8444	0.016	0.048	1.382	0.003
2.8889	0.016	0.048	1.400	0.003
2.9333	0.016	0.049	1.417	0.003
2.9778	0.016	0.050	1.434	0.003
3.0222	0.016	0.051	1.451	0.003
3.0667	0.016	0.051	1.467	0.003
3.1111	0.016	0.052	1.483	0.003
3.1556	0.016	0.053	1.499	0.003
3.2000	0.016	0.054	1.515	0.003
3.2444	0.016	0.054	1.531	0.003
3.2889	0.016	0.055	1.547	0.003
3.3333	0.016	0.056	1.562	0.003
3.3778	0.016	0.057	1.578	0.003
3.4222	0.016	0.057	1.593	0.003
3.4667	0.016	0.058	1.608	0.003
3.5111	0.016	0.059	1.631	0.003
3.5556	0.016	0.060	1.730	0.003
3.6000	0.016	0.060	1.871	0.003
3.6444	0.016	0.061	2.034	0.003
3.6889	0.016	0.062	2.195	0.003
3.7333	0.016	0.063	2.335	0.003
3.7778	0.016	0.063	2.440	0.003
3.8222	0.016	0.064	2.511	0.003
3.8667	0.016	0.065	2.585	0.003

3.9111	0.016	0.066	2.648	0.003
3.9556	0.016	0.066	2.709	0.003
4.0000	0.016	0.067	2.768	0.003
4.0444	0.016	0.068	2.824	0.003
4.0889	0.000	0.000	2.879	0.000

Vault 6

Width: 26.333 ft.
Length: 186 ft.
Depth: 4 ft.
Infiltration On
Infiltration rate: 0.2
Infiltration reduction factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 61.593
Total Volume Through Riser (ac-ft.): 31.306
Total Volume Through Facility (ac-ft.): 92.899
Percent Infiltrated: 66.3
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 3.5 ft.
Riser Diameter: 8 in.
Orifice 1 Diameter: 6.000 in. Elevation:1.75 ft.
Orifice 2 Diameter: 1.500 in. Elevation:2 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.112	0.000	0.000	0.000
0.0444	0.112	0.005	0.000	0.022
0.0889	0.112	0.010	0.000	0.022
0.1333	0.112	0.015	0.000	0.022
0.1778	0.112	0.020	0.000	0.022
0.2222	0.112	0.025	0.000	0.022
0.2667	0.112	0.030	0.000	0.022
0.3111	0.112	0.035	0.000	0.022
0.3556	0.112	0.040	0.000	0.022
0.4000	0.112	0.045	0.000	0.022
0.4444	0.112	0.050	0.000	0.022
0.4889	0.112	0.055	0.000	0.022
0.5333	0.112	0.060	0.000	0.022
0.5778	0.112	0.065	0.000	0.022
0.6222	0.112	0.070	0.000	0.022
0.6667	0.112	0.075	0.000	0.022
0.7111	0.112	0.080	0.000	0.022
0.7556	0.112	0.085	0.000	0.022
0.8000	0.112	0.090	0.000	0.022
0.8444	0.112	0.095	0.000	0.022
0.8889	0.112	0.099	0.000	0.022
0.9333	0.112	0.104	0.000	0.022
0.9778	0.112	0.109	0.000	0.022
1.0222	0.112	0.114	0.000	0.022
1.0667	0.112	0.119	0.000	0.022
1.1111	0.112	0.124	0.000	0.022
1.1556	0.112	0.129	0.000	0.022
1.2000	0.112	0.134	0.000	0.022
1.2444	0.112	0.139	0.000	0.022
1.2889	0.112	0.144	0.000	0.022

1.3333	0.112	0.149	0.000	0.022
1.3778	0.112	0.154	0.000	0.022
1.4222	0.112	0.159	0.000	0.022
1.4667	0.112	0.164	0.000	0.022
1.5111	0.112	0.169	0.000	0.022
1.5556	0.112	0.174	0.000	0.022
1.6000	0.112	0.179	0.000	0.022
1.6444	0.112	0.184	0.000	0.022
1.6889	0.112	0.189	0.000	0.022
1.7333	0.112	0.194	0.000	0.022
1.7778	0.112	0.199	0.162	0.022
1.8222	0.112	0.204	0.262	0.022
1.8667	0.112	0.209	0.333	0.022
1.9111	0.112	0.214	0.392	0.022
1.9556	0.112	0.219	0.442	0.022
2.0000	0.112	0.224	0.488	0.022
2.0444	0.112	0.229	0.543	0.022
2.0889	0.112	0.234	0.586	0.022
2.1333	0.112	0.239	0.627	0.022
2.1778	0.112	0.244	0.664	0.022
2.2222	0.112	0.249	0.700	0.022
2.2667	0.112	0.254	0.733	0.022
2.3111	0.112	0.259	0.765	0.022
2.3556	0.112	0.264	0.796	0.022
2.4000	0.112	0.269	0.826	0.022
2.4444	0.112	0.274	0.854	0.022
2.4889	0.112	0.279	0.882	0.022
2.5333	0.112	0.284	0.909	0.022
2.5778	0.112	0.289	0.935	0.022
2.6222	0.112	0.294	0.960	0.022
2.6667	0.112	0.299	0.985	0.022
2.7111	0.112	0.304	1.009	0.022
2.7556	0.112	0.309	1.032	0.022
2.8000	0.112	0.314	1.055	0.022
2.8444	0.112	0.319	1.078	0.022
2.8889	0.112	0.324	1.100	0.022
2.9333	0.112	0.329	1.121	0.022
2.9778	0.112	0.334	1.142	0.022
3.0222	0.112	0.339	1.163	0.022
3.0667	0.112	0.344	1.184	0.022
3.1111	0.112	0.349	1.204	0.022
3.1556	0.112	0.354	1.223	0.022
3.2000	0.112	0.359	1.243	0.022
3.2444	0.112	0.364	1.262	0.022
3.2889	0.112	0.369	1.281	0.022
3.3333	0.112	0.374	1.299	0.022
3.3778	0.112	0.379	1.318	0.022
3.4222	0.112	0.384	1.336	0.022
3.4667	0.112	0.389	1.353	0.022
3.5111	0.112	0.394	1.379	0.022
3.5556	0.112	0.399	1.481	0.022
3.6000	0.112	0.404	1.625	0.022
3.6444	0.112	0.409	1.790	0.022
3.6889	0.112	0.414	1.953	0.022
3.7333	0.112	0.419	2.095	0.022
3.7778	0.112	0.424	2.203	0.022
3.8222	0.112	0.429	2.276	0.022
3.8667	0.112	0.434	2.352	0.022

3.9111	0.112	0.439	2.418	0.022
3.9556	0.112	0.444	2.481	0.022
4.0000	0.112	0.449	2.541	0.022
4.0444	0.112	0.454	2.600	0.022
4.0889	0.000	0.000	2.656	0.000

Bioretention 11

Bottom Length:	50.00 ft.
Bottom Width:	7.50 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1.5
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Total Volume Infiltrated (ac-ft.):	9.735
Total Volume Through Riser (ac-ft.):	2.095
Total Volume Through Facility (ac-ft.):	25.689
Percent Infiltrated:	37.9
Total Precip Applied to Facility:	0.912
Total Evap From Facility:	0.438
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2.5
Offset (in.):	15
Flow Through Underdrain (ac-ft.):	13.859
Total Outflow (ac-ft.):	25.689
Percent Through Underdrain:	53.95
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	12 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0086	0.0000	0.0000	0.0000
0.0440	0.0086	0.0001	0.0000	0.0000
0.0879	0.0086	0.0003	0.0000	0.0000
0.1319	0.0086	0.0004	0.0000	0.0000
0.1758	0.0086	0.0006	0.0000	0.0000
0.2198	0.0086	0.0007	0.0000	0.0000
0.2637	0.0086	0.0009	0.0000	0.0000
0.3077	0.0086	0.0010	0.0000	0.0000
0.3516	0.0086	0.0012	0.0000	0.0000
0.3956	0.0086	0.0013	0.0000	0.0000
0.4396	0.0086	0.0014	0.0000	0.0017
0.4835	0.0086	0.0016	0.0000	0.0017
0.5275	0.0086	0.0017	0.0000	0.0017
0.5714	0.0086	0.0019	0.0000	0.0017
0.6154	0.0086	0.0020	0.0000	0.0017
0.6593	0.0086	0.0022	0.0000	0.0017
0.7033	0.0086	0.0023	0.0000	0.0017
0.7473	0.0086	0.0024	0.0000	0.0017
0.7912	0.0086	0.0026	0.0000	0.0017
0.8352	0.0086	0.0027	0.0000	0.0017
0.8791	0.0086	0.0029	0.0000	0.0017

0.9231	0.0086	0.0030	0.0000	0.0017
0.9670	0.0086	0.0032	0.0000	0.0017
1.0110	0.0086	0.0033	0.0000	0.0017
1.0549	0.0086	0.0035	0.0000	0.0017
1.0989	0.0086	0.0036	0.0000	0.0017
1.1429	0.0086	0.0037	0.0000	0.0017
1.1868	0.0086	0.0039	0.0000	0.0017
1.2308	0.0086	0.0040	0.0000	0.0017
1.2747	0.0086	0.0042	0.0000	0.0017
1.3187	0.0086	0.0043	0.0000	0.0017
1.3626	0.0086	0.0045	0.0000	0.0017
1.4066	0.0086	0.0046	0.0000	0.0017
1.4505	0.0086	0.0047	0.0000	0.0017
1.4945	0.0086	0.0049	0.0000	0.0017
1.5385	0.0086	0.0050	0.0000	0.0017
1.5824	0.0086	0.0052	0.0000	0.0017
1.6264	0.0086	0.0054	0.0000	0.0017
1.6703	0.0086	0.0055	0.0000	0.0017
1.7143	0.0086	0.0057	0.0000	0.0017
1.7582	0.0086	0.0058	0.0000	0.0017
1.8022	0.0086	0.0060	0.0000	0.0017
1.8462	0.0086	0.0061	0.0000	0.0017
1.8901	0.0086	0.0063	0.0000	0.0017
1.9341	0.0086	0.0065	0.0000	0.0017
1.9780	0.0086	0.0066	0.0000	0.0017
2.0220	0.0086	0.0068	0.0000	0.0017
2.0659	0.0086	0.0069	0.0000	0.0017
2.1099	0.0086	0.0071	0.0000	0.0017
2.1538	0.0086	0.0072	0.0000	0.0017
2.1978	0.0086	0.0074	0.0000	0.0017
2.2418	0.0086	0.0076	0.0000	0.0017
2.2857	0.0086	0.0077	0.0000	0.0017
2.3297	0.0086	0.0079	0.0000	0.0017
2.3736	0.0086	0.0080	0.0000	0.0017
2.4176	0.0086	0.0082	0.0000	0.0017
2.4615	0.0086	0.0083	0.0000	0.0017
2.5055	0.0086	0.0085	0.0000	0.0017
2.5495	0.0086	0.0087	0.0000	0.0017
2.5934	0.0086	0.0088	0.0000	0.0017
2.6374	0.0086	0.0090	0.0000	0.0017
2.6813	0.0086	0.0091	0.0000	0.0017
2.7253	0.0086	0.0093	0.0000	0.0017
2.7692	0.0086	0.0094	0.0197	0.0017
2.8132	0.0086	0.0096	0.0409	0.0017
2.8571	0.0086	0.0098	0.0545	0.0017
2.9011	0.0086	0.0099	0.0561	0.0017
2.9451	0.0086	0.0101	0.0561	0.0017
2.9890	0.0086	0.0102	0.0561	0.0017
3.0000	0.0086	0.0103	0.0561	0.0017

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0086	0.0103	0.0000	0.0434	0.0000
3.0440	0.0086	0.0106	0.0000	0.0434	0.0000
3.0879	0.0086	0.0110	0.0000	0.0459	0.0000
3.1319	0.0086	0.0114	0.0000	0.0472	0.0000
3.1758	0.0086	0.0118	0.0000	0.0485	0.0000
3.2198	0.0086	0.0122	0.0000	0.0498	0.0000

3.2637	0.0086	0.0125	0.0000	0.0510	0.0000
3.3077	0.0086	0.0129	0.0000	0.0523	0.0000
3.3516	0.0086	0.0133	0.0000	0.0536	0.0000
3.3956	0.0086	0.0137	0.0000	0.0548	0.0000
3.4396	0.0086	0.0141	0.0000	0.0561	0.0000
3.4835	0.0086	0.0144	0.0000	0.0574	0.0000
3.5275	0.0086	0.0148	0.0483	0.0579	0.0000
3.5714	0.0086	0.0152	0.2020	0.0579	0.0000
3.6154	0.0086	0.0156	0.4122	0.0579	0.0000
3.6593	0.0086	0.0159	0.6597	0.0579	0.0000
3.7033	0.0086	0.0163	0.9282	0.0579	0.0000
3.7473	0.0086	0.0167	1.2008	0.0579	0.0000
3.7912	0.0086	0.0171	1.4606	0.0579	0.0000
3.8352	0.0086	0.0175	1.6924	0.0579	0.0000
3.8791	0.0086	0.0178	1.8845	0.0579	0.0000
3.9231	0.0086	0.0182	2.0318	0.0579	0.0000
3.9670	0.0086	0.0186	2.1391	0.0579	0.0000
4.0000	0.0086	0.0189	2.2515	0.0579	0.0000

Bioretention 12

Bottom Length:	60.00 ft.
Bottom Width:	7.50 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1.5
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Total Volume Infiltrated (ac-ft.):	9.491
Total Volume Through Riser (ac-ft.):	0.093
Total Volume Through Facility (ac-ft.):	16.097
Percent Infiltrated:	58.96
Total Precip Applied to Facility:	1.093
Total Evap From Facility:	0.495
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	2.5
Offset (in.):	15
Flow Through Underdrain (ac-ft.):	6.513
Total Outflow (ac-ft.):	16.097
Percent Through Underdrain:	40.46
Discharge Structure	
Riser Height:	0.5 ft.
Riser Diameter:	12 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0103	0.0000	0.0000	0.0000
0.0440	0.0103	0.0002	0.0000	0.0000
0.0879	0.0103	0.0003	0.0000	0.0000
0.1319	0.0103	0.0005	0.0000	0.0000
0.1758	0.0103	0.0007	0.0000	0.0000
0.2198	0.0103	0.0009	0.0000	0.0000
0.2637	0.0103	0.0010	0.0000	0.0000
0.3077	0.0103	0.0012	0.0000	0.0000
0.3516	0.0103	0.0014	0.0000	0.0000
0.3956	0.0103	0.0016	0.0000	0.0000
0.4396	0.0103	0.0017	0.0000	0.0021
0.4835	0.0103	0.0019	0.0000	0.0021
0.5275	0.0103	0.0021	0.0000	0.0021
0.5714	0.0103	0.0022	0.0000	0.0021
0.6154	0.0103	0.0024	0.0000	0.0021
0.6593	0.0103	0.0026	0.0000	0.0021
0.7033	0.0103	0.0028	0.0000	0.0021
0.7473	0.0103	0.0029	0.0000	0.0021
0.7912	0.0103	0.0031	0.0000	0.0021
0.8352	0.0103	0.0033	0.0000	0.0021
0.8791	0.0103	0.0035	0.0000	0.0021

0.9231	0.0103	0.0036	0.0000	0.0021
0.9670	0.0103	0.0038	0.0000	0.0021
1.0110	0.0103	0.0040	0.0000	0.0021
1.0549	0.0103	0.0041	0.0000	0.0021
1.0989	0.0103	0.0043	0.0000	0.0021
1.1429	0.0103	0.0045	0.0000	0.0021
1.1868	0.0103	0.0047	0.0000	0.0021
1.2308	0.0103	0.0048	0.0000	0.0021
1.2747	0.0103	0.0050	0.0000	0.0021
1.3187	0.0103	0.0052	0.0000	0.0021
1.3626	0.0103	0.0053	0.0000	0.0021
1.4066	0.0103	0.0055	0.0000	0.0021
1.4505	0.0103	0.0057	0.0000	0.0021
1.4945	0.0103	0.0059	0.0000	0.0021
1.5385	0.0103	0.0061	0.0000	0.0021
1.5824	0.0103	0.0062	0.0000	0.0021
1.6264	0.0103	0.0064	0.0000	0.0021
1.6703	0.0103	0.0066	0.0000	0.0021
1.7143	0.0103	0.0068	0.0000	0.0021
1.7582	0.0103	0.0070	0.0000	0.0021
1.8022	0.0103	0.0072	0.0000	0.0021
1.8462	0.0103	0.0074	0.0000	0.0021
1.8901	0.0103	0.0076	0.0000	0.0021
1.9341	0.0103	0.0078	0.0000	0.0021
1.9780	0.0103	0.0079	0.0000	0.0021
2.0220	0.0103	0.0081	0.0000	0.0021
2.0659	0.0103	0.0083	0.0000	0.0021
2.1099	0.0103	0.0085	0.0000	0.0021
2.1538	0.0103	0.0087	0.0000	0.0021
2.1978	0.0103	0.0089	0.0000	0.0021
2.2418	0.0103	0.0091	0.0000	0.0021
2.2857	0.0103	0.0093	0.0000	0.0021
2.3297	0.0103	0.0094	0.0000	0.0021
2.3736	0.0103	0.0096	0.0000	0.0021
2.4176	0.0103	0.0098	0.0000	0.0021
2.4615	0.0103	0.0100	0.0000	0.0021
2.5055	0.0103	0.0102	0.0000	0.0021
2.5495	0.0103	0.0104	0.0000	0.0021
2.5934	0.0103	0.0106	0.0000	0.0021
2.6374	0.0103	0.0108	0.0000	0.0021
2.6813	0.0103	0.0110	0.0000	0.0021
2.7253	0.0103	0.0111	0.0000	0.0021
2.7692	0.0103	0.0113	0.0197	0.0021
2.8132	0.0103	0.0115	0.0409	0.0021
2.8571	0.0103	0.0117	0.0545	0.0021
2.9011	0.0103	0.0119	0.0653	0.0021
2.9451	0.0103	0.0121	0.0674	0.0021
2.9890	0.0103	0.0123	0.0674	0.0021
3.0000	0.0103	0.0123	0.0674	0.0021

Bioretention Surface Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.0000	0.0103	0.0123	0.0000	0.0521	0.0000
3.0440	0.0103	0.0128	0.0000	0.0521	0.0000
3.0879	0.0103	0.0132	0.0000	0.0551	0.0000
3.1319	0.0103	0.0137	0.0000	0.0567	0.0000
3.1758	0.0103	0.0141	0.0000	0.0582	0.0000
3.2198	0.0103	0.0146	0.0000	0.0597	0.0000

3.2637	0.0103	0.0150	0.0000	0.0612	0.0000
3.3077	0.0103	0.0155	0.0000	0.0628	0.0000
3.3516	0.0103	0.0160	0.0000	0.0643	0.0000
3.3956	0.0103	0.0164	0.0000	0.0658	0.0000
3.4396	0.0103	0.0169	0.0000	0.0673	0.0000
3.4835	0.0103	0.0173	0.0000	0.0689	0.0000
3.5275	0.0103	0.0178	0.0483	0.0694	0.0000
3.5714	0.0103	0.0182	0.2020	0.0694	0.0000
3.6154	0.0103	0.0187	0.4122	0.0694	0.0000
3.6593	0.0103	0.0191	0.6597	0.0694	0.0000
3.7033	0.0103	0.0196	0.9282	0.0694	0.0000
3.7473	0.0103	0.0200	1.2008	0.0694	0.0000
3.7912	0.0103	0.0205	1.4606	0.0694	0.0000
3.8352	0.0103	0.0209	1.6924	0.0694	0.0000
3.8791	0.0103	0.0214	1.8845	0.0694	0.0000
3.9231	0.0103	0.0219	2.0318	0.0694	0.0000
3.9670	0.0103	0.0223	2.1391	0.0694	0.0000
4.0000	0.0103	0.0227	2.2515	0.0694	0.0000

Bioretention 13

Bottom Length:	40.00 ft.
Bottom Width:	6.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.2
Infiltration reduction factor:	1
Total Volume Infiltrated (ac-ft.):	5.736
Total Volume Through Riser (ac-ft.):	1.807
Total Volume Through Facility (ac-ft.):	23.171
Percent Infiltrated:	24.76
Total Precip Applied to Facility:	0.587
Total Evap From Facility:	0.284
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	4
Offset (in.):	9
Flow Through Underdrain (ac-ft.):	15.628
Total Outflow (ac-ft.):	23.171
Percent Through Underdrain:	67.45
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	12 in.
Element Outlets:	
Outlet 1	Outlet 2
Outlet Flows To:	

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0055	0.0000	0.0000	0.0000
0.0440	0.0055	0.0001	0.0000	0.0000
0.0879	0.0055	0.0002	0.0000	0.0000
0.1319	0.0055	0.0003	0.0000	0.0000
0.1758	0.0055	0.0004	0.0000	0.0000
0.2198	0.0055	0.0005	0.0000	0.0000
0.2637	0.0055	0.0006	0.0000	0.0000
0.3077	0.0055	0.0006	0.0000	0.0000
0.3516	0.0055	0.0007	0.0000	0.0000
0.3956	0.0055	0.0008	0.0000	0.0000
0.4396	0.0055	0.0009	0.0000	0.0011
0.4835	0.0055	0.0010	0.0000	0.0011
0.5275	0.0055	0.0011	0.0000	0.0011
0.5714	0.0055	0.0012	0.0000	0.0011
0.6154	0.0055	0.0013	0.0000	0.0011
0.6593	0.0055	0.0014	0.0000	0.0011
0.7033	0.0055	0.0015	0.0000	0.0011
0.7473	0.0055	0.0016	0.0000	0.0011
0.7912	0.0055	0.0017	0.0000	0.0011
0.8352	0.0055	0.0017	0.0000	0.0011
0.8791	0.0055	0.0018	0.0000	0.0011

0.9231	0.0055	0.0019	0.0000	0.0011
0.9670	0.0055	0.0020	0.0000	0.0011
1.0110	0.0055	0.0021	0.0000	0.0011
1.0549	0.0055	0.0022	0.0000	0.0011
1.0989	0.0055	0.0023	0.0000	0.0011
1.1429	0.0055	0.0024	0.0000	0.0011
1.1868	0.0055	0.0025	0.0000	0.0011
1.2308	0.0055	0.0026	0.0000	0.0011
1.2747	0.0055	0.0027	0.0000	0.0011
1.3187	0.0055	0.0028	0.0000	0.0011
1.3626	0.0055	0.0029	0.0000	0.0011
1.4066	0.0055	0.0029	0.0000	0.0011
1.4505	0.0055	0.0030	0.0000	0.0011
1.4945	0.0055	0.0031	0.0000	0.0011
1.5385	0.0055	0.0032	0.0000	0.0011
1.5824	0.0055	0.0033	0.0000	0.0011
1.6264	0.0055	0.0034	0.0000	0.0011
1.6703	0.0055	0.0035	0.0000	0.0011
1.7143	0.0055	0.0036	0.0000	0.0011
1.7582	0.0055	0.0037	0.0000	0.0011
1.8022	0.0055	0.0038	0.0000	0.0011
1.8462	0.0055	0.0039	0.0114	0.0011
1.8901	0.0055	0.0040	0.0121	0.0011
1.9341	0.0055	0.0041	0.0134	0.0011
1.9780	0.0055	0.0042	0.0147	0.0011
2.0220	0.0055	0.0043	0.0162	0.0011
2.0659	0.0055	0.0044	0.0177	0.0011
2.1099	0.0055	0.0045	0.0193	0.0011
2.1538	0.0055	0.0046	0.0210	0.0011
2.1978	0.0055	0.0047	0.0227	0.0011
2.2418	0.0055	0.0048	0.0246	0.0011
2.2857	0.0055	0.0049	0.0265	0.0011
2.3297	0.0055	0.0050	0.0452	0.0011
2.3736	0.0055	0.0051	0.0452	0.0011
2.4176	0.0055	0.0052	0.0452	0.0011
2.4615	0.0055	0.0053	0.0452	0.0011
2.5000	0.0055	0.0054	0.0452	0.0011

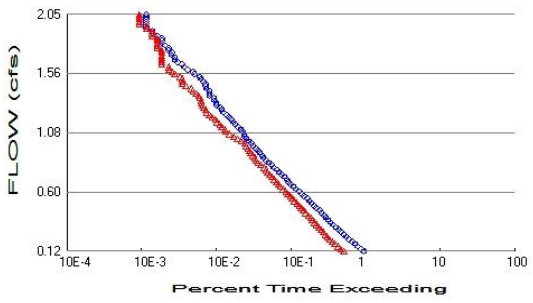
Bioretention Surface Hydraulic Table

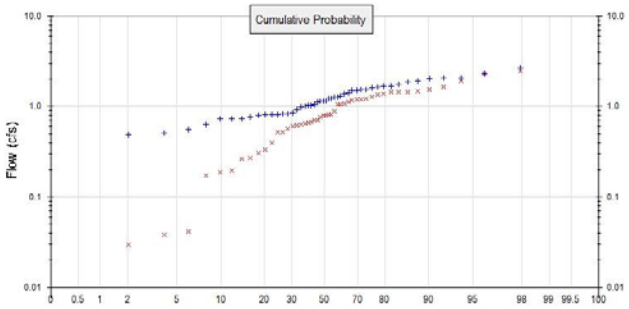
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.0055	0.0054	0.0000	0.0278	0.0000
2.5440	0.0055	0.0057	0.0000	0.0278	0.0000
2.5879	0.0055	0.0059	0.0000	0.0294	0.0000
2.6319	0.0055	0.0062	0.0000	0.0302	0.0000
2.6758	0.0055	0.0064	0.0000	0.0310	0.0000
2.7198	0.0055	0.0066	0.0000	0.0318	0.0000
2.7637	0.0055	0.0069	0.0000	0.0327	0.0000
2.8077	0.0055	0.0071	0.0000	0.0335	0.0000
2.8516	0.0055	0.0074	0.0000	0.0343	0.0000
2.8956	0.0055	0.0076	0.0000	0.0351	0.0000
2.9396	0.0055	0.0078	0.0000	0.0359	0.0000
2.9835	0.0055	0.0081	0.0000	0.0367	0.0000
3.0275	0.0055	0.0083	0.0000	0.0375	0.0000
3.0714	0.0055	0.0086	0.0000	0.0384	0.0000
3.1154	0.0055	0.0088	0.0000	0.0392	0.0000
3.1593	0.0055	0.0091	0.0000	0.0400	0.0000
3.2033	0.0055	0.0093	0.0000	0.0408	0.0000
3.2473	0.0055	0.0095	0.0000	0.0416	0.0000

3.2912	0.0055	0.0098	0.0000	0.0424	0.0000
3.3352	0.0055	0.0100	0.0000	0.0432	0.0000
3.3791	0.0055	0.0103	0.0000	0.0441	0.0000
3.4231	0.0055	0.0105	0.0000	0.0449	0.0000
3.4670	0.0055	0.0108	0.0000	0.0457	0.0000
3.5110	0.0055	0.0110	0.0122	0.0463	0.0000
3.5549	0.0055	0.0112	0.1365	0.0463	0.0000
3.5989	0.0055	0.0115	0.3281	0.0463	0.0000
3.6429	0.0055	0.0117	0.5635	0.0463	0.0000
3.6868	0.0055	0.0120	0.8261	0.0463	0.0000
3.7308	0.0055	0.0122	1.0991	0.0463	0.0000
3.7747	0.0055	0.0125	1.3657	0.0463	0.0000
3.8187	0.0055	0.0127	1.6096	0.0463	0.0000
3.8626	0.0055	0.0129	1.8176	0.0463	0.0000
3.9066	0.0055	0.0132	1.9818	0.0463	0.0000
3.9505	0.0055	0.0134	2.1028	0.0463	0.0000
3.9945	0.0055	0.0137	2.1930	0.0463	0.0000
4.0000	0.0055	0.0137	2.3112	0.0463	0.0000

Analysis Results

POC 1





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #1
Total Pervious Area: 2.631
Total Impervious Area: 0.01

Mitigated Landuse Totals for POC #1
Total Pervious Area: 4.578
Total Impervious Area: 1.827

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #1

Return Period	**Flow(cfs)**
2 year	1.15231
5 year	1.6725
10 year	2.04819
25 year	2.33184

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.790724
5 year	1.39169
10 year	1.55702
25 year	2.32455

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #1

Year	**Pre-Project**	**Mitigated**
1973	1.879	1.082
1974	1.033	0.880
1975	1.551	0.612
1976	0.632	0.041
1977	0.560	0.000
1978	1.383	1.224
1979	0.834	0.759
1980	1.141	1.062
1981	1.045	0.815
1982	1.155	1.452
1983	2.048	1.913
1984	1.227	0.670
1985	1.929	1.198
1986	1.281	1.160

1987	1.013	1.197
1988	1.113	0.393
1989	0.759	0.195
1990	0.840	0.334
1991	0.516	0.186
1992	1.219	0.797
1993	1.673	1.458
1994	0.236	0.038
1995	1.509	0.647
1996	0.731	0.308
1997	2.662	1.276
1998	1.620	1.351
1999	0.822	0.567
2000	0.932	0.815
2001	0.739	0.273
2002	1.036	1.045
2003	2.332	2.483
2004	1.544	1.463
2005	1.269	0.521
2006	2.089	2.325
2007	0.822	0.264
2008	1.423	1.392
2009	0.795	0.629
2010	1.643	1.466
2011	0.987	0.616
2012	1.152	0.791
2013	1.696	1.632
2014	0.814	0.522
2015	1.295	0.698
2016	1.738	1.114
2017	2.080	1.557
2018	0.729	0.653
2019	1.498	0.710
2020	0.850	0.173
2021	0.486	0.029

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #1

Rank	Pre-Project	Mitigated
1	2.6622	2.4830
2	2.3318	2.3246
3	2.0892	1.9132
4	2.0799	1.6322
5	2.0482	1.5570
6	1.9290	1.4656
7	1.8786	1.4628
8	1.7382	1.4584
9	1.6962	1.4523
10	1.6725	1.3917
11	1.6428	1.3512
12	1.6199	1.2758
13	1.5508	1.2241
14	1.5436	1.1983
15	1.5086	1.1970
16	1.4980	1.1598
17	1.4231	1.1143
18	1.3828	1.0825
19	1.2945	1.0619

20	1.2806	1.0447
21	1.2689	0.8799
22	1.2275	0.8154
23	1.2192	0.8145
24	1.1553	0.7969
25	1.1523	0.7907
26	1.1412	0.7585
27	1.1133	0.7100
28	1.0446	0.6979
29	1.0361	0.6696
30	1.0332	0.6528
31	1.0126	0.6471
32	0.9867	0.6294
33	0.9316	0.6155
34	0.8500	0.6119
35	0.8402	0.5667
36	0.8335	0.5218
37	0.8223	0.5215
38	0.8221	0.3931
39	0.8138	0.3337
40	0.7947	0.3085
41	0.7590	0.2727
42	0.7390	0.2641
43	0.7310	0.1955
44	0.7294	0.1860
45	0.6318	0.1728
46	0.5603	0.0414
47	0.5160	0.0381
48	0.4863	0.0293
49	0.2356	0.0003

Duration Flows

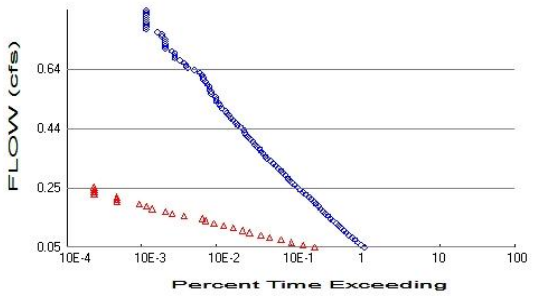
The Facility PASSED

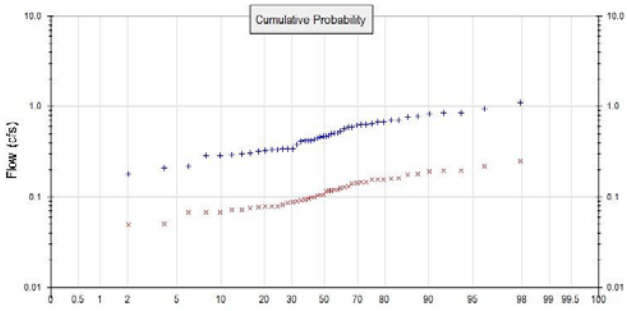
Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1152	4112	2201	53	Pass
0.1348	3759	2001	53	Pass
0.1543	3399	1852	54	Pass
0.1738	3124	1663	53	Pass
0.1933	2834	1544	54	Pass
0.2129	2592	1428	55	Pass
0.2324	2387	1320	55	Pass
0.2519	2212	1240	56	Pass
0.2714	2039	1166	57	Pass
0.2910	1889	1092	57	Pass
0.3105	1732	1018	58	Pass
0.3300	1598	958	59	Pass
0.3495	1478	896	60	Pass
0.3691	1355	836	61	Pass
0.3886	1271	800	62	Pass
0.4081	1198	740	61	Pass
0.4276	1103	684	62	Pass
0.4472	1037	633	61	Pass
0.4667	956	595	62	Pass
0.4862	889	561	63	Pass
0.5057	832	525	63	Pass
0.5253	766	482	62	Pass
0.5448	709	449	63	Pass
0.5643	647	427	65	Pass
0.5838	600	393	65	Pass
0.6034	551	368	66	Pass
0.6229	504	336	66	Pass
0.6424	463	311	67	Pass
0.6619	428	293	68	Pass
0.6815	396	277	69	Pass
0.7010	381	256	67	Pass
0.7205	354	239	67	Pass
0.7400	321	224	69	Pass
0.7596	297	208	70	Pass
0.7791	279	200	71	Pass
0.7986	257	188	73	Pass
0.8181	239	169	70	Pass
0.8377	218	156	71	Pass
0.8572	201	148	73	Pass
0.8767	186	143	76	Pass
0.8962	180	134	74	Pass
0.9157	166	125	75	Pass
0.9353	157	119	75	Pass
0.9548	147	114	77	Pass
0.9743	135	108	80	Pass
0.9938	127	104	81	Pass
1.0134	117	93	79	Pass
1.0329	109	83	76	Pass
1.0524	103	74	71	Pass
1.0719	102	65	63	Pass
1.0915	97	58	59	Pass
1.1110	92	56	60	Pass
1.1305	84	51	60	Pass

1.1500	77	48	62	Pass
1.1696	73	44	60	Pass
1.1891	69	42	60	Pass
1.2086	64	38	59	Pass
1.2281	59	35	59	Pass
1.2477	54	32	59	Pass
1.2672	51	31	60	Pass
1.2867	48	29	60	Pass
1.3062	44	28	63	Pass
1.3258	43	27	62	Pass
1.3453	41	27	65	Pass
1.3648	40	26	65	Pass
1.3843	35	25	71	Pass
1.4039	35	23	65	Pass
1.4234	35	21	60	Pass
1.4429	32	20	62	Pass
1.4624	31	17	54	Pass
1.4820	31	15	48	Pass
1.5015	29	15	51	Pass
1.5210	27	15	55	Pass
1.5405	26	14	53	Pass
1.5601	22	12	54	Pass
1.5796	21	11	52	Pass
1.5991	18	10	55	Pass
1.6186	16	10	62	Pass
1.6382	15	8	53	Pass
1.6577	13	8	61	Pass
1.6772	12	8	66	Pass
1.6967	12	8	66	Pass
1.7163	11	8	72	Pass
1.7358	11	8	72	Pass
1.7553	10	8	80	Pass
1.7748	10	7	70	Pass
1.7944	9	7	77	Pass
1.8139	8	7	87	Pass
1.8334	8	7	87	Pass
1.8529	8	7	87	Pass
1.8725	7	6	85	Pass
1.8920	6	6	100	Pass
1.9115	6	6	100	Pass
1.9310	5	5	100	Pass
1.9506	5	5	100	Pass
1.9701	5	4	80	Pass
1.9896	5	4	80	Pass
2.0091	5	4	80	Pass
2.0287	5	4	80	Pass
2.0482	5	4	80	Pass

Water Quality

POC 2





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #2
Total Pervious Area: 1.029
Total Impervious Area: 0.067

Mitigated Landuse Totals for POC #2
Total Pervious Area: 0.242
Total Impervious Area: 0

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #2

Return Period	**Flow(cfs)**
2 year	0.466656
5 year	0.674015
10 year	0.841377
25 year	0.954908

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	**Flow(cfs)**
2 year	0.106201
5 year	0.156071
10 year	0.190069
25 year	0.217806

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #2

Year	**Pre-Project**	**Mitigated**
1973	0.769	0.175
1974	0.420	0.099
1975	0.632	0.145
1976	0.286	0.068
1977	0.219	0.068
1978	0.570	0.128
1979	0.342	0.082
1980	0.471	0.106
1981	0.420	0.099
1982	0.478	0.106
1983	0.843	0.190
1984	0.498	0.115
1985	0.775	0.181
1986	0.529	0.118
1987	0.418	0.094

1988	0.454	0.104
1989	0.307	0.072
1990	0.340	0.090
1991	0.207	0.049
1992	0.467	0.118
1993	0.674	0.158
1994	0.085	0.024
1995	0.617	0.140
1996	0.292	0.079
1997	1.088	0.249
1998	0.641	0.156
1999	0.331	0.078
2000	0.381	0.087
2001	0.286	0.072
2002	0.429	0.095
2003	0.955	0.218
2004	0.636	0.142
2005	0.507	0.121
2006	0.853	0.195
2007	0.324	0.079
2008	0.589	0.131
2009	0.323	0.075
2010	0.670	0.154
2011	0.410	0.092
2012	0.464	0.119
2013	0.701	0.156
2014	0.332	0.077
2015	0.511	0.125
2016	0.708	0.163
2017	0.841	0.196
2018	0.299	0.068
2019	0.595	0.144
2020	0.339	0.086
2021	0.180	0.050

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #2

Rank	Pre-Project	Mitigated
1	1.0880	0.2488
2	0.9549	0.2178
3	0.8529	0.1961
4	0.8432	0.1950
5	0.8414	0.1901
6	0.7746	0.1815
7	0.7690	0.1749
8	0.7081	0.1630
9	0.7012	0.1583
10	0.6740	0.1561
11	0.6698	0.1558
12	0.6408	0.1536
13	0.6359	0.1447
14	0.6320	0.1442
15	0.6170	0.1424
16	0.5946	0.1403
17	0.5887	0.1315
18	0.5698	0.1285
19	0.5285	0.1251
20	0.5106	0.1208

21	0.5070	0.1194
22	0.4979	0.1180
23	0.4778	0.1179
24	0.4710	0.1150
25	0.4667	0.1062
26	0.4638	0.1056
27	0.4541	0.1036
28	0.4292	0.0993
29	0.4204	0.0986
30	0.4197	0.0952
31	0.4178	0.0936
32	0.4097	0.0916
33	0.3810	0.0898
34	0.3424	0.0869
35	0.3400	0.0856
36	0.3388	0.0823
37	0.3315	0.0789
38	0.3313	0.0786
39	0.3241	0.0780
40	0.3227	0.0767
41	0.3073	0.0747
42	0.2987	0.0720
43	0.2915	0.0715
44	0.2864	0.0682
45	0.2862	0.0677
46	0.2192	0.0677
47	0.2069	0.0505
48	0.1799	0.0489
49	0.0853	0.0245

Duration Flows

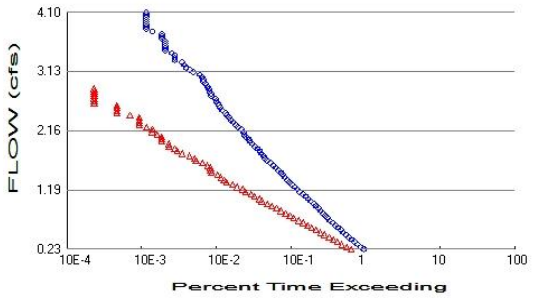
The Facility PASSED

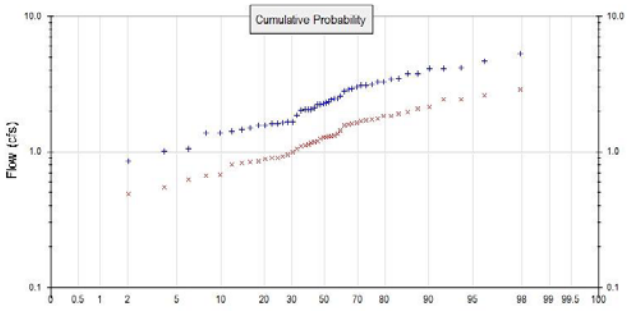
Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0467	4158	893	21	Pass
0.0547	3753	626	16	Pass
0.0627	3402	441	12	Pass
0.0707	3122	319	10	Pass
0.0788	2838	224	7	Pass
0.0868	2590	171	6	Pass
0.0948	2390	121	5	Pass
0.1029	2198	97	4	Pass
0.1109	2043	73	3	Pass
0.1189	1882	54	2	Pass
0.1269	1740	40	2	Pass
0.1350	1595	31	1	Pass
0.1430	1463	28	1	Pass
0.1510	1355	16	1	Pass
0.1590	1254	11	0	Pass
0.1671	1175	9	0	Pass
0.1751	1082	6	0	Pass
0.1831	1011	5	0	Pass
0.1912	933	4	0	Pass
0.1992	876	2	0	Pass
0.2072	808	2	0	Pass
0.2152	758	2	0	Pass
0.2233	684	1	0	Pass
0.2313	629	1	0	Pass
0.2393	573	1	0	Pass
0.2474	526	1	0	Pass
0.2554	492	0	0	Pass
0.2634	447	0	0	Pass
0.2714	417	0	0	Pass
0.2795	391	0	0	Pass
0.2875	365	0	0	Pass
0.2955	339	0	0	Pass
0.3035	317	0	0	Pass
0.3116	293	0	0	Pass
0.3196	271	0	0	Pass
0.3276	249	0	0	Pass
0.3357	231	0	0	Pass
0.3437	209	0	0	Pass
0.3517	196	0	0	Pass
0.3597	184	0	0	Pass
0.3678	175	0	0	Pass
0.3758	166	0	0	Pass
0.3838	153	0	0	Pass
0.3918	141	0	0	Pass
0.3999	134	0	0	Pass
0.4079	122	0	0	Pass
0.4159	115	0	0	Pass
0.4240	107	0	0	Pass
0.4320	103	0	0	Pass
0.4400	102	0	0	Pass
0.4480	92	0	0	Pass
0.4561	83	0	0	Pass
0.4641	78	0	0	Pass

0.4721	73	0	0	Pass
0.4801	67	0	0	Pass
0.4882	64	0	0	Pass
0.4962	60	0	0	Pass
0.5042	57	0	0	Pass
0.5123	51	0	0	Pass
0.5203	48	0	0	Pass
0.5283	47	0	0	Pass
0.5363	43	0	0	Pass
0.5444	43	0	0	Pass
0.5524	42	0	0	Pass
0.5604	37	0	0	Pass
0.5684	37	0	0	Pass
0.5765	35	0	0	Pass
0.5845	35	0	0	Pass
0.5925	33	0	0	Pass
0.6006	31	0	0	Pass
0.6086	29	0	0	Pass
0.6166	29	0	0	Pass
0.6246	28	0	0	Pass
0.6327	26	0	0	Pass
0.6407	22	0	0	Pass
0.6487	18	0	0	Pass
0.6567	17	0	0	Pass
0.6648	16	0	0	Pass
0.6728	14	0	0	Pass
0.6808	12	0	0	Pass
0.6889	12	0	0	Pass
0.6969	12	0	0	Pass
0.7049	11	0	0	Pass
0.7129	9	0	0	Pass
0.7210	9	0	0	Pass
0.7290	9	0	0	Pass
0.7370	9	0	0	Pass
0.7450	9	0	0	Pass
0.7531	8	0	0	Pass
0.7611	8	0	0	Pass
0.7691	7	0	0	Pass
0.7772	5	0	0	Pass
0.7852	5	0	0	Pass
0.7932	5	0	0	Pass
0.8012	5	0	0	Pass
0.8093	5	0	0	Pass
0.8173	5	0	0	Pass
0.8253	5	0	0	Pass
0.8333	5	0	0	Pass
0.8414	5	0	0	Pass

Water Quality

POC 3





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #3
Total Pervious Area: 5.241
Total Impervious Area: 0.129

Mitigated Landuse Totals for POC #3
Total Pervious Area: 2.729
Total Impervious Area: 0.642

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #3

Return Period	**Flow(cfs)**
2 year	2.25057
5 year	3.2837
10 year	4.10289
25 year	4.66273

Flow Frequency Return Periods for Mitigated. POC #3

Return Period	**Flow(cfs)**
2 year	1.27587
5 year	1.82431
10 year	2.13542
25 year	2.60069

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #3

Year	**Pre-Project**	**Mitigated**
1973	3.756	2.081
1974	2.050	1.127
1975	3.086	1.692
1976	1.373	0.804
1977	1.048	0.619
1978	2.779	1.565
1979	1.667	0.988
1980	2.301	1.307
1981	2.040	1.097
1982	2.338	1.360
1983	4.117	2.418
1984	2.428	1.305
1985	3.773	1.908
1986	2.585	1.446
1987	2.040	1.171

1988	2.217	1.193
1989	1.490	0.672
1990	1.658	0.949
1991	1.002	0.546
1992	2.251	1.276
1993	3.284	1.673
1994	0.410	0.232
1995	3.014	1.598
1996	1.422	0.835
1997	5.315	2.875
1998	3.134	1.726
1999	1.611	0.895
2000	1.858	1.051
2001	1.386	0.681
2002	2.097	1.242
2003	4.663	2.601
2004	3.109	1.758
2005	2.460	1.317
2006	4.164	2.438
2007	1.575	0.844
2008	2.876	1.639
2009	1.573	0.881
2010	3.255	1.832
2011	2.005	1.160
2012	2.228	1.286
2013	3.429	1.971
2014	1.614	0.921
2015	2.461	1.118
2016	3.455	1.824
2017	4.103	2.135
2018	1.457	0.820
2019	2.909	1.612
2020	1.640	0.905
2021	0.853	0.488

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #3

Rank	Pre-Project	Mitigated
1	5.3150	2.8747
2	4.6627	2.6007
3	4.1638	2.4382
4	4.1174	2.4176
5	4.1029	2.1354
6	3.7733	2.0813
7	3.7564	1.9709
8	3.4551	1.9075
9	3.4290	1.8320
10	3.2837	1.8243
11	3.2554	1.7577
12	3.1336	1.7264
13	3.1086	1.6918
14	3.0856	1.6735
15	3.0142	1.6393
16	2.9086	1.6118
17	2.8762	1.5977
18	2.7792	1.5655
19	2.5854	1.4464
20	2.4615	1.3601

21	2.4604	1.3174
22	2.4279	1.3072
23	2.3378	1.3054
24	2.3010	1.2856
25	2.2506	1.2759
26	2.2281	1.2425
27	2.2168	1.1926
28	2.0966	1.1706
29	2.0500	1.1597
30	2.0403	1.1268
31	2.0400	1.1181
32	2.0054	1.0975
33	1.8585	1.0508
34	1.6667	0.9881
35	1.6585	0.9493
36	1.6398	0.9210
37	1.6135	0.9051
38	1.6110	0.8948
39	1.5748	0.8811
40	1.5726	0.8435
41	1.4900	0.8351
42	1.4568	0.8201
43	1.4218	0.8039
44	1.3865	0.6805
45	1.3733	0.6715
46	1.0476	0.6191
47	1.0022	0.5457
48	0.8535	0.4884
49	0.4099	0.2316

Duration Flows

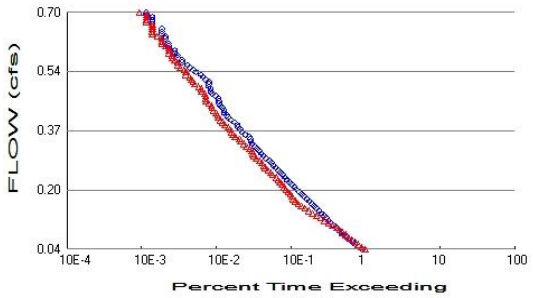
The Facility PASSED

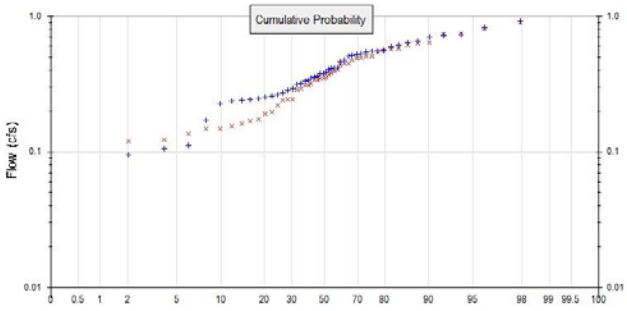
Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2251	4093	2770	67	Pass
0.2642	3697	2409	65	Pass
0.3034	3358	2075	61	Pass
0.3426	3068	1816	59	Pass
0.3817	2794	1599	57	Pass
0.4209	2563	1403	54	Pass
0.4601	2358	1216	51	Pass
0.4992	2166	1082	49	Pass
0.5384	2017	935	46	Pass
0.5776	1859	816	43	Pass
0.6168	1716	719	41	Pass
0.6559	1572	634	40	Pass
0.6951	1446	552	38	Pass
0.7343	1341	471	35	Pass
0.7734	1251	419	33	Pass
0.8126	1168	367	31	Pass
0.8518	1079	319	29	Pass
0.8909	1008	276	27	Pass
0.9301	925	240	25	Pass
0.9693	875	208	23	Pass
1.0085	804	176	21	Pass
1.0476	748	163	21	Pass
1.0868	677	141	20	Pass
1.1260	621	127	20	Pass
1.1651	562	107	19	Pass
1.2043	522	98	18	Pass
1.2435	489	82	16	Pass
1.2826	446	71	15	Pass
1.3218	415	59	14	Pass
1.3610	389	55	14	Pass
1.4002	359	50	13	Pass
1.4393	337	45	13	Pass
1.4785	317	37	11	Pass
1.5177	292	36	12	Pass
1.5568	271	36	13	Pass
1.5960	249	33	13	Pass
1.6352	230	28	12	Pass
1.6743	208	23	11	Pass
1.7135	195	22	11	Pass
1.7527	185	19	10	Pass
1.7919	174	15	8	Pass
1.8310	165	13	7	Pass
1.8702	154	12	7	Pass
1.9094	142	10	7	Pass
1.9485	131	10	7	Pass
1.9877	121	8	6	Pass
2.0269	117	8	6	Pass
2.0660	107	8	7	Pass
2.1052	102	7	6	Pass
2.1444	100	6	6	Pass
2.1836	93	6	6	Pass
2.2227	84	5	5	Pass
2.2619	78	4	5	Pass

2.3011	73	4	5	Pass
2.3402	67	4	5	Pass
2.3794	64	4	6	Pass
2.4186	60	3	5	Pass
2.4577	58	2	3	Pass
2.4969	52	2	3	Pass
2.5361	48	2	4	Pass
2.5753	47	2	4	Pass
2.6144	45	1	2	Pass
2.6536	43	1	2	Pass
2.6928	42	1	2	Pass
2.7319	37	1	2	Pass
2.7711	37	1	2	Pass
2.8103	35	1	2	Pass
2.8494	34	1	2	Pass
2.8886	33	0	0	Pass
2.9278	31	0	0	Pass
2.9670	29	0	0	Pass
3.0061	29	0	0	Pass
3.0453	28	0	0	Pass
3.0845	26	0	0	Pass
3.1236	21	0	0	Pass
3.1628	19	0	0	Pass
3.2020	17	0	0	Pass
3.2411	16	0	0	Pass
3.2803	15	0	0	Pass
3.3195	12	0	0	Pass
3.3587	12	0	0	Pass
3.3978	12	0	0	Pass
3.4370	11	0	0	Pass
3.4762	9	0	0	Pass
3.5153	9	0	0	Pass
3.5545	9	0	0	Pass
3.5937	9	0	0	Pass
3.6328	9	0	0	Pass
3.6720	8	0	0	Pass
3.7112	8	0	0	Pass
3.7504	8	0	0	Pass
3.7895	6	0	0	Pass
3.8287	5	0	0	Pass
3.8679	5	0	0	Pass
3.9070	5	0	0	Pass
3.9462	5	0	0	Pass
3.9854	5	0	0	Pass
4.0245	5	0	0	Pass
4.0637	5	0	0	Pass
4.1029	5	0	0	Pass

Water Quality

POC 4





\+ Pre-Project x Mitigated

Pre-Project Landuse Totals for POC #4
Total Pervious Area: 0.892
Total Impervious Area: 0.087

Mitigated Landuse Totals for POC #4
Total Pervious Area: 0.495
Total Impervious Area: 0.472

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Pre-Project. POC #4

Return Period	**Flow(cfs)**
2 year	0.375788
5 year	0.558234
10 year	0.701342
25 year	0.818582

Flow Frequency Return Periods for Mitigated. POC #4

Return Period	**Flow(cfs)**
2 year	0.346869
5 year	0.561455
10 year	0.638339
25 year	0.80894

Annual Peaks

Annual Peaks for Pre-Project and Mitigated. POC #4

Year	**Pre-Project**	**Mitigated**
1973	0.659	0.638
1974	0.350	0.310
1975	0.529	0.507
1976	0.111	0.191
1977	0.096	0.136
1978	0.475	0.476
1979	0.290	0.293
1980	0.408	0.393
1981	0.337	0.219
1982	0.418	0.406
1983	0.725	0.739
1984	0.406	0.380
1985	0.639	0.572
1986	0.460	0.436
1987	0.361	0.351

1988	0.376	0.317
1989	0.247	0.148
1990	0.285	0.243
1991	0.169	0.122
1992	0.331	0.339
1993	0.550	0.444
1994	0.065	0.120
1995	0.524	0.450
1996	0.238	0.239
1997	0.927	0.891
1998	0.558	0.489
1999	0.253	0.169
2000	0.319	0.288
2001	0.227	0.148
2002	0.376	0.371
2003	0.819	0.809
2004	0.554	0.542
2005	0.415	0.335
2006	0.729	0.740
2007	0.255	0.161
2008	0.509	0.504
2009	0.265	0.173
2010	0.545	0.580
2011	0.359	0.347
2012	0.313	0.347
2013	0.614	0.612
2014	0.272	0.241
2015	0.389	0.308
2016	0.597	0.561
2017	0.701	0.632
2018	0.243	0.196
2019	0.517	0.491
2020	0.235	0.155
2021	0.105	0.103

Ranked Annual Peaks

Ranked Annual Peaks for Pre-Project and Mitigated. POC #4

Rank	Pre-Project	Mitigated
1	0.9270	0.8906
2	0.8186	0.8089
3	0.7289	0.7395
4	0.7249	0.7388
5	0.7013	0.6383
6	0.6585	0.6322
7	0.6390	0.6122
8	0.6142	0.5801
9	0.5968	0.5719
10	0.5582	0.5615
11	0.5536	0.5415
12	0.5502	0.5067
13	0.5449	0.5044
14	0.5289	0.4909
15	0.5235	0.4889
16	0.5170	0.4758
17	0.5091	0.4499
18	0.4752	0.4438
19	0.4596	0.4360
20	0.4180	0.4057

21	0.4155	0.3933
22	0.4076	0.3803
23	0.4060	0.3712
24	0.3889	0.3511
25	0.3758	0.3469
26	0.3757	0.3468
27	0.3605	0.3389
28	0.3585	0.3355
29	0.3502	0.3168
30	0.3369	0.3099
31	0.3309	0.3083
32	0.3188	0.2926
33	0.3133	0.2883
34	0.2901	0.2425
35	0.2852	0.2414
36	0.2720	0.2395
37	0.2650	0.2194
38	0.2553	0.1962
39	0.2533	0.1909
40	0.2468	0.1725
41	0.2433	0.1689
42	0.2380	0.1606
43	0.2351	0.1553
44	0.2273	0.1484
45	0.1694	0.1477
46	0.1107	0.1360
47	0.1054	0.1224
48	0.0958	0.1196
49	0.0653	0.1025

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0376	3902	4241	108	Pass
0.0443	3501	3795	108	Pass
0.0510	3195	3461	108	Pass
0.0577	2910	3111	106	Pass
0.0644	2630	2827	107	Pass
0.0711	2423	2547	105	Pass
0.0778	2245	2358	105	Pass
0.0845	2058	2130	103	Pass
0.0912	1897	1938	102	Pass
0.0979	1763	1772	100	Pass
0.1046	1613	1548	95	Pass
0.1113	1480	1372	92	Pass
0.1180	1372	1225	89	Pass
0.1247	1295	1083	83	Pass
0.1314	1192	956	80	Pass
0.1381	1107	842	76	Pass
0.1449	1025	746	72	Pass
0.1516	946	668	70	Pass
0.1583	881	591	67	Pass
0.1650	820	541	65	Pass
0.1717	769	500	65	Pass
0.1784	705	467	66	Pass
0.1851	645	446	69	Pass
0.1918	603	423	70	Pass
0.1985	564	396	70	Pass
0.2052	512	368	71	Pass
0.2119	480	350	72	Pass
0.2186	446	326	73	Pass
0.2253	410	307	74	Pass
0.2320	380	290	76	Pass
0.2387	357	276	77	Pass
0.2454	334	245	73	Pass
0.2521	310	231	74	Pass
0.2588	290	213	73	Pass
0.2655	270	194	71	Pass
0.2722	249	185	74	Pass
0.2789	237	175	73	Pass
0.2857	222	163	73	Pass
0.2924	199	148	74	Pass
0.2991	185	139	75	Pass
0.3058	175	133	76	Pass
0.3125	163	129	79	Pass
0.3192	150	120	80	Pass
0.3259	142	109	76	Pass
0.3326	131	101	77	Pass
0.3393	125	92	73	Pass
0.3460	122	89	72	Pass
0.3527	118	77	65	Pass
0.3594	105	72	68	Pass
0.3661	95	70	73	Pass
0.3728	90	66	73	Pass
0.3795	85	62	72	Pass
0.3862	83	56	67	Pass

0.3929	76	53	69	Pass
0.3996	69	49	71	Pass
0.4063	62	46	74	Pass
0.4130	59	45	76	Pass
0.4197	55	43	78	Pass
0.4265	55	39	70	Pass
0.4332	52	38	73	Pass
0.4399	49	37	75	Pass
0.4466	47	34	72	Pass
0.4533	47	31	65	Pass
0.4600	46	31	67	Pass
0.4667	42	31	73	Pass
0.4734	38	30	78	Pass
0.4801	36	27	75	Pass
0.4868	36	27	75	Pass
0.4935	34	25	73	Pass
0.5002	34	22	64	Pass
0.5069	34	21	61	Pass
0.5136	31	20	64	Pass
0.5203	29	19	65	Pass
0.5270	27	17	62	Pass
0.5337	23	17	73	Pass
0.5404	21	16	76	Pass
0.5471	19	14	73	Pass
0.5538	18	13	72	Pass
0.5605	15	13	86	Pass
0.5672	15	12	80	Pass
0.5740	13	11	84	Pass
0.5807	13	11	84	Pass
0.5874	12	10	83	Pass
0.5941	12	10	83	Pass
0.6008	10	10	100	Pass
0.6075	10	9	90	Pass
0.6142	10	8	80	Pass
0.6209	9	8	88	Pass
0.6276	9	8	88	Pass
0.6343	9	7	77	Pass
0.6410	8	6	75	Pass
0.6477	8	6	75	Pass
0.6544	8	6	75	Pass
0.6611	6	6	100	Pass
0.6678	6	6	100	Pass
0.6745	6	5	83	Pass
0.6812	6	5	83	Pass
0.6879	6	5	83	Pass
0.6946	5	5	100	Pass
0.7013	5	4	80	Pass

Water Quality

POC 5

POC #5 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

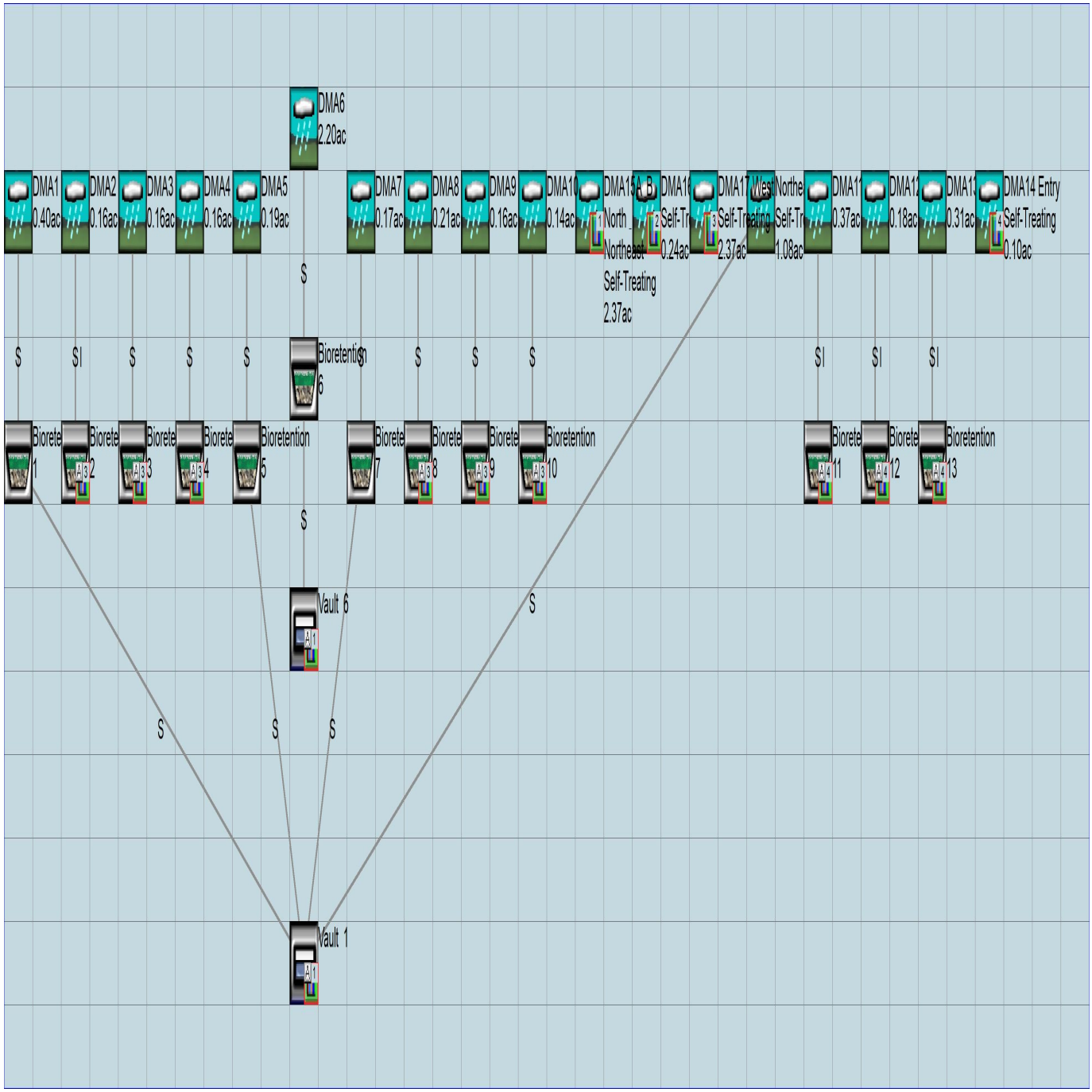
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Pre-Project Schematic

Mitigated Schematic



Disclaimer

Legal Notice

This program and accompanying documentation are provided 'as-is' without warranty of any kind.The entire risk regarding the performance and results of this program is assumed by End User. Clear Creek Solutions Inc. and the governmental licensee or sublicensees disclaim all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions Inc, Applied Marine SciencesIncorporated, the Alameda County Flood Control and Water Conservation District, EOA Incorporated, member agencies of the Alameda Countywide Clean Water Program, member agencies of the San Mateo Countywide Water Pollution Prevention Program, member agencies of the Santa Clara Valley Urban Runoff Pollution Prevention Program or any other LOU Participants or authorized representatives of LOU Participants be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information,business interruption, and the like) arising out of the use of, or inability to use this programeven if Clear Creek Solutions Inc., Applied Marine Sciences Incorporated, the Alameda County Flood Control and Water Conservation District, EOA Incorporated or any member agencies of the LOU Participants or their authorized representatives have been advised of the possibility of such damages.

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

Appendix H:

Transportation Supporting Information

THIS PAGE INTENTIONALLY LEFT BLANK

October 2, 2025

Ms. Prathna Maharaj, AICP
Senior Environmental Project Manager
First Carbon Solutions (FCS)
2999 Oak Road, Suite 290
Walnut Creek, CA 94597

DRAFT CEQA Transportation Impact Study for the 1125 Northgate Road Project in Contra Costa County

Dear Ms. Maharaj;

As requested, W-Trans has prepared a CEQA transportation impact study for the proposed residential development located at 1125 Northgate Road Project in Contra Costa County. The purpose of this letter is to address the project's trip generation as well as potential issues associated with site access, circulation, and safety.

Existing Conditions

The study area consists of Northgate Road, which runs along the frontage of the project site. Northgate Road is generally oriented north-south and is classified as a minor arterial by the California Road System (CRS) Map. Within the project vicinity, Northgate Road has one travel lane in each direction and no sidewalks, shoulders, or bike facilities.

Project Description

The proposed project involves the construction of a 19-dwelling-unit single-family residential subdivision on an existing parcel currently developed with one occupied home. For the purposes of this study, full buildout of the 19 units was assumed. A new paved private roadway will be constructed in place of the existing gravel road. This road would provide access from Northgate Road, which would have a gated entrance and internal circulation designed to meet fire safety standards. The internal street would include parking lanes, a sidewalk along one side, and terminate in a cul-de-sac.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual, 12th Edition*, 2025, for "Single Family Detached Housing" (ITE LU #210). Because the site is currently occupied by one single-family home, the trip generation of this residence was considered. Since the proposed project is not comprised of mixed-use development with retail and commercial components, it is not anticipated to generate any internal capture trips, or have pass-by trip credits. The project would generate an estimated average of 173 trips per day, including 13 trips during the a.m. peak hour and 18 trips during the p.m. peak hour. In comparison to the existing use, the project would be expected to generate an additional 164 daily trips, including 12 net new trips during the morning peak hour and 17 additional trips during the evening peak hour, as summarized in Table 1.

Table 1 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Existing											
Single Family Detached Housing	-1 du	9.09	-9	0.70	-1	0	-1	0.93	-1	-1	0
Proposed											
Single Family Detached Housing	19 du	9.09	173	0.70	13	3	10	0.93	18	11	7
Total New Trips			**164**		**12**	**3**	**9**		**17**	**10**	**7**

Note: du = dwelling units

Circulation Policy

Contra Costa County Goals and Policies

The *Contra Costa Countywide Bicycle & Pedestrian Master Plan*, 2018, provides the following goals regarding pedestrian facilities in the eastern unincorporated areas of the County.

- Encourage more people to walk and bicycle
- Increase safety and security for pedestrians and bicyclists
- Create a safe, connected, and comfortable network of bikeways and walkways for all ages and abilities

Pedestrian Facilities

Pedestrian facilities include walkways, curb ramps, safer crossings, traffic calming, direct connections and streetscape improvements. Currently, no sidewalks provide access for pedestrian travel in the vicinity of the proposed project site along Northgate Road. The *Contra Costa Countywide Bicycle & Pedestrian Master Plan* does not list any planned improvements along the project frontage.

Project Summary – Internal pedestrian access within the site would be provided via a network of paved pathways and curb ramps. All pedestrian facilities would be constructed to meet current design standards established by the Contra Costa County Public Works Department and the Federal Americans with Disabilities Act (ADA). There are no pedestrian facilities along adjacent roadways outside the project site. As a result, pedestrian trips to and from the site are expected to be minimal.

Finding – Pedestrian facilities serving the project site would not conflict with County policy provided that all built amenities are constructed to meet current Federal and County standards.

Bicycle Network

The *Contra Costa Countywide Bicycle & Pedestrian Master Plan* classifies bikeways into six categories:

- **Class I Shared-Use Paths** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bicycle Lane** – special lane markings, pavement legends, and signage, bike lanes provide designated street space for bicyclists.
- **Class II Buffered Bicycle Lane** – painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (such as driveways or intersections).
- **Class III Bicycle Routes** – signage, sharrow striping, and/or traffic calming treatments, and provide continuity to a bikeway network

- **Class III Bicycle Boulevards** – traffic diverters, chicanes, traffic circles, speed tables, and special wayfinding signage to nearby destinations or other bikeways.
- **Class IV Protected Bikeways** – a Class IV Separated Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

There are no designated bicycle facilities located within the project site, and the proposed development would not impact any existing or planned bikeways. Bicyclists in the surrounding area typically share the roadway as no formal bike lanes are present in the immediate vicinity. A review of the *Contra Costa Countywide Bicycle & Pedestrian Master Plan* confirms that there are no existing or proposed bicycle facilities within or adjacent to the project area. As such, the project would not interfere with adopted County plans regarding bicycle facilities.

Finding – It is presumed that the project would be consistent with County policy regarding bicycle facilities since no new bicycle facilities are proposed.

Transit Facilities

The proposed project is located two and a half miles from the nearest bus stop, which is at the Shadelands Shuttle at Ygnacio Valley Road and Shadelands Drive. The project does not propose any changes to the existing nearby transit facilities.

Finding – Existing nearby transit facilities will not be altered by the proposed project. Therefore, the project would not conflict with any existing transit policies or strategies.

Significance Finding – Assuming all the pedestrian amenities are constructed to meet current Federal and County standards, the proposed project would not conflict with any plans or policies related to pedestrian, bicycle, and transit facilities. The project's impact on such modes would therefore be less than significant.

Vehicle Miles Traveled (VMT)

Senate Bill (SB) 743 established the potential increase in vehicle miles traveled (VMT) associated with a project as the basis for determining transportation impacts of development projects. Guidance provided by both the California Governor's Office of Planning and Research (OPR) in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, 2018, Contra Costa Transportation Authority (CCTA)'s adopted *VMT Methodology* and the Contra Costa County Public Works Department *Transportation Analysis Guidelines*, June 2020, was used. The guidance provided in these documents recommends the use of screening thresholds to identify when a proposed project is presumed to result in a less-than-significant impact without conducting a detailed study. According to the Contra Costa County Travel Demand Model estimates, the Countywide home-based average VMT per resident is 16.1 miles. Concurring with guidance provided by this document, a project located anywhere in the County which generates a VMT that is 15-percent or more below this value, or 13.7 miles per resident, should be expected to cause a less-than-significant VMT impact and would not require further VMT analysis.

The project would be located within Traffic Analysis Zone (TAZ) 20237 of the Contra Costa Travel Demand Model which has a home-based VMT of 12.2 miles per resident. Because this per capita VMT rate of 12.2 is lower than the significance threshold of 13.7 miles, the project is presumed to have a less-than-significant VMT impact and does not require further VMT analysis. Further, adjacent TAZs, including 20239 and 20236, also have a per capita VMT rate that is less than the significance threshold so are consistent with TAZ 20237. A summary of the VMT findings is provided in Table 2.

Table 2 – Vehicle Miles Traveled Analysis Summary

VMT Metric	Baseline VMT Rate	Significance Threshold	Project VMT Rate	Resulting Significance
Residential VMT per Capita (Countywide Baseline)	16.1	13.7	12.2	Less-Than-Significant

Note: VMT Rate is measured in VMT per Capita, or the number of daily miles driven per resident

Significance Finding – The project would be located within a low-VMT area and is therefore presumed to have a less-than-significant VMT impact.

Site Circulation and Access

Vehicular Site Access

Access to the site is currently via a single full-access driveway located at 1125 Northgate Road. As part of the proposed project, the existing driveway would be reconstructed a few feet south of its current location and reoriented to improve the angle of entry. No additional driveways are proposed.

Sight Distance

At driveways, a substantially clear line of sight should be maintained between the driver of a vehicle waiting to enter the street and the driver of an approaching vehicle. Sight distances along Northgate Road at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans.

The approach travel speeds were used as the basis for determining the recommended sight distance. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn left into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street.

Northgate Road has a posted speed limit of 30 miles per hour (mph). An informal speed survey measured 85th percentile speeds of 29 mph in both the northbound and southbound directions, which closely align with the posted speed limit. Given that the observed operating speeds are nearly equal to the posted limit, it is appropriate to apply a stopping sight distance based on a design speed of 30 mph. For this speed, the minimum required stopping sight distance is 200 feet. Field measurements of sight distance were taken from the perspective of a driver waiting at each driveway approach location to ensure adequate visibility.

Sight lines for inbound drivers turning left and right into the project site exceed the minimum stopping sight distance of 200 feet required for a design speed of 30 mph. Sight lines to the north and south of the driveway are unobstructed for more than 250 feet, which is adequate for the observed 85th percentile speed of 29 mph and posted speed limit of 30 mph.

To preserve visibility at the proposed driveway, it is advised that vegetation, signage, or monuments near the driveway be maintained at a height of three feet or less, and that tree branches be trimmed to hang no lower than seven feet above the roadway surface. These recommendations follow the Federal Highway Administration's *Vegetation Control for Safety*, 2008, guidelines and help ensure a clear viewing window for drivers to observe oncoming traffic.

Finding – Sight lines at the proposed driveway are adequate for the posted speed limit of 30 mph.

Recommendation – To maintain adequate sight lines at the project driveway, it is recommended that any vegetation, signage, or monuments near the entrance be designed and maintained to ensure that all features remain below three feet in height or above seven feet.

Significance Finding – With implementation of a landscaping management program to control vegetation within the sight triangles, the proposed project would have a less-than-significant impact on safety as it would not introduce any new hazards.

Emergency Vehicle Access

The project's driveway would need to be designed to meet current County standards and thus can be expected to accommodate the access requirements for passenger vehicles. Vehicle access would be provided within the site via a network of private roadways which are at least 22 feet wide except for a pair of 12-foot-wide gates located approximately 660 feet west of Northgate Road. These roadways would have sufficient width to accommodate two-way traffic operations for circulating vehicles as well as vehicle maneuvers to/from parking spaces or private driveways.

The Contra Costa County Fire Department (CCCFD) provides rapid response to fires, medical emergencies, rescues, and other emergency calls for service throughout Contra Costa County. The closest CCCFD location to the proposed project site is Station #7 located 1.7 miles away at 1050 Walnut Avenue. Response times to this site can vary depending on time of day and the available resources. It is noted that the CCCFD has sole responsibility for determining the suitability of the project site for adequate fire apparatus vehicle access.

Emergency response vehicles would be able to access the site via the network of internal roadways. All the proposed internal roadways would be at least 22 feet wide, except at the 12-foot-wide gated sections. This configuration satisfies the *California Fire Code (CFC), Sections 503.2.1*, which states, "*Fire apparatus access roads shall have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than thirteen feet and six inches*" and section *D103.5* which states "*Where a fire apparatus road consists of a divided roadway, the gate width shall be not less than 12 feet*." The site includes a cul-de-sac style dead-end fire apparatus access road treatment which complies with section *D103.4* of the CFC for internal roadways longer than 150 feet. According to Table *D103.4* of the CFC, a cul-de-sac with a minimum diameter of 96 feet is required. The proposed cul-de-sac shown on the site plans has a diameter of only 90 feet, which does not meet this requirement. It is recommended that the CCCFD review the site plan and determine whether its design is acceptable.

Finding – The design of the internal roadways would satisfy most California Fire Code requirements except for the minimum diameter of the cul-de-sac.

Recommendation - The Contra Costa County Fire Department should review the site plan to determine whether its design is acceptable.

Significance Finding – Assuming approval of the site design by the Contra Costa County Fire Department, the project would result in a less-than-significant impact on emergency access.

Conclusions and Recommendations

- The proposed project would be expected to generate an average of approximately 164 additional daily trips, 12 net new morning peak hour trips, and 17 additional evening peak hour trips.

- The project does not conflict with existing plans or policies regarding pedestrian, bicycle, or transit facilities, resulting in a less-than-significant impact.

- The proposed project would be presumed to have a less-than-significant transportation impact on vehicle miles traveled (VMT) since the project is located within a low-VMT area.

- The project's driveway has adequate sight distances for inbound and outbound vehicles; it is recommended that existing and proposed vegetation be maintained to ensure the continued adequacy of vehicle sight lines. With a maintenance program implemented, the project would not introduce any hazards, and its impact would be less than significant.

- The proposed project would result in a less-than-significant impact on emergency response times provided the Contra Costa County Fire Department approves of the site design layout.

Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

Sincerely,

Beatrice Johnson-Drysdale
Assistant Engineer

Kenny Jeong, PE (Traffic)
Senior Engineer

Mark Spencer, PE (Traffic)
Senior Principal, President

MES/kbj-bjd/CCX032.L1