APPENDIX A:

RUNOFF CALCULATIONS

Runoff Analysis | Henderson Convers. | Nodes 1 + 2

Vineyard Block B, Drainage Line 1.1

Pre-project Design Storm Runoff

(N1) Drainage Line 1.1 to Vineyard Edge

Area = 1.1 ac Condition: Forested (C = 0.3)

$Q_{2yr-15min} = C\,I\,A$
$= (0.3)(1.68)(1.1ac) = \underline{0.55\ cfs}$

(N2) Combined Class III's to Edge of Property

Area = 8.6 ac Condition: Forested (C = 0.3)

$Q_{2yr-15min} = C\,I\,A$
$= (0.3)(1.68)(8.6) = \underline{4.3\ cfs}$

Post-project Design Storm Runoff

(N1) Drainage Line 1.1 to Vineyard Edge

Area = 1.1 ac Condition: Cultivated (C = 0.4)

$Q_{2yr-15min} = C\,I\,A$
$= (0.4)(1.68)(1.1) = \underline{0.74\ cfs}$

(N2) Combined Class III's to Edge of Property

Vineyard Area = 2.4 ac Condition: Cultivated (C=0.4)

$Q_{2yr-15min} = C\,I\,A$
$= (0.4)(1.68)(2.4) = 1.6\ cfs$

Forested Area = 6.2 ac Condition: Forest (C=0.35)
(Assume 50% canopy)

$Q_{2yr-15min} = C\,I\,A$

short term $= (0.35)(1.68)(6.2) = 3.6\ cfs$
long term $= (0.3)(1.68)(6.2) = \underline{3.1\ cfs}$

Total Post-project Combined Class III's to Edge of Property = 1.6 + 3.6

short term = $\underline{5.2\ cfs}$

long term = $\underline{4.7\ cfs}$

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Vineyard Block B, Drainage Line 3.2

(N3) Pre-project Design Storm Runoff

Drainage Line 3.2 to Vineyard Edge
(Includes Area in Drainage Line 3.1)

Area = 2.7 ac Condition: Forested (C = 0.3)

Q 2yr-15min = C I A

= (0.3)(1.68 in/hr)(2.7 ac) = 1.4 cfs

(N3) Post-project Design Storm Runoff

Drainage Line 3.2 to Vineyard Edge
(Exclusive of Area in Drainage Line 3.1)

Area = 1.3 ac Condition: Cultivated (C = 0.4)

Q 2yr-15min = C I A

= (0.4)(1.68)(1.3) = 0.87 cfs

Drainage Line 3.2 to Vineyard Edge
(Includes Area in Drainage Line 3.1)

Area = 2.9 ac Condition: Cultivated (C = 0.4)

Q 2yr-15min = C I A

= (0.4)(1.68)(2.9) = 1.9 cfs

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Stream A Watershed to Existing 0.5ac Pond

(N4) Pre-project Design Storm Runoff

Area = 34.0 ac Condition: Forested (C=0.3)

$I_{2yr-15\,min}$ = 0.42 in (NOAA, 1973)
= 1.68 in/hr

$Q_{2yr-15min}$ = C I A (Rational Runoff Eqn)
= (0.3)(1.68 in/hr)(34.0 ac)
= 17 cfs (15,300 gal/min)

(N4) Post-project Design Storm Runoff

Vineyard Area = 11.1 ac Condition: Cultivated (C=0.4)

Vineyard Area Draining to Reservoir = 7.0 ac

Vineyard Area Not to Reservoir = 4.1 ac

Reservoir Area = 1.0 ac Condition: C = 1.0

Forested Area = 21.9 ac Condition: 50% Canopy, assume C = 0.35 short term, C = 0.3 long term

Q 2yr-15min = C I A

Vineyard Area to Reserv.: (0.4)(1.68)(7.0) = 9.1 cfs

Vineyard Area Not to Res.: (0.4)(1.68)(4.1) = 2.8 cfs

Forested Area: (0.35)(1.68)(21.9) = 12.9 cfs
Long-term (0.3) = 11.0 cfs

Reservoir Area: (1.0)(1.68)(1.0) = 1.7 cfs

Q 2yr-15 min to Reservoir: 9.1 + 1.7 = 10.8 cfs

Short term Not to Reserv.: 2.8 + 12.9 = 15.7 cfs

Long-term Not to Reserv.: 2.8 + 11.0 = 13.8 cfs

Vineyard Block A, Drainage Line 6.1

Pre-project Design Storm Runoff

(N5) Drainage Line 6.1 to Vineyard Edge

Area = 1.05 ac Condition: Forested (c = 0.3)

$Q_{2yr-15min} = C\ I\ A$

$= (0.3)(1.68\ in/hr)(1.05\ ac) = \underline{0.53\ cfs}$

(N6) To Cl. III at Edge of Property

Area = 5.8 ac Condition: Forested (c = 0.3)

$Q_{2yr-15min} = (0.3)(1.68)(5.8) = \underline{2.9\ cfs}$

Post-project Design Storm Runoff

(N5) Drainage Line 6.1 to Vineyard Edge

Area = 1.05 ac Condition: Cultivated (C = 0.4)

$Q_{2yr-15min} = (0.4)(1.68)(1.05) = \underline{0.71\ cfs}$

(N6) To Cl. III at Edge of Property

Vineyard Area = 3.1 ac Condition: Cult. (C = 0.4)

$Q_{2yr-15min} = (0.4)(1.68)(3.1) = 2.1\ cfs$

Forested Area = 2.7 ac Condition: 50% Canopy (C = 0.35)

$Q_{2yr-15min} = (0.35)(1.68)(2.7) = 1.6\ cfs$ short term

$(0.3)(1.68)(2.7) = 1.4\ cfs$ long term

Total post-project to Edge of Property = 1.6 + 2.1

short term = $\underline{3.7\ cfs}$

long term = $\underline{3.5\ cfs}$

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Runoff Analysis | Henderson Corners | Nodes 7 + 8

Vineyard Block B, Drainage Line 2.1

Pre-project Design Storm Runoff

(N7) Drainage Line 2.1 to Vineyard Edge

Area = 0.9 ac Condition: Forested (C = 0.3)

$Q_{2yr-15min} = C\ I\ A$

$= (0.3)(1.68\ in/hr)(0.9\ ac) = \underline{0.45\ cfs}$

(N8) C1.III To Confluence with Stream B (Class II)

Area = 4.1 ac Condition: Forested (C = 0.3)

$Q_{2yr-15min} = C\ I\ A$

$= (0.3)(1.68)(4.1) = \underline{2.1\ cfs}$

Post-project Design Storm Runoff

(N7) Drainage Line 2.1 to Vineyard Edge

Vineyard Area = 0.8 ac Condition: Cultivated (C = 0.4)

$Q_{2yr-15min} = C I A$

$= (0.4)(1.68)(0.8) = 0.54\ cfs$

Forested Area = 0.1 ac Condition: Forested (C = 0.35)
(Assume 50% Canopy removal)

$Q_{2yr-15min} = C\ I\ A$

$= (0.35)(1.68)(0.1) = 0.06\ cfs$

Total post-project to Vineyard Edge = 0.54 + 0.06

$= \underline{0.60\ cfs}$

(N8) C1.III to Confluence with Stream B (Class II)

Vineyard Area = 1.7 ac Condition: Cultivated (C = 0.4)

$Q_{2yr-15min} = C\ I\ A$

$= (0.4)(1.68)(1.7) = 1.1\ cfs$

Forested Area = 2.4 ac Condition: Forest (50%) (C = 0.35)

$Q_{2yr-15min} = (0.35)(1.68)(2.4) = 1.4\ cfs$

Total Post-project to Confluence = $\underline{2.5\ cfs}$

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Stream C Watershed - C1.III Stream to Property Boundary

(N9) Pre-project Design Storm Runoff

Area = 15 ac. Condition: Forested (C = 0.3)

$Q_{2yr-15min} = C\ I\ A$

$= (0.3)(1.68\ in/hr)(15\ ac) = \underline{7.6\ cfs}$

(N9) Post-project Design Storm Runoff

Vineyard Area Condition: Cultivated (C = 0.4)

Block C = 3.9 ac

$Q_{2yr-15min} = C\ I\ A$

$= (0.4)(1.68)(3.9) = 2.6\ cfs$

Forest Area = 11.1 ac Condition: 50% Canopy (C = 0.35)

$Q_{2yr-15min} = C\ I\ A$

$= (0.35)(1.68)(11.1) = 6.5\ cfs$

Longterm $= (0.3)(1.68)(11.1) = 5.6\ cfs$

Total post-project to property boundary = 2.6 + 6.5

Short-term = $\underline{9.1\ cfs}$

Long-term = $\underline{8.2\ cfs}$

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Runoff Analysis	Henderson Convers.	Node 10

Stream B Watershed – C1 II stream to Property Boundary

(N10) Pre-project Design Storm Runoff

Area = 72 ac. Condition: Forested (C=0.3)

$Q_{2yr-15min} = C\ I\ A$

$= (0.3)(1.68\ in/hr)(72\ ac) = \underline{36\ cfs}$

(N10) Post-project Design Storm Runoff

Vineyard Area Condition: Cultivated (C=0.4)

Block A = 2.9 ac
Block B = 6.3 ac
Block C = 2.4 ac
Total = 11.6 ac

$Q_{2yr-15min} = C\ I\ A$

$= (0.4)(1.68)(11.6\ ac) = 7.8\ cfs$

Forest Area = 60.4 ac Condition: 50% canopy (C=0.35)

$Q_{2yr-15min} = C\ I\ A$

$= (0.35)(1.68)(60.4\ ac) = 36\ cfs$

Long-term $= (0.3)(1.68)(60.4\ ac) = 30\ cfs$

Total Post-project $= 7.8 + 36\ cfs$

$= \underline{43.8\ cfs}$ short-term

$= \underline{38\ cfs}$ long-term

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