EXHIBIT C

LincolnAE LLC
AGRICULTURAL ENGINEERING

Hydrology Report – Mitsuko, REV 1

Includes: WinTR55 Modeling
~~February 25, 2019~~ July 17, 2019

The project site is located at 4189 Withers Rd, Napa, CA 94559 (APN 047-280-017). The site is in the San Pablo drainage basin and borders Carneros Creek. The site and surrounding area are largely dominated by vineyards and retention ponds for water storage are common throughout. Topography is gentle rolling hills with slopes in the proposed project area ranging from 3% to 15% (average 8%). Soils are comprised of Diablo Clay (128) and Haire Clay Loam (148). Two watersheds were identified for the project that are bisected by an unnamed tributary to Carneros Creek and the Napa River. Watershed "A" is located south of the unnamed tributary and contains vineyard block #1 (40.5 acres gross). Watershed "B" is located north of the unnamed tributary and contains vineyard block #2 (6.2 acres gross). There is a small portion at the southern tip of the vineyard block that falls outside these watershed boundaries that is not expected to be significant. See attached WinTR55 PRE and POST maps as well as complete model results for both watersheds. Hydrologic Soil Group is mostly "C" in both watersheds with a downstream portion identified as "D" (see TR55 Map).

An extensive drainage system including retention ponds was installed sometime between 1988-1989 (when water appropriation rights were permitted) and 1993 (when drop inlets are visible on aerial photography). The exact connection of the network is not known and original design files have been purged from the engineering firm's files. Overall, the proposed development would have no change on existing hydrology. No changes to drainage system or pond morphology are proposed. The development proposes a conversion of "good" fallow grassland (regularly maintained with mowing) to a "good" vineyard development, which is an in-kind transition with the same Cn and a net neutral effect in all watersheds (Cronshey et al, 1986).

"PRE" development groundcover is comprised of wild oat grassland in "good" condition, assumed 80%. Please refer to Application Section 7: Photos for images of existing cover.

"POST" conditions in the new vineyard areas will establish a consistent 80% cover crop throughout all new vineyard blocks, which maintains the "good" hydrologic condition. All other vegetation on the subject site will remain the same.

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WinTR55 Land Use designations for each watershed were defined as follows (see Tables 1-2).

TABLE 1 Watershed #A				
Landuse	**HSG**	**PRE** (acres)	**POST** (acres)	**Cn**
Impervious	C	1.4	1.4	98
Pond	C/D	3.5	3.5	98
Dirt Roads	C	3.6	3.6	87
Dirt Roads	D	0.6	0.6	89
Farmstead	C	3.4	3.4	82
Woods/Grass Combo (fair)	C	14.4	14.4	76
Woods/Grass Combo (fair)	D	0.5	0.5	82
Grassland (good)	C	63.9	32.5	74
Grassland (good)	D	11.8	2.6	80
Vineyard (good)	C	0.0	31.4	74
Vineyard (good)	D	0.0	9.2	80
Vineyard (fair)	C	73.9	73.9	79
Vineyard (fair)	D	5.1	5.1	84
Total acres		**182.1**	**182.1**	
Weighted Cn		**78**	**78**	

TABLE 2				
Landuse	**HSG**	**PRE** (acres)	**POST** (acres)	**Cn**
Dirt Roads	C	1.5	1.5	87
Dirt Roads	D	5.6	5.6	89
Grassland (fair)	C	6.3	6.3	79
Grassland (fair)	D	16.3	8.2	84
Vineyard (fair)	C	28.5	28.5	79
Vineyard (fair)	D	48.7	56.8	84
Total		**106.9**	**106.9**	
Weighted Cn		**83**	**83**	

As indicated in Table 3, vineyard development will have no effect on hydrology at the site since the conversion of grassland to vineyard is an in-kind replacement with no change to Cn across the site:

TABLE 3						
Model Run	**Tc**	**Cn**	**Peak Flow (cfs)**			
			2-yr	**10-yr**	**50-yr**	**100-yr**
Watershed A - PRE	0.375	78	23.00	52.70	86.52	101.39
Watershed A - POST	0.375	78	23.00	52.70	86.52	101.39
Watershed B - PRE	0.311	83	19.71	39.93	61.9	71.36
Watershed B - POST	0.311	83	19.71	39.93	61.9	71.36

References

1. Cronshey, R., McCuen, R.H., Miller, N., Rawls, W., Robbins, S., and Woodward, D., *Urban Hydrology for Small Watersheds – TR-55*, from USDA NRCS Conservation Engineering Division, Technical Release 55, June 1986
2. *Custom Soil Resource Report for Napa County, CA, Mitsuko – TR55 Watersheds*, from USDA NRCS Web Soil Survey, January 2019

Watershed	Id	Type	Length	Slope
A	1	Sheet	100	10
A	2	Shallow Concentrated	2,405	5
A	3	Concentrated	681	3
A	4	Concentrated	3,780	1
B	1	Sheet	100	7
B	2	Shallow Concentrated	2,073	4
B	3	Concentrated	2,220	2

Watershed B
107 acres

Watershed A
182 acres

Run-on water captured captured at the fenceline and conveyed through buried culvert. Installation predates 1993.

Drop inlets interpreted from aerial photography. Exact drain line routes in Watershed B are unknown. Drainage system was installed pre-1993.

Shaded region of Hydrologic Soil Group D Soils (Elsewhere is Group C Soil)

Block 1
40.5 acres

Block 2
6.2 acres

Legend

- FlowlineTR55
- Existing Drain Line
- Drop Inlet
- Soils

Napa Contours

- Major (25 ft)
- Minor (5 ft)

Land Use

Cn_Descrip

- Dirt Roads
- Fallow
- Farmstead
- Impervious
- Mixed Woods-Grass
- Pond
- Vineyard

1 in = 550 ft

N

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QSD #00515

If bar does not measure 1 in then map is not to scale.

Drawn by: Sarah Pistone, CPESC #9225
Certified by: William D. Lincoln, CPESC #2296
Date: 7/17/19 **Version:** 0
File: ...Mitsuko_B_WinTR55_REV1.mxd

Mitsuko - WinTR55 Map (REV 1)

047-280-017
4189 Withers Rd, Napa, CA 94559

WinTR-55 Current Data Description

--- Identification Data ---

User: SPistone
Project: Mitsuko
SubTitle: Watershed A - PRE
State: California
County: Napa
Filename: C:\Users\Sarah\OneDrive - LincolnAE\AE Clients\Mitsuko\ECP\Mitsuko_A_REV1.w55

Date: 7/17/19
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
WatershedA	Watershed	Outlet	182.1	78	.448

Total area: 182.10 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

1-Yr (in)	2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)
2.07	2.72	3.54	4.2	5.08	5.74	6.4

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

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SPistone
Mitsuko
Watershed A - PRE
Napa County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	10-Yr (cfs)	50-Yr (cfs)	100-Yr (cfs)
SUBAREAS				
WatershedA	23.00	52.70	86.52	101.39
REACHES				
OUTLET	23.00	52.70	86.52	101.39

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SPistone
Mitsuko
Watershed A - PRE

Napa County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
WatershedA	182.10	0.448	78	Outlet	Watershed

Total Area: 182.10 (ac)

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SPistone

Mitsuko
Watershed A - PRE
Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
WatershedA							
SHEET	100	0.1000	0.060				0.045
SHALLOW	2405	0.0500	0.050				0.185
CHANNEL	681	0.0300	0.014	0.55	2.62	6.523	0.029
CHANNEL	3780	0.0100	0.014	1.77	4.71	5.556	0.189
					Time of Concentration		.448

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Mitsuko
Watershed A - PRE
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
WatershedA	Paved parking lots, roofs, driveways		C	4.9	98
	Dirt (w/ right-of-way)		C	3.6	87
	Dirt (w/ right-of-way)		D	.6	89
	Pasture, grassland or range	(fair)	C	73.9	79
	Pasture, grassland or range	(fair)	D	5.1	84
	Pasture, grassland or range	(good)	C	63.9	74
	Pasture, grassland or range	(good)	D	11.8	80
	Woods - grass combination	(fair)	C	14.4	76
	Woods - grass combination	(fair)	D	.5	82
	Farmsteads		C	3.4	82
	Total Area / Weighted Curve Number			182.1	78

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WinTR-55 Current Data Description

--- Identification Data ---

User: SPistone
Project: Mitsuko
SubTitle: Watershed A - POST
State: California
County: Napa
Filename: C:\Users\Sarah\OneDrive - LincolnAE\AE Clients\Mitsuko\ECP\Mitsuko_A_REV1_post.w55

Date: 7/17/19
Units: English
Areal Units: Acres

--- Sub-Area Data ---

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Napa County, California

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Mitsuko
Watershed A - POST

Napa County, California

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Total Area: 182.10 (ac)

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Napa County, California

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Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
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	Dirt (w/ right-of-way)		C	3.6	87
	Dirt (w/ right-of-way)		D	.6	89
	User defined urban (Click button or		C	31.4	74
	User defined urban (Click button or		D	9.2	80
	Pasture, grassland or range	(fair)	C	73.9	79
	Pasture, grassland or range	(fair)	D	5.1	84
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