EXHIBIT E

LincolnAE LLC
AGRICULTURAL ENGINEERING

Soil Loss Analysis – Mitsuko Vineyard REV 1

Includes: USLE Calculations
~~January 14, 2019~~ July 16, 2019

The NRCS web soil survey lists the soil type in the vineyard area as 128 Diablo Clay and 148 Hair Clay Loam [1]; see Site Plan – Aerial Map for soil boundaries. Soils data were obtained from the NRCS web soils survey, which notes that soil map data may not be valid the map scale for this project (1:2,400 or 1 in = 200 ft). The soils map was created at a scale of 1:24,000 or 1 in = 2,000 ft. Enlarged maps can cause misunderstandings of the accuracy of soil line placement. The NRCS Web Soil Survey lists the following soil properties:

Soils	Soils description	K	T	HSG
128	Diablo Clay, 15 to 30 percent slope	.20	5	C
148	Haire Clay Loam, 2 to 9 percent slope	.28	4	D

The Napa County Soil Survey [2] describes the Diablo series as well-drained soils on uplands derived from weathered sandstone and shale. Plant cover is generally annual grasses and scattered oaks and land is generally used for range and pasture. The Haire series is described as moderately well drained soils on old terraces and alluvial fans. The soils are formed from alluvium derived from weathered sedimentary rock. Vegetation is generally annual grasses and forbs and land is typically used as rangeland, pasture, orchard, or vineyard.

Average slope across vineyard blocks range from 3% to 15% with an average of 8%.

Segmented Slope Technique for LS Values was utilized for irregular slope flowlines #6 and #7, which were used in the USLE Erosion Calculation Results:

Segment	Length	Slope	LS	Fraction	Product
6a	350	13%	3.64	0.35	1.274
6b	350	3%	0.42	0.65	0.273
Total	**700**				**1.55**
7a	400	10%	2.71	0.35	0.9485
7b	400	4%	0.70	0.65	0.455
Total	**800**				**1.40**

SARAH PISTONE CPESC #9225
PO Box 1686 (707) 533-3511
Middletown, CA 95461 sarah@LincolnAE.com

The energy of precipitation (R) value was determined by getting the Point Precipitation Frequency Estimate for the subject site from the NOAA PFDS site. The value of 1.43 was converted to an R value of 35 from Table A-1 [3].

Current groundcover is comprised of wild oat grassland in moderate densities, 80% is assumed (60% grasses; 40% broadleaf weeds and undecayed residue). Please refer to Application Section 7: Photos for visual documentation of existing cover crop in each block. Post-ground cover will establish a consistent 80% groundcover throughout new vineyard areas and avenues.

An up/down-hill row direction for a P factor of 1 was assumed for soil loss calculations, which represents the “worst-case” scenario. Any row direction that deviates from up/down-hill and approaches parallel to contours would *improve* (i.e. reduce) soil loss.

SARAH PISTONE CPESC #9225
PO Box 1686 (707) 533-3511
Middletown, CA 95461 sarah@LincolnAE.com

Erosion Calculation Results

Soil Loss in tons/acre were computed using the following formula [4]:

A = (R) x (K) x (LS) x (C) x (P)   with A < T+2

Where:
- A = Predicted Soil Loss (tons/acre)
- R = Rainfall & Runoff Factor (energy of precipitation)
- K = Soil Erosiveness (NRCS whole soil, surface layer, dominant condition)
- LS = Erosion Energy (function of line length and steepness)
- C = Factor for cover crop, surface residue, roughness, and canopy
- P = Factor for contouring or cross-slope farming (1.0 if contouring is not applicable)
- T = Soil Loss Tolerance

Flow line locations are shown on Site Plan: Topo and ECP Detail. As presented, there will be no net increase in soil loss from the site. Erosion calculations for the pre and post project site are as follows:

Location	FEET	SLOPE %	K	LS	C		P	T	A	
					Pre	Post			Pre	Post
1	672	11	.20	4.094	0.025	0.022	1	5	0.72	0.63
2	494	5	.20	1.189	0.025	0.022	1	5	0.21	0.18
3	263	15	.20	4.151	0.025	0.022	1	5	0.73	0.64
4	400	9	.20	2.346	0.025	0.022	1	5	0.41	0.36
5	582	3	.20	0.487	0.025	0.022	1	5	0.09	0.07
6	700	13, 3	.20	1.55	0.025	0.022	1	5	0.27	0.24
7	800	10, 4	.20	1.40	0.025	0.022	1	5	0.25	0.22
8	285	12	.20	3.045	0.025	0.022	1	5	0.16	0.14
9	309	5	.28	0.940	0.025	0.022	1	4	0.64	0.56
10	360	10	.28	2.597	0.025	0.022	1	4	0.25	0.22
11	356	5	.28	1.009	0.025	0.022	1	4	1.61	1.42

References

1. *Custom Soil Reource Report for Napa County, California, Mitsuko*, from USDA NRCS Web Soil Survey, January 2019
2. Lambert, G., Kashiwagi, J. et al., *Soil Survey of Napa County, California*, USDA in cooperation with UC Agricultural Experiment Station, August 1978
3. *USLE Special Applications for Napa County*, USDA, NRCS, May 2014
4. Wischmeier, W.H., and Smith, D.D. *Predicting rainfall erosion losses – a guide to conservation planning.* USDA, Agriculture Handbook No. 537. 1978

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Napa County RCD USLE Equations

LEGACY LS EQUATION PER NCRCD USLE SPEADSHEET

```
=IF(C14<=9,((C13/72.6)*COS(ATAN(C14/100)))^O14*(65.41*(SIN(ATAN(C14/100)))^2+4.56*SIN(ATAN(C14/100))+0
.065),((C13/72.6)*COS(ATAN(C14/100)))^0.5*((SIN(ATAN(C14/100)))/SIN(5.143*3.14/180))^1.4)
```

If Gradient is less than or equal to 9%

$\theta = \tan^{-1}$ (percent gradient / 100)

$LS = [(\lambda/72.6)\cos\theta]^{m}\,(65.41\sin^{2}\theta + 4.56\sin\theta + 0.065)$

If Gradient is greater than 9%

$\theta = \tan^{-1}$ (percent gradient / 100)

$LS = [(\lambda/72.6)\cos\theta]^{0.5}\,[(\sin\theta) / (\sin(5.143\pi/180)]^{1.4}$

LS EQUATION PER USDA – PREDICTING RAINFALL EROSION LOSSES

Original File notes:

```
=IF(C14<1,((C13/72.6)^0.2)*(65.41*((SIN(ATAN(C14/100)))^2)+4.56*SIN((ATAN(C14/100)))+0.065),
IF(AND(C14>=1,C14<3.5),((C13/72.6)^0.3)*(65.41*((SIN(ATAN(C14/100)))^2)+4.56*SIN((ATAN(C14/100)))+0.065),
IF(AND(C14>=3.5,C14<5),((C13/72.6)^0.4)*(65.41*((SIN(ATAN(C14/100)))^2)+4.56*SIN((ATAN(C14/100)))+0.065),
IF(AND(C14>=5,C14<=20),((C13/72.6)^0.5)*(65.41*((SIN(ATAN(C14/100)))^2)+4.56*SIN((ATAN(C14/100)))+0.065),
IF(C14>20,((C13/72.6)^0.5)*(65.41*((SIN(ASIN(C14/100)))^2)+4.56*SIN((ASIN(C14/100)))+0.065)))))
```

Napa County Engineering (c/o Dan Basore):

```
=IF(B17<=1,(((B16/72.6)*COS(ATAN(B17/100)))^0.2)*(((65.41*(SIN(ATAN(B17/100)))^2)+4.56*SIN(ATAN(B17/100))
+0.065)),
IF(AND(B17>1,B17<=3.5),(((B16/72.6)*COS(ATAN(B17/100)))^0.3)*(((65.41*(SIN(ATAN(B17/100)))^2)+4.56*SIN(AT
AN(B17/100))+0.065)),
IF(AND(B17>3.5,B17<=4.5),(((B16/72.6)*COS(ATAN(B17/100)))^0.4)*(((65.41*(SIN(ATAN(B17/100)))^2)+4.56*SIN(
ATAN(B17/100))+0.065)),
IF(AND(B17>4.5,B17<=9),(((B16/72.6)*COS(ATAN(B17/100)))^0.5)*(((65.41*(SIN(ATAN(B17/100)))^2)+4.56*SIN(AT
AN(B17/100))+0.065)),
IF(B17>9,(((B16/72.6)*COS(ATAN(B17/100)))^0.5)*(((SIN(ATAN(B17/100)))/SIN(RADIANS(5.143)))^1.4),)))))
```

If Gradient is less than 1%

$m = 0.2$

$\theta = \tan^{-1}$ (Percent Slope Gradient / 100)

$LS = (\lambda/72.6)^{m}\,(65.41\sin^{2}\theta + 4.56\sin\theta + 0.065)$

If Gradient is greater or equal to 1% and less than 3.5%

$m = 0.3$

$\theta = \tan^{-1}$ (Percent Slope Gradient / 100)

$LS = (\lambda/72.6)^{m}\,(65.41\sin^{2}\theta + 4.56\sin\theta + 0.065)$

If gradient is greater or equal to 3.5% and less than 5%

$m = 0.4$

$\theta =$ tan-1 (Percent Slope Gradient / 100)

$LS = (\lambda/72.6)^{m}\,(65.41\sin^{2}\theta + 4.56\sin\theta + 0.065)$

If gradient is greater or equal to 5% and less than or equal to 20%

$m = 0.5$
$\theta = \tan^{-1}$ (Percent Slope Gradient / 100)
$LS = (\lambda/72.6)^m (65.41 \sin^2\theta + 4.56 \sin\theta + 0.065)$

If gradient is greater than 20%

$m = 0.5$
$\theta = \sin^{-1}$ (Percent Slope Gradient / 100)

> Rain drop impact forces along the surface and runoff shear stress are functions of the sine; therefore substituting 100sinθ for percent slope is more accurate. The substitution does not significantly affect the initial statistical derivation or the equation's solution for slopes of less than 20%, but as slope become steeper, the difference between the sine and tangent become appreciable and projections far beyond the range of the plot data become more realistic.

$LS = (\lambda/72.6)^m (65.41 \sin^2\theta + 4.56 \sin\theta + 0.065)$