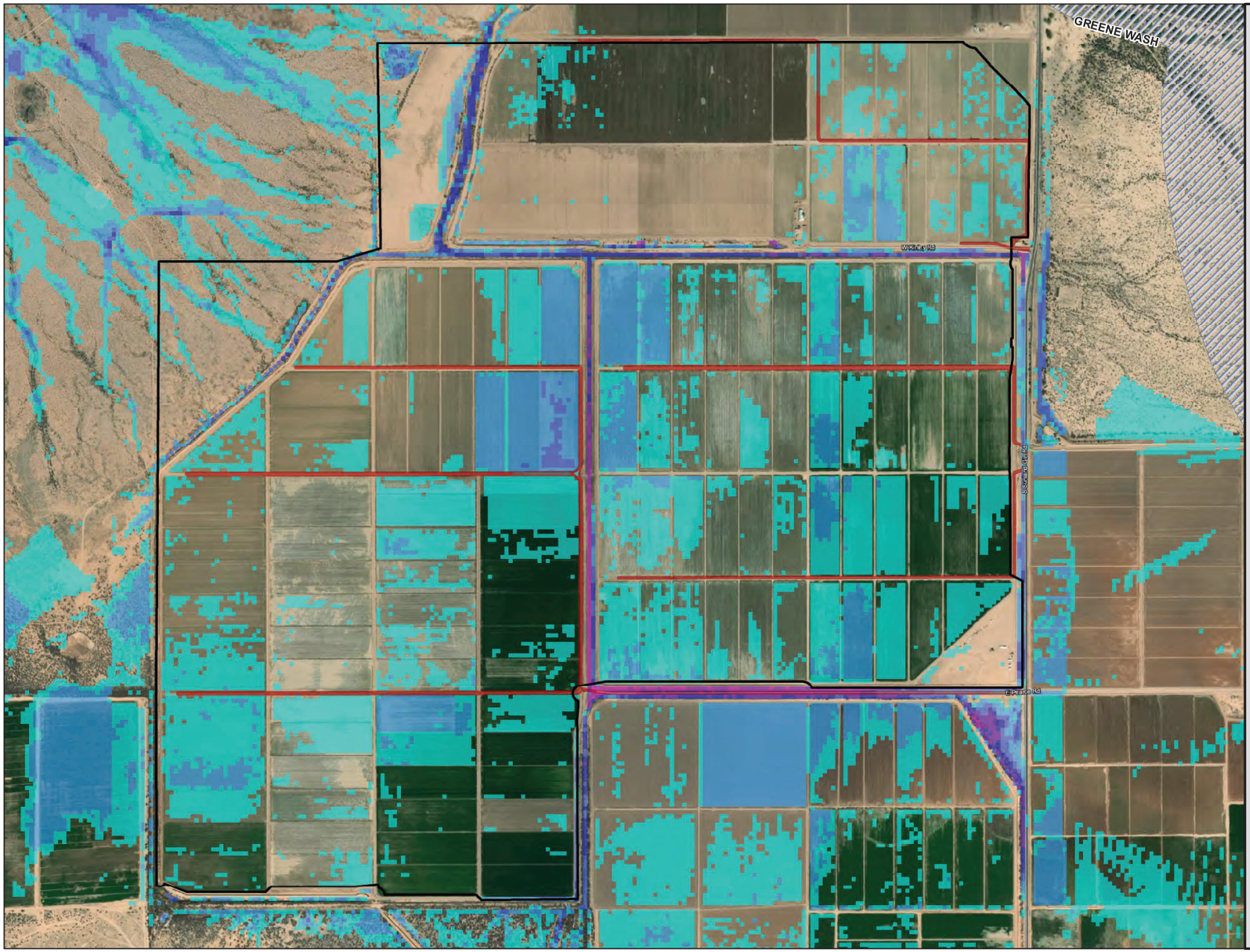


Sonak Solar

Legend

- Project Limits
- Proposed Road
- Zone A Flood Zone

Flow Depth (ft)

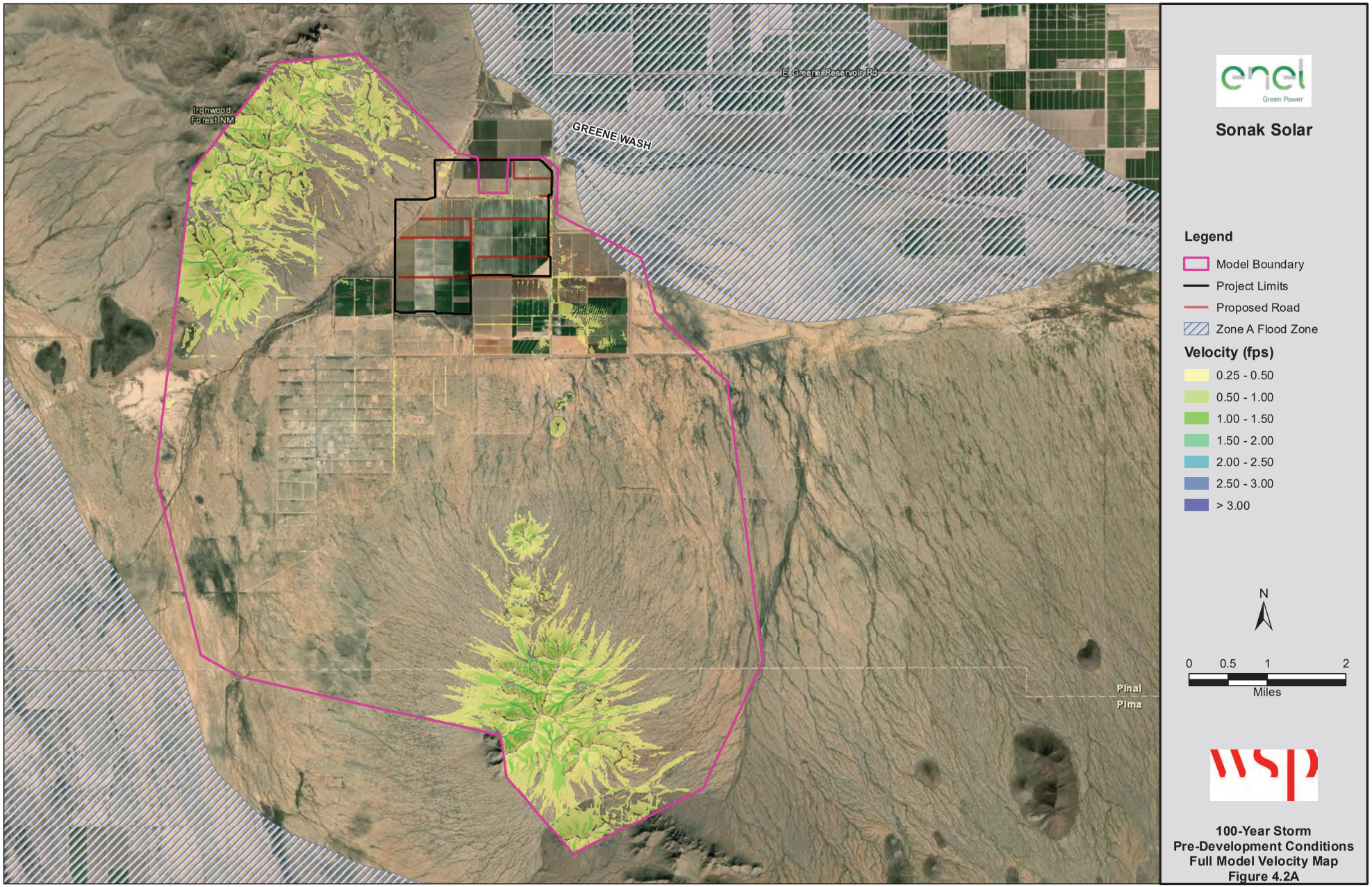
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- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- > 3.00

N

0 500 1,000 2,000

Feet

100-Year Storm
Pre-Development Conditions
Flow Depth Map
Figure 4.1B


Ironwood Forest NM
GREENE WASH
E Greene Reservoir Rd
Pinal
Pima
Sonak Solar
Legend
Model Boundary
Project Limits
Proposed Road
Zone A Flood Zone
Velocity (fps)
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
2.00 - 2.50
2.50 - 3.00
> 3.00
N
0 0.5 1 2
Miles
100-Year Storm
Pre-Development Conditions
Full Model Velocity Map
Figure 4.2A



Sonak Solar

Legend

- Project Limits
- Proposed Road
- Zone A Flood Zone

Velocity (fps)

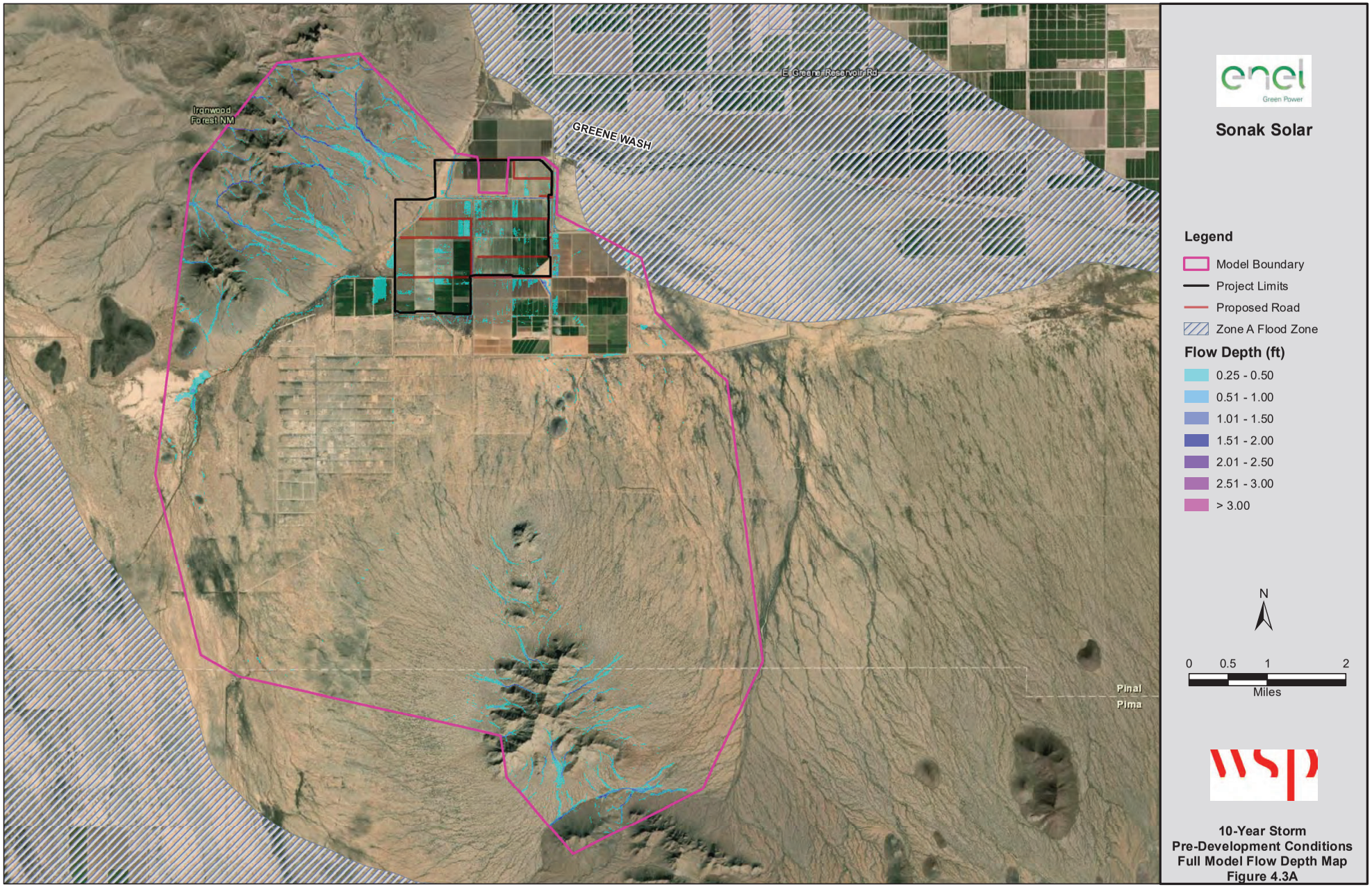
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- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- > 3.00

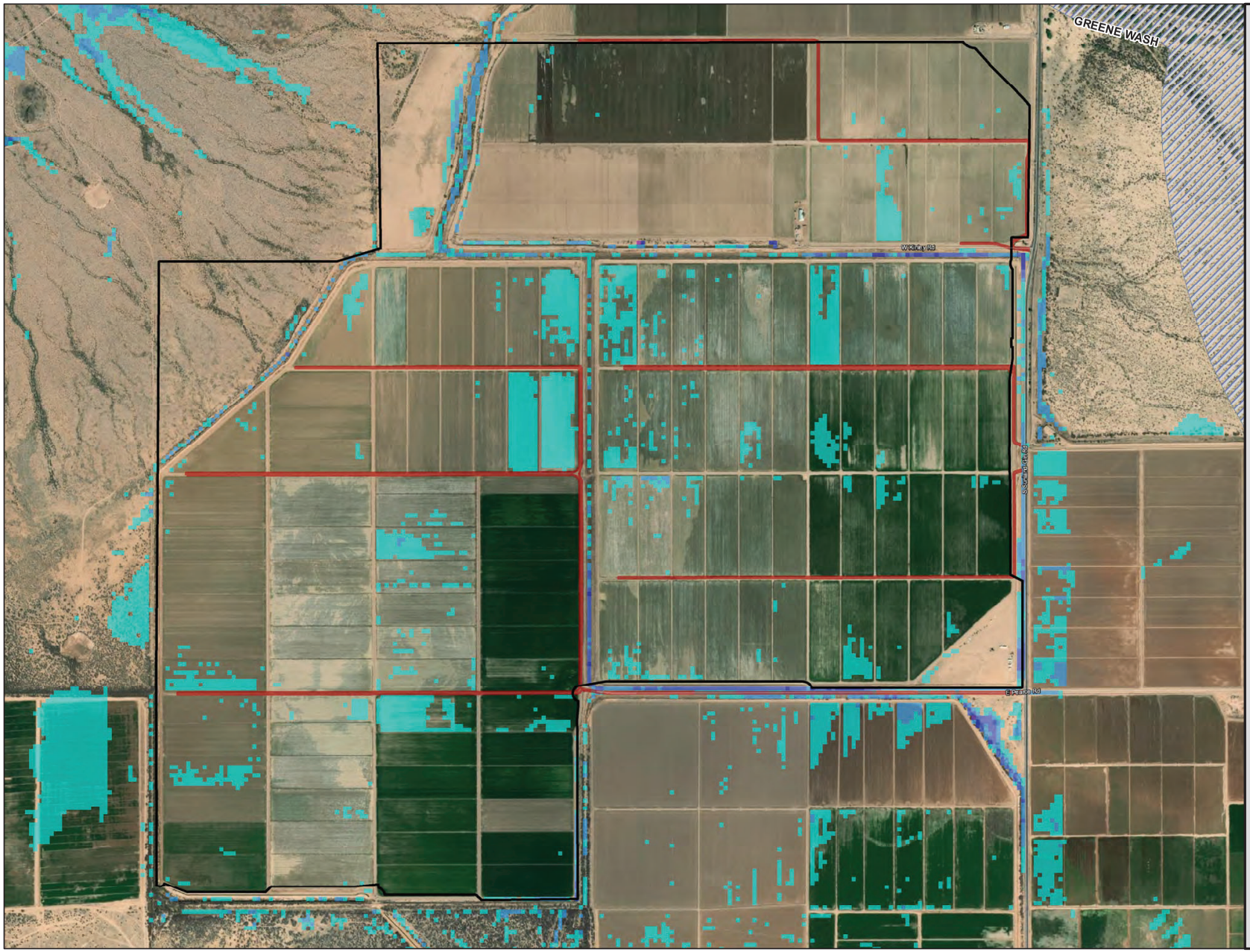
N

0 500 1,000 2,000

Feet

100-Year Storm
Pre-Development Conditions
Velocity Map
Figure 4.2B


Ironwood Forest NM
GREENE WASH
E Greene Reservoir Rd
Pinal
Pima
Sonak Solar
Legend
Model Boundary
Project Limits
Proposed Road
Zone A Flood Zone
Flow Depth (ft)
0.25 - 0.50
0.51 - 1.00
1.01 - 1.50
1.51 - 2.00
2.01 - 2.50
2.51 - 3.00
> 3.00
N
0 0.5 1 2
Miles
10-Year Storm
Pre-Development Conditions
Full Model Flow Depth Map
Figure 4.3A



Sonak Solar

Legend

- Project Limits
- Proposed Road
- Zone A Flood Zone

Flow Depth (ft)

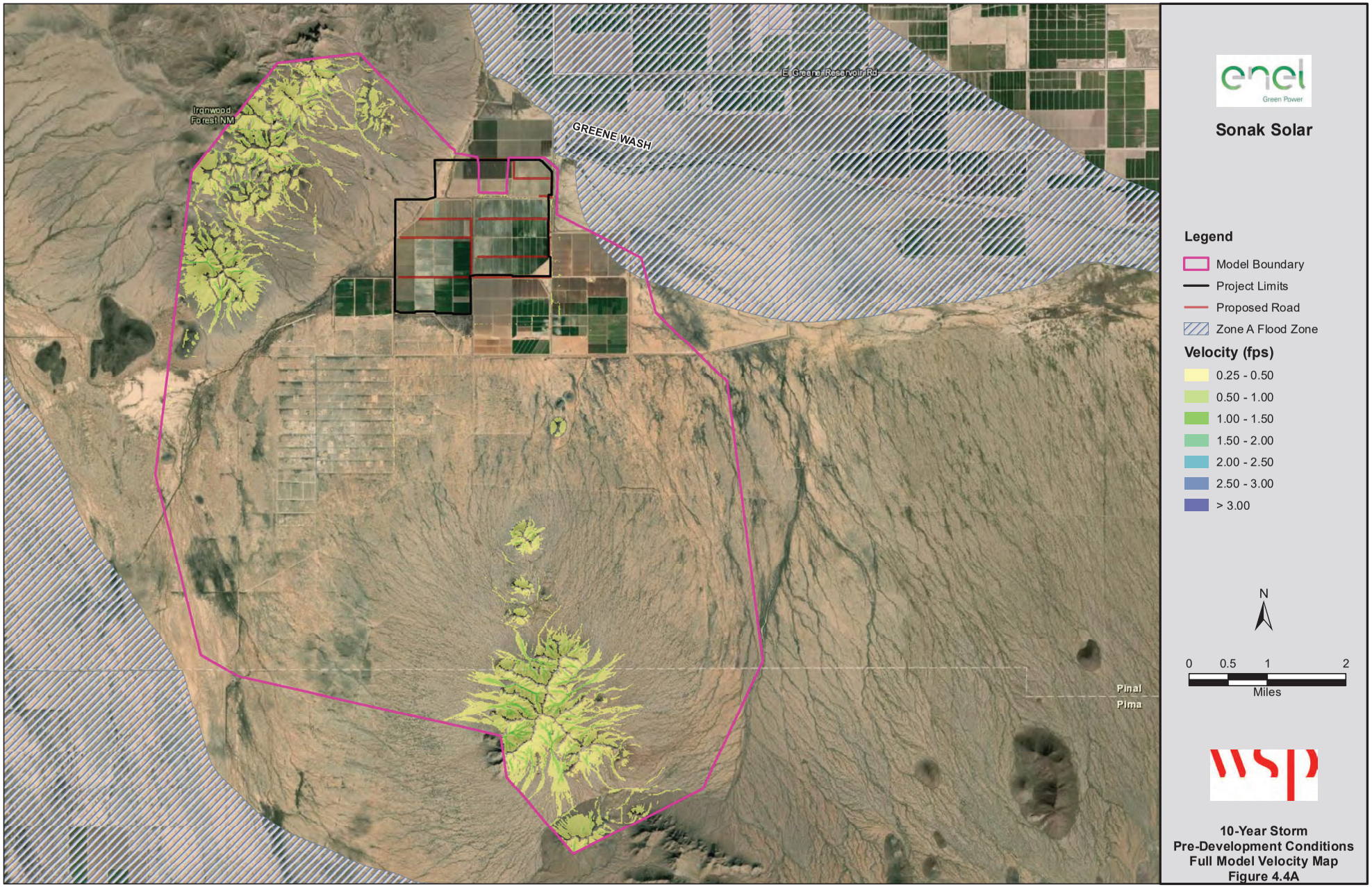
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- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- > 3.00

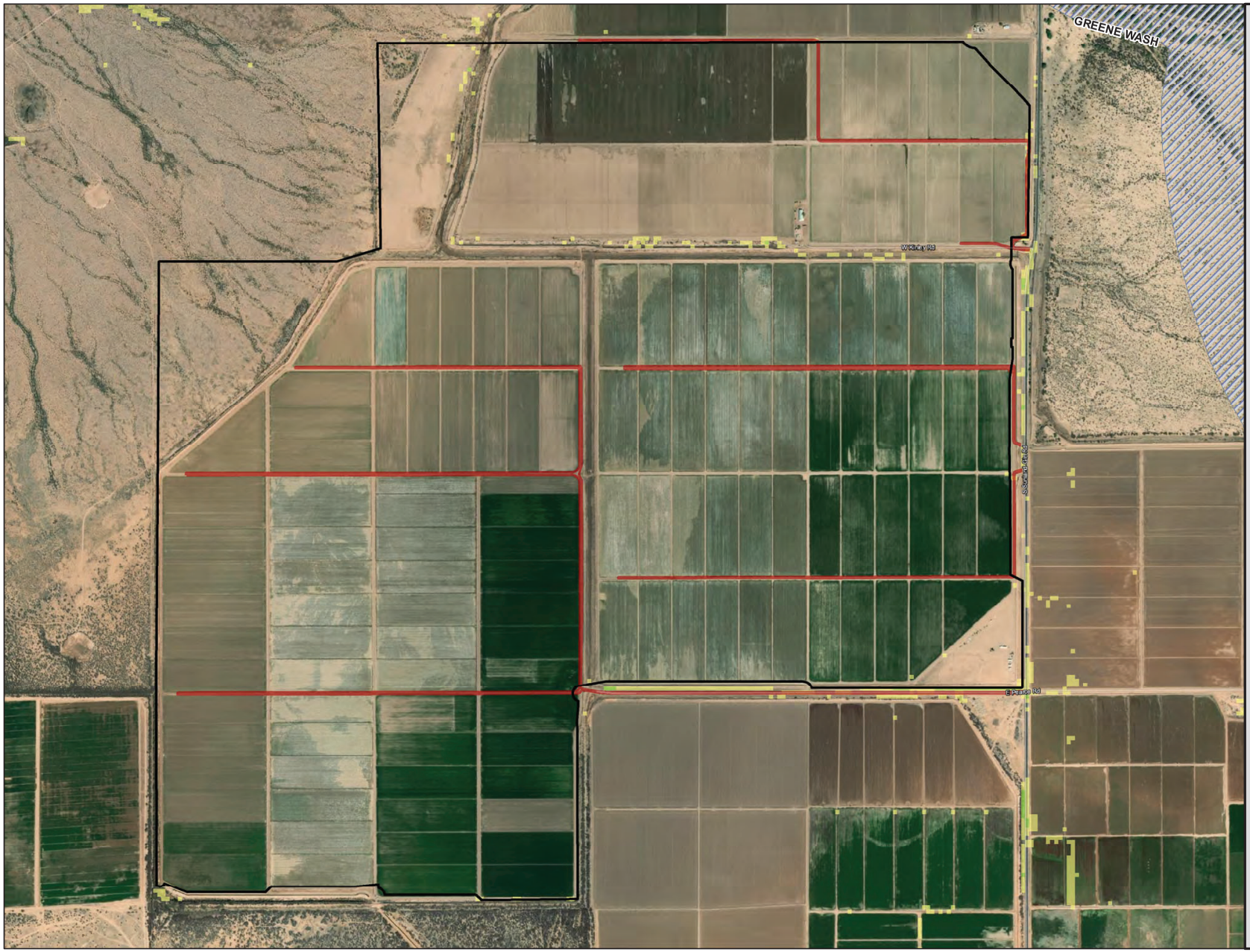
N

0 500 1,000 2,000

Feet

10-Year Storm
Pre-Development Conditions
Flow Depth Map
Figure 4.3B


Ironwood Forest NM
E Greene Reservoir Rd
GREENE WASH
Pinal
Pima
Sonak Solar
Legend
Model Boundary
Project Limits
Proposed Road
Zone A Flood Zone
Velocity (fps)
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
2.00 - 2.50
2.50 - 3.00
> 3.00
N
0 0.5 1 2
Miles
10-Year Storm
Pre-Development Conditions
Full Model Velocity Map
Figure 4.4A



Sonak Solar

Legend

- Project Limits
- Proposed Road
- Zone A Flood Zone

Velocity (fps)

- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- > 3.00

N

0 500 1,000 2,000

Feet

10-Year Storm
Pre-Development Conditions
Velocity Map
Figure 4.4B

5 CONCLUSION

5.1 CONCLUSIONS AND RECOMMENDATIONS

The Sonak Solar Project is being constructed on approximately 1,880 acres of land in Pinal County, Arizona. The purpose of this drainage study was to establish the 100-year and 10-year depths and velocities that will ultimately be used for determining solar equipment elevations (panels, inverter, and pads) and O&M building and substation pad elevations.

The Project is being developed primarily on agricultural land that will be revegetated with low maintenance native vegetation after development, presenting more favorable conditions for stormwater management in most instances. The storm events were modeled using FLO-2D for pre-development condition to evaluate flow depths and velocities throughout the site and potential impacts from development of the site.

All electrical equipment including, but not limited to, solar panels, inverters, transformers, and switch boxes are recommended to be elevated to a minimum of 12 inches above the flow depths. The project substation, O&M building, and construction offices should be elevated on fill a minimum of 12 inches above the flow depths established in this study.

6 REFERENCES

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For additional data sources, see Table 3.1.

Appendix A – Hydrologic and Hydraulic Parameters and Analysis

- A.1 NOAA Atlas 14 Rainfall Data
- A.2 TR-55 Rainfall Distribution Map
- A.3 Green-Ampt Calculations
- A.4 FLO-2D Manning's n values

A.1 NOAA Atlas 14 Rainfall Data

NOAA Atlas 14, Volume 1, Version 5
Location name: Eloy, Arizona, USA*
Latitude: 32.5858°, Longitude: -111.6894°
Elevation: 1579.86 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for ON1

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.210 (0.181-0.246)	0.273 (0.237-0.321)	0.370 (0.317-0.432)	0.441 (0.377-0.514)	0.539 (0.454-0.626)	0.613 (0.510-0.711)	0.688 (0.563-0.798)	0.765 (0.615-0.888)	0.865 (0.678-1.01)	0.943 (0.724-1.11)
10-min	0.319 (0.276-0.375)	0.416 (0.360-0.489)	0.562 (0.483-0.658)	0.672 (0.574-0.783)	0.821 (0.691-0.953)	0.934 (0.776-1.08)	1.05 (0.857-1.22)	1.16 (0.936-1.35)	1.32 (1.03-1.54)	1.44 (1.10-1.69)
15-min	0.395 (0.342-0.465)	0.516 (0.446-0.607)	0.697 (0.599-0.816)	0.833 (0.711-0.970)	1.02 (0.856-1.18)	1.16 (0.962-1.34)	1.30 (1.06-1.51)	1.44 (1.16-1.68)	1.63 (1.28-1.91)	1.78 (1.37-2.09)
30-min	0.532 (0.461-0.626)	0.695 (0.601-0.818)	0.939 (0.806-1.10)	1.12 (0.958-1.31)	1.37 (1.15-1.59)	1.56 (1.30-1.81)	1.75 (1.43-2.03)	1.94 (1.56-2.26)	2.20 (1.72-2.57)	2.40 (1.84-2.81)
60-min	0.659 (0.570-0.775)	0.860 (0.744-1.01)	1.16 (0.998-1.36)	1.39 (1.19-1.62)	1.70 (1.43-1.97)	1.93 (1.60-2.24)	2.17 (1.77-2.51)	2.41 (1.93-2.79)	2.72 (2.13-3.18)	2.97 (2.28-3.48)
2-hr	0.754 (0.659-0.878)	0.977 (0.850-1.14)	1.30 (1.12-1.51)	1.55 (1.33-1.80)	1.88 (1.59-2.17)	2.14 (1.79-2.47)	2.41 (1.98-2.78)	2.68 (2.16-3.10)	3.05 (2.40-3.54)	3.34 (2.56-3.90)
3-hr	0.816 (0.713-0.949)	1.04 (0.914-1.22)	1.37 (1.19-1.59)	1.63 (1.41-1.88)	1.99 (1.69-2.29)	2.28 (1.91-2.62)	2.58 (2.12-2.97)	2.89 (2.33-3.34)	3.33 (2.60-3.86)	3.68 (2.80-4.29)
6-hr	0.979 (0.867-1.12)	1.24 (1.10-1.42)	1.58 (1.40-1.81)	1.86 (1.63-2.11)	2.25 (1.94-2.54)	2.55 (2.17-2.87)	2.86 (2.40-3.23)	3.19 (2.62-3.61)	3.64 (2.90-4.13)	3.99 (3.11-4.56)
12-hr	1.11 (0.998-1.25)	1.41 (1.26-1.58)	1.78 (1.59-2.00)	2.08 (1.84-2.32)	2.48 (2.18-2.77)	2.80 (2.43-3.12)	3.12 (2.67-3.49)	3.45 (2.91-3.88)	3.91 (3.20-4.43)	4.26 (3.42-4.87)
24-hr	1.27 (1.16-1.42)	1.62 (1.47-1.80)	2.10 (1.90-2.32)	2.47 (2.23-2.74)	3.00 (2.69-3.31)	3.41 (3.04-3.76)	3.84 (3.40-4.23)	4.29 (3.77-4.73)	4.91 (4.26-5.42)	5.39 (4.64-5.96)
2-day	1.37 (1.24-1.52)	1.75 (1.58-1.94)	2.29 (2.07-2.54)	2.73 (2.45-3.02)	3.33 (2.98-3.68)	3.82 (3.39-4.22)	4.32 (3.82-4.78)	4.86 (4.26-5.38)	5.60 (4.86-6.22)	6.20 (5.33-6.92)
3-day	1.45 (1.31-1.61)	1.85 (1.67-2.05)	2.42 (2.19-2.69)	2.89 (2.60-3.20)	3.54 (3.17-3.92)	4.07 (3.62-4.50)	4.62 (4.09-5.11)	5.21 (4.57-5.77)	6.04 (5.23-6.70)	6.70 (5.75-7.47)
4-day	1.53 (1.38-1.70)	1.95 (1.76-2.16)	2.56 (2.31-2.84)	3.05 (2.75-3.38)	3.76 (3.36-4.15)	4.32 (3.84-4.78)	4.93 (4.35-5.44)	5.57 (4.87-6.16)	6.47 (5.59-7.19)	7.21 (6.17-8.03)
7-day	1.71 (1.54-1.90)	2.18 (1.97-2.43)	2.87 (2.58-3.19)	3.43 (3.08-3.80)	4.21 (3.75-4.67)	4.85 (4.30-5.37)	5.53 (4.86-6.13)	6.24 (5.45-6.93)	7.26 (6.25-8.08)	8.08 (6.88-9.02)
10-day	1.88 (1.70-2.10)	2.41 (2.17-2.68)	3.16 (2.85-3.52)	3.77 (3.39-4.19)	4.63 (4.13-5.14)	5.32 (4.72-5.90)	6.05 (5.33-6.71)	6.81 (5.96-7.58)	7.89 (6.82-8.80)	8.76 (7.49-9.79)
20-day	2.33 (2.10-2.58)	2.99 (2.70-3.31)	3.93 (3.55-4.35)	4.65 (4.18-5.13)	5.62 (5.03-6.20)	6.37 (5.68-7.02)	7.13 (6.33-7.87)	7.90 (6.98-8.73)	8.95 (7.83-9.92)	9.75 (8.46-10.8)
30-day	2.75 (2.50-3.02)	3.53 (3.21-3.88)	4.63 (4.21-5.09)	5.47 (4.96-6.00)	6.60 (5.96-7.23)	7.47 (6.71-8.18)	8.35 (7.47-9.15)	9.25 (8.22-10.2)	10.5 (9.21-11.5)	11.4 (9.96-12.6)
45-day	3.23 (2.94-3.55)	4.16 (3.78-4.57)	5.45 (4.95-5.98)	6.41 (5.81-7.03)	7.67 (6.92-8.40)	8.62 (7.74-9.43)	9.57 (8.57-10.5)	10.5 (9.37-11.6)	11.8 (10.4-13.0)	12.7 (11.2-14.1)
60-day	3.59 (3.26-3.93)	4.63 (4.21-5.07)	6.05 (5.50-6.64)	7.10 (6.44-7.77)	8.45 (7.64-9.24)	9.46 (8.51-10.3)	10.5 (9.37-11.5)	11.4 (10.2-12.5)	12.7 (11.3-14.0)	13.7 (12.1-15.1)

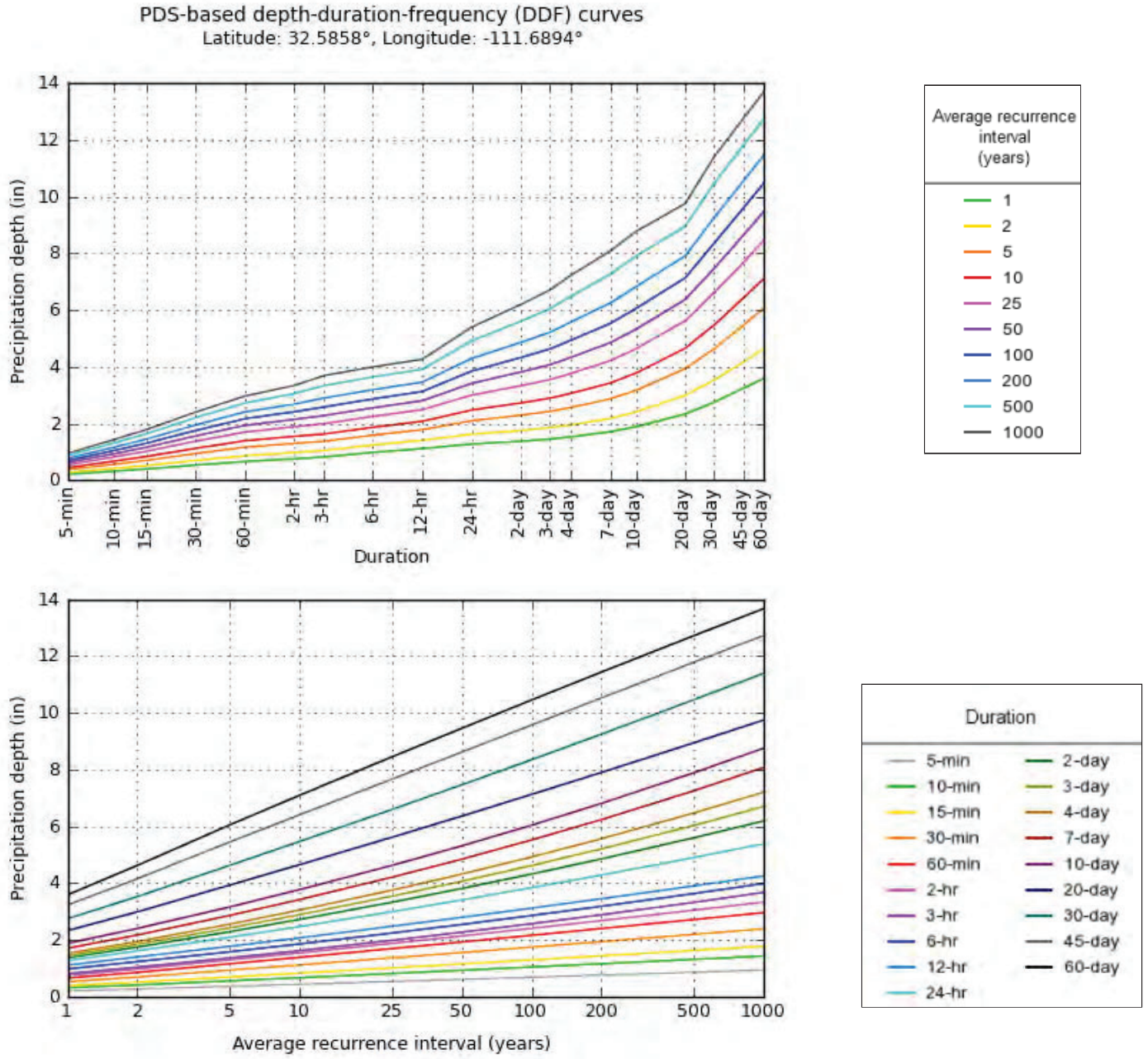
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



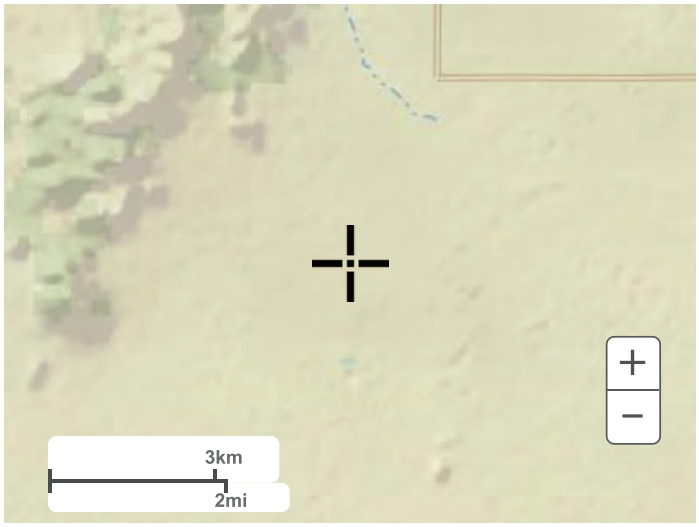
NOAA Atlas 14, Volume 1, Version 5

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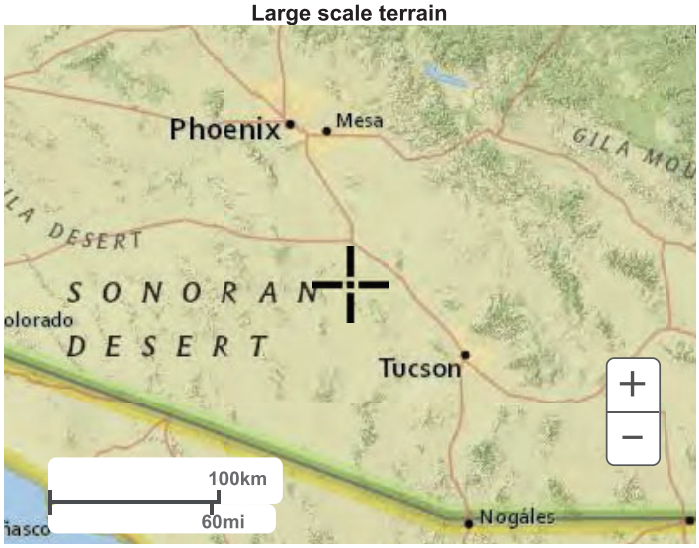
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Maps & aerials

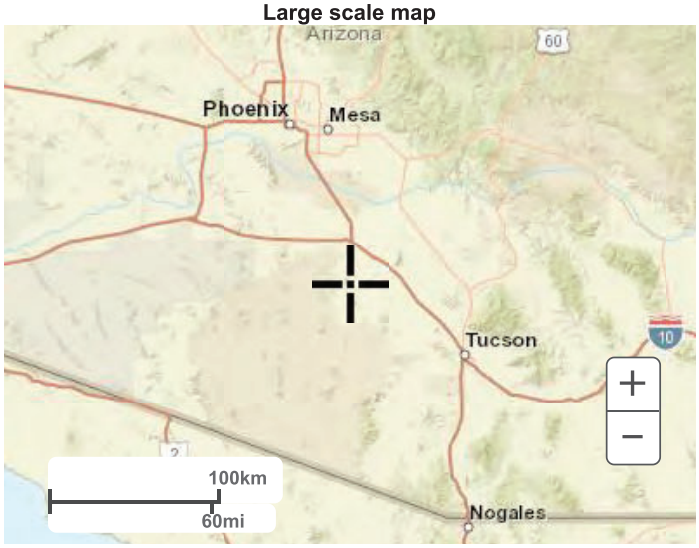
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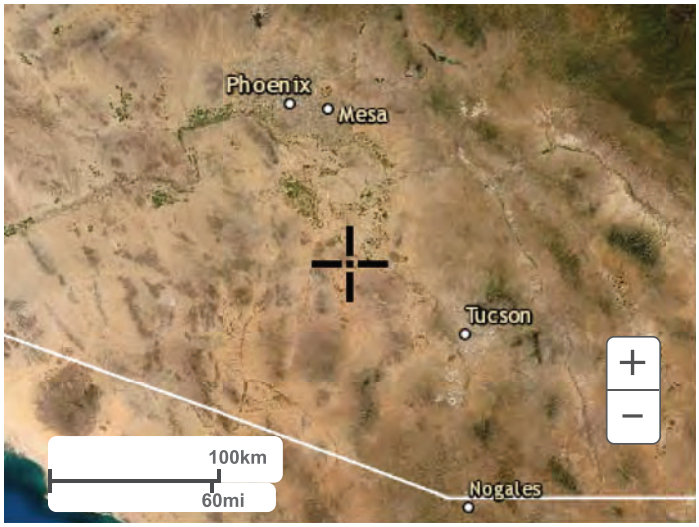
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 1, Version 5
Location name: Eloy, Arizona, USA*
Latitude: 32.6038°, Longitude: -111.7134°
Elevation: 1643.45 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for OFF1

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.211 (0.182-0.247)	0.275 (0.238-0.323)	0.371 (0.319-0.434)	0.444 (0.379-0.516)	0.542 (0.456-0.628)	0.616 (0.512-0.713)	0.691 (0.565-0.801)	0.768 (0.617-0.891)	0.868 (0.680-1.01)	0.945 (0.726-1.11)
10-min	0.320 (0.277-0.377)	0.418 (0.362-0.492)	0.565 (0.485-0.661)	0.676 (0.576-0.786)	0.825 (0.694-0.956)	0.938 (0.779-1.09)	1.05 (0.860-1.22)	1.17 (0.939-1.36)	1.32 (1.04-1.54)	1.44 (1.10-1.69)
15-min	0.397 (0.343-0.467)	0.518 (0.448-0.610)	0.701 (0.602-0.819)	0.838 (0.715-0.974)	1.02 (0.860-1.18)	1.16 (0.966-1.35)	1.30 (1.07-1.51)	1.45 (1.16-1.68)	1.64 (1.28-1.91)	1.78 (1.37-2.09)
30-min	0.535 (0.462-0.629)	0.698 (0.604-0.821)	0.944 (0.810-1.10)	1.13 (0.962-1.31)	1.38 (1.16-1.60)	1.57 (1.30-1.81)	1.76 (1.44-2.04)	1.95 (1.57-2.26)	2.21 (1.73-2.57)	2.40 (1.84-2.82)
60-min	0.662 (0.572-0.778)	0.864 (0.747-1.02)	1.17 (1.00-1.36)	1.40 (1.19-1.62)	1.71 (1.43-1.98)	1.94 (1.61-2.24)	2.18 (1.78-2.52)	2.42 (1.94-2.80)	2.73 (2.14-3.18)	2.97 (2.28-3.49)
2-hr	0.756 (0.660-0.880)	0.979 (0.852-1.14)	1.30 (1.13-1.51)	1.55 (1.33-1.80)	1.89 (1.60-2.17)	2.15 (1.80-2.47)	2.42 (1.99-2.78)	2.69 (2.17-3.10)	3.06 (2.40-3.55)	3.35 (2.57-3.90)
3-hr	0.818 (0.715-0.951)	1.05 (0.917-1.22)	1.37 (1.20-1.60)	1.63 (1.41-1.89)	2.00 (1.70-2.30)	2.28 (1.91-2.63)	2.58 (2.12-2.98)	2.90 (2.34-3.35)	3.34 (2.60-3.88)	3.69 (2.81-4.31)
6-hr	0.981 (0.869-1.12)	1.24 (1.10-1.42)	1.59 (1.40-1.81)	1.86 (1.64-2.12)	2.25 (1.95-2.54)	2.55 (2.18-2.88)	2.87 (2.40-3.24)	3.19 (2.63-3.61)	3.64 (2.91-4.14)	4.00 (3.11-4.57)
12-hr	1.12 (1.00-1.26)	1.41 (1.26-1.59)	1.78 (1.59-2.00)	2.08 (1.85-2.33)	2.49 (2.19-2.78)	2.81 (2.44-3.13)	3.14 (2.68-3.50)	3.47 (2.91-3.89)	3.92 (3.21-4.44)	4.28 (3.43-4.88)
24-hr	1.27 (1.16-1.41)	1.62 (1.47-1.80)	2.10 (1.90-2.32)	2.47 (2.23-2.73)	3.00 (2.69-3.30)	3.41 (3.04-3.76)	3.84 (3.40-4.23)	4.29 (3.77-4.73)	4.91 (4.27-5.42)	5.39 (4.64-5.96)
2-day	1.37 (1.24-1.52)	1.75 (1.58-1.94)	2.29 (2.07-2.54)	2.73 (2.46-3.02)	3.34 (2.98-3.68)	3.82 (3.40-4.22)	4.33 (3.83-4.79)	4.87 (4.27-5.39)	5.61 (4.88-6.24)	6.21 (5.34-6.93)
3-day	1.45 (1.31-1.61)	1.85 (1.67-2.05)	2.43 (2.19-2.69)	2.90 (2.61-3.20)	3.55 (3.18-3.92)	4.08 (3.63-4.51)	4.64 (4.10-5.13)	5.23 (4.58-5.79)	6.06 (5.25-6.73)	6.73 (5.77-7.50)
4-day	1.53 (1.38-1.70)	1.95 (1.76-2.17)	2.56 (2.32-2.85)	3.06 (2.76-3.39)	3.77 (3.37-4.17)	4.34 (3.86-4.80)	4.94 (4.36-5.47)	5.59 (4.89-6.19)	6.50 (5.61-7.22)	7.25 (6.19-8.07)
7-day	1.71 (1.54-1.90)	2.18 (1.97-2.43)	2.87 (2.59-3.19)	3.44 (3.08-3.81)	4.22 (3.77-4.68)	4.86 (4.31-5.39)	5.55 (4.89-6.15)	6.27 (5.47-6.96)	7.30 (6.29-8.12)	8.12 (6.92-9.06)
10-day	1.88 (1.70-2.10)	2.41 (2.18-2.68)	3.17 (2.86-3.53)	3.78 (3.40-4.20)	4.64 (4.15-5.15)	5.33 (4.74-5.92)	6.07 (5.36-6.74)	6.84 (5.98-7.60)	7.93 (6.85-8.84)	8.80 (7.53-9.84)
20-day	2.34 (2.11-2.58)	3.00 (2.71-3.32)	3.95 (3.56-4.36)	4.67 (4.20-5.16)	5.64 (5.06-6.23)	6.39 (5.70-7.06)	7.16 (6.36-7.92)	7.94 (7.02-8.79)	9.00 (7.87-9.99)	9.81 (8.51-10.9)
30-day	2.75 (2.50-3.03)	3.54 (3.22-3.89)	4.64 (4.22-5.10)	5.49 (4.98-6.02)	6.63 (5.98-7.26)	7.50 (6.74-8.22)	8.40 (7.50-9.20)	9.31 (8.26-10.2)	10.5 (9.26-11.6)	11.5 (10.0-12.7)
45-day	3.24 (2.95-3.56)	4.17 (3.79-4.58)	5.47 (4.97-6.00)	6.44 (5.84-7.06)	7.71 (6.96-8.44)	8.67 (7.79-9.49)	9.64 (8.62-10.6)	10.6 (9.44-11.6)	11.9 (10.5-13.1)	12.9 (11.3-14.2)
60-day	3.60 (3.27-3.95)	4.64 (4.22-5.09)	6.08 (5.52-6.67)	7.14 (6.47-7.82)	8.50 (7.68-9.30)	9.52 (8.56-10.4)	10.5 (9.43-11.5)	11.5 (10.3-12.7)	12.8 (11.4-14.1)	13.8 (12.2-15.2)

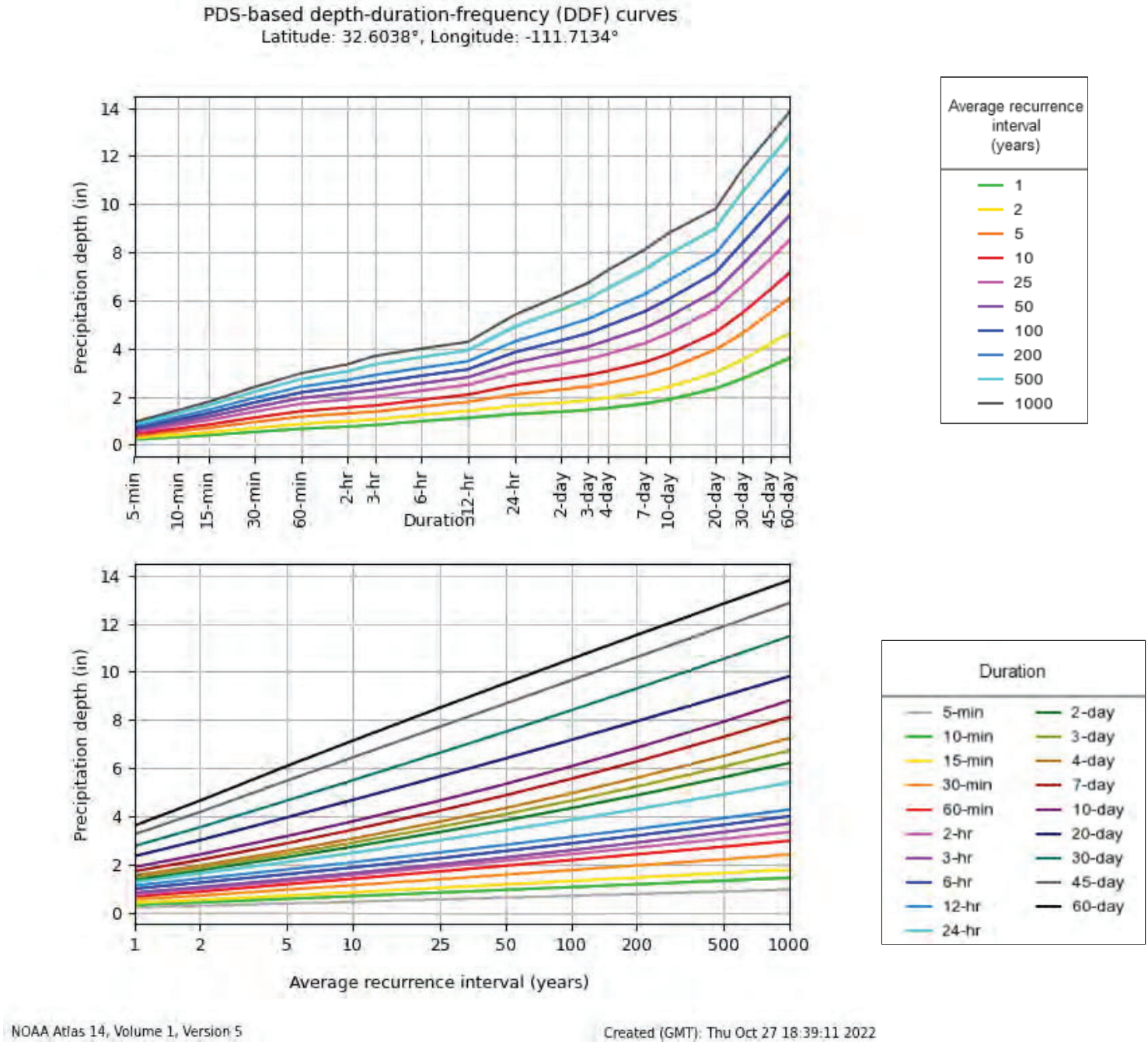
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



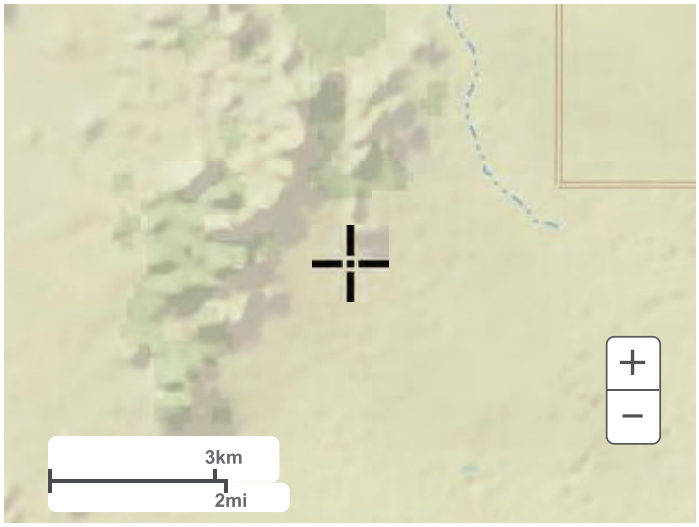
NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Thu Oct 27 18:39:11 2022

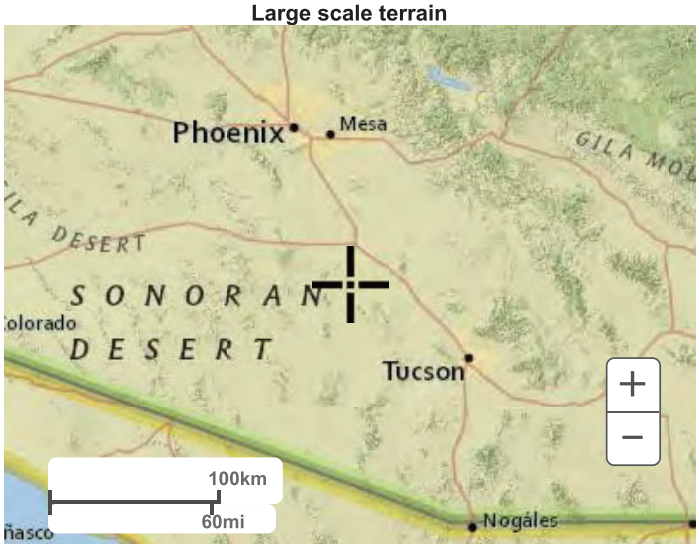
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Maps & aerials

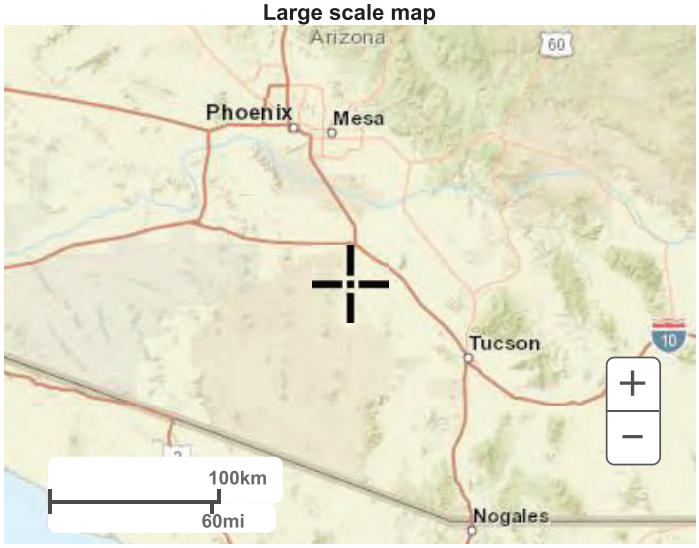
Small scale terrain



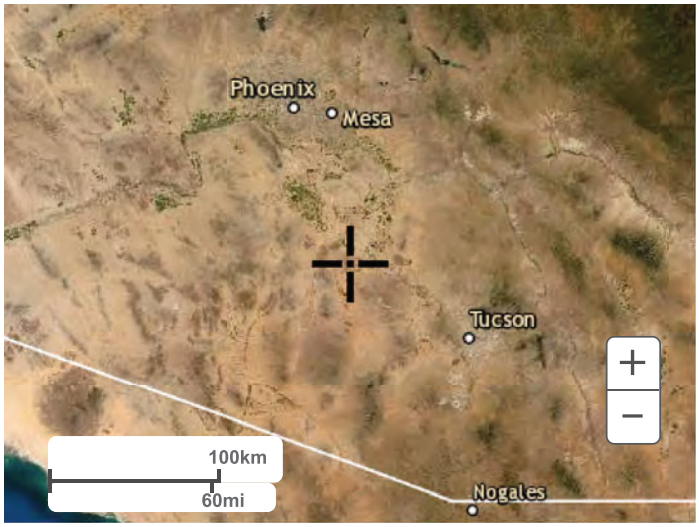
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 1, Version 5
Location name: Marana, Arizona, USA*
Latitude: 32.4709°, Longitude: -111.6702°
Elevation: 1912.95 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for OFF2

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.206 (0.179-0.242)	0.268 (0.233-0.315)	0.362 (0.312-0.423)	0.432 (0.370-0.503)	0.529 (0.447-0.613)	0.602 (0.503-0.698)	0.677 (0.556-0.786)	0.754 (0.609-0.877)	0.854 (0.672-0.999)	0.932 (0.718-1.10)
10-min	0.314 (0.272-0.368)	0.408 (0.355-0.480)	0.550 (0.475-0.643)	0.657 (0.564-0.766)	0.804 (0.681-0.933)	0.916 (0.766-1.06)	1.03 (0.846-1.20)	1.15 (0.926-1.33)	1.30 (1.02-1.52)	1.42 (1.09-1.67)
15-min	0.389 (0.338-0.456)	0.506 (0.440-0.595)	0.682 (0.589-0.798)	0.815 (0.699-0.950)	0.997 (0.844-1.16)	1.14 (0.949-1.32)	1.28 (1.05-1.48)	1.42 (1.15-1.65)	1.61 (1.27-1.89)	1.76 (1.35-2.07)
30-min	0.524 (0.455-0.613)	0.682 (0.593-0.801)	0.919 (0.793-1.07)	1.10 (0.942-1.28)	1.34 (1.14-1.56)	1.53 (1.28-1.77)	1.72 (1.41-2.00)	1.92 (1.55-2.23)	2.17 (1.71-2.54)	2.37 (1.82-2.78)
60-min	0.648 (0.563-0.759)	0.844 (0.734-0.991)	1.14 (0.981-1.33)	1.36 (1.16-1.58)	1.66 (1.41-1.93)	1.89 (1.58-2.20)	2.13 (1.75-2.47)	2.37 (1.91-2.76)	2.69 (2.11-3.14)	2.93 (2.26-3.45)
2-hr	0.740 (0.649-0.860)	0.956 (0.834-1.11)	1.27 (1.10-1.47)	1.51 (1.30-1.75)	1.84 (1.56-2.12)	2.10 (1.76-2.41)	2.36 (1.95-2.72)	2.63 (2.13-3.04)	3.00 (2.36-3.48)	3.29 (2.53-3.84)
3-hr	0.796 (0.698-0.925)	1.02 (0.892-1.18)	1.33 (1.16-1.55)	1.58 (1.37-1.83)	1.93 (1.65-2.23)	2.21 (1.86-2.54)	2.50 (2.06-2.89)	2.81 (2.28-3.26)	3.24 (2.54-3.78)	3.59 (2.74-4.21)
6-hr	0.962 (0.851-1.10)	1.22 (1.08-1.39)	1.55 (1.37-1.77)	1.82 (1.60-2.07)	2.20 (1.90-2.49)	2.50 (2.13-2.82)	2.81 (2.35-3.18)	3.14 (2.58-3.56)	3.59 (2.86-4.09)	3.95 (3.07-4.53)
12-hr	1.09 (0.982-1.23)	1.38 (1.24-1.55)	1.74 (1.56-1.95)	2.04 (1.81-2.27)	2.44 (2.14-2.71)	2.75 (2.38-3.05)	3.07 (2.62-3.42)	3.39 (2.85-3.81)	3.84 (3.15-4.35)	4.20 (3.36-4.79)
24-hr	1.33 (1.20-1.49)	1.69 (1.52-1.88)	2.16 (1.96-2.41)	2.54 (2.29-2.82)	3.07 (2.75-3.40)	3.48 (3.10-3.86)	3.91 (3.46-4.34)	4.36 (3.82-4.83)	4.97 (4.32-5.52)	5.44 (4.69-6.06)
2-day	1.44 (1.30-1.59)	1.82 (1.65-2.02)	2.36 (2.12-2.60)	2.79 (2.50-3.08)	3.39 (3.02-3.74)	3.87 (3.43-4.26)	4.36 (3.85-4.82)	4.89 (4.28-5.41)	5.61 (4.87-6.23)	6.19 (5.31-6.91)
3-day	1.52 (1.38-1.69)	1.93 (1.74-2.14)	2.50 (2.26-2.77)	2.96 (2.66-3.28)	3.61 (3.23-3.99)	4.13 (3.67-4.56)	4.68 (4.13-5.17)	5.26 (4.60-5.83)	6.07 (5.25-6.74)	6.72 (5.75-7.49)
4-day	1.61 (1.45-1.79)	2.04 (1.84-2.26)	2.65 (2.39-2.94)	3.14 (2.83-3.48)	3.84 (3.43-4.24)	4.40 (3.91-4.86)	5.00 (4.41-5.53)	5.63 (4.93-6.24)	6.52 (5.64-7.25)	7.24 (6.19-8.08)
7-day	1.82 (1.64-2.03)	2.31 (2.08-2.57)	3.00 (2.70-3.33)	3.56 (3.20-3.95)	4.34 (3.88-4.82)	4.98 (4.41-5.52)	5.65 (4.98-6.27)	6.35 (5.56-7.06)	7.35 (6.34-8.19)	8.14 (6.96-9.11)
10-day	2.02 (1.82-2.25)	2.56 (2.31-2.86)	3.32 (2.99-3.70)	3.94 (3.53-4.38)	4.79 (4.27-5.32)	5.47 (4.85-6.08)	6.19 (5.46-6.88)	6.94 (6.07-7.72)	7.98 (6.90-8.92)	8.82 (7.54-9.88)
20-day	2.50 (2.26-2.77)	3.19 (2.88-3.53)	4.14 (3.73-4.57)	4.86 (4.37-5.36)	5.83 (5.21-6.43)	6.57 (5.85-7.24)	7.32 (6.49-8.08)	8.07 (7.12-8.93)	9.09 (7.94-10.1)	9.86 (8.55-11.0)
30-day	2.98 (2.71-3.28)	3.80 (3.46-4.18)	4.92 (4.46-5.40)	5.76 (5.21-6.32)	6.88 (6.20-7.55)	7.73 (6.95-8.48)	8.60 (7.68-9.44)	9.47 (8.42-10.4)	10.6 (9.36-11.8)	11.5 (10.1-12.8)
45-day	3.52 (3.20-3.85)	4.49 (4.09-4.92)	5.79 (5.26-6.34)	6.74 (6.12-7.38)	7.99 (7.22-8.72)	8.91 (8.02-9.73)	9.83 (8.82-10.7)	10.7 (9.58-11.8)	11.9 (10.6-13.1)	12.8 (11.3-14.1)
60-day	3.91 (3.56-4.28)	5.00 (4.55-5.47)	6.42 (5.85-7.03)	7.46 (6.79-8.16)	8.80 (7.98-9.60)	9.78 (8.83-10.7)	10.7 (9.67-11.7)	11.7 (10.5-12.8)	12.9 (11.5-14.1)	13.8 (12.2-15.2)

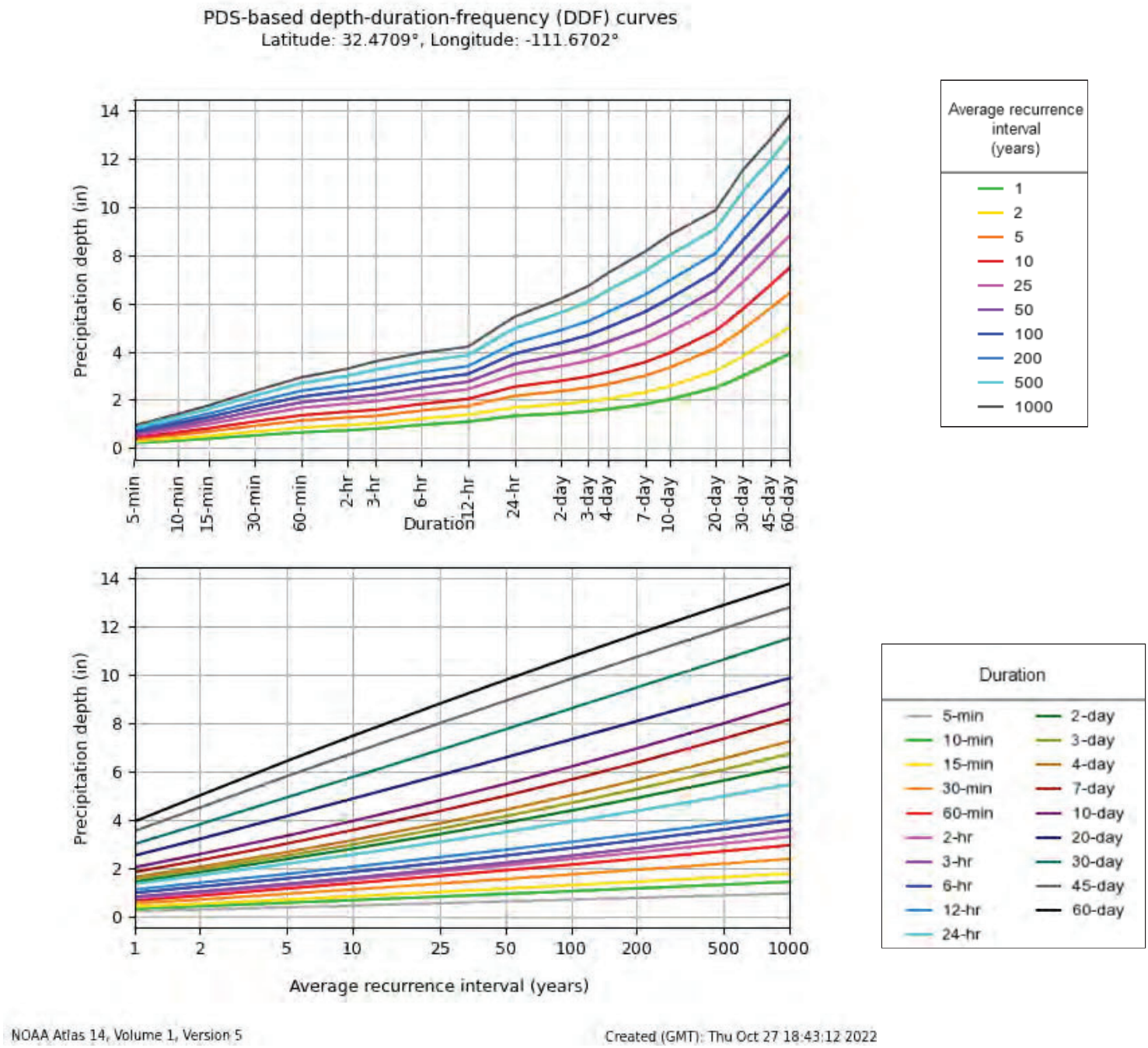
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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PF graphical



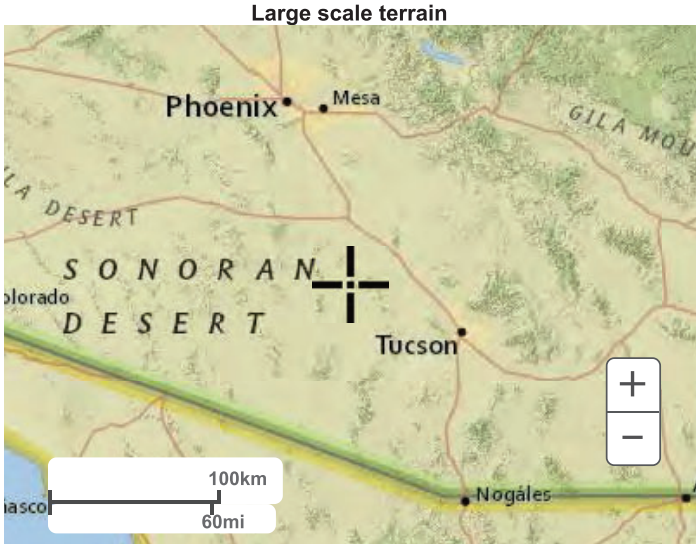
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Maps & aerials

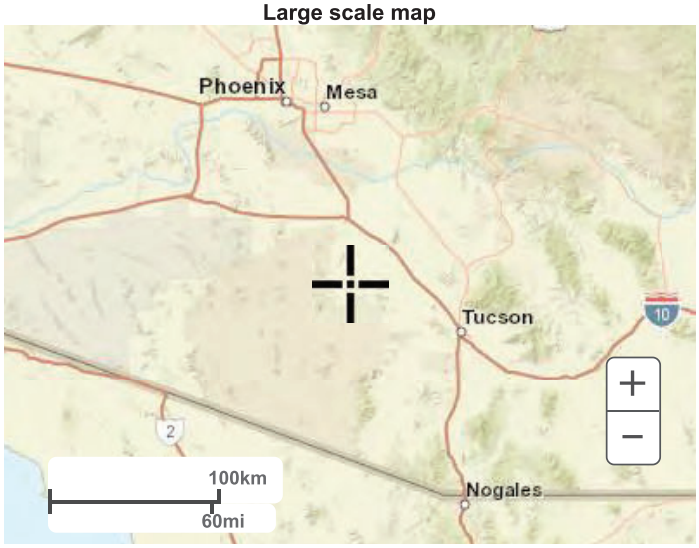
Small scale terrain



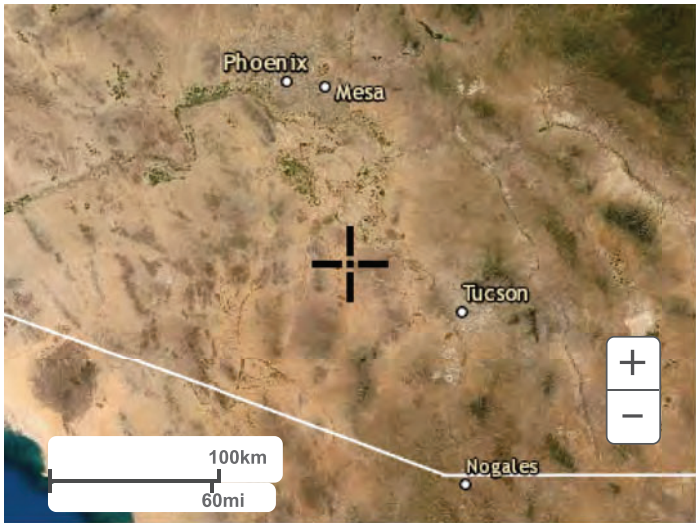
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
National Water Center
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 1, Version 5
Location name: Eloy, Arizona, USA*
Latitude: 32.5479°, Longitude: -111.7062°
Elevation: 1631.3 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for OFF3

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.209 (0.181-0.246)	0.273 (0.236-0.321)	0.369 (0.317-0.432)	0.441 (0.377-0.514)	0.538 (0.453-0.624)	0.612 (0.509-0.709)	0.687 (0.562-0.796)	0.763 (0.614-0.887)	0.863 (0.677-1.01)	0.941 (0.723-1.10)
10-min	0.318 (0.275-0.374)	0.415 (0.360-0.489)	0.561 (0.483-0.657)	0.671 (0.573-0.782)	0.819 (0.690-0.951)	0.932 (0.775-1.08)	1.05 (0.856-1.21)	1.16 (0.935-1.35)	1.31 (1.03-1.53)	1.43 (1.10-1.68)
15-min	0.395 (0.341-0.464)	0.515 (0.446-0.606)	0.696 (0.598-0.814)	0.832 (0.710-0.969)	1.02 (0.855-1.18)	1.16 (0.961-1.34)	1.30 (1.06-1.50)	1.44 (1.16-1.67)	1.63 (1.28-1.90)	1.78 (1.36-2.08)
30-min	0.532 (0.460-0.625)	0.693 (0.600-0.816)	0.937 (0.806-1.10)	1.12 (0.957-1.30)	1.37 (1.15-1.59)	1.56 (1.30-1.80)	1.75 (1.43-2.02)	1.94 (1.56-2.25)	2.19 (1.72-2.56)	2.39 (1.84-2.81)
60-min	0.658 (0.569-0.773)	0.858 (0.743-1.01)	1.16 (0.997-1.36)	1.39 (1.18-1.62)	1.69 (1.42-1.96)	1.93 (1.60-2.23)	2.16 (1.77-2.50)	2.40 (1.93-2.79)	2.72 (2.13-3.17)	2.96 (2.27-3.48)
2-hr	0.752 (0.658-0.876)	0.974 (0.847-1.14)	1.30 (1.12-1.51)	1.54 (1.32-1.79)	1.88 (1.59-2.16)	2.14 (1.79-2.46)	2.41 (1.98-2.77)	2.68 (2.16-3.09)	3.04 (2.39-3.53)	3.33 (2.56-3.89)
3-hr	0.813 (0.711-0.944)	1.04 (0.911-1.21)	1.36 (1.19-1.59)	1.62 (1.40-1.88)	1.98 (1.69-2.28)	2.27 (1.90-2.61)	2.57 (2.11-2.96)	2.88 (2.33-3.33)	3.32 (2.59-3.85)	3.67 (2.79-4.28)
6-hr	0.976 (0.864-1.12)	1.24 (1.10-1.41)	1.58 (1.40-1.80)	1.86 (1.63-2.11)	2.24 (1.94-2.53)	2.54 (2.17-2.86)	2.85 (2.39-3.22)	3.18 (2.62-3.60)	3.63 (2.90-4.12)	3.98 (3.10-4.55)
12-hr	1.11 (0.993-1.25)	1.40 (1.26-1.57)	1.77 (1.58-1.99)	2.07 (1.84-2.31)	2.48 (2.17-2.76)	2.79 (2.42-3.11)	3.11 (2.66-3.48)	3.44 (2.89-3.87)	3.90 (3.19-4.41)	4.25 (3.41-4.85)
24-hr	1.29 (1.17-1.43)	1.63 (1.48-1.82)	2.11 (1.90-2.34)	2.48 (2.23-2.75)	3.00 (2.69-3.31)	3.40 (3.03-3.76)	3.83 (3.39-4.23)	4.26 (3.75-4.72)	4.87 (4.23-5.40)	5.35 (4.60-5.93)
2-day	1.39 (1.26-1.53)	1.77 (1.60-1.95)	2.30 (2.08-2.54)	2.72 (2.45-3.01)	3.32 (2.97-3.66)	3.79 (3.38-4.18)	4.29 (3.79-4.73)	4.81 (4.22-5.32)	5.53 (4.81-6.14)	6.11 (5.25-6.81)
3-day	1.46 (1.33-1.62)	1.86 (1.69-2.06)	2.43 (2.20-2.69)	2.88 (2.60-3.19)	3.52 (3.15-3.89)	4.04 (3.60-4.46)	4.58 (4.05-5.06)	5.16 (4.52-5.70)	5.96 (5.16-6.61)	6.60 (5.66-7.35)
4-day	1.54 (1.40-1.71)	1.96 (1.78-2.18)	2.56 (2.32-2.84)	3.05 (2.74-3.37)	3.73 (3.34-4.12)	4.29 (3.81-4.73)	4.88 (4.31-5.38)	5.50 (4.82-6.08)	6.38 (5.52-7.08)	7.09 (6.07-7.89)
7-day	1.73 (1.56-1.92)	2.20 (1.99-2.45)	2.87 (2.59-3.19)	3.42 (3.08-3.80)	4.19 (3.74-4.64)	4.81 (4.27-5.32)	5.47 (4.83-6.06)	6.16 (5.39-6.83)	7.14 (6.17-7.94)	7.92 (6.78-8.84)
10-day	1.91 (1.72-2.12)	2.43 (2.20-2.70)	3.17 (2.86-3.53)	3.77 (3.38-4.18)	4.60 (4.11-5.10)	5.26 (4.68-5.84)	5.97 (5.27-6.62)	6.71 (5.87-7.45)	7.74 (6.70-8.63)	8.57 (7.34-9.58)
20-day	2.36 (2.13-2.61)	3.02 (2.73-3.34)	3.94 (3.56-4.35)	4.64 (4.18-5.12)	5.58 (5.00-6.15)	6.30 (5.63-6.94)	7.04 (6.26-7.77)	7.78 (6.88-8.59)	8.78 (7.69-9.72)	9.54 (8.30-10.6)
30-day	2.79 (2.54-3.06)	3.57 (3.24-3.92)	4.64 (4.22-5.09)	5.46 (4.95-5.98)	6.55 (5.92-7.17)	7.39 (6.64-8.08)	8.24 (7.37-9.02)	9.09 (8.09-9.98)	10.2 (9.03-11.3)	11.1 (9.73-12.3)
45-day	3.28 (2.99-3.60)	4.21 (3.83-4.61)	5.46 (4.97-5.98)	6.39 (5.81-6.99)	7.61 (6.88-8.30)	8.51 (7.67-9.29)	9.42 (8.46-10.3)	10.3 (9.21-11.3)	11.5 (10.2-12.6)	12.4 (10.9-13.6)
60-day	3.64 (3.32-3.98)	4.67 (4.26-5.12)	6.06 (5.52-6.63)	7.07 (6.43-7.72)	8.37 (7.59-9.14)	9.33 (8.43-10.2)	10.3 (9.25-11.2)	11.2 (10.0-12.3)	12.4 (11.0-13.6)	13.3 (11.8-14.6)

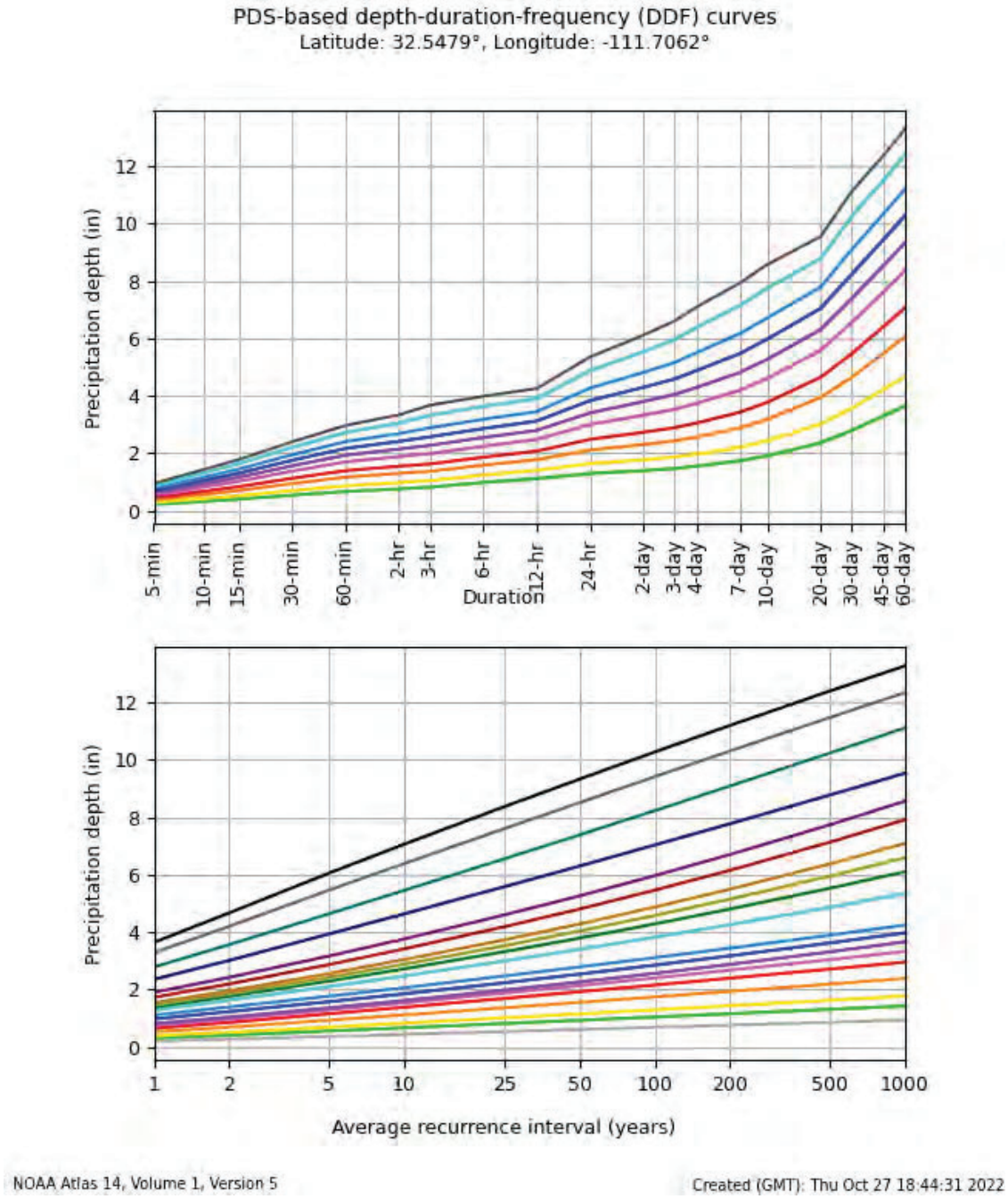
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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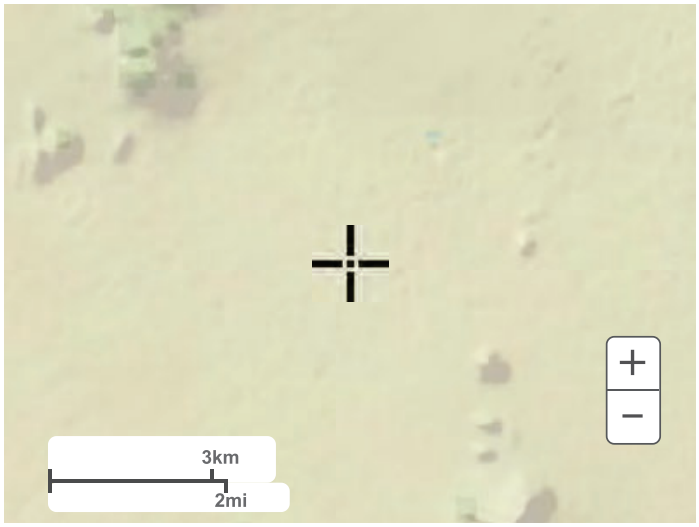
PF graphical



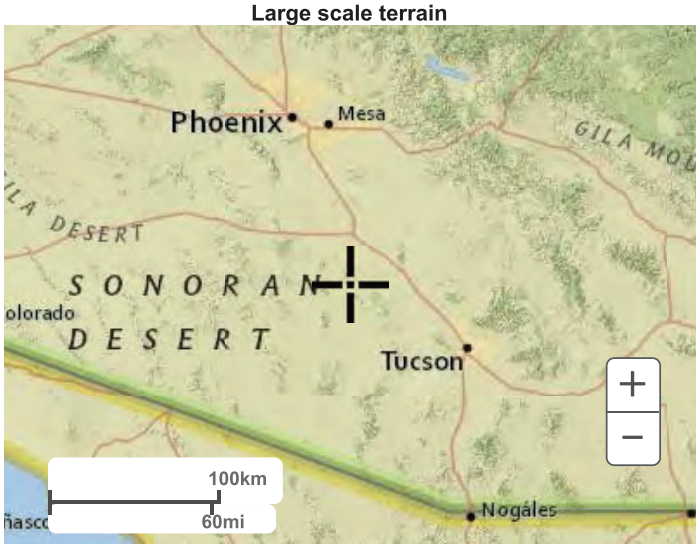
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Maps & aerials

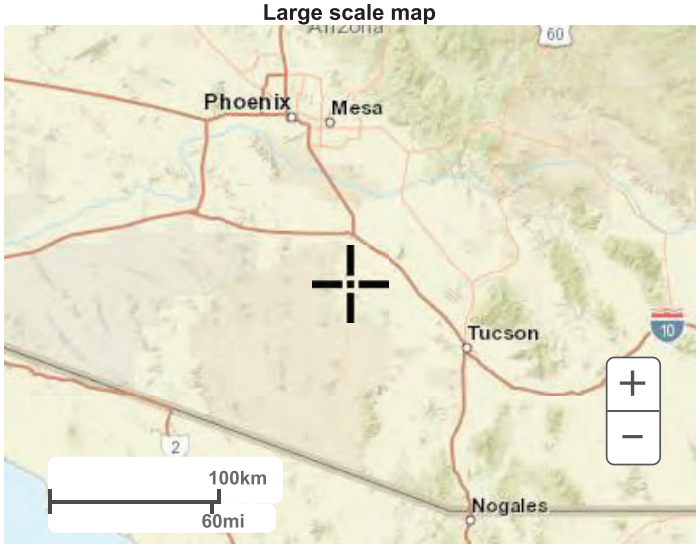
Small scale terrain



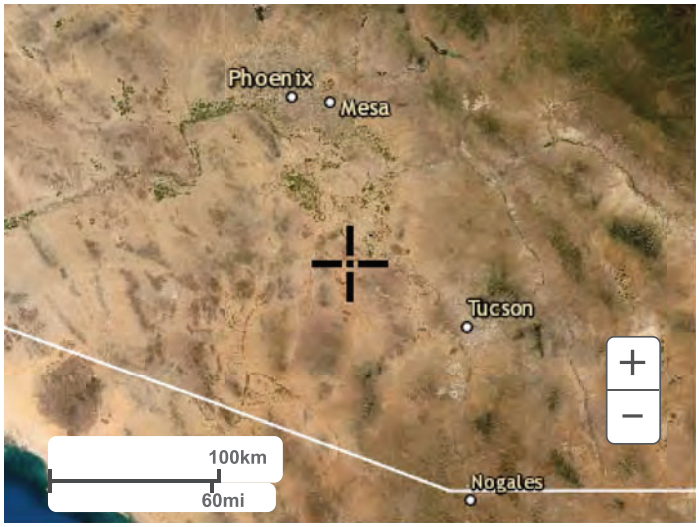
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 1, Version 5
Location name: Eloy, Arizona, USA*
Latitude: 32.5487°, Longitude: -111.6805°
Elevation: 1635.99 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for OFF4

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.209 (0.181-0.246)	0.273 (0.236-0.321)	0.369 (0.317-0.431)	0.440 (0.376-0.513)	0.538 (0.453-0.624)	0.612 (0.509-0.709)	0.687 (0.562-0.796)	0.763 (0.614-0.887)	0.863 (0.676-1.01)	0.941 (0.722-1.10)
10-min	0.318 (0.275-0.374)	0.415 (0.360-0.488)	0.561 (0.482-0.656)	0.670 (0.573-0.781)	0.819 (0.689-0.950)	0.931 (0.775-1.08)	1.04 (0.855-1.21)	1.16 (0.934-1.35)	1.31 (1.03-1.53)	1.43 (1.10-1.68)
15-min	0.395 (0.341-0.464)	0.515 (0.446-0.605)	0.695 (0.598-0.814)	0.831 (0.710-0.968)	1.02 (0.854-1.18)	1.16 (0.961-1.34)	1.30 (1.06-1.50)	1.44 (1.16-1.67)	1.63 (1.28-1.90)	1.78 (1.36-2.08)
30-min	0.532 (0.460-0.625)	0.693 (0.600-0.815)	0.936 (0.805-1.10)	1.12 (0.956-1.30)	1.37 (1.15-1.59)	1.56 (1.29-1.80)	1.75 (1.43-2.02)	1.94 (1.56-2.25)	2.19 (1.72-2.56)	2.39 (1.84-2.81)
60-min	0.658 (0.569-0.773)	0.858 (0.743-1.01)	1.16 (0.996-1.36)	1.38 (1.18-1.61)	1.69 (1.42-1.96)	1.92 (1.60-2.23)	2.16 (1.77-2.50)	2.40 (1.93-2.79)	2.72 (2.13-3.17)	2.96 (2.27-3.48)
2-hr	0.752 (0.658-0.876)	0.974 (0.847-1.13)	1.30 (1.12-1.50)	1.54 (1.32-1.79)	1.88 (1.59-2.16)	2.14 (1.79-2.46)	2.41 (1.98-2.76)	2.68 (2.16-3.08)	3.04 (2.39-3.53)	3.33 (2.56-3.88)
3-hr	0.813 (0.712-0.945)	1.04 (0.911-1.21)	1.36 (1.19-1.59)	1.62 (1.40-1.88)	1.98 (1.69-2.28)	2.27 (1.90-2.61)	2.56 (2.11-2.96)	2.88 (2.32-3.33)	3.31 (2.59-3.85)	3.66 (2.79-4.28)
6-hr	0.976 (0.864-1.12)	1.24 (1.10-1.41)	1.58 (1.40-1.80)	1.86 (1.63-2.11)	2.24 (1.94-2.53)	2.54 (2.17-2.86)	2.86 (2.39-3.22)	3.18 (2.62-3.60)	3.63 (2.90-4.12)	3.98 (3.10-4.55)
12-hr	1.11 (0.994-1.25)	1.40 (1.26-1.58)	1.77 (1.58-1.99)	2.07 (1.84-2.32)	2.47 (2.17-2.76)	2.79 (2.42-3.11)	3.11 (2.66-3.48)	3.44 (2.89-3.87)	3.90 (3.19-4.41)	4.25 (3.41-4.85)
24-hr	1.29 (1.17-1.44)	1.64 (1.48-1.82)	2.11 (1.91-2.34)	2.48 (2.24-2.75)	3.00 (2.69-3.32)	3.41 (3.04-3.76)	3.84 (3.40-4.23)	4.28 (3.76-4.72)	4.88 (4.24-5.40)	5.36 (4.62-5.94)
2-day	1.39 (1.26-1.54)	1.77 (1.60-1.96)	2.30 (2.08-2.54)	2.73 (2.46-3.02)	3.33 (2.98-3.67)	3.80 (3.38-4.19)	4.30 (3.80-4.74)	4.82 (4.23-5.33)	5.54 (4.82-6.15)	6.12 (5.27-6.82)
3-day	1.47 (1.33-1.63)	1.87 (1.69-2.07)	2.44 (2.20-2.70)	2.89 (2.61-3.20)	3.54 (3.16-3.90)	4.05 (3.61-4.47)	4.60 (4.06-5.07)	5.17 (4.53-5.72)	5.97 (5.18-6.62)	6.62 (5.68-7.37)
4-day	1.55 (1.40-1.72)	1.97 (1.78-2.18)	2.57 (2.32-2.85)	3.06 (2.76-3.38)	3.75 (3.35-4.13)	4.30 (3.83-4.74)	4.89 (4.32-5.40)	5.52 (4.84-6.10)	6.40 (5.54-7.10)	7.12 (6.09-7.92)
7-day	1.74 (1.57-1.93)	2.21 (2.00-2.46)	2.89 (2.60-3.20)	3.44 (3.09-3.81)	4.21 (3.76-4.66)	4.83 (4.29-5.34)	5.49 (4.85-6.08)	6.18 (5.41-6.86)	7.16 (6.20-7.97)	7.95 (6.80-8.88)
10-day	1.92 (1.73-2.13)	2.44 (2.20-2.72)	3.19 (2.87-3.54)	3.78 (3.40-4.20)	4.62 (4.13-5.12)	5.29 (4.70-5.87)	6.00 (5.30-6.65)	6.74 (5.90-7.49)	7.78 (6.73-8.66)	8.61 (7.37-9.62)
20-day	2.37 (2.14-2.62)	3.03 (2.74-3.35)	3.96 (3.57-4.37)	4.66 (4.20-5.14)	5.61 (5.03-6.18)	6.33 (5.65-6.98)	7.08 (6.29-7.80)	7.82 (6.91-8.64)	8.82 (7.73-9.77)	9.59 (8.34-10.7)
30-day	2.80 (2.55-3.08)	3.59 (3.26-3.94)	4.67 (4.24-5.12)	5.49 (4.98-6.02)	6.59 (5.95-7.21)	7.43 (6.68-8.13)	8.28 (7.41-9.06)	9.14 (8.13-10.0)	10.3 (9.07-11.3)	11.2 (9.78-12.4)
45-day	3.30 (3.01-3.62)	4.23 (3.85-4.63)	5.49 (5.00-6.01)	6.43 (5.84-7.03)	7.64 (6.92-8.34)	8.56 (7.72-9.34)	9.46 (8.51-10.3)	10.4 (9.27-11.3)	11.5 (10.3-12.7)	12.4 (11.0-13.7)
60-day	3.66 (3.34-4.01)	4.70 (4.28-5.14)	6.09 (5.55-6.66)	7.11 (6.47-7.76)	8.42 (7.63-9.18)	9.38 (8.47-10.2)	10.3 (9.30-11.3)	11.3 (10.1-12.3)	12.5 (11.1-13.7)	13.3 (11.8-14.7)

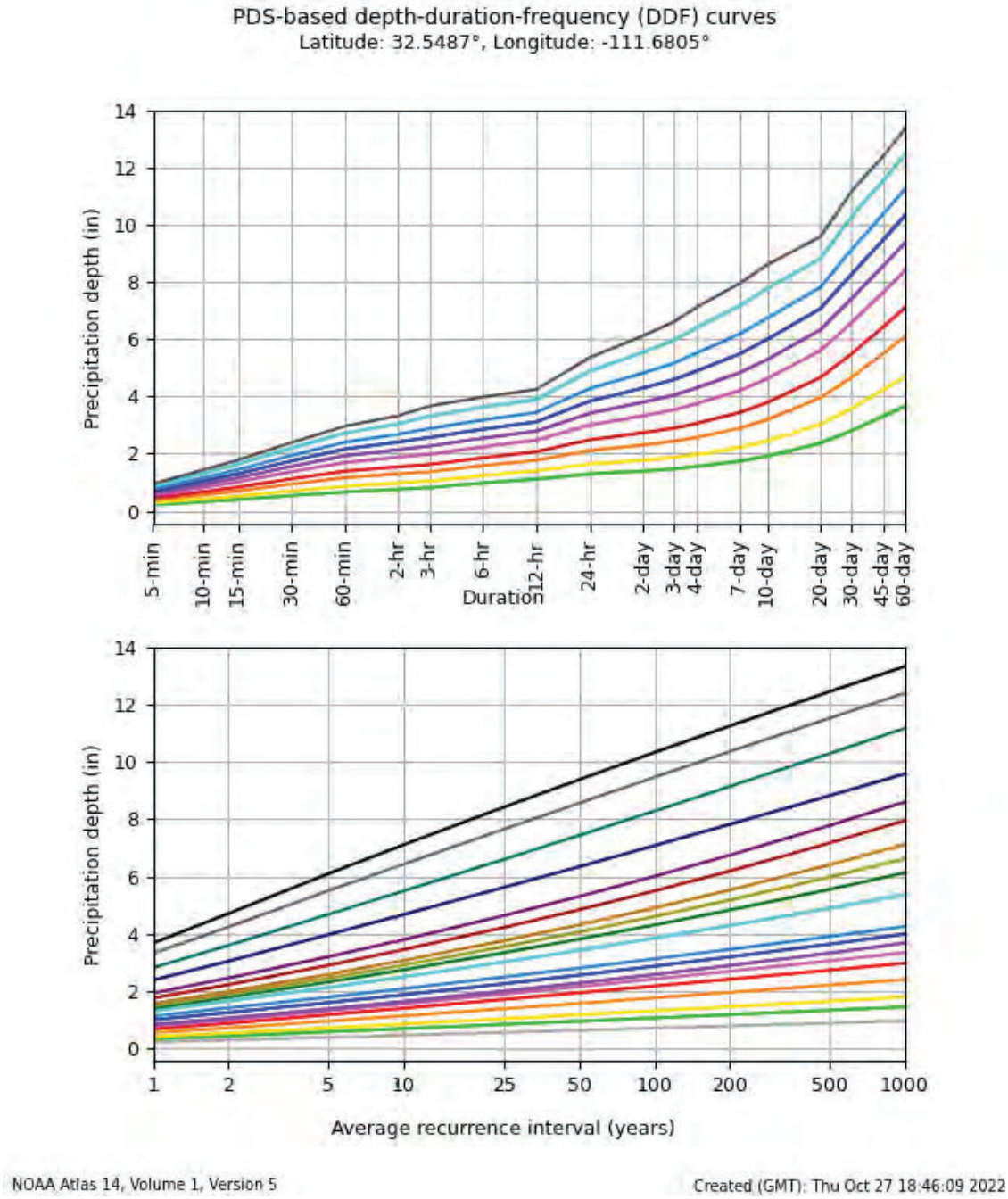
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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PF graphical



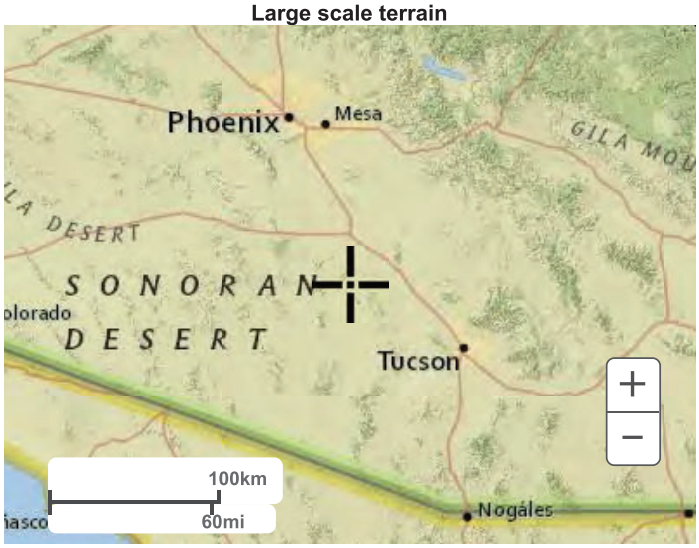
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Maps & aerials

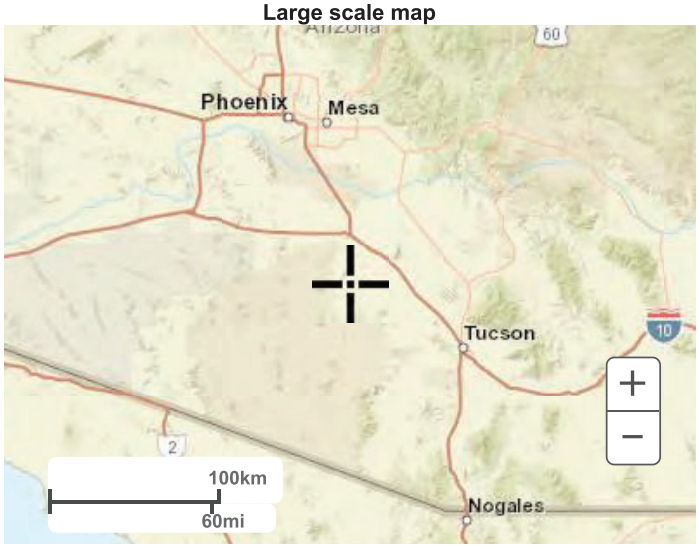
Small scale terrain



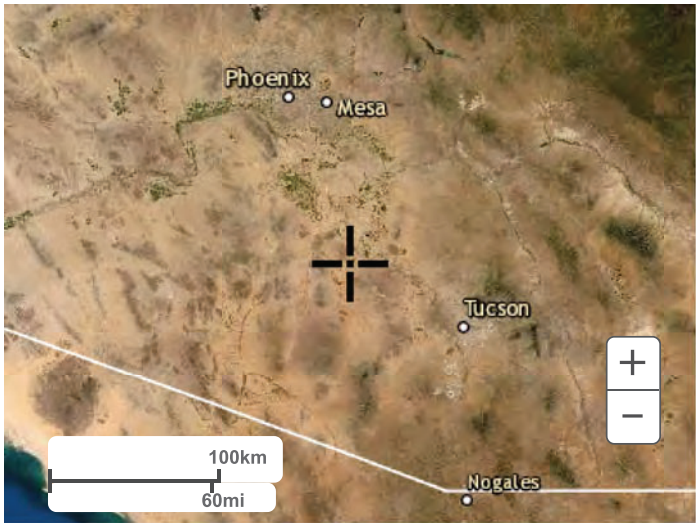
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
National Water Center
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 1, Version 5
Location name: Red Rock, Arizona, USA*
Latitude: 32.5317°, Longitude: -111.6525°
Elevation: 1706.19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES for OFF5

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.209 (0.181-0.245)	0.272 (0.236-0.320)	0.368 (0.315-0.430)	0.439 (0.375-0.512)	0.537 (0.452-0.623)	0.611 (0.508-0.708)	0.686 (0.560-0.795)	0.763 (0.612-0.886)	0.863 (0.675-1.01)	0.940 (0.721-1.10)
10-min	0.318 (0.275-0.373)	0.414 (0.359-0.487)	0.560 (0.480-0.654)	0.669 (0.571-0.779)	0.817 (0.687-0.948)	0.930 (0.772-1.08)	1.04 (0.852-1.21)	1.16 (0.931-1.35)	1.31 (1.03-1.53)	1.43 (1.10-1.68)
15-min	0.394 (0.341-0.463)	0.513 (0.445-0.604)	0.694 (0.595-0.811)	0.829 (0.707-0.966)	1.01 (0.852-1.18)	1.15 (0.958-1.34)	1.30 (1.06-1.50)	1.44 (1.15-1.67)	1.63 (1.27-1.90)	1.77 (1.36-2.08)
30-min	0.530 (0.459-0.623)	0.691 (0.599-0.814)	0.934 (0.802-1.09)	1.12 (0.953-1.30)	1.36 (1.15-1.58)	1.55 (1.29-1.80)	1.74 (1.42-2.02)	1.94 (1.56-2.25)	2.19 (1.72-2.56)	2.39 (1.83-2.81)
60-min	0.656 (0.568-0.771)	0.855 (0.741-1.01)	1.16 (0.992-1.35)	1.38 (1.18-1.61)	1.69 (1.42-1.96)	1.92 (1.60-2.23)	2.16 (1.76-2.50)	2.40 (1.92-2.78)	2.71 (2.12-3.17)	2.96 (2.27-3.47)
2-hr	0.752 (0.657-0.875)	0.972 (0.846-1.13)	1.29 (1.12-1.50)	1.54 (1.32-1.78)	1.87 (1.59-2.16)	2.13 (1.79-2.45)	2.40 (1.98-2.76)	2.68 (2.16-3.08)	3.04 (2.39-3.52)	3.33 (2.56-3.88)
3-hr	0.811 (0.710-0.942)	1.04 (0.909-1.21)	1.36 (1.18-1.58)	1.61 (1.40-1.87)	1.97 (1.68-2.28)	2.26 (1.89-2.60)	2.56 (2.10-2.95)	2.87 (2.32-3.32)	3.30 (2.58-3.84)	3.66 (2.79-4.27)
6-hr	0.974 (0.863-1.11)	1.23 (1.09-1.41)	1.58 (1.39-1.80)	1.85 (1.62-2.10)	2.23 (1.93-2.52)	2.54 (2.16-2.86)	2.85 (2.38-3.21)	3.17 (2.61-3.59)	3.62 (2.89-4.12)	3.97 (3.09-4.55)
12-hr	1.11 (0.992-1.25)	1.40 (1.25-1.57)	1.77 (1.58-1.99)	2.06 (1.83-2.31)	2.47 (2.16-2.75)	2.78 (2.41-3.10)	3.10 (2.65-3.47)	3.43 (2.88-3.86)	3.88 (3.18-4.40)	4.24 (3.40-4.84)
24-hr	1.30 (1.18-1.45)	1.65 (1.50-1.84)	2.13 (1.92-2.36)	2.50 (2.25-2.77)	3.02 (2.71-3.34)	3.43 (3.06-3.79)	3.86 (3.41-4.26)	4.30 (3.78-4.75)	4.91 (4.26-5.43)	5.39 (4.64-5.97)
2-day	1.40 (1.27-1.55)	1.78 (1.61-1.97)	2.32 (2.09-2.56)	2.74 (2.47-3.03)	3.34 (2.99-3.69)	3.82 (3.40-4.21)	4.31 (3.81-4.76)	4.83 (4.24-5.35)	5.56 (4.83-6.17)	6.14 (5.28-6.85)
3-day	1.48 (1.34-1.64)	1.89 (1.71-2.09)	2.46 (2.22-2.72)	2.91 (2.62-3.22)	3.56 (3.18-3.92)	4.07 (3.62-4.50)	4.62 (4.08-5.10)	5.20 (4.56-5.75)	6.00 (5.20-6.66)	6.65 (5.70-7.41)
4-day	1.57 (1.42-1.74)	1.99 (1.80-2.21)	2.59 (2.34-2.87)	3.08 (2.78-3.41)	3.78 (3.38-4.16)	4.33 (3.86-4.78)	4.93 (4.35-5.44)	5.56 (4.87-6.14)	6.44 (5.57-7.14)	7.16 (6.13-7.96)
7-day	1.76 (1.59-1.96)	2.24 (2.02-2.49)	2.92 (2.64-3.24)	3.48 (3.13-3.85)	4.25 (3.80-4.70)	4.87 (4.33-5.39)	5.54 (4.89-6.14)	6.24 (5.46-6.92)	7.22 (6.25-8.04)	8.02 (6.86-8.95)
10-day	1.95 (1.76-2.17)	2.48 (2.24-2.76)	3.23 (2.91-3.59)	3.83 (3.44-4.25)	4.67 (4.18-5.18)	5.35 (4.75-5.93)	6.06 (5.35-6.72)	6.80 (5.96-7.56)	7.85 (6.79-8.74)	8.68 (7.43-9.70)
20-day	2.41 (2.17-2.66)	3.08 (2.78-3.40)	4.01 (3.62-4.42)	4.72 (4.25-5.20)	5.67 (5.08-6.25)	6.40 (5.71-7.04)	7.14 (6.34-7.88)	7.89 (6.97-8.71)	8.89 (7.79-9.85)	9.66 (8.40-10.7)
30-day	2.85 (2.60-3.14)	3.65 (3.32-4.01)	4.74 (4.31-5.20)	5.57 (5.05-6.11)	6.67 (6.02-7.31)	7.52 (6.76-8.23)	8.37 (7.49-9.18)	9.24 (8.22-10.2)	10.4 (9.16-11.5)	11.3 (9.87-12.5)
45-day	3.36 (3.07-3.68)	4.30 (3.92-4.72)	5.58 (5.08-6.11)	6.52 (5.92-7.13)	7.74 (7.01-8.45)	8.66 (7.81-9.45)	9.57 (8.60-10.5)	10.5 (9.36-11.5)	11.6 (10.3-12.8)	12.5 (11.1-13.8)
60-day	3.73 (3.40-4.08)	4.78 (4.36-5.23)	6.18 (5.63-6.76)	7.20 (6.56-7.86)	8.52 (7.73-9.29)	9.49 (8.58-10.3)	10.4 (9.41-11.4)	11.4 (10.2-12.4)	12.6 (11.2-13.8)	13.5 (11.9-14.8)

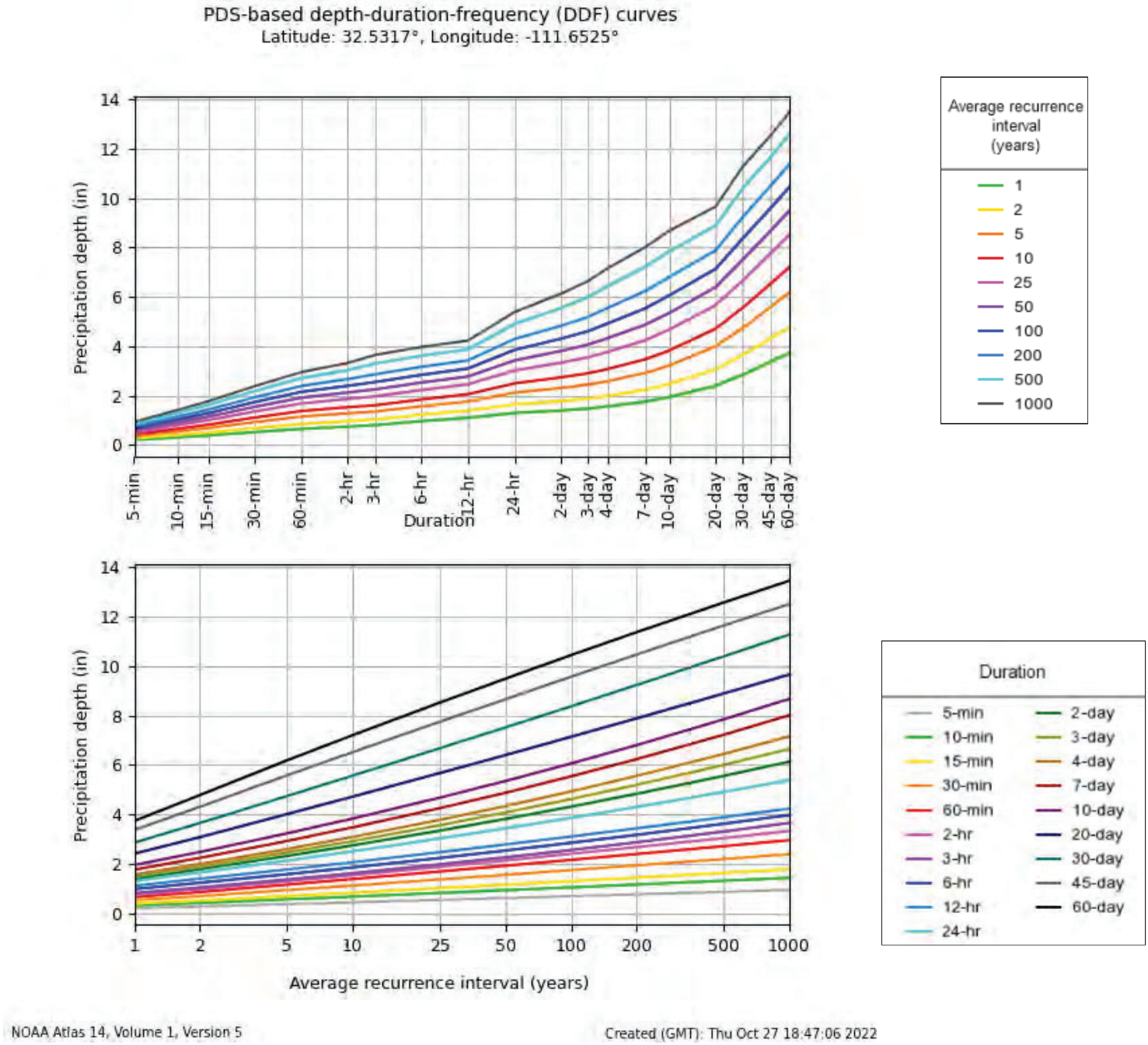
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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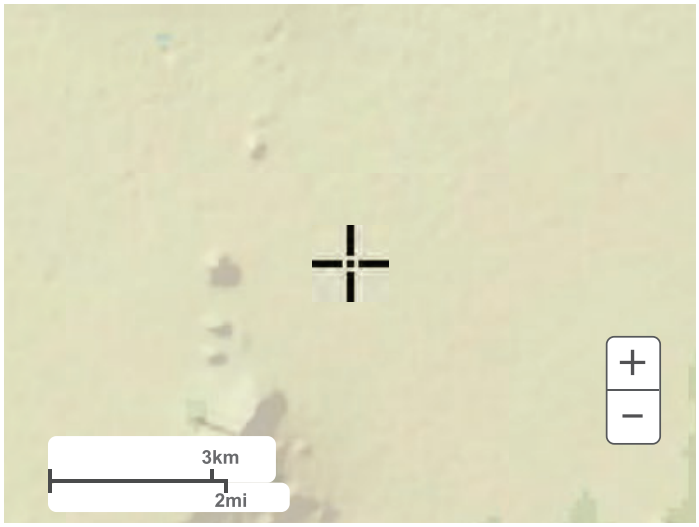
PF graphical



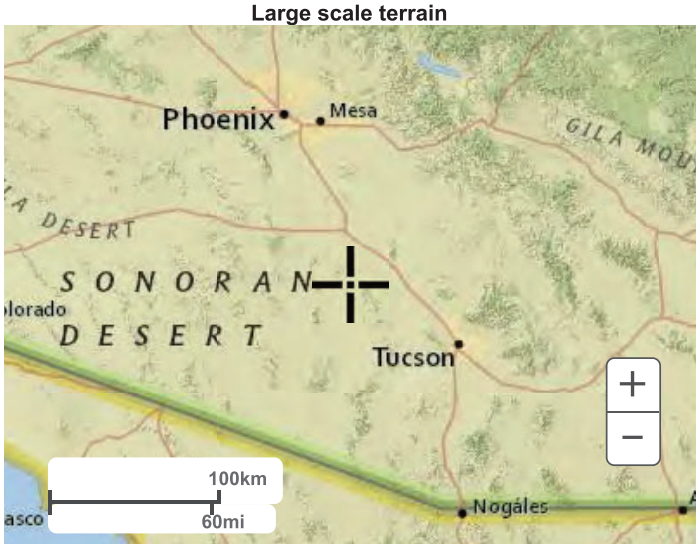
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Maps & aerials

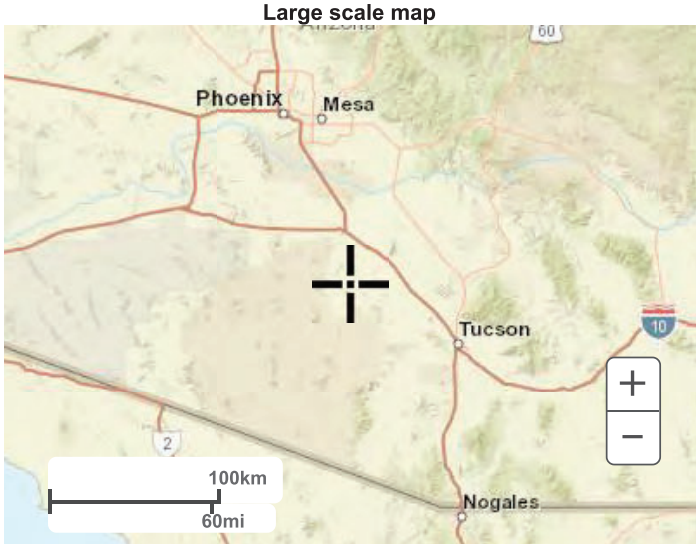
Small scale terrain



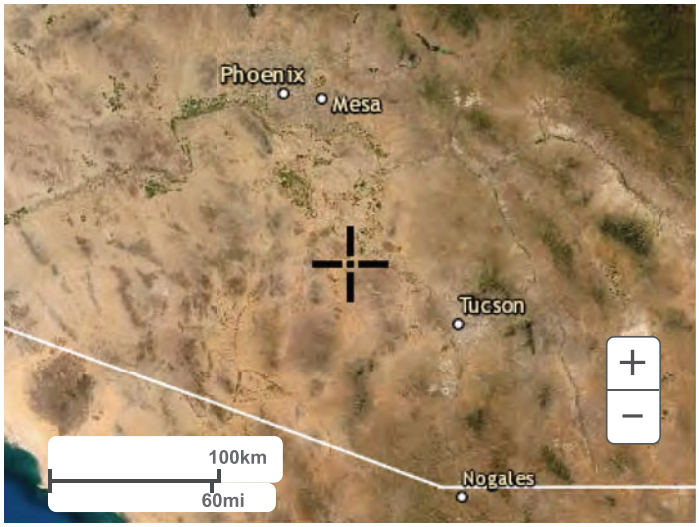
Large scale terrain



Large scale map



Large scale aerial



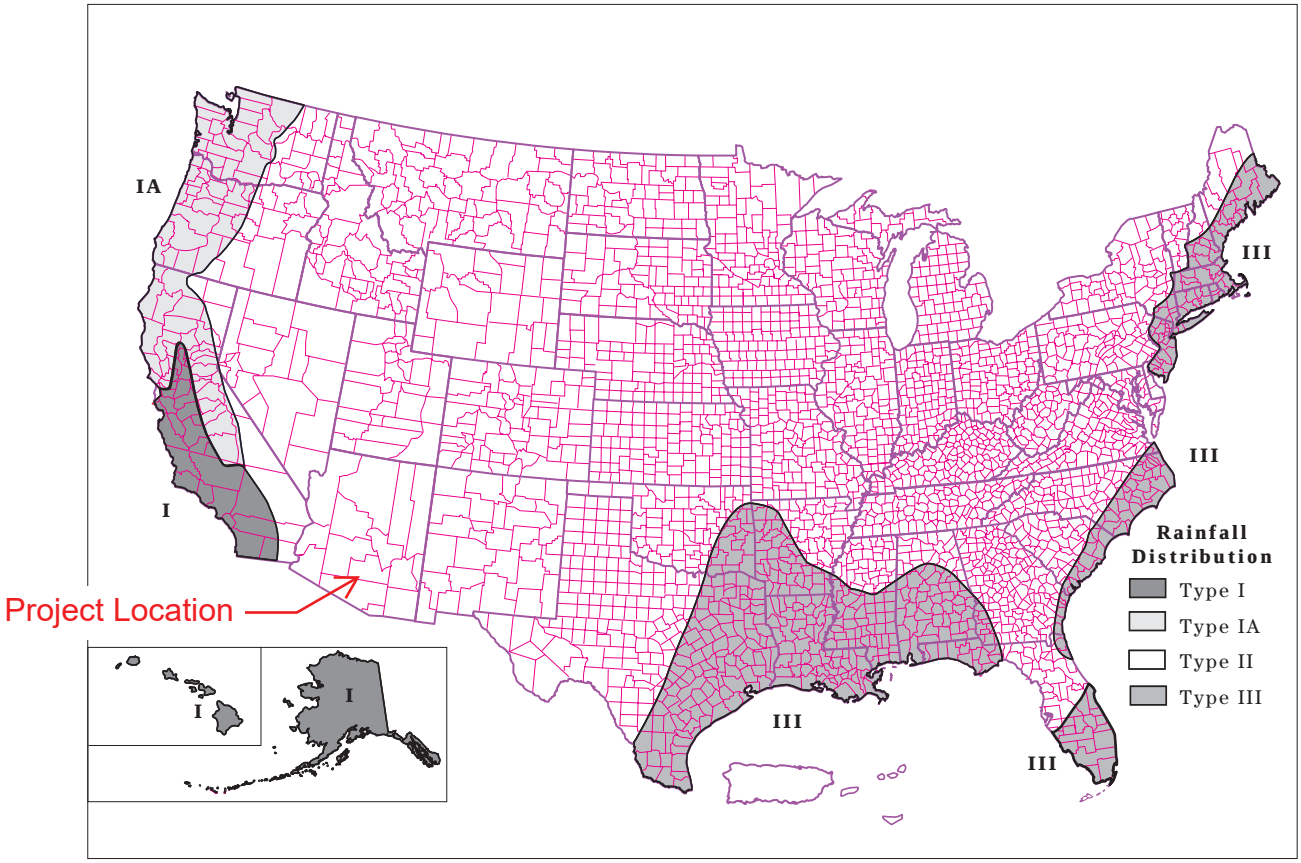
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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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Silver Spring, MD 20910
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Disclaimer

A.2 TR-55 RAINFALL DISTRIBUTION MAP

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

A.3 Green-Ampt Calculations

- A.3.1 Land Use Map
- A.3.2 Soil Map

ADOT HYDROLOGY DESIGN MANUAL
GREEN AND AMPT PARAMETERS

Subbasin ID	Survey	Soil Map Unit #	Map Unit Area	Percent of Subbasin (%)	Initical Content (Dry) (Volume Ratio)	Area Weighted Initial Content	Composite Initial Content (Dry)	Initial Content (Normal) (Volume Ratio)	Area Weighted Initial Content	Composite Initial Content (Normal)	Saturated Content (Volume Ratio)	Area Weighted Saturated Content	Composite Saturated Content	Suction (in)	Area Weighted Suction	Composite Suction	Conductivity (in/hr)	Area Weighted Conductivity	Composite Conductivity (in/hr)	%Natural Impreviousness	Area Weighted %Natural Impreviousness	Composite %Natural Impreviousness
OFF5	AZ669	15	208.90	3.17%	0.15	0.005		0.24	0.008		0.41	0.013		7.08	0.027		0.13	-0.028		15	0.476	
OFF5		16	413.00	6.27%	0.18	0.011		0.28	0.018		0.41	0.026		9.37	0.061		0.08	-0.069		0	0.000	
OFF5		26	464.40	7.05%	0.05	0.004		0.13	0.009		0.39	0.028		3.77	0.041		0.82	-0.006		0	0.000	
OFF5		38	41.30	0.63%	0.08	0.001		0.19	0.001		0.4	0.003		8.58	0.006		0.29	-0.003		15	0.094	
OFF5		53	171.40	2.60%	0.07	0.002		0.15	0.004		0.39	0.010		4.52	0.017		0.68	-0.004		0	0.000	
OFF5	AZ659	1	134.10	2.04%	0.08	0.002		0.17	0.003		0.4	0.008		5.2	0.015		0.39	-0.008		30	0.611	
OFF5		3	56.10	0.85%	0.08	0.001		0.15	0.001		0.4	0.003		3.27	0.004		0.71	-0.001		0	0.000	
OFF5		4	77.10	1.17%	0.2	0.002		0.33	0.004		0.44	0.005		16.48	0.014		0.07	-0.014		0	0.000	
OFF5		9	649.00	9.86%	0.21	0.021		0.35	0.035		0.44	0.043		16.65	0.120		0.05	-0.128		0	0.000	
OFF5		10	129.90	1.97%	0.25	0.005		0.38	0.007		0.47	0.009		16.3	0.024		0.03	-0.030		0	0.000	
OFF5		15	900.70	13.68%	0.08	0.011		0.16	0.022		0.4	0.055		4.04	0.083		0.45	-0.047		0	0.000	
OFF5		16	1276.00	19.38%	0.09	0.017		0.17	0.033		0.39	0.076		5.44	0.143		0.44	-0.069		0	0.000	
OFF5		17	499.40	7.59%	0.09	0.007		0.18	0.014		0.4	0.030		4.97	0.053		0.52	-0.022		0	0.000	
OFF5		19	4.60	0.07%	0.2	0.000		0.3	0.000		0.46	0.000		2.54	0.000		0.06	-0.001		0	0.000	
OFF5		20	9.80	0.15%	0.31	0.000		0.43	0.001		0.51	0.001		13.34	0.002		0.02	-0.003		0	0.000	
OFF5		23	197.60	3.00%	0.29	0.009		0.4	0.012		0.49	0.015		14.18	0.035		0.02	-0.051		0	0.000	
OFF5		31	651.70	9.90%	0.14	0.014		0.28	0.028		0.42	0.042		15.37	0.117		0.15	-0.082		0	0.000	
OFF5		33	697.60	10.60%	0.08	0.008	**0.12**	0.17	0.018	**0.22**	0.4	0.042	**0.41**	4.69	0.071	**6.8**	0.55	-0.028	**0.25**	0	0.000	**1.18**
OFF4	AZ659	1	60.30	1.18%	0.08	0.001		0.17	0.002		0.4	0.005		5.2	0.008		0.39	-0.005		30	0.354	
OFF4		3	713.80	13.98%	0.08	0.011		0.15	0.021		0.4	0.056		3.27	0.072		0.71	-0.021		0	0.000	
OFF4		4	157.60	3.09%	0.2	0.006		0.33	0.010		0.44	0.014		16.48	0.038		0.07	-0.036		0	0.000	
OFF4		10	1.60	0.03%	0.25	0.000		0.38	0.000		0.47	0.000		16.3	0.000		0.03	0.000		0	0.000	
OFF4		15	888.80	17.41%	0.08	0.014		0.16	0.028		0.4	0.070		4.04	0.106		0.45	-0.060		0	0.000	
OFF4		16	575.90	11.28%	0.09	0.010		0.17	0.019		0.39	0.044		5.44	0.083		0.44	-0.040		0	0.000	
OFF4		20	142.50	2.79%	0.31	0.009		0.43	0.012		0.51	0.014		13.34	0.031		0.02	-0.047		0	0.000	
OFF4		23	155.80	3.05%	0.29	0.009		0.4	0.012		0.49	0.015		14.18	0.035		0.02	-0.052		0	0.000	
OFF4		25	1.80	0.04%	0.11	0.000		0.22	0.000		0.39	0.000		8.42	0.000		0.17	0.000		0	0.000	
OFF4		31	1306.00	25.58%	0.14	0.036		0.28	0.072		0.42	0.107		15.37	0.304		0.15	-0.211		0	0.000	
OFF4		33	724.40	14.19%	0.08	0.011		0.17	0.024		0.4	0.057		4.69	0.095		0.55	-0.037		0	0.000	
OFF4		39	150.50	2.95%	0.1	0.003		0.23	0.007		0.41	0.012		0.55	-0.008		2	0.009		0	0.000	
OFF4		46	179.00	3.51%	0.13	0.005		0.26	0.009		0.41	0.014		14.57	0.041		0.14	-0.030		20	0.701	
OFF4		47	47.70	0.93%	0.08	0.001	**0.12**	0.16	0.001	**0.22**	0.4	0.004	**0.41**	4.04	0.006	**6.48**	0.38	-0.004	**0.29**	30	0.280	**1.34**
OFF3	AZ659	1	0.07	1.53%	0.08	0.001		0.170	0.003		0.4	0.006		5.2	0.011		0.39	-0.006		30	0.458	
OFF3		3	0.75	16.71%	0.08	0.013		0.15	0.025		0.4	0.067		3.27	0.086		0.71	-0.025		0	0.000	
OFF3		4	0.10	2.14%	0.2	0.004		0.33	0.007		0.44	0.009		16.48	0.026		0.07	-0.025		0	0.000	
OFF3		15	0.30	6.57%	0.08	0.005		0.160	0.011		0.4	0.026		4.04	0.040		0.45	-0.023		0	0.000	
OFF3		16	0.37	8.16%	0.09	0.007		0.170	0.014		0.39	0.032		5.44	0.060		0.44	-0.029		0	0.000	
OFF3		20	0.12	2.57%	0.31	0.008		0.430	0.011		0.51	0.013		13.34	0.029		0.02	-0.044		0	0.000	
OFF3		25	0.32	7.05%	0.11	0.008		0.220	0.016		0.39	0.027		8.42	0.065		0.17	-0.054		0	0.000	
OFF3		28	0.30	6.70%	0.13	0.009		0.260	0.017		0.41	0.027		14.81	0.078		0.2	-0.047		0	0.000	
OFF3		31	1.11	24.58%	0.14	0.034		0.280	0.069		0.42	0.103		15.37	0.292		0.15	-0.203		0	0.000	
OFF3		32	0.05	1.12%	0.2	0.002		0.330	0.004		0.44	0.005		16.48	0.014		0.07	-0.013		0	0.000	
OFF3	AZ669	38	0.05	1.19%	0.08	0.001		0.190	0.002		0.4	0.005		8.58	0.011		0.29	-0.006		15	0.178	
OFF3	AZ659	39	0.08	1.70%	0.1	0.002		0.230	0.004		0.41	0.007		13.62	0.019		0.17	-0.013		35	0.596	
OFF3		43	0.79	17.45%	0.09	0.016		0.170	0.030		0.4	0.070		4.13	0.107		0.52	-0.050		0	0.000	
OFF3		46	0.11	2.53%	0.13	0.003	**0.11**	0.260	0.007	**0.22**	0.41	0.010	**0.41**	14.57	0.029	**7.38**	0.14	-0.022	**0.28**	20	0.506	**1.74**
OFF2	AZ659	1	0.074	0.45%	0.08	0.000		0.170	0.001		0.4	0.002		5.2	0.003		0.39	-0.002		30	0.135	
OFF2		15	0.788	4.79%	0.08	0.004		0.160	0.008		0.4	0.019		4.04	0.029		0.45	-0.017		0	0.000	
OFF2		16	1.659	10.10%	0.09	0.009		0.170	0.017		0.39	0.039		5.44	0.074		0.44	-0.036		0	0.000	
OFF2		20	0.161	0.98%	0.31	0.003		0.430	0.004		0.51	0.005		13.34	0.011		0.02	-0.017		0	0.000	

OFF2		25	0.466	2.84%	0.11	0.003		0.220	0.006		0.39	0.011		8.42	0.026		0.17	-0.022		0	0.000	
OFF2		28	0.118	0.72%	0.13	0.001		0.260	0.002		0.41	0.003		14.81	0.008		0.2	-0.005		0	0.000	
OFF2		3	5.220	31.78%	0.08	0.025		0.15	0.048		0.4	0.127		3.27	0.164		0.71	-0.047		0	0.000	
OFF2		31	2.036	12.39%	0.14	0.017		0.280	0.035		0.42	0.052		15.37	0.147		0.15	-0.102		0	0.000	
OFF2		32	0.287	1.75%	0.2	0.003		0.330	0.006		0.44	0.008		16.48	0.021		0.07	-0.020		0	0.000	
OFF2		37	1.911	11.63%	0.14	0.016		0.26	0.030		0.41	0.048		11.6	0.124		0.09	-0.122		0	0.000	
OFF2		4	0.728	4.43%	0.2	0.009		0.33	0.015		0.44	0.020		16.48	0.054		0.07	-0.051		0	0.000	
OFF2		43	0.345	2.10%	0.09	0.002		0.170	0.004		0.4	0.008		4.13	0.013		0.52	-0.006		0	0.000	
OFF2		47	1.045	6.36%	0.08	0.005		0.16	0.010		0.4	0.025		4.04	0.039		0.38	-0.027		30	1.909	
OFF2		48	0.408	2.48%	0.06	0.001		0.15	0.004		0.4	0.010		4.06	0.015		0.84	-0.002		0	0.000	
OFF2		7	0.035	0.21%	0.11	0.000		0.2	0.000		0.39	0.001		8.12	0.002		0.21	-0.001		25	0.053	
OFF2	AZ669	15	0.240	1.46%	0.15	0.002		0.24	0.004		0.41	0.006		7.08	0.012		0.13	-0.013		15	0.219	
OFF2		16	0.157	0.95%	0.18	0.002		0.28	0.003		0.41	0.004		9.37	0.009		0.08	-0.010		0	0.000	
OFF2		26	0.439	2.67%	0.05	0.001		0.13	0.003		0.39	0.010		3.77	0.015		0.82	-0.002		0	0.000	
OFF2		38	0.089	0.54%	0.08	0.000		0.19	0.001		0.4	0.002		8.58	0.005		0.29	-0.003		15	0.081	
OFF2		44	0.006	0.04%	0.15	0.000		0.29	0.000		0.42	0.000		16.67	0.000		0.13	0.000		0	0.000	
OFF2		53	0.213	1.30%	0.07	0.001	**0.11**	0.150	0.002	**0.2**	0.39	0.005	**0.41**	4.52	0.009	**6.05**	0.68	-0.002	**0.31**	0	0.000	**2.4**
OFF1	AZ659	3	0.15	6.24%	0.08	0.005		0.15	0.009		0.4	0.025		3.27	0.032		0.71	-0.009		0	0.000	
OFF1		16	0.42	17.83%	0.09	0.016		0.170	0.030		0.39	0.070		5.44	0.131		0.44	-0.064		0	0.000	
OFF1		20	0.11	4.47%	0.31	0.014		0.430	0.019		0.51	0.023		13.34	0.050		0.02	-0.076		0	0.000	
OFF1		24	0.00	0.21%	0.21	0.000		0.35	0.001		0.45	0.001		20.61	0.003		0.04	-0.003		0	0.000	
OFF1		25	0.29	12.21%	0.11	0.013		0.220	0.027		0.39	0.048		8.42	0.113		0.17	-0.094		0	0.000	
OFF1		37	0.88	37.14%	0.14	0.052		0.26	0.097		0.41	0.152		11.6	0.395		0.09	-0.388		0	0.000	
OFF1		47	0.52	21.89%	0.08	0.018	**0.12**	0.16	0.035	**0.22**	0.4	0.088	**0.41**	4.04	0.133	**7.2**	0.38	-0.092	**0.19**	30	6.568	**6.57**

GREEN AND AMPT PARAMETERS FOR ON1

FLO2D Soil Layer

AREA SYMBOL	MUSYM	xksat (in/hr)	rockout (%)	eff (%)	soildepth (ft)
AZ659	1	0.39	30	0	0.5
	10	0.03	0	0	0.5
	15	0.45	0	0	0.5
	16	0.44	0	0	0.5
	17	0.52	0	0	0.5
	19	0.06	0	0	0.5
	20	0.02	0	0	0.5
	22	0.05	0	0	0.5
	23	0.02	0	0	0.5
	24	0.04	0	0	0.5
	25	0.17	0	0	0.5
	28	0.2	0	0	0.5
	3	0.71	0	0	0.5
	31	0.15	0	0	0.5
	32	0.07	0	0	0.5
	33	0.55	0	0	0.5
	37	0.09	0	0	0.5
	39	0.17	35	0	0.5
	4	0.07	0	0	0.5
	43	0.52	0	0	0.5
	46	0.14	20	0	0.5
	47	0.38	30	0	0.5
	48	0.84	0	0	0.5
	5	0.03	0	0	0.5
	7	0.21	25	0	0.5
	9	0.05	0	0	0.5
AZ669	15	0.13	15	0	0.5
	16	0.08	0	0	0.5
	2	0.1	20	0	0.5
	26	0.82	0	0	0.5
	38	0.29	15	0	0.5
	44	0.13	0	0	0.5
	48	0.02	0	0	0.5
	49	0.05	0	0	0.5
	53	0.68	0	0	0.5
	58	0.03	0	0	0.5
	83	0.05	0	0	0.5

FLO2D Land Use Layer

landuse_id	Description	Saturation (w/d/n)	Abstraction (in)	Imprev. Area (%)
11	Open Water	normal	0.35	0
21	Developed, Open Space	normal	0.1	0
22	Developed, Low Intensity	normal	0.1	0
23	Developed, Medium Intensity	normal	0.1	0
24	Developed, High Intensity	normal	0.1	0
31	Barren Land	dry	0.35	0
52	Shrub/Scrub	dry	0.35	0
71	Herbaceous	dry	0.35	0
81	Hay/Pasture	dry	0.35	0
82	Cultivated Crops	wet	0.5	0
90	Woody Wetlands	dry	0.35	0
95	Emergent Herbaceous Wetlands	dry	0.35	0

APPENDIX B
RAINFALL LOSS PARAMETERS

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ658	36	Why-Brios complex, 0 to 2 percent slopes	0.04	0.09	0.41	0.22	1.41	0
AZ658	37	Yahana-Indio complex, saline-sodic, 0 to 3 percent slopes	0.17	0.34	0.48	18.71	0.13	0
AZ658	38	Yahana silty clay loam, 0 to 2 percent slopes	0.21	0.38	0.49	22.63	0.08	0
AZ659	1	Akela-Rock outcrop complex, 10 to 60 percent slopes	0.08	0.17	0.4	5.2	0.39	30
AZ659	2	Antho loamy fine sand	0.03	0.09	0.42	0.71	1.9	0
AZ659	3	Casa Grande fine sandy loam	0.08	0.15	0.4	3.27	0.71	0
AZ659	4	Casa Grande clay loam	0.2	0.33	0.44	16.48	0.07	0
AZ659	5	Cashion clay	0.27	0.4	0.48	14.49	0.03	0
AZ659	6	Cellar-Rock outcrop complex, 5 to 60 percent slopes	0.08	0.16	0.4	4.04	0.45	35
AZ659	7	Cherioni-Rock outcrop complex, 5 to 60 percent slopes	0.11	0.2	0.39	8.12	0.21	25
AZ659	8	Cipriano cobbly loam, 1 to 8 percent slopes	0.12	0.25	0.4	15.77	0.11	0
AZ659	9	Contine clay loam	0.21	0.35	0.44	16.65	0.05	0
AZ659	10	Contine clay	0.25	0.38	0.47	16.3	0.03	0
AZ659	11	Coolidge sandy loam	0.05	0.14	0.41	3.25	0.94	0
AZ659	12	Cuerda fine sandy loam	0.07	0.15	0.39	3.67	0.7	0
AZ659	13	Dateland fine sandy loam	0.09	0.17	0.39	4.53	0.51	0
AZ659	14	Dateland fine sandy loam, saline	0.09	0.17	0.39	4.53	0.51	0
AZ659	15	Denure very gravelly sandy loam, 1 to 8 percent slopes	0.08	0.16	0.4	4.04	0.45	0
AZ659	16	Denure sandy loam, 1 to 3 percent slopes	0.09	0.17	0.39	5.44	0.44	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ659	17	Denure fine sandy loam, 0 to 1 percent slopes	0.09	0.18	0.4	4.97	0.52	0
AZ659	18	Denure clay loam, 0 to 1 percent slopes	0.19	0.32	0.43	16.63	0.07	0
AZ659	19	Dumps-Pits association	0.2	0.3	0.46	2.54	0.06	0
AZ659	20	Gadsden clay	0.31	0.43	0.51	13.34	0.02	0
AZ659	21	Gilman fine sandy loam	0.09	0.17	0.39	4.53	0.52	0
AZ659	22	Gilman clay loam	0.19	0.32	0.43	17.52	0.05	0
AZ659	23	Ginland clay	0.29	0.41	0.49	14.18	0.02	0
AZ659	24	Glenbar clay loam	0.21	0.35	0.45	20.61	0.04	0
AZ659	25	Gunsight-Cipriano complex, 1 to 8 percent slopes	0.11	0.22	0.39	8.42	0.17	0
AZ659	26	Gunsight-Pinamt complex, 1 to 8 percent slopes	0.13	0.22	0.39	6.45	0.15	0
AZ659	27	La Palma fine sandy loam	0.08	0.15	0.4	3.35	0.76	0
AZ659	28	Laveen loam	0.13	0.26	0.41	14.81	0.2	0
AZ659	29	Marana silty clay loam	0.18	0.36	0.45	32.12	0.04	0
AZ659	30	Mohall sandy loam	0.08	0.16	0.4	4.04	0.69	0
AZ659	31	Mohall loam	0.14	0.28	0.42	15.37	0.15	0
AZ659	32	Mohall clay loam	0.2	0.33	0.44	16.48	0.07	0
AZ659	33	Mohall-Denure association	0.08	0.17	0.4	4.69	0.55	0
AZ659	34	Momoli-Carrizo complex, 1 to 8 percent slopes	0.1	0.18	0.39	4.91	0.28	0
AZ659	35	Pajarito-Sonoita complex	0.08	0.18	0.4	6.78	0.4	0
AZ659	36	Pimer silty clay	0.27	0.41	0.52	15.04	0.06	0
AZ659	37	Pinamt-Momoli complex, 1 to 8 percent slopes	0.14	0.26	0.41	11.6	0.09	0
AZ659	38	Pits	0	0.04	0.43	0.12	2	0
AZ659	39	Quilotosa-Rock outcrop complex, 5 to 60 percent slopes	0.1	0.23	0.41	13.62	0.17	35
AZ659	40	Rositas loamy fine sand	0.01	0.07	0.41	0.55	2	0
AZ659	41	Saminiego silty clay loam	0.31	0.44	0.51	14.15	0.02	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ659	42	Sasco silt loam	0.1	0.3	0.42	34.51	0.12	0
AZ659	43	Toltec fine sandy loam	0.09	0.17	0.4	4.13	0.52	0
AZ659	44	Tremant-Denure complex*	0.14	0.25	0.41	10.78	0.13	0
AZ659	45	Trix clay loam	0.21	0.35	0.44	16.65	0.05	0
AZ659	46	Vaiva-Rock outcrop complex, 2 to 15 percent slopes	0.13	0.26	0.41	14.57	0.14	20
AZ659	47	Vaiva-Rock outcrop complex, 15 to 50 percent slopes	0.08	0.16	0.4	4.04	0.38	30
AZ659	48	Valencia sandy loam	0.06	0.15	0.4	4.06	0.84	0
AZ659	49	Why sandy loam	0.07	0.15	0.39	4.52	0.6	0
AZ659	50	Water	0.3	0.42	0.48	11.42	0.01	100
AZ661	1	Agustin-Kokan-Queencreek complex, 1 to 8 percent slopes	0.08	0.15	0.4	3.24	0.5	0
AZ661	2	Ajo-Guvo-Rock outcrop complex, 15 to 60 percent slopes	0.18	0.32	0.43	16.47	0.06	20
AZ661	3	Beardsley-Hickiwan complex, 1 to 8 percent slopes	0.19	0.32	0.43	16.34	0.06	0
AZ661	4	Beardsley-Suncity complex, 1 to 10 percent slopes	0.19	0.32	0.43	16.61	0.07	0
AZ661	5	Beaumain-Rock outcrop-Cherrycow complex, 5 to 60 percent slopes	0.19	0.32	0.46	11.44	0.09	20
AZ661	6	Bodecker soils and riverwash, 0 to 5 percent slopes	0.04	0.13	0.41	3.54	0.87	0
AZ661	7	Brewster-Rock outcrop-Woodcutter complex, 10 to 60 percent slopes	0.15	0.28	0.45	12.11	0.14	30
AZ661	8	Brunkcow-Chiricahua complex, 10 to 60 percent slopes	0.18	0.31	0.45	14.89	0.09	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ669	15	Chimenea-Cellar-Rock outcrop complex, 15 to 50 percent slopes	0.15	0.24	0.41	7.08	0.13	15
AZ669	16	Chimenea very gravelly fine sandy loam, 5 to 15 percent slopes	0.18	0.28	0.41	9.37	0.08	0
AZ669	17	Chiricahua-Lampshire complex, 5 to 15 percent slopes	0.2	0.34	0.46	14.03	0.07	0
AZ669	18	Combate gravelly loamy coarse sand, 2 to 8 percent slopes	0.05	0.11	0.45	3.6	1.34	0
AZ669	19	Comoro sandy loam, 0 to 2 percent slopes	0.05	0.14	0.44	1.39	1.37	0
AZ669	20	Cortaro-Rock outcrop-Faraway complex, 15 to 45 percent slopes	0.09	0.18	0.4	4.5	0.31	20
AZ669	21	Dateland-Denure association, 1 to 3 percent slopes	0.06	0.14	0.39	3.71	0.75	0
AZ669	22	Delnorte-Stagecoach complex, 1 to 20 percent slopes	0.07	0.15	0.4	3.9	0.45	0
AZ669	23	Deloro-Andrada complex, 5 to 35 percent slopes	0.19	0.33	0.45	14.75	0.05	0
AZ669	24	Deloro-Rock outcrop complex, 15 to 60 percent slopes	0.24	0.37	0.46	16.39	0.02	15
AZ669	25	Deloro-Schrap association, 1 to 8 percent slopes	0.21	0.34	0.44	16.17	0.03	0
AZ669	26	Denure gravelly sandy loam, 1 to 5 percent slopes	0.05	0.13	0.39	3.77	0.82	0
AZ669	27	Diaspar sandy loam, 1 to 5 percent slopes	0.09	0.17	0.4	4.56	0.45	0
AZ669	28	Far-Spudrock-Rock outcrop complex, 35 to 85 percent slopes	0.1	0.19	0.44	2.41	0.59	25

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ669	29	Glendale-Bucklebar complex, 0 to 3 percent slopes	0.11	0.25	0.42	13.32	0.21	0
AZ669	30	Glendale silt loam, 0 to 3 percent slopes	0.13	0.32	0.44	34.01	0.09	0
AZ669	31	Graham-Pantak complex, 2 to 15 percent slopes	0.26	0.39	0.48	13.21	0.03	0
AZ669	32	Graham-Pantak-Rock outcrop complex, 15 to 45 percent slopes	0.27	0.4	0.49	12.98	0.03	15
AZ669	33	Guest fine sandy loam, 0 to 1 percent slopes	0.06	0.15	0.44	1.75	1.12	0
AZ669	34	Hantz loam, 0 to 1 percent slopes	0.15	0.29	0.42	16.67	0.13	0
AZ669	35	Hayhook sandy loam, 1 to 5 percent slopes	0.08	0.16	0.4	4.04	0.71	0
AZ669	36	Hayhook-Sahuarita complex, 1 to 5 percent slopes	0.08	0.16	0.4	4.08	0.55	0
AZ669	37	Keysto extremely gravelly fine sandy loam, 2 to 8 percent slopes	0.1	0.24	0.44	10.03	0.26	0
AZ669	38	Lajitas-Delthorny-Rock outcrop complex, 25 to 60 percent slopes	0.08	0.19	0.4	8.58	0.29	15
AZ669	39	Lampshire-Pantak-Rock outcrop complex, 25 to 60 percent slopes	0.15	0.26	0.44	7.13	0.13	20
AZ669	40	Lampshire-Romero-Rock outcrop complex, 10 to 65 percent slopes	0.1	0.22	0.42	8.6	0.27	15
AZ669	41	Lehmans-Delthorny-Lajitas complex, 15 to 50 percent slopes	0.13	0.25	0.42	10.13	0.12	0
AZ669	42	Mabray-Deloro-Rock outcrop complex, 20 to 65 percent slopes	0.17	0.31	0.45	13.09	0.08	15
AZ669	43	Mohall gravelly fine sandy loam, 1 to 5 percent slopes	0.11	0.19	0.4	4.74	0.34	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ669	44	Mohall loam, 0 to 2 percent slopes	0.15	0.29	0.42	16.67	0.13	0
AZ669	45	Mohall-Pahaka complex, 1 to 3 percent slopes	0.07	0.15	0.4	4.09	0.68	0
AZ669	46	Mohall-Trix complex, 0 to 1 percent slopes	0.08	0.17	0.4	4.73	0.62	0
AZ669	47	Mohave soils and urban land, 1 to 8 percent slopes	0.1	0.21	0.4	6.84	0.32	0
AZ669	48	Nahda-Pinaleno complex, 2 to 8 percent slopes	0.22	0.33	0.43	13.67	0.02	0
AZ669	49	Nahda-Stagecoach complex, 1 to 15 percent slopes	0.17	0.28	0.43	9.03	0.05	0
AZ669	50	Nahda very cobbly loam, 2 to 8 percent slopes	0.1	0.23	0.39	14.87	0.17	0
AZ669	51	Nolam-Tombstone complex, 8 to 30 percent slopes	0.15	0.27	0.42	11	0.11	0
AZ669	52	Oracle-Romero-Rock outcrop complex, 5 to 35 percent slopes	0.15	0.26	0.43	8.77	0.15	20
AZ669	53	Pahaka fine sandy loam, 1 to 5 percent slopes	0.07	0.15	0.39	4.52	0.68	0
AZ669	54	Palos Verdes-Jaynes complex, 2 to 8 percent slopes	0.07	0.15	0.4	4.27	0.6	0
AZ669	55	Palos Verdes-Sahuarita complex, 2 to 8 percent slopes	0.08	0.16	0.4	4.09	0.5	0
AZ669	56	Pantak-Deloro complex, 8 to 35 percent slopes	0.22	0.36	0.46	14.79	0.03	0
AZ669	57	Pantak-Rock outcrop complex, 25 to 50 percent slopes	0.22	0.35	0.46	14.2	0.04	20
AZ669	58	Pantano-Granolite complex, 5 to 25 percent slopes	0.19	0.31	0.42	13.73	0.03	0
AZ669	59	Pantano-Rock outcrop complex, 25 to 60 percent slopes	0.14	0.27	0.41	16.28	0.08	25

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ669	60	Pinaleno-Stagecoach complex, 5 to 16 percent slopes	0.13	0.22	0.4	6.57	0.15	0
AZ669	61	Pinaleno-Stagecoach-Palos Verdes complex, 10 to 35 percent slopes	0.11	0.2	0.4	5.89	0.21	0
AZ669	62	Pinaleno very cobbly sandy loam, 1 to 8 percent slopes	0.17	0.27	0.4	10.06	0.06	0
AZ669	63	Pinamt-Momoli complex, 1 to 10 percent slopes	0.12	0.21	0.4	6.77	0.16	0
AZ669	64	Pits, dumps	0.14	0.22	0.45	1.01	0.17	0
AZ669	65	Powerline-Kimrose family complex, 10 to 35 percent slopes	0.1	0.21	0.43	6.28	0.3	0
AZ669	66	Redington very gravelly fine sand, 3 to 50 percent slopes	0.02	0.05	0.42	3	1.6	0
AZ669	67	Redo very gravelly sand, 15 to 50 percent slopes	0.03	0.06	0.43	3.57	1.35	0
AZ669	68	Riveroad and Comoro soils, 0 to 2 percent slopes	0.13	0.25	0.47	4.32	0.42	0
AZ669	69	Romero-Lampshire-Rock outcrop complex, 15 to 65 percent slopes	0.1	0.19	0.42	4.26	0.34	30
AZ669	70	Romero-Oracle complex, 25 to 60 percent slopes	0.13	0.24	0.43	7.23	0.18	0
AZ669	71	Saguaro-Rock outcrop complex, 15 to 45 percent slopes	0.07	0.15	0.39	4.52	0.36	30
AZ669	72	Sahuarita soils, mohave soils and urban land, 1 to 5 percent slopes	0.1	0.2	0.4	5.78	0.34	0
AZ669	73	Sasabe-Caralampi complex, 1 to 15 percent slopes	0.13	0.23	0.41	8.49	0.18	0
AZ669	74	Schrap very channery loam, 5 to 30 percent slopes	0.15	0.28	0.42	15.76	0.08	0
AZ669	75	Spudrock-Boriana complex, 10 to 35 percent slopes	0.09	0.18	0.44	2.85	0.5	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ669	76	Spudrock-Far-Rock outcrop complex, 25 to 65 percent slopes	0.1	0.18	0.44	2.68	0.5	15
AZ669	77	Spudrock-Lemmon complex, 15 to 45 percent slopes	0.11	0.22	0.43	5.92	0.27	0
AZ669	78	Stagecoach-Sahuarita association, 1 to 8 percent slopes	0.08	0.16	0.4	4.07	0.42	0
AZ669	79	Tombstone very gravelly loam, 15 to 50 percent slopes	0.13	0.26	0.43	12.81	0.16	0
AZ669	80	Tubac complex, 0 to 2 percent slopes	0.12	0.25	0.4	15.77	0.16	0
AZ669	81	Tubac gravelly loam, 1 to 8 percent slopes	0.12	0.25	0.4	15.77	0.16	0
AZ669	82	Tubac sandy loam, 0 to 2 percent slopes	0.12	0.25	0.4	15.77	0.16	0
AZ669	83	Vecont clay loam, 0 to 1 percent slopes	0.21	0.35	0.44	16.65	0.05	0
AZ669	84	White House-Caralampi complex, 5 to 25 percent slopes	0.21	0.34	0.44	16.22	0.04	0
AZ669	85	White House gravelly loam, 1 to 8 percent slopes	0.29	0.41	0.49	13.79	0.02	0
AZ669	86	Yaqui fine sandy loam, 1 to 3 percent slopes	0.08	0.15	0.4	3.27	0.73	0
AZ669	87	Water	0.3	0.42	0.48	11.42	0.01	100
AZ671	1	Altar-Mallet complex, 0 to 8 percent slopes	0.06	0.15	0.41	3.82	0.88	0
AZ671	2	Anthony-Maricopa complex, 0 to 5 percent slopes	0.07	0.15	0.4	4.76	0.68	0
AZ671	3	Arizo family-Riverwash complex, 0 to 3 percent slopes	0.02	0.07	0.41	3.29	1.5	0
AZ671	4	Ashcreek-Stanford complex, 0 to 10 percent slopes	0.22	0.34	0.45	10.92	0.07	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ701	174	Yumtheska-Rock outcrop complex, 15 to 45 percent slopes	0.15	0.32	0.5	12.43	0.18	25
AZ701	175	Yumtheska-Toqui-Rock outcrop complex, 2 to 8 percent slopes	0.15	0.27	0.45	7.49	0.19	15
AZ701	176	Yumtheska-Toqui-Rock outcrop complex, 15 to 40 percent slopes	0.17	0.3	0.46	11.49	0.12	15
AZ701	177	Zibate family, 2 to 8 percent slopes	0.18	0.32	0.42	18.23	0.04	0
AZ703	1	Ajo-Pinamt, deep, complex, 3 to 15 percent slopes	0.12	0.21	0.4	6.71	0.18	0
AZ703	2	Anklam-Cellar-Rock outcrop complex, 15 to 55 percent slopes	0.12	0.21	0.4	6.28	0.18	20
AZ703	3	Anklam very gravelly sandy loam, 3 to 15 percent slopes	0.06	0.15	0.4	4.06	0.5	0
AZ703	4	Arizo-Riverwash complex, 0 to 3 percent slopes	0.03	0.09	0.4	0.72	1.36	0
AZ703	5	Baboquivari-Combate complex, 1 to 8 percent slopes	0.06	0.14	0.44	3	1.01	0
AZ703	6	Bucklebar-Hayhook-Tubac complex, 0 to 3 percent slopes	0.09	0.18	0.4	4.63	0.53	0
AZ703	7	Caralampi-Selevin-Kimrose complex, 5 to 50 percent slopes	0.2	0.31	0.43	9.5	0.04	0
AZ703	8	Casa Grande-Kamato complex, 0 to 1 percent slopes	0.13	0.25	0.41	12.75	0.19	0
AZ703	9	Casa Grande-Rositas-Valencia complex, 0 to 5 percent slopes	0.08	0.16	0.4	3.18	0.61	0
AZ703	10	Cellar-Lampshire-Rock outcrop complex, 15 to 60 percent slopes	0.08	0.17	0.41	3.93	0.44	25

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ703	11	Chiricahua-Lampshire complex, 15 to 45 percent slopes	0.11	0.22	0.42	8.4	0.22	0
AZ703	12	Chuichu-Rock outcrop complex, 15 to 45 percent slopes	0.14	0.27	0.42	15.43	0.1	25
AZ703	13	Chutum loam, 1 to 3 percent slopes	0.19	0.32	0.43	16.63	0.07	0
AZ703	14	Combate gravelly loamy coarse sand, 2 to 8 percent slopes	0.04	0.11	0.45	3.23	1.48	0
AZ703	15	Dateland-Denure association, 1 to 3 percent slopes	0.08	0.15	0.39	4.01	0.58	0
AZ703	16	Delnorte-Stagecoach complex, 1 to 20 percent slopes	0.09	0.2	0.4	8.43	0.27	0
AZ703	17	Delthorny-Caracara complex, 3 to 25 percent slopes	0.11	0.2	0.4	5.69	0.23	0
AZ703	18	Delthorny-Garzona-Rock outcrop complex, 15 to 60 percent slopes	0.1	0.23	0.41	13.57	0.17	20
AZ703	19	Denure-Momoli complex, 1 to 5 percent slopes	0.08	0.16	0.4	4.49	0.37	0
AZ703	20	Denure-Pahaka complex, 1 to 3 percent slopes	0.08	0.17	0.39	5.34	0.5	0
AZ703	21	Dixaleta-Rock outcrop complex, 15 to 70 percent slopes	0.09	0.18	0.4	4.97	0.29	30
AZ703	22	Far-Spudrock-Rock outcrop complex, 35 to 85 percent slopes	0.09	0.18	0.45	2.32	0.64	25
AZ703	23	Gachado-Lomitas-Rock outcrop complex, 15 to 45 percent slopes	0.09	0.22	0.39	14.68	0.16	15
AZ703	24	Gadsden silty clay loam, 0 to 1 percent slopes	0.18	0.34	0.45	24.45	0.07	0

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ703	25	Gilman very fine sandy loam, 0 to 1 percent slopes	0.09	0.25	0.39	24.16	0.19	0
AZ703	26	Ginland silty clay, 0 to 1 percent slopes	0.28	0.42	0.52	13.77	0.05	0
AZ703	27	Glenbar loam, 0 to 1 percent slopes	0.15	0.29	0.41	20.07	0.1	0
AZ703	28	Glendale clay loam, 0 to 2 percent slopes, flooded	0.2	0.34	0.45	19.83	0.06	0
AZ703	29	Glendale silt loam, 1 to 3 percent slopes	0.13	0.32	0.44	34.01	0.09	0
AZ703	30	Glendale-Pajarito complex, 1 to 3 percent slopes	0.11	0.26	0.42	14.56	0.18	0
AZ703	31	Grabe-Vado complex, 1 to 5 percent slopes	0.09	0.19	0.4	7.77	0.39	0
AZ703	32	Granolite-Rock outcrop complex, 15 to 65 percent slopes	0.25	0.38	0.47	16.3	0.02	30
AZ703	33	Gunsight-Rillito complex, 1 to 8 percent slopes	0.08	0.17	0.39	5.12	0.32	0
AZ703	34	Hantz clay loam, 0 to 1 percent slopes	0.21	0.35	0.44	16.65	0.04	0
AZ703	35	Hayhook sandy loam, 1 to 5 percent slopes	0.09	0.17	0.4	4.56	0.57	0
AZ703	36	Hickiwan-Gunsight-Momoli complex, 3 to 15 percent slopes	0.09	0.17	0.39	5.4	0.3	0
AZ703	37	Hyder-Rock outcrop-Guvo complex, 10 to 45 percent slopes	0.1	0.23	0.4	14.09	0.17	25
AZ703	38	Keysto-Riverwash complex, 0 to 5 percent slopes	0.07	0.16	0.43	2.96	0.69	0
AZ703	39	Kohatk-Rock outcrop complex, 10 to 45 percent slopes	0.09	0.22	0.4	13.07	0.24	25
AZ703	40	Lajitas-Bosa-Rock outcrop complex, 15 to 50 percent slopes	0.12	0.23	0.41	8.12	0.15	25

Table B-4 Recommended Green and Ampt Values

NRCS Soil Survey	MUSYM	Name	Initial Content (volume ratio)		Saturated Content (volume ratio)	Suction (in)	Conductivity (in/hr)	Natural Imp. %
			Wilting Point (dry)	Field Capacity (normal)				
AZ703	41	Lampshire-Pantak-Rock outcrop complex, 25 to 60 percent slopes	0.1	0.18	0.42	3.58	0.39	20
AZ703	42	Mohall loam, 0 to 2 percent slopes	0.16	0.3	0.42	16.9	0.11	0
AZ703	43	Mohall-Pahaka complex, 1 to 3 percent slopes	0.07	0.15	0.4	4.09	0.68	0
AZ703	44	Mohall-Trix complex, 0 to 1 percent slopes	0.08	0.17	0.4	4.73	0.61	0
AZ703	45	Nahda-Stagecoach complex, 1 to 15 percent slopes	0.17	0.27	0.41	7.76	0.05	0
AZ703	46	Oracle-Romero-Rock outcrop complex, 5 to 35 percent slopes	0.1	0.19	0.42	4.26	0.42	10
AZ703	47	Pajarito-Sahuarita complex, 1 to 3 percent slopes	0.06	0.15	0.39	4.48	0.75	0
AZ703	48	Pantano-Granolite complex, 5 to 25 percent slopes	0.16	0.25	0.41	7.44	0.07	0
AZ703	49	Pinamt-Momoli complex, 1 to 10 percent slopes	0.12	0.21	0.39	6.91	0.16	0
AZ703	50	Quilotosa extremely gravelly coarse sandy loam, 3 to 15 percent slopes	0.06	0.15	0.4	3.78	0.45	0
AZ703	51	Quilotosa-Rock outcrop-Vaiva complex, 15 to 45 percent slopes	0.1	0.2	0.4	5.75	0.23	30
AZ703	52	Romero-Lampshire-Rock outcrop complex, 15 to 65 percent slopes	0.1	0.19	0.42	4.26	0.37	30
AZ703	53	Romero-Rock outcrop complex, 10 to 40 percent slopes	0.08	0.17	0.41	4.34	0.38	25
AZ703	54	Rositas loamy fine sand, 2 to 5 percent slopes	0.03	0.09	0.4	1.17	1.6	0
AZ703	55	Sasco loam, 0 to 1 percent slopes	0.11	0.25	0.41	15.12	0.23	0

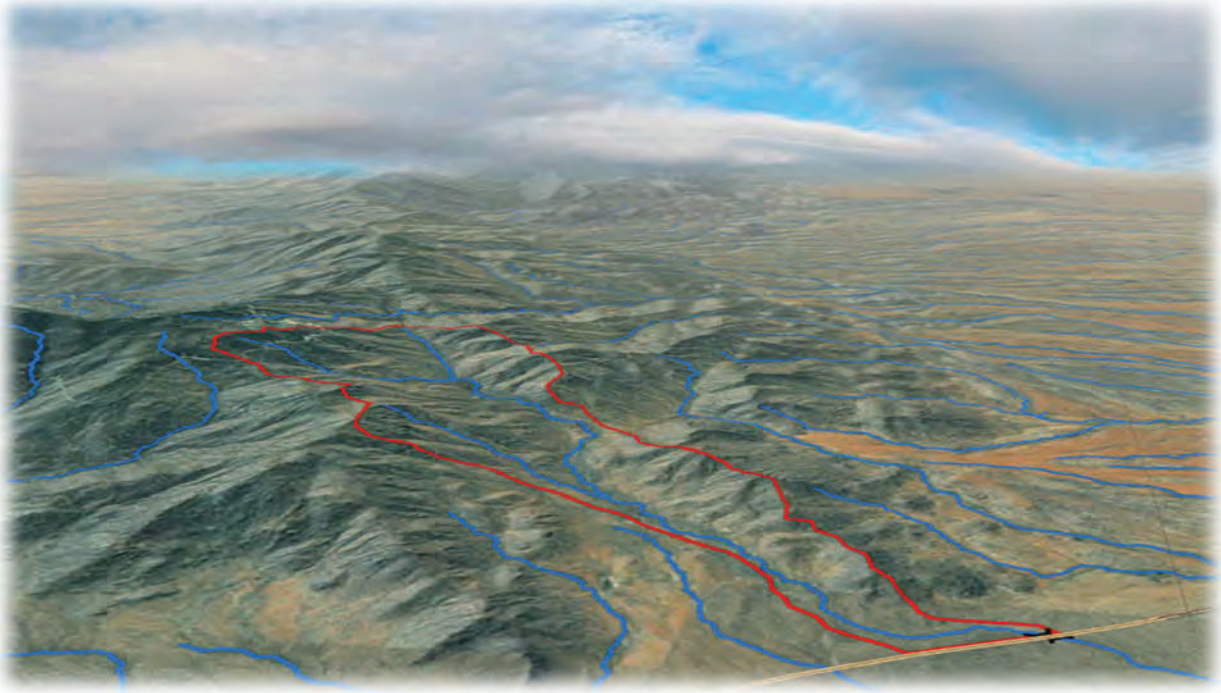
ADOT HYDROLOGY DESIGN MANUAL

SURFACE RETENTION LOSS & INITIAL STORAGE

Subbasin ID	Land Use	Area	Max Storage	Initial Srorage	Composite Max Storage	Composite Initial Storage
		(sq mi)	(in)	(%)	(in)	(%)
OFF1	Natural	2.38	0.35	0	**0.35**	**0**
OFF2	Natural	61.72	0.35	0	**0.35**	**0**
OFF3	Natural	4.19	0.35	0		
	Agricultural	0.36	0.50	100	**0.36**	**7.91**
OFF4	Natural	6.88	0.35	0		
	Agricultural	1.10	0.50	100	**0.37**	**13.79**
OFF5	Natural	8.99	0.35	0		
	Agricultural	1.29	0.50	100	**0.37**	**12.54**

ARIZONA DEPARTMENT OF TRANSPORTATION

Highway Drainage Design Manual



Volume 2

Hydrology

Second Edition, 2014

ADOT
Intermodal Transportation

significant and separable from surface depression losses, the "Canopy Method" may also be applicable. These circumstances might include heavily forested areas where significant tree canopy captures additional rainfall preventing it from reaching the ground. Separating the two types of initial losses may be necessary for continuous modeling or forensic modeling of storms with multiple rainfall bursts and periods of little or no rainfall in between. In these cases, HEC-HMS is able to drain the surface depression storage during a simulation and make it available again for subsequent rainfall losses as compared to interception (canopy) losses that are filled only once in a single simulation.

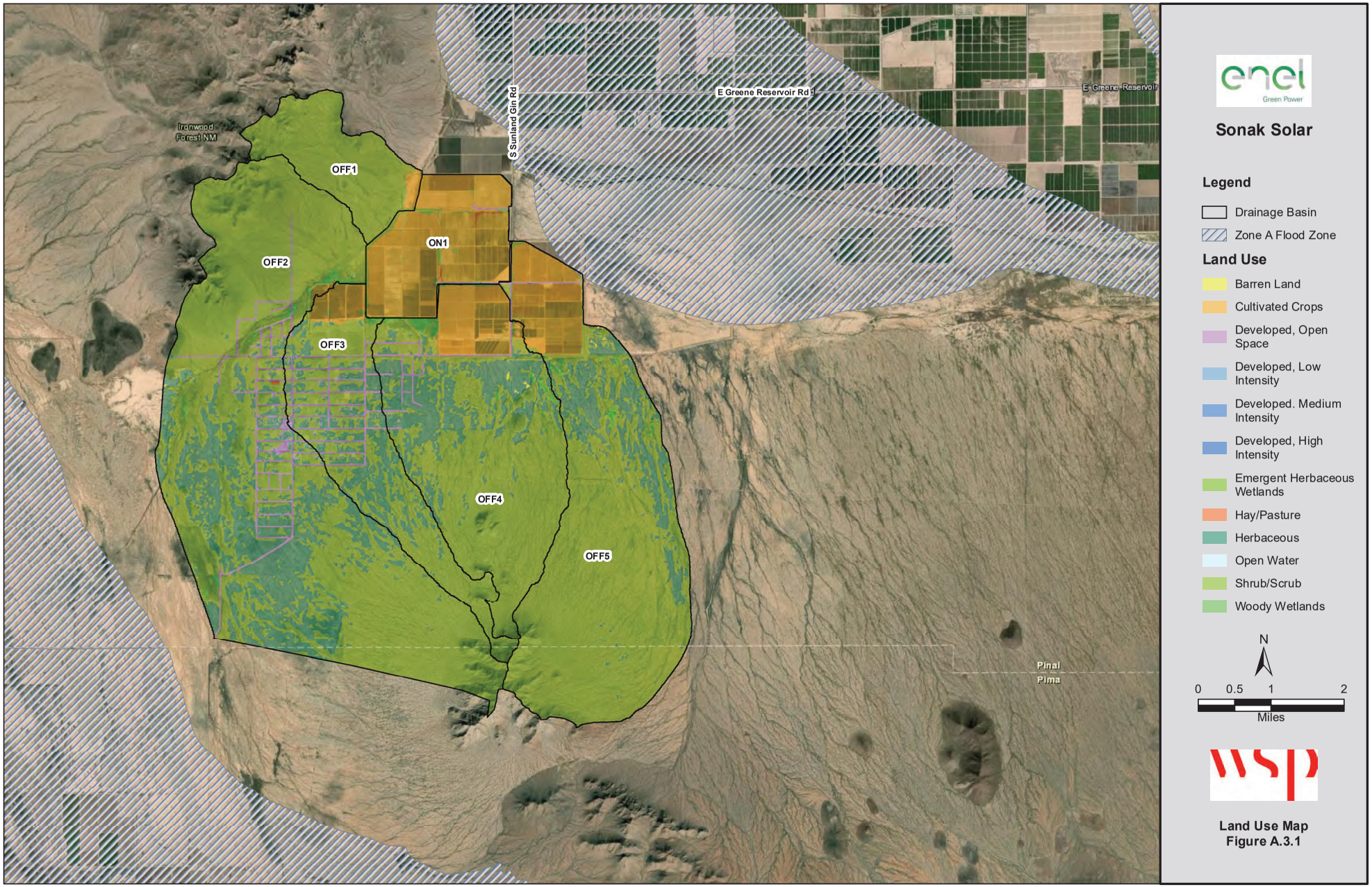
The "Initial Storage (%)" will generally be taken as zero (0) percent for drainage design applications. For saturated soil conditions such as agricultural fields, the initial storage should be set at 100 percent.

Surface loss parameters for use with this manual are provided in Table 3–1. Additional sources can be found in Table 6-1 in USACE EM 1110-2-1417 (USACE, 1996), Table 7.7 in the Drainage Design Manual for Mohave County (MCFCD, 2009), and Table 4.2 in Drainage Design Manual for Maricopa County, Hydrology (FCDMC, 2013).

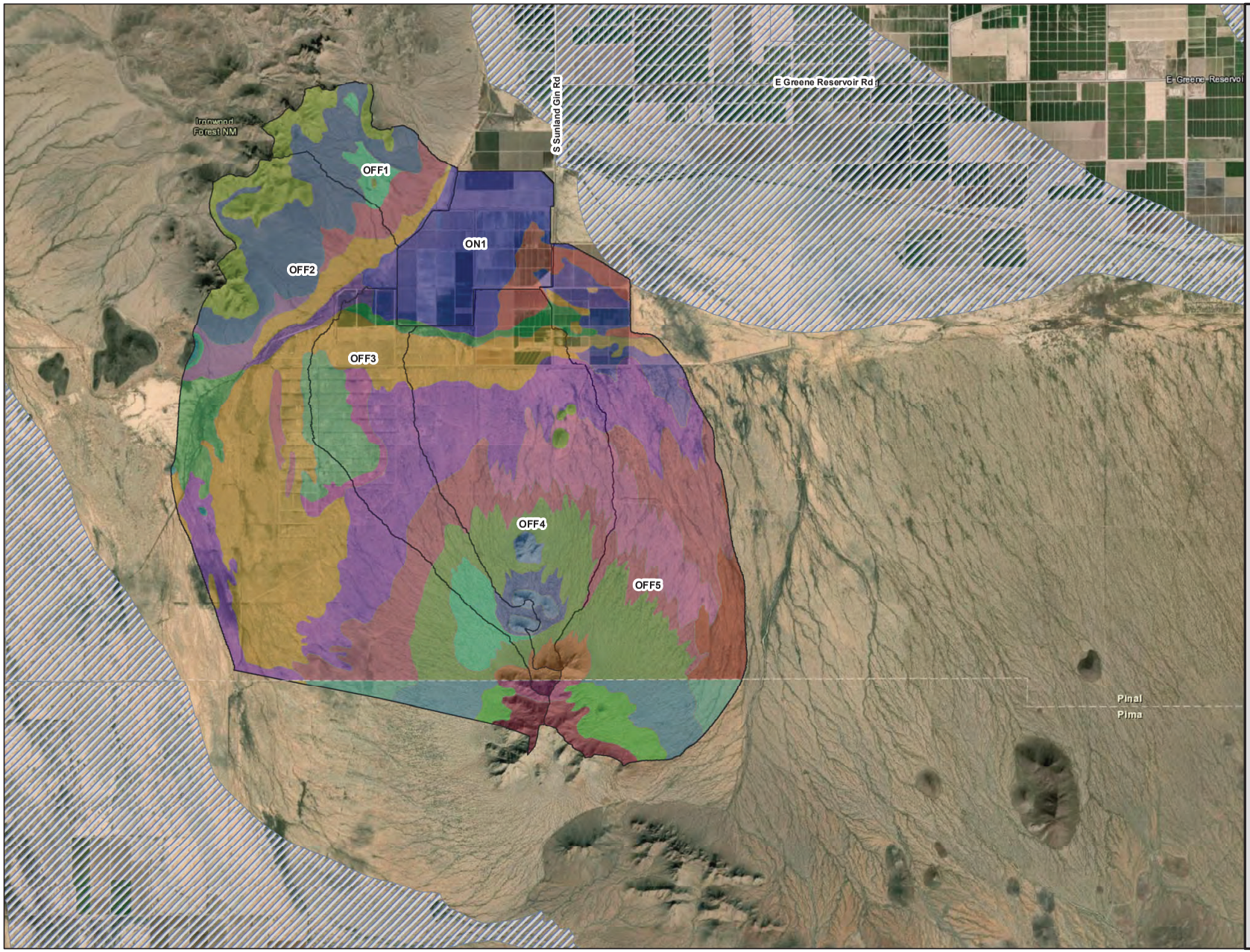
Table 3–1 Surface Retention Loss (Max Storage) for Various Land Surfaces in Arizona.

Land-use and/or Surface Cover	Surface Retention Loss (Max Storage), inches
Natural	
Desert and rangeland, flat slopes	0.35
Desert and rangeland, hill slopes	0.15
Mountain, with vegetated surface	0.25
Developed (Residential and Commercial)	
Lawn and turf	0.20
Desert landscape	0.10
Pavement	0.05
Agricultural	
Tilled fields and irrigated pasture	0.50

A.3.1 Land Use Map


Ironwood Forest NM
S Sunland Gin Rd
E Greene Reservoir Rd
E Greene Reservoir
OFF1
ON1
OFF2
OFF3
OFF4
OFF5
Pinal
Pima
Sonak Solar
Legend
Drainage Basin
Zone A Flood Zone
Land Use
Barren Land
Cultivated Crops
Developed, Open Space
Developed, Low Intensity
Developed. Medium Intensity
Developed, High Intensity
Emergent Herbaceous Wetlands
Hay/Pasture
Herbaceous
Open Water
Shrub/Scrub
Woody Wetlands
N
0 0.5 1 2
Miles
Land Use Map
Figure A.3.1

A.3.2 Soil Map



Sonak Solar

Legend

- Drainage Basin
- Zone A Flood Zone

Soil Group

- 1, AZ659
- 10, AZ659
- 15, AZ659
- 15, AZ669
- 16, AZ659
- 16, AZ669
- 17, AZ659
- 19, AZ659
- 2, AZ669
- 20, AZ659
- 23, AZ659
- 24, AZ659
- 25, AZ659
- 26, AZ669
- 28, AZ659
- 3, AZ659
- 31, AZ659
- 32, AZ659
- 33, AZ659
- 37, AZ659
- 38, AZ669
- 39, AZ659
- 4, AZ659
- 43, AZ659
- 44, AZ669
- 46, AZ659
- 47, AZ659
- 48, AZ659
- 5, AZ659
- 53, AZ669
- 58, AZ669
- 7, AZ659
- 9, AZ659

N

0 0.5 1 2

Miles

Soil Map
Figure A.3.2

A.4 FLO-2D MANNING'S N VALUES

4.2 Overland Flow

The simplest FLO-2D model is overland flow on an alluvial fan or floodplain. Typical overland flow as reflects the water surface elevation, roughness and 8-direction flow path. The floodplain element attributes can be modified to add detail to the predicted area of inundation. The grid element surface storage area or flow path can be adjusted for buildings or other obstructions. Using the area reduction factors (ARFs), a grid element can be completely removed from receiving any inflow. Any of the eight flow directions can be partially or completely blocked to represent flow obstruction. The area of inundation can also be affected by levees, channel breakout flows, flow constriction at bridges and culverts, or street flow in urban areas. Rainfall and infiltration losses can add or subtract from the flow volume on the floodplain surface. These overland flow components are shown in a computational flow chart in Figure 20.

Overland flow velocities and depths vary with topography and the grid element roughness. Spatial variation in floodplain roughness can be assigned through the GDS pre-processor program. The assignment of overland flow roughness must account for vegetation, surface irregularity, non-uniform and unsteady flow. It is also a function of flow depth. Typical overland flow roughness values (Manning's n coefficients) are shown in Table 3.

Table 3. Overland Flow Manning's n Roughness Values[1]

Surface	n-value
Dense turf	0.17 - 0.80
Bermuda and dense grass, dense vegetation	0.17 - 0.48
Shrubs and forest litter, pasture	0.30 - 0.40
Average grass cover	0.20 - 0.40
Poor grass cover on rough surface	0.20 - 0.30
Short prairie grass	0.10 - 0.20
Sparse vegetation	0.05 - 0.13
Sparse rangeland with debris	
0% cover	0.09 - 0.34
20 % cover	0.05 - 0.25
Plowed or tilled fields	
Fallow - no residue	0.008 - 0.012
Conventional tillage	0.06 - 0.22
Chisel plow	0.06 - 0.16
Fall disking	0.30 - 0.50
No till - no residue	0.04 - 0.10
No till (20 - 40% residue cover)	0.07 - 0.17
No till (60 - 100% residue cover)	0.17 - 0.47
Open ground with debris	0.10 - 0.20
Shallow glow on asphalt or concrete (0.25" to 1.0")	0.10 - 0.15
Fallow fields	0.08 - 0.12
Open ground, no debris	0.04 - 0.10
Asphalt or concrete	0.02 - 0.05

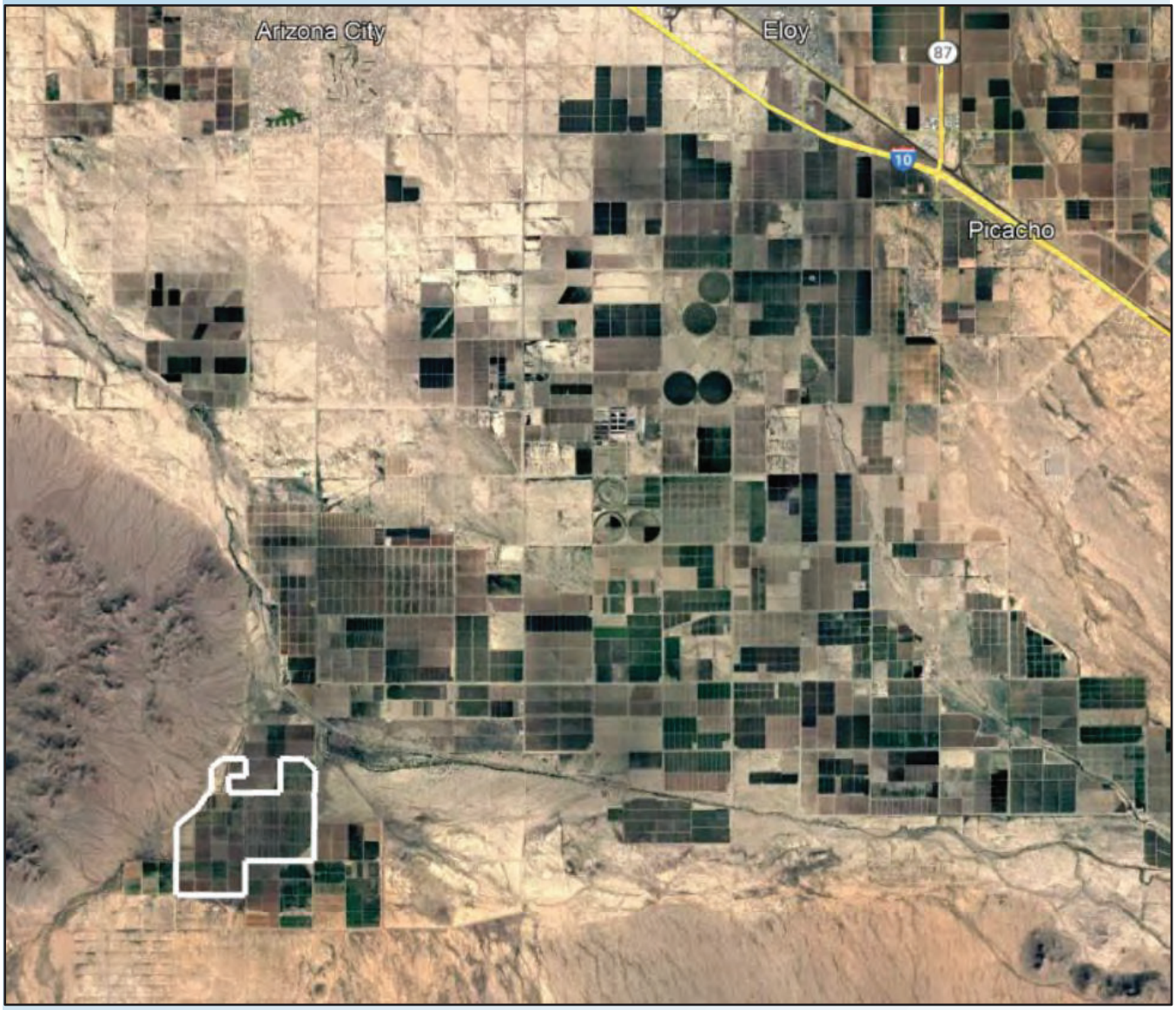
[1]Adapted from COE, HEC-1 Manual, 1990 and the COE, Technical Engineering and Design Guide, No. 19, 1997 with modifications.

APPENDIX F

Preliminary Traffic Impact Statement

SONAK SOLAR PROJECT

TRANSPORTATION STUDY



WSP PROJECT NO.: 31300042.K00
DATE: AUGUST 2023

FINAL

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PINAL COUNTY CASE NO.: Z-PA-157-22

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PROJECT OVERVIEW

SONAK SITE

Remote Assessment: October 2022

PURPOSE

Sonak Solar Project, LLC is proposing to construct a 323 megawatt alternating current (MWac)/367 megawatt direct current (MWdc) interconnecting solar energy generation facility with a 162 MWdc Battery Electric Storage System (BESS), referred to as the Sonak Solar Project (the Solar Facility or Project), in Pinal County, Arizona (for regional access to the site location, see Figure 1, for parcel location and site access, see Figure 2). The proposed Solar Facility is located on several contiguous property parcels located off Sunland Gin Road between Pearce Road and W. Kinley Road 12.5 miles southwest of the Picacho exit on interstate I-10. The proposed Solar Facility covers approximately 1,866.6 acres on various groupings of parcels. The Project includes the solar PV array, an electrical collector system, a main power substation/transformer, BESS, and associated infrastructure improvements.

Construction is anticipated to begin approximately in December 2024 and be completed by around December 2025.

WSP was hired to perform a desktop transportation permit study for the Sonak Solar Project. This study is intended to provide transportation information for the Pinal County permit requirements. This document is provided as a reference document only.

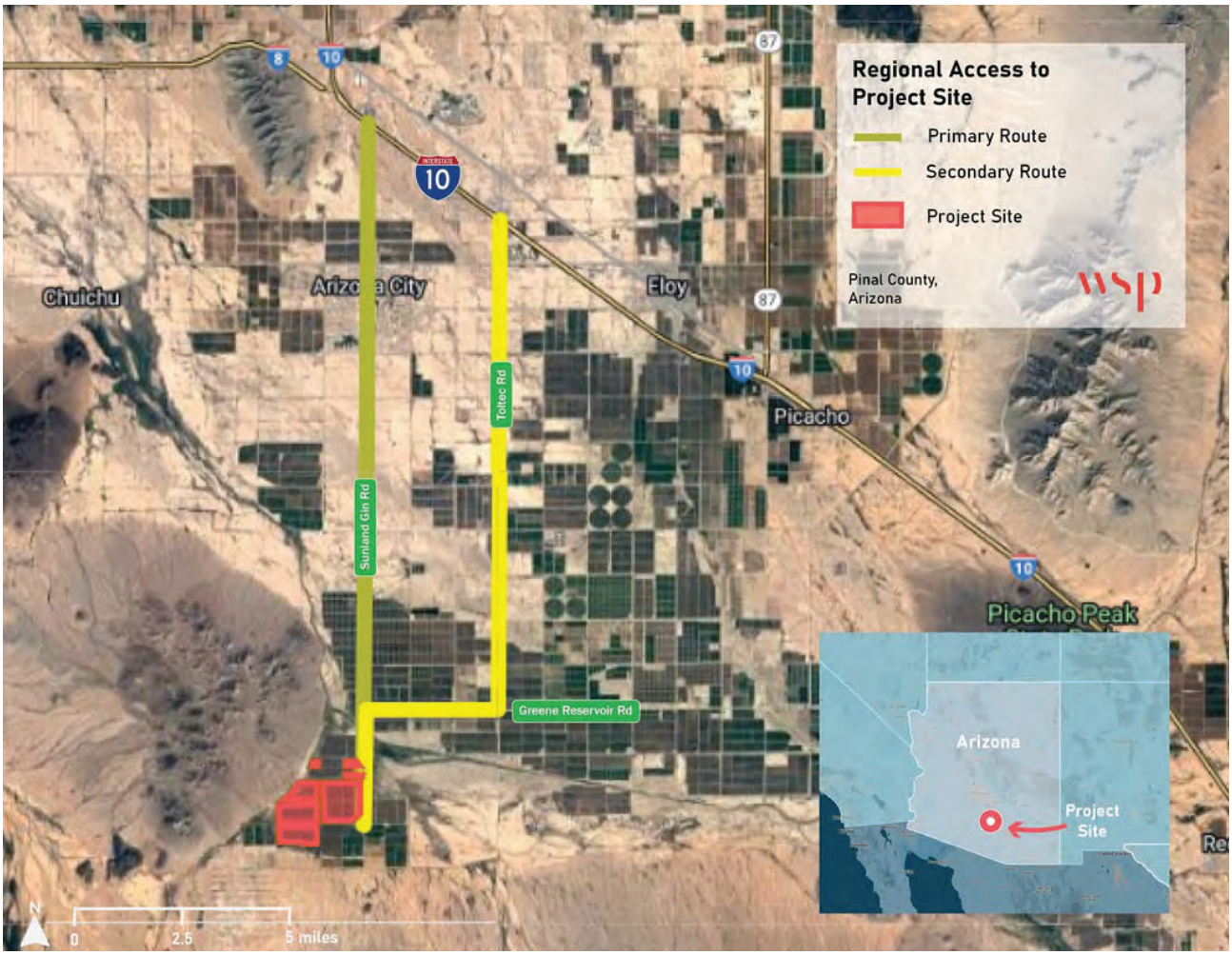


Figure 1: Regional Routing

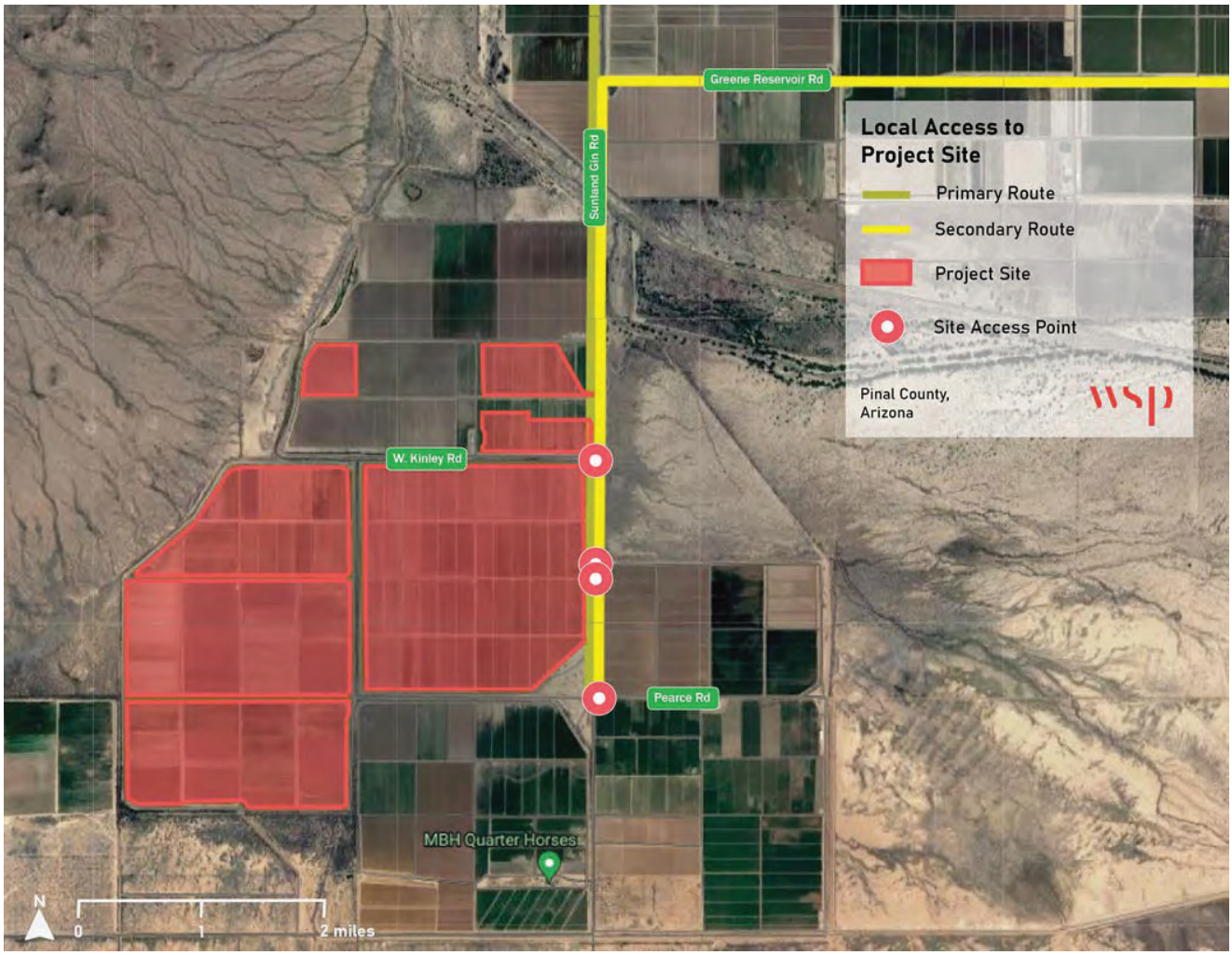


Figure 2: Site Parcel Routing

1. VEHICULAR GENERATION AND CONFIGURATIONS

DAILY TRIP GENERATION VEHICLE DATA

Traffic generation from the Solar Facility initially occurs in two phases. The first and most intensive is the construction phase while the second is the maintenance and operations phase. During the construction phase, vehicle trips will occur to prepare and clear the various parcels, construct the foundations and supporting infrastructure, and to supply and clear the site of the required construction materials and debris. Following construction, the operations move into a standard generation support type operation. While trip generation estimates are typically prepared using the Trip Generation Manual, published by the Institute of Transportation Engineers, solar facilities are not included as an option. Accordingly, trip estimates were based on information provided by the client, other similar projects, and engineering judgement. Since the operations of a solar energy center are relatively passive, only a minimal number of vehicular trips to and from the site are anticipated once normal generation operation commences. A decommissioning of the site to remove the solar panels and related equipment would occur at the end of the Project's design life in approximately 25 to 35 years. A summary of the anticipated traffic generated in the two phases for the Solar Facility is indicated in Table 1.

Vehicle Trip Generation Summary					
Project Phase	**Duration**	**Vehicle Type**	**Estimated Gross Vehicular Weight**	**Vehicles per Day**	**Maximum and Average Trips Per Vehicle per Day**
Construction					
Site Preparation / Clearing & Grubbing	10-15 Weeks	Passenger Vehicles	2,000 - 10,000 lbs.	10 cars/day	Max-6 / Ave-4
		Equipment Hauling Trucks	20,000 - 40,000 lbs.	8 trucks/day	Max-20 / Ave-16
Solar Facility Installation	35-40 weeks	Passenger Vehicles	2,000 - 10,000 lbs.	200 cars/day	Max-6 / Ave-4
		Connex and Delivery Trucks	30,000 - 80,000 lbs.	6 trucks/day	Max-2 / Ave-1
		Equipment Hauling Trucks	20,000 - 40,000 lbs.	8 trucks/day	Max-10 / Ave-6

		Fuel Truck	20,000 - 30,000 lbs.	1 truck/day	Max-1 / Ave-1
		Material Delivery Truck	20,000 - 30,000 lbs.	15 trucks/day	Max-2 / Ave-1
		Main Power Transformer Trailer	265,000lbs.	1 truck	1 Delivery
		O&M Building	80-000-150,000 lbs.	1 truck	1 Delivery
Maintenance & Operation					
Daily Operations	Weekdays	Utility Vehicle	2,000 - 10,000 lbs.	6 veh./day	Max-6 / Ave-4
Decommissioning					
Solar Facility Removal	30-35 Weeks	Passenger Vehicles	2,000 - 10,000 lbs.	200 cars/day	Max-6 / Ave-4
		Equipment Hauling Trucks	20,000 - 40,000 lbs.	5 trucks/day	Max-2 / Ave-1
		Connex and Delivery Trucks	30,000 - 80,000 lbs.	6 trucks/day	Max-4 / Ave-2
		Refuse/Recycling Trucks	30,000 - 80,000 lbs.	4 trucks/day	Max-10 / Ave-6

Table 1: Vehicle Trip Generation Summary

Construction Traffic Trip Generation

The majority of traffic generated as a result of the Solar Facility construction shall occur after the initial site preparation work during the 35-40 week facility construction period. During this time, material, and equipment delivery, along with panel installation, will be occurring. This traffic will primarily be site worker passenger vehicles along with more limited delivery and supply vehicles. The construction related traffic trips will be temporary in duration and will conclude as the phases of construction are completed.

As noted, the primary construction related traffic will be passenger vehicles (approximately 80%). Due to the numerous parcels, upwards of 200 passenger vehicles per day could be anticipated to the overall site with a combined maximum of six (6) and average four (4) trips per vehicle per day.

A breakdown of the delivery truck vehicular traffic includes Connex container delivery (6 Connex containers/delivery trucks per day) and equipment (rubber tire loader, pile driver, forklift, etc.). Delivery truck traffic to and from the Project is generally anticipated to occur outside of the traditional morning and evening peak traffic periods, which are not as pronounced near the Study Area due to the rural and agricultural land uses. Fuel delivery (1 truck per day) and material delivery trucks (15 per day) would be anticipated to the Project but would be vary in their delivery times during the day.

Special delivery vehicles for the main power transformer and the on-site O&M buildings are anticipated but would be limited to one delivery effort to the site when needed.

Project related traffic during all phases will not be significant during the traditional AM and PM peak periods (7:00–8:00 AM and 5:00-6:00 PM, respectively). Construction related passenger vehicle trips and delivery truck traffic are anticipated to occur mainly outside of the traditional roadway peak traffic periods. However, it is noted that roadways in the Study Area do not experience the traditional peaking hours. Given the low volume of traffic on the adjacent roadways even in the atypical peak periods, the portions of traffic that do overlap the peak periods would not be anticipated to significantly impact the traffic operations along these roadways during those times.

Accordingly, the traffic impacts on the roadway operating level of service during construction will be negligible. No detailed intersection or linear roadway analysis was conducted due to the minimal volumes of traffic anticipated to be generated by the Project. In addition, construction on Sunland Gin Road to increase capacity and safety by adding a center left turn lane through Arizona City is nearing completion. Sunland Gin Road is classified as a major arterial. The Federal Highway Administration classifies an arterial as a roadway that provides a high degree of mobility. They are a crucial link in the national transportation system for that regional mobility; trucks and freight are not an anomaly on roadways classified as such and trucks drivers are in fact encouraged to utilize freeways and arterials during trip planning. The anticipated construction and delivery traffic on Sunland Gin Road is an appropriate and typical usage for the associated classification.

Installation of solar field arrays do not require significant grading or topography modifications to be installed. Most grading on the Project site will be to support access road construction and required erosion and sedimentation measures. Any soil disturbance is anticipated to remain localized with grading and distribution of the borrow to remain within each parcel and on-site. No significant amounts of either cut or fill are anticipated to be required/generated by the Project.

Maintenance and Operations Traffic Trip Generation

The Solar Facility is anticipated to have up to six (6) full time operations personnel. Due to the limited personnel, the operations and maintenance of the Project will result in minimal vehicular traffic generation. Six (6) utility type maintenance vehicles would be anticipated to support the site operations. These vehicles would be anticipated to generate an average of four (4) trips per day with a maximum of six (6) trips per vehicle per day. The maintenance and operations work efforts would generally require vehicular trips to the site outside of the AM and PM peak traffic periods, but it can be assumed that a worst-case scenario would result in six (6) AM and PM peak hour trips. Typical operation and maintenance procedures for the facility would include:

- Informal site inspections and corrective maintenance for the Solar Facility occurring on an as-needed basis.
- Conducting ground maintenance of the Solar Facility during growing season months.

Due to the minimal trips generated by the maintenance and operations of the Solar Facility, the existing low volume of traffic along the site access roadways, and the rural nature of the Project site (not an urbanized congested location), the traffic impacts on the roadway operating level of service will be negligible. No detailed intersection or linear roadway analysis was conducted due to the minimal volumes of traffic anticipated to be generated by the site.

Decommissioning Traffic Trip Generation

The typical industry lifespan of a solar facility is approximately 25-35 years, at which point the facility may be decommissioned, or removed. During this removal process, all installed equipment and access road material is removed and either recycled, reused, or properly disposed of. Access roads are also typically removed. It is anticipated that the same number of passenger vehicles, upwards of 200 per day could be anticipated with a combined maximum of six (6) and average four (4) trips per vehicle per day as during construction.

The truck vehicular traffic is anticipated to consist of trucks for hauling equipment and Connex container delivery (11 per day) and refuse and recycling trucks (4 per day) for removing all equipment and material from the Project site.

Decommissioning related passenger vehicle trips and delivery truck traffic are anticipated to occur mainly outside of the traditional roadway peak traffic periods. However, it is noted that roadways in the Study Area do not experience the traditional peaking hours. Given the low volume of traffic on the adjacent roadways even in the peak periods, the portions of traffic that do overlap the peak periods would not be anticipated to significantly impact the traffic operations along these roadways during those times.

Accordingly, the traffic impacts on the roadway operating level of service during decommissioning will be negligible. No detailed intersection or linear roadway analysis was conducted due to the minimal volumes of traffic anticipated to be generated by the Project site.

TRAILER DIMENSIONS AND CONFIGURATION

During the construction phase of the project under study, there will be at least one oversized permitted delivery as well as legal loads deliveries. An oversized delivery is anticipated for the transformer. Details are provided on the estimated dimensions and weights of the loaded oversized specialized equipment (based on the largest component dimensions) in Table 2. Oversized truck dimensioning was then utilized to review turning movements at critical intersection locations along the delivery route(s). Truck configurations can and will be changed due to market demand and will be set by the Original Equipment Manufacturer (OEM). Once the specific type of trailer is known, then the turning templates can be refined. Prior to delivery of the MPT, applications for oversize/overweight permits will be processed through ADOT and Pinal County, at which point the exact dimensions and weight will be known. It was assumed, for analysis purposes, that the solar panels and other equipment would be delivered via a WB-67 truck and trailer combination.

1.1.1 MAIN POWER TRANSFORMERS (MPT) TRAILERS

The MPTs will be delivered from a yet to be determined location utilizing the I-8 or I-10 corridor. As the specific delivery vehicle is also not yet known, a possible trailer type was utilized in AutoTurn that may be able to carry the MPT. That vehicle, classified in AutoTurn as the Special Transport Booster Trailer B2, is shown in Figure 3.

ESTIMATED TOTAL WEIGHTS AND DIMENTIONS

	Width	Height	Length	Weight {lbs}
MPT Trailer	12'6"	15'8"	92'	150,000+

Table 2: Estimated Weights and Dimensions (MPT Trailer Configuration)

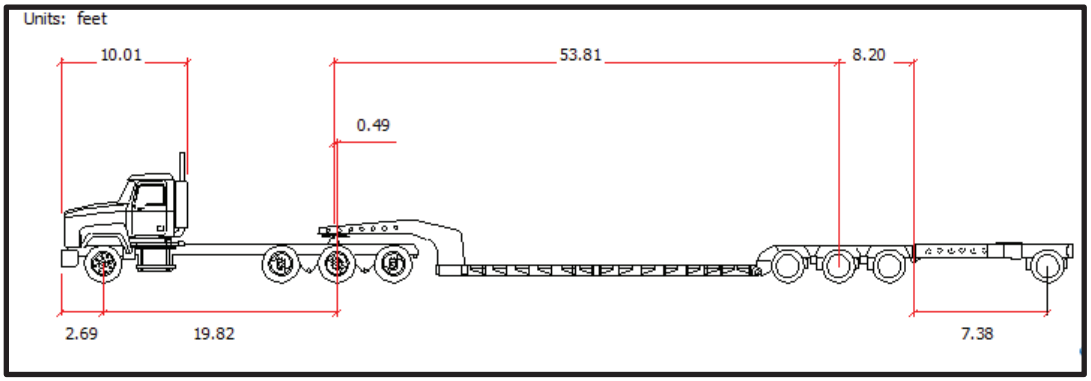


Figure 3: MPT Trailer Configuration

2. PROJECT SITE DATA

Pinal County, AZ

GPS COORDINATES:

32° 34' 45.3"N 111° 40' 21.9"W

TOPOGRAPHY:

The county includes most of the area between Phoenix and Tucson. Pinal County is among a number of counties that are part of the region known as South Central Arizona. The county can be considered to have two distinct geographic regions: the mountainous east and the low deserts with irrigated agricultural land to the west. Mountain ranges in the east include the Mineral Mountains and the Superstition Mountains and reach elevation of 6,000 ft. The western low desert is relatively flat with small hills and two smaller mountain ranges: Sacaton Mountains to the north and Waterman Mountains to the south. The desert floor elevation is between 1,500 ft and 1,600 ft. Most drainage in the county flows toward the Gila River, a tributary of the Colorado River which ultimately empties into the Gulf of California. Three tributaries of the Gila flow through the county, namely: the San Pedro River, Santa Cruz River, and Tom Mix Wash. There are also 13 major man-made waterways for irrigation of farmland throughout the desert lowlands. The soils in the county range from predominately well-drained loamy and sandy soils in the lowlands of the west to rocky in the east. With minimal rainfall, these well drained soils are predominately dry throughout the year with an exception for agricultural uses.

CLIMATE:

The Project site has hot, dry summers and generally mild winters.

ANNUAL RAINFALL:

7.75 inches

AVERAGE HIGH TEMPERATURE:

53 Degrees Fahrenheit in January

91 Degrees Fahrenheit in July

LAND USE:

According to the Pinal County's Major Comprehensive Plan Amendments, existing land uses on the Project site are Agriculture, Passive/Restricted Open Space, and Vacant/Undeveloped land. Land uses within 1 mile of the Project site include Agriculture, Passive/Restricted Open Space, Public Land, Single-Family Low Density, and Vacant as follows:

- West: Vacant/Undeveloped State Trust Land; one parcel designated for agricultural use.
- East: Agriculture and Vacant/Undeveloped land.
- North: State Trust Land
- South: Vacant/Undeveloped land, with scattered Single-family residences starting 0.5 mile to the south and southwest including residences along West Aries Drive and Sunland Gin Road.

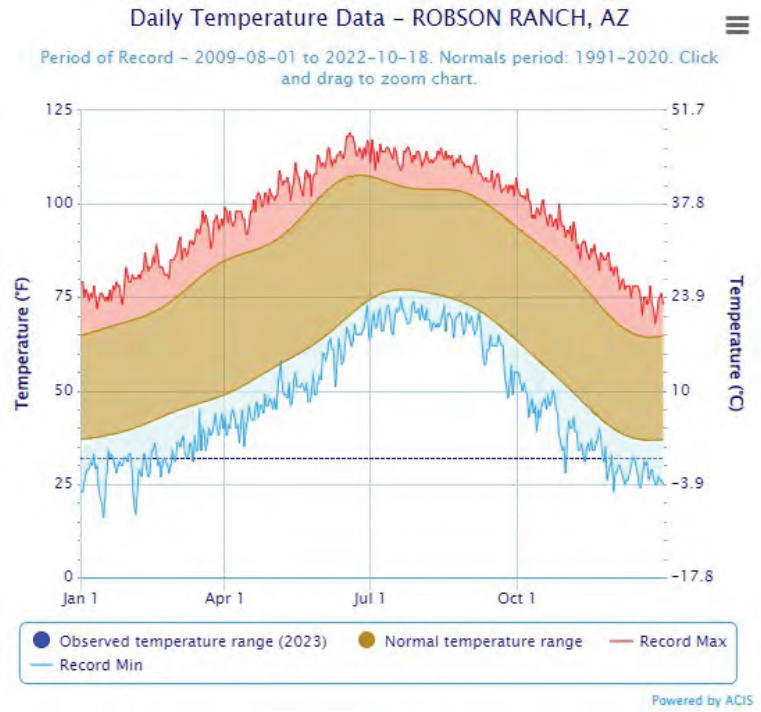


Figure 4: Daily temperature data, Robson Ranch, AZ (Source: NWS)

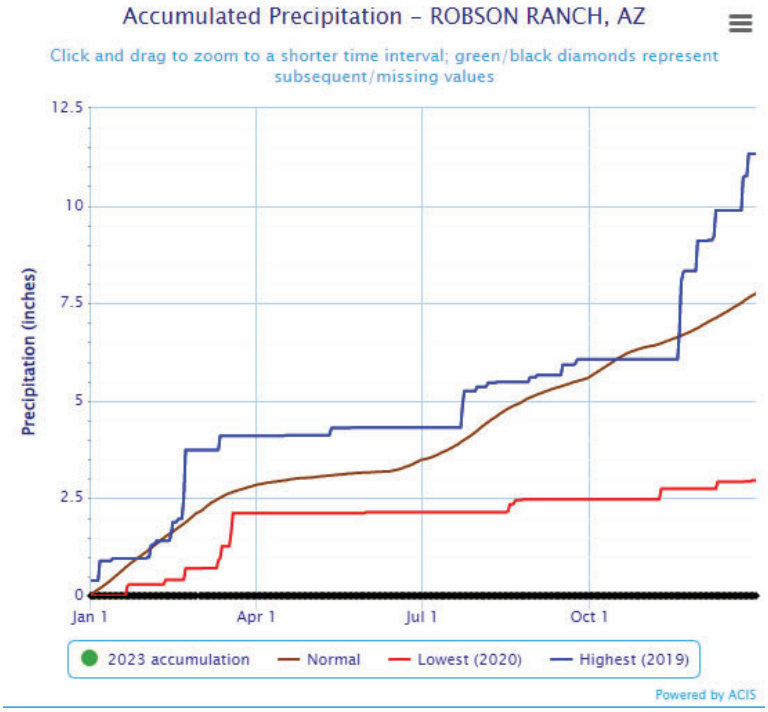


Figure 5: Accumulated Precipitation, Robson Ranch, AZ (Source: NWS)

PRE-CONSTRUCTION SITE CHARACTERISTICS

The Solar Facility parcels are all located in unincorporated sections of Pinal County, Arizona. The following is a description of the access roadway network to the parcels associated with the Project site:

Sunland Gin Road – Sunland Gin Road is a north/south arterial road from the Casa Grande-Picacho Highway and Mopar Road in the north, crosses I-10 and continues through Arizona City to its southern terminus at Aries Drive and Overfield Road. This road will be the primary delivery route to the Project site from I-10 and Phoenix/Tucson. The roadway carries around 11,000 ADT (ADOT AADT) near I-10 in 2019 and around 500 AADT in 2019 near the Project site. From I-10 and south the road is a two-lane two-direction arterial road with 12-foot lanes and limited shoulders of gravel. Posted speeds are 35 mph around the I-10 interchange, 50 mph between I-10 and Arizona City, 25 mph to 35 mph within the city and returning to 50 mph south of the city. Portions of the asphalt road within Arizona City are currently under construction (as of 2023). One completed, this section will have three 12-foot lanes, one in each direction with a center left turn lane. South of Harmon Road, Sunland Gin Road has been repaved within the last 10 years. The asphalt between I-10 and Arizona City and south of Arizona City to Harmon Road is older and in fair to poor condition as of 2019. There are no discernable peak periods, with the highest amount of traffic occurring midday. Volumes near the interchange do not exceed 810 vehicles in both directions.

Toltec Road – Toltec Road is a north/south arterial/local road from East Cornman Road in the north, crossing over I-10, and terminating south of Greene Reservoir Road in the South. This route will be the first segment on the secondary route from I-10 to the Project site. The roadway carries 3,800 ADT in 2019 near I-10 and 750 ADT about three miles south of I-10. This road is a two-lane two-way road with 12-foot lanes and limited gravel shoulders. The asphalt south of Cowboy Trail is in fair condition as of 2011 and the concrete from I-10 to Cowboy Trail is in fair to poor condition. Posted Speeds are 35 mph near I-10 that increase to 50 mph about a mile south of I-10. The AM peak period is from 7:00 am to 8:00 am and there is no discernable PM peak period.

Greene Reservoir Road – Greene Reservoir Road is an east/west local road that connects Sunland Gin Road in the west and Toltec Road before ending at South Wheeler Road in the east. It will be a segment of the secondary truck route to the site. Greene Reservoir Road is an approximately 24-foot unpaved dirt/gravel well-graded road with a posted speed limit of 50 mph. While there are no AADT or counts available, volumes are assumed to be low given the rural and agricultural nature of the nearby land uses.

Central Arizona Regional Transit (CART) (operated by The City of Coolidge Transit Department) and Maricopa Express Transit service areas mainly to the north of the Solar Facility. The eastbound CART route includes a stop at the Love's Travel Stop on Sunland Gin Road south of the I-10 interchange.

The Project parcels and access roadways are included in the Eloy Elementary School District, Toltec School District, Casa Grande Union High School District, and Santa Cruz Valley Union High School District. School bus routes in the area likely change yearly based on population needs, and they are not fixed. Contractors should coordinate with the school districts prior to commencing any work that may close roadways or impact possible school bus stops.

The Project site is outside of the fire districts, providing fire and EMS services. The closest fire districts are Eloy, Arizona City and Avra Valley.

Load- or height-restricted bridges and culverts, based on inspection reports, do not have the reserve capacity to accommodate vehicles over the identified posted weights or heights. Existing bridge posting data was acquired from AZGeo Open Data

Portal and cross referenced with ADOT *Weight Restrictions for State Highway Bridges, February 2022* list. Potential routes for the delivery of the power transformer have the following height weight restricted bridges near the Project:

- Bridge ID 01102 and 01103, the over-pass ramps from I-8 to I-10, restricted height to 15 ft 11 over I-10 southbound
- Bridge ID 00941 located along Sunland Gin Road and overcrossing I-10, restricted to 15 ft 8 in over I-10 southbound and 15 ft 10 in over I-10 NB
- Bridge ID 02152, located along Toltec Rd and overcrossing I-10, restricted to 15 ft 8 in over I-10 northbound.

No weight restricted bridges or culverts in the Study Area have been identified through the sources available online to the public. Arizona Administrative Code, Title 17, Chapter 6, Table 4 contains the most current information regarding height and weight restrictions along state routes. Sonak Solar plans to continue to coordinate with Pinal County Public Works and will coordinate with AZDOT as applicable to ensure compliance with relevant height and weight restrictions on the proposed routes.

The Project site is located in a rural part of Pinal County, off secondary roadways with no critical intersections, and not located in or near a congested urbanized area. Nearby access to Sunland Gin Road allows freeway/expressway routing from Phoenix and Tucson however requires routing through Arizona City. Sunland Gin Road is designated as a Regionally Significant Route (RSR) north of Baumgartner Road and is situated adjacent to the northeastern portion of the Project site. While Peart Road, a planned RSR runs diagonally through a portion of the Project site, Pinal County has agreed that the dedication of the right-of-way can be delayed until Project decommissioning. The alternate routes using Toltec Road and Greene Reservoir Road would route trucks through a less dense areas of Eloy and Arizona City.

3. TRANSPORTATION STRATEGY

OVERVIEW

As noted, the Project site is located on numerous parcels of property within unincorporated sections of Pinal County. Thus, access to each parcel can vary and is contingent on the location of the driveway site access connections to the adjacent roadway system. Main designated access routes to the parcels include Sunland Gin Road. Figure 1 and Figure 2 illustrate the parcel locations, proposed driveway connections, and existing connection points to the roadway network around those locations.

At this time, the origin of the MPTs and solar equipment is unknown, but it is assumed to originate from the I-8 or I-10 corridor. Preliminary routing begins at the I-10, which is the direct connecting Interstate between Phoenix and Tucson.

TRUCK ROUTING

Anticipated Route: From a location along the I-8 or I-10 corridor, utilizing I-10:

- Access the Project site directly From Sunland Gin Road.

As an emergency alternate to I-10, trucks can utilize Toltec Road to Greene Reservoir Road from I-10. Sunland Gin Road will allow for easier access due to pavement conditions and minimal turns. It is also noted I-10 bridges have height restrictions of 15’ 11” for the I-8 bridge and 15’10” for the bridge over Sunland Gin Road.

Road Improvements: Road improvements may be required based on existing roadway pavement conditions. Impact and remediation to be determined at a later date.

Holiday Restrictions: Yes (state)

Frost Law: No

Police Escorts: ADOT may require law enforcement escorts based on review of the permit.

Structures/Bridges: Three bridges on the primary route in the immediate vicinity of the Study Area have substandard vertical clearances per the Arizona Administrative Code. Bridges were only examined as far as I-8 on I-10. Once delivery routes are more defined, further examination can be completed. Alternate routes were considered however alternative routes have more unpaved mileage, and therefore infeasible.

DOT Constructions: At the time of this study, construction is noted to be underway or beginning soon at the following locations:

- Sunland Gin Road between Battaglia Drive and Monaco Blvd

Further information, including projects planned further in the future can be obtained from Pinal County website.

Risk Level: Low

Summary:

Initial turning templates indicate that deliveries can be made by an assumed special transport vehicle and WB-67s using the existing pavement width, except at the intersections of Toltec Road and Greene Reservoir Road and Greene Reservoir Road and Sunland Gin Road. If the secondary route is utilized, a WB-67 and the special transport vehicles cannot turn within the

existing limits of pavement/graded roadway at these intersections. Any changes to the transport vehicles will need to be analyzed since the existing roadway width at intersections may not be able to support turns by another type of vehicle.

The carrier shall coordinate with Arizona DOT for evaluation of the route and any required temporary improvements and/or traffic management. All carriers should run routes to verify measurements and routing at time of delivery. Specific construction impacts are unknown for the time frame of deliveries.

Permits/Approvals needed from: Arizona DOT, Pinal County.

STANDARD VEHICLE ROUTING

The construction and operation workforce will be sourced from the local labor pool of Pinal County as much as practicable. Other employees may come from the larger population areas of Phoenix and Tucson. All employees are expected to access the Project area from expressways and primary arterials in the vicinity of the Project site. In order to minimize increased traffic on local roads, the workforce should be instructed to utilize the same routing as the delivery vehicles, which is to access the Project site directly from Sunland Gin Road. An alternative route uses Toltec Road to Greene Reservoir Road to Sunland Gin Road.

PARKING AND DRIVEWAY ACCESS

During construction of the Solar Facility, staging areas will be provided to avoid vehicles parking on public roads. Due to the constrained nature of the public roads within the study area, parking on public right-of-way will not be allowed.

It is anticipated that a series of unpaved, 20-foot-wide internal, newly constructed roadways will connect to Sunland Gin Road through existing access points and thereby connect to the local roadway system. The driveway access points will be upgraded as needed to accommodate construction equipment.

The first driveway access utilizes the existing intersection of Sunland Gin Road and W. Kinley Road, which is 1,060 feet south of the nearest existing driveway and 1.59 miles south of the nearest public road intersection. The next driveway to the south is 2,370 feet, with another 300 feet further south. The southern-most driveway utilizes the existing intersection of Sunland Gin Road and Pearce Road, which is approximately 880 feet north of an existing driveway on the east side of the roadway and just under a mile north from the nearest public road intersection. Appendix A-3 includes a visual representation of these distances. While the spacing of the two center driveways is less than the minimum guideline of 360’ in the Pinal County Access Management Manual, all driveways use existing access points, rather than proposed. After construction these driveways will be infrequently used for maintenance purposes, rather than the higher use residential or commercial driveways that are more common. Based upon our desktop analysis review utilizing Google Streetview, it appears that sight distance is sufficient at all driveway locations. The driveways at existing access points meet the corner clearance requirements in the Pinal County Access Management Manual.

4. ENVIRONMENTAL

WEATHER

While local roadways in the vicinity of the Project site have not been recently affected by long term closures due to washouts caused by heavy rainfall during extreme events, the area is prone to flooding during tropical storms, winter rains and summer monsoons. Flooding risks are mitigated through natural and human-made earth drainage channels, washes, and channels. Future extreme precipitation events have the potential to disrupt delivery of the components to the Project site. Review ADOT and Pinal County restrictions prior to travel.

FUGITIVE DUST

Fugitive dust is particulate matter that enters the atmosphere without first passing through a stack or duct designed to direct or control its flow. Fugitive dust can occur due to unpaved internal access roads in the site or during installation and decommissioning activities. Sonak Solar and their contractor will apply water or an approved mineral or chemical dust suppressant on a regular basis, limit vehicle speeds, conduct inspections using visual emissions observations on the unpaved service roads to minimize fugitive dust, and follow other methods as legally required by the Pinal County Code of Ordinances. Sonak Solar and their contractor will also coordinate with the county on measures proposed to minimize fugitive dust due to the transportation of material to and from the Project site.

5. ROAD IMPROVEMENTS ON SITE

It is anticipated that a series of internal roadways will connect into a number of existing driveway access points on Sunland Gin Road to access the local roadway system. All newly constructed project roads will utilize existing access points to Sunland Gin Road, and the access points will be upgraded as needed. No new driveway access points will be created as part of this Project.

On-site roadway improvements were determined based on coordination with Sonak Solar regarding roadway construction standards and delivery vehicles. Improvements considered the weight, number, and size of vehicles, as well as provide sufficient temporary parking and loading areas for construction personnel and equipment. Consideration for design vehicles and required roadway curve radii and turning requirements at internal roadway intersections were included in the design. Due to existing swales alongside the public roadways, drainage was also a consideration in the design of the connections of the internal access roadways.

Roadway and infrastructure improvements are in accordance with the current Pinal County Subdivision Regulations, Subdivision and Infrastructure Design Manual, the Regionally Significant Routes for Safety and Mobility, and Regionally Significant Routes for Safety and Mobility Access Management Manual Update to the extent as documented in this submission.

6. ROAD IMPROVEMENTS OFF SITE

Utilizing the design vehicles as previously described, off-site roadway improvements to the radii at public roadway intersections along the primary route are not expected.

If the secondary route is utilized, a WB-67 and the special transport vehicles cannot turn within the existing limits of pavement/graded roadway at the intersections of Toltec Road and Greene Reservoir Road and Greene Reservoir Road and Sunland Gin Road. There are no posted weight restrictions on Sunland Gin Road however, it is possible that Pinal County may still require roadway improvements prior to or after the delivery of overweight equipment. Coordination with Pinal County will continue to determine if any road use and restoration agreements are required prior to using them for construction activities.

As previously noted, a number of existing driveway access points along Sunland Gin Road will be used to connect onto the local roadway system.

Driveway opening size and required radius of the pavement connection were determined based on the level of usage anticipated at each access point and the design requirements associated with the access roadway type. Driveway intersections along these higher speed roadways will need to ensure adequate sight distance and pavement area when constructed.

7. TRAFFIC COUNTS

Traffic data for roadways in the Project area is available through AZGeo Data Hub and ADOT websites. Locations either have a singular 24-hour count, or multiple 24-hour counts every several years. 2019 estimated Annual Average Daily Traffic (AADT) were calculated by ADOT using the latest data available. Data is presented below.

- Sunland Gin Road
    - Near I-10: 10,700 (2019)
    - Through Arizona City: 6,000 (2019)
    - Near Project Site: 750 (2019)
- Toltec Road
    - Near I-10: 3,800 (2019)
    - Near Greene Reservoir Road: 750 (2019)
- Greene Reservoir Road – Counts, if any, are not publicly available

8. SUMMARY

Changing the final condition use on the Project parcels from ranch/agricultural to a solar facility would have a de minimus effect on the number of vehicular trips on the adjacent roadways that are currently being generated to and from the properties within the study area. Based on the short-term duration construction generated traffic and then the long-term limited number of trips that the proposed Solar Facility would generate, we offer the following findings:

1. The Solar Facility construction is anticipated to begin in approximately December 2024 (site preparation then material and equipment delivery) and end in December 2025.
2. The initial site preparation work is anticipated to last for a period of 10 to 15 weeks. During this time a total of 18 passenger and equipment hauling vehicles will be expected to the site per day.
3. The Solar Facility construction is expected to generate an average of 30 heavy vehicles to the site per day during material and equipment delivery following the site preparation work. During construction, the Solar Facility will be anticipated to generate an average of 200 passenger vehicles to the site per day for the facility installation workers. Multiple trips to and from the site may occur from the construction related vehicles. The construction duration is anticipated to last for 35 to 40 weeks.
4. The site construction is not anticipated to require large amounts of earthwork and will not generate significant (if any) quantities of cut or fill.
5. The site construction will require at least one (1) over-sized load delivery. This will be to provide the main power transformers to the site at the central sub-station parcel. The over-sized deliveries would approach the site on the designated access routes as identified in Figure 1 and Figure 2; I-10 to Sunland Gin Road to the driveway access points. The delivery vehicle will utilize internal roadways to turn around and exit the site via the same routing. Utilizing the turning template for a Special Transport Booster Trailer B2 and WB-67 in AutoTurn, roadway improvements to the radii at public roadway intersections along the primary route are not expected. If the secondary access must be used, the vehicles cannot turn within the existing limits of pavement/graded roadway at the intersections of Toltec Road and Greene Reservoir Road and Greene Reservoir Road and Sunland Gin Road. The size of the delivery is an estimate and will be confirmed through the permitting process with ADOT and Pinal County.
6. Improvements to the intersection of Toltec Road and Greene Reservoir Road and Greene Reservoir Road and Sunland Gin Road will be required if a vehicle similar in size to a WB-67 is utilized for the delivery of materials on the secondary route. A WB-67 or special transport truck turn cannot be accommodated within the limits of existing pavement.
7. During the Solar Facility operation, an average of 24 passenger vehicle trips per day are anticipated.
8. Daily site generated traffic is not anticipated to impact school bus operations for either the Eloy Elementary, Toltec Elementary, Casa Grande Union High School, and Santa Cruz Valley Union High School Districts due to the limited number of vehicles generated by the site during standard operations and maintenance. Any roadway closures that need to occur during construction have the potential to impact school bus operations and the contractor should coordinate with Eloy Elementary, Toltec Elementary, Casa Grande Union High School, and Santa Cruz Valley Union High School Districts.

9. Newly constructed internal roadways will connect to Sunland Gin Road through existing access points. The driveway access points are dispersed throughout the Project eliminating concentration of vehicular movements at the individual access points. Sight distance for the proposed driveway access road designs for each parcel are designed to meet sight distance requirements.

10. While no roadways are weight restricted, Greene Reservoir Road is a gravel road. Pinal County will require an oversize/overweight load permit, in addition to the ADOT permit. Coordination with Pinal County will continue to determine if any road use and restoration agreements are required prior to using them for construction activities. If required, the road use and restoration agreements are expected to be obtained prior to the construction phase of the Project. The restoration agreements would document the rights and obligations for road use and repair during the Project's construction phase with the appropriate authority.

11. No new off-site traffic control devices would be required to accommodate the anticipated site traffic. On-site roadway intersections will only require stop or yield traffic control.

12. Due to the lack of passenger railroads, subways, fixed route buses and any other fixed route mass transit systems in the vicinity of the study area, there are no anticipated impacts to these types of facilities by the Project. The nearest public aviation facility to the Project is Pinal Airpark which is located more than 20 miles away. The low-level elevation of the solar panels will not require a Special Use Airspace designation from the Federal Aviation Administration (FAA).

13. Site access driveways were designed to conform to required design criteria based on adjacent roadway type and anticipated traffic volume. All driveway access points from public roadways will be reconstructed to ensure adequate sight distance, pavement widths and turning radii.

14. Carriers should run all routes prior to deliveries and coordinate with State and Local transportation officials when a route is confirmed and for the timeline on any oversize delivery.

15. As proposed, vehicle trips generated by Solar Facility construction and Solar Facility maintenance and operations is not anticipated to create adverse traffic related impacts on roadways within the Project area.

APPENDIX

A-1. PICTURES

Sunland Gin Road

Over I-10



(2022)

South of I-10



(2022, South Facing)



(2022, North Facing)

In Arizona City – 2022 Construction



(2022)

South of Arizona City



(2011 South Facing)

At Harmon Road



(2019)

South of Harmon Road – Newer Aerials and Street View (Above in the distance) shows newer pavement



(2022)



(2011)

Toltec Road

Near I-10



(2022)

Near Concordia Road



(2022)

Near Harmond Road



(2011)



(2011)

Near Greene Reservoir Road



(2011)

Greene Reservoir Road at Toltec Rd



(2011)

A-2. TRAFFIC DATA