



NAU Flooding Mitigation, Garden Design, and Storm Water Utilization



Rolle Activity Center [1]

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Butterfly garden [2]

Problem Statement

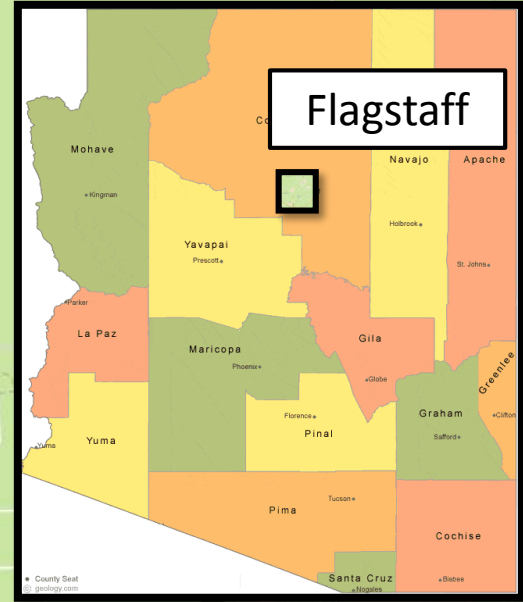


Site photos [3]

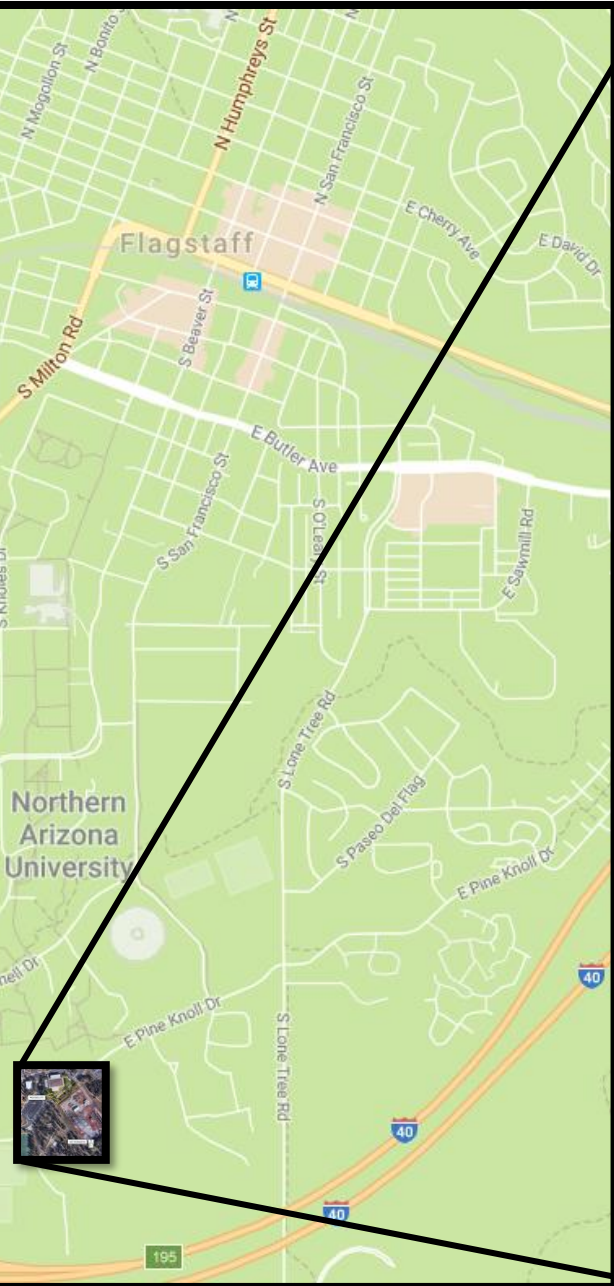
- Facility Services wants to mitigate flooding at Rolle Activity Center



- Office of Sustainability wants a garden between APS Substation and Pine Knoll



Flagstaff



PROPOSED SITE



Vicinity and site [4]

NAU Storm and Garden

Swearingen 3

Stakeholders

- Client - NAU Facility Services and the Office of Sustainability
- Beneficiaries -
 - NAU students, faculty, and visitors
 - Flagstaff community
 - Environment
- Neutral party -
 - APS



Stakeholders [5]

Scope

2.1 Site Investigation

2.1.1 Surveying

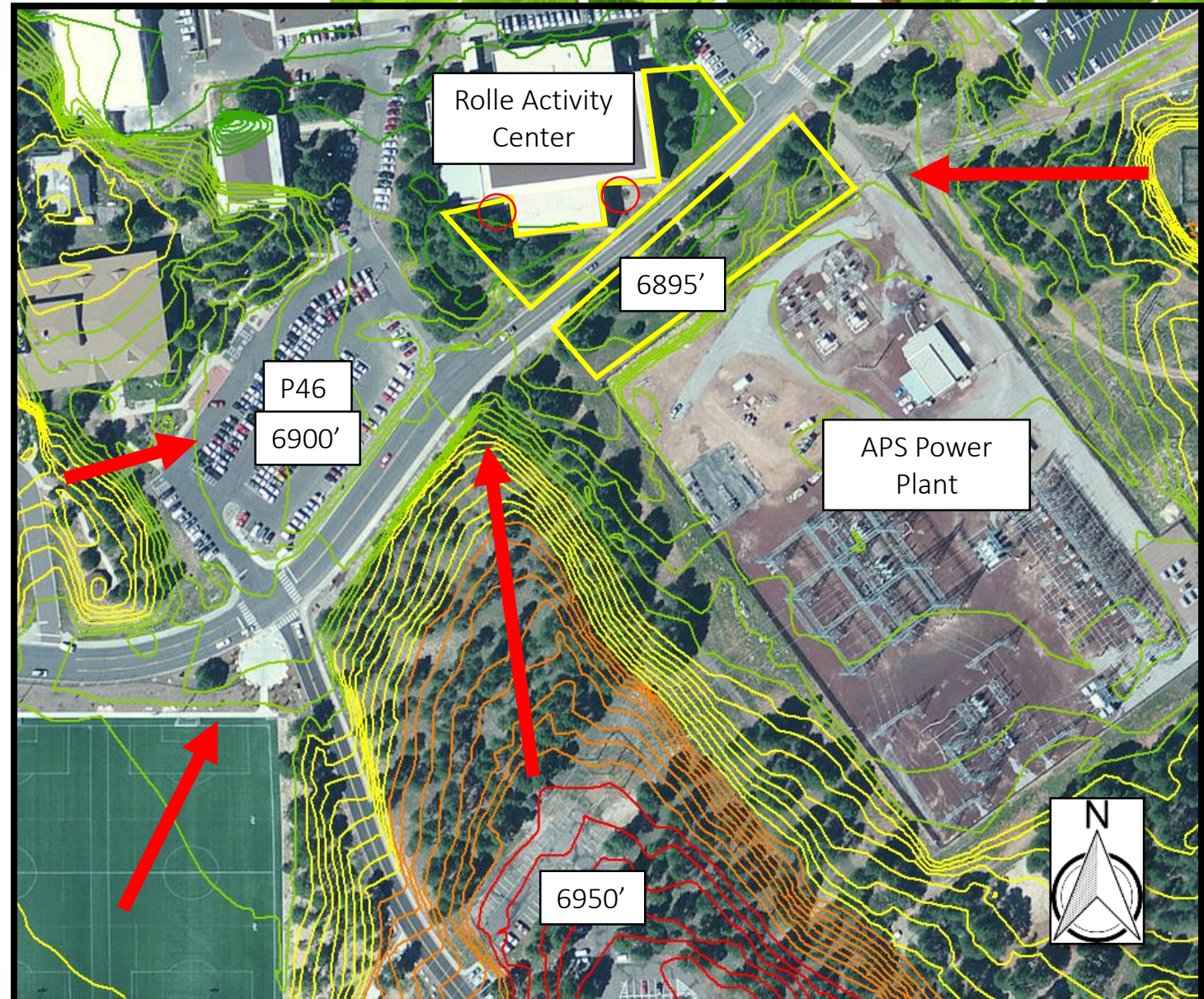
2.1.2 Geotechnical Analysis

2.1.3 Water Quality

2.2 Mapping and Modeling

2.2.1 Topography

2.2.2 Hydrology



ArcGIS Contours [6]

NAU Storm and Garden

Zirotti Betoney 5

Scope

2.3 Design

2.3.1 Conceptual 3D Model

2.3.2 Irrigation Design

2.3.3 Basin/Catchment Design

2.3.4 Landscaping Design

2.3.5 Engineering Design



Biodiverse detention [7]

Scope

2.4 Green Fund

Communicate with Green Fund Team throughout project

2.5 Exclusions

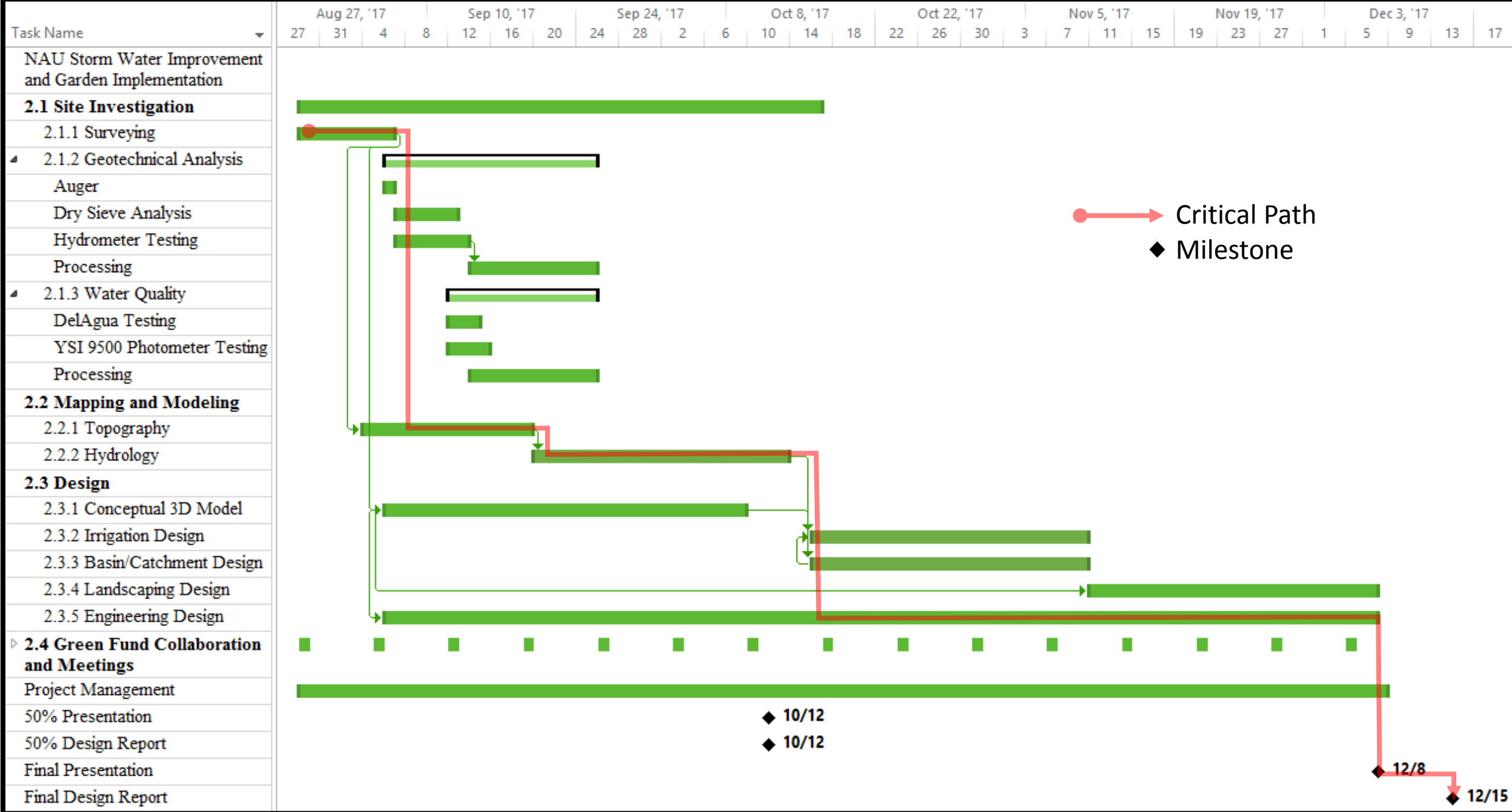
Implementation

Permitting

- NAU
- APS
- City of Flagstaff



NAU Green Fund Team [8]



Staffing

Task	Hours			
	<i>Project Manager</i>	<i>Sr. Engineer (P.E.)</i>	<i>Jr. Engineer (E.I.T.)</i>	<i>Licensed Surveyor</i>
2.1 Site Investigation				
2.1.1 Surveying	8	16	32	32
2.1.2 Geotechnical Analysis	16	32	40	0
2.1.3 Water Quality	16	32	48	0
2.2 Mapping and Modeling				
2.2.2 Topography	16	24	24	24
2.2.1 Hydrology	24	48	48	0
2.3 Design				
2.3.1 Conceptual 3D Model	8	8	16	0
2.3.2 Irrigation Design	24	32	24	0
2.3.3 Basin/Catchment Design	16	32	24	0
2.3.4 Landscaping Design	8	16	16	0
2.3.5 Engineering Design	8	16	16	0
2.4 Green Fund Collaboration and Meetings	16	16	16	16
Total Task Hours	160	272	304	72

Consulting Services

Consulting Services	Quantity	Unit (hours)	Unit Cost (\$)	Total (\$)
Project Manager	1	160	120	19,200
Sr. Engineer (P.E.)	1	272	105	28,560
Jr. Engineer (E.I.T.)	1	304	90	27,360
Licensed Surveyor	1	72	75	5,400
	Total Hours	808	Total Cost (\$)	61,320
Other Costs				
Contingency (10%)	NA	NA	NA	6,132
Supplies	NA	NA	NA	5,000
			Total Cost (\$)	72,452

References

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- [2]"Butterfly Garden", 2017. [Online]. Available: <http://ucnj.org/parks-recreation/trailside-nature-science-center/butterfly-garden-2/>. [Accessed: 22- Apr- 2017].
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 - Bottom, "Site Ground View", *Swearingen*, 2017.
- [4]"Google Maps", *Google Maps*, 2017. [Online]. Available: <https://www.google.com/maps>. [Accessed: 22- Apr- 2017].
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