Duncan Floodplain Analysis

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Project Background

- Client
  - Phil Ronnerud, Greenlee County Engineer
- Request
  - Analyze the floodplain in Duncan
- Purpose
  - Provide possible solutions to flooding in Duncan

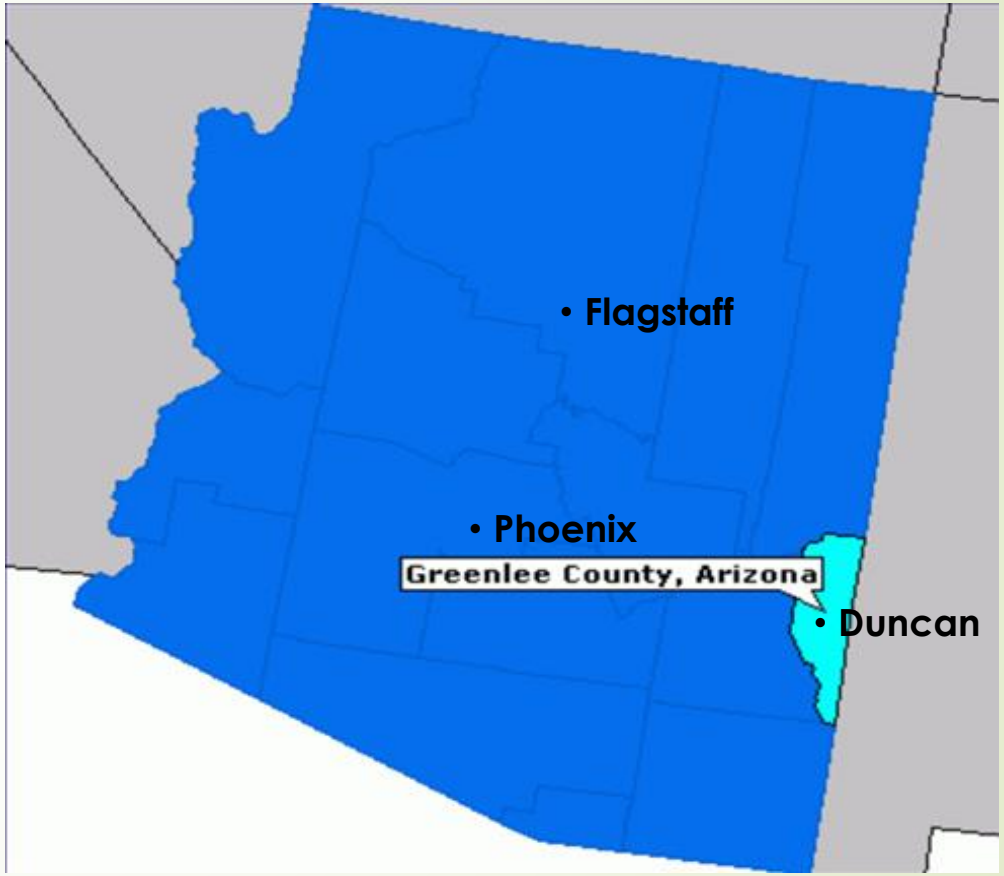


Figure 1: Location of Greenlee County in Arizona [1]

[1] ePodunk Inc, "Profile for Greenlee County, Arizona," 2007. [Online]. Available: http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=11205.

Project Background Continued

- Location
- Community
- Gila River

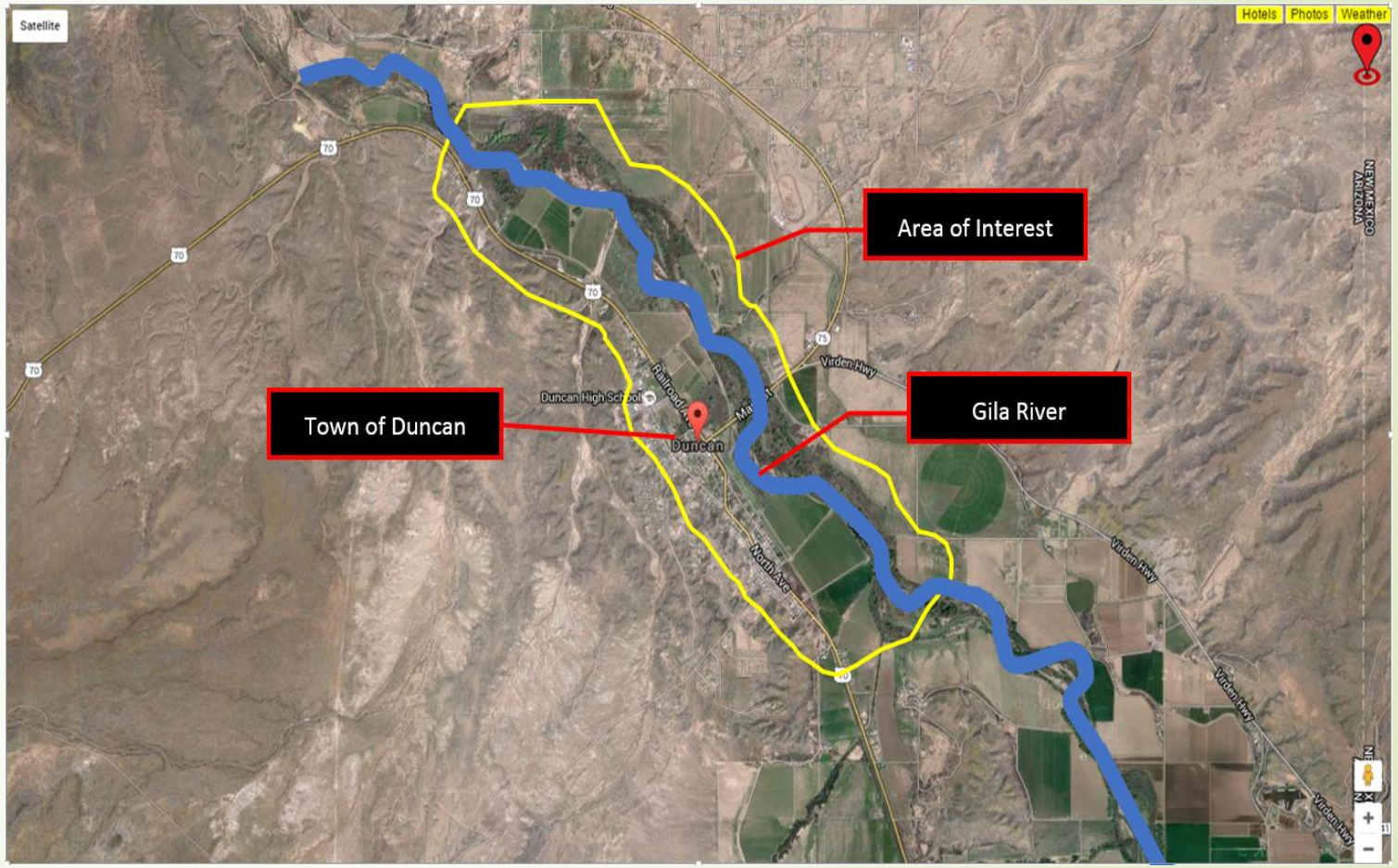


Figure 2: Area of Interest for the floodplain analysis

Project Understanding

- Previous Study
  - Civil 3D
  - HEC-RAS One Dimensional Analysis
- Continuing Study
  - Flo-2D
  - HEC-RAS 2D

Figure 3: Bridge Crossing the Gila River in Duncan, AZ [2]

[2] R. Shantz, "Photograph of Flood on Gila River 2/13/05 near Duncan, Arizona", Rshantz.com, 2005. [Online]. Available: http://www.rshantz.com/Scenes/Arizona/Southeast/20050213GilaFlood/20050213Flood13.htm. [Accessed: 15- Apr- 2016].

Potential Challenges

- Distance
- Unfamiliarity
- Communication

Stakeholders

- Greenlee County
- Client
- FEMA

Figure 4: Flooding in Duncan, AZ [3]

[3] "Flooding Minor in Duncan", Eastern Arizona Courier, 2005. [Online]. Available: http://www.eacourier.com/news/flooding-minor-in-duncan/image_e429b018-6989-5d4c-badc-0e70b620e737.html. [Accessed: 15- Apr- 2016].

Scope of Services

- **1.0 Data Collection**
  - 1.1 County
  - 1.2 NAU Crown Engineering
  - 1.3 FEMA

Figure 5: Bridge Crossing the Gila River [2]

Scope of Services Continued

- **2.0 Hydraulics: 2D Modeling**
  - 2.1 Model Parameters
    - 2.1.1 Grid System
    - 2.1.2 Manning's Number
    - 2.1.3 Courant and DEPTOL
  - 2.2 Two Dimensional Modeling
    - 2.2.1 Flo-2D
    - 2.2.2 RAS-2D
    - 2.2.3 Model Conditions
      - 2.2.3.1 Existing Conditions
      - 2.2.3.2 Existing Without Agricultural Dike
      - 2.2.3.3 Proposed Levee
      - 2.2.3.4 Proposed Gila River Restoration

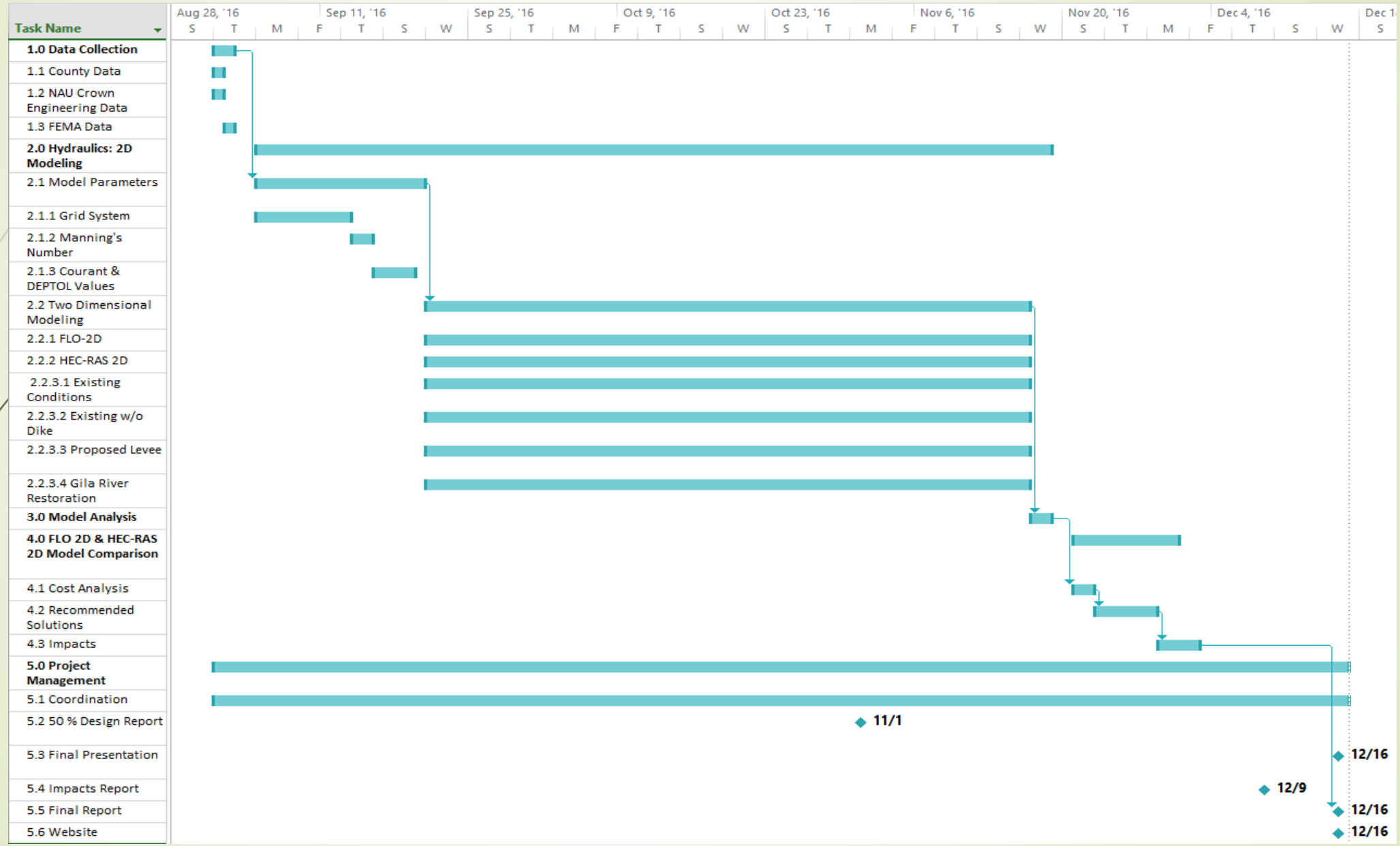
Scope of Services Continued

- **4.0 Model Comparison**
  - 4.1 Cost Analysis
  - 4.2 Recommended Solutions
  - 4.3 Impacts
- **5.0 Project Management**
  - 5.1 Coordination
  - 5.2 50% Design Report
  - 5.3 Impacts Report
  - 5.4 Final Report
  - 5.5 Website

Exclusions

- Surveying
- Geotechnical Analysis
- Levee width, slope, and soil type
- New One Dimensional Model
- Hydrological Data Collection
- Future Development Analysis
- Invasive Species Removal and Management

Schedule


Task Name
1.0 Data Collection
1.1 County Data
1.2 NAU Crown Engineering Data
1.3 FEMA Data
2.0 Hydraulics: 2D Modeling
2.1 Model Parameters
2.1.1 Grid System
2.1.2 Manning's Number
2.1.3 Courant & DEPTOL Values
2.2 Two Dimensional Modeling
2.2.1 FLO-2D
2.2.2 HEC-RAS 2D
2.2.3.1 Existing Conditions
2.2.3.2 Existing w/o Dike
2.2.3.3 Proposed Levee
2.2.3.4 Gila River Restoration
3.0 Model Analysis
4.0 FLO 2D & HEC-RAS 2D Model Comparison
4.1 Cost Analysis
4.2 Recommended Solutions
4.3 Impacts
5.0 Project Management
5.1 Coordination
5.2 50 % Design Report
5.3 Final Presentation
5.4 Impacts Report
5.5 Final Report
5.6 Website
Aug 28, '16
Sep 11, '16
Sep 25, '16
Oct 9, '16
Oct 23, '16
Nov 6, '16
Nov 20, '16
Dec 4, '16
S T M F T S W
11/1
12/16
12/9
12/16
12/16

Staffing

Title	Classification
Senior Engineer	SENG
Engineer	ENG
Intern	INT

Task	SENG	ENG	INT	Total
1.0 Data Collection				
1.1 County	0.5		1	1.5
1.2 NAU Crown Engineering	0.5		1	1.5
1.3 FEMA	0.5		1	1.5
2.0 Hydraulics				
2.1 Model Parameters	0.5		1	1.5
2.1.1 Grid System	5	23	12	40
2.1.2 Manning's Number	3	10	10	23
2.1.3 Courant and DEPTOL	0.5	3	2	5.5
2.2 Two Dimensional Modeling				
2.2.1 Flo-2D	25	62	50	137
2.2.2 RAS-2D	25	62	50	137
2.2.3 Model Conditions	0.5	0	2	2.5
3.0 Model Analysis	8	4	4	16
4.0 Model Comparisons				
4.1 Cost Analysis	2	10	10	22
4.2 Recommended Solutions	5	10	5	20
4.3 Impacts	3	8	6	17
5.0 Project Management				
5.1 Coordinations	32	32	32	96
5.2 50% Design Report	5	10	15	30
5.3 Impacts Report	3	10	15	28
5.4 Final Presentation	1	1	3	5
5.5 Final Report	5	10	15	30
5.6 Website	1	2	5	8
Total	126	257	240	**623**

Cost

Classification	Billing Rate ($/hr)	Hours	Total Cost
SENG	131.03	126	16,509.78
ENG	80.46	257	20,678.22
INT	36.62	240	57,600.00
Total Staffing			**$94,788.00**
Travel (2 Meetings)			
700 miles/meeting	$0.54/mile	1400 miles	756.00
Rental Car	$40/day	4 days	160.00
Hotel	$50/night/room	4 rooms	200.00
Per Diem	$10/meal/person	16 meals	160.00
Total Travel			1,276.00
Project Total			**$96,064.00**

Questions?

Figure 4: Gila River in Duncan, AZ

[2] R. Shantz, "Photograph of Flood on Gila River 2/13/05 near Duncan, Arizona", Rshantz.com, 2005. [Online]. Available: http://www.rshantz.com/Scenes/Arizona/Southeast/20050213GilaFlood/20050213Flood13.htm. [Accessed: 15- Apr- 2016].