Sinclair Wash Restoration Feasibility Study

Photo by: Eric Lima

CENE 476 Final Proposal Presentation
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Hyd Engineering Team
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Client and Purpose

- Client-Mark Lamer
- The purpose of this project is to identify four sites within the Northern Arizona University stretch of Sinclair Wash which may be considered for repair and restoration.
- A plan set will be produced for each site which will allow for the implementation of the chosen designs

Background

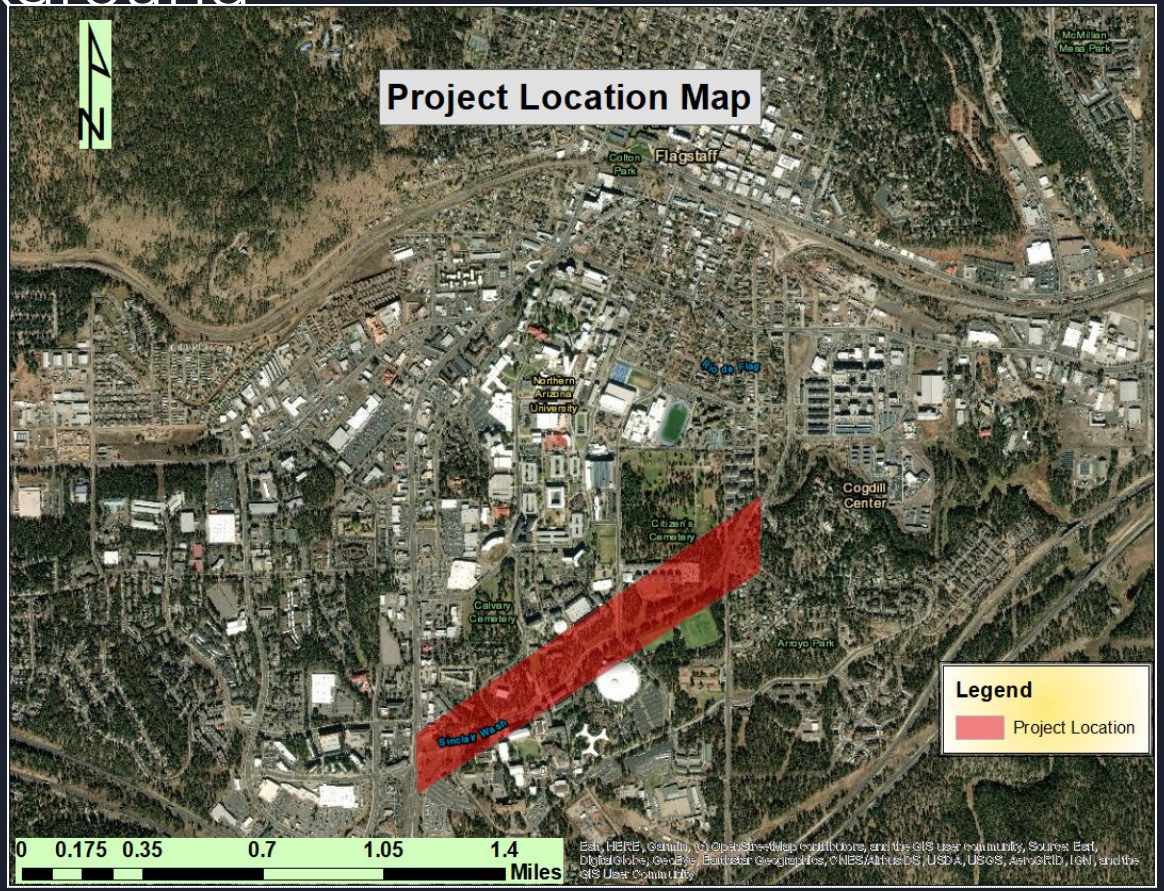


Figure 1: Project Location Map

Background cont.

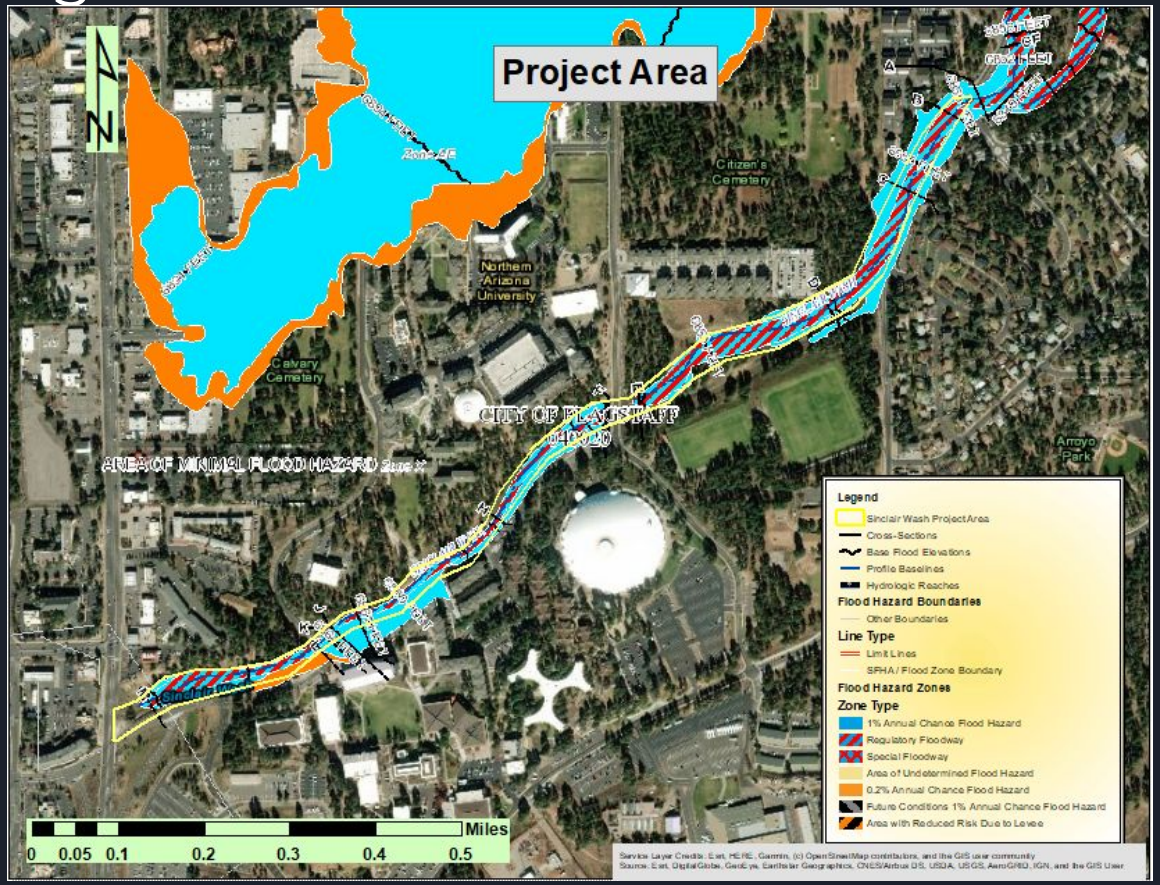


Figure 2: Site Location Map

Scope of Work
Task 1.0 Site Selection Research

- 1.1 Surveying Data
  - Use available data to create topographic map
- 1.2 FEMA Floodway and FIS
  - Utilize data to determine level of flood hazard
- 1.3 Hydrologic Data
  - Utilize previous and historical data to determine expected flows
- 1.4 Hydraulic Data
  - Determine applicable existing designs
- 1.5 Geomorphic Data
  - Determine erosion and sediment deposition along channel
- 1.6 Site Selection Criteria
  - Develop criteria for selecting sites to focus study on

Figure 3: Field investigation (WP1) Mljet lakes and Kuti lake June 2018 [1]

Task 2.0 Effective Hydraulic Model

- 2.1 Input Data Development
  - Input data along the wash to develop an accurate model.
- 2.2 Hydraulic Modeling
  - Utilize existing data to create a HEC-RAS model
- 2.3 Site Selection
  - Determine four sites to focus the study

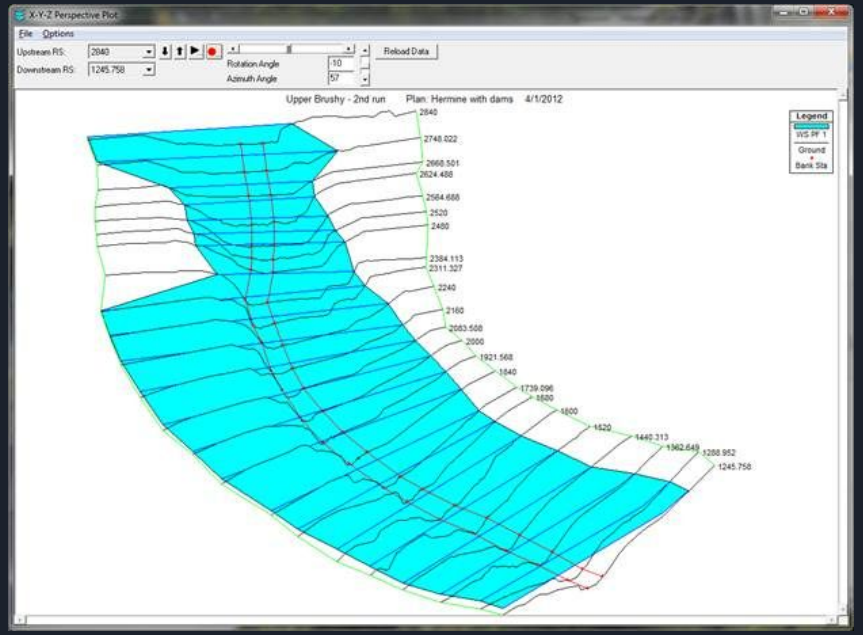


Figure 4: Example HEC-RAS Model [2]

Task 3.0 Corrected Effective Model

- 3.1 - Site 1 Corrected Effective Model
- 3.2 - Site 2 Corrected Effective Model
- 3.3 - Site 3 Corrected Effective Model
- 3.4 - Site 4 Corrected Effective Model
- Corrected Effective Model process for each of the four sites
  - Create HEC-RAS model for each site to better reflect current flow conditions
    - Input Data Development
      - Input data in HEC-RAS to update lining and culvert conditions
    - Hydraulic Model
      - Utilize input data to develop Hydraulic Model for each site

Photo by: Eric Lima

Figure 5: Prior improvements to Sinclair Wash

Task 4.0 Proposed Restoration Plan

- 4.1 Site 1 Restoration Plan
- 4.2 Site 2 Restoration Plan
- 4.3 Site 3 Restoration Plan
- 4.4 Site 4 Restoration Plan
  - Three plans will be created for each of the four sites being studied
    - Site Geomorphic Plan
      - Determine optimal shape of channels
    - Site Hydraulic Plan
      - Determine flow rate based on channel conditions for sites
    - Site Vegetation Plan
      - Determine vegetation removal and or replacement for sites

Photo by: Eric Lima

Figure 6: Vegetation growth in Sinclair Wash

Task 5.0 Plan Set

- 5.1 Cover Page
- 5.2 Notes
- 5.3 Details
- 5.4 Topographic Map
- 5.5 Site Plans
  - Plans for each of the four sites
  - Include cost estimate for the needed work on four sites by site basis

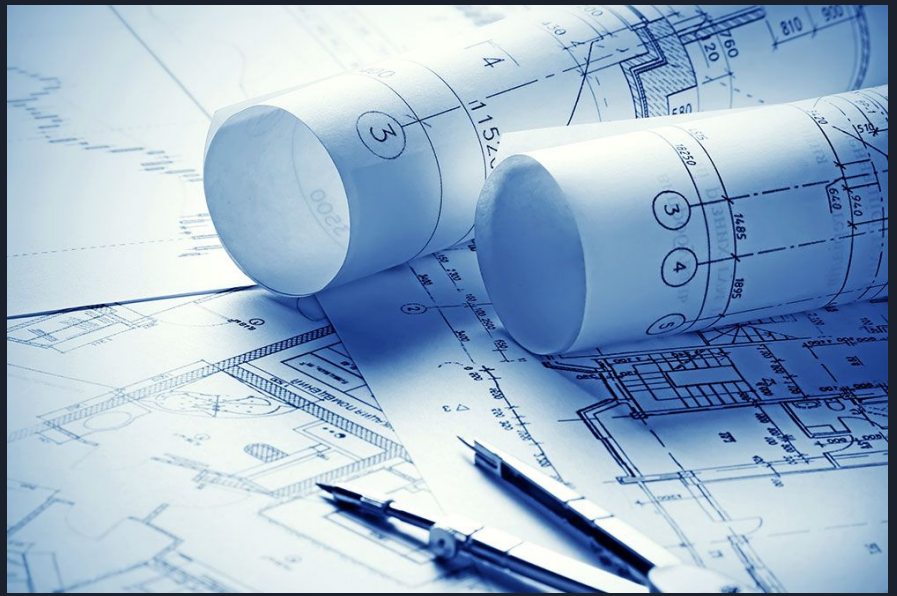


Figure 7: Construction Plans [3]

Task 6.0 Project Deliverables

- 6.1 Meeting Memo Binder.
- 6.2 30% Report and Presentation
- 6.3 60% Report and Presentation
- 6.4 90% Report
- 6.5 Final Report and Presentation
- 6.6 Construction Plan Set
- 6.7 Website

Task 7.0 Management

- 7.1 Team Meetings
- 7.2 Technical Adviser Meetings
- 7.3 Client Meetings
- 7.4 Schedule Management
- 7.5 Resource Management
- 7.6 Impacts
  - Social, Economic, Environmental

Exclusions

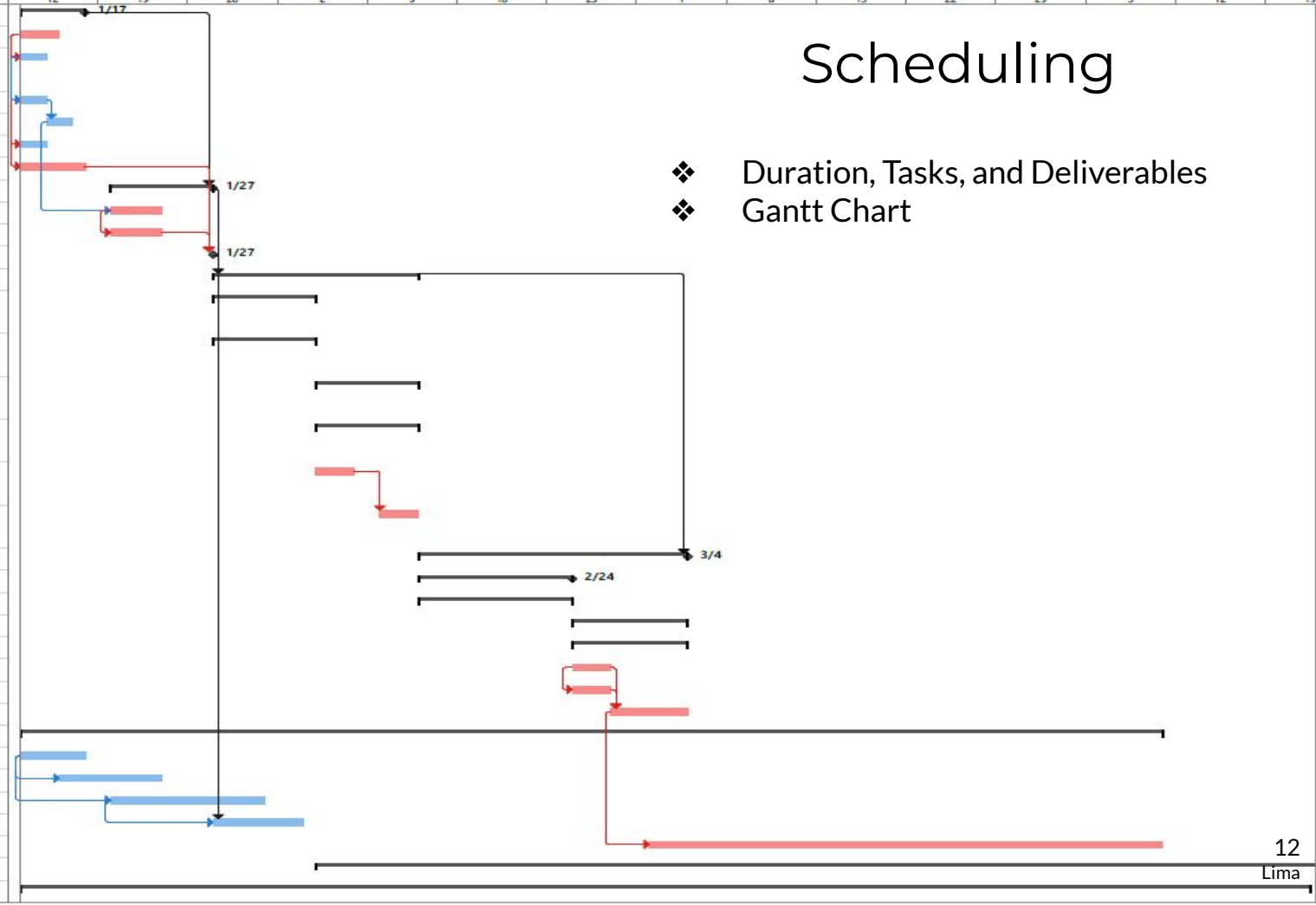
- **Structural Engineering**
  - No construction being performed
- **Biological and Ecological Assessment**
  - Invasive species survey
- **Traffic Assessments**
  - No current traffic impacts
- **Geotechnical Analysis**
  - It is not expected to perform any extensive geotechnical analysis
- **Surveying**
  - It is not expected to perform any extensive surveying

Figure 8: Footbridge over a river [4]

Scheduling

- Duration, Tasks, and Deliverables
- Gantt Chart

ID	Task Name	Duration
1	**1.0 Site Selection Research**	**5 days**
2	1.1 Surveying Data	3 days
3	1.2 FEMA Flood Way and FIS Data	2 days
4	1.3 Hydrologoic Data	2 days
5	1.4 Hydraulic Data	2 days
6	1.5 Geomorphic Data	2 days
7	1.6 Site Selection Criteria	5 days
8	**2.0 Effective Hydraulic Model**	**6 days**
9	2.1 Input Data Development	4 days
10	2.2 Hydraulic Modeling	4 days
11	2.3 Site Selection	2 days
12	**3.0 Corrected Effective Model**	**12 days**
13	**3.1 Site 1 Corrected Effective Model**	**6 days**
16	**3.2 Site 2 Corrected Effective Model**	**6 days**
19	**3.3 Site 3 Corrected Effective Model**	**6 days**
22	**3.4 Site 4 Corrected Effective Model**	**6 days**
23	3.4.1 Site 4 Input Data Development	3 days
24	3.4.2 Site 4 Hydraulic Modeling	3 days
25	**4.0 Proposed Restoration Plan**	**15 days**
26	**4.1 Site 1 Restoration Plan**	**8 days**
30	**4.2 Site 2 Restoration Plan**	**8 days**
34	**4.3 Site 3 Restoration Plan**	**7 days**
38	**4.4 Site 4 Restoration Plan**	**7 days**
39	4.4.1 Site 4 Geomorph Plan	3 days
40	4.4.2 Site 4 Hydraulic Plan	3 days
41	4.4.3 Site 4 Vegetation Plan	4 days
42	**5.0 Plan Set**	**65 days**
43	5.1 Cover Page	5 days
44	5.2 Notes	6 days
45	5.3 Details	10 days
46	5.4 Topographic Map	5 days
47	5.5 Site Plans	30 days
48	**6.0 Deliverables**	**56 days**
56	**7.0 Project Management**	**72.5 days**



Project Staffing

Table 1: Summarized Matrix table of Staffing Positions

	Senior Engineer	Engineer II	Engineer I	Engineering Intern	
Task Name	SENG	ENG II	ENG I	INT	Total Hours
1.0 Site Selection Research	6	10	12	12	40
2.0 Effective Hydraulic Model	4	6	9	11	30
3.0 Corrected Effective Model	16	24	30	31	101
4.0 Proposed Restoration Plan	17	48	59	56	180
5.0 Plan Set	5	45	71	65	186
6.0 Deliverables	31	55	56	45	187
7.0 Project Management	49	34	23	23	129
Total hours	128	222	260	243	**853**

Cost of Engineering Services

Table 2: Cost of Engineering Services

1.0 Personnel	Classification	Hours	Rate, $/hr	Cost
	SENG	128	213	$ 27,264.00
	ENG II	222	136	$ 30,192.00
	ENG I	260	85	$ 22,100.00
	INT	243	22	$ 5,346.00
	Total Personnel			**$ 84,902.00**
2.0 Travel	N/A			$ -
3.0 Supplies	Surveying Equipment Rental (Tentative)		$100/day	$ 100.00
	Geotechnical Lab Time (Tentative)		$100/day	$ 100.00
4.0 Subcontract	N/A			$ -
5.0 Total				**$ 85,102.00**

Questions?

References

[1] Stanko, Ružičić. “Field Investigation (WP1) Mljet Lakes and Kuti Lake June 2018.” Rudarsko Geološko Naftni Fakultet, https://www.rgn.unizg.hr/en/research/projects/research-projects/national-projects-a/nanomin/news/2182-field-investigation-wp1-mljet-and-kuti-3

[2]“Introduction to HEC-RAS and Floodplain Mapping.” *Home - Department of Civil, Architectural and Environmental Engineering*, http://www.ce.utexas.edu/prof/maidment/CE374KSpr12/Ex4/Ex4.htm

[3] Pearl, Deb, et al. “How to Read Construction Plans - A Beginner's Guide.” Construct, 23 May 2019, www.construct-ed.com/beginners-guide-how-to-read-construction-plans/

[4] “Foot Bridge Design from BDS Structural Design Services Ltd.” *BDS Structural Design Services Ltd*, https://bdsstructuraldesignservices.com/sectors/bridges/