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HYDROLOGY & GEOMORPHOLOGY, INC.

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August 6th, 2018

Jackie Watkins, PE, PTOE
Cochise County Highway & Floodplain
1415 Melody Lane
Bisbee, AZ 85603

RE: Proposal – Ephemeral Streamflow and Groundwater Monitoring Year 2
Additional Service #2-Horseshoe Draw Monitoring

Dear Jackie:

Per your request, JE Fuller/Hydrology & Geomorphology (JE Fuller) in conjunction with GeoSystems Analysis (GSA) is providing you with this proposal for the referenced services. This proposal pertains to Additional Service #2 of the current County contract for Ephemeral Streamflow and Groundwater Monitoring, PSA 18-12-HFP-03, to install surface water and groundwater monitoring equipment at the County-maintained Horseshoe Draw Flood and Erosion Control facility, collect monitoring data through the end of December 2018 and analyze/summarize the data collected in a Memo to the County.

The following items are attached to this proposal:

A. Summary Cost Sheet for the Additional Service #2 Scope of Work (SOW)
B. JE Fuller Scope of Work Narrative and Cost Estimate; and,
C. GSA Scope of Work and Cost Estimate.

The expected cost for this work is **$51,011**, according to the summary table provided as Attachment A. JE Fuller appreciates the opportunity to provide you with this proposal. You may indicate your acceptance of this proposal and provide notice to proceed by forwarding the applicable Professional Services Agreement (PSA) Amendment for signature. As always, please feel free to contact me by email (cyrus@jefuller.com) or by phone at 520-623-3112 if you have any questions regarding this proposal.

Sincerely,
JE Fuller/Hydrology & Geomorphology, Inc.

Cyrus D. Miller, P.E., CFM
Vice President

ATTACHMENT A

Summary Cost Sheet for the Additional Service #2 SOW

PROJ: Cochise County/Ephemeral Streamflow and Groundwater Monitoring Year 2 Project
DETAIL: Total Project Cost Calculation
DATE: August 2, 2018
Prepared by: JE Fuller/Hydrology & Geomorphology (JE Fuller)

Summary Cost Sheet for the Ephemeral Streamflow and Groundwater Monitoring SOW
Additional Service #2

Task	Title	Deliverable (see SOW for task details)	Costs		
			JE Fuller	GSA	TOTAL
1	Project Management	-	$68	$1,351	**$1,419**
2a	Develop Monitor Well Specificatoins	Monitor Well Installation Memo	$29	$583	**$612**
2b	Monitoring Well Installation and Instrumentation		$1,257	$25,144	**$26,401**
2c	Installation Memo		$60	$1,192	**$1,252**
2d	Data Downloads and Maintenance		$63	$1,260	**$1,323**
2e	Data Processing and Analysis		$56	$1,110	**$1,166**
3a	Equipment Procurement and Installation	Surface Water Monitoring Installation Memo	$206	$4,117	**$4,323**
3b	Installation memo		$45	$906	**$951**
3c	Data Downloads and Equipment Maintenance		$82	$1,642	**$1,724**
3d	Data Processing and Analysis		$4,037	$2,237	**$6,274**
4	Data Memo	Data Memo	$2,070	$3,497	**$5,567**
		TOTALS	**$7,972**	**$43,039**	**$51,011**

Notes:
5.00% Subconsultant markup included in JE Fuller Cost
All fee estimates are approximate.
The total fee is a not-to-exceed (NTE) amount and individual task fees may vary within the total NTE.
Where needed tasks may be performed concurrently or out of the sequence indicated above.

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ATTACHMENT B
JE Fuller Scope of Work Narrative and Cost Estimate

JE Fuller Scope of Work Narrative and Cost Estimate
(Refer to Attachment C for additional details)

Task 1 – Project Management

No additional work is proposed by JE Fuller for this task.
Work proposed by GSA is detailed on Attachment C.

Task 2 – Horseshoe Draw Groundwater Monitoring

No additional work is proposed by JE Fuller for this task.
Work proposed by GSA is detailed on Attachment C.

Task 3 – Horseshoe Draw Flood and Erosion Control Structure Monitoring

Unless described below, all work will be performed by GSA as detailed on Attachment C.

Subtask 3.d – Data Processing and Analysis

JE Fuller will develop a stage-discharge hydraulic rating curve and table for the inlet weir/spillway to calculate normal depths corresponding to facility design discharge ranges, using either standard weir equations or Manning's equation for uniform flow based on the location and configuration of the sensor installation relative to the weir/spillway.

JE Fuller will develop a stage-discharge hydraulic rating curve and table for the outlet pipes to calculate normal depths corresponding to facility design discharge ranges, using methods provided by the Federal Highway Administration (FHWA), namely the HY-8 computer program.

All elevations and dimensions will be based on facility as-built plans as provided by Cochise County.

Data collected from the inlet and outlet sensors will be analyzed by JE Fuller for the recorded time-stage relationships to derive estimated flow hydrographs based on the rating curves developed for each location, during each flow event classified for analysis. Hydrograph volumes will be calculated by integrating the inflow and outflow hydrographs over time.

Task 4

JE Fuller will collaborate with GSA in formulating the Data Summary Memo that will summarize the estimated inlet and outlet flow volumes resulting from the recorded flow events, groundwater data trends, conclusions from the Surface Water Imagery (SWI) data, with groundwater and surface water monitoring equipment installation memos attached.

PROJ: Cochise County/Ephemeral Streamflow and Groundwater Monitoring Year 2 Project
DETAIL: JEF Cost Calculation
DATE: August 2, 2018
Prepared by: JE Fuller/Hydrology & Geomorphology (JE Fuller)

JE Fuller Cost Estimate for the Ephemeral Streamflow and Groundwater Monitoring SOW
Additional Service #2

Task	Title	Deliverable (see SOW for task details)	JE Fuller Hours		JE Fuller Labor Cost	JE Fuller Direct Costs	JE Fuller Total Cost
			PM II	PE II			
			$135.00	$110.00			
1	Project Management	-	0	0	$0	$0	**$0**
2a	Develop Monitor Well Specificatoins	Monitor Well Installation Memo	0	0	$0	$0	**$0**
2b	Monitoring Well Installation and Instrumentation		0	0	$0	$0	**$0**
2c	Installation Memo		0	0	$0	$0	**$0**
2d	Data Downloads and Maintenance		0	0	$0	$0	**$0**
2e	Data Processing and Analysis		0	0	$0	$0	**$0**
3a	Equipment Procurement and Installation	Surface Water Monitoring Installation Memo	0	0	$0	$0	**$0**
3b	Installation memo		0	0	$0	$0	**$0**
3c	Data Downloads and Equipment Maintenance		0	0	$0	$0	**$0**
3d	Data Processing and Analysis		3	32	$3,925	$0	**$3,925**
4	Data Memo	Data Memo	1	16	$1,895	$0	**$1,895**
		TOTALS	**4**	**48**	**$5,820**	**$0**	**$5,820**

Notes:
All fee estimates are approximate.
The total fee is a not-to-exceed (NTE) amount and individual task fees may vary within the total NTE.
Where needed tasks may be performed concurrently or out of the sequence indicated above.

ATTACHMENT C
GSA Scope of Work and Cost Estimate

1.0 INTRODUCTION

This proposal has been prepared for the Cochise County Recharge Network (CCRN) to provide additional monitoring instrumentation that will complement and improve existing CCRN surface water, recharge, and groundwater monitoring systems. The proposed project includes two monitoring goals:

1) Installation and instrumentation and monitoring of one monitoring well at the Horseshoe Draw structure to monitor groundwater elevation, and

2) Instrumentation and monitoring at the Horseshoe Draw structure to estimate facility stormwater runoff inflow and outflow.

The Horseshoe Draw Flood and Erosion Control Water Quality Improvement and Water Recharge Project structure was completed at the Ladd Ranch in June 2017 (Figure 1). Installation of one approximately 210 foot deep environmental monitoring well is proposed at the Horseshoe Draw flood and erosion control structure. The well will provide information on groundwater elevation and document any effects of recharge on groundwater levels. This data will also supplement the existing upper San Pedro groundwater monitoring network, which provides critical information on baseline groundwater conditions in the basin.

Additionally, GSA proposes installing monitoring equipment to determine inflow and outflow at the structure using two stilling wells and one SWI station. Stilling wells will collect data on water depth and duration which can then be used to estimate storage volumes, drainage rates, and groundwater recharge volumes. The SWI station will include a wildlife camera installed on the bankline and programmed to record images every fifteen minutes. The images will also provide valuable information on surface water flow dynamics (lateral extent, formation of preferential flow paths, flow relative to PT placement, etc.) and provide for quality assurance and quality control (QA/QC) of associated stilling well PT data. Because precipitation data for the watershed is limited to one gauge associated with the ESM project, GSA also proposes installing an additional precipitation gauge at the inlet to the Horseshoe Draw structure.

Four tasks are proposed;

Task 1 – Project Management

Task 2 – Horseshoe Draw Groundwater Monitoring

Task 3 – Horseshoe Draw Erosion Control Structure Monitoring

Task 4 – 2018 Data Memo

Descriptions of proposed work for each task are provided in the following sections.

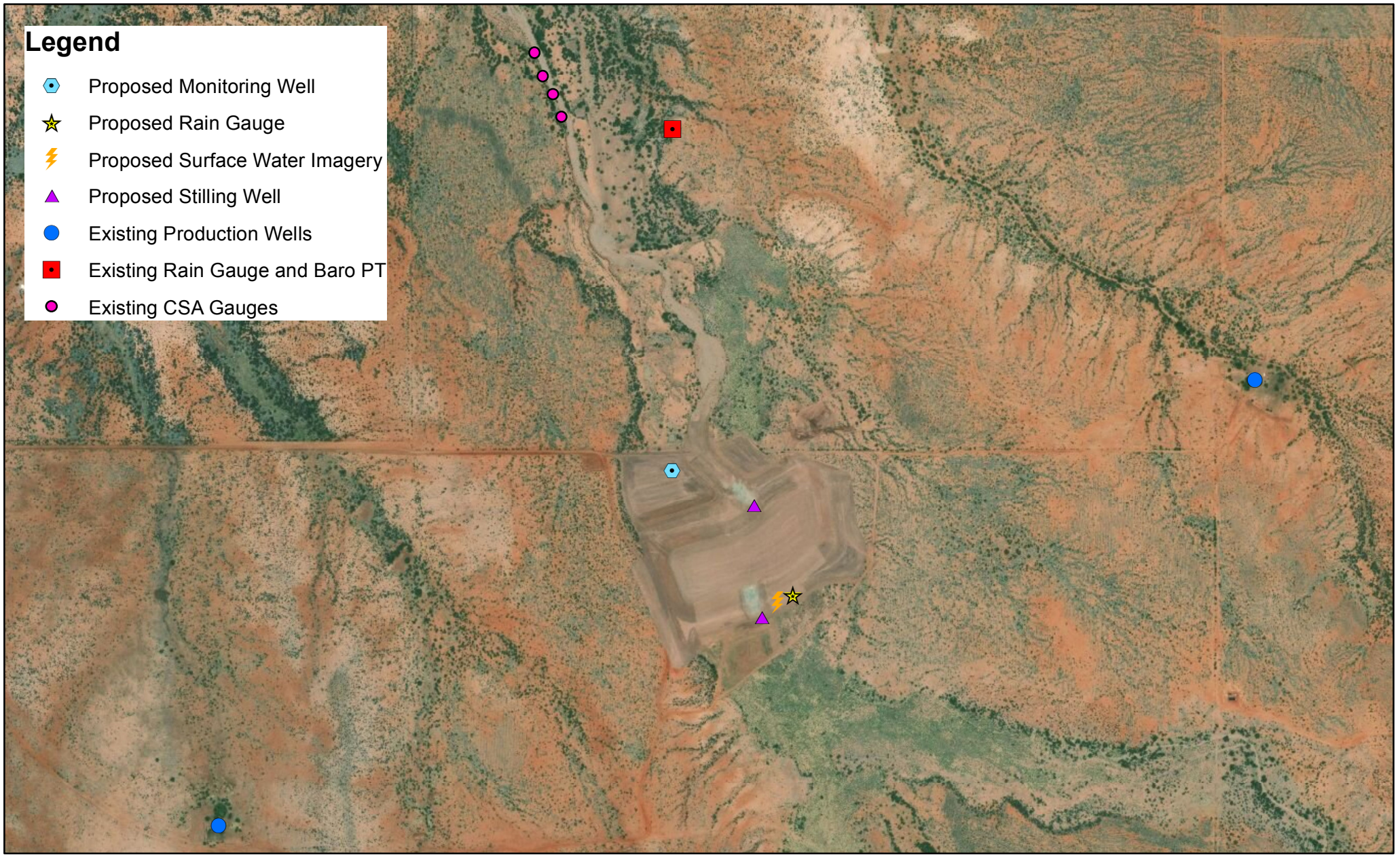

Figure 1. Proposed and Existing Monitoring Equipment at Horseshoe Draw

2.0 PROPOSED TASKS

2.1 Task 1 – Project Management

Project management activities will include correspondence with JEF and other Cochise County Recharge Network (CCRN) partners (Cochise County and TNC), driller coordination, project and field data download coordination, billing, and other administrative tasks. It will also include any necessary coordination of site use permission and access, and development of task-specific health and safety and quality assurance plans.

2.2 Task 2 – Horseshoe Draw Groundwater Monitoring

2.2.1 Subtask 2.a – Develop Monitor Well Specifications

GSA will coordinate with the contracted well driller (Resilient Drilling, Mesa, AZ) to draft the monitoring well layout and provide specifications necessary for submission of the required ADWR well permit application. GSA will coordinate with the Ladd family and Cochise County to select a suitable monitoring well location, which is anticipated to be on the northwest side of the structure for ease of access and so that any groundwater mounding associated with recharge can be detected.

2.2.2 Subtask 2.b – Monitoring Well Installation and Instrumentation

An environmental monitoring well will be installed on the northwestern boundary of the Horseshoe Draw structure. According to nearby well data, groundwater is approximately 180 feet deep. An approximately 210 foot deep monitoring well will be drilled and completed by Resilient Drilling over the course of approximately four days. GSA will be present for the drilling, and will log drill cuttings and collect volumetric core samples to assess material properties and potential recharge rates of materials on the site. Following completion of well construction, GSA will install an automated data logging pressure transducer (Rugged TROLL 100, In-Situ, Inc., Ft. Collins, CO) to monitor depth to groundwater and groundwater elevation. The PT will be programmed to record data every four hours and will be suspended from the top of the well casing by a stainless steel cable. The casing height and PT hang length will be recorded at the well to allow for calculation of depth to groundwater from the monitoring data.

2.2.3 Subtask 2.c – Installation Memo

An installation memo will be provided to JE Fuller and Cochise County within 30 days of completion of well installation and instrumentation. A revised, final memo will be provided within 15 days of receiving comments from Cochise County and partners. The memo will include details on the groundwater monitoring location, installation, and material characteristics. This memo may be combined with installation details associated with Task 3.

2.2.4 Subtask 2.d – Data Downloads and Maintenance

Data downloads will occur concurrently with data download site visits for the Ephemeral Streamflow Monitoring project (JEF 2017). Prior to removing the PT for download, the water level in the well will be manually measured using a water level meter (Model 101, Solinst Canada Ltd., Georgetown, Ontario). These values will be recorded and compared to the corresponding PT-measured water levels as a data quality assurance check. Preliminary PT data will be reviewed on-site for quality control, and maintenance or troubleshooting actions will be taken where possible. Maintenance and troubleshooting may include field calibration of the PT, verification of sensor hang length, well casing height, and replacement of failed PTs, if necessary.

2.2.5 Subtask 2.e – Data Processing and Analysis

Data from the absolute pressure transducers used to monitor groundwater elevations will be barometrically corrected using In-Situ's BaroMerge software, and post-processed in Microsoft Excel to calculate depth to groundwater and groundwater elevation at each well from PT hang lengths, well casing heights, and surveyed ground surface elevations above mean sea level. Groundwater elevation averages for wet and dry periods will be analyzed and displayed graphically using GIS software (ArcGIS 10.3, ESRI, Redlands, CA) to estimate groundwater gradients if possible.

Analyzed data will be incorporated into the annual groundwater monitoring report for other San Pedro groundwater monitoring locations. A data appendix containing all raw and processed groundwater data will be provided as a Microsoft Excel document.

2.3 Task 3 – Horseshoe Draw Flood and Erosion Control Structure Monitoring

2.3.1 Subtask 3.a – Equipment Procurement and Installation

Proposed monitoring equipment at the Horseshoe Draw structure includes two stilling wells, one SWI station, and one precipitation gauge (Figure 2). The stilling wells will be located at the graded inlet spillway and the central pipe of three 36" diameter outlet pipes (Figure 6, HilgartWilson 2017). Stilling wells will be constructed from sections of 2" schedule 40 steel pipe equipped with locking well caps. Stilling wells will be bolted to the concrete surfaces in locations anticipated to minimize disturbance during large flows and optimize data quality. Stilling wells will be instrumented with data logging pressure transducers (In-Situ, Inc. Rugged TROLL 100, Ft. Collins, CO) set to log data every five minutes. The SWI station will be located on the embankment above the inlet spillway to monitor ponding upstream of the structure and flow into the inlet (Figure 2). The station will include one wildlife camera and one staff gauge installed into the rip rap with reflective tape markings every 3 inches. The camera will be mounted adjacent to the spillway and oriented to have the best possible view of the facility inlet. The camera will be secured in a locked enclosure to minimize the potential for vandalism and damage. Images will be captured every 15 minutes. GSA also proposes installing a precipitation gauge (ECRN-100 and EM50 data logger, Decagon Devices, Pullman, WA) at the inlet to the Horseshoe Draw structure to improve monitoring of rainfall spatial variability in the watershed and provide redundancy of data. Currently, there is only one gauge located downstream and adjacent to the existing CSA station (Figure 1Figure 1).

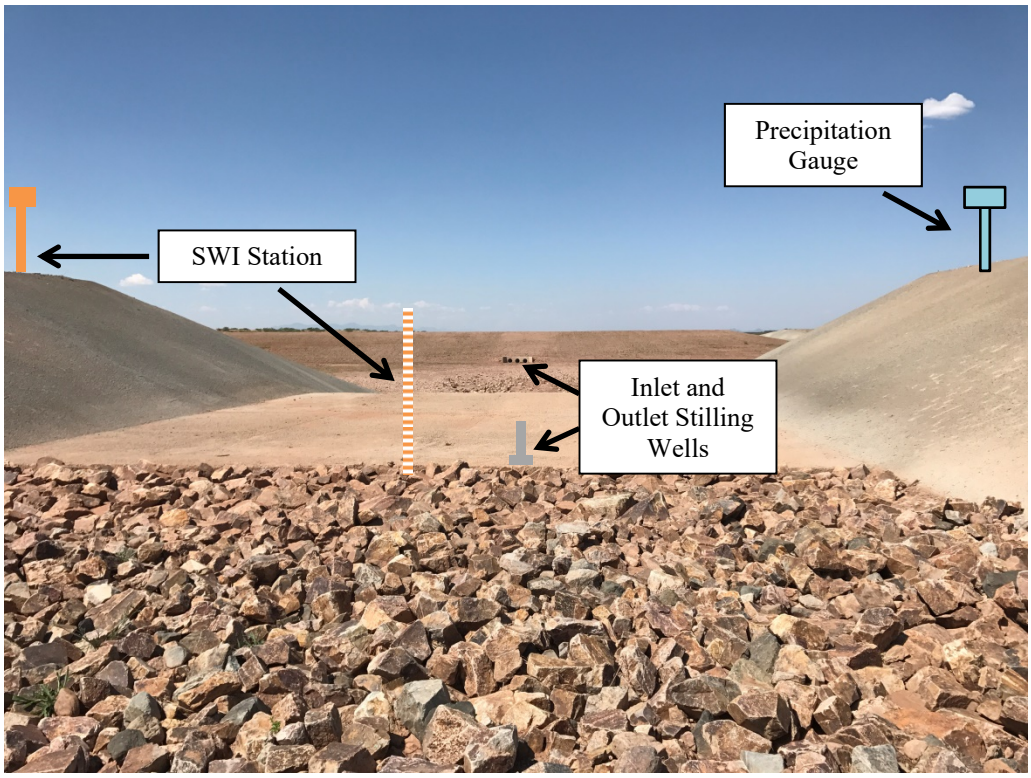

Figure 2. Proposed inlet and outlet monitoring equipment at the Horseshoe Draw structure.

2.3.2 Subtask 3.b – Installation Memo

An installation memo will be provided to JE Fuller and Cochise County within 30 days of completion of installation activities. A revised, final memo will be provided within 15 days of receiving comments from Cochise County and partners. The memo will detail monitoring instrumentation locations and associated installation details.

2.3.3 Subtask 3.c – Data Downloads and Equipment Maintenance

Data will be downloaded from the SWI camera, stilling wells, and precipitation gauge on a quarterly basis, and will occur concurrently with data download site visits for the Ephemeral Streamflow Monitoring project (JEF 2017). SWI images will be reviewed in the field to ensure proper camera placement, and batteries will be replaced as necessary. The camera SD card will be retrieved and replaced with a new one to minimize data transfer time while in the field. Stilling wells will be cleared of any accumulated sediment or debris. Data trends will be examined in the field to assure data quality, and any necessary adjustments will be made. All equipment will be assessed for functionality, battery life, and sensor and clock drift. Any additional maintenance needs will be addressed during each site visit.

2.3.4 Subtask 3.d – Data Processing and Analysis

Rating curves will be developed by a JE Fuller for the graded inlet spillway and the outlet pipe to calculate flow rates from water depth. Stilling well PT data will be barometrically corrected and processed to isolate runoff events and associated water ponding depths. Total facility inlet and outlet flow volumes will be estimated for each event and for the annual monitoring period. Estimated infiltration volumes will be calculated using reported percolation rates (6.1 cfs/acre, HilgartWilson 2015) and/or estimated rates associated with logged sediments during well construction (Task 2), and infiltration plus evaporation can be estimated using a mass balance approach (inlet minus outlet flow volumes).

2.3.5 Subtask 3.f – Data Memo

A data memo will be provided to JE Fuller and Cochise County within 60 days of completion of the annual monitoring period. A revised, final memo will be provided within 15 days of receiving comments from Cochise County and partners. The memo will summarize estimated inlet and outlet flow volumes, SWI data, and infiltration volumes, as well as any maintenance activities conducted during the monitoring period.

2.4 Task 4 – 2018 Data Memo

A data memo will be provided to JE Fuller and Cochise County within 60 days of completion of the annual monitoring period. A revised, final memo will be provided within 15 days of receiving comments from Cochise County and partners. The memo will summarize estimated groundwater data trends, inlet and outlet flow volumes, SWI data, and infiltration volumes, as well as any maintenance activities conducted during the monitoring period.

3.0 PROPOSED BUDGET AND SCHEDULE

An estimated summary budget is provided in Table 1. Table 2 presents a detailed estimated task-by-task budget.

This proposal is currently budgeted to include monitoring through the end of the 2018 calendar year. As such, monitoring equipment and well installation is anticipated to be completed in August, 2018. Assuming this project start date, the monitoring period will run from August 2018 through December 2018 to correspond to CCRN calendar year monitoring for other projects in the region. The proposed budget assumes extension of Ephemeral Streamflow Monitoring to allow for concurrent data downloads through December 2018. An installation memo will be submitted within one month of installation of monitoring equipment. Groundwater monitoring (Task 2) results will be included in ESM annual

reports. Horseshoe Draw structure monitoring results (Task 3) will be summarized in a data memo and provided to CCRN by February 2019.

4.0 REFERENCES

HilgartWilson 2015. Horseshoe Draw Flood Control, Restoration and Erosion Mitigation Study and Design Project, Volume 4, Existing Conditions Recharge Potential Analysis, Cochise County, Arizona. Prepared for Hereford Natural Resource Conservation District. December 2015.

HilgartWilson 2017. Horseshoe Draw Flood Control, Restoration and Erosion Mitigation Study and Design Project, Volume 6, Final Design Report, Cochise County, Arizona. Prepared for Hereford Natural Resource Conservation District. January 2017.

JEF 2017. Proposal for San Pedro Ephemeral Streamflow Monitoring, Year 2. Prepared for the Cochise County Highway & Floodplain Department, June 2017.

Horseshoe Draw Monitoring

1745 - Cochise County

July 30, 2018

Table 1 - Cost Summary By Task

	Total Costs
1 - Project Management	**$1,351**
No Subtask	$1,351
2 - Horseshoe Draw Groundwater Monitoring	**$29,288**
2a - Develop Monitor Well Specifications	$583
2b - Monitoring Well Installation and Instrumentation	$25,144
2c - Installation Memo	$1,192
2d - Data Downloads and Maintenance	$1,260
2e - Data Processing and Analysis (Aug - Dec 2018)	$1,110
3 - Horseshoe Draw Flood and Erosion Control Structure Monitoring	**$8,902**
3a - Equipment Procurement and Installation	$4,117
3b - Installation Memo	$906
3c - Data Downloads and Equipment Maintenance (Aug - Dec 2018)	$1,642
3d - Data Processing and Analysis	$2,237
4 - 2018 Data Memo	**$3,497**
No Subtask	$3,497
Proposal Grand Total	**$43,039**

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

Task: 1 - Project Management

		Quantity	Unit Cost	Shipping	Total Cost
Personnel Costs					
Subtask: No Subtask					
Program Director	Milczarek	2	$145	NA	290
Staff Hydrologist	Bunting	8	$90	NA	720
Clerical Staff	Torres	4	$65	NA	260
			Subtask Total:		*$1,270*
Other Direct Costs					
Subtask: No Subtask					
Reproduction		0.5	$50	NA	25
Communications		1	$50	NA	50
			Subtask Total:		*$81*
	8.00% Overhead: $6.00		**Task Total**		**$1,351**

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

Task: 2 - Horseshoe Draw Groundwater Monitoring

		Quantity	Unit Cost	Shipping	Total Cost
Personnel Costs					
Subtask: 2a - Develop Monitor Well Specifications					
Program Director	Milczarek	0.5	$145	NA	72.5
Staff Hydrologist	Bunting	4	$90	NA	360
AutoCAD/GIS	Buchanan	2	$75	NA	150
			Subtask Total:		*$583*
Subtask: 2b - Monitoring Well Installation and Instrumentation					
Program Director	Milczarek	1	$145	NA	145
Staff Hydrologist	Bunting	46	$90	NA	4140
			Subtask Total:		*$4,285*
Subtask: 2c - Installation Memo					
Program Director	Milczarek	1	$145	NA	145
Staff Hydrologist	Bunting	8	$90	NA	720
AutoCAD/GIS	Buchanan	4	$75	NA	300
			Subtask Total:		*$1,165*
Subtask: 2d - Data Downloads and Maintenance					
Staff Hydrologist	Bunting	2	$90	NA	180
Hydrologist 1	Gonzales	4	$75	NA	300
			Subtask Total:		*$480*
Subtask: 2e - Data Processing and Analysis (Aug - Dec 2018)					
Staff Hydrologist	Bunting	4	$90	NA	360
Hydrologist 1	Gonzales	8	$75	NA	600
AutoCAD/GIS	Buchanan	2	$75	NA	150
			Subtask Total:		*$1,110*
Drilling Costs					
Subtask: 2b - Monitoring Well Installation and Instrumentation					
Resilient - Job Prep/Mob/Demob		1	$1,500	NA	1500
Resilient - Additional Crewmember		3	$600	NA	1800
Resilient - Support Trucks/Equipment		3	$575	NA	1725
Resilient - Wellhead Completion		1	$325	NA	325
Resilient - Crew Expenses (3 men)		3.5	$300	NA	1050
Resilient - ADWR Permit		1	$200	NA	200
Resilient - Daily Prep/Local Travel/Access		4	$185	NA	740
Resilient - Drive Sampling (est.)		21	$65	NA	1365
Resilient - Install 2" monitor well		210	$28	NA	5880
Resilient - Auger Drilling (1/210', est.)		210	$16	NA	3360
			Subtask Total:		*$19,381*

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

Instruments Costs

Subtask: 2b - Monitoring Well Installation and Instrumentation					
	In Situ Rugged Troll 100	1	$400	NA	400
			Subtask Total:		*$432*

Other Direct Costs

Subtask: 2b - Monitoring Well Installation and Instrumentation					
	Lodging	3	$85	NA	255
	Installation Supplies	1	$50	NA	50
	Miscellaneous	3	$50	NA	150
	Subsistence	4	$46	NA	184
	PT suspension cable	4	$15	NA	60
	Padlock	1	$10	NA	10
	4WD Truck	400	$1	NA	260
			Subtask Total:		*$1,047*
Subtask: 2c - Installation Memo					
	Reproduction	0.5	$50	NA	25
			Subtask Total:		*$27*
Subtask: 2d - Data Downloads and Maintenance					
	Equipment Replacement	0.5	$800	NA	400
	Miscellaneous	2	$50	NA	100
	Subsistence	2	$46	NA	92
	4WD Truck	200	$1	NA	130
			Subtask Total:		*$780*
	8.00% Overhead: $1604.88		**Task Total**		**$29,288**

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

Task: 3 - Horseshoe Draw Flood and Erosion Control Structure Monitoring

	Quantity	Unit Cost	Shipping	Total Cost
Personnel Costs				
Subtask: 3a - Equipment Procurement and Installation				
Staff Hydrologist Bunting	2	$90	NA	180
Hydrologist 1 Gonzales	10	$75	NA	750
Technician Heydorn	10	$65	NA	650
		Subtask Total:		*$1,580*
Subtask: 3b - Installation Memo				
Program Director Milczarek	0.5	$145	NA	72.5
Staff Hydrologist Bunting	2	$90	NA	180
AutoCAD/GIS Buchanan	2	$75	NA	150
Hydrologist 1 Gonzales	6	$75	NA	450
		Subtask Total:		*$853*
Subtask: 3c - Data Downloads and Equipment Maintenance (Aug - Dec 2018)				
Staff Hydrologist Bunting	2	$90	NA	180
Hydrologist 1 Gonzales	6	$75	NA	450
		Subtask Total:		*$630*
Subtask: 3d - Data Processing and Analysis				
Program Director Milczarek	2	$145	NA	290
Staff Hydrologist Bunting	8	$90	NA	720
Hydrologist 1 Gonzales	16	$75	NA	1200
		Subtask Total:		*$2,210*
Instruments Costs				
Subtask: 3a - Equipment Procurement and Installation				
METER EM50 Datalogger	1	$350	NA	350
METER ECRN 100 Rain Gauge	1	$235	NA	235
Surface Water Camera	1	$150	NA	150
		Subtask Total:		*$794*
Other Direct Costs				
Subtask: 3a - Equipment Procurement and Installation				
In-Situ Rugged Troll 100	2	$380	NA	760
Lodging	2	$85	NA	170
Staff Gage	1	$50	NA	50
2" Steel Pipe	2	$50	NA	100
Installation Supplies	2	$50	NA	100
Shipping	2	$50	NA	100
Subsistence	2	$46	NA	92
Camera Mounting Bracket	1	$20	NA	20

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

	PT suspension cable	2	$15	NA	30
	SD Card	2	$15	NA	30
	Lithium Batteries (qty 8)	1	$12	NA	12
	Padlock	2	$10	NA	20
	4WD Truck	200	$1	NA	130
			Subtask Total:		*$1,743*
Subtask: 3b - Installation Memo					
	Reproduction	0.5	$50	NA	25
	Communications	0.5	$50	NA	25
			Subtask Total:		*$54*
Subtask: 3c - Data Downloads and Equipment Maintenance (Aug - Dec 2018)					
	Equipment Replacement	0.5	$800	NA	400
	Lodging	2	$85	NA	170
	Communications	0.5	$50	NA	25
	Miscellaneous	4	$50	NA	200
	Lithium Batteries (qty 8)	1	$12	NA	12
	4WD Truck	200	$1	NA	130
			Subtask Total:		*$1,012*
Subtask: 3d - Data Processing and Analysis					
	Communications	0.5	$50	NA	25
			Subtask Total:		*$27*
	8.00% Overhead: $268.88		**Task Total**		**$8,902**

Horseshoe Draw Monitoring
Table 2 - Detailed Costs

Task: 4 - 2018 Data Memo

		Quantity	Unit Cost	Shipping	Total Cost
Personnel Costs					
Subtask: No Subtask					
Program Director	Milczarek	2	$145	NA	290
Staff Hydrologist	Bunting	12	$90	NA	1080
AutoCAD/GIS	Buchanan	4	$75	NA	300
Hydrologist 1	Gonzales	24	$75	NA	1800
			Subtask Total:		*$3,470*
Other Direct Costs					
Subtask: No Subtask					
Reproduction		0.5	$50	NA	25
			Subtask Total:		*$27*
	8.00% Overhead: $2.00		**Task Total**		**$3,497**
			PROPOSAL GRAND TOTAL:		**$43,039**