STATE OF MICHIGAN
ENTERPRISE PROCUREMENT

Department of Technology, Management, and Budget
320 S. Walnut Street 2nd Floor Lansing, MI 48933
P.O. BOX 30026 LANSING, MICHIGAN 48909

CONTRACT CHANGE NOTICE

Change Notice Number **4**
to
Contract Number **MA210000001620**

CONTRACTOR	
	Quantum Spatial, Inc.
	10033 MLK Street N, Ste. 200
	St. Petersburg FL 33716
	Andrew Brenner
	734-680-6424
	abrenner@quantumspatial.com
	CV0049662

STATE			
	Program Manager	Mark Holmes	DTMB
		517-285-6592	
		Holmesm3@michigan.gov	
	Contract Administrator	Jeremy Lyon	DTMB
		517-230-2858	
		lyonj5@michigan.gov	

CONTRACT SUMMARY

CONFLATION OF ATTRIBUTES FROM EXISTING NHD DATA TO THE NEW ELEVATION DERIVED HYDROGRAPHY FEATURES

INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE
October 1, 2021	September 30, 2026	5 - 12 Months	September 30, 2026

PAYMENT TERMS	DELIVERY TIMEFRAME

ALTERNATE PAYMENT OPTIONS	EXTENDED PURCHASING
☐ P-Card ☐ Direct Voucher (PRC) ☐ Other	☐ Yes ☒ No

MINIMUM DELIVERY REQUIREMENTS

DESCRIPTION OF CHANGE NOTICE

OPTION	LENGTH OF OPTION	EXTENSION	LENGTH OF EXTENSION	REVISED EXP. DATE
☐		☐		

CURRENT VALUE	VALUE OF CHANGE NOTICE	ESTIMATED AGGREGATE CONTRACT VALUE
$4,411,892.23	$0.00	$4,411,892.23

DESCRIPTION

Effective 9/12/2024, the parties add the services in the attached NV5 Hydrography Data Development statement of work, utilizing existing contract funds.

All other terms, conditions, specifications, and pricing remain the same. Per contractor, agency and DTMB Central Procurement Services.

STATEMENT OF WORK -
IT CHANGE NOTICE

Project Title: NV5 Hydrography Data Development	**September 1, 2024 to September 30, 2026**
Requesting Department: DTMB Center for Shared Solutions	**Date**: Aug 14, 2024
Agency Project Manager: Mark Holmes	**517-285-6592**
DTMB Project Manager: Mark Holmes	**Phone**: **517-285-6592**

Brief description of services to be provided:

BACKGROUND:

This statement of work is for a change notice to the NV5 Geospatial contract for our hydrography GIS data development project to reduce scope and costs for some deliverables, and also add scope for additional requirements that are needed to meet new United State Geological Survey data standards through their 3D Hydrography Program (3DHP).

PROJECT OBJECTIVE:

The objective of this change notice and scope of work is to adjust the work for the GIS data development to reduce some effort for the hydro-enforcement in sub-regions, 1, 9 and 10. It also adds the costs for NV5 to add new standards and fix any edits identified by USGS review of the watersheds that are a part of the USGS 3DHP program and the Data Collaboration Announcement (DCA) that officially aligned 38 watersheds, within our hydrography project data deliverables, with the USGS 3DHP program.

SCOPE OF WORK:

This scope of work change makes adjustments to the hydrography data development deliverables that are currently outlined in change notices 2 and 3 of contract #210000001620.

TASKS:

1) Because of additional culvert source GIS data that was identified that could be leveraged to complete the hydro-enforcement tasks in NV5's current scope, this change notice is reducing that scope of the effort for culvert development in Sub-region 1, sub-region 9 and sub-region 10. The cost reduction associated with this task is $78,132.38.

2) With new standards outlined by the United State Geological Survey for their 3D Hydrography Program (3DHP), which the data being developed under this project is being integrated into this national system for hydrography. To meet the latest standards released by USGS, NV5 will complete the following additional tasks as part of the data development work. The costs for adding these tasks to is $222,145.72.

    1. Adding a 250 m buffer and checking hydro-flattening and other features
    2. Ensure schema passes all known QC check and production of additional spatial metadata
    3. Responding to USGS edit calls
    4. Management of USGS team calls and tracking of items arising from them

DELIVERABLES:

Deliverables will not be considered complete until the Agency Project Manager has formally accepted them. Deliverables for this project include:

The deliverables are the same final data deliverables as the previous change notice. NV5 provides hydrography flowlines, water bodies, water area features, watershed boundaries, final 1m digital elevation models, final hydro-enforced digital elevation models, geo-morphic indicator files, quality control review flagged features, and final data collection reports. These are all developed and delivered at the HUC 8 watershed level. Final acceptance will be made once data has been reviewed by State of Michigan advisory group for hydrography and the USGS data review team. Watersheds that are part of an official USGS project, will be required to pass the USGS data review process to be compatible to load into the USGS 3DHP system.

ACCEPTANCE CRITERIA:

Acceptance is outlined in the standard terms and conditions of the contract.

PROJECT CONTROL AND REPORTS:

Regular progress reports must be submitted to the DTMB Project Managers throughout the life of this project. This report is provided via project web page and also via a bi-weekly call. A report is also needed to accompany any invoicing, this should include the current milestones being billed on the invoice and total of the milestone billed to date.

PAYMENT SCHEDULE:

Payment will be made on a fixed fee basis. Please see the accompanying cost tables in Appendix A for the latest price schedule for the data development work.

EXPENSES:

The State will NOT pay for any travel expenses, including hotel, mileage, meals, parking, etc.

PROJECT CONTACTS:

The designated Agency Project Manager is: N/A

The designated DTMB Project Manager is:

Mark Holmes
DTMB Center for Shared Solutions
eMichigan/Geospatial Services

Romney Bldg 10th Floor
111 S. Capitol Ave
Lansing, MI 48933
517-285-6592
Holmesm3@michigan.gov

AGENCY RESPONSIBILITIES:

N/A

LOCATION OF WHERE THE WORK IS TO BE PERFORMED:
Consultants will work at their office locations.

EXPECTED CONTRACTOR WORK HOURS AND CONDITIONS:

Work hours are not to exceed eight (8) hours a day, forty (40) hours a week. Normal working hours of 8:00 am to 5:00 pm are to be observed unless otherwise agreed to in writing.

No overtime will be permitted.

This purchase order is a release from Contract Number #210000001620. This purchase order, statement of work, and the terms and conditions of Contract Number #210000001620 constitute the entire agreement between the State and the Contractor.

Appendix A - Cost Adjustments to Hydrography Data Development

This document outlines the cost adjustments to the NV5 hydrography GIS data development scope of work on contract #210000001620 change notice 2 and 3.

The Table 1 shows the additional costs associated with the new USGS standards and the necessary NV5 scope to prepare the data for delivery to USGS and to make any edits suggested by USGS. The prices below are the costs per Hydrologic Unit (HU) 8 watershed.

Table1: Costs associated with USGS involvement in data delivery and review for each HU8

		Domain Expert	Analyst	Team Lead	PM	Total Hours	Price
Task	**Rate**	**$127.65**	**$74.25**	**$127.65**	**$150.41**		
DEM Modifications		6				**6**	$740.82
QC Check			20			**20**	$1,231.80
USGS Edits			36			**36**	$2,217.24
Coordination & Management				6	6	**12**	$1,254.54
Total		**6**	**56**	**6**	**6**	**74**	**$5,444.40**

Table 2 below shows the price changes associated with the reduced scope in specific subregions where additional culvert source data can be leveraged for hydro-enforcement. It also outlines the increase in costs for working with USGS (as part of the awarded 2024 Data Collaboration Announcement (DCA)) in 38 of the HU8 watersheds. These 38 watersheds are the ones that are officially part of the current project with USGS. Table 3 and 4 outlined costs for optional additional NV5 work for the remaining watersheds when they are processed in coordination with USGS as parts of proposed DCA projects in 2025 and 2026.

Table 2: Price changes associated with scope changes outlined in this change notice. This cost table becomes the current price schedule for the data development scope of the NV5 contract.

Note: The discounts for sub region 5 and sub-region 11 were captured in change notice 3 but outlined again here in this table to provide a complete updated price schedule as of 8/5/2024. The pricing changes associated with this change notice are the discounts (listed under Discount column) to sub regions 1, 9 and 10 and the additional NV5 costs for the data preparation for the USGS DCA project that was awarded in 2024 (listed under the USGS Cost column). These scope changes will result in a reduction in costs totaling $78,132.38 and new costs for the USGS review totaling $222,145.72.

Base Contract Mod 8/5/2024						
Development of Region 1a	**Total # HU8s**	**#HU8 in 2024 DCA**	**Discount**	**USGS Cost**	**Original Price**	**Mod Price**
Sub region 1	5	2	$ 54,116.81	$ 11,691.88	$ 281,244.35	$ 238,819.42
Sub region 2	2	2	$ -	$ 11,691.88	$ 138,719.03	$ 150,410.91
Sub region 3	2	2	$ -	$ 11,691.88	$ 130,837.70	$ 142,529.58
Sub region 4	2	2	$ -	$ 11,691.88	$ 119,562.32	$ 131,254.20
Sub region 5	4	2	$ 87,181.10	$ 11,691.88	$ 99,635.55	$ 24,146.33
Sub region 6	2	2	$ -	$ 11,691.88	$ 76,392.91	$ 88,084.79
Total Region 1a	17	12	$ 141,297.91	$ 70,151.28	$ 846,391.85	$ 775,245.22
Development of Region 1b						
Sub region 7	2	2	$ -	$ 11,691.88	$ 64,536.46	$ 76,228.34
Sub region 8	2	2	$ -	$ 11,691.88	$ 162,212.74	$ 173,904.62
Sub region 9	2	2	$ 15,574.13	$ 11,691.88	$ 105,331.76	$ 101,449.52
Sub region 10	1	1	$ 8,441.44	$ 5,845.94	$ 56,757.10	$ 54,161.60
Sub region 11	3	3	$ 81,097.07	$ 17,537.82	$ 101,625.40	$ 38,066.15
Total Region 1b	10	10	$ 105,112.63	$ 58,459.40	$ 490,463.46	$ 443,810.22
Development of Region 2						
Sub region 12	1	1	$ -	$ 5,845.94	$ 115,291.08	$ 121,137.02
Sub region 13	1	1	$ -	$ 5,845.94	$ 150,982.27	$ 156,828.21
Sub region 14	2	2	$ -	$ 11,691.88	$ 152,007.05	$ 163,698.93
Sub region 15	1	1	$ -	$ 5,845.94	$ 92,384.28	$ 98,230.22
Sub region 16	2	2	$ -	$ 11,691.88	$ 170,011.15	$ 181,703.03
Sub region 17	2	2	$ -	$ 11,691.88	$ 113,407.31	$ 125,099.19
Sub region 18	2	2	$ -	$ 11,691.88	$ 82,767.75	$ 94,459.63
Total Region 2	11	11	$ -	$ 64,305.34	$ 876,850.89	$ 941,156.23
Development of Region 3						
Sub region 19	2	2	$ -	$ 11,691.88	$ 94,626.37	$ 106,318.25
Sub region 20	3	2	$ -	$ 11,691.88	$ 81,629.68	$ 93,321.56
Sub region 21	2	1	$ -	$ 5,845.94	$ 145,639.75	$ 151,485.69
Sub region 22	2	0	$ -	$ -	$ 67,886.14	$ 67,886.14
Sub region 23	2	0	$ -	$ -	$ 108,116.61	$ 108,116.61
Sub region 24	2	0	$ -	$ -	$ 92,759.67	$ 92,759.67
Sub region 25	1	0	$ -	$ -	$ 50,490.58	$ 50,490.58
Sub region 26	3	0	$ -	$ -	$ 125,460.50	$ 125,460.50
Sub region 27	2	0	$ -	$ -	$ 57,444.19	$ 57,444.19
Sub region 28	2	0	$ -	$ -	$ 113,520.49	$ 113,520.49
Total Region 3	21	5	$ -	$ 29,229.70	$ 937,573.98	$ 966,803.68
Total	**59**	**38**	**$ 246,410.55**	**$ 222,145.72**	**$ 3,151,280.18**	**$ 3,127,015.35**

Table 3: Option 1: Price changes associated with additional scope for NV5 to support USGS review for the following number of HU8 watersheds that will fall into the proposed DCA in 2025.

Development of Region 3	# HU 8s	Increase in Price	Mod Price
Sub region 19	0	$ -	$ 94,626.37
Sub region 20	1	$ 5,845.94	$ 87,475.62
Sub region 21	1	$ 5,845.94	$ 151,485.69
Sub region 22	2	$ 11,691.88	$ 79,578.02
Sub region 23	2	$ 11,691.88	$ 119,808.49
Sub region 24	2	$ 11,691.88	$ 104,451.55
Sub region 25	1	$ 5,845.94	$ 56,336.52
Sub region 26	3	$ 17,537.82	$ 142,998.32
Sub region 27	2	$ 11,691.88	$ 69,136.07
Sub region 28	2	$ 11,691.88	$ 125,212.37
Total Region 3	16	$ 93,535.04	$ 1,031,109.02

Table 4: Option 2: Price changes associated with additional scope for NV5 to support USGS review for the following number of HU8 watersheds that will fall into the proposed DCA in 2025.

Development of Region 1	# HU 8s	Increase in Price	Mod Price
Sub region 1	3	$ 17,537.82	$ 298,782.17
Sub region 2	0	$ -	$ 138,719.03
Sub region 3	0	$ -	$ 130,837.70
Sub region 4	0	$ -	$ 119,562.32
Sub region 5	2	$ 11,691.88	$ 111,327.43
Sub region 6	0	$ -	$ 76,392.91
Total Region 1a	5	$ 29,229.70	$ 875,621.55

STATE OF MICHIGAN
CENTRAL PROCUREMENT SERVICES
Department of Technology, Management, and Budget
320 S. WALNUT ST., LANSING, MICHIGAN 48933
P.O. BOX 30026 LANSING, MICHIGAN 48909

CONTRACT CHANGE NOTICE

Change Notice Number **3**

to

Contract Number **210000001620**

CONTRACTOR	
	NV5 Geospatial
	10033 MLK Street N, Ste. 200
	St. Petersburg, FL 33716
	Andrew Brenner
	734-680-6424
	abrenner@nv5.com
	CV0049662

STATE			
	Program Manager	Mark Holmes	DTMB
		517-285-6592	
		Holmesm3@michigan.gov	
	Contract Administrator	Sean Regan	DTMB
		(517) 243-8459	
		regans@michigan.gov	

CONTRACT SUMMARY

CONFLATION OF ATTRIBUTES FROM EXISTING NHD DATA TO THE NEW ELEVATION DERIVED HYDROGRAPHY FEATURES

INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE
October 1, 2021	September 30, 2026	5 - 1 Year	September 30, 2026

PAYMENT TERMS	DELIVERY TIMEFRAME
NET 45	

ALTERNATE PAYMENT OPTIONS			EXTENDED PURCHASING	
☐ P-Card	☐ PRC	☐ Other	☒ Yes	☐ No

MINIMUM DELIVERY REQUIREMENTS

DESCRIPTION OF CHANGE NOTICE

OPTION	LENGTH OF OPTION	EXTENSION	LENGTH OF EXTENSION	REVISED EXP. DATE
☐		☐		September 30, 2026

CURRENT VALUE	VALUE OF CHANGE NOTICE	ESTIMATED AGGREGATE CONTRACT VALUE
$4,411,892.23	$0.00	$4,411,892.23

DESCRIPTION

Effective January 1, 2024, the Contract pricing is being updated for sub region 5 & 11, per below.

All other terms, conditions, specifications, and pricing remain the same. Per contractor, agency and DTMB Central Procurement Services.

NV5 GEOSPATIAL

10033 MLK Street N., Suite 200. St. Petersburg FL 33716

Attention: Mark Holmes and Sean Regan

9/17/2023

Memo: Reduction of Scope for Subregions 5 and 11

Contract Name: GIS Development of Hydrography Features and Conflation from Existing NHD features.

Contract Number: 210000001620

Background: The project currently being completed by NV5 Geospatial (NV5G), (formerly Quantum Spatial) contractor number CV0049662, was previously worked on by another entity. This entity completed some of the sub regions associated with this work. It was however necessary for NV5G to make some adjustments to the dataset in order to bring it into compliance with USGS's 3DHP specification. At the time of contracting it was unclear the amount of work that would be required, so the contract was set up assuming the cost associated with the work being completed without any previous effort being expended.

It was acknowledged by both the State of Michigan and NV5G that once the datasets could be evaluated the costs associated with these subregions would be reduced as part of the contract modification process. NV5G has been able to do our assessment on the data sets and we have proposed a modification to the cost to complete the subregions below.

Reduction of costs

For sub region 5 NV5G will complete the sub region at 12.5% of the contracted cost.

For subregion 11 NV5G will complete the sub region at 20.2% of the contracted cost.

The details are shown in the table below.

Sub region	Contracted Cost	% of contracted cost that these data will be completed for	Revised Contracted Cost	Cost Saving
Sub Region 5	$99,632.55	12.5%	$12,454.44	$87,181.10
Sub Region 11	$101,625.40	20.2%	$20,528.33	$81.097.07
Total	**$201,260.94**		**$32.982.77**	**$168,278.17**

Please let me know if you have any questions.

Andrew Brenner

Andrew Brenner

Vice-President Solutions Engineering, 734-680-6424, Andrew.Brenner@NV5.com

STATE OF MICHIGAN
CENTRAL PROCUREMENT SERVICES
Department of Technology, Management, and Budget

320 S. WALNUT ST., LANSING, MICHIGAN 48933
P.O. BOX 30026 LANSING, MICHIGAN 48909

CONTRACT CHANGE NOTICE

Change Notice Number **2**

to

Contract Number **210000001620**

CONTRACTOR	
	Quantum Spatial, Inc.
	10033 MLK Street N, Ste. 200
	St. Petersburg, FL 33716
	Andrew Brenner
	734-680-6424
	abrenner@quantumspatial.com
	CV0049662

STATE			
	Program Manager	Mark Holmes	DTMB
		517-285-6592	
		Holmesm3@michigan.gov	
	Contract Administrator	Sean Regan	DTMB
		(517) 243-8459	
		regans@michigan.gov	

CONTRACT SUMMARY

GIS DEVELOPMENT OF HYDROGRAPHY FEATURES & CONFLATION FROM EXISTING NHD DATA

INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE
October 1, 2021	September 30, 2026	5 - 1 Year	September 30, 2026

PAYMENT TERMS	DELIVERY TIMEFRAME
Net 45	

ALTERNATE PAYMENT OPTIONS			EXTENDED PURCHASING	
☐ P-Card	☐ PRC	☐ Other	☒ Yes	☐ No

MINIMUM DELIVERY REQUIREMENTS

DESCRIPTION OF CHANGE NOTICE

OPTION	LENGTH OF OPTION	EXTENSION	LENGTH OF EXTENSION	REVISED EXP. DATE
☐		☐		September 30, 2026

CURRENT VALUE	VALUE OF CHANGE NOTICE	ESTIMATED AGGREGATE CONTRACT VALUE
$956,035.21	$3,455,857.02	$4,411,892.23

DESCRIPTION

Effective December 19, 2022, this Contract is increased by $3,455,857.02 for NV5G to develop hydrography features across watersheds and perform quality control, per the below statement of work.

The State of Michigan can remove any deliverable sub-regions that may have been completed by another Contractor. NV5G will also review any partial sub-region work and if portions of the work can be re-used, NV5G will discount an amount to that particular sub-region cost.

All other terms, conditions, specifications, and pricing remain the same. Per contractor, agency and DTMB Central Procurement Services and Administrative Board approval on 1/3/2023.

Elevation Derived Hydrography Feature Development and Quality Control

State of Michigan Phase 1 Workplan

Authors: **Andrew Brenner, Cathy Power, Tim Marcella**

Version: **1.0**

NV5 GEOSPATIAL

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Document Information

General Information

Project Name	Elevation Derived Hydrography Feature Development and Quality Control		
Prepared By	Andrew Brenner & Tim Marcella	**Document Version**	1.0
Title	Project Plan	**Document Version Date**	12/21/2022

History

Ver. No.	Ver. Date	Revised By	Description	Filename
1.0	12/21/2022	Andrew Brenner	Initial document.	Elevation Derived Hydrography Feature Development and Quality Controlv1 12212022.docx

Distribution List

From	Date	Contact Information
Andrew Brenner	12/21/2022	Andrew.Brenner@NV5.com
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Mark Holmes			holmesm3@michigan.gov

Acknowledgements

The state of Michigan is the sponsor of this project. Project concept, oversight, and funding were provided by the state.

Preface

This project plan is derived from Project Management Institute (PMI) Body of Knowledge (PMBOK) guidelines and describes NV5 Geospatial's (NV5G), approach to managing the Quality Control and EDH Data Creation workflow. Where applicable the standard established norms, methods, processes and practices will be followed with the intent of applying project management best practices. The objective of this plan is to decrease project risk by providing a comprehensive description of the tasks, technical activities and phasing, staff levels and critical paths.

Table of Contents

1 Introduction

The intent of the Project Management Plan is to present the detail required to successfully execute and control the project, facilitate communication among project stakeholders, and document approved baselines. The project plan is a living document and is expected to change over time as more information about the project is developed.

The approved Statement of Work (SOW) serves as the Project Charter to formally authorize the existence of the project. The approved SOW provides the project manager with the authority to apply organizational resources to project activities and contains the scope of work, the methodology, and approach to completing the scope of work along with a plan for staffing and quality control and the schedule of milestones, deliverables and key assumptions. These same topics are addressed in this Project Management Plan with details added and adjustments made where applicable.

2 Project Description

Today, Michigan has a statewide hydrography layer depicting rivers, lakes and streams that was digitized at 1:24,000 scale during the early the 2000s from USGS topographic quadrangles. At 1:24,000 scale, the location accuracy of features can be off as much as 40 feet.

This project would leverage Light Detection and Ranging (lidar) data that have been collected through aerial acquisition projects over the past four years and is at a Quality Level 2 (QL2), or better, to provide an accuracy of between 2 to 5 feet and with elevation accuracies on the order of 4 to 6 inches. New streams identified will be added to the existing dataset which will be used to update the Michigan Resource Information System (MIRIS) and, eventually, the USGS 3-Dimensional Hydrography Program dataset (3DHP).

The project will start with the development of the workplan that lays out the workflow, data schema, product details, schedule, and communication protocols. This will include the agreed-upon criteria for landscape settings and features (attributes for streams, waterbodies, flow obstructions, and springs), and will consider our plan to utilize existing data in the development of spatial attributes. This is especially important given the current development of the USGS 3DHP data model. The Team's process utilizes manual and automated techniques , for flow analysis, landform classification, object identification, and conflation. Based on our experience across many different landscapes, we expect and are prepared to modify rules and methods as necessary to best capture the hydrography across Michigan's various landscape types. During the workplan development process an initial subregion will be selected in coordination with the State of Michigan. Once complete, this data will be reviewed by project stakeholders via an established review portal. The review portal enables a large number of stakeholders to review the data created and allows any issues to be identified early in the process.

All our work follows guidelines outlined in the USGS Elevation-Derived Hydrography Representation, Extraction, Attribution, and Delineation Rules, as well as the Elevation-Derived Hydrography Acquisition Specifications, 2022 rev. A, detailed at the following websites, respectively:

https://pubs.usgs.gov/tm/11/b12/tm11b12.pdf

https://www.usgs.gov/ngp-standards-and-specifications/elevation-derived-hydrography-acquisition-specifications-table

Objectives

1) Download and reprocess all 3DEP lidar to 1 m specification
2) Review all data that has been acquired to date and identify any additional data needed
3) Create geomorphic layers from DEM and delineate water bodies
4) Hydro-enforce DEM using culverts information and flowlines
5) Automated flowline development
6) Manual editing and smoothing
7) Finalize geometry and addition of z values
8) Quality Control
9) Collaboration throughout the project with USGS to follow guidelines and standards for elevation-derived hydrography

3 Project Scope

NV5G will be responsible for:

- Reprocessing the bare earth DEM to 1 m
- Organizing and creating a database of ancillary data for the project
    - Any additional culvert outreach to the counties will be conducted by SoM staff
- Creation of geomorphon and water body boundaries based off the lidar
- Creation of a 3DHP compliant river and stream network
- Creation of a hydro-enforced DEM
- Attribution of network with z values
- Ensuring that datasets meet current 3DHP specifications

NV5G will work with the USGS to gather requirements and specifications to include in the methodology to make the data as compatible as possible for the future 3DHP data model, with the understanding that this data model is actively under development by USGS.

- Changes to these requirements and specifications during the contract cycle will be reviewed with the larger team and the implications on cost and schedule will be evaluated prior to adjusting workflows.

4 Project Team

Below are descriptions of the project team members and their roles (Figure 1). Full résumés for any staff members are available upon request.

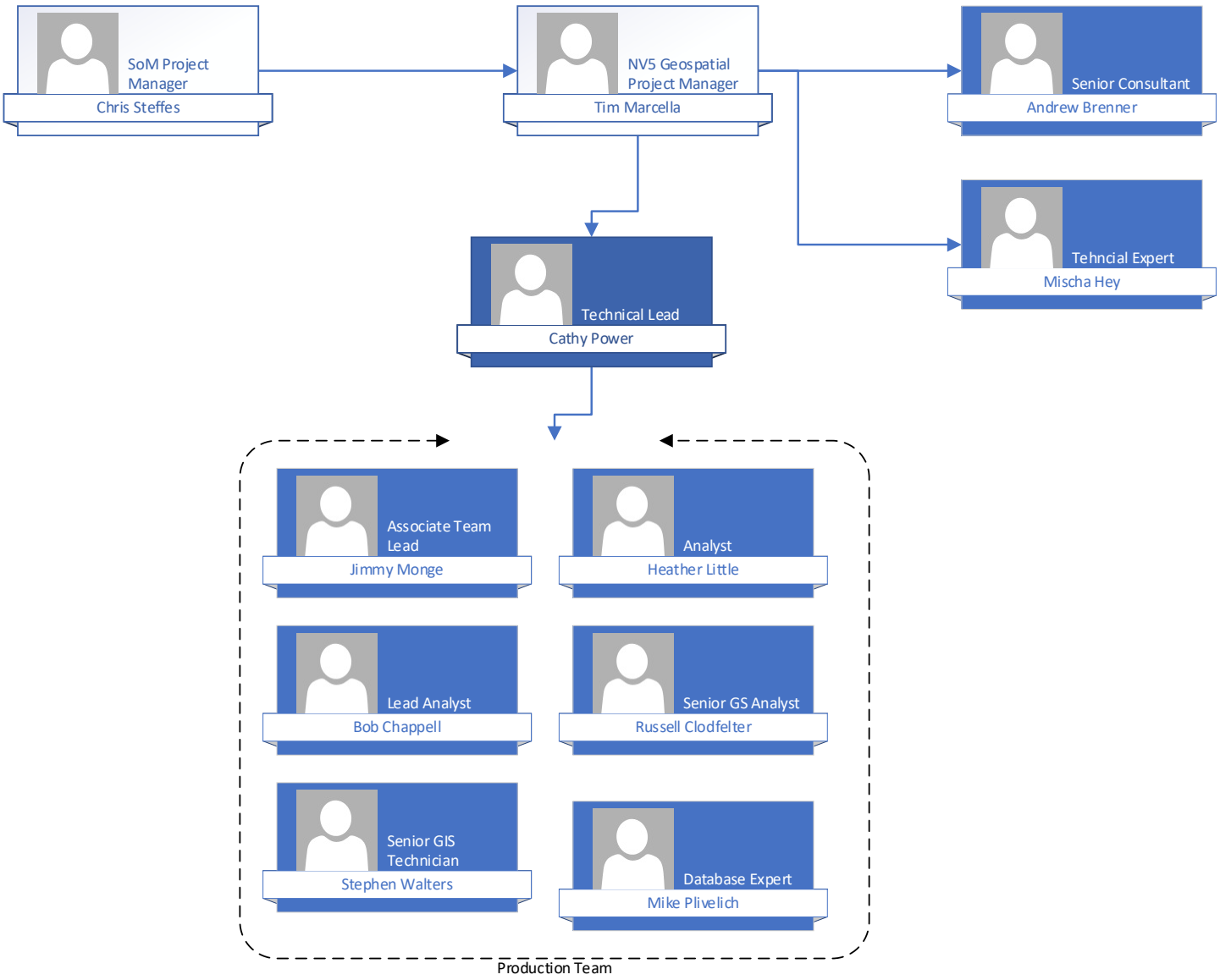

Figure 1: Key Project Team Members

Andrew Brenner – Senior Program Director: Contractor contract administrator who is responsible for (a) administering the terms of this Contract, and (b) approval and execution of any Change Notices under this Contract. Will also act as Senior Consultant on the Project.

Tim Marcella – Senior Project Manager: Contractor resource who is responsible to serve as the primary contact with regard to services, who will have the authority to act on behalf of the Contractor in matters pertaining to the implementation services, matters pertaining to the receipt and processing of Support Requests and the Support Services.

Cathy Power – Hydrography Technical Lead: Contractor resource who is responsible for leading the technical team that will perform the development of the hydrography deliverables including standards adherence, attribute conflation processes, accuracy testing, and quality control. Cathy Power has considerable knowledge and experience with developing GIS data, the USGS NHD model, and the USGS standards for developing hydrography from elevation data.

5 Communication Plan

The communication plan describes the regular format of communication with the primary project stakeholders. Our Team will use all forms of communication to include email, phone calls, video conference calls, in-person meetings, and webinars to ensure that all team members are kept informed of all that is occurring on a project. During the life cycle of the project, NV5G will coordinate the necessary meetings with the State of Michigan (SoM), and the USGS – as necessary. At this point, these meetings will be held, for the most part, virtually - via conference call.

Weekly Communication (Project Manager Meetings)

During the planning phase of the project, Project Managers from NV5G, and State of Michigan will convene for a weekly meeting via conference call/webinar to discuss/establish process details and project management expectations including but not limited to:

- Quality Management
- Data Handoffs
- Change Tracking
- Schedule of upcoming activities

As the processes are defined, this meeting will likely evolve into a scrum of scrums meetings to update on technical progress throughout the project.

Weekly Communication (Project Meetings)

A second weekly meeting is currently established as a placeholder to gather and discuss key topics and make decisions relevant to the SoM Hydrography Improvement Project at a technical level and will include members from all parties' technical teams to weigh in on decisions. These meetings are likely where any process changes will be evaluated for level of effort and schedule impacts.

Annual/ Bi-Annual Communication (Stakeholder Progress Presentations)

These meetings may be held in person should circumstances allow or virtually otherwise. All teams will check in on high level project goals and statuses and plan/prioritize for the upcoming year. This is anticipated to be an open discussion with not just the contractors and SoM, but with the larger stakeholder audience as well.

Ad Hoc Communications

Especially during the pilot phase of the project, additional meetings may be required with the SoM to work through the details of the schema and data management. These meetings will include targeted members of the team who can/will provide valuable input to continue the forward progress of the project. The scheduling of these meetings will be on an as needed basis.

Communication Tools

The NV5G production team uses the Monday.com board to track tasks and this will be used to track progress and deliveries between the project team and the SoM team. This board is updated in near real time by team members allowing for

constant up to date status review by the client. The SoM will be provided with credentials to view the progress summary dashboard associated with the task board.

A SoM MS Teams site has been created for this project with access granted to NV5G team members to share project-specific files such as the project plan, progress reports, and deliverables.

Project Management

The focus of the project management task will be to ensure effective, accurate, on-time and compliant deliverables within budget. The project team will work collaboratively with the SoM and partner agency stakeholders to achieve project objectives. The Scrum framework will be used to manage project activities. The project team is familiar with the Scrum framework and understands the value it provides for effective communication and as a foundation for managing the many priorities and dependencies of a large scale (both size and duration) project.

The NV5G PM and the SoM PM are responsible for building the product backlog, which is a list of the work products to be delivered by the team. The SoM Product Owner prioritizes the product backlog with input from the team. The team works in month long increments, known as Sprints. During the Sprint Planning meeting the team selects and discusses the highest priority backlog items and commits to completing the tasks associated with developing the product, which constitutes a deliverable or portion thereof. At the end of each month, stakeholders are invited to attend a review meeting during which the development team presents the work products advanced or completed during the Sprint. The team iterates through the backlog until all deliverables have been submitted as illustrated in Figure 2 below.

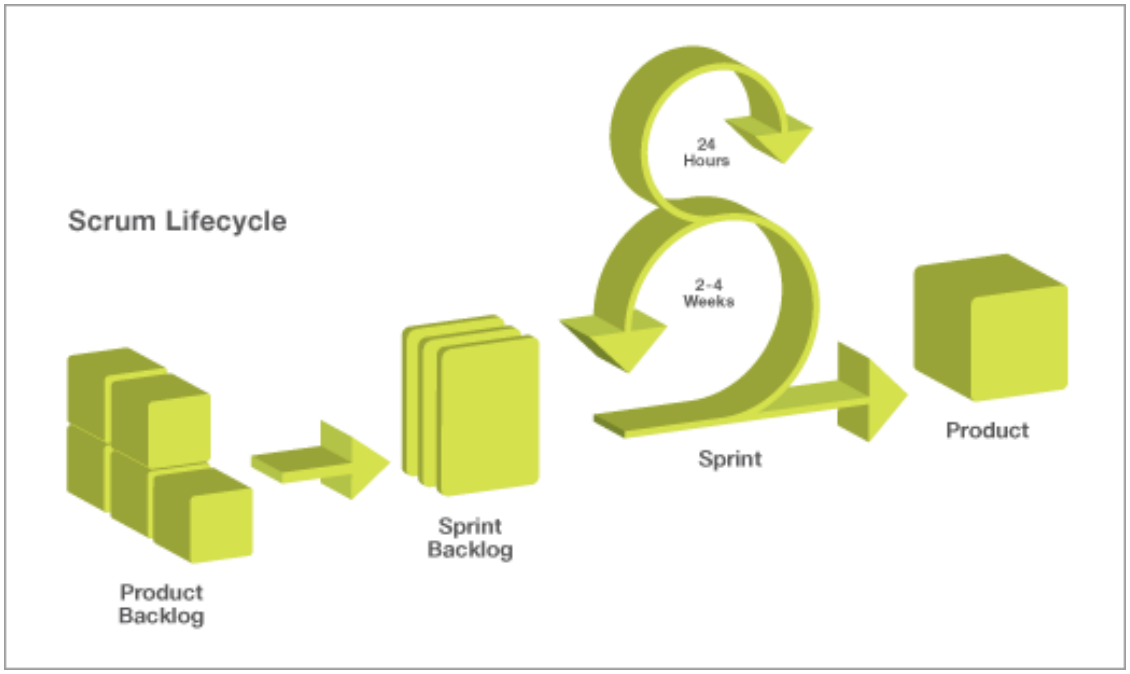

Figure 2: Scrum Lifecycle

6 Quality Management

NV5G treats quality management with a process-based approach integrated into all components of a project. This proactive process is designed to prevent errors and ensure usability and requirement conformity. The NV5G Project Manager oversees QA throughout the project and will coordinate with the project team to ensure all questions and issues relating to the project requirements and expectations are properly addressed and documented. The Scrum-based implementation of project management helps re-enforce this process and culture.

Figure 3 displays a typical workflow for each of the deliverables associated with the project. These deliverables may come in the form of documents, databases, or other formats, but each will receive the same processing from a QC perspective. The list of project deliverables and the acceptance criteria for each will be based on the requirements listed in the Statement of Work. NV5G will work with the SoM to develop and implement the QC procedures to validate deliverables. The SoM will approve or reject each deliverable and NV5G will redeliver as needed and place final accepted deliverables on the Teams site.

Acceptance criteria should include, but is not limited to, the final list of attributes intended for the SoM version of the data base and the rules associated with populating any of the SoM specific attributes (calculation methods, transfer sources, left empty for now, etc.).

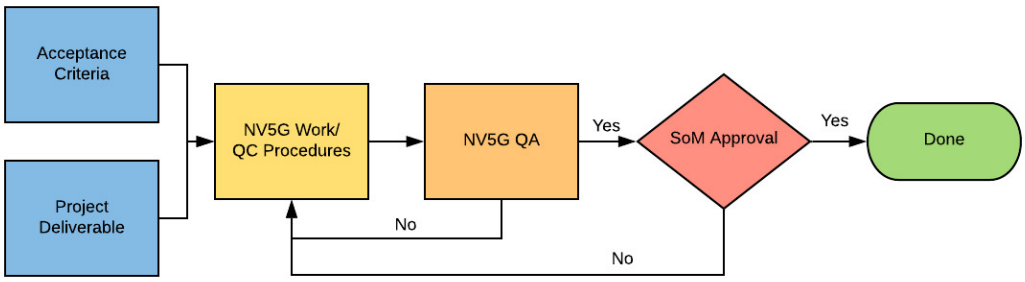

Figure 3: Quality Control Process for Deliverables

For the Michigan Hydro project, NV5G has integrated QC measures into every step of the project approach and methodology. These measures ensure that we can provide the highest quality datasets and services and facilitate a culture of continuous improvement. Examples of these quality control measures are described below and the implementation of them are incorporated into Section 7.

Standard Operating Procedures (SOPs) – NV5G has developed and implemented SOPs to standardize technical work. These documents are updated continuously and will be followed by the team for the duration of the project.

Resource Management - As much as possible we will aim to resource the same staff to perform the same workflow steps to ensure consistency in our processing. All information relating to data quality will be reviewed by higher-level technical staff.

7 Approach to SOW Tasks

1) Download and reprocess all 3DEP lidar to 1 m specification

The Team will obtain the deliverables associated with the 3DEP compliant lidar acquired for the State. The lidar point cloud will be reprocessed into a 1 m bare earth DEM. This will achieve two objectives. First, it will ensure that the data are generated with the 3DHP compliant source data. Secondly it will remove some artifacts that exist in the 2 ft DEM (See Figure 4).

Figure 4: The 2 ft DEM contains some artifacts such as the lines visible in the bare earth that require correcting before hydro-enforcement can be undertaken.

Also, QC tools build by NV5 Geospatial and USGS assume a 1 m DEM. There is not expected to be any decrease in accuracy in the resulting dataset as a result of reducing the DEM resolution. If necessary linework from MSU will be reprocessed to align with this DEM, this is discussed in the linework section. Costs associated with this reprocessing will be based on an assessment of MSU's linework.

Other data utilized include breaklines and lidar intensity. Although all data have passed through USGS QC, in flat areas where there is significant vegetation cover, the bare earth DEM can be of variable quality. Since the Team has the capability to analyze the data from the original point cloud, we will use this capability when it is needed for the program.

2) Review all data that has been acquired to date and identify any additional data needed

NV5 Geospatial recognizes that MSU and SoM have collected a large amount of data from stakeholders and partners. We expect these data to be transferred to NV5G in an ordered fashion. NV5G does not expect further outreach to counties as part of this scope and that if additional information is collected at the county level, this will be done by the SoM staff.

NV5G will create a Program Database that contains all the required source data and the intermediate, draft, and final databases. The initial database will be created to store the input data. The input data will include but not be limited to:

1. Culvert Features: These data will be either provided by MSU or the State. This will form the basis for the Comprehensive Culvert Inventory (CCI) for the AOI that will result from the project. SoM will conduct webinar with local stakeholders every six months to communicate the need for culverts and any other existing data that might already exist that could benefit the project. NV5 will have a staff member attend those webinars to answers any questions or understand what data might be available that can help the project.
2. Orthoimagery: The Team will utilize existing 12-inch leaf off orthoimagery to review and quality control the data. When necessary, imagery will be downloaded from the state to run through classification routines required for delineation of lakes and ponds. The Team will also be able to access the most recent USDA NAIP imagery for review.
3. Existing NHD: The Team will download and assess the current NHD High Res Plus for the program area. These data will be used for quality control, attribution of the output dataset, and reference for the program.
4. Roads and Railroads: Road and railroad data will be downloaded the from the State. These data will be used to support the hydro-enforcement of the DEM and additional culvert classification. We will work with the SoM to identify if there are other datasets that should be utilized.
5. Levees and Dams: These data will be obtained from the relevant agencies and used for the identification and labeling of the network water features.

6. National Wetlands Inventory: Although the delineation of wetlands is not part of the scope, wetlands are highly connected with the hydrography. NV5G will review the current work being undertaken by Duck's Unlimited to see where it adds value to the program. Evaluation of wetlands data should promote future agreement between the two hydrography datasets, which is the long term goal of the program.
7. Other Supporting Data: The inventory of data listed above is comprehensive but other information may be needed to verify and attribute the dataset. This may include things like underground stormwater systems.

Urban infrastructure integration is not anticipated to be part of the project; however, rules will be developed based on how to deal with flow through urban environments. All data used in the program will be detailed in our reporting to the State.

3) Create geomorphic layers from DEM and delineate water bodies

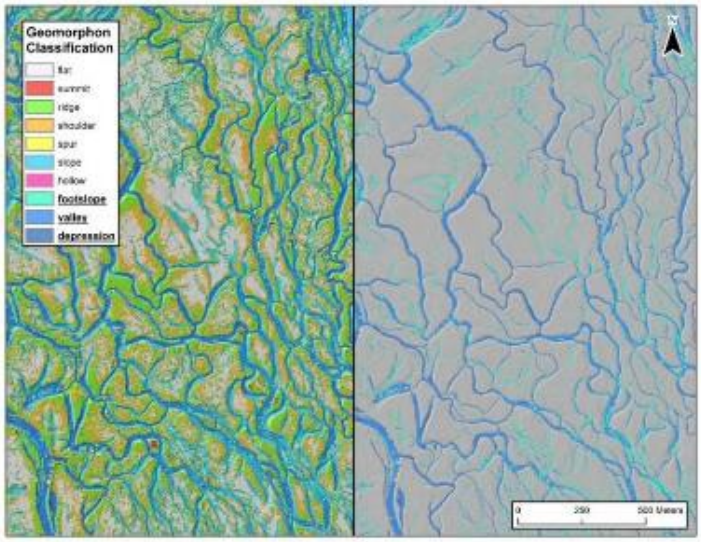

Figure 5. Geomorphons generated by NV5G for a Texas flood plain.

To begin the surface flowline extraction, the input hydro flattened bare earth DEM from the database will be processed. This process will use de-noising and filtering routines that are run to remove fine-scale DEM noise elements that cause errors in flow direction and geomorphon development. Landform detection routines (geomorphons) are then run on the data classifying the landscape into discrete landscape classes such as pit, valley, peak, etc., that can be used to support the subsequent analyses. Geomorphic classification is used to both define the rough channel skeleton aiding in hydro enforcement as well as identifying any finer scale omission or commission errors in the initial flowlines.

Water body delineation is undertaken at the start of the project so that it is ready to be included in the network creation described below. The level of effort of the flat and sloped water delineation tasks will depend on the degree of original lidar break line collection and will vary by watershed. The breakline dataset provided by the lidar vendor is not sufficient for hydrography delineation to the current USGS specification having only captured Lake/Ponds greater than 2 acres and Stream/Rivers nominally 30 m wide. The EDH specification requires Lake/Ponds capture down to an approximately 0.4-acre threshold and Stream/Rivers capture of those streams nominally 15 m wide, depending on length. The EDH specification also requires collection of all previously existing NHD features that are still visible in the ground model/imagery; including many Lake/Ponds below the 0.4-acre threshold as otherwise this would result in an unnecessary loss of data. NV5 Geospatial, has developed an approach to rapidly delineate

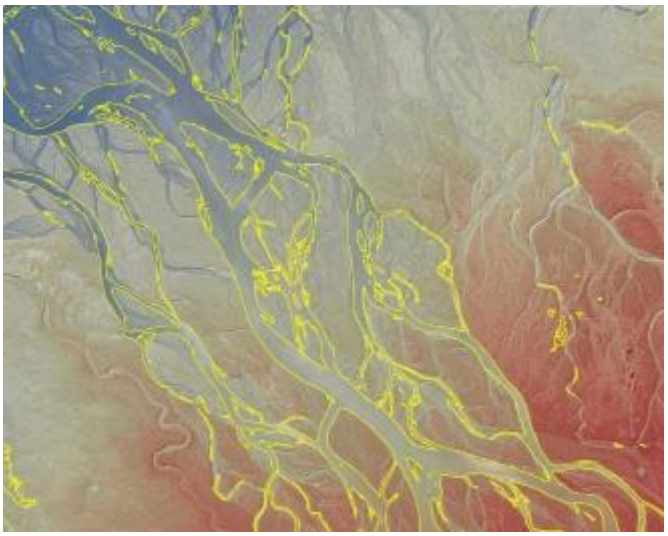

Figure 6. Automated delineation of water body and wide stream boundaries from lidar intensity and imagery.

breaklines from lidar intensity and available imagery down to these lower thresholds to allow complete breakline collection. NV5 Geospatial will utilize its automated object-based image analysis (OBIA) routines to delineate the water edge and then review the output with manual inspection and cleanup of any missing or mis-mapped features (Figure #). The OBIA approach starts with lidar derived terrain descriptors including intensity, slope, and point density to create area polygons of homogeneity within the data. The classification routine then beings to discriminate between known water and known land and iteratively classifies water based on physical and spectral information and contextual relationships. This approach produces consistent and reproducible outputs that are of greater detail than hand drawn polygons. Single elevations will be assigned to lake/pond and reservoir features while stream/rivers and ditch/canals with detectable slope will have monotonic flow enforced. The output from this task will be water polygons that will later be integrated with the surface flowlines.

We are aware of the differences between the National Wetlands Inventory specifications and the 3DHP. We are working with both organizations to better understand how these datasets can be integrated into one seamless database. In this effort we are working closely with our partners and any work that Duck's Unlimited can provide. The datasets that will be produced by our team as part of this project will be built with a plan on how they will integrate into a seamless dataset with the NWI. NV5 will attend meetings with NWI/Ducks Unlimited every other month to coordinate work and discuss any data sharing that might benefit both initiatives.

4) Hydro Enforce DEM using culverts and manual review

Using the two processes described above the hydrologic network is created by hydro-enforcing the DEM. This is necessary to verify that water runs downhill and is not blocked by false obstructions or incorrectly routed due to a lack of channel definition in the lidar DEM. The process includes:

a) Flatten the water elevation in polygons and double line streams. The original QL2 DEMs will be flattened for Lakes/Ponds >2 acres and Rivers > 15 m, however EDH specifications will require additional flattening at a resolution that exceeds those of the original lidar breaklines.

b) Edit the water body shoreline interface so they are consistent with the surrounding terrain, e.g., smooth transition from water to shore if the surrounding terrain is flat or of low slope

c) Connect all water courses through bridges and culverts, ensuring continuous downstream flow

d) Resolve and eliminate puddling or false depressions that may affect downstream flow direction

e) Enforce drainage so that all streams flow downhill in the proper direction

Hydro-enforcement is an iterative process where the locations of water puddling or incorrectly routed flow will be identified, rectified and then the assessment rerun. The geomorphon approach discussed above supports the identification of stream channel misrouting and where to breach roads or other flowline obstructions. The other primary datasets used to support this process are the roads and culverts layers. These layers will be acquired to the maximum extent possible and merged into a statewide database. Although stakeholder supplied data is helpful for hydro-enforcement, it cannot be relied on to be exhaustive or positionally accurate in all cases. The Team has developed processes that iteratively identifies and breaches artificial barriers supporting the additional culvert/barrier capture that will be necessary. One critical element of hydro enforcement is to verify that the culvert/hydro enforcement lines are

identified to their full extent. If this is not done correctly the barrier may not fully be breached and flow may still be misdirected.

An additional approach that we have found necessary during the hydro-enforcement process in low slope areas is the iterative filling of sinks to determine where the actual outlet of an area is and which way the water will flow. The blanket filling of sinks, especially in areas of wetlands and flat ground can lead to significant errors in network flow direction. Our team's experience will help guide the mapping of the network, so water moves appropriately across the landscape. This will be a particular challenge in SE Michigan.

The Team has developed a series of automation tools to support these tasks but emphasizes that it is essential to include expert manual review of any automated processes and review the full network before proceeding to the next stage of network delineation. We have not seen any fully automated method of hydro-enforcement that provides results acceptable when considering the USGS specifications for this data.

The Team has developed a workflow system that verifies consistency in editing and review across large programs using a scalable distributed team that will be implemented at the start of hydro-enforcement review. This workflow provides speed and quality assessments of individuals within the team and three levels of QC of the data. The net result is problem identification before it can impact the overall quality of the data delivered to the client. The system is focused on providing the editor the information needed to make necessary decisions regarding data generation while constraining the decisions possible to adhere to end data structure.

Comprehensive Culvert Inventory: The Team understands that culverts are essential not just for hydrography delineation, but for many other water management activities. To this end, we will develop a Comprehensive Culvert Inventory (CCI) for our project area. Culvert features are essential for accurate water flow analysis, and the Team will compile and standardize existing culvert data from local (county), State, and Federal government agencies. It should be emphasized that the process that NV5 Geospatial undertakes will identify all barrier to flow. The provided culvert data act as a complement to the identification of blockages that are culverts in the landscape.

As the spatial and attribute accuracy of these culverts will be variable, the new CCI will be designed to retain the key attributes in the original inventories but standardize the available attribution and refine the spatial locations as necessary for hydrography. The CCI will include culverts that travel below roadways, driveways, field access pathways and other barriers to water flow. The dataset will also contain "false" culverts indicating barriers such as vegetation or felled trees over drains such that the DEM does not accurately represent flow direction. These "false culverts'' will be identified in the attribution fields. Culvert features will be individual line features of varying length and direction.

The result will be a new Statewide asset dataset representing public and private culverts obtained with high confidence from a combination of previously collected data, lidar, and high-resolution ortho-imagery. This Comprehensive Culvert Inventory will be provided to the State as a final deliverable. The dataset will include the original database information as well as the source database. New culvert attribute information will not be included, but the database will have the capacity to store the information when provided by the local stakeholder. Often stakeholder-provided culvert data lacks the spatial accuracy required of hydro-enforcement and so the new CCI will have the culvert in the required location for hydro-enforcement which may differ from the client supplied location.

5) Automated flowline development

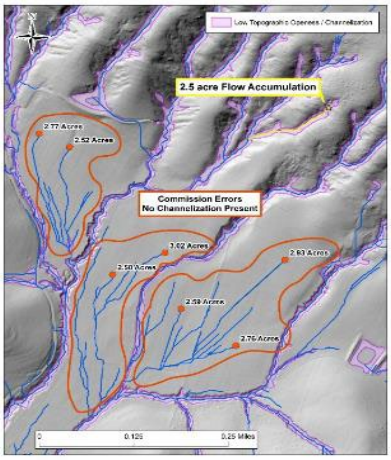

Figure 7. Lines delineated from flow accumulation that have no channels can be identified using geomorphons.

Once all artificial barriers to flow have been removed from the DEM, flow direction and flow accumulation rasters are generated and analyzed to determine an appropriate flow accumulation threshold for stream initiation. This uses the cumulative number of cells flowing into a specific cell to define whether there is surface water flow. The flow accumulation threshold for stream initiation/definition is not predetermined but is set based on reference to the current NHD, the geomorphon information, and imagery. The suitable flow accumulation threshold for stream definition will vary by area based on the character of the specific landscape. If too high a threshold is selected, there will be many omission errors. If too low a threshold will result in excessive commission errors; specifically, many false streamlines with no evidence of actual flow in the lidar ground model. Our experience tuning the flow accumulation to the reality of the landscape is critical to the success of this statewide project where hydrography will need to be extracted from many different landscape types.

Once the stream definition criteria are set, a stream raster can be derived from the flow accumulation raster and then converted into a polyline feature. The data is then compared to the current 1:24,000 scale NHD reach file. Singular omission errors are corrected using a lower flow accumulation threshold for the isolated area, however if it is found that many omission errors exist, the flow accumulation threshold used for stream definition will be lowered for the hydrologic unit and stream polylines regenerated. The data is then also analyzed for commission errors. Initial stream segments must at a minimum have a detectable channel in the DEM or be required to connect detectable channels to be developed for inclusion.

Channelization information from the geomorphons and topographic openness can be used to rapidly remove false streams allowing for a lower flow accumulation threshold to be used and therefore more complete mapping of ephemeral and headwater streams (Figure 7).

This manual review is necessary to obtain quality results usable to the widest variety of data users and verify that Michigan receives a detailed base hydrography dataset.

To model water flow through the hydrologic network and create a 3DHP compliant dataset, artificial path flowlines need to be created through the previously created lake and stream polygons (covered above). The process for creating the centerline for the flat and sloped water polygons uses an automated process developed by NV5 Geospatial. Our solution utilizes Delaunay triangulation in an iterative manner until a single flow line is created that will represent flow through the center of that polygon. The output of this routine is then manually QC'd to verify adherence with USGS Artificial Path standards.

Polygon-derived flowlines must be connected to the stream network to connect the full hydrologic network. This will be achieved by first removing the direction-based stream network line features from inside the polygon features and then developing links from stream network to polygon centerlines though Euclidean distance analysis. The Team has developed a proprietary process to perform this integration and reclassification that adheres to the USGS specifications. Once the lines are connected the entire system will be validated using automated geometric network tests to verify that there are no breaks in the network and that water can flow from the headwaters to the main branch of the river system. The output from this step is the full topologically correct hydrologic network at the local scale.

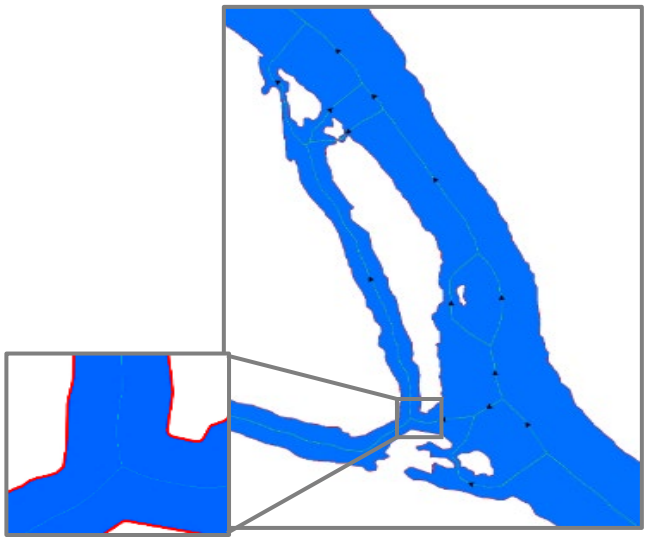

Figure 8. Lake and river centerline delineation for sloped and flat water bodies.

When the dataset is completed the low flow accumulation lines, i.e. those that don't meet the criteria for integration of the lines into the 3DHP will be provided as a separate dataset to the SoM for storage and use in very specific use cases.

6) Manual editing

Adherence to the "Elevation-Derived Hydrography: Acquisition Specifications," "Elevation-Derived Hydrography: Representation, Extraction, Attribution, and Delineation Rules," and geometry, topology, and attribution rules are continually monitored throughout data creation. There are four levels of QC before the data is released to the client

- Level 1: Trained analysts will process edited data through internal QC tools developed by NV5 prior to handoff for secondary review. This ensures all primary edits have improved horizontal positioning and hydrologic connectivity without introducing unintended errors.
- Level 2: Production team members will review each other's work weekly during the editing process. This allows for internal calibration of feature collection and interpretation.
- Level 3: Production supervisor will review all analysts' work and compare productivity and quality against benchmarks set for the project. Deviation from benchmarks will identify staff that require additional training or supervision.
- Level 4: The final dataset will be reviewed by the production quality control lead before being submitted to the client. This review will verify metadata and the data format, extent, and quality are signed off on before submission.

While major parts of the workflow can be automated, it should still be stressed that manual review and correction will still be necessary for this step in the process representing the bulk of the labor for the project.

7) Finalize geometry

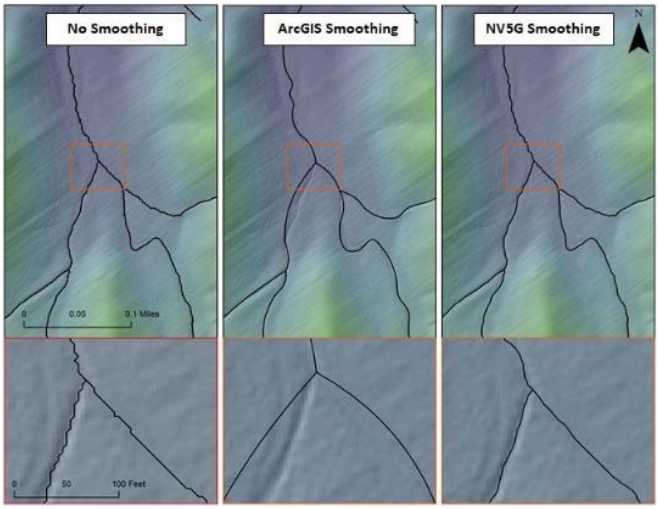

Figure 9. NV5 Geospatial uses a custom smoothing routine that removes vertices but keeps the river in the riverbed, producing a valid cartographic and analytic product.

Flowlines developed through automated analysis of raster elevation models retain artifacts from the cell-to-cell nature of the directional flow computation. These artifacts manifest as zigzags or sharp bends in the flowlines. Traditional smoothing and generalization procedures can shift flowline locations outside of the actual channel. Therefore, once all manual review is complete, NV5 Geospatial will perform custom smoothing routines (Figure 9) designed to produce a more natural aesthetic character of the streams. This process also eliminates unnecessary vertices and regulates vertex spacing while critically preserving locational accuracy which is necessary for adding elevation information and ensuring good vector and raster alignment. The output of this smoothing routine has been utilized in our work for USGS and is an approved method for smoothing raster artifacts while preserving positional accuracy.

Once the full network has been X,Y smoothed, Z values for all surface flows are extracted from the hydroflattened bare earth DEM and attached to both the linear and polygonal network features. For surface flow features, once the elevation is extracted to feature vertices, monotonic flow (ensuring that the network allows continuous downhill flow based on elevation values) is enforced throughout the network such that any elevational change to a vertex is thus propagated through the entire network preserving agreement in all intersecting line nodes. The output from this step are lake and river breaklines and stream flowlines that are attributed with elevation information, adhere to downstream flow requirements, and preserve topological agreement in XYZ.

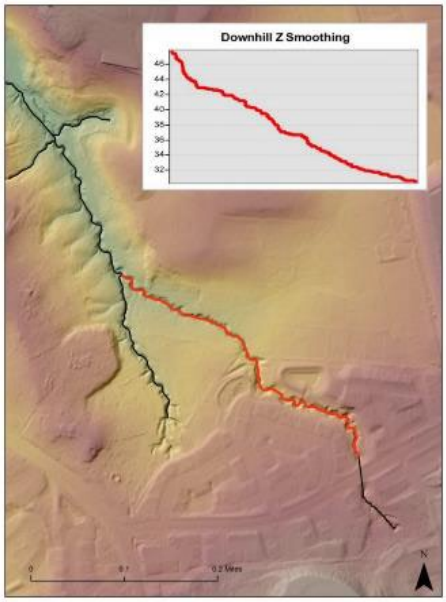

Figure 10: Custom smoothing routines allow for monotonicity.

8) Quality Control

The team sees Quality Control as a priority to ensure a first-time right data delivery. The quality control processes for development of 3D Hydrography for USGS are integrated throughout the data development lifecycle. QC and data development are performed concurrently such that potential errors early in the development process are caught and corrected so they do not propagate through subsequent steps of data production. The Team has developed numerous tools supporting both development and QA/QC. These include:

a) Automated channel detection routines to minimize both omission and commission errors in the feature capture,

b) Line network and polygon integration processes to verify both topological node agreement as well as correct feature classification,

c) Customized smoothing routines to preserve locational accuracy of the linework while removing rasterization artifacts and reduce feature vertices,

d) A monotonic flow utility which forces vertex elevation to be downhill while propagating any vertical adjustments throughout the entire network to verify vertical agreement between all network features,

e) Transect based analysis process which identifies line locations which may deviate from the channel bottom due to sink filling or single cell directional errors in the source DEM.

Beyond the above utilities, the data undergoes multiple rounds of visual inspection by experienced analysts to verify the feature capture, location, and classification. Our work with USGS on other EDH projects, specifically in CONUS, has also informed us of the various quality checks and thresholds USGS is developing and performs on and EDH datasets allowing us to replicate those same QC tests on our end. Given the scale of the project, the Team plans to implement a distributed processing and editing framework in the cloud that we initially developed for landcover analytics and have adapted for hydro network extraction. This system supports consistent interpretation between analysts and highly efficient data handling allowing for rapid, scalable processing utilizing open-source libraries.

Review of the data by stakeholder and the State is critical to the success of the project to this end the Team has developed a data review portal that allows multiple stakeholder the opportunity to provide feedback to the production team in a timely fashion.

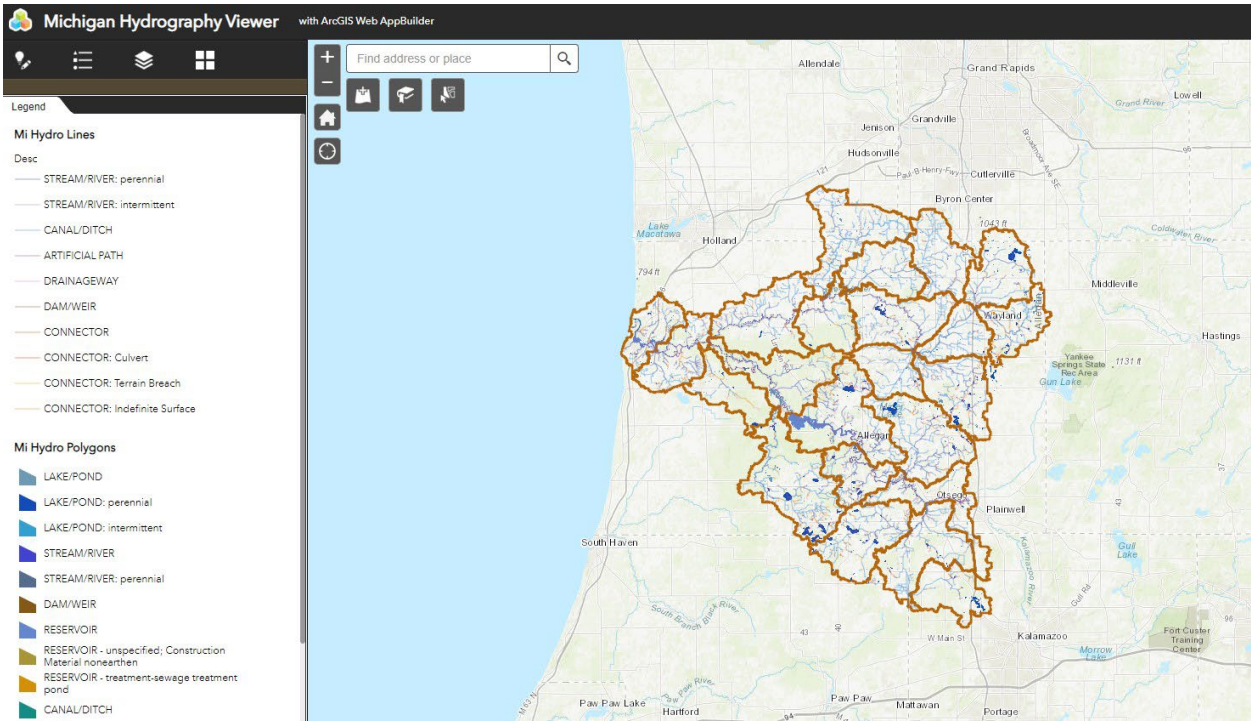

Figure 11. NV5 Geospatial developed a portal that allows interactive review of the draft 3DHP data with stakeholders.

This portal is set up with username and password access, allowing multiple stakeholders to review and provide focused feedback on the dataset. Figure 11 shows a portal set up for hydrography review for the State of Michigan hydrography improvement project. Reviewers will interact with data through a web portal where they can provide input and share local knowledge. Input from stakeholders is controlled through the system to provide data that can be used to support any

updates requested, and all edit suggestions are reviewed, and if appropriate within the guidelines of EDH data development standards, are completed by the production team. This system allows the production team to work closely with local experts from the start of the project to get buy-in and incorporate as much local knowledge as possible. The workflow for review will need to be worked out with SoM. It is envisaged that the same viewer will be used for both line and attribute review by the larger stakeholder group, however the dedicated data reviewers at the state may prefer to receive the data and review it within their own infrastructure. The details of this can be worked out after contract award.

9) Collaboration throughout the project with USGS to follow guidelines and standards for elevation-derived hydrography

It is fully acknowledged that the 3DHP specifications are in development. As USGS contractors we are confident that we have a good understanding of the current specifications and the direction USGS is taking the program. As a continued partner, we work closely with USGS on many projects and will be cognizant of any news from USGS that may change our workplan. Any changes that impact this program will be brought to the steering committee and will be discussed and if necessary, worked into the plan of work and handled through change management protocols.

8 Deliverable Schedule

This project will have milestones/deliverables associated with each subregions, see Table 1. Due dates for the regional data development will be determined incrementally throughout the project with all project stakeholders. The current delivery schedule is laid out from Subregion 1 to Subregion 28. It is understood that this will not be the final order. NV5G will work with SoM to prioritize subregions prior to the start of work. The current working assumption is that the contract will be signed by January 15th, 2023. In subregions or HUC 8s where additional funding may be sought, purchase orders for those deliverables may be issued at future times within the project and not at the initial start of this scope. Purchase orders will only be issued for sub-regions or HUC 8s, if funding is available for those subregions. The goals of the work will be to complete the program over a period of three and a half years from this date. The initial deliverables for all subregions should be delivered to SoM by the end of June 2026. The cadence would be to develop 10 HU8s which is around 5 Subregions in Year 1, this would ramp up to around 10 sub regions for Years 2 and 3. The contract duration should be set for 4 years to allow for any modifications that occur after final submission. SoM has the opportunity to remove any deliverable sub-regions that may have been completed by Michigan State University (MSU) that has been reviewed by NV5G. NV5G will also review any partial sub-region work and if portions of the work can be re-used, NV5G will discount an amount to that particular sub-region cost.

- Areas completed by MSU (*)
- Areas with partially completed data by MSU (**)

Table 1: Deliverable Schedule

Deliverable ID	Task	Due Date
1	Project Kickoff	1/21/2023
2	SOW 1 Project Plan	1/30/2023
3	DEM Reprocessing	2/28/2023
4	NV5G ingestion of ancillary data that has been collected	Ongoing

	Sequence of sub region deliveries to be determined with SoM
5	Hydrography Development Sub region 1**
6	Hydrography Development Sub region 2
7	Hydrography Development Sub region 3
8	Hydrography Development Sub region 4
9	Hydrography Development Sub region 5*
10	Hydrography Development Sub region 6
11	Hydrography Development Sub region 7
12	Hydrography Development Sub region 8
13	Hydrography Development Sub region 9**
14	Hydrography Development Sub region 10**
15	Hydrography Development Sub region 11**
16	Hydrography Development Sub region 12
17	Hydrography Development Sub region 13
18	Hydrography Development Sub region 14
19	Hydrography Development Sub region 15
20	Hydrography Development Sub region 16
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26	Hydrography Development Sub region 22
27	Hydrography Development Sub region 23
28	Hydrography Development Sub region 24
29	Hydrography Development Sub region 25
30	Hydrography Development Sub region 26
31	Hydrography Development Sub region 27
32	Hydrography Development Sub region 28

9 Issue/Risk Management Process

Project concerns/issues/risks are to be documented in a spreadsheet and shared with the project team so that they can be monitored by all parties and updated as required. The following general procedure will be used to manage project issues and risks:

1. Identify and document
2. Assess impact and prioritize
3. Assign responsibility
4. Monitor and report progress
5. Communicate issue resolution

10 Change Management

During the project, either party may request in writing additions, deletions, or modifications to the services described in the SOW ("change"). NV5G shall have no obligation to commence work in connection with any change until priorities and schedule impacts are agreed upon by both parties and documented in a shared change log maintained on the SoM Teams site. Changes that may incur a large cost or schedule impact will need to be reviewed and approved by the NV5G Account Manager.

Upon receiving a request for a change, NV5G will evaluate all relevant factors and detail the change in the Change Log including a description of the change, the impact of the change on the project schedule, the impact on project priorities, and any potential for increased level of effort. After review and discussion, the SoM may accept or reject the change. If accepted, NV5G will move forward with implementing any newly required elements into our standard workflow. If a requested change should result in a cost change, the appropriate contract modification channels will be followed to do so.

This process ensures that all system changes are documented and reviewed before implementation, and that the actual implementation is tracked throughout the lifecycle of the change request.

11 Pricing

Task	Price	Comment
Project Management, Quality Control	Original $266,643.78 *– Discount $20,000* *Final $264,643.78*	This is spread across duration of project
DEM reprocessing	$32,433.07	This is necessary to speed up production and make it compliant
Database preparation	$25,500.00	Getting started up with the database
Development of Hydrography Features - Region 1 – Sub-regions 1-6	$846,391.85	This is for the whole Sub-region
Development of Hydrography Features - Region 1 – Sub-regions 7-11	$490,463.46	This is for the whole Sub-region
Development of Hydrography Features - Region 2 – All Sub Regions	$876,850.89	This is for the whole Region
Development of Hydrography Features - Region 3 – All Sub Regions	$937,573.98	This is for the whole Region
Total Costs	**$3,475,857.02**	

Development of Region 1a	**Price**	
Sub region 1	$281,244.35	Reassess price once MSU data has been assessed
Sub region 2	$138,719.03	
Sub region 3	$130,837.70	
Sub region 4	$119,562.32	
Sub region 5	$99,635.55	Reassess price once MSU data has been assessed
Sub region 6	$76,392.91	
Total Region 1a	**$846,391.85**	
Development of Region 1b		
Sub region 7	$64,536.46	
Sub region 8	$162,212.74	
Sub region 9	$105,331.76	Reassess price once MSU data has been assessed
Sub region 10	$56,757.10	Reassess price once MSU data has been assessed
Sub region 11	$101,625.40	Reassess price once MSU data has been assessed
Total Region 1b	**$490,463.46**	
Development of Region 2		

Sub region 12	$115,291.08
Sub region 13	$150,982.27
Sub region 14	$152,007.05
Sub region 15	$92,384.28
Sub region 16	$170,011.15
Sub region 17	$113,407.31
Sub region 18	$82,767.75
Total Region 2	**$876,850.89**
Development of Region 3	
Sub region 19	$94,626.37
Sub region 20	$81,629.68
Sub region 21	$145,639.75
Sub region 22	$67,886.14
Sub region 23	$108,116.61
Sub region 24	$92,759.67
Sub region 25	$50,490.58
Sub region 26	$125,460.50
Sub region 27	$57,444.19
Sub region 28	$113,520.49
Total Region 3	**$937,573.98**
Total	**$3,455,857.02**

This includes discount on PM costs

STATE OF MICHIGAN
CENTRAL PROCUREMENT SERVICES
Department of Technology, Management, and Budget
320 S. WALNUT ST., LANSING, MICHIGAN 48933
P.O. BOX 30026 LANSING, MICHIGAN 48909

CONTRACT CHANGE NOTICE

Change Notice Number **1**

to

Contract Number **210000001620**

CONTRACTOR	
	Quantum Spatial, Inc.
	10033 MLK Street N, Ste. 200
	St. Petersburg, FL 33716
	Andrew Brenner
	734-680-6424
	abrenner@quantumspatial.com
	CV0049662

STATE			
	Program Manager	Mark Holmes	DTMB
		517-285-6592	
		Holmesm3@michigan.gov	
	Contract Administrator	Sean Regan	DTMB
		(517) 243-8459	
		regans@michigan.gov	

CONTRACT SUMMARY

CONFLATION OF ATTRIBUTES FROM EXISTING NHD DATA TO THE NEW ELEVATION DERIVED HYDROGRAPHY FEATURES

INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE
October 1, 2021	September 30, 2026	5 - 1 Year	September 30, 2026

PAYMENT TERMS	DELIVERY TIMEFRAME

ALTERNATE PAYMENT OPTIONS			EXTENDED PURCHASING	
☐ P-Card	☐ PRC	☐ Other	☒ Yes	☐ No

MINIMUM DELIVERY REQUIREMENTS

DESCRIPTION OF CHANGE NOTICE

OPTION	LENGTH OF OPTION	EXTENSION	LENGTH OF EXTENSION	REVISED EXP. DATE
☐		☐		September 30, 2026

CURRENT VALUE	VALUE OF CHANGE NOTICE	ESTIMATED AGGREGATE CONTRACT VALUE
$781,238.21	$174,797.00	$956,035.21

DESCRIPTION

Effective August 31, 2022, DTMB is adding $174,797.00 to the Contract for Quantum Spatial to perform quality control specific to elevation derived hydrography specifications outlined by the United States Geological Survey.

All other terms, conditions, specifications, and pricing remain the same. Per contractor, agency and DTMB Central Procurement Services.

NV5 Geospatial. – 1100 NE Circle Blvd, Suite 126, Corvallis, OR 97330 – Ph. 734-680-6424

Overview

MSU is currently producing hydrography networks for the state. These data are then reviewed by USGS staff where issues are identified and returned to MSU for correction. The corrected data should then be resubmitted to USGS for final approval so it can then be submitted to NV5G for conflation. NV5G will then run the data through the conflation steps required to upload the data into the NHD and WBD. The current cadence of the data review cycle is not sufficient to meet the timeline of the project. The state has expressed a desire to expedite the review process by leveraging NV5G's tools and experience developing USGS compliant hydrography networks. NV5G has been working with the USGS 3D Hydrography Program for the last five years and has developed both automated and manual QC processes designed to identify and correct many of the typical errors so that when the data are submitted to USGS they generally meet the requirements of both the NHD and the 3DHP specifications as published by USGS.

This proposal brings NV5G's expertise and tools into the review and QC process to shorten the turnaround time for review of MSU data and reduce the time required by USGS staff in an effort to improve the overall timeline of the program. The approach outlined below is designed to support this objective.

Technical Approach

The approach outlined here is designed to provide timely feedback to MSU on the datasets and ensure that the datasets that are created will meet in general USGS requirements. The approach for QC is broken into two parts. Automated QC items are taken directly from USGS review reports. Bold italicized items may be automatically correctable during the QC process assuming no egregious errors in the provided network from MSU.

1. Automated Checks
2. Manual Checks

1. Automated Checks

These procedures will check the following items focused on data schema and topology.

- Correct schema used (EDH)
- ***Unique IDs provided (EDH)***
- Z-Enabled features provided (EDH)
- ***Correct projection (EDH)***
- Horizontal placement (EDH/NHD)
- ***Vertex spacing > 1.5 m (EHD)***

- Minimum feature length 2 m (NHD/EDH guidance)
- Vertical placement of features (EDH)
    - Below the surface
    - Above the surface
- ***Flowlines inside polygons or artificial paths outside (NHD)***
- Density compared to target density (target density may vary locally) (NHD)
- ***XYZ coordinates at line start/end node intersections (XY-NHD/Z-EDH)***
- ***XY coordinates between line start/end nodes and polygon boundaries (EDH/NHD)***
- Network check (NHD) - The first check and data returned if not complete.
- ***Line monotonicity (EDH)- If fixed could reduce MSU LOE.***
- ***Lake boundary vertices on the hydroflattened surface. (EDH) -Use Lidar breaklines when available. Use NWI for other features with indicative attribution.***
- NHD point features included (NHD) – Removed features summarized in MSU report.
- NHD (non-flow) line features included (NHD) – Removed features summarized.
- NHD area and waterbody features included (NHD) – Removed features summarized.
- Breaklines with corresponding waterbody features (EDH)
- Topology: lines (NHD)
- Topology: polygons (NHD)

2. **Manual Checks**
   These procedures will follow the below steps to identify systematic errors related to inclusion, classification, and position.
    - Each HU 8 will be tiled into 1 km tiles
    - A stratified sample a minimum of 100 x 1 km^2 tiles will be sampled for all HU 8s. Additional units of 100 x 1 km^2 tiles will be added to this sample up to 5% of total area of HU. The number of 5% can be increased or decreased depending on the quality of the data being produced.
    - These tiles will be manually inspected for omission, commission, positioning, classification, and delineation errors.
    - Review tiles will be selected based on a variety of factors, including land cover, slope, and proximity to geomorphic index derived from the provided elevation data

The output from both 1 and 2 will be a revised network with any automated corrections applied accompanied by standardized reports summarizing identified errors. These reports will be developed in conjunction with MSU and USGS to ensure they are helpful to guide rectification of any systematic issues. NV5G has developed these types of reports for both this product and others for USGS. If, during the automated checks, the dataset is found to contain sufficient errors such that manual checks should be delayed, the automated report and network will be returned to MSU for correction and manual checks will not occur until these items are resolved to minimize duplicative effort.

The automated and manual QC reports generated under this scope of work will be used by the state to determine when the data generated by MSU in SOW 1 has met the requirements of that scope. Once the data is SOW 1 scope compliant, a final copy of data will be passed to NV5 to perform the official NHD pre-conflation checks. Once confirmed that the geometry is NHD compliant, it is expected that the MSU will deliver the final data in the 3DHP deliverable format to USGS along with the collection report and all NV5G QC reports. *It should be noted that the data that is delivered to USGS in 3DHP format will be available to USGS for review, however this review and sign off will not be required before the project moves through the pre-conflation tools and ultimately into geoconflation. The dataset that will reside in the 3DHP format will be reviewed by USGS when the 3DHP schema and final 3DHP national database is finalized and active for data population. The 3DHP data generated as part of this project will have a*

provisional label assigned to it because it will have been developed from a 2 ft DEM rather than a 1 m DEM. There may be other differences between the datasets created by this project and the final 3DHP schema. It is generally thought that moving the data from this project to the final 3DHP schema, once it is finalized by USGS, will not be a significant undertaking.

The data derived as a result of this project will ultimately be accepted into the NHD once it passes all the tests and requirements using the geoconflation tools. The process laid out below will enable USGS to participate in the review without being a bottleneck in the production of the datasets required by the State of Michigan

3. Training

The State of Michigan has requested a cost for NV5G to train the state staff in the review of the dataset. The training would be 8 hours conducted remotely using web meeting software. This would include two 4 hour sessions that could be on the same day or consecutive days. The first session will cover setting up ArcMap, panning to data, and data review protocols. A sample area would be provided to the staff and employees would review the data using the system. The second session would be set up where NV5G staff would run through the identified comments and provide feedback on what was reviewed and what was missed. Then there would be a follow up session a week or so later where NV5G staff would interact with the review team and answer questions and provide feedback on what had been identified in the datasets.

Deliverables

Automated Checks

A standard report and database will be provided that identify the following items. Specific formats to be agreed upon by NV5G and MSU to ensure clarity and ease of use.

- Report:
  - Correct schema used (y/n)
  - Unique IDs provided by MSU (y/n – corrected where there is failure)
  - Z-Enabled features provided (y/n)
  - Correct projection (y/n)
  - Density compared to target density (y/n)
  - Summary of the errors included in the Error Database
- Database of errors:
  - Horizontal placement (Cross sections with suspected issues)
  - Vertex spacing < 1.5 m
  - Above and Below surface features
  - Flowlines inside polygons or artificial paths outside
  - Lines on islands
  - XYZ coordinates at line start/end node intersections
  - XY coordinates between line start/end nodes and polygon boundaries
  - Line monotonicity
  - Lake boundary vertices on the hydroflattened surface
  - NHD point features excluded
  - NHD line features excluded
  - NHD polygon features excluded
  - Breaklines with corresponding waterbody features

- Topology: lines –
- Topology: polygons –

Manual Checks

A geodatabase of inspect shapes created during the stratified manual review will be provided that identify the following items

- Horizontal position Errors
- Misuse of classification
- Omission/Commission Errors

Corrected EDH Geodatabase

A geodatabase of MSU's current line work with the following issues corrected as necessary

- Vertex spacing < 1.5 m
- Above and below surface features
- Flowlines inside polygons or artificial paths outside
- XYZ coordinates at line start/end node intersections
- XY coordinates between line start/end nodes and polygon boundaries
- Line monotonicity
- Lake boundary vertices on the hydroflattened surface for lidar breakline features

Training

Remote training of State of Michigan staff

- Session 1: 4 hours training
- Session 2: 4 hours review
- Session 3: 4 hours review of identified errors and feedback
- Training materials

Schedule

The NV5G team will run the automated checks in a one-week period after the dataset has been submitted to NV5G from MSU. The reports will be provided to MSU and if the errors > threshold then the manual checks will not take place until errors are corrected. If the automated checks pass NV5G will take 2 weeks to conduct the manual review and provide the reports to the State and MSU. The determination of the threshold will be discussed between the state, MSU and USGS.

*Note – these timelines are provisional and currently represent our best estimate for turnaround time once the process is mature. We expect a ramp up period where the timelines will be greater than the times presented here.

Cost Proposal

Pricing is provided in the table below, assuming specifications and deliverables for the State of Michigan provided in the above proposal.

The costs are based on the review of a HU8. They are broken down into the two review steps. A single HU8 may require more than one review cycle if sufficient errors are found in initial review.

Automated checks: These checks will cost $3,969 per review cycle.

Manual checks: These checks will cost $2,314 for the first 100 x 1 km tile reviews for each HU 8, and then $1,205 per 100 x 1 km tiles groups after that for each HU8 for each review cycle. We think a 5% stratified review of the HU will be sufficient to pick up systematic and specific items that need resolution. The % review could be increased or decreased based on the quality of data being provided by MSU and this is expected to change as the project progresses.

The cost of a training would be $6,830 per training. Each training can train up to 8 state of Michigan staff members.

STATE OF MICHIGAN PROCUREMENT

525 W. Allegan, Lansing, MI 48933
P.O. Box 30026 Lansing, MI 48909

NOTICE OF CONTRACT

NOTICE OF CONTRACT NO. 210000001620
between
THE STATE OF MICHIGAN
and

CONTRACTOR	
	Quantum Spatial, Inc.
	10033 MLK Street N, Ste. 200
	St. Petersburg, FL 33716
	Andrew Brenner
	734-680-6424
	abrenner@quantumspatial.com
	CV0049662

STATE			
	Program Manager	Mark Holmes	DTMB
		517-285-6592	
		Holmesm3@michigan.gov	
	Contract Administrator	Sean Regan	DTMB
		517-243-8459	
		regans@michigan.gov	

CONTRACT SUMMARY			
DESCRIPTION: CONFLATION OF ATTRIBUTES FROM EXISTING NHD DATA TO THE NEW ELEVATION DERIVED HYDROGRAPHY FEATURES			
INITIAL EFFECTIVE DATE	**INITIAL EXPIRATION DATE**	**INITIAL AVAILABLE OPTIONS**	**EXPIRATION DATE BEFORE CHANGE(S) NOTED BELOW**
10/1/2021	9/30/2026	5, 1 Year	
PAYMENT TERMS		**DELIVERY TIMEFRAME**	
Net 45			
ALTERNATE PAYMENT OPTIONS			**EXTENDED PURCHASING**
☐ P-card ☐ Payment Request (PRC) ☐ Other			☒ Yes ☐ No
MINIMUM DELIVERY REQUIREMENTS			
MISCELLANEOUS INFORMATION			
ESTIMATED CONTRACT VALUE AT TIME OF EXECUTION			**$781,238.21**

FOR THE CONTRACTOR:

Company Name

Authorized Agent Signature

Authorized Agent (Print or Type)

Date

FOR THE STATE:

Signature

Name & Title

Agency

Date

STANDARD TERMS AND CONDITIONS

This STANDARD CONTRACT ("**Contract**") is agreed to between the State of Michigan (the "**State**") and Quantum Spatial, Inc. ("**Contractor**"). This Contract is effective on October 1, 2021 ("**Effective Date**"), and unless terminated, expires on September 30, 2026.

The parties agree as follows:

1. **Duties of Contractor.** Contractor must perform the services and provide the deliverables described in **Schedule A – Statement of Work** (the "**Contract Activities**"). An obligation to provide delivery of any commodity is considered a service and is a Contract Activity.

   Contractor must furnish all labor, equipment, materials, and supplies necessary for the performance of the Contract Activities, and meet operational standards, unless otherwise specified in Schedule A.

   Contractor must: (a) perform the Contract Activities in a timely, professional, safe, and workmanlike manner consistent with standards in the trade, profession, or industry; (b) meet or exceed the performance and operational standards, and specifications of the Contract; (c) provide all Contract Activities in good quality, with no material defects; (d) not interfere with the State's operations; (e) obtain and maintain all necessary licenses, permits or other authorizations necessary for the performance of the Contract; (f) cooperate with the State, including the State's quality assurance personnel, and any third party to achieve the objectives of the Contract; (g) return to the State any State-furnished equipment or other resources in the same condition as when provided when no longer required for the Contract; (h) not make any media releases without prior written authorization from the State; (i) assign to the State any claims resulting from state or federal antitrust violations to the extent that those violations concern materials or services supplied by third parties toward fulfillment of the Contract; (j) comply with all State physical and IT security policies and standards which will be made available upon request; and (k) provide the State priority in performance of the Contract except as mandated by federal disaster response requirements. Any breach under this paragraph is considered a material breach.

   Contractor must also be clearly identifiable while on State property by wearing identification issued by the State, and clearly identify themselves whenever making contact with the State.

2. **Notices.** All notices and other communications required or permitted under this Contract must be in writing and will be considered given and received: (a) when verified by written receipt if sent by courier; (b) when actually received if sent by mail without verification of receipt; or (c) when verified by automated receipt or electronic logs if sent by facsimile or email.

3. **Performance Guarantee.** Contractor must at all times have financial resources sufficient, in the opinion of the State, to ensure performance of the Contract and must provide proof upon request. The State may require a performance bond (as specified in Schedule A – Statement of Work) if, in the opinion of the State, it will ensure performance of the Contract.

   If any of the required policies provide **claims-made** coverage, the Contractor must: (a) provide coverage with a retroactive date before the Effective Date of the Contract or the beginning of Contract Activities; (b) maintain coverage and provide evidence of coverage for at least three (3) years after completion of the Contract Activities; and (c) if coverage is cancelled or not renewed, and not replaced with another claims-made policy form with a retroactive date prior to the Contract Effective Date, Contractor must purchase extended reporting coverage for a minimum of three (3) years after completion of work.

   Contractor must: (a) provide insurance certificates to the Contract Administrator, containing the agreement or delivery order number, at Contract formation and within twenty (20) calendar days of the

expiration date of the applicable policies; (b) require that subcontractors maintain the required insurances contained in this Section; (c) notify the Contract Administrator within five (5) business days if any insurance is cancelled; and (d) waive all rights against the State for damages covered by insurance. Failure to maintain the required insurance does not limit this waiver.

This Section is not intended to and is not to be construed in any manner as waiving, restricting or limiting the liability of either party for any obligations under this Contract (including any provisions hereof requiring Contractor to indemnify, defend and hold harmless the State).

4. **Administrative Fee and Reporting.** Contractor must pay an administrative fee of 1% on all payments made to Contractor under the Contract including transactions with the State (including its departments, divisions, agencies, offices, and commissions), MiDEAL members, and other states (including governmental subdivisions and authorized entities). Administrative fee payments must be made online by check or credit card at: https://www.thepayplace.com/mi/dtmb/adminfee

   Contractor must submit an itemized purchasing activity report, which includes at a minimum, the name of the purchasing entity and the total dollar volume in sales. Reports should be mailed to MiDeal@michigan.gov.

   The administrative fee and purchasing activity report are due within 30 calendar days from the last day of each calendar quarter.

5. **Extended Purchasing Program.** This contract is extended to MiDEAL members. MiDEAL members include local units of government, school districts, universities, community colleges, and nonprofit hospitals. A current list of MiDEAL members is available at www.michigan.gov/mideal.

   Upon written agreement between the State and Contractor, this contract may also be extended to: (a) other states (including governmental subdivisions and authorized entities) and (b) State of Michigan employees.

   If extended, Contractor must supply all Contract Activities at the established Contract prices and terms. The State reserves the right to impose an administrative fee and negotiate additional discounts based on any increased volume generated by such extensions.

   Contractor must submit invoices to, and receive payment from, extended purchasing program members on a direct and individual basis.

6. **Independent Contractor.** Contractor is an independent contractor and assumes all rights, obligations and liabilities set forth in this Contract. Contractor, its employees, and agents will not be considered employees of the State. No partnership or joint venture relationship is created by virtue of this Contract. Contractor, and not the State, is responsible for the payment of wages, benefits and taxes of Contractor's employees and any subcontractors. Prior performance does not modify Contractor's status as an independent contractor.

   Contractor hereby acknowledges that the State is and will be the sole and exclusive owner of all right, title, and interest in the Contract Activities and all associated intellectual property rights, if any. Such Contract Activities are works made for hire as defined in Section 101 of the Copyright Act of 1976. To the extent any Contract Activities and related intellectual property do not qualify as works made for hire under the Copyright Act, Contractor will, and hereby does, immediately on its creation, assign, transfer and otherwise convey to the State, irrevocably and in perpetuity, throughout the universe, all right, title and interest in and to the Contract Activities, including all intellectual property rights therein.

7. **Subcontracting.** Contractor may not delegate any of its obligations under the Contract without the prior written approval of the State. Contractor must notify the State at least 90 calendar days before the proposed delegation and provide the State any information it requests to determine whether the delegation is in its best interest. If approved, Contractor must: (a) be the sole point of contact regarding all contractual matters, including payment and charges for all Contract Activities; (b) make all payments to the subcontractor; and (c) incorporate the terms and conditions contained in this

Contract in any subcontract with a subcontractor. Contractor remains responsible for the completion of the Contract Activities, compliance with the terms of this Contract, and the acts and omissions of the subcontractor. The State, in its sole discretion, may require the replacement of any subcontractor.

8. **Staffing.** The State's Contract Administrator may require Contractor to remove or reassign personnel by providing a notice to Contractor.

9. **Background Checks.** Pursuant to Michigan law, all agencies subject to IRS Pub. 1075 are required to ask the Michigan State Police to perform fingerprint background checks on all employees, including Contractor and Subcontractor employees, who may have access to any database of information maintained by the federal government that contains confidential or personal information, including, but not limited to, federal tax information. Further, pursuant to Michigan law, any agency described above is prohibited from providing Contractors or Subcontractors with the result of such background check. For more information, please see Michigan Public Act 427 of 2018. Upon request, or as may be specified in Schedule A, Contractor must perform background checks on all employees and subcontractors and its employees prior to their assignment. The scope is at the discretion of the State and documentation must be provided as requested. Contractor is responsible for all costs associated with the requested background checks. The State, in its sole discretion, may also perform background checks.

10. **Assignment.** Contractor may not assign this Contract to any other party without the prior approval of the State. Upon notice to Contractor, the State, in its sole discretion, may assign in whole or in part, its rights or responsibilities under this Contract to any other party. If the State determines that a novation of the Contract to a third party is necessary, Contractor will agree to the novation and provide all necessary documentation and signatures.

11. **Change of Control.** Contractor will notify within 30 days of any public announcement or otherwise once legally permitted to do so, the State of a change in Contractor's organizational structure or ownership. For purposes of this Contract, a change in control means any of the following: (a) a sale of more than 50% of Contractor's stock; (b) a sale of substantially all of Contractor's assets; (c) a change in a majority of Contractor's board members; (d) consummation of a merger or consolidation of Contractor with any other entity; (e) a change in ownership through a transaction or series of transactions; (f) or the board (or the stockholders) approves a plan of complete liquidation. A change of control does not include any consolidation or merger effected exclusively to change the domicile of Contractor, or any transaction or series of transactions principally for bona fide equity financing purposes.

    In the event of a change of control, Contractor must require the successor to assume this Contract and all of its obligations under this Contract.

12. **Ordering.** Contractor is not authorized to begin performance until receipt of authorization as identified in Schedule A.

13. **Acceptance.** Contract Activities are subject to inspection and testing by the State within 30 calendar days of the State's receipt of them ("**State Review Period**"), unless otherwise provided in Schedule A. If the Contract Activities are not fully accepted by the State, the State will notify Contractor by the end of the State Review Period that either: (a) the Contract Activities are accepted but noted deficiencies must be corrected; or (b) the Contract Activities are rejected. If the State finds material deficiencies, it may: (i) reject the Contract Activities without performing any further inspections; (ii) demand performance at no additional cost; or (iii) terminate this Contract in accordance with Section 23, Termination for Cause.

    Within 10 business days from the date of Contractor's receipt of notification of acceptance with deficiencies or rejection of any Contract Activities, Contractor must cure, at no additional cost, the deficiency and deliver unequivocally acceptable Contract Activities to the State. If acceptance with deficiencies or rejection of the Contract Activities impacts the content or delivery of other non-

completed Contract Activities, the parties' respective Program Managers must determine an agreed to number of days for re-submission that minimizes the overall impact to the Contract. However, nothing herein affects, alters, or relieves Contractor of its obligations to correct deficiencies in accordance with the time response standards set forth in this Contract.

If Contractor is unable or refuses to correct the deficiency within the time response standards set forth in this Contract, the State may cancel the order in whole or in part. The State, or a third party identified by the State, may perform the Contract Activities and recover the difference between the cost to cure and the Contract price plus an additional 10% administrative fee.

14. **Delivery.** Contractor must deliver all Contract Activities F.O.B. destination, within the State premises with transportation and handling charges paid by Contractor, unless otherwise specified in Schedule A. All containers and packaging become the State's exclusive property upon acceptance.

15. **Risk of Loss and Title.** Until final acceptance, title and risk of loss or damage to Contract Activities remains with Contractor. Contractor is responsible for filing, processing, and collecting all damage claims. The State will record and report to Contractor any evidence of visible damage. If the State rejects the Contract Activities, Contractor must remove them from the premises within 10 calendar days after notification of rejection. The risk of loss of rejected or non-conforming Contract Activities remains with Contractor. Rejected Contract Activities not removed by Contractor within 10 calendar days will be deemed abandoned by Contractor, and the State will have the right to dispose of it as its own property. Contractor must reimburse the State for costs and expenses incurred in storing or effecting removal or disposition of rejected Contract Activities.

16. **Reserved.**

17. **Terms of Payment.** Invoices must conform to the requirements communicated from time-to-time by the State. All undisputed amounts are payable within 45 days of the State's receipt. Contractor may only charge for Contract Activities performed as specified in Schedule A. Invoices must include an itemized statement of all charges. The State is exempt from State sales tax for direct purchases and may be exempt from federal excise tax, if Services purchased under this Agreement are for the State's exclusive use. All prices are exclusive of taxes, and Contractor is responsible for all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state, or local governmental entity on any amounts payable by the State under this Contract.

    The State has the right to withhold payment of any disputed amounts until the parties agree as to the validity of the disputed amount. The State will notify Contractor of any dispute within a reasonable time. Payment by the State will not constitute a waiver of any rights as to Contractor's continuing obligations, including claims for deficiencies or substandard Contract Activities. Contractor's acceptance of final payment by the State constitutes a waiver of all claims by Contractor against the State for payment under this Contract, other than those claims previously filed in writing on a timely basis and still disputed.

    The State will only disburse payments under this Contract through Electronic Funds Transfer (EFT). Contractor must register with the State at http://www.michigan.gov/SIGMAVSS to receive electronic fund transfer payments. If Contractor does not register, the State is not liable for failure to provide payment. Without prejudice to any other right or remedy it may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

18. **Stop Work Order.** The State may suspend any or all activities under the Contract at any time. The State will provide Contractor a written stop work order detailing the suspension. Contractor must comply with the stop work order upon receipt. Within 90 calendar days, or any longer period agreed to by Contractor, the State will either: (a) issue a notice authorizing Contractor to resume work, or (b) terminate the Contract or delivery order. The State will not pay for Contract Activities, Contractor's lost profits, or any additional compensation during a stop work period.

19. **Termination for Cause.** The State may terminate this Contract for cause, in whole or in part, if Contractor, as determined by the State: (a) endangers the value, integrity, or security of any location, data, or personnel; (b) becomes insolvent, petitions for bankruptcy court proceedings, or has an involuntary bankruptcy proceeding filed against it by any creditor; (c) engages in any conduct that may expose the State to liability; (d) breaches any of its material duties or obligations; or (e) fails to cure a breach within the time stated in a notice of breach. Any reference to specific breaches being material breaches within this Contract will not be construed to mean that other breaches are not material.

    If the State terminates this Contract under this Section, the State will issue a termination notice specifying whether Contractor must: (a) cease performance immediately, or (b) continue to perform for a specified period. If it is later determined that Contractor was not in breach of the Contract, the termination will be deemed to have been a Termination for Convenience, effective as of the same date, and the rights and obligations of the parties will be limited to those provided in Section 24, Termination for Convenience.

    The State will only pay for amounts due to Contractor for Contract Activities accepted by the State on or before the date of termination, subject to the State's right to set off any amounts owed by the Contractor for the State's reasonable costs in terminating this Contract. The Contractor must pay all reasonable costs incurred by the State in terminating this Contract for cause, including administrative costs, attorneys' fees, court costs, transition costs, and any costs the State incurs to procure the Contract Activities from other sources.

20. **Termination for Convenience.** The State may immediately terminate this Contract in whole or in part without penalty and for any reason, including but not limited to, appropriation or budget shortfalls. The termination notice will specify whether Contractor must: (a) cease performance of the Contract Activities immediately, or (b) continue to perform the Contract Activities in accordance with Section 25, Transition Responsibilities. If the State terminates this Contract for convenience, the State will pay all reasonable costs, as determined by the State, for State approved Transition Responsibilities.

21. **Transition Responsibilities.** Upon termination or expiration of this Contract for any reason, Contractor must, for a period of time specified by the State (not to exceed **90** calendar days), provide all reasonable transition assistance requested by the State, to allow for the expired or terminated portion of the Contract Activities to continue without interruption or adverse effect, and to facilitate the orderly transfer of such Contract Activities to the State or its designees. Such transition assistance may include, but is not limited to: (a) continuing to perform the Contract Activities at the established Contract rates; (b) taking all reasonable and necessary measures to transition performance of the work, including all applicable Contract Activities, training, equipment, software, leases, reports and other documentation, to the State or the State's designee; (c) taking all necessary and appropriate steps, or such other action as the State may direct, to preserve, maintain, protect, or return to the State all materials, data, property, and confidential information provided directly or indirectly to Contractor by any entity, agent, vendor, or employee of the State; (d) transferring title in and delivering to the State, at the State's discretion, all completed or partially completed deliverables prepared under this Contract as of the Contract termination date; and (e) preparing an accurate accounting from which the State and Contractor may reconcile all outstanding accounts (collectively, "**Transition Responsibilities**"). This Contract will automatically be extended through the end of the transition period.

22. **General Indemnification.** Contractor must defend, indemnify and hold the State, its departments, divisions, agencies, offices, commissions, officers, and employees harmless, without limitation, from and against any and all actions, claims, losses, liabilities, damages, costs, attorney fees, and expenses (including those required to establish the right to indemnification), arising out of or relating to: (a) any breach by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable) of any of the promises, agreements, representations, warranties, or insurance requirements contained in this Contract; (b) any infringement, misappropriation, or other violation of any intellectual property right or other right of any

third party; (c) any bodily injury, death, or damage to real or tangible personal property occurring wholly or in part due to action or inaction by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable); and (d) any acts or omissions of Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable).

The State will notify Contractor in writing if indemnification is sought; however, failure to do so will not relieve Contractor, except to the extent that Contractor is materially prejudiced. Contractor must, to the satisfaction of the State, demonstrate its financial ability to carry out these obligations.

The State is entitled to: (i) regular updates on proceeding status; (ii) participate in the defense of the proceeding; (iii) employ its own counsel; and to (iv) retain control of the defense if the State deems necessary. Contractor will not, without the State's written consent (not to be unreasonably withheld), settle, compromise, or consent to the entry of any judgment in or otherwise seek to terminate any claim, action, or proceeding. To the extent that any State employee, official, or law may be involved or challenged, the State may, at its own expense, control the defense of that portion of the claim.

Any litigation activity on behalf of the State, or any of its subdivisions under this Section, must be coordinated with the Department of Attorney General. An attorney designated to represent the State may not do so until approved by the Michigan Attorney General and appointed as a Special Assistant Attorney General.

23. **Infringement Remedies.** If, in either party's opinion, any piece of equipment, software, commodity, or service supplied by Contractor or its subcontractors, or its operation, use or reproduction, is likely to become the subject of a copyright, patent, trademark, or trade secret infringement claim, Contractor must, at its expense: (a) procure for the State the right to continue using the equipment, software, commodity, or service, or if this option is not reasonably available to Contractor, (b) replace or modify the same so that it becomes non-infringing; or (c) accept its return by the State with appropriate credits to the State against Contractor's charges and reimburse the State for any losses or costs incurred as a consequence of the State ceasing its use and returning it.

24. **Limitation of Liability and Disclaimer of Damages. IN NO EVENT WILL THE STATE'S AGGREGATE LIABILITY TO CONTRACTOR UNDER THIS CONTRACT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT, EXCEED THE MAXIMUM AMOUNT OF FEES PAYABLE UNDER THIS CONTRACT.** The State is not liable for consequential, incidental, indirect, or special damages, regardless of the nature of the action.

25. **Disclosure of Litigation, or Other Proceeding.** Contractor must notify the State within 14 calendar days of receiving notice of any litigation, investigation, arbitration, or other proceeding (collectively, "**Proceeding**") involving Contractor, a subcontractor, or an officer or director of Contractor or subcontractor, that arises during the term of the Contract, including: (a) a criminal Proceeding; (b) a parole or probation Proceeding; (c) a Proceeding under the Sarbanes-Oxley Act; (d) a civil Proceeding involving: (1) a claim that might reasonably be expected to adversely affect Contractor's viability or financial stability; or (2) a governmental or public entity's claim or written allegation of fraud; or (e) a Proceeding involving any license that Contractor is required to possess in order to perform under this Contract.

26. **Reserved.**

27. **State Data.**

    a. **Ownership**. The State's data ("**State Data**," which will be treated by Contractor as Confidential Information) includes: (a) the State's data collected, used, processed, stored, or generated as the result of the Contract Activities; (b) personally identifiable information ("**PII**") collected, used, processed, stored, or generated as the result of the Contract Activities, including, without

limitation, any information that identifies an individual, such as an individual's social security number or other government-issued identification number, date of birth, address, telephone number, biometric data, mother's maiden name, email address, credit card information, or an individual's name in combination with any other of the elements here listed; and, (c) personal health information ("**PHI**") collected, used, processed, stored, or generated as the result of the Contract Activities, which is defined under the Health Insurance Portability and Accountability Act (HIPAA) and its related rules and regulations. State Data is and will remain the sole and exclusive property of the State and all right, title, and interest in the same is reserved by the State. This Section survives the termination of this Contract.

b. **Contractor Use of State Data**. Contractor is provided a limited license to State Data for the sole and exclusive purpose of providing the Contract Activities, including a license to collect, process, store, generate, and display State Data only to the extent necessary in the provision of the Contract Activities. Contractor must: (a) keep and maintain State Data in strict confidence, using such degree of care as is appropriate and consistent with its obligations as further described in this Contract and applicable law to avoid unauthorized access, use, disclosure, or loss; (b) use and disclose State Data solely and exclusively for the purpose of providing the Contract Activities, such use and disclosure being in accordance with this Contract, any applicable Statement of Work, and applicable law; and (c) not use, sell, rent, transfer, distribute, or otherwise disclose or make available State Data for Contractor's own purposes or for the benefit of anyone other than the State without the State's prior written consent. This Section survives the termination of this Contract.

c. **Extraction of State Data**. Contractor must, within five (5) business days of the State's request, provide the State, without charge and without any conditions or contingencies whatsoever (including but not limited to the payment of any fees due to Contractor), an extract of the State Data in the format specified by the State.

d. **Backup and Recovery of State Data**. Unless otherwise specified in Schedule A, Contractor is responsible for maintaining a backup of State Data and for an orderly and timely recovery of such data. Unless otherwise described in Schedule A, Contractor must maintain a contemporaneous backup of State Data that can be recovered within two (2) hours at any point in time.

e. **Loss or Compromise of Data**. In the event of any act, error or omission, negligence, misconduct, or breach on the part of Contractor that compromises or is suspected to compromise the security, confidentiality, or integrity of State Data or the physical, technical, administrative, or organizational safeguards put in place by Contractor that relate to the protection of the security, confidentiality, or integrity of State Data, Contractor must, as applicable: (a) notify the State as soon as practicable but no later than twenty-four (24) hours of becoming aware of such occurrence; (b) cooperate with the State in investigating the occurrence, including making available all relevant records, logs, files, data reporting, and other materials required to comply with applicable law or as otherwise required by the State; (c) in the case of PII or PHI, at the State's sole election, (i) with approval and assistance from the State, notify the affected individuals who comprise the PII or PHI as soon as practicable but no later than is required to comply with applicable law, or, in the absence of any legally required notification period, within five (5) calendar days of the occurrence; or (ii) reimburse the State for any costs in notifying the affected individuals; (d) in the case of PII, provide third-party credit and identity monitoring services to each of the affected individuals who comprise the PII for the period required to comply with applicable law, or, in the absence of any legally required monitoring services, for no less than twenty-four (24) months following the date of notification to such individuals; (e) perform or take any other actions required to comply with applicable law as a result of the occurrence; (f) pay for any costs associated with the occurrence, including but not limited to any costs incurred by the State in investigating and resolving the occurrence, including reasonable attorney's fees associated with such investigation and resolution; (g) without limiting Contractor's obligations of indemnification as further described in this Contract, indemnify, defend,

and hold harmless the State for any and all claims, including reasonable attorneys' fees, costs, and incidental expenses, which may be suffered by, accrued against, charged to, or recoverable from the State in connection with the occurrence; (h) be responsible for recreating lost State Data in the manner and on the schedule set by the State without charge to the State; and (i) provide to the State a detailed plan within ten (10) calendar days of the occurrence describing the measures Contractor will undertake to prevent a future occurrence. Notification to affected individuals, as described above, must comply with applicable law, be written in plain language, not be tangentially used for any solicitation purposes, and contain, at a minimum: name and contact information of Contractor's representative; a description of the nature of the loss; a list of the types of data involved; the known or approximate date of the loss; how such loss may affect the affected individual; what steps Contractor has taken to protect the affected individual; what steps the affected individual can take to protect himself or herself; contact information for major credit card reporting agencies; and, information regarding the credit and identity monitoring services to be provided by Contractor. The State will have the option to review and approve any notification sent to affected individuals prior to its delivery. Notification to any other party, including but not limited to public media outlets, must be reviewed and approved by the State in writing prior to its dissemination. The parties agree that any damages relating to a breach of this **Section 31** are to be considered direct damages and not consequential damages. This section survives termination or expiration of this Contract.

f. **State's Governance, Risk and Compliance (GRC) platform**. Contractor is required to assist the State with its security accreditation process through the development, completion and ongoing updating of a system security plan using the State's automated GRC platform and implement any required safeguards or remediate any security vulnerabilities as identified by the results of the security accreditation process.

28. Non-Disclosure of Confidential Information. The parties acknowledge that each party may be exposed to or acquire communication or data of the other party that is confidential, privileged communication not intended to be disclosed to third parties. The provisions of this Section survive the termination of this Contract.

a. **Meaning of Confidential Information**. For the purposes of this Contract, the term "**Confidential Information**" means all information and documentation of a party that: (a) has been marked "confidential" or with words of similar meaning, at the time of disclosure by such party; (b) if disclosed orally or not marked "confidential" or with words of similar meaning, was subsequently summarized in writing by the disclosing party and marked "confidential" or with words of similar meaning; and, (c) should reasonably be recognized as confidential information of the disclosing party. The term "Confidential Information" does not include any information or documentation that was: (a) subject to disclosure under the Michigan Freedom of Information Act (FOIA); (b) already in the possession of the receiving party without an obligation of confidentiality; (c) developed independently by the receiving party, as demonstrated by the receiving party, without violating the disclosing party's proprietary rights; (d) obtained from a source other than the disclosing party without an obligation of confidentiality; or, (e) publicly available when received, or thereafter became publicly available (other than through any unauthorized disclosure by, through, or on behalf of, the receiving party). For purposes of this Contract, in all cases and for all matters, State Data is deemed to be Confidential Information.

b. **Obligation of Confidentiality**. The parties agree to hold all Confidential Information in strict confidence and not to copy, reproduce, sell, transfer, or otherwise dispose of, give or disclose such Confidential Information to third parties other than employees, agents, or subcontractors of a party who have a need to know in connection with this Contract or to use such Confidential Information for any purposes whatsoever other than the performance of this Contract. The parties agree to advise and require their respective employees, agents, and subcontractors of their obligations to keep all Confidential Information confidential. Disclosure to a subcontractor is

permissible where: (a) use of a subcontractor is authorized under this Contract; (b) the disclosure is necessary or otherwise naturally occurs in connection with work that is within the subcontractor's responsibilities; and (c) Contractor obligates the subcontractor in a written contract to maintain the State's Confidential Information in confidence. At the State's request, any employee of Contractor or any subcontractor may be required to execute a separate agreement to be bound by the provisions of this Section.

c. **Cooperation to Prevent Disclosure of Confidential Information**. Each party must use its best efforts to assist the other party in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limiting the foregoing, each party must advise the other party immediately in the event either party learns or has reason to believe that any person who has had access to Confidential Information has violated or intends to violate the terms of this Contract and each party will cooperate with the other party in seeking injunctive or other equitable relief against any such person.

d. **Remedies for Breach of Obligation of Confidentiality**. Each party acknowledges that breach of its obligation of confidentiality may give rise to irreparable injury to the other party, which damage may be inadequately compensable in the form of monetary damages. Accordingly, a party may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies which may be available, to include, in the case of the State, at the sole election of the State, the immediate termination, without liability to the State, of this Contract or any Statement of Work corresponding to the breach or threatened breach.

e. **Surrender of Confidential Information upon Termination**. Upon termination of this Contract or a Statement of Work, in whole or in part, each party must, within 5 calendar days from the date of termination, return to the other party any and all Confidential Information received from the other party, or created or received by a party on behalf of the other party, which are in such party's possession, custody, or control; provided, however, that Contractor must return State Data to the State following the timeframe and procedure described further in this Contract. Should Contractor or the State determine that the return of any Confidential Information is not feasible, such party must destroy the Confidential Information and must certify the same in writing within 5 calendar days from the date of termination to the other party. However, the State's legal ability to destroy Contractor data may be restricted by its retention and disposal schedule, in which case Contractor's Confidential Information will be destroyed after the retention period expires.

29. Data Privacy and Information Security.

a. **Undertaking by Contractor**. Without limiting Contractor's obligation of confidentiality as further described, Contractor is responsible for establishing and maintaining a data privacy and information security program, including physical, technical, administrative, and organizational safeguards, that is designed to: (a) ensure the security and confidentiality of the State Data; (b) protect against any anticipated threats or hazards to the security or integrity of the State Data; (c) protect against unauthorized disclosure, access to, or use of the State Data; (d) ensure the proper disposal of State Data; and (e) ensure that all employees, agents, and subcontractors of Contractor, if any, comply with all of the foregoing. In no case will the safeguards of Contractor's data privacy and information security program be less stringent than the safeguards used by the State, and Contractor must at all times comply with all applicable State IT policies and standards, which are available to Contractor upon request.

b. **Audit by Contractor**. No less than annually, Contractor must conduct a comprehensive independent third-party audit of its data privacy and information security program and provide such audit findings to the State.

c. **Right of Audit by the State.** Without limiting any other audit rights of the State, the State has the right to review Contractor's data privacy and information security program prior to the

commencement of Contract Activities and from time to time during the term of this Contract. During the providing of the Contract Activities, on an ongoing basis from time to time and without notice, the State, at its own expense, is entitled to perform, or to have performed, an on-site audit of Contractor's data privacy and information security program. In lieu of an on-site audit, upon request by the State, Contractor agrees to complete, within 45 calendar days of receipt, an audit questionnaire provided by the State regarding Contractor's data privacy and information security program.

d. **Audit Findings**. Contractor must implement any required safeguards as identified by the State or by any audit of Contractor's data privacy and information security program.

e. **State's Right to Termination for Deficiencies**. The State reserves the right, at its sole election, to immediately terminate this Contract or a Statement of Work without limitation and without liability if the State determines that Contractor fails or has failed to meet its obligations under this Section.

30. Reserved.

31. Reserved.

32. Records Maintenance, Inspection, Examination, and Audit. The State or its designee may audit Contractor to verify compliance with this Contract. Contractor must retain and provide to the State or its designee and the auditor general upon request, all financial and accounting records related to the Contract through the term of the Contract and for 4 years after the latter of termination, expiration, or final payment under this Contract or any extension ("**Audit Period**"). If an audit, litigation, or other action involving the records is initiated before the end of the Audit Period, Contractor must retain the records until all issues are resolved.

Within 10 calendar days of providing notice, the State and its authorized representatives or designees have the right to enter and inspect Contractor's premises or any other places where Contract Activities are being performed, and examine, copy, and audit all records related to this Contract. Contractor must cooperate and provide reasonable assistance. If any financial errors are revealed, the amount in error must be reflected as a credit or debit on subsequent invoices until the amount is paid or refunded. Any remaining balance at the end of the Contract must be paid or refunded within 45 calendar days.

This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.

33. Warranties and Representations. Contractor represents and warrants: (a) Contractor is the owner or licensee of any Contract Activities that it licenses, sells, or develops and Contractor has the rights necessary to convey title, ownership rights, or licensed use; (b) all Contract Activities are delivered free from any security interest, lien, or encumbrance and will continue in that respect; (c) the Contract Activities will not infringe the patent, trademark, copyright, trade secret, or other proprietary rights of any third party; (d) Contractor must assign or otherwise transfer to the State or its designee any manufacturer's warranty for the Contract Activities; (e) the Contract Activities are merchantable and fit for the specific purposes identified in the Contract; (f) the Contract signatory has the authority to enter into this Contract; (g) all information furnished by Contractor in connection with the Contract fairly and accurately represents Contractor's business, properties, finances, and operations as of the dates covered by the information, and Contractor will inform the State of any material adverse changes;(h) all information furnished and representations made in connection with the award of this Contract is true, accurate, and complete, and contains no false statements or omits any fact that would make the information misleading; (i) Contractor is neither currently engaged in nor will engage in the boycott of a person based in or doing business with a strategic partner as described in 22 USC 8601 to 8606; and that (j) that no Deliverable will contain any harmful code. A breach of this Section is considered a

material breach of this Contract, which entitles the State to terminate this Contract under Section 23, Termination for Cause.

34. **Conflicts and Ethics.** Contractor will uphold high ethical standards and is prohibited from: (a) holding or acquiring an interest that would conflict with this Contract; (b) doing anything that creates an appearance of impropriety with respect to the award or performance of the Contract; (c) attempting to influence or appearing to influence any State employee by the direct or indirect offer of anything of value; or (d) paying or agreeing to pay any person, other than employees and consultants working for Contractor, any consideration contingent upon the award of the Contract. Contractor must immediately notify the State of any violation or potential violation of these standards. This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.

35. **Compliance with Laws.** Contractor must comply with all federal, state and local laws, rules and regulations.

36. **Prevailing Wage.** Contractor must comply with prevailing wage requirements, to the extent applicable to this Contract.

37. **State Printing.** All printing in Michigan must be performed by a business that meets *one* of the following: (a) have authorized use of the Allied Printing Trades Council union label in the locality in which the printing services will be performed; (b) have on file with the Michigan Secretary of State, a sworn statement indicating that employees producing the printing are receiving prevailing wages and are working under conditions prevalent in the locality in which the printing services will be performed; or (c) have a collective bargaining agreement in effect and the employees are represented by an operations that is not influenced or controlled by management.

38. **Nondiscrimination.** Under the Elliott-Larsen Civil Rights Act, 1976 PA 453, MCL 37.2101, *et seq*., the Persons with Disabilities Civil Rights Act, 1976 PA 220, MCL 37.1101, *et seq*., and Executive Directive 2019-09. Contractor and its subcontractors agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex (as defined in Executive Directive 2019-09), height, weight, marital status, partisan considerations, any mental or physical disability, or genetic information that is unrelated to the person's ability to perform the duties of a particular job or position. Breach of this covenant is a material breach of this Contract.

39. **Unfair Labor Practice.** Under MCL 423.324, the State may void any Contract with a Contractor or subcontractor who appears on the Unfair Labor Practice register compiled under MCL 423.322.

40. **Governing Law.** This Contract is governed, construed, and enforced in accordance with Michigan law, excluding choice-of-law principles, and all claims relating to or arising out of this Contract are governed by Michigan law, excluding choice-of-law principles. Any dispute arising from this Contract must be resolved in Michigan Court of Claims. Contractor consents to venue in Ingham County, and waives any objections, such as lack of personal jurisdiction or *forum non conveniens*. Contractor must appoint agents in Michigan to receive service of process.

41. **Non-Exclusivity.** Nothing contained in this Contract is intended nor will be construed as creating any requirements contract with Contractor. This Contract does not restrict the State or its agencies from acquiring similar, equal, or like Contract Activities from other sources.

42. **Force Majeure.** Neither party will be in breach of this Contract because of any failure arising from any disaster or acts of god that are beyond their control and without their fault or negligence. Each party will use commercially reasonable efforts to resume performance. Contractor will not be relieved of a breach or delay caused by its subcontractors. If immediate performance is necessary to ensure public health and safety, the State may immediately contract with a third party.

43. **Dispute Resolution.** The parties will endeavor to resolve any Contract dispute in accordance with this provision. The dispute will be referred to the parties' respective Contract Administrators or Program Managers. Such referral must include a description of the issues and all supporting documentation. The parties must submit the dispute to a senior executive if unable to resolve the dispute within 15 business days. The parties will continue performing while a dispute is being resolved, unless the dispute precludes performance. A dispute involving payment does not preclude performance.

    Litigation to resolve the dispute will not be instituted until after the dispute has been elevated to the parties' senior executive and either concludes that resolution is unlikely or fails to respond within 15 business days. The parties are not prohibited from instituting formal proceedings: (a) to avoid the expiration of statute of limitations period; (b) to preserve a superior position with respect to creditors; or (c) where a party makes a determination that a temporary restraining order or other injunctive relief is the only adequate remedy. This Section does not limit the State's right to terminate the Contract.

44. **Media Releases.** News releases (including promotional literature and commercial advertisements) pertaining to the Contract or project to which it relates must not be made without prior written State approval, and then only in accordance with the explicit written instructions of the State.

45. **Website Incorporation.** The State is not bound by any content on Contractor's website unless expressly incorporated directly into this Contract.

46. **Schedules**. All Schedules and Exhibits that are referenced herein and attached hereto are hereby incorporated by reference. The following Schedules are attached hereto and incorporated herein:

47. **Entire Agreement and Order of Precedence.** This Contract, which includes Schedule A – Statement of Work, and schedules and exhibits which are hereby expressly incorporated, is the entire agreement of the parties related to the Contract Activities. This Contract supersedes and replaces all previous understandings and agreements between the parties for the Contract Activities. If there is a conflict between documents, the order of precedence is: (a) first, this Contract, excluding its schedules, exhibits, and Schedule A – Statement of Work; (b) second, Schedule A – Statement of Work as of the Effective Date; and (c) third, schedules expressly incorporated into this Contract as of the Effective Date. NO TERMS ON CONTRACTOR'S INVOICES, ORDERING DOCUMENTS, WEBSITE, BROWSE-WRAP, SHRINK-WRAP, CLICK-WRAP, CLICK-THROUGH OR OTHER NON-NEGOTIATED TERMS AND CONDITIONS PROVIDED WITH ANY OF THE CONTRACT ACTIVITIES WILL CONSTITUTE A PART OR AMENDMENT OF THIS CONTRACT OR IS BINDING ON THE STATE FOR ANY PURPOSE. ALL SUCH OTHER TERMS AND CONDITIONS HAVE NO FORCE AND EFFECT AND ARE DEEMED REJECTED BY THE STATE, EVEN IF ACCESS TO OR USE OF THE CONTRACT ACTIVITIES REQUIRES AFFIRMATIVE ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

48. **Severability.** If any part of this Contract is held invalid or unenforceable, by any court of competent jurisdiction, that part will be deemed deleted from this Contract and the severed part will be replaced by agreed upon language that achieves the same or similar objectives. The remaining Contract will continue in full force and effect.

49. **Waiver.** Failure to enforce any provision of this Contract will not constitute a waiver.

50. **Survival.** The provisions of this Contract that impose continuing obligations, including warranties and representations, termination, transition, insurance coverage, indemnification, and confidentiality, will survive the expiration or termination of this Contract.

51. **Contract Modification.** This Contract may not be amended except by signed agreement between the parties (a "**Contract Change Notice**"). Notwithstanding the foregoing, no subsequent Statement of Work or Contract Change Notice executed after the Effective Date will be construed to amend this Contract unless it specifically states its intent to do so and cites the section or sections amended.

SCHEDULE A - STATEMENT OF WORK

BACKGROUND

Today, Michigan has a statewide hydrography layer depicting rivers, lakes and stream that was digitized at 1:24,000 scale during the early the 2000s from USGS topographic quadrangles. At 1:24,000 scale, the location accuracy of features can be off as much as 40 feet.

For repositioning hydrography data, the proposed project would leverage Light Detection and Ranging (LiDAR) data that have been collected through aerial acquisition projects over the past four years and is at a Quality Level 2 (QL2) which means it can provide an accuracy of between 2 to 5 feet and with elevations on the order of 4 to 6 inches. LiDAR will provide the elevation data needed to detect water channels and flow directions resulting in more accurate positioning of river, lake, and stream systems and more complete coverage of water features by providing the capability to map many more stream networks. Many ephemeral/headwater streams were not captured in the original Michigan Resource Information System (MIRIS) and National Hydrography Dataset (NHD) Hi-Resolution hydrology datasets. It is the expectation that additional streams not currently in existing hydrography datasets will be captured in the new enhanced data sets created during this project.

PURPOSE

Specific business goals to achieve:

1) Develop a more accurate stream network derived from QL2 LiDAR elevation data

2) Once the new hydrography network is derived, develop a process to conflate information from the previous hydrography sources to the new hydrography network

3) Establish attributes for previously unmapped water channels that are derived in the new hydrography network that were not previously mapped in Unites State Geological Survey's (USGS) National Hydrography Dataset (NHD)

4) Develop a long-term maintenance program to ensures sustainability of the data

5) Develop an integration process for the enhanced hydrography data from the State's MGF Data Hub into the USGS NHD system to synchronize regular updates to the federal hydrography network

6) Collaboration throughout the project with USGS to follow guidelines and standards for elevation-derived hydrography.

Contract Term

The contract(s) will be a 5-year base, with 5, 1-year options.

STATEMENT OF WORK 2 – CONFLATION OF ATTRIBUTES FROM EXISTING NHD DATA TO THE NEW ELEVATION DERIVED HYDROGRAPHY FEATURES

The conflation process will be conducted by the selected Contractor for this statement of work. This will include:

Developing of a plan for conflation of NHD attributes

The selected Contractor will be responsible for developing a comprehensive plan for the conflation of existing USGS Production Data attributes to the new flowlines, water bodies and water area features developed by the Selected Contractor for SOW 1. The selected Contractor will work with selected Contractor for SOW 1, USGS, and the State to determine the business/validation rules that will be needed to run as part of the conflation process to meet expected USGS conflation guidelines for existing NHD attributes. The selected Contractor will also need to develop a methodology and guidelines, in consultation with selected Contractor for SOW 1, USGS and the State, to assign attributes to additional flowlines that are not currently in the USGS NHD. These guidelines or best practices will be based on the best information available at that time, and in consultation with USGS, to determine the threshold of what new flowlines should be included in the new dataset and how to best be attributed. Because of the volume of new hydro features created in SOW 1, there may be some flowline channels and other hydrography features that are determined to not be candidates for the attribution and will be kept as a vector based additional reference layer.

The Selected Contractor will hold meetings with USGS to gather requirements and specifications to include in the methodology to make the conflated data compatible to be loaded into USGS NHD once a region is finalized.

The selected Contractor will develop the process (coordinating with USGS) for adding IDs and other attributes to the new hydrography features and for determining thresholds for which new features can be attributed. Thresholds in this case means determining which new feature types can be attributed and which new features might not have attributes or only certain attributes.

It is expected that the selected Contractor will need to prepare both the NHD Production data and the new flowlines, water areas, and water bodies for the conflation process prior to running any automated process. This will include running USGS pre-conflation processes. This preparation would include steps such as making sure the appropriate feature codes are attached to data, connectivity with flow direction is intact, artificial paths exist where needed. These preparatory steps should be outlined in the conflation plan.

For pre-conflation steps, the Contractor will also generate new watershed boundaries at a HUC 8 level using the new hydrography data from SOW1 as a quality control check to determine how it the new data aligns with existing watershed boundaries and detect any potential errors to be resolved before conflation. The Contractor will work with USGS and the State on the process for this step.

Step 2.1: Development of Data Schema for Project

A critical element for the project is to determine the data schema at the beginning of the project, this data schema needs to meet the needs of both the USGS and the Michigan stakeholders. The schema will need to be designed so that State of Michigan specific attribution that necessitates the splitting of flowline reaches in ways that violate NHD geometry rules, specifically in regard to pseudo nodes, can easily and automatically be merged for future maintenance. Our precise approach to this is described in the next section. The output of this task is the final data schema that meets the needs of the USGS and the national databases and the Michigan stakeholders If not selected for SOW 1, we would also at this time design and deploy the previously mentioned portal for client and stakeholder review and feedback aimed at incorporating local stakeholder review of the final attribution.

Step 2.2: SOW 1 QC

If separate contractors are selected for SOW 1 and SOW 2, as the SOW 2 contractor we would immediately run a full suite of QC checks to ensure data is meeting all EDH and NHD geometry and topology rules. It is ill advised to proceed to full attribution of the data if the geometry will subsequently change. The bulk of the SOW 2 work is entirely contingent upon the quality of the data produced by the SOW 1 contractor and therefore to avoid unnecessary rework it will be essential to validate the data created in SOW 1.

Step 2.3: Development of and Conflation of attributes for EDH/NHD

The QSI Team has unparalleled experience conflating hydrography attributes. As previously mentioned, we feel that having full NHD FCode attribution would be beneficial for one-time state and stakeholder review for both geometry and attribution, and that is most easily accomplished by having the same contractor for SOW 1 and SOW 2. However, if that is not the case, our first step in attribution would be transfer the existing NHD specific FCodes to the line and polygon work. Adding the NHD FCodes will add detail to the dataset. The generic EDH FCode domains (in the EDH FCode domain only *46000* 'generic' stream/river is allowed whereas NHD Fcode domains allow for *46006* stream/river intermittent). This first step in attribution transfer will allow for the preservation of the local knowledge that has informed the NHD to date. We would also at this time transfer any existing State of Michigan specific attributes to the data.

There are several options to add new attribution. For the data in SOW 1 to be EDH compliant, streams should have evidence of flow in the ground model, and there should be no reason to exclude any of these features based on any sort of attribution. The one possible exception to this is ditches/canals in agricultural areas; however, the over capture of ditches/canals is discussed in the EDH specification, which if SOW 1 is to comply with, should not contain this over capture.

1) So to attribute the newly created features, the first option is to leave their FCode value the same as it is in the EDH schema, which is to say the "generic" stream/river or "generic" lake/pond with no further detail at this time. The attribution can always be refined later by local stakeholders as the feature now exist and will continue to exist in the NHD database.

2) The second option would be to choose a flow accumulation threshold at which to define a stream as perennial, intermittent, or ephemeral. This would only be applicable to stream/river flowline features and it should be noted that the relationship between flow accumulation and periodicity is tenuous at best with many other influencing factors not detectable from lidar/imagery data alone.

3) A third option, one we deployed for our work in Marin County, CA, is similar to option 2 but refines the flow accumulation by watersheds and calls for local stakeholder input and review. This option looks at the flow accumulation of the existing NHD flowlines and their attribution and then identifies stream reaches with similar flow accumulation but different attribution. For example, the average flow accumulation of perennial streams in the area is calculated and then other streams reaches within a range of that flow accumulation not classified as perennial are identified and isolated for local review in the previously mentioned review portal.

Network tracing checks will be used to ensure the logical continuation of periodicity classification to ensure that ephemeral and intermittent streams are not downstream of perennials and so on unless there is a logical or special circumstance. Classification of Lake/Pond and Stream/River polygons will similarly have the existing NHD attribution transferred over and will be visually compared with the Michigan Imagery Solution (MIS)connection from DTMB.

Step 2.4: QC with USGS Provided Tools

QSI will use the USGS provided tools and national best practice to analyze new NHD content prior to the submission of data to the NHD production database or the SoM. QA/QC of new NHD

content happens across several distinct stages within the larger NHD Update workflow which happen in the following order:

1) Pre-Conflation QC
2) GeoConflation QC
3) NHD Update QC
4) Final QC

Pre-Conflation QC, which occurs before new NHD content are introduced into the GeoConflation workflow, includes an assessment of NHD schema requirements, topological/spatial relationships between feature classes, and geometric network integrity. It is the users/steward's responsibility to ensure Pre-Conflation QC is completed and fully passed before the data are introduced into the GeoConflation workflow.

GeoConflation QC pertains to the automated assessment and manual revision (where required) of ReachCodes and GNIS attribute values within the actual conflation workflow. GeoConflation QC needs to be undertaken at prescribed points during the conflation workflow and successfully passed before the GeoConflation Toolbox (GCT) can advance to any subsequent sub-processes – these checks occur at GeoConflation Steps 2.4, 2.5 and 2.7 within the GCT.

NHD Update QC occurs once the new data have been conflated and loaded into an NHD Production job/checkout replica. Update QC can be summarized as a stepwise series of required validations that allow the user/steward to run smaller groupings of QC checks and revise content iteratively (as necessary) with the NHD Update toolbar before proceeding to the next grouping of Update checks. Once the data are compliant with the suite of NHD Update QC checks, the user/steward can proceed to Final QC for full analysis of the NHD content within the replica prior to submission of data to the Production NHD.

Final QC includes an extensive series of mandatory checks that span feature integrity checks, spatial relationships, related table assessments, metadata relationships, GNIS validation, ReachCode validation, and confirmation of NHD schema requirements. Successful validation and completion of Final QC is mandatory before the Update Tool will allow the user/steward to submit data to the NHD Production database for synchronization.

Step 2.5: Delivery of data to USGS and Upload to NHD via NHD Update Tools

Once the data has passed Final QC it can be uploaded to the NHD using the USGS's NHD Update Tool. This update will generally occur by extents specific to WBD HU8 boundaries (note - depending on how specific WBD boundaries align with state boundaries, HU10s may be used as the update and transfer extent). We will work with the Michigan Principle NHD Steward to make this update.

The tools for NHD upload are the PreConflation QAQC tool, the NHD GeoConflation tool bar, and the NHD update Toolbar. If these tools pass the data, it will be accepted into the NHD and the final datasets will be uploaded there.

As the work pertains specifically to the conflation of current NHD Production attributes to new hydrography features, QSI will adhere to the USGS's GeoConflation methodology and workflow. The USGS GeoConflation methodology addresses the conflation of ALL requisite attributes currently used by the NHD Production data, as well as maintains the underlying table relationships which utilize existing NHD Production attributes. QSI is familiar with all the tools that can be successfully used for conflation. We are currently evaluating the new tools developed by a third party for conflation, however, to date no dataset has been successfully conflated with these tools and they do not represent a time saving to our team. SoM is interested in not just the conflation of the previous NHD information but also any information that may exist in the current Michigan datasets.

The datasets will also be run through a series of check to ensure that the Michigan specific attributes pass QC and will then be loaded into the Michigan Geographic Framework (MGF) through the use of a custom script.

STEP 2.5: WBD HU DELINEATION & ATTRIBUTION

When stream reaches are finalized the watersheds will be delineated at the HU12 level . For the statewide update, HUs will be delineated at the 8, 10 and 12 digit levels. The existing WBD information will be transferred and attribution such as the HUType indicating whether the unit is a single or multi outlet unit will be QC'ed for necessary changes based on the update. QSI will work with the USGS WBD team and Michigan WBD state steward to ensure all units meet the specifications laid out in the Federal Standards and Procedures for the National Water Boundary Dataset. There are only 3 groups who can perform WBD Stewardship (USDA NRCS, USGS NGToC, & USGS Water Sciences Center) and any work those 3 groups submit must be certified by the WBD Stewardship committee before the new data can be put into NHD Production. Although this work would generally be done by the SOW 1 contractor after the development of the EDH, QSI has the capability of doing this as both the SOW 1 or SOW 2 contractor.

Step 2.7: Develop long term maintenance for State

From the beginning of the project the long term maintenance plan will be developed with the State and the stakeholders. This is important because of the need for buy-in to the maintenance of the dataset by the local stewards and to ensure the investment in the quality and currency of the dataset is maintained going forward. The long term maintenance plan will contain information about the people, technology and institution requirements that need to be in place to maintain the data. The key elements of this plan are described in the sections below. Although this task falls into SOW 2, it should be initiated with discussions with stakeholders in SOW 1.

Develop data schema for the project

The selected Contractor will work with the State, USGS, and selected Contractor for SOW 1 to finalize a data schema for the hydrography data that will allow for integration into the USGS NHD. The selected Contractor will start with any schemas that are part of the Elevation Derived Hydrography specifications. This schema development will also consider additional attributes that may be requested by the State or other stakeholders to include in the schema. Examples of additional attributes being considered are temperature gradient, stream substrate, stream order. The State's Michigan Geographic Framework Data Hub systems will be updated with the final schema as the MGF Data Hub will be the integration point for data updates prior to submission to the USGS NHD data sets. It is expected that this data schema phase of SOW 2 will occur in parallel to the conflation plan development.

USGS' 3D NHD data (i.e., Elevation Derived Hydrography or EDH) schema is strictly defined. There are small differences between the historic NHD data schema and the more recent 3D Hydrography/EDH data schema relating to treatment and handling specific features like culverts or pipelines. The approach QSI will take to developing a data schema that meets both the needs of NHD and WBD and the needs of the Michigan stakeholders is explained below. This reflects an approach we have taken in both Alaska and in in Washington DC. The details of the approach taken will emerge from the results of the data schema discussions with the SoM and their stakeholders.

QSI's approach to handling such differences is to build a single dataset that contains the highest level of feature capture and attribution for all required uses covering both USGS and SoM requirements. The data schema and dataset development will create the linework, polygon delineation, and attribution that covers the EDH/NHD and SoM requirements. Once the full dataset is created, ETL scripts will be developed that allow the production of an EDH compliant dataset while also meeting SoM needs such as incorporation of additional attribution (i.e. temperature gradient, stream substrate, stream order and other elements) as requested by the State.

Completing a conflation pilot project

Once the methodology and schema are developed, the selected Contractor will begin a pilot project to test out the process. The State, the Selected Contractor for SOW1 and the selected Contractor for SOW 2 will determine the size and geographic area for the pilot.

Quality Control Process

The Contractor will develop a quality control process to ensure the integrity of the data is maintained throughout the conflation process. The quality control will validate that the geometry is segmented appropriately, all directions of flow and connectivity are maintained, and attributes are populated as outlined in the conflation plan and schema developed for the project. The quality control plan will need to be developed and tested for the pilot project. The quality control plan should also include validating data through the hydrography validations that are part of the State's Michigan Geographic Framework system

As each project area is delivered, the State and USGS will conduct a QA/QC process to determine if all deliverables are NHD compliant. The State and USGS will flag any areas that need to be reviewed by the Contractor for possible corrections prior to a final delivery. The final deliverable must be in a state to load into the Michigan Geographic Framework Data Hub and the USGS NHD

Prepare data to be loaded into MGF Data Hub

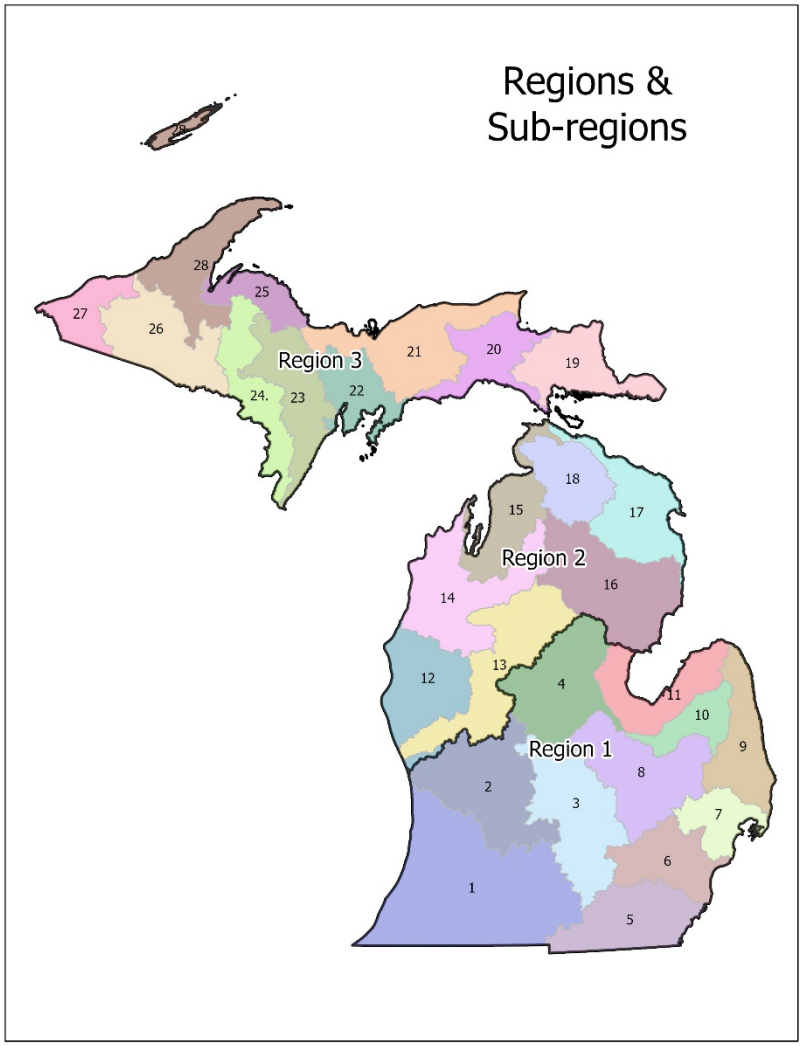
As referenced in the quality control process, the selected Contractor will develop the data to ultimately be loaded into the State's Michigan Geographic Framework Data Hub that will be used as the long-term data integration hub for data updates and running validation rules on the data prior to submission to USGS NHD on a regular basis. These validation rules in MGF will already be present within the MGF Data Hub from a previous project but should be reviewed by the selected Contractor to determine if any adjustments need to be made for successful validation for integration with NHD. The selected Contractor will need to work with the State and USGS to develop a workflow for data updates to be loaded into the MGF Data Hub and then integrated into USGS NHD. The Contractor will work with USGS and the State of Michigan to include watershed boundary updates to the Watershed Boundary Data and the MGF.

Develop long-term maintenance plan for the State

The selected Contractor will develop a long-term data maintenance plan for hydrography data for editors to make updates to the geometry and attributes following guidelines that keep the data and attributes in the format that will load into the MGF for integration into the USGS NHD. The maintenance plan should be developed in consultation with the State's hydrography working group and should include outlining a process for GNIS updates.

REGIONAL APPROACH AND TIMELINE

The project will follow a proposed plan that will divide the project tasks and deliverables into regions and sub-regions. Sub-region completion will serve as project milestones. The final selection of regions and sub-regions, which is expected to occur upon project commencement, may change and evolve throughout the project based on State of Michigan priorities, data availability or other factors. This initial map of regions and sub-regions has been provided to outline the potential realignment workplan and to develop a deliverable schedule for payment milestones. The pricing schedule in this proposal follows this regional approach and proposed timeline outlined in the section below.



It is expected as the selected Contractor for SOW 1 completes its flowline, water body, water area feature development tasks, deliveries to the selected Contractor for SOW 2 will be in the form of sub-regions consisting of either single HUC8 watersheds or collections of several HUC8 watersheds. These delivery formats will be finalized by both selected Contractors during the initial phase of the project.

The selected Contractors for both SOWs will develop a timeline for deliverables following the regional approach outlined in the project timeline section.

Region 1: Southern Lower Peninsula

Region 2: Northern Lower Peninsula

Region 3: Upper Peninsula

TIMELINE

The full project scope is roughly estimated to take 4 years to complete. A draft timeline has been provided for completion of the project. The final timeline will be determined following project commencement and will be based, project plan of the selected Contractors, the official established contract start date, State of Michigan priorities, data availability and other factors.

Draft Project Timeline	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Region 1, Sub-Regions 1 - 6																
Region 1, Sub-Regions 7 - 11																
Region 2, All Sub-Regions																
Region 3, All Sub-Regions																

1. DATA RETENTION

The State will need to retain all data for the entire length of the Contract unless otherwise direct by the State. The State will need the ability to delete data, even data that may be stored off-line or in backups. The State will need to retrieve data, even data that may be stored off-line or in backups.

QSI has a Business Continuity Plan that ensures data is backed up off-line and procedures are in place to restore data as needed. The QSI will retain all delivered data for the duration of the contract, and the State will be able to retrieve and delete data as required.

2. TRAINING SERVICES

The Contractor will provide training via remote meetings to review how to keep the data maintained and how to maintain the USGS NHD standards within the new datasets. This training will provide the attendees with the recommended data maintenance procedures developed by the Contractor in the data maintenance plan deliverable in the statement of work. The training will also include the steps for the State to validate the data to prepare for upload to the USGS NHD.

3. DOCUMENTATION

Contractor must provide reports that document the various stages of the project. These documents include:

- Conflation plan
- Data schema
- Quality control plan
- Metadata for complete project
- Data maintenance plan including data flow from editors to MGF Data Hub to USGS NHD
- Any scripts or automated processes developed specifically for this project

4. ADDITIONAL PRODUCTS AND SERVICES

QSI can provide additional products and services, however there are no additional specifications that are necessary to implement and support this solution. All these services are covered in this contract.

5. CONTRACTOR PERSONNEL

Contractor Contract Administrator. Contractor resource who is responsible to(a) administer the terms of this Contract, and (b) approve and execute any Change Notices under this Contract.

Name: Andrew Brenner **Address:** 1074 Scio Hills Court, Ann Arbor, Michigan **Phone:** 734-680-6424 **Email:** abrenner@quantumspatial.com

6. CONTRACTOR KEY PERSONNEL

Contractor Project Manager. Contractor resource who is responsible to serve as the primary contact with regard to services who will have the authority to act on behalf of the Contractor in matters pertaining to the implementation services, matters pertaining to the receipt and processing of Support Requests and the Support Services.

Quantum Spatial
Name: Alexa Ramirez, PMP, GISP **Address** 10033 MLK Street N, Suite 200, St Petersburg, Florida 33716 **Phone** 727-619-6172 **Email** aramirez@quantumspatial.com

Contractor Technical Lead. Contractor resource who is responsible for leading the technical team that will perform the development of the hydrography deliverables including standards, conflation process, testing, quality control and integration into NHD. This person must have a sufficient knowledge and experience with developing GIS data, the USGS NHD model, and the USGS standards for developing hydrography from elevation data. This person will also coordinate technical aspects of the project with the other selected Bidder team.

Quantum Spatial
Name: Cathy Power **Address** 1100 NE Circle Blvd, Suite 126, Corvallis, Oregon 97330 **Phone** 541-275-1035 **Email** cpower@quantumspatial.com

7. CONTRACTOR PERSONNEL REQUIREMENTS

Background Checks. Contractor must present certifications evidencing satisfactory Michigan State Police Background checks, ICHAT, and drug tests for all staff identified for assignment to this project.

In addition, proposed Contractor personnel will be required to complete and submit an RI-8 Fingerprint Card for the National Crime Information Center (NCIC) Finger Prints, if required by project.

Contractor will pay for all costs associated with ensuring their staff meets all requirements.

Offshore Resources.

QSI will not be using offshore resources for this work

8. STATE RESOURCES/RESPONSIBILITIES

The State will provide the following resources as part of the implementation and ongoing support of the Solution.

State Contract Administrator. The State Contract Administrator is the individual appointed by the State to (a) administer the terms of this Contract, and (b) approve and execute any Change Notices under this Contract.

State Contract Administrator
Name: Sean Regan **Phone: 517-243-8459** **Email: regans@michigan.gov**

Program Managers. The DTMB and Agency Program Managers will jointly approve all Deliverables and day to day activities.

DTMB Program Manager
Name: Mark Holmes **Phone: 517-285-6592** **Email: holmesm3@michigan.gov**

9. MEETINGS

At start of the engagement, the Contractor Project Manager must facilitate a project kick off meeting with the support from the State's Project Manager and the identified State resources to review the approach to accomplishing the project, schedule tasks and identify related timing, and identify any risks or issues related to the planned approach. From project kick-off until final acceptance and go-live, Contractor Project Manager must facilitate weekly meetings (or more if determined necessary by the parties) to provide updates on implementation progress. Following go-live, Contractor must facilitate monthly meetings (or more or less if determined necessary by the parties) to ensure ongoing support success.

The Contractor must attend the following meetings, at a location and time as identified by the state, at no additional cost to the State:

- Kick-off meeting
- Bi-weekly status meetings

10. PROJECT CONTROL & REPORTS

Once the Project Kick-Off meeting has occurred, the Contractor Project Manager will monitor project progress and report on a weekly basis to the State's Project Manager the following:

- Progress to complete milestones, comparing forecasted completion dates to planned and actual completion dates

- Accomplishments during the reporting period, what was worked on and what was completed during the current reporting period
- Indicate the number of hours expended during the past week, and the cumulative total to date for the project. Also, state whether the remaining hours are sufficient to complete the project
- Tasks planned for the next reporting period
- Identify any existing issues which are impacting the project and the steps being taken to address those issues
- Identify any new risks and describe progress in mitigating high impact/high probability risks previously identified
- Indicate the amount of funds expended during the current reporting period, and the cumulative total to date for the project.

11. PROJECT MANAGEMENT

The Contractor Project Manager will be responsible for maintaining a project schedule (or approved alternative) identifying tasks, durations, forecasted dates and resources – both Contractor and State - required to meet the timeframes as agreed to by both parties.

Changes to scope, schedule or cost must be addressed through a formal change request process with the State and the Contractor to ensure understanding, agreement and approval of authorized parties to the change and clearly identify the impact to the overall project.

SUITE Documentation
In managing its obligation to meet the above milestones and deliverables, the Contractor is required to utilize the applicable State Unified Information Technology Environment (SUITE) methodologies, or an equivalent methodology proposed by the Contractor.

SUITE's primary goal is the delivery of on-time, on-budget, quality systems that meet customer expectations. SUITE is based on industry best practices, including those identified in the Project Management Institute's PMBoK and the Capability Maturity Model Integration for Development. It was designed and implemented to standardize methodologies, processes, procedures, training, and tools for project management and systems development lifecycle management. It offers guidance for efficient, effective improvement across multiple process disciplines in the organization, improvements to best practices incorporated from earlier models, and a common, integrated vision of improvement for all project and system related elements.

While applying the SUITE framework through its methodologies is required, SUITE was not designed to add layers of complexity to project execution. There should be no additional costs from the Contractor, since it is expected that they are already following industry best practices which are at least similar to those that form SUITE's foundation.

SUITE's companion templates are used to document project progress or deliverables. In some cases, Contractors may have in place their own set of templates for similar use. Because SUITE can be tailored to fit specific projects, project teams and State project managers may decide to use the Contractor's provided templates, as long as they demonstrate fulfillment of the SUITE methodologies.

Milestones/Deliverables for Implementation
The State's proposed milestone schedule and associated deliverables are set forth below.

Milestone Event	Associated Milestone Deliverable(s)	Schedule	Payment
Project Planning	Project Kickoff	Contract Execution + 10 calendar days	
Project Planning	Project plan, schedule, including the process to engage	Contract Execution + 30 calendar days	
Requirements and Methodology Validation	Validation sessions, Final Requirement Validation Document, Final Implementation Document	Execution + 90 calendar days	

Data Sample	Provide sample data to be imported to the State of Michigan's MGF system	Execution + 150 calendar days
Deliverables and Acceptance Review	Final Data Deliverables, Final Training Documentation, Final Acceptance	According to project plan milestone dates mutually agreed upon
Additional Support	Ongoing after Final Acceptance.	As needed will be requested as additional scope

12. SERVICE LEVEL AGREEMENT

For each milestone deliverable agreed upon by the State and selected Bidder(s), the deliverables must be delivered by the mutually agreed upon date or a 2% credit will be applied to any deliverables that are not delivered by that date.

Any delays of milestones will be evaluated by both the State and the Contractor, and the roles and responsibilities of the delay will be evaluated to determine the Contractor was solely responsible. This Service Level Agreement is negotiable with the State, but an SLA is mandated for any State contract.

13. ADDITONAL INFORMATION

The State reserves the right to purchase any additional services or products from the Contractor during the duration of the Contract.

SCHEDULE A – TABLE 1 - Business Specification Worksheet

Business Specification Number	Business Specification	Contractor's delivery of the business Specifications.
1.0	Project methodology must consider guidelines outlined in the USGS Elevation-Derived Hydrography Acquisition Specifications	All hydrography developed by QSI uses the guidelines outlined in the USGS Elevation Derived Hydrography Acquisition Specifications. We worked closely with USGS from the pilot through to the operational test to assess the Guidelines. Our QC tools are designed to test the created datasets against the specifications. The biggest risk associated with this is that the specifications may change during the project, we have seen this a couple of times. Since the specifications are so new, USGS is making decisions when it encounters new elements that may make it into the specifications in a revision, this may make data that are produced earlier in the cycle non-compliant. Dealing with this issue can be a problem, however the contractor and the SoM will need to determine the specifications that the project is to be run against at the start of the project and datasets should be assessed against those specifications.
2.0	Project methodology must consider guidelines outlined in the USGS Elevation-Derived Hydrography Representation, Extraction, Attribution, and Delineation Rules	Adherence to the "Elevation-Derived Hydrography: Acquisition Specifications", "Elevation-Derived Hydrography: Representation, Extraction, Attribution, and Delineation Rules", and NHD geometry, topology, and attribution rules are continually monitored throughout data creation. As discussed in the SOW document, there are three levels of QC incorporating these guidelines before the data is released to the client. As discussed in 11.0 the biggest risk associated with this requirement is that the specifications may change during the project. Dealing with this issue can be a problem, however the contractor and the SoM will need to determine the specifications that the project is to be run against at the start of the project and datasets should be assessed against those specifications.

3.0	Contractor must provide a web-based viewer for deliverable review that will allow State to flag areas that need possible re-work	The dataset will be distributed through a task specific portal for Client and Stakeholder review and feedback. This portal is set up with username and password access allowing multiple stakeholders to review and provide focused feedback on the dataset. QSI has done this on other projects and this is another place where there will be duplication if there are two contractors since both SOW 1 and SOW 2 require stakeholder review and will yield potential rework. There are multiple risks in this because of the dependence on stakeholder resources. For the review cycle to be effective the stakeholders need to be invested in the data. If there is poor or late review by stakeholders, this can delay the project schedule or result in incorrect data being published. QSI will build relationships with the stakeholders that last the duration of the program, specific people will be identified as reviewers from the beginning of the project and will be incentivized to review the data in a timely manner.
4.0	Contractor will be responsible for validating the data from SOW1 using any existing USGS tools (e.g. NHDUpdateTool, GeoConflation) and/or internal tools to prepare the data for the conflation process	QSI will run all the pre-conflation checks on the datasets produced by the Contractor for SOW1. As discussed before the biggest risk is the spitting of the two SOWs, if errors are found in the linework it impacts the conflation and network creation. Discussions also needs to occur on the labeling of the periodicity and how these data will be attached to the linework. Carefully tracking the iterations and errors for each subregion is critical to ensuring clean data transfer between contractors.
5.0	Contractor will generate new watershed boundaries at a HUC 8 level using the new hydrography data from SOW1 as a quality control check to determine how it the new data aligns with existing watershed boundaries and detect any potential errors to be resolved before conflation. The Bidder will work with USGS and the State on the process for this step. The Bidder will also coordinate with the USGS and the State to incorporate these updates in the	For the statewide update, HUs will be delineated at the 8, 10 and 12 digit levels. The existing WBD information will be transferred and attribution such as the HUType indicating whether the unit is a single or multi outlet unit will be QC'ed for necessary changes based on the update. QSI will work with the USGS WBD team and Michigan NHD state steward to ensure all units meet the specifications laid out in the Federal Standards and Procedures for the National Water Boundary Dataset, the risk to this requirement is if the linework changes it generally required an adjustment in the

	Watershed Boundary Dataset and also incorporate those edits back into the MGF.	watershed boundary. So, the linework needs to be accepted before the watershed boundaries are created.
6.0	Conflate NHD Data Production attributes to new hydrography features derived from elevation data.	As the work pertains specifically to the conflation of current NHD Production attributes to new hydrography features, QSI will adhere to the USGS's GeoConflation methodology and workflow. The USGS GeoConflation methodology addresses the conflation of ALL requisite attributes currently used by the NHD Production data, as well as maintains the underlying table relationships which utilize existing NHD Production attributes. This workflow is described, in detail, beginning on page 54 of the current NHD GeoConflation Tool User Guide – this user guide serves as the national best practice document for the conflation of NHD content; has been authored the USGS National Geospatial Technical Operations Center; and is actively maintained by the USGS GeoConflation Tool product owner. Our team has unparalleled experience with the USGS's GeoConflation tool and workflow. We see no risk associated with this requirement.
7.0	Contractor must review existing conflation tools available through USGS as part of the conflation methodology and leverage those tools unless alternatives are approved by both USGS and the State (Add in names of existing tools to use or most recent version)	QSI is familiar with all the tools that can be successfully used for conflation. We are currently evaluating the new tools developed by a third party for conflation, however, to date no dataset has been successfully conflated with these tools and they do not represent a time saving to our team. The State is interested in not just the conflation of the previous NHD information but also any information that may exist in the current Michigan datasets. The datasets will also be run through a series of checks to ensure that the Michigan specific attributes pass QC and will then be loaded into the MGF through the use of a custom script. The risks are associated with the updating of the data model for EDH, although the NHD tools work well for NHD and WBD, as the EDH database evolves these tools may need to be updated. We are currently assessing new tools that have been developed for EDH by USGS.

8.0	Contractor must deliver data by regions agreed upon by the State, and the selected Bidder(s). A current proposed regional map is included in the statement of work section. This will be reviewed and finalized as part of the project plan development.	QSI will deliver the datasets by region. The first task will be to review the boundaries of the regions with the State and finalize the map. The order of the subregions should be discussed based on availability of ancillary data and type of landscape being mapped. These will be discussed with the project team and will be incorporated into the project plan. There are some risks associated with this requirement related to tying in with hydrography networks in the neighboring states of OH, IN and WI. In some instances, we may have to modify new SOM data, and, in other instances, we may have to modify the NHD outside the SoM to maintain network integrity. .
9.0	Contractor must conduct a QA/QC process on the data prior to deliveries to the State	The QSI team will adhere to our QA/QC processes in both SOW #1 and #2 as we do for every deliverable, ensuring the integrity of the data is maintained throughout the project cycle. Furthermore, it is understood that, as each project area is delivered, the State and USGS will conduct a QA/QC process to determine if all deliverables are NHD compliant. The State and USGS will flag any areas that need to be reviewed by the Contractor for possible corrections prior to a final delivery. We anticipate that the only corrections that may be needed are those that incorporate local knowledge that is not contained in the existing databases. The risk to this requirement is dedicated stakeholder and State review resources. QSI will enable this through the review portal.
10.0	Contractor will submit deliverables in ESRI geodatabase in USGS NHD Geodatabase Format for each completed HUC dataset,	The QSI team will submit deliverables in ESRI geodatabase in USGS NHD Geodatabase Format for each completed HUC dataset. This is the format we have delivered all our other deliverables in and understand the format well and have QC steps to ensure topological and attribute accuracy and completeness. There are no risks associated with this requirement.
11.0	Contractor must deliver FGDC format metadata for the deliverables.	The QSI team will deliver FGDC format metadata for the deliverables. We generally ask the client to provide a metadata template for the program and we will adhere to this requirement and format. There are no risks associated with this requirement.

12.0	Contractor must include data design to have cross-walk with current reach codes and new ones that might be derived	The QSI team understands the importance of ReachCode attributes which serve as part of an addressing system within the NHD to locate hydro observations along a stream reach or a position along a stream reach. Where possible, existing ReachCodels will be maintained and new ReachCodes will be applied in accordance with USGS policies. The risks associated with this requirement is whether the guidance on new ReachCodels for the EDH dataset are well established and are appropriate in all situations in Michigan. QSI will work with USGS to ensure that application of new ReachCode attributes are in line with USGS and State requirements
13.0	Data deliverable must be designed to upload into the Michigan Geographic Framework Data Hub	As part of the database design task the final database will be developed so that it can accommodate both USGS and State needs. The data will be uploadable to MGF data hub using scripts that will be designed for the purpose. There are no risks associated with this requirement.
14.0	Data must be designed to be uploaded from the Michigan Geographic Framework Data Hub to the USGS NHD.	All data will be created in order to be uploaded from the Michigan Geographic Framework Data Hub to the USGS NHD. Our team has been through this process for other frameworks and has a deep understanding of the process. The database will be designed so that it can be uploaded to both the USGS NHD and the MGF. There are no risks associated with this requirement.
15.0	Long-term data maintenance plan must include the workflow for authorized data editors to 'push' data updates to the Michigan Geographic Framework Data Hub. From the Michigan Geographic Framework Data Hub, the hydrography data would be uploaded to NHD. The Michigan Geographic Framework will have validations to ensure that data meets the NHD schema and standards for uploads. (these MGF validation tools are already being implemented as part of a separate existing project)	The long term data maintenance plan will include multiple elements including instructions detailing how the data will be maintained by authorized users. Scripts will be developed to upload future data updates to the MGF and documentation of data preparation and the processes necessary to upload the future updates to the NHD will be provided. Although the mentioned MGF upload scripts can be developed for the current and designed database schemas, if the schemas change over the course of the project, these scripts would need to be adapted.

SCHEDULE B – PRICING

Table B – SOW 2 – Conflation of NHD Attributes to New Hydrography Features Fixed-Fee Costs

Project Task	Cost
Project Management, Project Conflation Plan, Quality Control Plan	$69,724.47
Pilot Project	$13,832.13
Conflation of NHD Attributes - Region 1 – Sub-regions 1-6	$168,809.19
Conflation of NHD Attributes - Region 1 – Sub-regions 7-11	$111,766.14
Conflation of NHD Attributes - Region 2 – All Sub Regions	$146,966.66
Conflation of NHD Attributes - Region 3 – All Sub Regions	$219,819.74
Integration plan with MGF Data Hub and USGS NHD	$27,704.40
Long-term data maintenance plan	$22,615.48
Total Costs	$781,238.21

Table B – Hourly Rates

Staff Category (e.g. Project Manager, GIS Analyst, etc.)	Hourly Rate
Senior Project Manager	$150.41
Technical Expert	$127.65
Senior GIS Analyst	$92.82
GIS Analyst	$74.25
GIS Technician	$62.89

The invoicing schedule is laid out below.

Conflation of NHD Attributes to New Hydrography Features Invoicing Schedule.

Project Tasks	# Regions	$ Per Region	Year 1	Year 2	Year 3	Year 4	Total
Project Management, Project Conflation Plan, Quality Control Plan			$20,917.34	$13,944.89	$13,944.89	$20,917.34	$69,724.47
Pilot Project			$13,832.13				$13,832.13
Conflation of NHD Attributes - Region 1 – Sub-regions 1-6	6	$28,134.86	$168,809.19				$168,809.19
Conflation of NHD Attributes - Region 1 – Sub-regions 7-11	5	$22,353.23		$111,766.14			$111,766.14
Conflation of NHD Attributes - Region 2 – All Sub Regions	7	$20,995.24			$146,966.66		$146,966.66
Conflation of NHD Attributes - Region 3 – All Sub Regions	11	$19,983.61				$219,819.74	$219,819.74
Integration plan with MGF Data Hub and USGS NHD			$6,926.10	$6,926.10	$6,926.10	$6,926.10	$27,704.40
Long-term data maintenance plan					$11,307.74	$11,307.74	$22,615.48
Total Costs			**$210,484.76**	**$132,637.13**	**$179,145.39**	**$258,970.92**	**$781,238.21**

Sub regions will be invoiced once they are approved by the project manager. Management costs will be invoiced monthly or bi-monthly.

Travel and Expenses
The State does not pay for overtime or travel expenses.

SCHEDULE C - INSURANCE SCHEDULE

Required Coverage.

1.1 **Insurance Requirements.** Contractor must maintain the insurances identified below and is responsible for all deductibles. All required insurance must: (a) protect the State from claims that may arise out of, are alleged to arise out of, or result from Contractor's or a Permitted Subcontractor's performance; (b) be primary and non-contributing to any comparable liability insurance (including self-insurance) carried by the State; and (c) be provided by an company with an A.M. Best rating of "A" or better and a financial size of VII or better.

Insurance Type	**Additional Requirements**
Commercial General Liability Insurance	
Minimal Limits: $1,000,000 Each Occurrence Limit $1,000,000 Personal & Advertising Injury Limit $2,000,000 General Aggregate Limit $2,000,000 Products/Completed Operations Deductible Maximum: $50,000 Each Occurrence	Contractor must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 2010 07 04 and CG 2037 07 0.
Umbrella or Excess Liability Insurance	
Minimal Limits: $5,000,000 General Aggregate	Contractor must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds.
Automobile Liability Insurance	
Minimal Limits: $1,000,000 Per Occurrence	
Workers' Compensation Insurance	
Minimal Limits: Coverage according to applicable laws governing work activities.	Waiver of subrogation, except where waiver is prohibited by law.
Employers Liability Insurance	

Minimal Limits: $500,000 Each Accident $500,000 Each Employee by Disease $500,000 Aggregate Disease.	
Privacy and Security Liability (Cyber Liability) Insurance	
Minimal Limits: $1,000,000 Each Occurrence $1,000,000 Annual Aggregate	Contractor must have their policy: (1) endorsed to add “the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents” as additional insureds; and (2) cover information security and privacy liability, privacy notification costs, regulatory defense and penalties, and website media content liability.

1.2 If Contractor's policy contains limits higher than the minimum limits, the State is entitled to coverage to the extent of the higher limits. The minimum limits are not intended and may not be construed to limit any liability or indemnity of Contractor to any indemnified party or other persons.

1.3 If any of the required policies provide claim-made coverage, the Contractor must: (a) provide coverage with a retroactive date before the effective date of the contract or the beginning of contract work; (b) maintain coverage and provide evidence of coverage for at least three (3) years after completion of the contract of work; and (c) if coverage is canceled or not renewed, and not replaced with another claims-made policy form with a retroactive date prior to the contract effective date, Contractor must purchase extended reporting coverage for a minimum of three (3) years after completion of work.

1.4 Contractor must: (a) provide insurance certificates to the Contract Administrator, containing the agreement or purchase order number, at Contract formation and within 20 calendar days of the expiration date of the applicable policies; (b) require that Permitted Subcontractors maintain the required insurances contained in this Section; (c) notify the Contract Administrator within 5 business days if any insurance is cancelled; and (d) waive all rights against the State for damages covered by insurance. Failure to maintain the required insurance does not limit this waiver.

Non-waiver. This Insurance Schedule is not intended to and is not to be construed in any manner to waive, restrict or limit the liability of either party for any obligations under this Contract (including any provisions hereof requiring Contractor to indemnify, defend and hold harmless the State).

SCHEDULE H - Federal Provisions Addendum

This addendum applies to purchases that will be paid for in whole or in part with funds obtained from the federal government. The provisions below are required and the language is not negotiable. If any provision below conflicts with the State's terms and conditions, including any attachments, schedules, or exhibits to the State's Contract, the provisions below take priority to the extent a provision is required by federal law; otherwise, the order of precedence set forth in the Contract applies. Hyperlinks are provided for convenience only; broken hyperlinks will not relieve Contractor from compliance with the law.

1. Equal Employment Opportunity

If this Contract is a "**federally assisted construction contract**" as defined in 41 CFR Part 60-1.3, and except as otherwise may be provided under 41 CFR Part 60, then during performance of this Contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24,

1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

2. Davis-Bacon Act (Prevailing Wage)

If this Contract is a **prime construction contracts** in excess of $2,000, the Contractor (and its Subcontractors) must comply with the Davis-Bacon Act (40 USC 3141-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"), and during performance of this Contract the Contractor agrees as follows:

(1) All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.

(2) Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.

(3) Additionally, contractors are required to pay wages not less than once a week.

3. Copeland "Anti-Kickback" Act

If this Contract is a contract for construction or repair work in excess of $2,000 where the Davis-Bacon Act applies, the Contractor must comply with the Copeland "Anti-Kickback" Act (40 USC 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"), which prohibits the Contractor and subrecipients from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled, and during performance of this Contract the Contractor agrees as follows:

(1) Contractor. The Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

(2) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA or the applicable federal awarding agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

(3) Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and Subcontractor as provided in 29 C.F.R. § 5.12.

4. Contract Work Hours and Safety Standards Act

If the Contract is **in excess of $100,000** and **involves the employment of mechanics or laborers**, the Contractor must comply with 40 USC 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5), as applicable, and during performance of this Contract the Contractor agrees as follows:

(1) Overtime requirements. No Contractor or Subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The State shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor

shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

5. Rights to Inventions Made Under a Contract or Agreement

If the Contract is funded by a federal "funding agreement" as defined under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

6. Clean Air Act and the Federal Water Pollution Control Act

If this Contract is **in excess of $150,000,** the Contractor must comply with all applicable standards, orders, and regulations issued under the Clean Air Act (42 USC 7401-7671q) and the Federal Water Pollution Control Act (33 USC 1251-1387), and during performance of this Contract the Contractor agrees as follows:

Clean Air Act

1. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
3. The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

Federal Water Pollution Control Act

(1) The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
(2) The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

7. Debarment and Suspension

A "contract award" (see 2 CFR 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (51 FR 6370; February 21, 1986) and 12689 (54 FR 34131; August 18, 1989), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(1) This Contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the Contractor is required to verify that none of the Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by the State. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the State, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

8. Byrd Anti-Lobbying Amendment

Contractors who apply or bid for an award of **$100,000 or more** shall file the required certification in Exhibit 1 – Byrd Anti-Lobbying Certification below. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

9. Procurement of Recovered Materials

Under 2 CFR 200.322, Contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

(1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—

a. Competitively within a timeframe providing for compliance with the contract performance schedule;

b. Meeting contract performance requirements; or

c. At a reasonable price.

(2) Information about this requirement, along with the list of EPA- designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive- procurement-guideline-cpg-program.

(3) The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

10. Additional FEMA Contract Provisions.

The following provisions apply to purchases that will be paid for in whole or in part with funds obtained from the Federal Emergency Management Agency (FEMA):

(1) Access to Records. The following access to records requirements apply to this contract:

a. The Contractor agrees to provide the State, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents,

papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

b. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

c. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

d. In compliance with the Disaster Recovery Act of 2018, the State and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

(2) Changes.

See the provisions regarding modifications or change notice in the Contract Terms.

(3) DHS Seal, Logo, And Flags.

The Contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

(4) Compliance with Federal Law, Regulations, and Executive Orders.

This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives.

(5) No Obligation by Federal Government.

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the State, Contractor, or any other party pertaining to any matter resulting from the Contract."

(6) Program Fraud and False or Fraudulent Statements or Related Acts.

The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract.

Schedule H, Attachment 1 - Byrd Anti-Lobbying Certification

Contractor must complete this certification if the purchase will be paid for in whole or in part with funds obtained from the federal government and the purchase is greater than $100,000.

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor,_____ certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____
Signature of Contractor’s Authorized Official

_____
Name and Title of Contractor’s Authorized Official

_____

Date