NapaSan

GHD - TASK ORDER No. 71

Collection System Master Plan Phase 2 (CIP #19727)

Date: _____

Issued under Professional Services Agreement dated August 9, 2017.

To: GHD

Project Description:

Professional Engineering Services

Description of Scope of Services to be performed by Consultant under this Task Order:

See Attachment 'A' – Scope of Services

Description of Services to be Provided by District:	See Attachment 'A' – Scope of Services
Deliverables:	See Attachment 'A' – Scope of Services
Consultant Project Manager:	Matt Winkelman, PE
Consultant Quality Control Manager:	Greg Watanabe, PE
Schedule to Perform Services:	See Attachment 'A' – Project Schedule
Time & Materials Not-to-Exceed Cost Limit:	$563,461 See Attachment 'B' – Project Fee Estimating Sheet

APPROVALS:

GHD

By: _____ _____

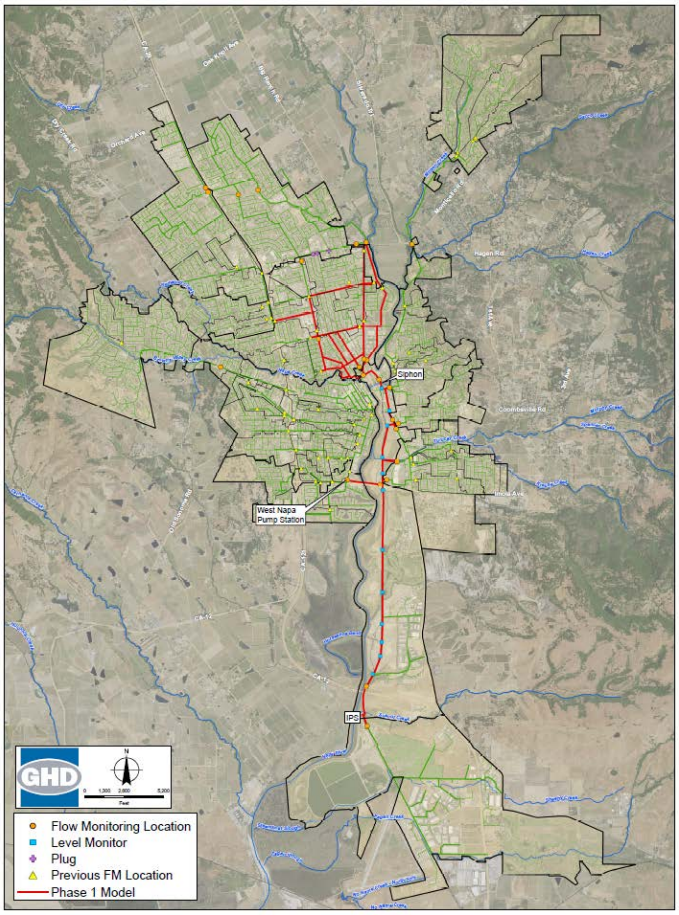
Authorized Representative Date

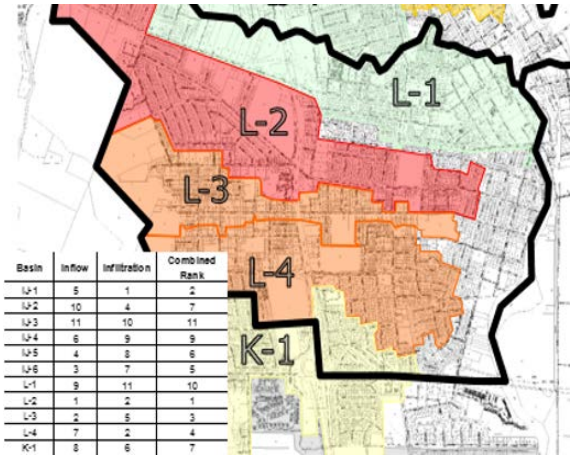
NAPA SANITATION DISTRICT

By: _____ _____

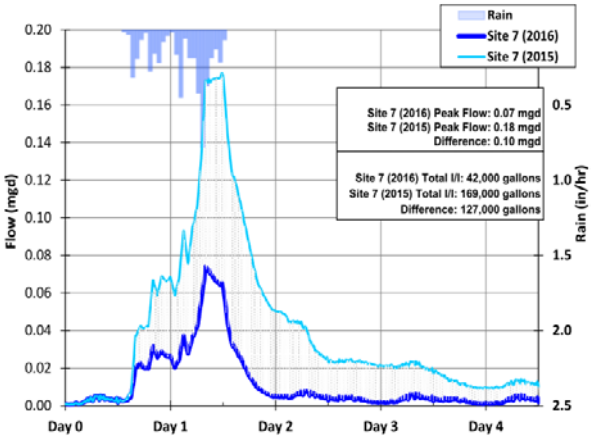
Purchasing Agent Date

NSD Account No.: CIP 19727





Basin	Inflow	Infiltration	Combined Rank
L-1	5	1	2
L-2	10	4	7
L-3	11	10	11
L-4	6	9	9
L-5	4	8	6
L-6	3	7	5
L-1	9	11	10
L-2	1	2	1
L-3	2	5	3
L-4	7	2	4
K-1	8	6	7



Napa Sanitation District

Collection System Master Plan

Phase 2 – Work Plan

May 2019

Project Charter

Vision Statement

The Napa Sanitation District (NapaSan) owns and operates critical infrastructure serving the City of Napa and surrounding areas of Napa County with wastewater conveyance, treatment, water reuse and discharge services that serves current customers and is intended to serve future growth. NapaSan seeks to operate their facilities at a high level of service and in a sustainable manner for the benefit of all stakeholders.

Problem Statement

Wet weather conditions have a significant effect on NapaSan's sanitary collection system, where rainfall derived infiltration and inflow (RDII) can cause portions of the collection system to become surcharged and limit capacity needed to convey wastewater for existing customers and to accommodate planned growth. Failure of some facilities due to age/condition or hydraulic deficiencies could carry significant consequences in terms of costs to make repairs and clean up spills, environmental damage, and fines. The previous Collection System Master Plan (CSMP) was completed in 2007. Changes in dry-weather flow, construction of I&I projects, intensification of storm events, and changes in growth projections prompted NapaSan to consider an updated CSMP, for 2019, to be completed in two phases. NapaSan's 66-inch Trunk Sewer Rehabilitation Project is currently addressing corrosion and structural issues within one of its most critical assets. The expedition and execution of an updated CSMP provides the key added benefit of guiding NapaSan in determining and validating key design decisions on that project.

GHD proposes to employ a holistic approach to both phases of this master plan, utilizing advanced GIS-centric modeling software deliver a comprehensive solution. A comprehensive evaluation of the sewer collection system is needed to identify near-term risks, mitigation strategies, and capacity needs, and to support a program that identifies sustainable funding needs for a long-term planning horizon.

Project Purpose and Objectives

The purpose of Phase 2 is to prepare a comprehensive Collection System Master Plan meeting the following objectives:

- Import NapaSan's production GIS to populate and validate an all-pipes dynamic hydraulic model;
- Utilizing all available land use, general plan, urban water management plan, and water billing data, refine, update, and calibrate an existing and future dry weather flow all-pipes model;
- Utilizing the 2019-2020 wet weather flow monitoring data, determine appropriate wet weather calibration parameters and calibrate an all-pipes model accordingly;
- Generate an up-to-date design storm that considers the effects of near and longer-term climate change.
- Assess the hydraulic capacity of the all-pipes network using a range of scenarios that assess the timing and magnitude of various pumping, routing, flow splitting, I&I reduction, potential CIP projects, and design storm/rainfall options and focuses on the 66-inch interceptor and major trunk lines serving it for existing and projected buildout flows;
- Analyze the progress of the I&I Program recommended by the 2007 CSMP;
- Generate a Capital Improvement Program (CIP) that prioritizes capacity improvements and I&I Reduction Projects, and;
- Prepare a comprehensive report documenting the evaluation findings and recommended investment / management / planning strategies for determining and validating key planning and design decisions for the 66-inch interceptor and major trunk lines.

Stakeholders

The project outcome will need to help NapaSan address expectations of key stakeholders.

Internal Stakeholders	External Stakeholders
NapaSan Board	City of Napa
Engineering, O&M, and Finance	Napa County
	Development Community
	Permitting Agencies
	General Public

Scope of Work

The detailed project scope is included with the executed agreement as Attachment A. A summary of each task and associated meetings, workshops and deliverables is provided in Table 1.

Table 1 Summary of Scope Tasks, Meetings and Deliverables

Scope of Services	Meetings	Deliverables
Task 1.1 Project management & coordination	Bi-weekly check-in calls monthly meetings	Monthly progress reports
Task 1.2 Project meetings	Kickoff workshop; monthly progress meetings	Agendas, notes
Task 2.1 Data Review & Knowledge Transfer		NapaSan to provide records and data requested by GHD
Task 2.2 GIS import and all-pipes model update		
Task 2.3 Initiate model review and validation		
Task 2.4 Gap assessment		
Task 2.5 Field survey/field recon for missing/erroneous data		
Task 2.6 Incorporate field work and complete engineering review and validation of remaining model parameters		
Task 3.1 Flow and level sensor monitoring analysis and reporting		Flow Monitoring Results Report
Task 3.2 Perform Dry Weather Flow Monitoring		
Task 4.1 Collect and review all dry weather flow planning data		
Task 4.2 Determine DWF factors, geo-process, and load to model		
Task 4.3 Enhance and apply DWF diurnal patterns to model		
Task 4.4 Draft and deliver tech memo		TM No. 1 – DWF Model Calibration
Task 5.1 Delineate sewersheds and associate sewershed drainage points to model nodes		
Task 5.2 Import wet weather meter basin flow hydrographs into model		
Task 5.3 Associate rainfall data to model		
Task 5.4 Decompose flow components and generate I&I parameters		
Task 5.5 Calibrate I&I parameters for model sewersheds		
Task 5.6 Draft and deliver tech memo		TM No. 2 – WWF Model Calibration
Task 6.1 Develop appropriate design storm		

Task 6.2 Associate design storm rain patterns to model meter basins		
Task 6.3 Hydraulic Capacity Criteria Planning Workshop	Hydraulic Capacity Criteria Planning Workshop	
Task 7.1 Run existing capacity scenario simulations		
Task 7.2 Run future capacity scenario simulations		
Task 7.3 Draft and deliver tech memo		TM No. 3 – Design Storm and Capacity Analysis TM
Task 8.1 Conduct hydraulic capacity results review & CIP planning workshop	CIP Planning Workshop #1	
Task 8.2 Generate prioritized CIP		
Task 8.3 Conduct CIP results workshop	CIP Planning Workshop #2	
Task 9.1 DRAFT CSMP report		DRAFT CSMP Report
Task 9.2 Final DRAFT CSMP report		Final DRAFT CSMP Report
Task 9.3 Present to NapaSan Board	Presentation with NapaSan Board/Stakeholders	
Task 9.4 FINAL CSMP report		FINAL CSMP Report
Task 9.5 Deliver complete GIS geodatabase	Final GIS Geodatabase	

GHD's project manager will have bi-weekly correspondence with NapaSan's project manager (emails, phone calls, meetings) to discuss progress, action items and potential changes to the scope. Changes to the scope will be documented for both parties' benefit and contract amendments will be submitted for approval before work progresses on additional services.

Progress reports will be provided by GHD with monthly invoices that describe work completed to date and work scheduled for the coming month, and any potential changes in scope will also be noted in the report. GHD will work collaboratively with the NapaSan to make scope adjustments as necessary to meet the overall project objectives.

Schedule

Table 2 provides a summary of key project tasks and milestones. Joint meetings are highlighted in purple, tasks requiring NapaSan actions are highlighted in red, field activities are highlighted in green, and tasks with deliverables are blue.

Table 2 Schedule of Key Project Tasks and Milestones

Key Task/Milestone Description	Start	End
1.2 Project Kick-off Meeting (Approximate window of timing)	6 May 2019	13 May 2019
2.1 Requested Records Provided by NapaSan		On-going
2.2 GIS import and all-pipes model update		24 Jun 2019
2.3 Initiate model review and validation	13 May 2019	20 May 2019
2.4 Gap assessment	20 May 2019	27 May 2019
2.5 Field survey/field recon for missing/erroneous data	27 May 2019	17 Jun 2019
2.6 Incorporate field work and complete model validation	17 Jun 2019	1 Jul 2019
3.1 Draft and deliver - Flow Monitoring Results Report		17 Jun 2019
3.2 Perform Dry Weather Flow Monitoring (V&A)	20 May 2019	3 Jun 2019
4.1 Collect and review all dry weather flow planning data	6 May 2019	10 Jun 2019
4.2 Determine DWF factors, geo-process, and load to model	20 May 2019	1 Jul 2019
4.3 Enhance and apply DWF diurnal patterns to model	10 Jun 2019	8 Jul 2019
4.4 Draft and deliver TM No. 1 – DWF Model Calibration	22 Apr 2019	15 Jul 2019
5.1 Delineate meter basins and associate modeled nodes to basins	24 Jun 2019	8 Jul 2019
5.2 Import wet weather meter basin flow hydrographs into model	8 Jul 2019	15 Jul 2019
5.3 Associate rainfall data to model	15 Jul 2019	22 Jul 2019
5.4 Decompose flow components and generate I&I parameters	22 Jul 2019	29 Jul 2019
5.5 Assign calibrated I&I parameters to meter basin nodes	29 Jul 2019	5 Aug 2019
5.6 Draft and deliver TM No. 2 – WWF Model Calibration	24 Jun 2019	19 Aug 2019
6.1 Develop appropriate design storm	5 Aug 2019	19 Aug 2019
6.2 Associate design storm rain patterns to model meter basins	19 Aug 2019	26 Aug 2019
6.3 Hydraulic capacity criteria planning workshop	19 Aug 2019	26 Aug 2019
7.1 Run existing scenario capacity simulations	26 Aug 2019	9 Sep 2019
7.2 Run future scenario capacity simulations	9 Sep 2019	23 Sep 2019
7.3 Draft and deliver TM No. 3 – Design Storm & Capacity Analysis	5 Aug 2019	30 Sep 2019
8.1 Conduct hydraulic capacity results & CIP planning workshop #1	30 Sep 2019	7 Oct 2019
8.2 Generate Prioritized CIP	7 Oct 2019	4 Nov 2019
8.3 Conduct CIP Planning workshop #2	28 Oct 2019	4 Nov 2019
9.1 DRAFT CSMP report		18 Nov 2019
9.2 Final DRAFT CSMP report		9 Dec 2019
9.3 Present to NapaSan Board	9 Dec 2019	16 Dec 2019
9.4 FINAL CSMP report		23 Dec 2019
9.5 Deliver complete GIS geodatabase		30 Dec 2019

Budget

The total project budget for the basic scope of services is for time and materials not to exceed $563,641. A budget ceiling is not set for individual project tasks, but to establish project management controls. Task budgets have been estimated as shown in Table 3. Invoices, including sub-consultant invoices, shall summarize the budget status including current billings, total billings project to date, total budget, and budget

Budget

The total project budget for the basic scope of services is for time and materials not to exceed $563,461. A budget ceiling is not set for individual project tasks, but to establish project management controls. Task budgets have been estimated as shown in Table 3. Invoices, including sub-consultant invoices, shall summarize the budget status including current billings, total billings project to date, total budget, and budget remaining. Tasks in green may be subject to some budget variability and are more dependent on quality and quantity of data received from NapaSan.

Table 3 Estimated Task Budgets by Project Phase

Task Description	Budget
Task 1 - Project Management & Coordination	$54,711
Task 2 – Model Build, Gap Assessment & Field Work	$84,652
Task 3 - Flow and Level Sensor Monitoring Analysis & Reporting	$32,386
Task 4 - DWF Model Development & Calibration	$74,683
Task 5 - WWF Model Development & Calibration	$55,463
Task 6 - Design Storm Development & Application	$23,427
Task 7 - Hydraulic Capacity Analysis	$63,061
Task 8 - Asset Prioritization and CIP Planning	$76,252
Task 9 - Final CSMP Report	$98,826
Total Budget (Basic Scope of Services)	**$563,461**

Quality Management

GHD will perform QA/QC review of all deliverables before they are submitted to the NapaSan for review. The schedule assumes two weeks for NapaSan reviews of all technical memoranda and the Draft Report.

Communications

Given the number of people that will be involved in the project and the coordination required for the field work, communication will need to take place between individuals on an as-necessary basis to keep the project on schedule. However, NapaSan's project manager (Matt Lemmon) and GHD's project manager (Matt Winkelman) should be copied on correspondence so they can keep track of information exchanges and decisions that impact the project. In addition, GHD team leads should also be copied on correspondence that impacts their areas of responsibility.

Matt Winkelman is the GHD project Manager and the primary point of contact for NapaSan. GHD may not replace Matt without prior written communication from NapaSan. Table 4 provides a list of key project team members, their project role, and their contact information.

Table 4 Project Team Contact Information

Team Member	Project Role	Email Address	Phone Number
NapaSan:			
Matt Lemmon	Project Manager / Senior Civil Engineer	mlemmon@napasan.com	707.258.6004
Andrew Damron	Attend milestone meetings; provide project review and acceptance of recommendations	adamron@napasan.com	707.258.6007
Jim Keller	Attend milestone meetings; provide project review and acceptance of recommendations	jkeller@napasan.com	707.258.6000 x 601
Tim Healy	Attend milestone meetings; provide project review and acceptance of recommendations	thealy@napasan.com	707.258.6000 x 508
Consultant Team:			
Ted Whiton	Principal GHD	ted.whiton@ghd.com	707.540.9007
Matt Winkelman	Project Manager, GHD	matt.winkelman@ghd.com	707.236.1546
Greg Watanabe	QA/QC Manager, GHD	greg.watanabe@ghd.com	714.496.1752
Chris Brothers	Technical Lead, GHD	chris.brothers@ghd.com	619.347.2737
Adam Fisher	Modeling/GIS, GHD	adam.fisher@ghd.com	707.236.1552
Jill Kjellsson	Engr Support, GHD	jill.kjellsson@ghd.com	707.236.1548
Gage Muckleroy	Asset Mgmt Lead, GHD	gage.muckleroy@ghd.com	240.206.6831
Elissa Overton	Technical Support, GHD	elissa.overton@ghd.com	707.236.1535
Kevin Krajewski	I&I Analysis, V&A (sub)	kkrajewski@vaengineering.com	510.903.6606

Attachments

Attachment A – Scope of Work

ATTACHMENT “A”

May 7, 2019

2019 Collection System Master Plan

This scope of services is for the preparation of the second of two phases as part of a comprehensive Collection System Master Plan (CSMP). The CSMP effort includes evaluation of the benefits and costs associated with various project types, including infiltration and inflow (I&I) reduction, capacity modifications, and improvements related to condition, efficiency, risk, and level of service. GHD intends to deliver the project under two phases. Phase 1 included an in depth hydraulic analysis of the 66-inch trunk sewer and has been completed. Phase 2 will involve building an all pipes dynamic model and leveraging various data to evaluate the entire network as part of a comprehensive CSMP and is the basis for this scope of services.

Basic Scope of Services for Phase 2 – Collection System Master Plan

The professional engineering services for the project are provided below.

Task 1 – Project Management and Coordination

Task 1.1 Internal Coordination and Administration

Provide project management services during the project. The following summarizes our project management activities:

- Project staffing requirements. Evaluate and assign staff as needed to meet project quality and schedule requirements.
- Project progress. Evaluate and track progress on scope, schedule, and budget. Prepare monthly project activity reports to be provided with each of our monthly invoices during the project. These reports will provide NapaSan with a brief description of the activities completed during the previous month.
- Project Work Plan. Develop a detailed Project Work Plan for the team to use as a basis for project execution.

Deliverables: *Project Work Plan; Monthly Progress Reports*

QA/QC review time is incorporated into the various project tasks.

Task 1.2 Project Meetings and Coordination with NapaSan

- Kickoff workshop to be attended by GHD’s project team and V&A’s Project Manager. Topics for discussion at this meeting include modeling needs; preparation for field work; and confirmation of NapaSan’s goals/objectives for the project;
- Existing Model Review Workshop to be attended by GHD’s project team and V&A’s Project Manager. The purpose of this meeting is to review various aspects and assumptions for the existing hydraulic model and identify any changes for the model to be completed as part of Phase 2.
- Conduct monthly progress meetings and weekly progress calls between GHD’s Project Manager, Technical Lead, and NapaSan staff;
- Preparation of meeting notes, as necessary; and
- Miscellaneous coordination with NapaSan for the duration of the scope of work.

Other project meetings related to specific scope tasks are noted elsewhere in the scope of services.

Deliverables: *GHD will prepare meeting agenda, meeting notes (commensurate with the formality of the meeting), and monthly invoice progress reporting (including monthly milestone schedule and budget updates).*

Task 2 – Model Build, Gap Assessment, and & Field Work

Task 2.1 Data Review and Knowledge Transfer

Comprehensive planning starts with establishing a firm understanding of current and future drivers that will affect the performance of the conveyance system. This understanding is obtained through the transfer of knowledge from NapaSan staff and review of available records. GHD will collect, organize, and review existing mapping resources, computerized maintenance management system (CMMS) data, and available reports with the purpose of confirming the scope of work for field data collection and technical evaluation. This will include but not be limited to existing sewer plans, planning documents (General & Specific Plans), customer water billing records, regulatory rules, and other materials important to the development of the SMP.

Task 2.2 GIS Import and All-Pipes Model Update

This task involves using the hydraulic model’s GIS Gateway tool to import NapaSan’s latest model specific elements into the model space. The link between hydraulic model elements and NapaSan’s GIS is a permanently stored cluster which will allow the model and the GIS to be easily updated based on newly acquired GIS data. Care will be taken to ensure original NapaSan element IDs are maintained through the model build process so that future data transfers are feasible.

Task 2.3 Initiate Model Review and Validation

This task involves first using the hydraulic model’s advanced network review features to validate and correct easily fixable issues like connectivity, link direction, and numbering/ids. Hydraulic modeling tools like ‘trace network’, ‘locate disconnected links/nodes’, and ‘fix connectivity’ will be employed to validate the imported GIS features.

Task 2.4 Gap Assessment

After the network has been validated for connectivity and ID consistency, a gap assessment will be made to determine where field surveying for manhole rim and inverts needs completing, and appropriate field surveys completed to obtain missing data.

Task 2.5 Field Survey/Field Recon for Missing/Erroneous Data

GHD will conduct field surveys on selected portions of the sanitary sewer collection system where information for the existing hydraulic model needs to be verified, if missing or erroneous data cannot be reliably rectified using the above initial model verification tools. This task includes coordination with NapaSan Collection System Operations and Maintenance staff during field work.

GHD will conduct a field survey using GPS-enabled devices to collect rim and invert elevations. This effort is anticipated to take at least few weeks for one staff member as accompanied by a NapaSan staff member, plus additional NapaSan staff and resources as needed for traffic control and manhole access. GHD will “dip” structures to determine inverts and record pertinent information about the surveyed structures (such as materials, pipeline and structure dimensions, and condition). GPS data will be used to establish the horizontal and vertical position of collection system manholes, which will be used for connecting sewer pipelines. Note: it

may not be feasible to accurately collect pipeline diameter and material data during the field work (work does not include confined space entry).

Task 2.6 Incorporate Field Work and Complete Engineering Review and Validation of Remaining Model Parameters

NapaSan's current hydraulic model will be augmented or revised based on data collected in the field for rim and invert elevations of selected manholes. The focus will be on portions of the collection system where information is not currently in the GIS database or where previous modeling efforts have been based on record drawing information and not field survey elevations. GHD anticipates that information will be needed for the addition of smaller diameter pipelines to create an all pipe model.

GHD may rely on anecdotal information from NapaSan to fill-in certain data gaps for preparation of the hydraulic model. Any outstanding rim and invert elevations not determined after field surveying and NapaSan coordination will be calculated using digital elevation model, topographic survey information, and proximate linear interpolation methods using the hydraulic models 'Node Invert Calculator' and 'Elevation Extraction' tools. The model's engineering review tools will validate many of the remaining modeling parameters.

Task 3 – Flow Monitoring Analysis & Reporting

Task 3.1 QA/QC V&A's Wet Season Monitoring Effort and Present Report to NapaSan

V&A already completed the bulk of their flow monitoring over the 2018-2019 wet season as part of Phase 1. GHD will review V&A's 2018-2019 wet season flow and level sensor monitoring report and present to NapaSan. GHD will then incorporate this wet season flow and level sensor monitoring results into the model build and calibration process accordingly.

Phase 2 Deliverable: 2018-2019 Wet Season Flow and Level Senor Monitoring Report (electronic and hard copies)

Task 3.2 Perform Dry Weather Flow (DWF) Monitoring

V&A will perform a dry weather usage rate study consisting of installing 10 flow monitors for 2 weeks to capture flow data to assist GHD in dry weather flow generation.

Task 4 – DWF Model Development and Calibration

Task 4.1 Collect and Review all DWF Planning Data

This task involves gathering all relevant dry weather flow data sources, and these would include but not be limited to water billing customer records, industrial user records, Traffic Analysis Zone (TAZ) data, census data, current and future land use data, and whatever the City of Napa is able to provide from their latest General and/or Specific Plan Update work.

Task 4.2 Determine DWF Factors, Geo-Process, and Load to Model

GHD intends to utilize the City of Napa's updated water billing record data as the basis for estimating DWF for the existing conditions hydraulic model. This data may need to be geo-coded to the model network using geo-spatial tools and scripts. Updated land use data from the sources from task 4.1 may inform the spatial distribution of existing and future condition model scenarios. Planned development will be processed

accordingly and folded into future conditions. The model’s DWF allocator tool may expedite the geo-processing and association of water billing parcels to modeled elements.

Task 4.3 Enhance and Apply DWF Diurnal Patterns to Model

The most recent DWF monitoring data period covering the entire service area comprehensively will be chosen as the basis for diurnal profile shapes. These initial DWF patterns may be improved where demographic data (i.e. land use type or income statistics) warrant them and in areas with significant amounts of commercial/industrial flows (i.e. hospitals, schools, restaurants, industry). Ideally, DWF monitoring data will coincide with water billing periods to provide an apples-to-apples comparison/calibration basis.

Task 4.4 Draft and Deliver DWF Model Calibration TM

GHD will calibrate the DWF model to existing and future conditions based on the above data inputs and methods. Then, a summary technical memorandum will be drafted and presented to NapaSan.

Phase 2 Deliverable: DWF Model Development and Calibration TM #1 (electronic)

Task 5 – WWF Model Development and Calibration

Task 5.1 Delineate Sewersheds and Associate Sewershed Drainage Points to Model Nodes

This task involves carefully delineating sewersheds based on natural hydrologic and topographic boundaries for the purposes of aggregating DWF, rainfall, and WWF and loading to appropriate model locations. V&A flow meter basins will form the basis of determining the greater boundaries for the smaller sewersheds.

Task 5.2 Import Wet Weather Meter Basin Flow Hydrographs into Model

V&A will post-process flow meter data to produce the net flows per meter basin (subtracting out meter basin flows nested or upstream from others and massaging/correcting issues where flow splits/overflows may affect hydraulic conditions). GHD will import these hydrographs into the hydraulic model.

Task 5.3 Associate Rainfall Data to Model

V&A will install and gather data from three strategically placed rainfall gauges for this project. GHD will import raw rainfall data into the hydraulic model. The mean precipitation for each flow meter basin will be calculated by taking data from the three rain gauges and using the inverse distance weighting (IDW) triangulation method. A rain gage model element will be created to represent the virtual centroid rain pattern for each meter basin which will then get associated to each delineated sewershed.

Task 5.4 Decompose Flow Components and Generate I&I Parameters

GHD will import the meter basin hydrographs into the hydraulic model and using an I/I processor, and decompose dry, wet, and groundwater flow components using a rainfall threshold. The I/I component is then analysed to determine rain dependent inflow & infiltration (RDII) events and to calibrate parameters of the RTK synthetic unit hydrograph so that the RDII flow simulated by the RTK method closely matches the RDII flow obtained by the decomposition process.

Task 5.5 Calibrate I&I parameters for Model Sewersheds

GHD will then pass the calibrated RTK parameters and the WWF patterns to hydraulic model engine and can be assigned to all nodes within each flow meter basin in proportion to sewershed areas or based on other user defined criteria.

Task 5.6 Draft and Deliver WWF Calibration TM

GHD will calibrate the WWF model to existing and future conditions based on the above data inputs and methods. Then, a summary technical memorandum will be drafted and presented to NapaSan.

Phase 2 Deliverable: WWF Model Development and Calibration TM #2 (electronic)

Task 6 – Design Storm Development and Application

In this task, the GHD team would work with NapaSan to come up with an appropriate design storm, which in the past has been a 10-year, 24-hour storm. The 10-year, 24-hour design storm will be created and personalized for each metered basin (virtual rain gage) using the IDW method in a similar manner as descried above in Task 5.3.

Phase 2 Workshop: Hydraulic Capacity Criteria Planning Workshop (Intention is to summarize DWF, WWF, and Design Storm methodologies and get buy-in from NapaSan on appropriate planning criteria for hydraulic capacity evaluations

Task 7– Hydraulic Capacity Analysis

Task 7.1/7.2 Run Existing/Future Capacity Scenario Simulations

GHD will review levels of service used in previous studies (2007 CSMP, BVT Predesign, etc.) and consider balancing attenuation in the collection system versus capacity upgrades that convey flows to the WWTP.

A range of scenarios may include existing conditions, build-out conditions, build-out conditions with CIP projects incorporated and anticipated I/I reduction program projects. GHD will prepare a preliminary model results report that contains visual HGL profiles and thematic plan maps with detailed hydraulic model results. These maps will show d/D, q/Q, and capacity restrictions due to throttling and backwater conditions for all of the major areas of concern.

Task 7.3 Draft and Deliver Design Storm and Capacity Analysis TM

GHD will capture the methodologies and results of the hydraulic capacity evaluations a technical memorandum that will be drafted and presented to NapaSan.

Phase 2 Deliverable: Design Storm and Capacity Analysis TM #3 (electronic)

Task 8 – Asset Prioritization and Capital Improvement Program (CIP) Planning

The hydraulic model will provide the project team with a useful tool for assessing the hydraulic performance of the conveyance system; however, hydraulic performance is only one important aspect to consider when developing a long-range system improvement plan. Although NapaSan agrees that a comprehensive CIP Plan for its conveyance system should consider capacity as well as results from the evaluation of condition assessment, efficiency, and risk management; it feels the timing of bringing all of those data, logic, and decision

inputs together as part of this master plan is premature. GHD recommends that a full scale asset prioritization effort that considers capacity, condition, efficiency, risk, and level of service be revisited as part of a standalone task order or future amendment. For this master plan, the focus of the CIP planning will be in balancing attenuation in the collection system, which will most likely be in the form of targeted, efficient I&I reduction projects versus capacity upgrades to major trunk lines that convey flow to the IPS-WWTP.

Task 8.1 Conduct Hydraulic Capacity Results & CIP Planning Workshop #1

This task involves meeting with NapaSan to discuss the results from the capacity analysis and outline the framework for the asset prioritization and CIP planning process.

Phase 2 Workshop: CIP Planning Workshop #1

Task 8.2 Generate Prioritized CIP

The focus of the project prioritization will be around determining the most cost effective balance between where and when to implement I&I reduction projects and where and when to suggest larger trunk conveyance upgrades or replacement projects. The more specific process of generating the phased and prioritized CIP will center on creating business case evaluations for at least 5 prioritized needs (two of which will be I&I reduction and capacity increase). Business case evaluations will look at up to three to four alternatives for each priority including the status quoted option, repair/rehab option, replace option and a maintenance/operational change option. A business case may be a solution set and not necessarily a specific project. An example business case solution set may be:

- I&I reduction in a particular sub basin + rehab of the 66-inch trunk + operational strategy for West Napa Pump Station

GHD will work closely with the NapaSan to determine the appropriate prioritization to spread costs, meet LOS objectives, and timed to meet key development deadlines and population growth scenarios.

Task 8.3 Conduct CIP Planning Workshop #2

GHD will conduct a final CIP workshop with NapaSan staff to evaluate and develop the proposed CIP, and discuss with stakeholders and regulatory agencies affected by the CIP projects, prior to preparation of the CSMP report. The workshop will also include discussion and determination of a ranking matrix for business case solution sets and CIP projects. The purpose of the workshop is to communicate the CIP outcomes and verify that the CIP incorporates NapaSan input.

Phase 2 Workshop: CIP Planning Workshop #2

Task 9 – Generate CSMP Report

All methodologies, results, and conclusions will be captured in a standalone document to be used as a reference for the implementation of NapaSan’s long-term CIP, and to facilitate financial discussions with stakeholders and regulators as needed.

The CSMP Report will provide a summary of the existing facilities and their condition, wastewater flows, identified system deficiencies, recommended CIP and R&R projects and operation and maintenance practices, and recommended inspection programs. The Draft Report will be submitted to the NapaSan for review, as well as other stakeholders at NapaSan’s discretion.

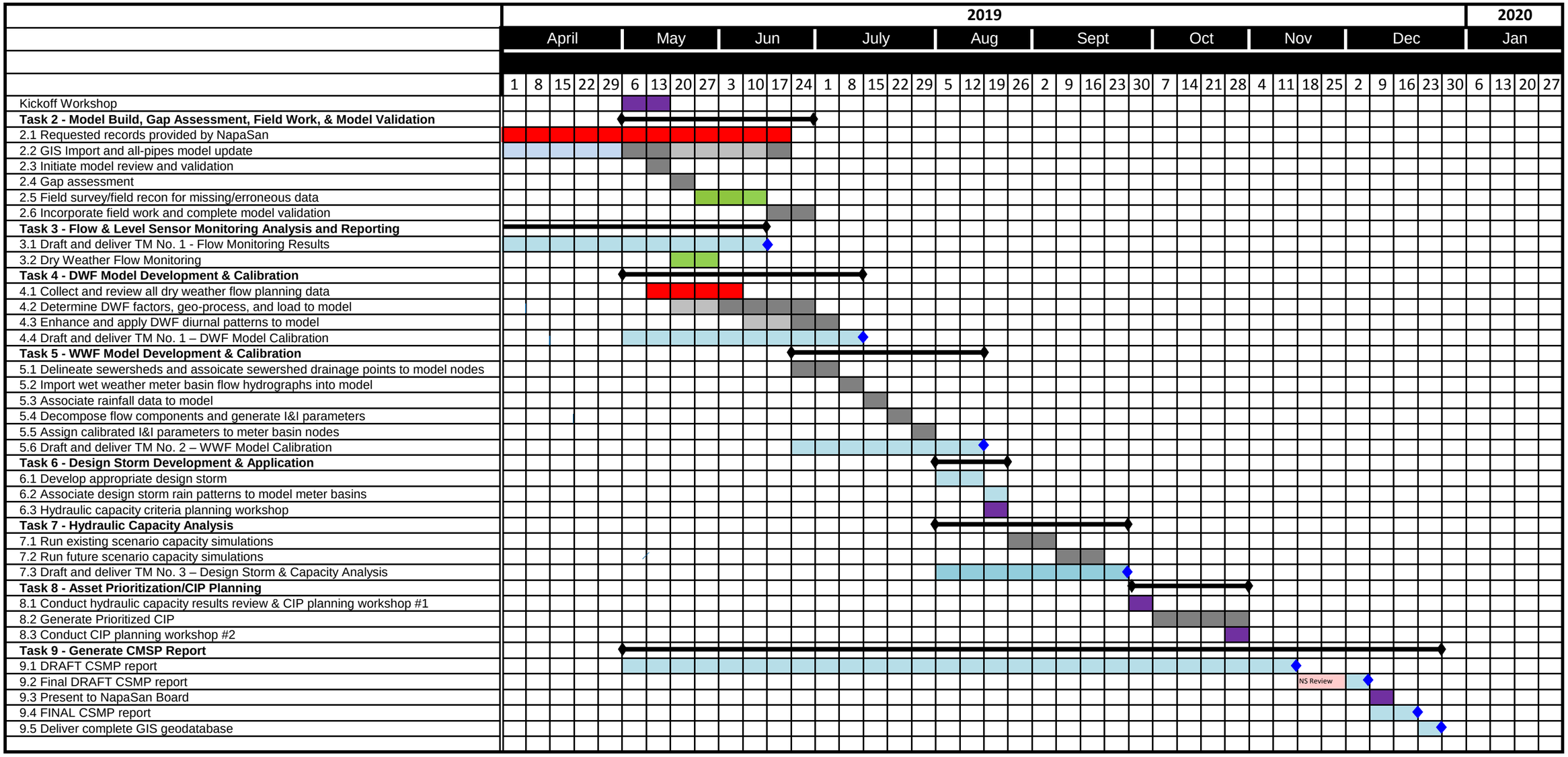
During the review period, GHD will facilitate a workshop with NapaSan staff to discuss the Draft Report to solicit feedback and confirm understanding of NapaSan comments. Following review, the report will be finalized and presented to NapaSan’s Board as appropriate.

After submittal of the final CSMP Report, GHD will turn over to NapaSan a comprehensive GIS database, including all additions to existing data such as pipe slope, manhole rim elevation, and drop manhole inlet invert depth.

Phase 2 - Task 9 Deliverables:

- *Draft Master Plan Report*
- *Final Draft Master Plan Report*
- *Presentation/Workshop with the NapaSan Board*
- *Final Master Plan Report*
- *Comprehensive GIS Geodatabase*

NapaSan CSMP
Phase 2 - Project Schedule



ATTACHMENT "B"

PROJECT FEE ESTIMATING SHEET

Project Name: CSMP Phase 2 **Client:** NapaSan

Prepared by: C. Brothers **Date:** May 7, 2019

Reviewed by: M. Winkelman

Job Number: 11177278

	LABOR COSTS											FEE COMPUTATION		
LABOR CATEGORY > / RATE > / Task / Item	Principal $265 /Hr	QA/QC Manager $235 /Hr	Project Manager $235 /Hr	Technical Lead $195 /Hr	Staff/AM Engineer $145 /Hr	GIS / Hydraulics $175 /Hr	AM Lead $265 /Hr	AM Engr. $175 /Hr	Tech Writer $140 /Hr	Admin $120 /Hr	TOTAL HOURS	*OTHER DIRECT COSTS	Sub-Consultant V&A	TOTAL FEE
Task 1 - Project Management and Coordination														
1.1 Internal Coordination and Administration	2	2	12	6	2	2				4	30	$180		$6,290
1.2 Project Meetings and Coordination with NapaSan	4		95	70	4	36	12				221	$1,326		$48,421
Subtotal Task 1	**6**	**2**	**107**	**76**	**6**	**38**	**12**	**0**	**0**	**4**	**251**	**$1,506**	**$0**	**$54,711**
Task 2 - Model Build, Gap Assessment, Field Work, & Model Validation														
2.1 Requested records provided by NapaSan			4	8	8	8					28	$168		$5,228
2.2 GIS Import and all-pipes model update		4	4	12	8	18					46	$276		$8,806
2.3 Initiate model review and validation			2	36	18	58					114	$684		$20,934
2.4 Gap assessment			2	24	16	24					66	$396		$12,066
2.5 Field survey/field recon for missing/erroneous data			2	12	80	16					110	$660		$17,870
2.6 Incorporate field work and complete model validation		4	2	40	32	30					108	$648		$19,748
Subtotal Task 2	**0**	**8**	**16**	**132**	**162**	**154**	**0**	**0**	**0**	**0**	**472**	**$2,832**	**$0**	**$84,652**
Task 3 - Flow Monitoring Analysis and Reporting														
3.1 Draft and deliver TM No. 1 - Flow Monitoring Results		4	2	8		8			4		26	$156		$5,086
3.2 Perform Dry Weather Flow Monitoring (V&A's original Optional Task 6)												$0	$27,300	$27,300
Subtotal Task 3	**0**	**4**	**2**	**8**	**0**	**8**	**0**	**0**	**4**	**0**	**26**	**$156**	**$27,300**	**$32,386**
Task 4 - DWF Model Development & Calibration														
4.1 Collect and review all dry weather flow planning data			2	12	16	16					46	$276		$8,206
4.2 Determine DWF factors, geo-process, and load to model			2	24	110	80					216	$1,296		$36,396
4.3 Enhance and apply DWF diurnal patterns to model			2	12	30	32					76	$456		$13,216
4.4 Draft and deliver TM No. 2 – DWF Model Calibration	1	4	2	20	32	32				4	95	$570		$16,865
Subtotal Task 4	**1**	**4**	**8**	**68**	**188**	**160**	**0**	**0**	**0**	**4**	**433**	**$2,598**	**$0**	**$74,683**
Task 5 - WWF Model Development & Calibration														
5.1 Delineate meter basins and associate modeled nodes to basins			2	8	24	16					50	$300		$8,610
5.2 Import wet weather meter basin flow hydrographs into model			2	16	12	8					38	$228		$6,958
5.3 Associate rainfall data to model			2	12	12	8					34	$204		$6,154
5.4 Decompose flow components and generate I&I parameters			2	32		8					42	$252		$8,362
5.5 Calibrate I&I parameters and assign to meter basin nodes			2	48		8					58	$348		$11,578
5.6 Draft and deliver TM No. 3 – WWF Model Calibration	1	4	2	36		24				4	71	$426		$13,801
Subtotal Task 5	**1**	**4**	**12**	**152**	**48**	**72**	**0**	**0**	**0**	**4**	**293**	**$1,758**	**$0**	**$55,463**
Task 6 - Design Storm Development & Application														
6.1 Develop appropriate design storm		2	2	24		8					36	$216		$7,236
6.2 Associate design storm rain patterns to model meter basins		2	2	16		8					28	$168		$5,628
6.3 Hydraulic capacity criteria planning workshop	1	2	2	32		16					53	$318		$10,563
Subtotal Task 6	**1**	**6**	**6**	**72**	**0**	**32**	**0**	**0**	**0**	**0**	**117**	**$702**	**$0**	**$23,427**
Task 7 - Hydraulic Capacity Analysis														
7.1 Run existing scenario capacity simulations			2	60	4	60					126	$756		$24,006
7.2 Run future scenario capacity simulations				60	4	60					124	$744		$23,524
7.3 Draft and deliver TM No. 4 – Design Storm & Capacity Analysis	1	8		32	4	32				4	81	$486		$15,531
Subtotal Task 7	**1**	**8**	**2**	**152**	**12**	**152**	**0**	**0**	**0**	**4**	**331**	**$1,986**	**$0**	**$63,061**
Task 8 - Asset Prioritization and CIP Planning														
8.1 Conduct hydraulic capacity results & CIP planning workshop #1	6		6	12	12	12	8				56	$1,336		$12,636
8.10 Generate Prioritized CIP	8	8	8	80	60	80	16				260	$2,560		$50,980
8.10 Conduct CIP Planning Workshop #2	6		6	12	12	12	8				56	$1,336		$12,636
Subtotal Task 8	**14**	**8**	**14**	**92**	**72**	**92**	**24**	**0**	**0**	**0**	**316**	**$3,896**	**$0**	**$76,252**
Task 9 - Generate CSMP Report														
9.1 DRAFT CSMP report	2	8	8	40	48	48	8	8	16	16	202	$1,212		$36,342
9.2 Final DRAFT CSMP report	2	8	8	24	16	24	4		8	12	106	$636		$19,746
9.3 Present to NapaSan Board	4		8	16	16	8	8				60	$360		$12,260
9.4 FINAL CSMP report	2	8	8	20	16	8	8		8	12	90	$1,540		$18,130
9.5 Deliver complete GIS and asset register geodatabase				8	28	24	8				68	$408		$12,348
Subtotal Task 9	**10**	**24**	**32**	**108**	**124**	**112**	**36**	**8**	**32**	**40**	**526**	**$4,156**	**$0**	**$98,826**
PROJECT TOTALS	**34**	**68**	**199**	**860**	**612**	**820**	**72**	**8**	**36**	**56**	**2,765**	**$19,590**	**$27,300**	**$563,461**

*OTHER DIRECT COSTS include telephone, mileage, printing, photocopies and other miscellaneous direct expenses.