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TECHNICAL MEMORANDUM

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SENT VIA: EMAIL

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SUBJECT: Scope of work to complete modeling and/or monitoring of a reduced discharge to Cooper's Creek

The Consultant Team – West Yost Associates (West Yost), HDR, and Tom Dodson & Associates (TDA) – completed the draft *Cooper's Creek and San Timoteo Creek Habitat Characterization and Sustainability Report* (Phase 1 Report) in January 2025. The Phase 1 Report supports the City of Beaumont's (City) efforts to reduce discharges from the Beaumont Wastewater Treatment Plant (WWTP) to Cooper's Creek. On January 28, 2025, the Consultant Team met with the City to review the Phase 1 Report and discuss the next steps and options of reduced discharge from the WWTP for the City to pursue. During the meeting two reduced discharge scenarios were discussed for further consideration based on the results and conclusions of the Phase 1 Report. The two reduced discharge scenarios are:

- Scenario 1 - Reduce discharge to 1.7 million gallons per day (MGD). Includes implementation of the baseline monitoring program.
- Scenario 2 - Explore a discharge lower than 1.7 MGD. Includes modeling of the hydrologic system and its response to a suite of reduced discharges, and the implementation of the baseline monitoring program.

This Technical Memorandum (TM) describes the scope of work for each discharge reduction scenario, which would entail baseline monitoring and/or modeling to evaluate any impacts from discharge reductions to Cooper's Creek. The TM was requested by the City to assist in evaluating and selecting the reduced discharge scenario to pursue. The TM is organized as follows:

- A brief introduction and background of the work completed to date.
- A description of two proposed scenarios (Scenario 1 and Scenario 2) in which the City can pursue a reduced discharge.
- A scope of work for Scenario 1 and Scenario 2, including rough order of magnitude costs.

- Conclusions and recommendations.

INTRODUCTION AND BACKGROUND

The City has initiated plans to reduce the discharge of treated wastewater (i.e. recycled water) from the Beaumont WWTP to Cooper's Creek, and divert that water for other beneficial uses. To reduce the volume of discharge to Cooper's Creek, the City must file a Wastewater Change Petition (Change Petition) under California Water Code Section 1211 with the State Water Resources Control Board (SWRCB), Division of Water Rights. When the City first discussed the plan to apply for a change petition with Division of Water Rights staff, they advised that the City develop an adaptive management and mitigation plan (AMMP) to aid in the process of approving the reduced discharge.

An AMMP is required to ensure there is a plan and program in place to assess and mitigate, if necessary, any riparian habitat impacts that result from reducing the WWTP discharge to Cooper's Creek. The AMMP defines the monitoring, adaptive triggers, and mitigation measures put in place to manage the effects of a reduced discharge to the Cooper's and San Timoteo Creeks.

The Consultant Team prepared the Phase 1 Report to support the efforts to reduce WWTP discharges and as the first step in preparing an AMMP (West Yost and HDR, 2025). The Phase 1 Report characterized the i) historical WWTP discharges to Cooper's Creek; ii) surface water flows and quality; iii) groundwater levels and quality; iv) historical riparian habitat health via normalized difference vegetation index (NDVI); and v) historical and existing biological resources.

DISCHARGE REDUCTION SCENARIOS

Based on our understanding of the Change Petition process, a technical study is typically required to assess the potential impacts of reduced discharge on riparian and hydrologic systems. The study should provide the technical basis for a recommended discharge reduction that would not adversely impact the riparian habitat.

The Phase 1 Report established two distinct periods of Beaumont WWTP discharges: i) pre-2004 discharges that were historically lower that increased monotonically from approximately 1,200 acre feet per year (AFY) in 1989 (average of 1.1 MGD) to 1,900 AFY in 2003 (average of 1.7 MGD); and ii) post-2004 discharges that were historically higher and increased more than 100 percent from 2004 to a maximum of 4,300 AFY in 2020 (average of 3.8 MGD). The NDVI data showed that before 2004, riparian habitat health within Cooper's Creek was maintained and exhibited little to no trend; and after 2004, riparian habitat health responded to increases in discharge and exhibited increasing trends. The surface water flows over the period of recorded maintained consistent groundwater levels to support the riparian habitat.

The Consultant Team recommended in the Phase 1 Report that Beaumont WWTP discharges should be maintained at the minimum level necessary to sustain i) groundwater levels and ii) the riparian habitat along Cooper's and San Timoteo Creeks that has historically benefited from Beaumont WWTP discharges. Further, any reductions in discharge should be implemented gradually.

The Consultant Team advised that based on the analyses and conclusions in the Phase 1 Report, a reduced discharge of the 1.7 MGD (equivalent to the WWTP discharge in 2003) would likely sustain groundwater levels and the riparian habitat health. A reduced discharge below 1.7 MGD would require additional analysis to support the potential impacts. Hence, the Consultant Team advised of these two reduced discharge scenarios to be explored by the City:

- **Scenario 1 - Reduce Discharges to 1.7 MGD.** The City would file a Change Petition for this reduced discharge, and the technical basis for this discharge is supported in the Phase 1 Report. The reduced discharge would be implemented gradually, in a manner that mirrors the natural hydrologic system. An incremental reduction would involve gradually decreasing discharges over time until reaching the targeted 1.7 MGD daily average discharge (equivalent to 1,900 AFY). As recommended in the Phase 1 Report, surface water flows would be required for at least 75 percent (%) of the year, maintained in the winter months, and diminishing in the summer months. This approach would require the implementation of the baseline monitoring program (described in the Phase I Report) immediately and at a minimum up until the City begins reducing its discharge. Some version of a monitoring program would continue throughout the reduction in discharges to assess impacts to the hydrology and riparian habitat and would be established later in the AMMP process.

- **Scenario 2 - Explore a Reduced Discharge Less than 1.7 MGD.** Currently, there is no technical basis to support reduced discharges below 1.7 MGD. Therefore, the Consultant Team recommends development of a hydrologic model that has the ability to predict the response of surface water flow and groundwater levels to a range of reduced discharge rates. The results of this modeling will be used to identify the reduced discharge to pursue through a Change Petition and the technical basis to support it. Like Scenario 1, this approach would require the implementation of baseline monitoring program immediately and at a minimum up until the City begins reducing its discharge. Some version of a monitoring program would continue throughout the reduction in discharges to assess impacts to the hydrology and riparian habitat and would be established later in the AMMP process.

SCOPE OF WORK FOR SCENARIOS 1 AND 2

Below is a brief scope of work and rough order of magnitude (ROM) costs for pursuing Scenario 1 and Scenario 2. A summary of costs is provided in Table 1.

Table 1. Rough Order of Magnitude (ROM) Costs for Scenario 1 and Scenario 2

Scenario	Tasks	Assumed Time (for cost estimating)	Pursued Reduced Discharge	Total ROM Cost
Scenario 1	Monitoring	Two years	1.7 MGD	$415,000
Scenario 2	Modeling & Monitoring	Monitoring: Two years Modeling: One year (after monitoring)	Below 1.7 MGD	$980,000

Scenario 1 Scope (Monitoring)

As described in the Phase 1 Report, the proposed baseline monitoring plan should be implemented as soon as possible and until the City begins reducing discharges to Cooper's Creek. Some form of monitoring (i.e., on-going monitoring) would continue beyond the implementation of the reduced discharge and as part of the AMMP. On-going monitoring is not included in this scope and will be developed later in the AMMP process. The baseline monitoring plan scope and ROM costs are outlined below in Table 2. The estimated costs assume implementation of the monitoring program for the first two years.

Table 2. Scenario 1 Scope Description and Rough Order of Magnitude (ROM) Costs

Task No.[a]	Task Name	Description	Deliverables	ROM Costs
15a	Installation Activities	Includes i) preparation for all installation activities, ii) purchasing of equipment, iii) canvassing well owners and private landowners of the stream channels, iv) installing four stream gages, and v) installing ten groundwater sensors. It is assumed that no permits will be required	Deliverables for this task will be included in the Task 15e and will include a description of installation activities.	$100,000
15b	Biologic Baseline Monitoring Activities	Includes i) the collection, processing, QA/QC, and analysis of NDVI data for 2024-2027), ii) performing three annual drone surveys (2025, 2026, and 2027), and iii) conducting one ground survey (2027)	Deliverables for this task will be included in the Tasks 15d and 15e and will include maps, tables, and time-series plots as well as a description of biologic monitoring conducted.	$60,000
15c	Hydrologic Baseline Monitoring Activities	Includes i) quarterly downloads for ten groundwater transducers, ii) three streamflow measurements per year at four surface water gages to aid in development of a rating curve, iii) one reference point and thalweg survey with a professional land surveyor, iv) collection of climate and Maximum Benefit data, and v) processing, QA/QC, and uploading all to HydroDaVE all hydrologic data	Deliverables for this task will be included in Tasks 15d and 15e and will include maps, figures, and time-series plots and a description of the hydrologic monitoring conducted	$125,000
15d	Reporting for Year 1 – 2025/2026	Includes data from the end of the Phase 1 Report through mid 2026. This task includes the preparation of maps, tables, and time-series plots of biologic and hydrologic data in draft and final form. One meeting is included to present the findings to the City	Draft and final maps, table, and time-series plots	$45,000
15e	Reporting for Year 2 – 2026/ 2027	Includes data from the end of the Phase 1 Report through mid-2027. This task includes the preparation of a Report in draft and final form. One meeting is included to present the findings to the City	Draft and final 2027 Report	$85,000
			Monitoring Total	**$415,000**

Notes:

a) Task numbers are from the original proposal.

Scenario 2 Scope (Modeling and Monitoring)

The proposed monitoring scope and costs for Scenario 2 are the same as Scenario 1 and are provided in Table 2 above.

As described earlier, the goal of the modeling scope will be to predict and evaluate the effects of reductions in WWTP discharge to Cooper's Creek on groundwater and surface water conditions within the Study Area. The model would prioritize groundwater levels, stream flows, and riparian habitat evapotranspiration (ET).

West Yost's recommendation is to construct a new model utilizing available existing models and datasets as a basis for the design. The model recommendation is MODFLOW6 and the model area is recommended to be the Study Area and the Beaumont Basin to the northeast. MODFLOW6 would allow an unstructured model grid, which would help with focusing computational resources on the riparian habitat area.

Relying on the existing models aims to prevent repeating efforts and allows for a more efficient model development process. However, part of the process of incorporating existing information will be to assess it for usefulness and to prevent incorrect or flawed understanding of the system to be incorporated into a new modeling tool. West Yost can potentially use the existing models in the following ways:

- **Beaumont Groundwater Model**: structure of the Beaumont Basin and initial structure of the riparian area to El Casco, initial parameterization, HCM of the Beaumont Basin, and groundwater head calibration information.
- **Yucaipa Integrated Hydrological Model (YIHM)**: structure of the riparian area to the end of the Study Area, initial parameterization, and groundwater head and streamflow calibration information.
- **Santa Ana River Wasteload Allocation Model (SAWLAM)**: stream structure and routing, land surface characteristics, and streamflow calibration information.

We recommend placing substantial effort into data gathering to better characterize the state of groundwater-surface water interaction, which will be accomplished through the baseline monitoring program. Additionally, we plan to assess available sources of runoff generation[1] to determine whether an existing tool can be used for rainfall-runoff generation, or whether we need to develop a new one.

Scenario 2 task descriptions, deliverables, and ROM costs are provided below in Table 3.

[1] Such as the USGS Basin Characterization Model, existing Beaumont Hydrological Simulation Program – FORTRAN (HSPF) model, and WLAM HSPF model.

Table 3. Scenario 2 Scope Description and Rough Order of Magnitude (ROM) Costs

Task No.[(a)]	Task Name	Description	Deliverables	ROM Costs
10a	Data Collection, Management, and Assessment	This task would include additional data collection not currently being collected as part of the AMMP scope, organization of baseline monitoring data, and assessing data for usability. Data collection efforts can be incorporated from the baseline monitoring program to maximize efficiency	All collected data will be made available to the client	$40,000
10b	Hydrologic Conceptual Model Development	Development of the hydrologic conceptual model includes synthesis of data to create the conceptual model portions that govern the geology, hydrogeology, hydrology, riparian, and climate systems.	The results of this task will be incorporated into the Modeling Report (Task 10f)	$50,000
10c	Rainfall-Runoff Model Construction and Calibration	Utilizing historical climate data and existing models, this task will include developing the portion of the model that will govern the rainfall and runoff	The results of this task will be incorporated into the Modeling Report (Task 10f) and calibration results will be provided as an interim milestone at a project meeting	$130,000
10d	Historical Groundwater-Surface Water Model Construction and Calibration	This task includes the creation of the numerical model for the surface water and groundwater. It includes calibration of the model to historical groundwater and surface water data. Existing modeling tools will contribute significantly to the development of a groundwater-surface water modeling tool	The results of this task will be incorporated into the Project Report (Task 10f) and calibration results will be provided as an interim milestone at a project meeting	$190,000
10e	Model Scenarios	This task includes running the model for one baseline and three alternatives using a range of discharges from the Beaumont WWTP. Analysis of the output groundwater levels and surface water flows will aide in understanding their response to a variety of discharges at and below 1.7 MGD. Baseline and alternative scenarios will be designed in collaboration with the client and run using the model. Comparisons between baseline and alternatives	The results of this task will be incorporated into the Project Report (Task 10f) and scenario results will be provided as an interim milestone at a project meeting	$80,000

Table 3. Scenario 2 Scope Description and Rough Order of Magnitude (ROM) Costs

Task No.[a]	Task Name	Description	Deliverables	ROM Costs
10f	Modeling Report	We will prepare a Draft Report, which will be modified based on the City's comments to produce a Final Report	One (1) Draft and one (1) Final Report will be delivered	$75,000
			Modeling Total	**$565,000**
			Monitoring Total	**$415,000**
			Scenario 2 Total	**$980,000**

Notes:
a) Task numbers are from the original July 2023 proposal.

Comparison of Potential Costs for Scenarios 1 and 2 to Approved Budget

Table 4 shows a comparison of the potential cost increases associated with Scenarios 1 and 2 to the approved budget outlined in the July 2023 proposal. It is intended to aid the City with understanding potential additional costs associated with pursuing either scenario.

Table 4. Comparison of Potential ROM Cost Increases Associated with Scenarios 1 and 2

Task Number(s)[a]	Task Name (Scenario)	Approved Budget[b]	ROM Costs Outlined in this TM	ROM Cost Increase from Approved Budget
15	Monitoring (Scenario 1)	$40,000	$415,000	$375,000
10	Modeling (portion of Scenario 2)	$200,000	$565,000	$365,000
15 & 10	Monitoring & Modeling (Scenario 2)	$240,000	$980,000	$740,000

Notes:
a) Task numbers are from the original July 2023 proposal.
b) Estimated costs are based on the original proposal from July 2023.

CONCLUSIONS AND RECOMMENDATIONS

This TM will assist the City in understanding the rationale and required effort to pursue two reduced discharge scenarios for the Beaumont WWTP. It will also aid in making an informed decision on the reduced discharge to request in the Change Petition.

The City should consider the timing of its ability to file a Change Petition and determine the volume and use of the recycled water. The City could perform a cost-benefit analysis to determine whether the additional recycled water produced in Scenario 2 is more advantageous compared to Scenario 1.