

## SCOPE OF WORK FOR CONTINUED SUPPORT WITH IMPLEMENTATION OF THE DOMINGUEZ CHANNEL ENHANCED WATERSHED MANAGEMENT PROGRAM

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Paradigm Environmental, Inc. (Paradigm) is pleased to provide this scope of work to the city of Carson (City) to provide continuing support related to the implementation of the Enhanced Watershed Management Program for the Dominguez Channel Watershed Management Area (DC EWMP). The DC EWMP, which was approved by the Regional Board in April 2016, describes a customized compliance pathway the City will follow to address the pollutant reduction requirements of the 2012 Municipal Separate Storm Sewer System (MS4) Permit. Paradigm has been supporting the City since August 2015 with efforts related to MS4 Permit compliance, including development of the implementation strategy within the EWMP. Paradigm has also supported the City with developing conceptual designs for regional stormwater projects at Carriage Crest Park and Stevenson Park. The scope of work would provide continuation of this type of support (Task 1).

Additionally, Paradigm will provide support related to the design of the Carriage Crest Regional Stormwater Capture Project (Project) under Task 2 and Task 3. The proposed Project, which would be located at Carriage Crest Park in the city of Carson, could potentially capture runoff from over 1,000 acres of urbanized area (see Figure 1). The city of Carson has developed an initial conceptual design for an underground infiltration gallery and is leading efforts to secure funding for the Project from Caltrans. The Project is a signature facility within the Enhanced Watershed Management Program (EWMP) for the Dominguez Channel Watershed Management Area. The proposed site for the Project is adjacent to the LACSD Joint Water Pollution Control Plant and Bixby Marsh, providing a unique opportunity for LACSD to collaborate on a multi-benefit, regional stormwater capture facility. The Project is currently in the conceptual design phase, with more detailed design efforts and feasibility studies anticipated in late 2016.

Currently, the project conceptual design is focused on capturing wet weather flows from ~200 acres of Carson, while only dry weather flows would be captured from the remaining 900+ acres (Figure 1). However, review of recent geotechnical investigations from a nearby commercial development shows that depth to groundwater may be greater than 50 feet, and thus it could be feasible to capture wet weather runoff from the 900+ acres (if funding was available). The tasks within this scope of work would support Project sizing decisions as the design moves forward. Specifically, this scope of work includes tasks to conduct additional field and desktop analyses to evaluate key components of the Project design, as follows:

- Detailed analysis of the Project capture area (Task 2)#
  - Investigate the boundaries of the capture area to the Project (Task 2.1)#
  - Simulate wet weather flows and pollutant loads from subcatchments within the Project drainage area (Task 2.2)#
- Characterize dry weather flows to be diverted by the Project (Task 3)#

These tasks are detailed in the next section. Details on proposed cost and schedule are presented thereafter.

## SCOPE OF WORK

### Task 1: Dominguez Channel EWMP Implementation Support

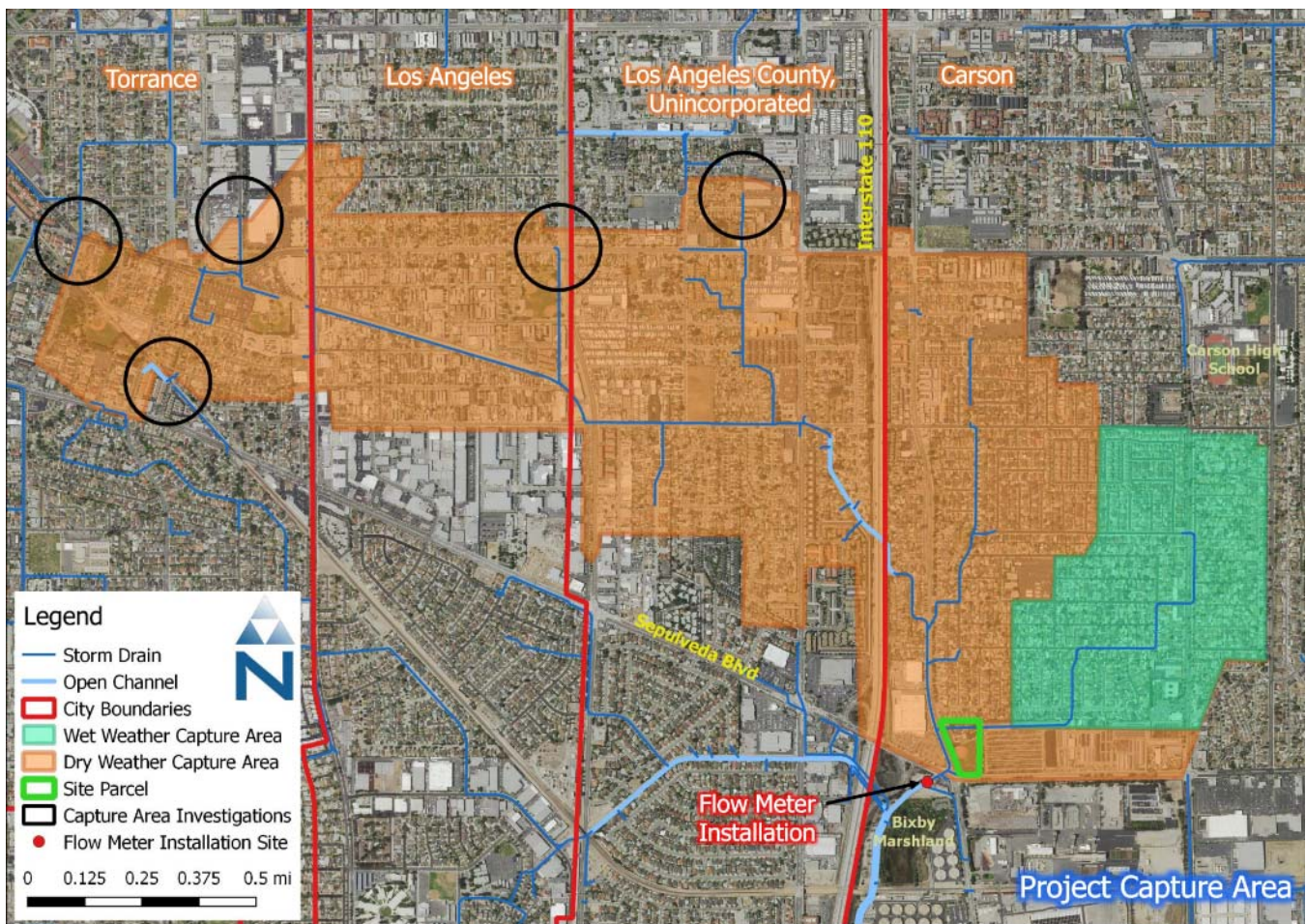
Now that the EWMP has been approved, Carson will be in the implementation and adaptive management phase of the EWMP. The EWMP triggers new approaches to implementing, tracking and reporting to remain in compliance with the MS4 Permit. This task would support the City, on an as-needed basis, with tasks that arise after EWMP submittal. This support would facilitate progress with EWMP implementation and increase the likelihood of success with MS4 Permit compliance. Efforts that fall under this task could include, but are not limited to, the following:

- ▼ Development of strategies, studies or projects to support EWMP implementation and MS4 compliance;
- ▼ Refinement of existing conceptual designs for regional stormwater projects and creation of new conceptual designs
- ▼ Development of materials or strategies to support City efforts to secure funding for EWMP implementation
- ▼ Addressing questions/inquiries regarding the EWMP or MS4 program from City staff, public or stakeholders;
- ▼ Support with Regional Board or City Council meetings regarding topics or regulations that potentially affect the City's MS4 Program;
- ▼ Responding to public notices regarding draft orders or policies from the Regional Board, State Board or USEPA that potentially affect the City's MS4 Program;
- ▼ Facilitating coordination among Carson, the DC WMA Group and/or other MS4s to promote efficiency and consistency when developing strategies, studies or projects; and
- ▼ Further evaluation of the control measures specified in the EWMP to support development of capital improvement plans, funding measures or alternative compliance schedules.

When a need arises, the City will request assistance from Paradigm up to a specified amount for the effort-of-interest. The City will only incur costs for actual time spent on efforts that are pre-approved from the City.

### Task 2: Detailed Analysis of Carriage Crest Project Capture Area

As described in the following subsections, the effort under Task 2 is organized into two subtasks.



**Figure 1. Map of Approximate Project Capture Area and Locations of Capture Area Investigations**

## Task 2.1: Capture Area Boundary Investigation

Previous estimates of the project capture area were based on GIS layers from the Los Angeles County Flood Control District (LACFCD). The source of the capture area boundary is a watershed delineation that was extracted and prepared from the USGS National Hydrography Dataset. Desktop-derived GIS delineations can have errors and inaccuracies, and field checks of delineated boundaries can increase the reliability of sizing calculations. Because the project location contains areas with relatively flat topography, catch basins near the edge of the watershed boundary may actually receive runoff from more or less area than represented in the existing GIS shapefiles from LACFCD. Paradigm will conduct field work supported by a desktop analysis to improve the reliability of the estimated size and extent of the capture area. The field work will be composed of capture area “investigations” near locations where uncertainty in the capture area boundary has been highlighted (see the black circles in Figure 1). At each of those five identified areas, the investigation field work will include the following efforts:

1. Manholes will be opened and storm drains below will be visually-inspected to verify flow direction and pipe extent. To support visual inspections and document findings, a high-definition video camera attached to a pole with a high-lumen flashlight will be used. Visual inspections will determine whether the storm drains terminate at the locations shown by the GIS data, or whether the storm drains cross the capture area boundary. It is assumed that traffic control will be provided by personnel from City of Carson, which is consistent with field efforts conducted to date.
2. Infrastructure features that can potentially change the direction of flow will be investigated. The list of features to be investigated will be determined from the desktop by reviewing aerial images and GIS data,



potentially including storm drains, catch basins, road ditches, and culverts. In the field, the location of these features will be documented including photos and GPS coordinates, and flow directions and drainage areas will be estimated where feasible.

As needed, where the visual inspections above are inconclusive or insufficient to address highlighted uncertainties in the capture area boundary, as-builts from the LACFCD and/or City of Carson will be compiled and examined to determine whether the as-builts provide additional insight into the location of the capture area boundary.

### **Deliverables for Task 2.1:**

- ▼ Revised GIS shapefile that represents the updated capture area boundary and an attached text file that presents a metadata GIS analysis of its total area, land uses, impervious area, and jurisdictional areas.
- ▼ Technical memorandum that summarizes the findings of the field investigations for each of the five areas identified in Figure 1. The memo will include maps and key photos collected during the field investigation. The draft memo will be provided to LACSD for review and finalized by Paradigm based on comments received.
- ▼ Raw photos and videos from the field investigations will also be provided if requested.

## **Task 2.2: Wet Weather Flow and Pollutant Analysis**

The estimated performance of the Project largely depends on the runoff and pollutant loading generated from the upstream capture area. The preliminary conceptual design for the Project simulated total volumes and peak flow rates using the County of Los Angeles' modified rational method (MODRAT). The analysis with MODRAT represented the capture area as one large watershed. In order to support the final design, this task will conduct a higher-resolution simulation of the runoff and pollutant loading from the project capture area using the Stormwater Management Model (SWMM). First, the capture area will be delineated into smaller subcatchments. Second, the simulation will explicitly represent the storm drain pipe network and quantify the relative volumes and pollutant loads from each of the delineated subcatchments. The outcome of the analysis will be interpreted to address the following questions:

- ▼ What are the total volumes and pollutants loads under the simulated storm conditions, and what are the associated peak flow rates and pollutant concentrations? (would support Project sizing calculations)
- ▼ What is the relative contribution of stormwater flow and pollutants from the subcatchments and jurisdictions upstream of the Project? (could support Project cost sharing formulas)
- ▼ Which options for diversion / capture would provide the most water quality benefit? (e.g., the current concept would include full capture of wet weather flows from the ~200 acres of city of Carson only; but how does that compare in terms of flow and pollutant reduction to the alternative of partial capture of the entire 1100-acres upstream?)

The simulated storm conditions will include the 85<sup>th</sup> percentile, 24-hour storm and the annual average year. Zinc will be used as the surrogate pollutant for the applicable toxics and bacteria TMDLs, consistent with the EWMP.

### **Deliverables for Task 2.2:**

- ▼ Text file with time series of flow rate and zinc concentration as simulated by SWMM for the 85<sup>th</sup> percentile, 24-hour storm event and the annual average year
- ▼ Technical memorandum that presents the methods and results of the SWMM simulation, and interprets the simulation output to answer the questions listed above. The draft memo will be provided to LACSD for review and finalized by Paradigm based on comments received.

## **Task 3: Carriage Crest Dry Weather Flow Characterization**

The dry weather flows generated by the capture area are an important consideration for Project design. Dry weather flow rates in storm drains tend to be highly variable and are challenging to simulate using hydrologic models. In addition, dry weather flow rates tend to exhibit diurnal variability, making it difficult to characterize

peak flow rates with point measurements. Under this task, monitoring equipment will be deployed to characterize dry weather flows over a 30-day period. As shown in **Figure 2**, the proposed approximate location of the equipment installation is just downstream of the Carriage Crest Park, where the storm drain daylights.

Field crews will install temporary flow monitoring equipment, including temporary flow control measures (weirs), which will allow for accurate level and flow monitoring. Monitoring equipment will be programmed to log data at 15-minute intervals. By collecting measurements every 15 minutes over 30-days, the monitoring effort will help characterize typical, peak and minimum flow rates during dry weather. The deployed equipment will be visited during the monitoring period to check equipment security, confirm data collection, and field-check the recorded measurements. Should any field issues occur during the equipment deployment (theft, vandalism or equipment failures), LACSD will be notified. Paradigm intends to use a subcontractor for the field work under this task (Amec Foster Wheeler Environment & Infrastructure, Inc.). It is assumed that LACSD will require an access permit prior to deploying the monitoring equipment. After the monitoring period, the data will be downloaded, equipment will be removed, and the site will be returned to its original condition in accordance with the access permit. For this task, it is assumed confined space entry will not be required.

### Deliverables for Task 3:

- ▼ Text file with raw and post-processed time series of water level, velocity and flow rate as measured by the monitoring equipment during the 30-day period
- ▼ Technical memorandum that presents the field methods and results of the monitoring including figures and tables that characterize the typical, peak and minimum dry weather flow rates. The draft memo will be provided to LACSD for review and finalized by Paradigm based on comments received.



**Figure 2. Map of Proposed Location of Dry Weather Flow Monitoring (approximate)**

## COST ESTIMATE

The costs for the tasks described above are presented in the following table:

Task	Description	Cost <sup>1</sup>
1	EWMP Implementation Support	\$45,000
2.1	Capture Area Boundary Investigation	\$16,800
2.2	Wet Weather Flow and Pollutant Analysis	\$19,450
3	Dry Weather Flow Characterization	\$23,500

**TOTAL \$104,750**

1 – Inclusive of labor and direct costs including subcontractor costs

## SCHEDULE

For Task 1, efforts will be performed on an as-needed basis throughout the implementation of the Dominguez Channel EWMP. The total cost for this task (\$45,000) will be separated across fiscal years, with \$10,000 allocated for Fiscal Year 2015-16 and \$35,000 for Fiscal Year 2016-17.

For Task 2, the draft deliverables for the capture area boundary investigation (Task 2.1) and wet weather flow and pollutant analysis (Task 2.2) will be submitted within six (6) weeks of receiving a notice to proceed (NTP). The deliverables will be finalized within two (2) weeks of receiving comments from LACSD.

For Task 3, the application for the LACFCD access permit will be submitted within one (1) week of receiving an NTP. The flow monitoring equipment will be deployed within three (3) weeks of receiving the approved access Permit from LACFCD. The equipment will be deployed for at least 30-days, and the draft technical memorandum will be submitted to LACSD within three (3) weeks of the end of the monitoring period. The memo will be finalized within two (2) weeks of receiving comments from LACSD.