

**AMENDMENT NO. 1  
TO PROFESSIONAL SERVICES AGREEMENT  
BETWEEN COUNTY OF MONTEREY AND  
BROWN AND CALDWELL**

**THIS AMENDMENT NO. 1** to the Professional Services Agreement between the County of Monterey, a political subdivision of the State of California (hereinafter, "County") and Brown and Caldwell (hereinafter, "CONTRACTOR") is hereby entered into between the County and the CONTRACTOR (collectively, the "Parties") and effective as of the last date opposite the respective signatures below.

**WHEREAS**, CONTRACTOR entered into a Professional Services Agreement with County on July 3, 2014 (hereinafter, "Agreement") to perform the 2010 General Plan Salinas River Groundwater Basin Zone 2C Study (hereinafter, "Project"); and

**WHEREAS**, all tasks have been completed for Project 1 – Near Term Assessment of the Groundwater Basin's Health and Status included in Exhibit A – Scope of Services/Payment Provisions of the Agreement for the Project; and

**WHEREAS**, in response to terms of the County's 2015 Settlement Agreement known as "Exhibit B to Settlement Agreement Other Actions" additional tasks originally not included in the Agreement and as included in Exhibit A -1 – Scope of Services/Payment Provisions are necessary to complete the Project; and

**WHEREAS**, additional funding is necessary; and

**WHEREAS**, the Parties wish to amend the Agreement to increase the amount by \$462,284 to allow CONTRACTOR to continue to provide tasks identified in the Agreement and as amended by this Amendment No. 1.

**NOW, THEREFORE**, the Parties agree to amend the Agreement as follows:

1. Amend the first sentence of Section 1, "Services to be Provided" to read as follows:

The COUNTY hereby engages CONTRACTOR to perform, and CONTRACTOR hereby agrees to perform, the services described in **Exhibits A and A-1** in conformity with the terms of this Agreement.

2. Amend Paragraph 2.01 under Section 2, "Payments by County", to read as follows:

COUNTY shall pay the CONTRACTOR in accordance with the payment provisions set forth in **Exhibits A and A-1**, subject to the limitations set forth in this Agreement. It is

anticipated that the total cost for services provided pursuant to the Agreement shall be an amount not to exceed \$1,236,157.

3. Amend Section 4, "Additional Provisions/Exhibits", by adding "Exhibit A-1 – Scope of Services/Payment Provisions".
4. All other terms and conditions of the Agreement remain unchanged and in full force.
5. This Amendment No. 1 shall be attached to the Agreement and incorporated therein as if fully set forth in the Agreement.
6. The recitals to this Amendment No. 1 are incorporated into the Agreement and this Amendment No. 1.

IN WITNESS WHEREOF, the Parties hereto have executed this Amendment No. 1 to the Agreement which shall be effective as of the last date opposite the respective signatures below.

**COUNTY OF MONTEREY**

**CONTRACTOR\***

By: \_\_\_\_\_  
Acting Resource Management Agency Director

\_\_\_\_\_  
Brown and Caldwell  
Contractor's Business Name

Date: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of Chair, President or Vice President)

Its: James W. Garydon, Vice President  
(Print Name and Title)

Date: June 19, 2015

Approved as to Form and Legality  
Office of the County Counsel

By: \_\_\_\_\_  
Deputy County Counsel

Date: 6/23/15

By: \_\_\_\_\_  
(Signature of Secretary, Asst. Secretary, CFO,  
Treasurer or Assistant Treasurer)

Its: Robert D. Goodson, Secretary  
(Print Name and Title)

Date: June 19, 2015

Approved as to Fiscal Provisions

By: \_\_\_\_\_  
Auditor/Controller

Date: 6/24/15

Approved as to Indemnity and Insurance Provisions

By: \_\_\_\_\_  
Risk Management

Date: \_\_\_\_\_

\*INSTRUCTIONS: IF CONTRACTOR is a corporation, including limited liability and non-profit corporations, the full legal name of the corporation shall be set forth above together with the signatures of two specified officers. If CONTRACTOR is a partnership, the name of the partnership shall be set forth above together with the signature of a partner who has authority to execute this Agreement on behalf of the partnership. IF CONTRACTOR is contracting in an individual capacity, the individual shall set forth the name of the business, if any, and shall personally sign the Agreement.

# EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

1390 Market Street, Suite 1025  
San Francisco, CA 94102

2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
RMA

Brown and Caldwell

Phone: 415-552-5849  
Fax: 925-937-9026



May 27, 2015

Leslie J. Girard  
Chief Assistant County Counsel  
County of Monterey  
168 W. Alisal Street, 3rd Floor  
Salinas, California 93901

071963-010

Subject: Proposal for Professional Services – Amended Scope of Work and Budget -  
Salinas River Groundwater Basin Investigation

Dear Mr. Girard:

Brown and Caldwell (BC) is pleased to propose a scope of work, estimated costs, and schedule as part of the amended agreement for the Salinas River Groundwater Basin Investigation. This proposed additional scope and budget are to be added to the July 3, 2014 Professional Services Agreement (PSA) as an "amendment".

The proposed additional work is in response to terms of the County's 2015 settlement agreement known as "Exhibit B to Settlement Agreement Other Actions". The proposed additional tasks are to be performed as part of the five-year study of Zone 2C of the Salinas River Groundwater Basin; as originally defined in the Professional Services Agreement (PSA) with the County of Monterey Resource Management Agency executed on July 3, 2014.

The amended scope of work proposed consists of five tasks:

1. Review of Potential Climate Change Impacts and Incorporation of Climate Model Results into the Groundwater / Surface Water Model (New);
2. Land Use Assessment for the Salinas Valley for 2030 (New);
3. Stakeholder Outreach (Expanded);
4. Technical Advisory Committee (TAC) (Expanded); and
5. Additional Project Coordination

A summary of our proposed costs and schedule under each of the additional tasks is presented in Table 1. Detailed scopes of work are presented in Attachment A – Amended Scope of Work. Technical approaches and assumptions used for development of the estimated costs presented in Table 1 are included in Attachment A.

	Task 1	Task 2	Task 3	Task 4	Task 5
Task	Climate Change	Land Use Assessment	Stakeholder Outreach	TAC	Additional PM
Schedule	April - August 2015	2015 - 2019	2015	2015	2015
Budget	\$98,035	\$192,165	\$63,623	\$81,967	\$28,494

**EXHIBIT A-1 -- SCOPE OF SERVICES/PAYMENT PROVISIONS**

Leslie J. Girard

Chief Assistant County Counsel 2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
County of Monterey

Brown and Caldwell

RMA

May 27, 2015

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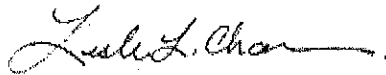
**Proposed Fee and Schedule**

Our estimated fee is **\$462,284** for the proposed scope of work to be completed on a time and material basis. Our fee schedule is attached to the PROFESSIONAL SERVICES AGREEMENT dated July 3, 2014 between the County of Monterey and Brown and Caldwell. The detailed budget is presented in Attachment B.

I would be happy to discuss this proposal with you. Please call me if you have any questions.

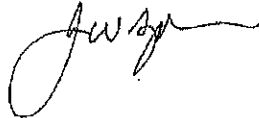
Very truly yours,

**Brown and Caldwell**



Leslie L. Chau

Principal Investigator, Managing Geologist



James W. Graydon, P.E. LEED AP

Vice President

LC:MK:ds

Attachments (2)

Attachment A: Amended Scope of Work

Attachment B: Detailed Budget

**EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS**

Brown and Caldwell  
2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
Attachment A RMA

Amended Scope of Work

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**Attachment A: Amended Scope of Work**

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A

## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Amended Scope of Work

Brown and Caldwell  
2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
Attachment A RMA

### **Task 1 - Review of Potential Climate Change Impacts and Incorporation of Climate Model Results into the Groundwater / Surface Water Model**

This Scope of Work provides a detailed assessment of the potential effects of climate change on the water supply and water quality of the Salinas River Groundwater Basin.

#### **Settlement Agreement Item 4a - Review of Potential Climate Change Impacts and Incorporation of Climate Model Results into the Groundwater / Surface Water Model**

This amended scope of work will provide a detailed assessment of climate change effects using a basin characterization geographic information system (GIS) model approach, utilizing data available from global climate change models. The climate change analysis will be used to evaluate the combined effect of groundwater pumping and rising sea level on the location of the freshwater-seawater interface with time and to develop projections of changes in seawater intrusion volume.

#### **Approach**

The tasks described herein deal with using the approach of the U.S. Geological Survey (USGS) Basin Characterization Model, incorporating projected temperature, precipitation and other data from available global climate change models and incorporating them into the numerical groundwater/surface water model currently being developed as part of Project 2 of the original Scope of Work. Specifically, the additional scope will address the effects of climate change on the above hydrologic variables that drive the hydrologic system (Task 1.2), as well as the effects of climate change on sea level and how that may affect seawater intrusion (SWI; Task 1.3).

There are five (5) components (subtasks as listed below) in the overall climate change evaluation which are intended to satisfy Settlement Items 4a and 4c:

- Subtask 1.2 will address Item 4a.
- Subtask 1.3 will address Item 4c.
- Subtasks 1.1, 1.4, and 1.5 are applicable to both Items 4a and 4c.

#### **Task 1.1 - Literature Review - Climate Change Effects in California**

The first part of the climate change investigation will be to gather and consider quantitative and qualitative information of the projected impacts of climate change on California. It is recognized that there is a great deal of uncertainty in the climatic conditions that may exist in the future, especially on a sub-regional to local scale. The goal of this task will not be to craft a novel estimate of climate change impacts. Instead, this task will include reviewing relevant studies and reports that have performed in-depth investigations into climate change impacts using accepted methods and approaches. Brown and Caldwell (BC) will then determine how the results from those studies can be related to potential future conditions in the Salinas Valley. There will be no separate deliverable for this task; instead, it will be included as a section in the overall Technical Memorandum (TM). However, the results of the task will be discussed with staff from the Monterey County Water Resources Agency and the Technical Advisory Committee (TAC) prior to initiation of further tasks.

**Deliverable:** Discussion of literature review with TAC and response to Agency verbal comments.

#### **Task 1.2 - Incorporating Climate Change into the Groundwater Model**

The groundwater / surface water model as envisioned in the original Scope of Work did not include climate change information. Predictive modeling was to be accomplished assuming some degree of

**Brown AND Caldwell**

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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Amended Scope of Work

Brown and Caldwell  
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Attachment A RMA

stationarity (i.e. past climatic cycles could be applied in the future). The goal of this amended task is to explicitly incorporate into the model the predicted effects of climate change on precipitation, temperature, and other environmental variables that drive the hydrologic system. It will consist of two subtasks: gathering the appropriate data and applying it to the model.

### Task 1.2.1 - Acquiring Climate Change Data

Widely accepted climate change simulations have been promulgated by the Intergovernmental Panel on Climate Change (IPCC) in their Assessment Reports, the latest of which is the Fifth Assessment Report (AR5), which was finalized in November 2014. The resolution of the global climate models (GCMs) used to prepare AR5 is too coarse to be useful to simulating conditions on the scale of the Salinas River Basin. The USGS has down-scaled GCM projections (which are at a 2-degree spatial resolution) to a 12-kilometer resolution for the United States; within California, these projections were further downscaled to a 4-kilometer resolution, then to a 270-meter resolution (Flint and Flint, 2012a). These data are available from the USGS.

Flint and Flint (2012b) applied the downscaled climate projections to their Basin Characterization Model (BCM) to predict the effects of climate change on hydrologic systems in the San Francisco Bay region. Their study did not include the Salinas Valley, but did include the nearby Santa Cruz area. The USGS later published BCM results for the entire state of California (Flint and Flint, 2014).

There is a variety of GCMs that have been incorporated into the IPCC assessment process, running multiple different emissions scenarios (such as business as usual, increased emissions, etc.). Rather than judge what would be the "best" GCM or "most likely" emissions scenario, the BCM utilized two different GCMs and two different emission scenarios (four combinations total) to create an envelope of results (Flint and Flint, 2012b). One of the two GCMs simulates a generally warmer and wetter California, while the other simulates a generally warmer and drier California. The two emissions scenarios are a fuel-intensive scenario and an optimistic scenario. It is expected that using these four in combination defines a range of likely results, without making unjustifiable value judgments on the representativeness of any one GCM or the likelihood of any one emissions scenario.

The method for incorporating climate change into the numerical model will be developed in consultation with the TAC, which will include input from the USGS.

Depending on the agreed-upon approach, this task may consist of either 1) acquiring the downscaled climate data for the study area from the USGS (i.e. the inputs to the BCM) and using them to estimate recharge and other components of the water budget (using whatever approach is ultimately chosen for estimating recharge in the numerical groundwater/surface water model), or 2) gathering and using the results (i.e. outputs) of the BCM itself as inputs to the numerical model.<sup>1</sup> It must be noted that the BCM does not simulate the operation of reservoirs, which are very important to the replenishment of the Salinas River Groundwater Basin.

### Task 1.2.2 - Applying Climate Change Data to the Numerical Model

This task consists of the application of the data collected under Task 2.2 to the numerical model currently being constructed under the original Scope of Work. As noted above, the approach for performing this task may consist of either applying the downscaled climate data to the model, or to applying the results of the existing BCM.

<sup>1</sup> It is worth noting that the BCM has been calibrated to streamflow using data from numerous streamflow gauges throughout the state, but no calibration gauges were used from the Salinas Valley, and only the Arroyo Seco near Greenfield gauge was used in the model validation process. The goodness-of-fit statistics for this streamflow gauge were generally approximately equal to or better than the average statistics for the calibration and validation gauges.





## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Brown and Caldwell  
2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
Attachment A RMA

Amended Scope of Work

The exact method of applying the climate change projections to the numerical model will depend greatly on the exact modeling approach chosen and the type of data acquired (downscaled climate data or BCM results). If, for example, the numerical model uses the GSFLOW software (which couples MODFLOW for groundwater flow modeling with PRMS for surface water modeling), the downscaled climate data can be used as inputs to PRMS to predict the streamflow and simulate groundwater-surface water interaction under a changed climate. It is anticipated that the level of effort required to accomplish the two potential approaches (i.e. using the BCM inputs or the BCM outputs) would be approximately equal.

Using the approach of Flint and Flint (2012b), the baseline scenario from Project 2 will be run under four different combinations of GCMs and emissions scenarios in order to define an envelope of likely future conditions. **Deliverable:** Biweekly update of progress. Report out to TAC.

**Assumptions:** Additional changes to the model will not be made; it is noted that the numerical model structure relies on some parameters that may be transient, particularly in the surface water system. Over the coming decades, stream beds, vegetation cover, and other parameters may change in ways that cannot be easily foreseen, and will not be included in the climate change scenarios.

### Task 1.3 - Incorporating Sea Level Rise into the Numerical Model

Sea level rise is intimately connected with climate change. This task deals with incorporating sea level rise explicitly into the numerical model.

#### Task 1.3.1 - Determination of Appropriate Sea Level Rise

A quantification of projected sea level rise is outside of the scope of this project. The inclusion of sea level rise in the numerical model will rely on independent estimates of sea level rise, such as those published by NRC (2012). These projections range from about 8 to 23 centimeters over the period from 2000 to 2030, and are based in part on the same emission scenarios used by the USGS in their BCM. Additional literatures will be reviewed to determine an appropriate range of sea level rise over the modeling period. The rate of sea level rise will be assumed to be steady over the model period, and changes in sea level rise due to factors on-land (e.g. tectonic effects or subsidence) will be assumed to be negligible.

#### Task 1.3.2 - Applying Sea Level Rise in the Model

The numerical model currently being developed will include the capability for simulating seawater intrusion through the inclusion of a boundary condition of some kind (depending on the modeling software deemed appropriate). Sea level rise will be included in the model through modification of this boundary condition, both by changing the location of the boundary condition (due to changes in the shape of the coastline due only to rising sea level<sup>2</sup>) and by changing the seawater head along the boundary.

Up to three different sea level rise scenarios will be included (minimum, average, and maximum rise) to define an envelope of likely effects of sea level rise. The focus of including sea level rise in the model will be on its effects on the extent of seawater intrusion compared to the baseline scenario.

**Deliverable:** Biweekly telephone update of progress. Report out to TAC.

<sup>2</sup> Changes to the coastline due to the effects of wave action, changes in fluvial processes, and other modifications to the coastal system will not be considered. Additionally, tectonic processes or land subsidence that may raise or lower the land level will be assumed to be negligible.

**Brown AND Caldwell**

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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

### Task 1.4 - Technical Memorandum

A technical memorandum will be prepared to detail the analyses undertaken to fulfill the three tasks described above. The TM will include a brief literature review of potential climate change effects in the Salinas Valley, and describe the approach taken to establish the appropriate climate variables and rate of sea level rise. The TM will present the results of the climate change modeling visually with an accompanying narrative. One Draft TM will be submitted for review to the TAC. The Final TM will be presented at a stakeholders meeting.

**Deliverables:** One draft and one final TM.

**Assumptions:** Draft TM will be available for TAC review for two weeks, after which a meeting of the TAC will be scheduled to address comments.

### Task 1.5 - As-needed Technical Services, TAC and Stakeholder Meetings

The BC Team will provide as-needed technical services and responses to comments from TAC and stakeholders. This task is budgeted at 8 hours per month for the year 2015 (96 hours).

**Deliverables:** One (1) kickoff meeting with the TAC to discuss study methods and proposed content of TM (Task 1.4). One (1) TAC meeting will present the Draft TM and discuss findings. The final TM will be discussed at one (1) stakeholder meeting.

## Task 2 - Land Use Assessment for the Salinas Valley for 2030

This task shall reassess the 2030 demand projections made in the 2010 General Plan EIR in light of changes to or errors in the assumptions for baseline and future demand, including trends in land and water use. The 2030 demand projections will be based on reassessments of land use assumptions.

### Settlement Agreement, Item 4b Land Use Reassessment

The amended scope of work described herein provides a detailed approach for land use reassessment and is based on the stipulations in Items 4.b.ii, iii, and iv in the Settlement Agreement.

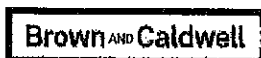
### Changes in the Brown and Caldwell July 3, 2014 Scope of Work

1. (Page B2) The scope of work is amended to develop revised land use data based on reassessed land use assumptions in the 2010 General Plan;
2. (Page B4) The 2010 General Plan EIR land use assumptions will be evaluated and water demand projections for model input will be based on reassessed land use and changes to assumptions on baseline water demand;
3. (Page B7) Land Use Model Input - The scope of work is amended to develop revised land use data based on reassessed land use assumptions in the 2010 General Plan;
4. (Page B9) Model Run for Year 2030 - The scope of work is amended such that projections of land use and water demand from year 2019 to 2029 will be based on reassessed land use assumptions and changes to baseline and future water demand.

### Approach

Agricultural water use is 90 percent of water use in the County. Majority of focus in this task is agriculture water use which is dictated by current and future crop acreage, crop water use efficiency, and irrigation methods. The proposed land use survey will focus on historic, current, and future estimates of specific crop acreage to estimate agricultural water use into 2030.

The accuracy of water use forecasting based on land use is limited by several factors:



## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Brown and Caldwell

2010 General Plan Salinas River Groundwater Basin Zone 2C Study

Amended Scope of Work

Attachment A

RMA

- Precise maps of land use crop acreage in Monterey County are provided by the California Department of Water Resources (DWR), with the last detailed survey completed in 1997. Significant changes in the patterns of land use have occurred since then and no other private entity, county, state, or federal agency has updated the 1997 DWR land use survey.
- Growers in the agriculturally diverse Salinas Valley have a variety of crops to choose from each year. Predicting grower crop choices in any given year is further complicated by land values, crop prices, consumer preferences, grower's expertise, technology, availability of water and available investment capital. For instance, from 2009 to 2013 revenue for strawberries exceeded leaf lettuce and strawberries became the number one agricultural commodity in Monterey County. However in 2013, the acreage of leaf and head lettuce (the number two and three crops) greatly exceeded strawberry acreage, approximately 110,000 to 11,000 acres, respectively. This large discrepancy in acres planted to lettuce versus strawberries suggests that lettuce growers may convert their fields from head lettuce to leaf lettuce; but converting lettuce fields into strawberries is likely not practical because of the specialized soils, climate, equipment, expertise and investment required to grow strawberries.
- Irrigation water use on the same crop in the same location varies depending on the efficiency of the irrigation system. Drip and micro-sprinkler irrigation systems are more water use efficient than conventional sprinkler and much more efficient than surface flood or furrow irrigation. No maps of irrigation systems are compiled by private or public agency; however DWR compiles some statistics on irrigation systems.

There are four (4) components (subtasks as listed below) in the overall land use reassessment which are intended to satisfy Settlement Items 4b:

- Subtask 2.1 for Item 4b ii a,b, and c;
- Subtasks 2.2 to 2.4 for Items 4b ii d, 4b iii, and 4b iv,

### Task 2.1 - Urban, Rural, and Industrial Land Use

The BC Team will consult and potentially acquire the latest consumptive and industrial water use statistics from the County Planning Commission, County Health Department, and the MCWRA.

In 1990, the US Census Bureau estimated Monterey County's population at 355,660. In 2013, the US Census estimated the County's population at 428,826. Despite approximately 20 percent population increase, MCWRA estimates that Salinas Valley groundwater extraction for urban use increased from 41,884 in 1995 to 45,332 acre-feet (AF) in 2013 an 8.2 percent increase.

Estimating rural water use will be more difficult because some of these well data are not reported to MCWRA. BC will work with MCWRA, the State Water Resources Control Board (SWRCB) and other state agencies to obtain the best available data. BC will review and use information in the 2010 Urban Water Management Plan, Salinas District (Prepared by the California Water Service Company) to prepare a baseline water use and then project changes to the year 2030.

**Deliverables:** Land use GIS layers and database including metadata (sources of information) that will be updated on an as-needed basis during the five-year study.

#### Assumptions:

- Land use assessment will use the best available data
- Land use assessment limited to Zone 2C
- Maximum of two (2) updates for the GIS and database within the five year study.

**Brown AND Caldwell**

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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Amended Scope of Work

Brown and Caldwell  
2010 General Plan Salinas River Groundwater Basin Zone 2C Study  
Attachment A RMA

### Task 2.2 - Crop Patterns

Estimating agricultural water use to 2030 will require grower inputs of future crop choices and investments in irrigation systems. Developing an accurate land use geographical information system (GIS) provides a dynamic mapping tool that can assist the County to communicate with growers and the public; hence, continue to increase accuracy as the public participation process proceeds for the next few years in this assessment.

#### Step 1 – Historical Trend Reviews, County Crop Reports

Total groundwater use is closely tied to crop irrigation systems; therefore quantifying crop acreage is critical to accurately assessing agricultural water use. Historic Monterey County annual crop reports from 1950 to 2013 will be evaluated and used as historical trends in crop acreage and indirectly crop irrigation water use.

#### Step 2 – Crop Type GIS Maps

This task involves the use of aerial and satellite imagery data in GIS to acquire a "first look" into current or recent cropping patterns in the Salinas Valley. Aerial imagery covering the County will come from the US Department of Agriculture and CropScape satellite imagery is available from the National Agriculture Statistics Service (<http://nassgeodata.gmu.edu/CropScape/>). The latest imageries 2007, 2010, and 2013 have a 30-meter spatial resolution (about 100-foot, or 10,000 square feet per pixel, or 0.23 acres). Data will be processed into GIS layers and geo-databases to be used for public and stakeholder inputs (Step 3). Additional data formatting will be performed for GW/SW model inputs.

#### Step 3 – Crop Type and Irrigation Ground Surveys for year 2014 of the Pressure and East Side Subareas

Ground surveys of the Pressure and East Side Subareas are a viable option to better characterize the crop patterns and irrigation practices in these highly diverse farm lands. Ground surveys in these areas are proposed as an optional effort.

To compliment satellite imageries (Tasks 2.2 and 2.3), detailed 2014 aerial photographs available from the United States Department of Agriculture (USDA), field verification of crop type can be beneficial to provide better definition of agricultural land use and are also deemed sufficient for numerical modeling. While field verification of the entire Salinas Valley is not practical, focusing a one-time ground survey on the East Side and Pressure Subareas would be beneficial to the accuracy of the 2015 land use GIS.

BC will conduct field surveys of crop types across the East Side and Pressure Subareas. Approximately 500 locations will be surveyed to validate data derived in Step 2, above. This represents a sampling grid spacing of approximately 4,000 feet between data points in the two Subareas.

#### Step 4 – Stakeholder Survey

Maps and databases from Step 2 will be used to solicit input from growers in five (5) yearly stakeholder workshops with focus on the Pressure and East Side Subareas as priority and then the Fore Bay and Upper Valley. Alternatively, stakeholder inputs can be provided confidentially by growers in separate engagements. Stakeholder inputs of specific focus include: crop type; crop rotations; fallowing; and water efficiency.

**Deliverables:** Land use GIS layers and database including metadata (sources of information) that will be updated on a yearly basis for five years.

**Brown AND Caldwell**

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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

Brown and Caldwell  
Attachment A RMA

Amended Scope of Work

2010 General Plan Salinas River Groundwater Basin Zone 2C Study

### Assumptions:

- Land use assessment limited to Zone 2C
- One round of stakeholder inputs per year for five years.
- The budget for data formatting for GW/SW model inputs is included in this task.
- Approximately 500 locations will be field checked to validate data. The budget is for three (3) weeks of field activities that includes ODCs for mobile GIS, lodging, meals, and logistics.

### Task 2.3 - Irrigation Practices

Irrigation systems include flood irrigation, overhead conventional sprinklers and drip systems listed in increasing irrigation use efficiency (IUE); the term IUE is defined as = crop evapotranspiration/applied irrigation water. Properly installed drip irrigation systems deliver water to individual root systems of lettuce, broccoli and strawberry plants more efficiently than overhead sprinkler (or flood) systems that wet soil in between plants reducing the IUE. Recent studies (2005 to 2012) in Monterey County suggest that field, vine and tree crops can reach 90-95 percent IUE, whereas vegetables and strawberry irrigation average approximately 75 percent IUE.

As more farms install drip irrigation systems, IUE will increase and agricultural water consumption per crop acre will be reduced. Accurately accounting for current and projected future irrigation systems are an important component of forecasting agricultural irrigation demand.

#### Step 1 – Consultation with UCCE and RCDMC

BC will consult and prepare a memoranda of understanding (MOUs) with University of California Cooperative Extension (UCCE), Resource Conservation District of Monterey County (RCDMC), and Central Coast Water Quality Coalition who are actively involved in monitoring and reporting water use efficiency in Monterey County agricultural operations.

#### Step 2 – Irrigation GIS Maps and Stakeholder Inputs

The irrigation systems can be mapped as additional layer(s) to the crop type GIS described in Task 2.2 above. BC will conduct field surveys of irrigation types across the Ease Side and Pressure Subareas. Approximately 150 locations will be surveyed to validate data derived in Step 1, above. This represents a sampling grid spacing of approximately 4000 feet across the two Subareas. These irrigation system surveys will be presented to the growers to verify (solicit their inputs) their accuracy in a public or private venue.

**Deliverables:** Irrigation GIS layer(s) and database including metadata (sources of information) that will be updated on a yearly basis for five years.

### Assumptions:

- Land use assessment limited to Zone 2C
- One round of stakeholder inputs per year for five years.
- The budget for data formatting for GW/SW model inputs is included in this task.
- BC will field-survey irrigation types at approximately 150 locations in the Pressure and Eastside Subareas for purposes of validating irrigation type data obtained in Step 1. The field activity will be concurrent with those in Task 2.2 Step 3 Crop Ground Survey.
- The budget is for three (3) weeks of field activities that includes ODCs for mobile GIS, lodging, meals, and logistics.

**Brown AND Caldwell**

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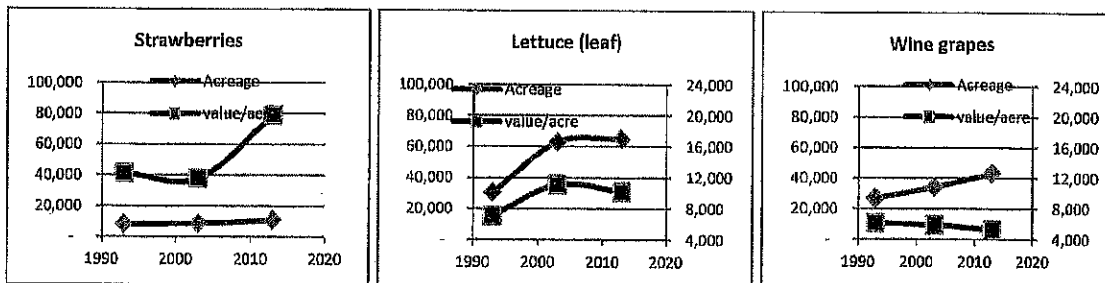
## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

### Task 2.4 - Agricultural Trend Analysis

BC will conduct meetings with County agencies and discuss GIS maps prepared as part of Subtasks 2.2 and 2.3. BC will compile Crop Report data developed by the Monterey County Agricultural Commissioner's office to support discussions of future trends in crops grown in Monterey County to the year 2030. The intent of this effort is to reconcile potential inconsistent reports of irrigated acreage and pumping records.

The Crop Reports provide an annual summary of agricultural crop acreage and economic value of crops grown in Monterey County from 1940's to 2013. Although projected land and water use from now until 2030 are always subject to uncertainty, trends in crop acreage are documented and relatively consistent over the past 20 years.

From 1993 to 2013, the crop reports show that the economic value of crops change dramatically over 20 years, but acreage (and therefore water use) changes are more subtle. The grower's choice to grow a particular crop is not unlimited; growing a high quality crop requires specialized expertise, equipment, specific soil and climatic conditions, land ownership or lease arrangements as well as a marketing and distribution system that assures a buyer on the open market. The best way to initiate a projection of land and water use over the next 15 years into the future can be initiated by observing past trends in crop acreage (considering market value of crops) and compiling water use demand for each crop.



Considering only three high value crops grown in Monterey County from 1993 to 2003, the figures above show that despite the profitability of strawberries, strawberry acreage (just under 11,000 acres in 2013) is relatively modest compared to leaf lettuce, which is still the most widely planted crop in Monterey County (over 60,000 acres planted in 2013). These trends demonstrate that the value of a crop is not the only factor that dictates farmer's behavior in future crop choices.

Land use is one very important component in projecting water use to 2030; total water demand and water use efficiency are the other principal factors that will affect these projected water use. In order to address these crop water use data, BC will enlist the help of the University of California Cooperative Extension (UCCE), who have published studies, active research in water use for most crops grown in Monterey County and good relationships with farmers.

One aspect of water use cannot be precisely forecasted; investment in upgrading irrigation systems to more efficient systems cannot be accurately predicted. Upgrading irrigation systems to efficient drip and micro-sprinkler systems requires capital investment and on-going maintenance. An individual farmer's choice to invest in this upgrade depends on another complex set of issues including the individual farm's available funds, the price and availability of water and any other incentives to conserve irrigation water. Given the current overdraft of some groundwater wells and the increasing chloride concentration in selected areas, groundwater availability, quality and

## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

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conservation incentives may change within the next 15 years. The improvement in irrigation system efficiency in the next 15 years in Monterey County is difficult to predict.

### **Deliverables:** Draft and Final TM:

- Specific crop acreage trend analysis in the past 20 years with projections into 2015. These trend analyses will consider the top 20 crops grown in Monterey County over the past 20 years according to County Crop Reports.
- Total water use requirement of the same top 20 crops grown in Monterey County will be estimated to the year 2030. BC will engage with the County Agricultural Commissioner's office, the UCCE (Richard Smith, Michael Cahn, and Tom Lockhart) and Resource Conservation District of Monterey County (RCDMC; Paul Robins) on total water use and water use efficiency.

### **Assumptions:**

- Projected investment in high efficiency drip or micro-sprinkler irrigation systems cannot be predicted at this time. Meeting with stakeholders will potentially elicit input on these issues and if some input is provided, increases in water efficiency may be estimated. If no input is received, BC will utilize the DWR data from 1997, UCCE and RCDMC to estimate irrigation system efficiency.

### **Task 2.5 - As-needed Technical Services and Stakeholder Comments**

The BC Team will provide as-needed technical services and responses to comments from stakeholders. This "contingency effort" this task is budgeted at 8 hours per month for the year 2015 (96 hours).

**Deliverables:** To be determined

**Assumptions:** To be Determined

### **Supplemental Discussion: Groundwater Model Input**

A main purpose of the Land Use Assessment is to provide an updated determination of 2030 land use patterns to help inform the numerical groundwater model that is a major part of the Salinas River Groundwater Basin Investigation. Because agriculture is such a critical part of the hydrologic system, a realistic estimation of the future course of agriculture in the study area is important to the predictive capability of the numerical model.

Although the exact modeling software that will be used to construct the numerical model has not yet been determined, the land use component of the modeling approach will likely consist of an estimate of agricultural return flow using the land use prediction, crop-specific coefficients, crop irrigation efficiency, and potential evapotranspiration. The Land Use Assessment will provide information on the spatial distribution of crops, crop rotation patterns, and irrigation practices (typical application rates by crop and weather conditions, for example) that can be expected in the study area in 2030, based on the best information currently available.

For the purpose of the groundwater modeling part of this project, the Land Use Assessment will result in a quantification of recharge to the groundwater system resulting from agricultural practices.

## **Task 3 - Stakeholder Outreach**

### **Stakeholder Engagement**

The labor budget (stipend) for a facilitator is anticipated to be around \$30,000 for up to ten (10) regularly scheduled stakeholder meetings in 2015.

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Additional effort provided by BC is anticipated for stakeholder meetings and response to "third-party" requests. Part of this effort and budget is supplemental to the existing Stakeholder Outreach task authorized as Project 2 Task 7 in the BC Agreement for Professional Services dated July 3, 2014. There are four (4) stakeholder meetings budgeted in that task.

There will be an initial stakeholder workshop to be held at the MCWRA followed by ten (10) regularly scheduled meetings. The workshop is intended to discuss the State of the Basin Report (issued 16 January 2015).

The budget in this amended scope is for an initial stakeholder workshop and six (6) additional scheduled stakeholder meetings for year 2015, lasting four (4) hours per meeting. BC will have up to two (2) staffs attending the workshop and each of the stakeholder meeting (up to 10 meetings).

The breakdown is as follows:

- Anticipated four (4) hours for two (2) BC staffs attendance per bimonthly stakeholder engagement (48 hours for additional 6 meetings).
- Additional four (4) hours for two (2) BC staff per meeting is budgeted for preparation for meetings and response to "third-party requests" (48 hours for additional 6 meetings);

Other Direct Cost: \$2,000

**Deliverables for Facilitator:** Meeting venues, meeting formats, meetings schedule, meeting agenda, meeting handouts and meeting minutes, identify and inform interested parties of meetings, email or County web distributions of agenda and minutes

### Assumptions:

1. The BC team has a support role with technical methods and professional opinions provided to the Facilitator and the County lead agency(s). BC will only provide technical materials to be inserted into the deliverables listed. The Facilitator will be responsible "as the lead" for all the deliverables listed.
2. Response to Stakeholder questions and request will be limited to a budget of 48 hours.

## Task 4 - Technical Advisory Committee (TAC)

The TAC's overall function is to provide independent review and comments on the technical approach prior to commencing the technical work in this project. The TAC will comment and recommend changes to technical workflows in;

- i) model code assessment and selection;
- ii) modeling procedures – e.g. model construction, time-steps, and calibration;
- iii) priority model focus areas and calibration requirements;
- iv) uncertainty analysis and calibration results;
- v) basin wide hydrostratigraphic review and potential revisions
- vi) data inputs, including hydrologic futures under a changing climate; and
- vii) model result documentation and reporting.

The labor budget (stipend) for the TAC is anticipated to be around \$60,000. A stipend amount of \$20,000 is in the July 3, 2014 Task 10 TAC budget. Additional \$40,000 is budgeted in this amended scope for the TAC. The planned effort includes monthly TAC meetings of four (4) hours per meeting for one (1) year – i.e. 2015.

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Additional effort provided by BC is anticipated for TAC meetings and response to comments and action items. The BC Team will present the updated technical work to the TAC and respond to comments on a monthly basis.

An existing budget of \$11,312 is in the July 3, 2014 Task 10 scope of work. The budget in this amended scope is for a total of 12 TAC meetings for year 2015, lasting four (4) hours per meeting. BC will have up to three (3) staffs attending each of the TAC meetings. There can be up to 12 meetings. The breakdown is as follows:

- Anticipated four (4) hours for three (3) BC staff attendance per monthly TAC meeting (144 hours for 12 meetings).
- Additional eight (8) hours per meeting is budgeted for preparation of meetings and response to TAC (96 hours for 12 meetings);
- Other Direct Cost: \$3,000

**Deliverables for TAC Facilitator:** Meeting venues, meeting formats, meetings schedule, meeting agenda, meeting handouts and meeting minutes, identify and inform interested parties of meetings, email or County web distributions of agenda and minutes.

### Assumptions:

1. To maintain independence, MCWRA will select the TAC, designate a person to oversee all TAC activities and manage the TAC comment and response process.
2. The BC team has a support role with technical methods and professional opinions provided to the Facilitator and the County lead agency(s). BC will only provide technical materials to be inserted into the deliverables listed. The Facilitator will be responsible "as the lead" for all the deliverables listed.

## Task 5 - Additional Project Coordination

Additional project coordination effort is specifically for this amended scope of work. The budget is for efforts in addition to those scoped and budgeted in the original July 3, 2014 Agreement. Additional efforts are needed for the following:

- Subcontract management of stakeholder facilitator and TAC members;
- Supplemental efforts to coordinate the technical work in Tasks 1 and 2 in this amended scope of work

The anticipated project coordination is for additional 12 hours per month for 12 months in the year 2015 (144 hours). This is about 8 percent of the total effort in the amended scope of work.

**Deliverables:** The deliverables for this task are described under Task 1.1 in the July 3, 2014 scope of work. This task also includes subcontract preparation and administration.

**Assumption:** Subcontract administration this is about 5 percent of actual dollar efforts in the total amended scope. The total augmented budgeted for project coordination is about 8 percent of total amended scope of work.

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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

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Attachment A  
RMA

### References

- Flint, L.E. and A.L. Flint, Downscaling Future Climate Scenarios to Fine Scales for Hydrologic and Ecological Modeling and Analysis, *Ecological Processes* 1(1), 2012a, 15p.
- Flint, L.E. and A.L. Flint, Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains, U.S. Geological Survey Scientific Investigations Report 2012-5132, 2012b, 69p.
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- NRC, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, Committee on Sea Level Rise in California, Oregon, and Washington, Board on Earth Sciences and Resources and Ocean Studies Board, Division on Earth and Life Studies, National Research Council (NRC) of the National Academies, National Academy Press, Washington, D.C., 2012, 217p.

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**EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS**

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Amended Scope of Work

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**Attachment B: Detailed Budget**

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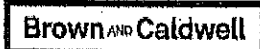
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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

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Detailed Budget			
Task Name	Estimated effort (total hours)	Estimated Budget	Averaged Hourly Rate
<b>Task Name</b>	2025.3	\$462,284	
<b>Task 1 - Review of Climate Change and Incorporation of Climate Model Results Into the Groundwater / Surface Water Model</b>	580.7	\$98,035	
Task 1.1 - Review of Climate Change Effects In California	46.7	\$8,142	\$174.34
Project Kickoff and Initial Data Review	46.7	\$8,142	
<b>Deliverable:</b> One telephone update with MCWRA	0	\$0	
Task 1.2 - Incorporating Climate Change into the Numerical Model	166	\$27,139	\$163.49
Task 1.2.1 - Acquiring Climate Change Data	45	\$7,324	
Task 1.2.2 - Applying Climate Change Data to the Numerical Model	121	\$19,815	
<b>Deliverable:</b> Biweekly telephone updates of progress.	0	\$0	
Task 1.3 - Incorporating Sea Level Rise into the Numerical Model	158	\$25,436	\$160.98
Task 1.3.1 - Determination of Appropriate Sea Level Rise	21	\$3,630	
Task 1.3.2 - Applying Sea Level Rise in the Model	137	\$21,806	
<b>Deliverable:</b> Biweekly telephone updates of progress.	0	\$0	
Task 1.4 - Technical Memorandum	114	\$19,212	\$168.53
Task 1.4.1 - Technical Memorandum	101	\$16,719	
Task 1.4.2 - Presentation to MCWRA	13	\$2,493	
<b>Deliverable:</b> One draft and one final TM	0	\$0	
Task 1.5 - As-needed Technical Services and Stakeholder Comments	96	\$18,107	\$188.61
Additional Technical Services	48	\$9,053	
Respond to stakeholder comments	48	\$9,053	
<b>Deliverable:</b> To be determined			
<b>Task 2 - Land Use Assessment for the Salinas Valley for 2030</b>	1017	\$192,165	
Task 2.1 - Urban, Commercial, and Industrial Land Use	88	\$15,823	\$179.81
Data compilation from County Planning, Health, UWMP, and MCWRA	88	\$15,823	
<b>Deliverable:</b> Land use GIS layers and database			
Task 2.2 - Crop Patterns	501.1	\$91,883	\$183.36
Step 1 - Historical Trend Reviews, County Crop Reports	58	\$12,961	
Step 2 - Crop Type GIS Maps	175.1	\$29,649	



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## EXHIBIT A-1 – SCOPE OF SERVICES/PAYMENT PROVISIONS

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Amended Scope of Work

Detailed Budget			
	Estimated effort (total hours)	Estimated Budget	Averaged Hourly Rate
Step 3 - Crop Type and Irrigation Ground Surveys (Pressure and Eastside)	160	\$26,070	
Step 4 - Stakeholder Survey (one round of stakeholder input per year for 5 years)	108	\$19,703	
Other Direct Costs (ODCs)		\$3,500	
<b>Deliverable:</b> Land use GIS layers and database			
Task 2.3 - Irrigation Practices	216	\$41,405	\$191.69
Step 1 - Consultation with UCCE and RCDMC	16	\$3,484	
Step 2 - Stakeholder Inputs - Irrigation GIS Maps (one round of stakeholder input per year for 5 years)	200	\$37,921	
<b>Deliverable:</b> Land use GIS layers and database			
Task 2.4 - Economic Trend Analysis	116	\$24,317	\$209.63
<b>Deliverable:</b> Draft and Final TM			
Task 2.5 - As-needed Technical Services and Stakeholder Comments	96	\$18,736	\$195.17
Additional Technical Services	44	\$8,359	
Respond to stakeholder comments	52	\$10,377	
<b>Deliverable:</b> To be Determined			
<b>Task 3 - Stakeholder Outreach (2015 10 meetings)</b>	102.5	\$63,623	
Stakeholder Meetings - six (6) meetings added to the existing four (4) budgeted in the 2014 scope	102.5	\$21,623	\$210.96
Facilitator for Stakeholder meetings (2015)		\$40,000	
Other Direct Costs (ODCs)		\$2,000	
<b>Deliverables:</b> Meeting venues, meeting formats, meetings schedule, meeting agenda, meeting handouts and meeting minutes, identify and inform interested parties of meetings, email or County web distributions of agenda and minutes			
<b>Task 4 - Technical Advisory Committee (2015)</b>	181	\$81,967	
Additional TAC member stipend (Note: total of \$60K stipend is needed, with existing \$20K in original 7/3/14 budget. An augmented budget of \$40K is proposed in this budget).		\$40,000	
Additional BC Team Effort (Note: total effort of 240 hours is needed for 12 meetings which amount to \$48,225. A budget of \$11,312 is in the 7/3/14 budget. An augmentation of \$36,966 is proposed in this budget).	181	\$36,967	\$204.24
Other Direct Costs (ODCs)		\$3,000	
Subconsultant 5% markup		\$2,000	
<b>Task 5 - Additional Project Coordination (2015)</b>	144	\$26,494	\$183.98
<b>New Totals Hours (5-22-15)</b>	2025	\$462,284	

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