



## SACOG Board of Directors

September 13, 2012

### **Authorize Contract with Calthorpe Associates for Implementation of UrbanFootprint Tool in SACOG Region**

**Issue:** SACOG needs to begin development and deployment of a new land use scenario tool as a long-term replacement to the I-PLACE<sup>3</sup>S model.

**Recommendation:** The Government Relations & Public Affairs Committee recommends that the Board authorize the Chief Executive Officer to execute a sole-source contract with Calthorpe Associates for development and deployment of the UrbanFootprint planning model in the amount of \$259,940.

**Committee Action/Discussion:** For the 11th consecutive year, in June, the Board approved a sole-source contract with EcoInteractive, Inc. for the continued use of I-PLACE<sup>3</sup>S for FY 2012/2013. However, the approved contract was at a lower level of service and cost than in previous years with the intention that staff would research a new land use modeling tool to transition to within the year. Each year, when the EcoInteractive contract has been renewed, some Board members have questioned whether we were getting the best deal possible, and have asked why it was necessary to pay an annual operating fee for use of the software. Staff has consistently indicated to the Board that while the contract represented a good value to SACOG and its members, we were working diligently to find a way to move I-PLACE<sup>3</sup>S into a true open source environment that would, among other benefits, substantially reduce or eliminate the annual operating costs. Although we have not succeeded in accomplishing this to date, a high performing alternative software finally has become available and we are recommending switching platforms.

SACOG needs a tool that has similar functionality to I-PLACE<sup>3</sup>S, such as being internet based and allowing multi-users, yet offers several advantages over the current platform, like easier expandability. UrbanFootprint was developed and deployed across the state by Calthorpe Associates as part of the Vision California process (funded with Proposition 84 funds), and has been tested in other parts of the country. I-PLACE<sup>3</sup>S and UrbanFootprint were the only web-based, dynamic scenario creation and land use modeling tools SACOG staff found during their research. UrbanFootprint adds some functions that I-PLACE<sup>3</sup>S lacks. These additional functions include infrastructure costs and public health impacts (physical activity related disease, respiratory impacts, and pedestrian safety). One major difference between these tools, however, is that UrbanFootprint was developed using “open source” software. Open source software generally allows users to change and distribute the software without copyright and/or licensing issues or costs. As a result, open source programs are often developed in a very collaborative manner with a wider user base from which to learn and exchange information. SACOG has engaged in several discussions with the national Open Source Planning Tools Ecosystem working group, UC Davis, State Office of Planning and Research, and the Strategic Growth Council about available tools, and has concluded that UrbanFootprint has the potential for a wide-user base across the state and nation, for which SACOG would be a catalyst.

In order for SACOG to maintain the same detailed level of modeling it does using I-PLACE<sup>3</sup>S, some enhancements to UrbanFootprint are needed. Once these initial enhancements are created and UrbanFootprint is deployed at SACOG, there is no on-going or annual cost for licensing the model which will result in a significant long-term savings to the agency over time. Additionally, SACOG staff will be trained on the programming code used to create UrbanFootprint and will have the potential to make many, smaller-scale, future improvements to the tool over time without additional consultant costs.

An OWP amendment is being made this month that will address the budget for this contract. A seven-month contract from September 1, 2012 to March 31, 2013 is proposed. The scope of work and sole-source justification are attached. In preparation of this scope of work, a 30-day contract for \$19,500 was executed by the Chief Executive Officer to conduct a feasibility analysis of UrbanFootprint. The short time schedule is necessary because the new tool has to be implemented by early 2013 to meet the schedule for the next MTP/SCS. SACOG has received preliminary approval for a \$100,000 match grant from the Resources Legacy Fund (RLF) to be used toward this contract if we can find the other approximately \$150,000. While we are pursuing several sources for these funds, we need to make a commitment now in order to have this software functional to begin the preliminary work for the next MTP in the spring of 2013. Therefore, we are asking the Board to approve the \$150,000 expenditure now; again, with the hope that we will offset some or all of it with other funding sources. A second phase of UrbanFootprint development will be needed to add functions on rural agriculture planning for the RUCS project and for the building energy module currently in I-PLACE<sup>3</sup>S. Funding for this phase is being pursued.

Approved by:

Mike McKeever  
Chief Executive Officer

MM:RP:ef

Attachments

Key Staff:                   Gordon Garry, Director of Research & Analysis, (916) 340-6279  
                                  Raef Porter, Senior Research Analyst, (916) 340-6261

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# UrbanFootprint Transition & Feature Development

## SACOG Deployment and Model Development Work Plan

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Rev. 31 August 2012

This work plan outlines the tasks associated with setting up the UrbanFootprint model and data framework for the Sacramento Area Council of Governments (SACOG). It focuses on the development of specific scenario development capability and features as designated by SACOG staff, and also includes the move of the model and its version 1.0 functionality to SACOG. This work plan covers approximately 6-7 months of work, with the intent of readying SACOG and its staff to deploy UrbanFootprint by early 2013 as part of its 2016 SCS/RTP process. This work plan is designed to allow flexibility in how tasks are ultimately executed, as it is expected that regular meetings between Calthorpe Associates and SACOG will result in refinements and further detailing of tasks and deliverables. The total budget for this 6-7 month work plan is approximately \$260,000, which includes budget for advanced programmers via subcontract with Calthorpe Associates.

### *Work Plan Tasks*

**Task 1. UrbanFootprint Development Environment and Local Access Setup.** Systems for customizing UrbanFootprint functions and interfaces for SACOG will initially be set up at Calthorpe Associates and in ‘cloud-based’ (i.e. Amazon or similar) servers. Systems for access by SACOG staff will be designed and implemented, and a program for the move of UrbanFootprint to SACOG hardware will be discussed and developed. This move would likely occur towards the end of this contract period to allow for discussions about best setup and operations, and would include installation of all open source software components required by the model and its user interface (i.e. Ubuntu, PostgreSQL, PostGIS, Python, Django, Geoserver, etc). SACOG staff will be given access to UrbanFootprint’s dual development environment, code repository, bug tracking system, and other protocols to allow for remote transfer of model updates and advancements and early stage dual development by the Calthorpe Associates team and SACOG.

*Task Budget: \$22,080*

**Task 2. Project/Scenario Development Work Flow and User Environment.** Building from initial discussions and presentations of the current/I-Place3s scenario development work flow utilized by SACOG staff, UrbanFootprint user work flows and project/data organization methods will be developed and reviewed with SACOG staff prior to the execution of model function, programming, and user interface development tasks. Work flow design includes critical components of scenario development, including the organization of projects, planning geographies, methods of access to base data and scenarios, and other general project setup and organization tasks that need to be integrated with established SACOG work flows and data systems.

*Task Budget: \$15,200*

**Task 3. Parcel Level Painting and Scenario Development Functions.** Parcel-level painting and select scenario development functions will be built within the UrbanFootprint model. This task will include programming, scripting, and other development tasks associated with parcel-level painting, translation, and analysis, and will be coordinated with other tasks associated with place/building types, base data processes, and user interface design. This task will also include a detailed review of the base data process and 2012 SCS translation used to produce UrbanFootprint’s initial depiction of the SACOG base and future environments, which were built by Calthorpe Associates as part of the Vision California process. This task will transition UrbanFootprint from using the grid cell to the parcel as its primary unit of

scenario development and allow parcel-level output to be utilized by SACSIM and other SACOG processes. Specific subtasks within this larger transition to parcel-based scenario development include:

- 3a. Integrate base year parcels into UrbanFootprint.** This subtask encompasses the work to integrate the SACOG base-year parcel base and associated existing conditions dataset into the UrbanFootprint system as the ‘canvas’ upon which base year editing and future scenario production will take place.
- 3b. Building type-to-parcel painting capability.** Current UrbanFootprint painting systems will be modified to allow for the painting of both building types and place types (equivalent to SACOG’s ‘blended’ place types) on parcels and pseudo parcels.
- 3c. Painting adjustment functions.** Functions will be developed that allow for the adjustment of the application of building or place types to parcels. This includes proportional adjustments to development, acreage, and redevelopment percentages.
- 3d. Rule-based painting capability.** This subtask incorporates certain rule-based scenario development capabilities, such as the ability to paint according to spatial queries (i.e. transit station buffers).

*Task Budget: \$84,300*

**Task 4. Subarea and Scenario Reporting, Statistics and Related Functions.** This task includes work to develop subarea reporting and spatial query capability within the UrbanFootprint model and user interface, as well as the ability of the model to calculate and display other user-defined statistics by scenario or specified area. Specific subtasks include:

- 4a. Scenario Reporting and Statistics.** Development program statistics (i.e. population, dwelling units by type, employment by types) will be reported at the scenario level based on user queries. Additional statistics, such as population or employment by place or building type, can also be integrated into this task.
- 4b. Subarea Reporting and Statistics.** The capacity to produce development program and other statistics for subareas will be developed in this task. Users will be able to establish subareas via rules, selections, spatial query, or shapefile import.

*Task Budget: \$29,490*

**Task 5. Data Import/Export and Environmental Features Integration.** This task builds the capacity to import and export datasets, shapefiles, and other key file types between UrbanFootprint and other software (i.e. ArcGIS, MS Excel, Access, Google Earth, etc.). This functionality will be developed and then integrated into the primary user interface for ease of use. In addition, this task will focus on the transfer of environmental features data and shape files into the UrbanFootprint scenario development framework for both analysis, scenario development, and display functions.

*Task Budget: \$8,320*

**Task 6. Place Type User Interface Integration.** This task focuses on the integration of basic Place Type development and modification functionality into UrbanFootprint’s graphical user interface (GUI). This will allow a user to make ‘on the fly’ modifications to Place Types during the scenario development process, and to assert ‘rule-based’ changes to place types globally or in a subset/sub-area of a scenario. Task details and subtasks will be developed in initial project meetings and consultation with SACOG staff.

*Task Budget: \$33,550*

**Task 7. User Interface Customization and Enhancements.** This task includes enhancements, customization, and upgrades to UrbanFootprint’s graphical user interface (GUI) and will be closely coordinated with the new functions and enhancements developed in other project tasks. A SACOG-specific interface will be developed that includes those functions that SACOG users seek to maintain from the iPlaces interface, and other UrbanFootprint model functions integrated as appropriate. The focus of this initial transition project will be to ensure that the details of painting, scenario, and basic analytical functionality are worked out and threaded into the GUI for web-based accessibility by SACOG staff. Other functions to be integrated into the GUI could include the processes associated with the base data load, as well as an expanded ability to alter policy settings via the GUI. Task details and subtasks will be developed in consultation with SACOG staff.

*Task Budget: \$41,850*

**Task 8. Monthly Development Meetings.** The Calthorpe Associates team will travel to SACOG for full day meetings with the SACOG team once per month through the project period. Additional meetings or correspondence will take place via email, phone, web meeting, or in person at Calthorpe Associates’ Berkeley office.

*Task Budget: \$24,150*

*Budget Tables*

UrbanFootprint for SACOG - Tasks	Total	Calthorpe Associates	Contract Programmers*
1. UrbanFootprint Development Environment and Local Access Setup	\$22,080	\$17,600	\$4,480
2. Project/Scenario Development Work Flow and User Environment	\$15,200	\$14,080	\$1,120
3. Parcel Level Painting and Scenario Development Functions	\$84,300	\$79,300	\$5,000
4. Subarea and Scenario Reporting, Statistics and Related Functions	\$29,490	\$27,050	\$2,440
5. Data Import/Export and Environmental Features Integration	\$ 8,320	\$7,040	\$1,280
6. Place Type User Interface Integration	\$33,550	\$30,550	\$3,000
7. User Interface Customization and Enhancements	\$41,850	\$38,050	\$3,800
8. Monthly Development Meetings	\$24,150	\$24,150	
Subtotal	\$258,940	\$237,820	\$21,120
Expenses (billed at cost only)	\$1,000		
<b>TOTAL</b>	<b>\$259,940</b>		

\*Estimate: In some cases, tasks identified for programmers could be performed by Calthorpe Associates internally.

*Project Hours Estimate*

Budget	TEAM TOTAL		Joe DiStefano		Garlynn Woodson		Nick Wilson		Evan Babb		Andy Likuski		Total Calthorpe		Programmers	
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
1 UrbanFootprint Development Environment and Local Access Setup	166	\$ 22,080	10	\$ 2,250	10	\$ 1,600	10	\$ 1,250	60	\$ 7,500	40	\$ 5,000	130	\$ 17,600	36	\$ 4,480
2 Project/Scenario Development Work Flow and User Environment	112	\$ 15,200	8	\$ 1,800	8	\$ 1,280	8	\$ 1,000	40	\$ 5,000	40	\$ 5,000	104	\$ 14,080	8	\$ 1,120
3 Parcel Level Painting and Scenario Development Functions	627	\$ 84,300	32	\$ 7,200	60	\$ 9,600	60	\$ 7,500	220	\$ 27,500	220	\$ 27,500	592	\$ 79,300	35	\$ 5,000
4 Subarea and Scenario Reporting, Statistics and Related Functions	219	\$ 29,490	10	\$ 2,250	30	\$ 4,800	40	\$ 5,000	60	\$ 7,500	60	\$ 7,500	200	\$ 27,050	19	\$ 2,440
5 Data Import/Export and Environmental Features Integration	60	\$ 8,320	4	\$ 900	4	\$ 640	4	\$ 500	20	\$ 2,500	20	\$ 2,500	52	\$ 7,040	8	\$ 1,280
6 Place Type User Interface Integration	240	\$ 33,550	20	\$ 4,500	30	\$ 4,800	10	\$ 1,250	80	\$ 10,000	80	\$ 10,000	220	\$ 30,550	20	\$ 3,000
7 User Interface Customization & Enhancements	305	\$ 41,850	20	\$ 4,500	30	\$ 4,800	30	\$ 3,750	100	\$ 12,500	100	\$ 12,500	280	\$ 38,050	25	\$ 3,800
8 Monthly Meetings	150	\$ 24,150	40	\$ 9,000	40	\$ 6,400	20	\$ 2,500	30	\$ 3,750	20	\$ 2,500	150	\$ 24,150	0	\$ -
<b>TOTAL LABOR</b>	<b>1879</b>	<b>\$258,940</b>	<b>144</b>	<b>\$32,400</b>	<b>212</b>	<b>\$33,920</b>	<b>182</b>	<b>\$22,750</b>	<b>610</b>	<b>\$76,250</b>	<b>580</b>	<b>\$72,500</b>	<b>1728</b>	<b>\$237,820</b>	<b>151</b>	<b>\$21,120</b>
Estimated Expenses (Billed at actual cost only)		\$ 1,000														
<b>TOTAL EXPENSES + LABOR</b>		<b>\$259,940</b>														

August 13, 2012

**To:** Mike McKeever  
Chief Executive Officer

**From:** Raef Porter, Senior Research Analyst

**Subject:** UrbanFootprint Tool - Feasibility Contract with Calthorpe Associates; Sole Source Justification

The four year cycle for development, refinement, and adoption of the mandated MTP/Sustainable Communities Strategy (SCS) begins in the summer of 2012. Early work includes the update of the base year, regional forecasts, and scenario development. Later work includes testing scenarios, creating metrics, and plan implementation. In order to conduct this work, SACOG uses a land use and transportation scenario comparison tool. This tool needs to be agile enough to handle large amounts of data, fast enough to be responsive in a workshop setting, flexible enough to meet any new demands, portable enough to be used throughout the region, and inexpensive enough to be attractive to a wide range of users.

The tool SACOG currently uses, I-Place<sup>3</sup>s, is a web-based GIS tool that allows for fast comparisons of large amounts of data. However, there are problem with this platform, including the annual expense for a third party to host and maintain the software, and the cumbersome nature of updating or expanding functionality. SACOG's goal is to move to an "open source" software, to eliminate the annual hosting expense.

SACOG has researched other existing land use and transportation scenario comparison tools, including creating one from the ground up. However, due to either the expense to create and maintain, or not being web enabled, most tools do not meet the minimum requirements SACOG needs in such a tool. Only one existing "open source" tool, UrbanFootprint - developed by Calthorpe Associates for a State of California function - appears to meet SACOG's requirements. The purpose of this contract is to assess the functionality of UrbanFootprint and determine the efficiency and feasibility of using it for SACOG's needs.

cc: Contracts file

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