GENERAL DESCRIPTION OF WORK
The project is to prepare a Feasibility Study for a Dry Anaerobic Energy/Compost Facility in the City of Palo Alto, California. The facility would recover energy from methane derived from dry anaerobic digestion of food scraps, yard trimmings, and, possibly wastewater biosolids. The chief residual from the processes would be compost. The Feasibility Study would include an economic, greenhouse gas, and environmental impact analysis. An Initial Study (CEQA Checklist) pursuant to the California Environmental Quality Act will also be prepared. (Further California Environmental Quality Act work may be performed through a Contract Amendment.) Several suboptions will be studied. The costs, impacts, and benefits will be compared to a “no action” alternative and to the alternative of a similar processing facility located outside of Palo Alto, but within 20 miles. The location of the Palo Alto facility would be immediately southeast of the Palo Alto Regional Water Quality Control Plant on an 8-9 acre site.

BACKGROUND
The City of Palo Alto currently handles organic residuals in the following ways:
1. Yard trimmings are composted at the Palo Alto landfill site in uncovered windrows;
2. Residential food scraps are disposed of with the garbage and landfilled in South San Jose;
3. Commercial food scraps are increasingly being source separated and composted near Gilroy, CA, with the remainder being landfilled in South San Jose; and
4. Wastewater Biosolids are dewatered and incinerated at the Regional Water Quality Control Plant in Palo Alto.

The 8-9 acre site described above is currently on dedicated Parkland. The site would have to be undedicated by a vote of the residents before an Energy/Compost Facility could be constructed. A number of other approvals and permits would also be needed. However, this Scope of Services does not include working on these approval processes. The City already operates its own gas and electric utilities, which are potential users of gas or energy generated by an anaerobic digestion facility. The electric enterprise fund has been directed to procure 33% of its electric supply from renewable sources by 2015. The gas enterprise fund is investigating opportunities to supply some load using biogas. The City also fuels a portion of its vehicle fleet with compressed natural gas, which is another potential use for biogas generated by the facility.

PROJECT APPROACH
The Consultant will evaluate and compare three basic alternatives:
Alternative 1: A new dry anaerobic digestion facility adjacent to the Palo Alto Wastewater Treatment Plant.
Alternative 2: A similar Regional Facility adjacent to the San Jose Wastewater Treatment Plant
Alternative 3: The current facilities and plans which Palo Alto has arranged for its organics residuals following closure of the Palo Alto Landfill.

The City will provide much of the data for the analysis of Alternatives 2 and 3. The majority of the Consultants work will be on Alternative 1. There are two sites involved in Alternative 1, the 8-9 acre Landfill site just Southeast of the Wastewater Treatment Plant, and the Wastewater
TREATMENT PLANT itself. Therefore, there will be subalternatives to Alternative 1 as follows:

Sub-options to Alternative 1:
1a.) A new dry anaerobic digestion for yard, food and biosolids on the landfill site (biosolids in separate cells).
1b.) Dry anaerobic digestion for yard, food and wet anaerobic digestion for biosolids on the landfill site.
1c.) Dry anaerobic digestion for yard and food on the landfill site and wet anaerobic digestion for biosolids on the Wastewater Plant site.
1d.) Dry anaerobic digestion for yard and food waste and no methane production from the biosolids.

The analysis of all four sub-options of Alternative 1 will assume that a common methane energy recovery facility will be located on the Landfill site. The analysis of all main options and sub-options will include:

1. A financial analysis;
2. A life-cycle analysis of greenhouse gas emissions; and
3. An analysis of environmental and other impacts.

The analysis of the wet anaerobic digestion process in Alternative 2 and Alternative 3 will be performed through a separate, parallel study: the Wastewater Long Range Planning process. The firm selected for that study will provide the evaluation of wet anaerobic digestion to the Consultant. Following submittal of Preliminary Analysis (Task 4), City will consider whether other alternatives should be considered as well. For example, it may become apparent that an alternative of a somewhat larger or smaller site would better accommodate a cost effective option, and be within the intent of the Council April 5, 2010 Directive to staff.

CONSULTANT SERVICES

TASK 1: Development of Detailed Workplan
The Consultant will develop a draft detailed Workplan and attend a kick-off meeting in Palo Alto with City representatives. The draft Workplan will be available for review prior to the meeting. Other goals of the kick-off meeting will be to review the draft Workplan and schedule, to establish the City’s goals, objectives and expectations for the Feasibility Study and Environmental Impact Initial Study, and to establish lines of communication.

TASK 2: Community Scoping for Feasibility Study and for Environmental Review
The Consultant will attend a community meeting arranged by the City to solicit input on the Feasibility Study and Environmental Impact Initial Study. In addition to gathering information from the public on the Feasibility Study, a primary purpose of the community scoping meeting will be to identify key community concerns regarding the project’s potential environmental effects. The CEQA environmental review process will be described, as necessary, and the opportunities for the public to participate in the environmental review process will be identified. Following the meeting, City comments will be incorporated into and a final Workplan will be issued.

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TASK 3: Preparation of Draft Preliminary Financial and Greenhouse Gas Analysis
The Consultant will develop a financial model to evaluate each of the four (4) sub-options of Alternative 1. Using budgetary cost estimates supplemented with additional information such as estimated financing costs, the Consultant will calculate annual costs per ton and the total present value cost over the life cycle for each sub-option. The economic model will be constructed to enable the analysis of alternative project development scenarios (for example, private ownership and operation compared to publicly-financed design/build/operate implementation), as well as the impact of potential grant and funding sources. In addition, the economic model will provide for consideration of the potential cost-savings associated with the prevailing tax exempt market should the City own the energy/compost facility. The preliminary financial model will be submitted to the City for review.

Key environmental parameters will be considered in preparing the draft preliminary evaluation. The key environmental parameters will be identified through consultation with the City, through the community scoping meeting input, and based on the professional experience of the project team. The key environmental parameters will be presented in a data management system format.

The greenhouse gas (GHG) analysis will discuss the current state of the science (e.g., Intergovernmental Panel on Climate Change's [IPCC] Fourth Assessment Report) along with applicable regulatory framework and relevant guidance (e.g., Assembly Bill [AB] 32, recently adopted CEQA Guideline amendments and Bay Area Air Quality Management District's [BAAQMD] Air Quality Guidance and GHG Thresholds of Significance). Specifically, as required by Senate Bill 97, the CEQA Guidelines were revised on December 30, 2009, to address GHG emissions under CEQA; this analysis will comply with these newly adopted guidelines along with those adopted by BAAQMD on June 2, 2010. The following analysis will be conducted for all alternatives and sub-options.

For project-generated construction-related emissions, the Urban Emissions Model (URBEMIS) will be used to estimate increases in GHGs (e.g., heavy-duty construction equipment exhaust). This modeling will be based on BAAQMD-recommended input parameters, project-specific construction data (e.g., size of disturbed ground area, construction phasing schedule), and URBEMIS default settings.

URBEMIS, the BAAQMD GHG Model (BGM), and methods from the California Air Resources Board (ARB) will be used to estimate direct project-generated operational-related emissions of GHGs for mobile, stationary, and area source types (e.g., vehicle trips associated with facility employees and material collection and delivery). This modeling will be based on BAAQMD-recommended input parameters, project-specific operational data (e.g., type and size of the proposed facility, operational schedule), default settings, and project specific traffic data (e.g., overall trip generation and vehicle miles traveled [VMT]). Other applicable quantification methods, emissions factors, and assumptions protocols from, but not limited to, the Western Climate Initiative, IPCC, California Climate Action Registry's General Reporting Protocol, and ARB will be used to estimate long-term operational-related indirect source emissions. These types of facilities are not a covered sector under ARB regulation for the mandatory reporting of GHG emissions; however, aspects of the digester offset quantification protocol may apply.

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Additionally, though mandatory reporting would not be required or utilization of the digester offset protocol, quantification methods selected for this project will rely on ARB requirements and default emission factors, where applicable to this exact facility type, as stated in the regulation for usability in the future and substantiation of approach for legal defensibility. This analysis will also address the GHG emissions (e.g., lifecycle) from the alternate fates (e.g., composting, land filling, and incinerating) of the wastes by virtue of the collection of these wastes for use with regards to the proposed project.

Increases in GHGs will be compared to applicable thresholds and mitigation measures prepared as needed that clearly identify timing, responsibility, and performance standards. A two-tiered approach will be used to assess the project’s potential generation of GHGs and its incremental contribution to the cumulative effect resulting from emissions of GHGs as follows: (1) the potential for project-generated GHG emissions to have a significant impact on the environment and (2) the potential for the project to conflict with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions. The amount of GHGs determined in this analysis (and associated impacts) will be presented in a data management system.

TASK 4: Preparation of Final Preliminary Financial and Greenhouse Gas Analysis
Based on the City's comments from review of the preliminary financial and greenhouse analysis, a final preliminary analysis will be submitted to the City. This will include a working model in Excel format that will allow the City to test a change in clearly identified variables to assess the impact on life-cycle cost and greenhouse gas emissions.

TASK 5: Preparation of Draft Feasibility Study and California Environmental Quality Act Checklist
The Consultant will assist the City in presenting the preliminary financial analysis to the Community and City Council. In consultation with the City, comments and suggestions received from these presentations will be incorporated into a draft feasibility report which will be prepared to succinctly compile the results of the work performed. The report will include an overview, introduction, waste analysis, conversion technology facility description, and economic analysis. The introduction will include a description of the project planning and history, system elements, and participants. The waste analysis section of the report will include an overview of the existing solid waste management system in the City as well as summarizing available information on waste generation, composition of yard trimmings, food scraps, and biosolids, and waste flow control provisions. Site regulatory and permitting considerations will be included with descriptions of the technologies responding to the request-for-information described in Task 8. The economic analysis section of the report will include a discussion of scope and methods, capital and operation and maintenance cost estimates, financing considerations, and life-cycle cost analysis with sensitivities.

Following presentation of the Preliminary Analysis to the community and City Council, the Consultant will prepare a Draft CEQA Initial Study (CEQA Checklist). The Consultant will coordinate with City of Palo Alto staff and the project team members to identify the elements to be included in the Initial Study project description. The project description will focus on the changes anticipated with implementation of the Feasibility Study. Depending upon the alternative approach selected by the City, the key considerations will likely include the odor and...
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traffic generating potential of the proposed Dry Anaerobic Energy/Compost Facility and its compatibility with Byxbee Park users, biological resources, and the nearby municipal airport.

The Environmental Checklist Form will be completed with explanations for each response for the proposed project. The level of analysis and degree of impact will vary depending on the environmental topic. Mitigation measures will be developed, when necessary, to minimize environmental impacts anticipated from the proposed project. An administrative draft Initial Study will be prepared for review by City staff and the project team members. The Initial Study will be revised based on the comments received on the administrative draft document. The completed document will be presented to the City for public distribution.

TASK 6: Preparation of Final Feasibility Study, California Environmental Quality Act Checklist, and Workplan for Completion of California Environmental Quality Act Analysis

The Consultant will assist the City in presenting the draft Feasibility Study to the Community and to City Council. Comments and suggestions received from these presentations will be incorporated, in consultation with the City, into a final Feasibility Study. Feedback gathered during the City Council meeting will be used to finalize the Initial Study including any information presented regarding potential environmental effects or suggested mitigation strategies. The administrative draft Initial Study will be revised based on the comments received during the City Council meeting. The completed document will be submitted to the City.

TASK 7: Preparation of Workplan for Complete California Environmental Quality Act Analysis

Following completion of the Initial Study, the Consultant will confer with the City and the project team regarding the appropriate level of CEQA review for the Feasibility Study (i.e., Program EIR, Project-level EIR, or Focused EIR). Based on the direction provided by the City, the Consultant will prepare a work plan for the preparation of the environmental review document identified by the City as being appropriate for the Feasibility Plan.
TASK 8: Analysis of Energy Generation from Methane
Four (4) sub-options for Alternative 1 will be evaluated for a new dry anaerobic facility at the landfill site. These options are in the following matrix:

<table>
<thead>
<tr>
<th>Sub-option</th>
<th>Anaerobic Digestion System</th>
<th>Yard Trimmings</th>
<th>Food Scraps</th>
<th>Biosolids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 a)</td>
<td>Dry</td>
<td>X</td>
<td>X</td>
<td>X (separate cell)</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1 b)</td>
<td>Dry</td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>--</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>1 c)</td>
<td>Dry</td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>--</td>
<td>--</td>
<td>X (wastewater treatment plant site)</td>
</tr>
<tr>
<td>1 d)</td>
<td>Dry</td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

The Consultant will prepare a request-for-information (RFI) document for selected technology companies, requesting cost and performance data for each of the sub-options identified above. The Consultant understands that cost and performance data for the wet anaerobic digestion or biosolids will be provided by another firm selected by the City for the facility planning process associated with the wastewater treatment facility (i.e., the Long Range Facilities Plan).

The RFI will include an introduction, discussion of general conditions, schedule, submission of information requirements, and qualification information. The RFI approach will enable the Consultant to solicit project-specific information and will enable the responding companies to incorporate their current thinking regarding both technology and business postures in their responses. The Consultant’s database will also be used to compare the cost and performance data received from the technology companies through the RFI process for reasonableness. Adjustments will be made to cost and performance data input to the economic model, as deemed necessary.

Based on the response to the RFI and the Consultant’s experience and judgment, the quantity of biogas generated in each of the four (4) sub-options will be estimated. The quantity of landfill gas available from the Palo Alto landfill will be considered in a separate sensitivity analysis and a recommendation made as to whether landfill gas should be incorporated into the sub-options.
The methane-rich gas produced from the dry anaerobic digestion process can be used in a variety of electrical generation equipment including: internal combustion engines, gas turbines, gas turbines in a combined cycle configuration, or fuel cells. The methane-rich gas can also be upgraded for production of compressed natural gas or pipeline quality natural gas. A common methane energy recovery system will be adopted by the Consultant for the analysis of the four (4) sub-options. This selection will be made based on the Consultant’s experience and the responses to the RFI received from technology companies.

The Consultant will also investigate grant and funding opportunities that could result in either a lower overall amount of borrowing or a lower cost of capital. These include, among others, Clean Renewable Energy Bonds (CREBS), Qualified Energy Conservation Bonds (QECBs), Tax Credit Bonds, United States Department of Energy (USDOE) grants, and loan guarantees. Additional funding opportunities may be available through various State-administered programs.

In addition, the Consultant will analyze the advantages and disadvantages of public and private models for project delivery, considering ownership, risk sharing for performance and cost, financing options and opportunities for grants and low interest loans available on a State and Federal basis for different methods of project delivery. These methods include both public and private models; design-build (DB), design-build-operate (DBO) and design-build-own-operate-transfer (DBOOT).

A preliminary site engineering analysis will be conducted for the landfill site including consideration of access, space requirements, rough grading requirements, foundation considerations, and interconnection of utilities. The City will provide the Consultant with a quantity estimate of cubic yards of in-place refuse that will need to be relocated from the site. The City will also provide the Consultant copies of previous geotechnical investigations performed on and adjacent to the landfill site. A conceptual site layout drawing will be prepared indicating the arrangement and location of the facility on the site. The drawing will be compatible with the City’s GIS system. If facility information is available in sufficient detail to depict plan and side views, additional drawings will be prepared depicting a three dimensional view of the facility.

TASK 9: Project Management
The Consultant will meet with the City monthly to review progress and establish priorities for work to be conducted the following month. It is anticipated that these meetings will be conducted both in person, as needed, and by teleconference.