LAMPHIER-GREGORY

TECHNICAL MEMORANDUM

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SUBJECT: **EBMUD 39th Avenue Reservoir Replacement Project Construction Period Air Quality and GHG Emissions and Health Risk Analysis**

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INTRODUCTION

East Bay Municipal District (EBMUD) is a publicly-owned utility formed under the Municipal Utility District Act. EBMUD's water system serves approximately 1.3 million people in a 325-square mile area extending from Crockett in the north, southward to Castro Valley, eastward from San Francisco Bay to Walnut Creek, and south through the San Ramon Valley.

EBMUD is planning on replacing the current open-cut style 39th Avenue Reservoir in Oakland with a smaller tank type reservoir. The replacement tank type reservoir is intended to substantially improve the design standards and seismic stability of the facility.

Lamphier-Gregory has been asked to conduct an analysis of air quality and greenhouse gas emissions associated with the construction of the 39th Avenue Reservoir Replacement Project to meet requirements of the California Environmental Quality Act (CEQA) in these areas.

PROJECT DESCRIPTION

According to the description provided by EBMUD, the construction project would span approximately 1.3 years (69 weeks). Attachment A includes detailed information about the construction activities. To summarize, the existing reservoir will first be drained, followed by removal of the roof structure and lining; concrete crushing will occur on-site before being hauled away. The new reservoir foundation, walls and roof will then be constructed and the remainder of the old reservoir filled, with the valve pit and piping put in place after. Following field testing and startup, final site grading, landscaping and paving will be restored.

The following additional assumptions were made:

1. Haul trucks average 10 cubic yards per load.

2. 550 cubic yards of roofing and roof structure debris will be removed from the site.
3. 3,000 cubic yards of soil will be imported to the site and 4,300 cubic yards will be moved on-site.

SUMMARY OF FINDINGS

Air quality and greenhouse gas emissions from construction of the 39th Avenue Reservoir Replacement Project would be below applicable significance thresholds, including those related to health risks, and therefore result in less-than-significant impacts. BAAQMD requires basic construction mitigation measures of all construction projects (Mitigation Measure Air-1) to reduce fugitive dust and emissions.

SETTING

Criteria Air Pollutants

Ambient air quality standards have been established by state and federal environmental agencies for specific air pollutants most pervasive in urban environments. These pollutants are referred to as criteria air pollutants because the standards established for them were developed to meet specific health and welfare criteria set forth in the enabling legislation. The criteria air pollutants of concern in construction projects of this type include ozone precursors (NO_x and ROG) and suspended particulate matter (PM_{10} and $PM_{2.5}$).

Greenhouse Gasses

In addition to the criteria air pollutants and toxic air contaminants of concern in air quality analyses, other emissions may not be directly associated with adverse health effects, but are suspected of contributing to "global warming." Global warming has occurred in the past as a result of natural processes, but the term is often used now to refer to the warming predicted by computer models to occur as a result of increased emissions of greenhouse gases (GHG).

The State of California is concerned about GHG emissions and their effect on global warming. The State recognizes that there appears to be a close relationship between the concentration of GHG in the atmosphere and global temperatures and that the evidence for global warming is overwhelming. The effects of global warming on California, in terms of how it would affect the ecosystem and economy, remain uncertain. According to the 2006 Climate Action Team Report[1] the following global warming effects and conditions can be expected in California over the course of the next century:

- A diminishing Sierra snow pack declining by 70 percent to 90 percent, threatening the state's water supply;
- Increasing temperatures from eight to 10.4 degrees Fahrenheit under the higher emission scenarios, leading to a 25 to 35 percent increase in the number of days ozone pollution levels are exceeded in most urban areas;

[1] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.* (http://www.climatechange.ca.gov/climate_action_team/reports/2006-04-03_FINAL_CAT_REPORT.PDF)

- Coastal erosion along the length of California and seawater intrusion into the Sacramento River Delta from a four-to 33-inch rise in sea level. This would exacerbate flooding in already vulnerable regions;
- Increased vulnerability of forests due to pest infestation and increased temperatures;
- Increased challenges for the state's important agricultural industry from water shortages, increasing temperatures, and saltwater intrusion into the Delta; and
- Increased electricity demand, particularly in the hot summer months.

The Global Warming Potential (GWP) concept is used to compare the ability of each GHG to trap heat in the atmosphere relative to carbon dioxide (CO_2), which is the most abundant GHG. CO_2 has a GWP of 1, expressed as CO_2 equivalent (CO_2e). Other GHGs, such as methane and nitrous oxide are commonly found in the atmosphere at much lower concentrations, but with higher warming potentials, having CO_2e ratings of 21 and 310, respectively. Other trace gases, such as chlorofluorocarbons and hydro chlorofluorocarbons, have much greater warming potential. Fortunately these gases are found at much lower concentrations and many are being phased out as a result of global efforts to reduce destruction of stratospheric ozone.[2]

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are a defined set of airborne pollutants that may pose a present or potential hazard to human health (cancers or acute or chronic non-cancerous effects). TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level.

Diesel exhaust is the predominant TAC in urban air, and is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). The California Air Resource Board (CARB) reports that recent air pollution studies have shown an association that diesel exhaust and other cancer-causing toxic air contaminants emitted from vehicles are responsible for much of the overall cancer risk from TACs in California. Particulate matter emitted from diesel-fueled engines (diesel particulate matter [DPM]) was found to comprise much of that risk. In August, 1998, CARB formally identified DPM as a TAC. Fine particulate matter ($PM_{2.5}$), a component of DPM as well as originating from other sources, is considered by the Bay Area Air Quality Management District (BAAQMD) to be the biggest contributor to public health impacts in this air basin.

State of California and Federal Air Quality Standards

Both the California Air Resource Board and the U.S. Environmental Protection Agency have established ambient air quality standards for common pollutants, including ozone and its precursors (ROG and NO_X), PM_{10} and $PM_{2.5}$. These ambient air quality standards represent safe levels that avoid specific adverse health effects associated with each pollutant. For some of these

[2] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2008*. U.S. EPA. April 15, 2010, Table 2-1: Recent Trends in U.S. Greenhouse Gas Emissions and Sinks.

pollutants, notably ozone and PM_{10}, the State standards are more stringent than the national standards.

In 1988, California passed the California Clean Air Act (CCAA, California Health and Safety Code § 39600 *et seq.*). Under the CCAA, the Bay Area Air Basin is required to have a Clean Air Plan (CAP) to achieve and maintain ozone standards.

AB 32 and the Air Resource Board's Climate Change Scoping Plan

In 2006, the governor of California signed AB 32, the Global Warming Solutions Act, into legislation. The Act requires that California cap its GHG emissions at 1990 levels by 2020.

On December 11, 2008, the California Environmental Protection Agency Air Resources Board (ARB) adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of ARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce GHG emissions by 174 million metric tons (MMT), or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT of CO_2e under a business-as-usual scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions ARB recommends for each emissions sector of the state's GHG inventory.[3]

Bay Area Air Quality Management District

The project is located within the nine county San Francisco Bay Area Air Basin and therefore within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). BAAQMD enforces rules and regulations regarding air pollution sources and is the primary agency preparing the regional air quality plans mandated under state and federal law.

According to the standards of the federal Clean Air Act, the Bay Area is in attainment with all ambient air quality standards except for state and national ozone standards and national particulate matter ambient air quality standards. The nonattainment status is attributed to the region's development history. Past, present and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.

The most recent adopted update to the Clean Air Plan (CAP) was completed in 2000, though the 2010 CAP update is currently in draft form. The 2000 CAP applies control measures to stationary sources, mobile sources, and transportation control measures (TCMs). Although the 2000 CAP is an ozone plan, it includes PM10 attainment planning as an informational item. In January 2006, BAAQMD adopted the Bay Area 2005 Ozone Strategy to update and build upon the 2000 CAP.

[3] California Air Resource Board. April 22, 2010. *AB 32 Scoping Plan Implementation Update.* Accessed at http://www.arb.ca.gov/board/books/2010/042110/10-4-1pres.pdf .

BAAQMD also provides a document titled *California Environmental Quality Act Air Quality Guidelines* ("Guidelines"), which provides guidance for consideration by lead agencies, consultants, and other parties evaluating air quality impacts in the San Francisco Bay Area Air Basin conducted pursuant to CEQA. The document provides guidance on evaluating air quality and GHG impacts of development projects and local plans, determining whether an impact is significant, and mitigating significant impacts.

BAAQMD has recently updated these Guidelines in coordination with adoption of new thresholds of significance on June 2, 2010.[4] The most recent version of the Guidelines is dated May 2011.[5] The analysis below of the 39th Avenue Reservoir Replacement Project is consistent with the June 2010 adopted Thresholds and the May 2011 Guidelines and recommended methodologies.

In March 2012, the Alameda County Superior Court ordered BAAQMD to set aside the Thresholds until they complete an assessment of the environmental effects of the Thresholds in accordance with CEQA, the Court finding that the Thresholds, themselves, constitute a "project" for which environmental review is required. Consequently, these Thresholds are not currently in effect; however, they are the most conservative thresholds available and comparison of the Project's emissions against these Thresholds provides a conservative assessment as the basis for a determination of significance.

Alameda County Climate Change Leadership Strategy Resolution

The Project is located in the city of Oakland within Alameda County. On June 6, 2006 the Alameda County Board of Supervisors unanimously adopted a resolution establishing a County Climate Change Leadership Strategy. This resolution commits the County to reduce its contribution of climate-changing gases such as carbon dioxide. In adopting this resolution, the County encourages other local governments throughout the county to take on the challenge of global warming. Key elements of the strategy include:

- Conduct a GHG emissions inventory and forecast;
- Establish County GHG emissions reduction targets;
- Develop an implementation plan to meet the County GHG reduction targets;
- Implement the plan;
- Monitor and review progress;
- Require a collaborative cross-agency approach to develop and implement plans to achieve greenhouse gas reduction targets and to prepare for future effects of global warming;
- Provide administrative oversight for the effort and establish the cross-agency Sustainability Executive Committee a cross-agency Climate Action Team;
- Require that agencies and associated entities should actively participate in meeting GHG reduction targets;

[4] Bay Area Air Quality Management District. June 2, 2010. News Release http://www.baaqmd.gov/~/media/Files/Communications%20and%20Outreach/Publications/News%20Releases/2010/ceqa_100602.ashx .

[5] Bay Area Air Quality Management District. June 2010. *California Environmental Quality Act Air Quality Guidelines.*

- Require that global warming mitigation and adaptation strategies will be integrated into key County planning processes, budgeting, and training when possible or appropriate;
- Require that the County of Alameda share urgent concerns and key learnings with businesses, the public, and other government agencies (e.g., EBMUD); and
- Encourage other local governments throughout the United States to adopt a similar resolution.

While the resolution does not establish standards of significance, it seeks the cooperation of other government agencies, e.g., utility districts and cities in Alameda County, to participate in the effort to minimize and reduce emissions of GHG. Thus, the Project is subject to the overall goals of the resolution.

Local Climate Action Plans

Oakland's Energy and Climate Action Plan (ECAP) was in draft form during the preparation of this document.[6] While the Climate Action Plan would generally not directly relate to this project, EBMUD's promotion of water conservation can help meet Climate Action Plan goals, as discussed further in the impact section.

ANALYSIS AND IMPACT DISCUSSION

CEQA Checklist Items

This emissions analysis responds to the following CEQA checklist items:

	Environmental Factors and Focused Questions for Determination of Environmental Impact	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
III.	**AIR QUALITY** — Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the Project:				
	a) Conflict with or obstruct implementation of the applicable air quality plan?	[ ]	[ ]	[ ]	[✓]
	b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	[ ]	[✓]	[ ]	[ ]
	c) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?	[ ]	[ ]	[✓]	[ ]
	d) Expose sensitive receptors to substantial pollutant concentrations?	[ ]	[ ]	[✓]	[ ]

[6] City of Oakland website, Sustainable Oakland page, accessed on 6/4/12 at http://www2.oaklandnet.com/Government/o/PWA/s/SO/index.htm

	Environmental Factors and Focused Questions for Determination of Environmental Impact	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
VII.	**Greenhouse Gas Emissions** — Would the Project:				
	a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	[ ]	[ ]	[✓]	[ ]
	b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emission of greenhouse gases?	[ ]	[ ]	[ ]	[✓]

Operational Period

The Project represents replacement of an existing water reservoir, which is currently aging and larger than needed. Such a replacement/improvement would not lead to increased emissions during operations. Therefore, the following analysis is focused on the construction period only.

Method of Analysis

The Urban Emission (URBEMIS) model was used to estimate emissions from this type of construction project, as recommended by BAAQMD. The estimated construction schedule and duration of various onsite activities were provided by EBMUD along with other Project specifics, and used as inputs for URBEMIS as discussed under the Project Description above and detailed in Attachment A.

Estimated construction-generated emissions are summarized in **Table 1**, below.

Table 1: Emissions Estimates and Thresholds

	ROG[1]	NOx[2]	Exhaust PM10[3]	Fugitive Dust PM10[3,4]	Exhaust PM2.5[5]	Fugitive Dust PM2.5[4,5]
				Maximum (pounds/day)		
Maximum Daily Average	2.52	23.36	0.87	42.30	0.80	8.84
BAAQMD Thresholds	*54.00*	*54.00*	*82.00*	*BMPs*[6]	*54.00*	*BMPs*[6]

Notes:
[1] Reactive Organic Gases (ozone precursors)
[2] Nitrous Oxide
[3] Respirable Particulate Matter with an aerodynamic resistance diameter of 10 micrograms or less.
[4] Fugitive Dust was reduced 53% to account for implementation of basic construction mitigation measures detailed in Mitigation Measure Air-1. (This reduction is consistent with BAAQMD methodologies, see their May 2011 Guidelines, page B-11.)
[5] Respirable Particulate Matter with an aerodynamic resistance diameter of 2.5 micrograms or less.
[6] BMPs = Best Management Practices. Construction-period fugitive dust impacts are assumed to be less than significant with implementation of BMPs .

Air Quality Items b) and c) Criteria Pollutant and Precursor Emissions

Significance Criteria: The project would have a significant environmental impact if it would exceed BAAQMD's emission rate thresholds of any criteria pollutant, as shown in **Table 1**.

Impact Air-1: **Construction Dust and Exhaust**. Construction activities would generate exhaust emissions from vehicles/equipment and fugitive dust particles that could affect air quality. This would be a *potentially significant* impact.

Construction-period emissions for criteria pollutants and precursors have been calculated using URBEMIS (inputs and outputs can be found in Attachment B). As shown in **Table 1**, the Project would result in maximum daily emissions levels that are below BAAQMD thresholds. Therefore, the Project's impact related to construction-period criteria pollutant emissions is ***less-than-significant***. However, BAAQMD recommends implementation of construction mitigation measures to reduce construction-related emissions for all projects, regardless of the significance level of construction-period impacts, so Mitigation Measure Air-1 would be applicable.

Construction activities can also result in fugitive dust, which contributes to particulate matter levels. While construction-period dust emissions have been estimated, BAAQMD does not have a threshold of significance for fugitive dust impacts, but instead regards fugitive dust impacts to be mitigated if appropriate management practices are implemented. BAAQMD-recommended basic construction management practices are included in Mitigation Measure Air-1. Consistent with BAAQMD recommendations, the fugitive dust emissions presented in **Table 1** have been reduced by 53% to reflect implementation of the measures included in Mitigation Measure Air-1.

Mitigation Measure Air-1: **Basic Construction Management Practices.** The Project shall demonstrate proposed compliance with all applicable regulations and operating procedures prior to issuance of construction permits, including implementation of the following BAAQMD "Basic Construction Mitigation Measures," as feasible.

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
- Post a publically visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall

respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Impacts related to criteria pollutants would be reduced to ***less-than-significant*** through implementation of the Basic Construction Mitigation Measures listed in Mitigation Measure Air-1. Because construction-period emissions do not exceed applicable significance thresholds, additional construction mitigation measures would not be required to mitigate impacts.

Air Quality Item a) Consistency with the Air Quality Plan

Significance Criteria: The project would be considered to have a significant impact if it were to be in conflict with the *Clean Air Plan* or *Ozone Strategy*.

General estimated basin-wide construction-related emissions are included in the BAAQMD emission inventory (which, in part, forms the basis for the air quality plans cited above) and are not expected to prevent attainment or maintenance of the ozone, particulate matter, and carbon monoxide standards within the Bay Area. Therefore, construction impacts related to air quality plans from the proposed Project would be ***less than significant***, and no mitigation would be required.

Air Quality Item d) Exposure of Sensitive Receptors

"Sensitive receptors" are defined as facilities where sensitive population groups, such as children, the elderly, the acutely ill and the chronically ill, are likely to be located. These land uses include residences, schools, playgrounds, childcare centers, retirement homes, convalescent homes, hospitals and medical clinics. Sensitive uses, including residential homes, are located near the project and could be exposed to potentially hazardous emissions from diesel-fueled construction equipment and trucks.

BAAQMD has adopted the following project-specific thresholds of significance for new sources of potentially hazardous emissions: increased cancer risk of greater than 10 in a million, increased non-cancer risk of greater than 1.0 Hazard Index, and ambient $PM_{2.5}$ increases greater than 0.3 micrograms per meter squared annual average.

BAAQMD recommends assessment of community risks and hazards within a 1,000 foot radius of a project boundary. The Project site is surrounded by residential uses. Due to the proximity of residential units, which are considered sensitive receptors in relation to health risks, a Construction Health Risk Assessment was performed (included in Attachment C), which used the URBEMIS emissions estimates (discussed above) together with the EPA dispersion model, SCREEN3, to determine the potential health risks related to diesel exhaust from construction equipment.

For the maximum exposed individual, including conservative age sensitivity factor of 10 to account for young children, the inhalation cancer risk would be 1.79 in 1 million (compared to a threshold of 10.00 in 1 million), the maximum chronic hazard index would be 0.008 (compared to a threshold of 1.000) and the annual average $PM_{2.5}$ concentration would be 0.042 $\mu g/m^3$ (compared to the threshold of 0.300 $\mu g/m^3$). These quantitative modeling results are conservative (i.e., likely overstate actual health risks) because the model was run taking into account the

approximately 5 percent reductions in exhaust emissions that would result from implementation of basic construction measures included in Mitigation Measure Air-1, above.

The Project vicinity is largely built-out. There are no additional projects to take into account for cumulative localized construction-period impacts.

Exposure risks for the maximally exposed individual are below threshold levels; therefore, the impact related to construction-period exposure would be ***less than significant***.

Also note that the existing materials could contain asbestos and/or lead-based paint. Appropriate surveying of the materials and removal of any hazardous materials by a qualified consultant are required prior to issuance of demolition permits.

Greenhouse Gas Emissions Item a) Greenhouse Gas Emissions

Significance Criteria: BAAQMD does not have an adopted threshold of significance for construction-related GHG emissions. BAAQMD's operational threshold of 1,100 metric tons CO_2e per year was used for a conservative analysis.

Impact Air-2: **Construction GHG Emissions.** Temporary construction-related exhaust from on-site construction equipment and trucks and worker vehicles coming to and leaving the site would be a source of GHG emissions that could contribute to significant impacts on the environment. This would be a *less-than-significant* impact.

Construction-period emissions of CO_2 have been calculated using URBEMIS (inputs and outputs can be found in Attachments A and B, respectively). Short tons were converted to metric tons using a conversion factor of 0.91. Consistent with U.S. EPA assumptions, BAAQMD assumes CO_2 accounts for 95% of the GHG from vehicle exhaust, so the CO_2 emissions were multiplied by 1.0526 to account for other GHGs and convert the emissions to CO_2 equivalent (CO_2e). The Project would result in total emissions of 144 metric tons CO_2e. This total would be divided across the construction period to find the annual emission of 111 metric tons for comparison to the threshold of 1,100 metric tons CO_2e per year.

While BAAQMD has proposed no thresholds for construction-period GHG emissions, these have been conservatively compared to the operational threshold of 1,100 metric tons CO_2e per year and therefore determined to be a ***less-than-significant*** impact.

These emissions would be further reduced through implementation of the construction mitigation measures identified in Mitigation Measure Air-1.

Greenhouse Gas Emissions b) Consistency with Greenhouse Gas Reduction Plans

Significance Criteria: The project would have a significant environmental impact if it was inconsistent with a plan, policy or regulation adopted for the purpose of reducing the emission of GHGs.

The Project is located in the city of Oakland, whose Climate Action Plan was in draft form during the preparation of this document.[7] While the Climate Action Plan would generally not directly relate to this project, EBMUD does promote water conservation, which can help cities meet their Climate Action Plan goals.

Water conservation opportunities provided by EBMUD include free conservation devices such as faucet aerators, discounts on mulch to help retain soil moisture and protect drip irrigation systems in gardens, free on-site water surveys to provide customized information on how to save water, rebates for certain efficiency upgrades, etc.[8] These water conservation opportunities are not directly related to the Project.

Additionally, GHG emissions have been analyzed per the BAAQMD Guidelines and found to be less-than-significant. BAAQMD's thresholds and methodologies take into account implementation of state-wide regulations and plans, such as the AB 32 Scoping Plan and adopted state regulations.

Therefore, there would be a ***less-than-significant*** impact in relation to consistency with GHG reduction plans, policies or regulations.

[7] City of Oakland website, Sustainable Oakland page, accessed on 6/4/12at http://www2.oaklandnet.com/Government/o/PWA/s/SO/index.htm

[8] EBMUD website, WaterSmart Center page, accessed at http://www.ebmud.com/environment/conservation-and-recycling/watersmart-center.