EXHIBIT NO. 1

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6-24-03

City of Alexandria, Virginia

MEMORANDUM

DATE: JUNE 19, 2003

TO: THE HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL

FROM: PHILIP SUNDERLAND, CITY MANAGER ps

SUBJECT: EISENHOWER EAST AREA – METHANE GAS AND UNDERGROUND PARKING

ISSUE: Consideration of Council request to consider a mechanism to modify the allowable density in Eisenhower East if the presence of methane gas makes underground parking impractical

RECOMMENDATION: That City Council receive this report and maintain the Eisenhower East Plan as adopted.

DISCUSSION: During the review of the Eisenhower East Small Area Plan, Council requested that the Department of Planning and Zoning explore the need for a mechanism to increase the allowable gross floor area on individual sites if it were determined that the provision of underground parking was impractical on the site due to the presence of methane gas.

Consensus for the Eisenhower East Plan resulted from an extensive planning process that included analysis and discussion of the height, mass and bulk of buildings in the area. These were critical elements in determining the appropriate levels of development intensity that were approved. The issue of potentially increasing the height and bulk of buildings is not a simple one, in that it would involve modification to the balance between building scale, urban design qualities and reducing the impacts of above-grade parking.

The City currently has a policy for the abatement of methane gas when it is found on a development site. Depending on the size of the project, the actual cost of mitigation has been found to be quite minimal. Also it is prudent from insurance and liability standpoints to manage methane gas conditions. The existence of methane gas and its abatement have not been found to be a barrier to the provision of underground parking.

Eisenhower East Plan

The Eisenhower East Plan outlines a defined amount of allowable gross floor area on a block-by-block basis. Allowable gross floor area includes virtually all of the floor area located above

grade within a structure, whether or not the area is actually leaseable space, parking, storage or circulation. This approach provides a level of assurance to both the developer and the community of the potential mass and bulk of future above-ground structures. The approach is similar to the way development densities were approved in Carlyle. During the planning process, a conscientious effort was undertaken to more accurately define the potential mass and scale of new buildings from an urban design standpoint, in order to create a more cohesive and desirable physical environment and to minimize potential impacts to adjoining properties and to the community.

A major tenet of the Eisenhower East Plan is to reduce the above-ground mass and height scale of the development that is attributable to above grade parking structures. There was considerable discussion with the community about mechanisms to reduce the potential visual and physical impacts of such structures through the incorporation of parking within buildings, architectural treatment of facades and the provision of underground parking. The allowable gross floor area defined for each of the blocks in the Plan is the result of an analysis of the building mass and bulk that would minimize negative community impacts, while providing a reasonable level of development potential on each site. The community accepted the Plan's overall level of development that was predicated on this approach.

On many sites, additional development square footage was incorporated into the allowable gross floor area as an incentive for redevelopment. On other sites appropriate locations were identified for independent above-grade parking structures, where they would not have a visible impact. In those cases, the square footage of these structures is not counted toward the site's allowable gross square footage.

The Eisenhower East Plan does not require the construction of underground parking, although it provides a strong disincentive to constructing all parking above grade (such parking "consumes" some of the allowable gross floor area). Moreover, the allowable gross floor area is calculated to include above ground maximum allowed parking less the parking which can be provided in two levels of underground parking. In addition, of course, the maximum amount of parking permitted on each site does not have to be built. All in all, the location and amount of parking would be a business decision on the part of the developer.

An amendment to the Eisenhower East Plan would be required in order to introduce a mechanism for increasing the allowable gross floor area on any individual sites. As the Plan is the result of a balance of issues and approaches, selective amendments have the potential of undermining the goals that the Plan sets out to achieve, as well as the consensus reached through the process. As will be shown in the discussion that follows, Staff does not believe there is a need to modify the level of allowed development based on the presence of methane gas.

Methane Gas in Eisenhower East Area

Methane gas exists throughout most if not all of the Eisenhower East area. The methane in the soil is a by-product of the landfilling operations that have taken place over time. Methane will

migrate through the soil into areas beyond the original landfill site. Methane is also lighter than air and will move to the ground surface until the upward movement is inhibited by a dense, impermeable cover material, such as clay or a concrete slab. When upward movement is inhibited, the gas tends to migrate horizontally to other areas within the landfill or to areas outside the landfill, where it can resume its upward path. There is the potential for the methane gas to migrate through much of the Eisenhower East area. (The attached Appendix provides a more detailed discussion of the characteristics and abatement methods for methane gas.)

Health and Safety Issues: There are several potential health and safety issues associated with the presence of methane gas generally. Proper management can mitigate any adverse effects. Methane gas can be a potential problem where it is allowed to collect in a confined space to a concentration at which it could explode. A confined space might be a manhole or other subsurface space. Thus, mitigation and remediation are necessary to ensure that the gas does not become concentrated in a confined space.

Current City Policy: The City has an established policy for the evaluation and remediation of methane that is applicable within the Eisenhower East area. With development or redevelopment proposals in and around areas where methane is suspected, the Department of Transportation and Environmental Services requires that a site specific geotechnical study be undertaken to determine the location and concentration of landfill gas and, where needed, that a methane abatement system be incorporated in the design of the proposed project.

Remediation System Costs: According to discussions with developers, building contractors and geotechnical engineers, remediation of methane gas through the installation of a collection and mitigation system is a very minor expense when viewed in the context of the entire project construction cost.

The following is an actual example of the construction costs for an office building within the Carlyle development.

> The project includes 3 ½ levels (effectively four levels) of underground parking, with a 37,000 s.f. garage footprint. A simple passive methane abatement system was installed that included a slotted PVC piping system placed in a stone base under the lowest garage level, with venting to carry the gas above the building. Methane/carbon dioxide detectors were placed in each garage level that are wired to exhaust fans. The exhaust fans are timed to go on and exhaust the garage at scheduled intervals as needed for the underground parking generally, and, using the methane monitors, the fans will also go on if the measure of gas in the garage reaches a predefined level. According to the construction contractor, the total cost of the abatement system was about $65,000 or 0.3% of the total project construction cost of $20,000,000. The labor and materials for the piping system totaled about $20,000 and the cost of the monitoring/exhaust system for all four underground levels was $45,000. With approximately 175 parking spaces, the added cost of methane abatement is about $371 per space.

In a situation where underground parking is not provided, the abatement costs would be reduced somewhat, but the difference is quite minor. A piping system would be required, and the labor costs would remain roughly the same though there would be some minor savings on the amount of vertical piping that would be needed. Monitoring of potential gases into the building would be necessary, as well as an exhaust system should some infiltration occur and the presence of gas within the building be found. The major difference would be the monitoring and exhaust systems located on each level constructed underground. However, based on the example presented above, this is approximately $11-12,000 per level for a 37,000 s.f. level - - a very small amount in the context of a $20,000,000 project.

Liability issues: Concern was raised during the public discussion about the potential for liability resulting from the placement of underground parking in locations where methane gas is present. It must be understood that the remediation of methane gas with new construction is a necessary part of the construction activity – both from a City policy standpoint and from a potential future liability standpoint. Simply capping the ground with a liner and concrete slab, upon which a structure is built, is not an accepted solution. It is merely a transference and postponement of the problem as the methane gas, having no upward route, will migrate underground to adjacent property. Thus, capping may have an adverse impact on adjoining properties by increasing the quantity and concentration of the gas.

In discussions with developers, the liability concerns increase if a remediation system is not installed. First, a system provides insurance that there will be no future problems should the amount of methane gas in the ground increase in amount or concentration. The situation is already being abated. Second, it is much more difficult to obtain insurance coverage and financing if the situation is not actively mitigated. According to one developer, it is prudent to put in a system, as it will reduce potential liability in the long-term.

As an aside, the Virginia Department of Environmental Quality (VDEQ) has a Voluntary Remediation Program (VRP) for brownfield sites. Participation in the program (including site remediation) ensures that property owners will not be faced with liability and clean-up/mitigation expenses for a contaminated site in the future. Participation in this program adds value to the property in the long term and makes the property more attractive to lenders as the liability risk is removed. (LCOR/PTO and Blocks C, L, O and P in the Carlyle development are participating in the VRP program.)

Conclusion

While methane gas is a known characteristic of the land in the Eisenhower East area, the concentrations of the gas are not generally high enough to cause potential health and safety risks. Management and abatement of methane gas is an established City policy for new development. The cost associated with such abatement is quite minor as part of overall construction costs, even when employed with underground parking. With the employment of established practices for the remediation and monitoring of methane gas, liability risks to the property owner are minimized.

Based upon research and the experiences of developers in the area, staff believes that the presence of methane gas in the Eisenhower East area does not, in any meaningful way, impact the cost of providing underground parking. As a result, we believe there is no reason, based on the presence of methane gas, to define a mechanism that would allow parking in Eisenhower East to build above ground and not use or "consume" allowable gross floor area footage.

STAFF:
Eileen Fogarty, Director, Department of Planning and Zoning
Kimberley Fogle, Chief, Neighborhood Planning and Community Development

Attachment

Appendix
Methane Gas - Eisenhower East Area

Characteristics of Methane Gas
Health and Safety Issues
Methods of Methane Remediation
Current City Policy for Methane Abatement

Characteristics of Methane Gas

Methane gas exists throughout most if not all of the Eisenhower East area. The methane in the soil is a by-product of the sedimentation and filling of the original tidal marsh in the area with soil from the construction of the Capital Beltway and the subsequent use of the area as a City landfill. Methane is a naturally occurring gas. It is colorless and odorless. Landfills are the single largest source of man-made methane emissions.

Methane gas is produced by bacterial decomposition that occurs when organic waste is broken down by bacteria naturally present in the waste and in the soil used to cover the waste. It is believed that the primary source of the organic material in Eisenhower East is peat from the original tidal marsh. Methane, as well as other gases, are produced once material has been covered for a period of time. Peak gas production usually occurs from 5 to 7 years after the waste is buried. The gas is typically produced at a stable rate for about 20 years; however, gas will continue to be emitted for 50 or more years after the waste is placed in the landfill (Crawford and Smith 1985). Gas production might last longer, for example, if greater amounts of organics are present in the waste, such as might occur with the underlying presence of the organic materials in the tidal marsh. The Capital Beltway construction and actual landfill operation took place approximately 40 years ago.

Once gases are produced under the landfill surface, they generally move away from the landfill. Gases tend to expand and fill the available space, so that they move, or "migrate," through the limited pore spaces within the refuse and soils covering the landfill. The natural tendency of methane, which is lighter than air, is to move upward, usually through the landfill surface. Upward movement of landfill gas can be inhibited by a dense, impermeable cover material, such as clay or a concrete slab. When upward movement is inhibited, the gas tends to migrate horizontally to other areas within the landfill or to areas outside the landfill, where it can resume its upward path. Basically, the gases follow the path of least resistance. There are three main factors that influence the migration of landfill gases: concentration, pressure, and permeability.

According to studies in the literature, it is difficult to predict the distance that landfill gas will travel because so many factors affect its ability to migrate underground; however, travel distances greater than 1,500 feet have been observed.

Health and Safety Issues

There are several potential health and safety issues associated with the presence of methane gas generally. Proper management can mitigate any adverse effects.

Landfill gases may migrate either above or below ground. Gases may move through the landfill surface to the ambient air. Once in the air, they can be carried to the community with the wind. Gases may also move through the soil underground and enter buildings or utility corridors on or near the landfill. Landfill gas collection and control systems have the greatest impact on gas migration and exposures. If a collection or control system is in place and operating properly, migration and exposures should be minimal. Outside air methane concentrations do not pose an inhalation or explosion hazard.

Methane gas is potentially explosive at certain concentrations, called the explosive limit. The potential for a gas to explode is determined by its lower explosive limit (LEL) and upper explosive limit (UEL). The LEL and UEL are measures of the percent of a gas in the air by volume. At concentrations below its LEL and above its UEL, a gas is not explosive. However, an explosion hazard may exist if a gas is present in the air between the LEL and UEL and an ignition source is present. Methane is explosive between its LEL of 5% by volume and its UEL of 15% by volume. Studies conducted in the Eisenhower East area have primarily shown the concentrations of methane to be lower than the 5% LEL. In a few instances, some higher concentrations have been measured. However, once the gas reaches the ambient air, the concentration is reduced to below the LEL, and thus, is not volatile.

Methane gas may collect in a confined space to a concentration at which it could potentially explode. A confined space might be a manhole or other subsurface space. Thus, mitigation and remediation are necessary to ensure that the gas does not become concentrated within its explosive limits.

Methods of Methane Remediation

Methane gas can be collected by either a passive or an active collection system. A typical collection system is composed of a series of gas collection pipes placed under the foundation of a building. The pipes then present the preferred pathway for gas migration. The two types of remediation systems are described below:

> ***Passive Gas Collection Systems.*** Passive gas collection systems use existing variations in pressure and gas concentrations to vent landfill gas into the atmosphere or a control system. The collection system is typically constructed of perforated or slotted PVC pipe that are installed on a stone base as part of an underslab system. Collection vents are installed to carry the gas above the building for discharge directly to the atmosphere. An impermeable liner (e.g., clay or geosynthetic membranes) placed under a slab and behind the walls of an underground structure will trap methane gas so that it can be channeled into the preferred gas migration pathways.

The efficiency of a passive collection system depends on environmental conditions, which may or may not be controlled by the system design. When the pressure in the ground is inadequate to push the gas to the venting device, passive systems fail to remove the gas effectively. (Higher pressure is created in areas with higher concentrations – gases accumulating underground create areas of high pressure where gas movement is restricted and areas of low pressure where gas movement is unrestricted.) Passive collection systems are not considered reliable enough for use in areas with a high risk of gas migration, especially where methane can collect to explosive levels in buildings and confined spaces.

Active Gas Collection. Well-designed active collection systems are considered the most effective means of landfill gas collection (EPA 1991). Active gas collection systems include piping and collection wells similar to passive collection systems. Active systems include vacuums or pumps to move gas out of the ground by creating a low pressure system. The size, type, and number of vacuums required in an active system to pull the gas depend on the amount of gas being produced.

The type of system to be employed depends on the methane gas concentration and characteristics of a given site. Irrespective of which collection system is used, a monitoring system should be installed to ensure the system is working as designed. Surface monitoring of methane can qualitatively indicate whether high levels of methane gas are escaping or whether the gas collection and control system is working well to minimize emissions.

Current City Policy for Methane Abatement

The City has an established policy for the evaluation and remediation of methane that is applicable within the Eisenhower East area. With development or redevelopment proposals in and around areas of old landfills or other areas where methane is suspected, the Department of Transportation and Environmental Services' Division of Environmental Quality (DEQ) requires that either a site specific geotechnical study is undertaken to determine the location and concentration of landfill gas and/or a methane abatement system is incorporated in the design of the proposed structures or buildings.

DEQ uses a "Map of Possible Contamination" dated December 1977 and "Map of Possible Methane Generation and Arsenic Contamination" dated October 1976 to identify areas where development activity will be subject to the requirement of site specific study and/or the installation of a methane abatement system.

The following are the conditions that are usually applied to SUP applications, in cases where the potential for contamination exists:

- The applicant shall design and install a vapor barrier and ventilation system for the buildings and parking areas to prevent the migration or accumulation of

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methane or other gases under parking areas or into buildings, or conduct a study and provide a report signed by a professional engineer showing that such measures are not needed to the satisfaction of Directors of T&ES and Code Enforcement.

- The final site plan shall not be released and no construction activity shall take place until the following has been submitted and approved by the Director of T&ES:

1) Submit a Site Characterization Report/Extent of Contamination Study detailing the location, the contaminants, and the estimated quantity of any contaminated soils and/or groundwater at or in the immediate vicinity of the proposed site.
2) Submit a Risk Assessment indicating any risks associated with the contamination.
3) Submit a Remediation Plan detailing how any contaminated soils and/or groundwater will be dealt with, including plans to remediate utility corridors.
4) Submit a Health and Safety Plan indicating measures to be taken during any remediation and/or construction to minimize the potential risks to workers, the neighborhood and the environment.