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JEFFERSON PARK RECREATION AREA
LANDFILL CAP PRELIMINARY EVALUATION

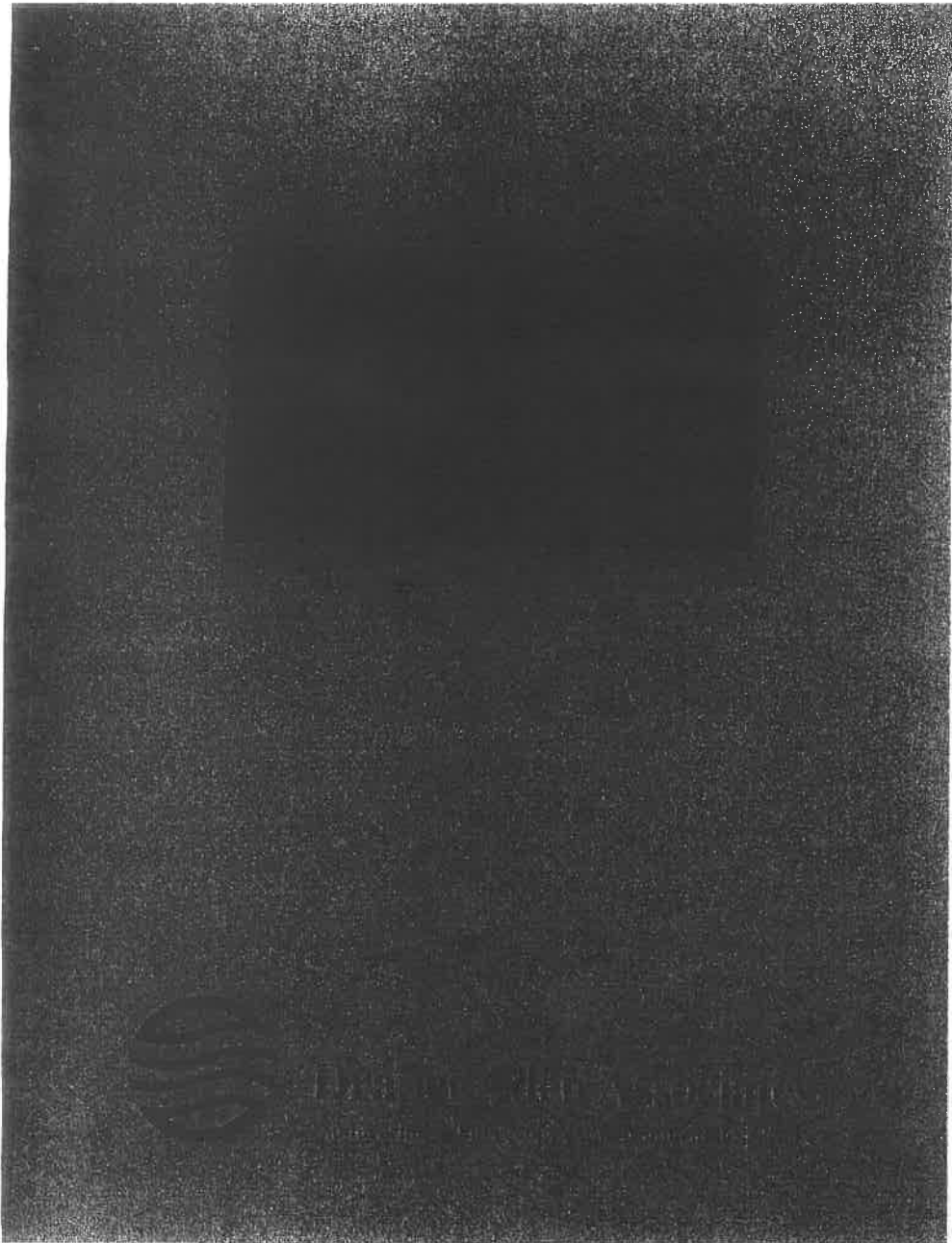
Prepared For:

City of Lynchburg, Virginia
Department of Public Works
Waste Management Division

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1.0 INTRODUCTION

The Jefferson Park Recreational area is constructed over two old landfills. Significant differential settlement has occurred in the park. There is residential development in the immediate vicinity of the two disposal areas. Gas has been observed bubbling up through a puddle on the ground surface.

The City desired to have a preliminary assessment of the site completed. The purpose of this assessment was to determine if landfill gas being produced by the old landfills poses a hazard to the users of the park or the surrounding residential areas, to determine if improvements are required because of the differential settlement that has occurred, and to determine if leachate seepage to surface water is occurring. Impacts of the facility on groundwater quality were not evaluated.

2.0 BASE SCOPE OF SERVICES

The preliminary assessment consisted of two phases. The first phase consisted of a site visit by an environmental technician and a solid waste engineer to evaluate the surface condition of the site. During this time the Draper Aden Associate personnel investigated the site for areas of settlement, evidence of leachate discharge and evidence of landfill gas migration. Settlement and leachate discharge were evaluated by visual observation. Auger probes and bar holes were used to provide a preliminary evaluation of landfill gas migration. Areas of concern were photographed. Based on this visit, this report was prepared outlining the observations and making recommendations for additional investigations or actions that may be required to identify and/or correct problems at the facility.

The second phase of the project will consist of any additional investigations that may be recommended based on the first phase of the project. At a minimum, the City should anticipate that the installation of several gas probes will be recommended to determine the extent of gas migration at the facility. Other investigations, such as borings to determine cap thickness and permeability, and borings to determine groundwater or waste depth may also be required. At this time the City is only authorizing the first phase of the assessment.

3.0 FIELD INVESTIGATION

The field investigation for the first phase of the preliminary assessment was performed on July 2 and 3, 1996. The field investigation consisted of hand and gasoline powered auger holes in the landfill cover, monitoring of methane in auger holes, bar holes, manholes, buildings and other structures, and investigating for settlement, leachate discharges, and vegetative stress.

Appendix A includes site mapping from the City's GIS system. The approximate locations of monitoring points and auger holes are indicated on the drawing.

Landfill Gas Migration

Evidence of gas was observed around several manholes. It appears that the gas is venting to the atmosphere around the exterior of the manholes. Dead vegetation was noted in the immediate vicinity of several manhole tops. There were not any large areas of dead vegetation over the surface area of the landfill that would indicate significant gas venting.

Results of gas monitoring performed during the site investigation are included as Appendix B. Monitoring locations included:

- Manholes
- Culverts
- Drop Inlets
- Boreholes
- Recreation Center
- Concession Building

Methane was detected in two manholes, labeled as Manholes 3 and 8 on the drawing in Appendix A. The concentration of methane was 6.1 percent in Manhole 3 and 1.7 percent in Manhole 8. The lower explosive limit of methane in air is 5.0 percent. Thus, the methane concentration found in Manhole 3 is potentially dangerous.

Methane was not detected in the culvert or drop inlet monitored. Methane was also not detected in the recreation center or in the concession building. Monitoring of the concession building consisted of insertion of the monitoring probe beneath the exterior door of the building and sampling. In the recreation building, ambient air in each room was sampled, along with floor drains in the bathrooms and within cabinets in the kitchen. In addition, cracks in the foundation were also monitored. No methane was detected in the buildings.

The gas investigation in the landfill cap consisted of augering holes into the cap and measuring methane concentrations. The holes augered on July 2, 1996, were advanced with a hand auger bucket or punched with a bar. On July 3, 1996, a gasoline powered hand held auger was used to advance the boreholes. Bar holes were also punched on July 3, 1996. The approximate borehole locations are shown on the drawing in Appendix A. Methane was detected in Boreholes 30, 48, 50, 51, 52, 53, 56, 58, 67, 71, 72, 75, 76, 80, and 81. The concentration levels ranged from 0.1 percent methane to 54.7 percent methane. Concentration of methane above the lower explosive limits (5.0 percent) were found in Boreholes 30, 48, 56, 58, 72, and 81.

Borehole 30 was located approximately 250 feet west of the recreation center building. The borehole was advanced into waste and the methane concentration was recorded at 20.5 percent. This concentration in waste is reasonable.

Borehole 48 was located on the western edge of the smaller park area. The methane level was recorded at 54.7 percent. A residence is located across York Street from Borehole 48. Borehole 47 was advanced on the edge of York Street, between Borehole 48 and the residence. Methane was non-detect at Borehole 47.

Boreholes 50 and 51 detected low levels of methane along the western edge of the larger park area. Monitoring of additional boreholes between the park and nearby residences (Boreholes 33, 34, 35, and 36) did not detect methane.

Borehole 52 was located within the fill area on the larger park site.

Borehole 53 detected a low level (0.1 percent) of methane at the top of the slope on the eastern edge of the main park area. This area appears, from comparing current and old mapping, to have been filled, presumably with soil, to create a pad for construction of the adjacent buildings. Additional boreholes were placed in the vicinity of the buildings. Monitoring of these boreholes, shown as 54 and 55, did not detect methane.

Boreholes were advanced around the smaller park area approximately 100 feet apart. Boreholes 56 and 58 indicated elevated readings (23.8 and 34.5 percent, respectively) of methane near the northeast corner of the site. A residence is located approximately 100 feet from the boreholes.

Methane was not detected along the northern boundary or in the northwest corner. This area was of concern because of the school located across York Street. The northern slope of the site appears to have been cut into rock. Outcrops are visible along the slope. The presence of bedrock is a positive sign since subsurface methane flow usually is confined to above bedrock.

Methane was detected in Boreholes 67 and 71 below the lower explosive limits. Methane was detected in Borehole 72 above the lower explosive limit. Additional boreholes were advanced in the vicinity of Borehole 72 to attempt to determine the extent of migration. Boreholes 80 and 81 were advanced between the park and Chambers Street and on the east side of Chambers Street, respectively. A residence is located approximately 100 feet east of Chambers Street. Methane was detected in both Boreholes 80 and 81, with the concentration recorded in Borehole 81 at 6.1 percent.

Methane was also detected in Borehole 76, located on the east side of the small park area. Borehole 82 was placed outside of the park along Chambers Street in the vicinity of Borehole 76.

Methane was not detected in Borehole 82 or in the nearby culvert that drains stormwater runoff beneath Chambers Street.

Leachate Discharges

There was no visible evidence of active leachate discharges during the site investigation. A tributary to Blackwater Creek is located down gradient from the park. This stream was visually observed and no signs of leachate discharges (odor, oily surface film) were noted in the water. Some of the rocks in the stream, however, did show signs of discoloration. The cause of the discoloration was indeterminable during the investigation.

Cover Condition

The cover soil on the landfill areas is hard consolidated clayey soils. The depth of cover in various boreholes was found to be the following.

<u>Borehole</u>	<u>Total Depth, feet</u>	<u>Comments</u>
1	3.5	No waste encountered, approximately 1.5 feet of hard clay on cover
49	3	No waste encountered
51	4	No waste encountered
52	2	Waste at 2 feet

Settlement

~~Significant areas of differential settlement were observed in both park areas. The most severe settlement is found in the smaller area around the playground equipment and on the basketball court. Smaller areas of settlement were found on the main park site.~~

4.0 CONCLUSIONS AND RECOMMENDATIONS

Methane gas is apparently migrating off of the landfill sites. Although there does not appear to be any immediate human or environmental threat, steps should be taken to determine the extent of methane migration. The proposed steps are as follows.

1. Conduct methane monitoring within the house located to the east of Boreholes 80 and 81. This house is located at the intersection of Chambers Street and Second Street.
2. Conduct methane monitoring within the house located at the northeast corner of the smaller park area.

3. Install monitoring probes at the park property boundary in the vicinity of all boreholes near the property boundary in which methane was detected. At a minimum, probes will be installed in the vicinity of Boreholes 48, 50, 51, 53, 56, 58, 67, 71, 72, 75, and 76. Consideration should be given to constructing probes around the perimeter of each park area, spaced at a maximum of 400 feet apart.

Additional soil appears to be needed to grade the settled areas of the playground. The limited borehole evaluation in this study indicated a shallow depth of soil cover on the waste. There does not appear to be sufficient soil to excavate cover in areas to use in the settled areas. The basketball court has the most severe settlement. If the court is to be replaced, the existing asphalt surface should be removed, and select fill placed to properly grade the surface.

CHAMBERS STREET

CONCESSION BUILDING
46 (AIR)

TENNIS COURTS

RECREATION CENTER BUILDING

(DROP INLET)
45

PAVILION

GP-5

YORK STREET

JEFFERSON PARK

SECOND STREET

GP-4

GP-12

56
(23.8)

GP-11

58
(34.5)

77

78
(3.7)

GP-13

75
(0.1)

74

73

81
(6.6)

80
(2.9)

71
(2.3)

GP-14

72
(9.4)

70

GP-17

62

63

64

65

GP-15

48
(54.7)

67
(3.1)

88

GP-16

47

7800

MH

31

11

10

9

8

7

6

5

4

3

2

1

0

-1

-2

-3

-4

-5

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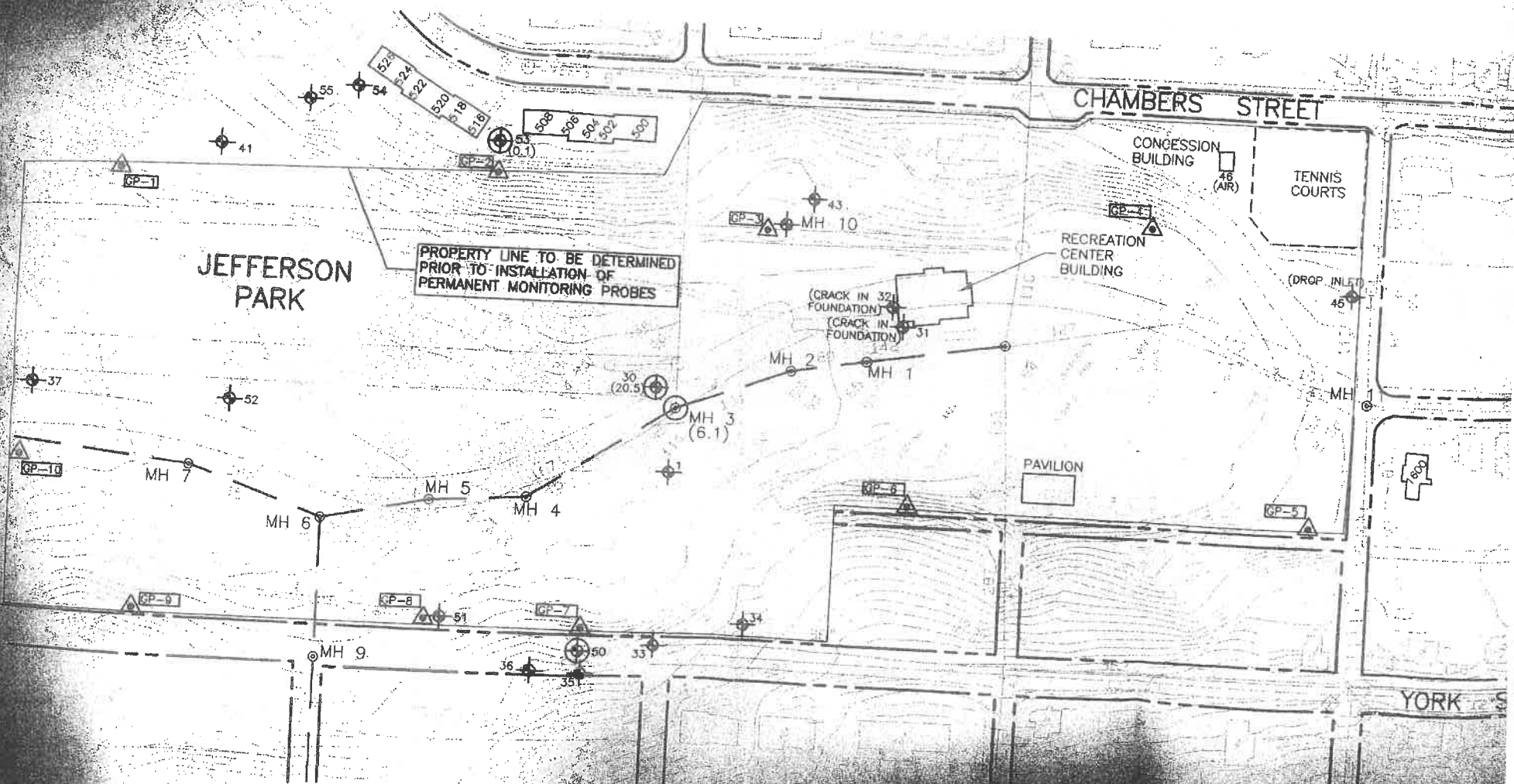
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JEFFERSON PARK

CHAMBERS STREET

YORK STREET

PROPERTY LINE TO BE DETERMINED
PRIOR TO INSTALLATION OF
PERMANENT MONITORING PROBES

CONCESSION BUILDING

TENNIS COURTS

RECREATION CENTER BUILDING

PAVILION

(DROP INLET)

(CRACK IN 32" FOUNDATION)
(CRACK IN 48" FOUNDATION)

525
524
522
520
518
516
508
506
504
502
500
55
54
41
37
52
30 (20.5)
31
34
36
351
50
33
31
43
46 (AIR)
45
800

GP-1

GP-2

GP-3

GP-4

GP-5

GP-6

GP-10

GP-9

GP-8

GP-7

MH 7

MH 5

MH 4

MH 8

MH 9

MH 3 (6.1)

MH 2

MH 1

MH 10