ZILKER PARK

PHASE 1, TASK 6 - REMEDIAL ACTION REPORT

AUSTIN, TEXAS

EMCON

ZILKER PARK

PHASE 1, TASK 6 - REMEDIAL ACTION REPORT

AUSTIN, TEXAS

Prepared for

CITY OF AUSTIN, TEXAS

September 30, 1998

STATE OF TEXAS
10-6-98
MICHAEL J. RUSS
78144
REGISTERED
PROFESSIONAL ENGINEER

Prepared by

EMCON
2579 Western Trails Blvd., Suite 130
Austin, Texas 78745
512/892-6755

Project 62786-002.001

Zilker Park Phase I, Task 6 - Remedial Action Report
Austin, Texas

The material and data in this report were prepared under the supervision and direction of the undersigned.

EMCON

Michael J. Russ, P.E.
Senior Engineer

Rex Hunt, P.E.
Senior Engineer

CONTENTS

TABLES AND ILLUSTRATIONS

Tables

Figures

1. INTRODUCTION AND BACKGROUND

The City of Austin retained EMCON to perform an investigation and assessment of the Butler Landfill located within Zilker Park. The first task was a preliminary environmental assessment of the landfill and included review and analysis of existing information. The findings were presented in a report entitled Zilker Park Landfill Project, Phase I, Task 1-Preliminary Site Assessment, dated December, 1997. Task 2 included a field investigation completed in March 1998 consisting of borings, installation of groundwater monitor wells, and landfill gas measurements. Task 3 consisted of analyzing groundwater samples collected during Task 2. Task 4 consisted of performing a risk assessment comparing the groundwater analytical data with the Texas Natural Resource Conservation Commission (TNRCC) Risk Reduction Standards and the State Drinking Water Standards. Phase I, Task 5 was preparation of a report summarizing the findings of Tasks 2 through 4 in a report entitled Zilker Park Subsurface Investigation, dated June, 1998. This Remedial Action Report is Phase I, Task 6 of the project and presents the alternatives and recommendations for remedial actions at the site. This report concludes Phase I of the project.

The portion of Zilker Park studied contains an area called Butler Landfill. Wastes were dumped at Butler Landfill from approximately 1944 to 1967. The Town Lake Hike and Bike Trail and Town Lake form the lake-side boundary of the waste while Stratford Drive forms the southern boundary. The western boundary is Dry Creek and the eastern boundary is Lou Neff Road. The site location is presented on Figure 1 Location Map. An enlargement of the area with topography is presented as Figure 2, Existing Conditions. The estimated limits of waste encompass an area of approximately 22 acres.

The practical options for remedial action are presented in a tabular format for comparative evaluation in Table 1. The comparison includes cost ranges, which are intended to aid in a comparison between alternatives. The report concludes with recommendations for action at the former Butler Landfill.

2. CONCERNS IDENTIFIED

The field investigation did not identify new conditions at the site which are immediate threats to human health or the environment such as exposed putrescible waste. Waste has been previously reported to be exposed as the Dry Creek slope crest erodes. The field investigation indicates that the waste was disposed in various locations and not as a monolithic mass since some borings did not encounter waste. The area generally slopes toward Town Lake with water ponding along the Hike and Bike Trail. Groundwater was not found to be significantly impacted as detailed in the Phase I, Task 5 - Site Assessment Report.

The field investigation, risk assessment, and site assessment identified several concerns which may be addressed through engineering solutions. Based on the data available from the investigations, none of the concerns present an immediate threat to human health or the environment with the exception of exposed waste at Dry Creek. In the absence of immediate threats to human health or the environment, the remedial actions discussed in this report are proactive in that they reduce the potential for future impacts to human health or the environment.

A limited amount of waste is exposed on the ground surface. Differential settlement has resulted in ponding of water over some waste areas. The paved area under the Mopac Expressway (Loop 1) has settled significantly resulting in large potholes and an undulating surface which is undesirable for a parking area. Landfill gas was detected in significant concentrations at several locations across the landfill. Each of the concerns are discussed in this section. Solutions to these concerns are presented in Section 4, Engineering Solutions.

2.1 Exposed Waste

Inert debris including small fragments of glass are present on the ground surface west of the Mopac expressway bridges. A used tire is exposed on the edge of the Hike and Bike Trail under Mopac. Except for the bank of Dry Creek as mentioned above, no putrescible wastes were found to be exposed. Exposed waste west of Mopac is a general concern for public safety from possible cuts by glass debris; however the small pieces of glass do not represent a significant hazard. It is possible that the glass fragments were exposed by erosion of soil covering the waste or that the glass fragments are the result of broken litter. Borings and observations indicate that waste is not covered by a uniform thickness of soil over the site.

Dry Creek forms the western limit of the Butler Landfill. The landfill surface is relatively flat and then slopes steeply down as the bank of Dry Creek and Town Lake. The bottom of the slope along the water's edge is well vegetated with trees and woody plants. The top of the bank has been eroding and continues to erode, which exposes waste. The exposed waste observed during the field investigation consists of metal, glass, trash bags, a tire, and a crushed drum.

Approximately 50 feet of slope has exposed waste. The waste along the eroding edge is covered by approximately two feet of topsoil supporting grasses.

2.2 Settlement

The natural decomposition of organic matter results in a reduction of mass. As waste material decomposes, overlying waste and fill settles to fill the void left by the decomposed material, resulting in settlement of the landfill surface. Inorganic fill material which is placed with little or no compactive effort during placement will settle when compared to an undisturbed ground surface. If the material is homogeneous in terms of material and placement procedure, the entire area would settle as a unit. Differential settlement occurs when the fill materials vary, the placement procedures vary, or when waste is placed in discrete areas resulting in an undulating surface, as is found at the site.

A fundamental performance standard for a landfill final cover is positive drainage off the cover with no ponding of water. Differential settlement is quite noticeable in the parking area under the Mopac expressway. The area was previously paved with asphalt. The weight of the vehicles has likely caused areas of compressible or decaying waste to settle more than adjacent areas, resulting in an undulating surface. Settlement of the waste fill is noticeable along the Hike and Bike Trail. A likely combination of settlement in the landfill and the periodic addition of crushed granite to the trail surface has resulted in the ground surface south of the trail being lower than the trail. The area does not slope sufficiently in the east - west direction to provide drainage of surface water runoff. As a result, water ponds on the ground surface along the Hike and Bike Trail.

Ponding water tends to percolate through the waste fill. Based on observations, the percolation rate is relatively slow because water ponds for long periods of the time. Water percolating through the waste fill is a concern because the flow increases the possibility of contaminants within the waste being transported away from the landfill.

Elevated concentration of metals were detected in the groundwater. The groundwater condition is discussed in detail in the Phase I, Task 5 - Site Assessment Report. Landfill gas was also detected and is discussed in Section 4 with the Landfill Gas Management heading.

3. FUTURE USE

In instances where steps are necessary to protect human health and the environment, remedial action should be generally taken immediately. In situations such as the Butler Landfill, where risks are not clearly identifiable, other factors such as public use and available financial resources should be considered and an appropriate balance reached between these factors. Zilker Park is a popular public space and remedial construction activities need to be consistent with the current and future potential use of the area.

City personnel provided input regarding the current and possible future use options for the park area. While no definitive plans exist for the area, several options were identified consisting of:

- Continued use of the Hike and Bike Trail
- The Zilker Zephyr Miniature Train may be extended to the Mopac bridges parking area. A train station depot may be added and riders would have the option of purchasing tickets and embarking the train at the depot. The addition of a train depot will require parking for train customers.
- An expansion of the parking area under Mopac is needed to accommodate visitors to the Austin Nature and Science Center. School buses park in the area while children are at the Austin Nature and Science Center.
- The landfill will continue to be used for overflow parking for Zilker Park events.

Selected remedial options should minimize the physical and visual impacts to the area and maintain the aesthetics of the park while accommodating the planned future use of the area. For example, a common first step in remedial actions at an abandoned landfill site is to limit access by constructing a fence. Such fencing would significantly detract from the park setting. Temporary fencing will be necessary during construction to separate the public from construction equipment; however, a permanent fence is not consistent with the current and future use of the area and would adversely impact the aesthetic value of the park area.

4. ENGINEERING ALTERNATIVES

A wide range of remedial actions are available for the Butler Landfill site, although only a limited number of such actions are appropriate in this case, given the findings of the previously discussed investigation of the site. For example, alternatives range from "no action" to complete exhumation of waste and restoration of the area. Considering the sensitive nature of the site, a course of no action is probably imprudent. Removal of the waste and replacing it with clean backfill would eliminate the source of possible contaminants in the work area. However, excavating all of the landfilled waste and properly disposing of the waste in a permitted landfill is the most extreme of options in that it would significantly disturb the area, temporarily restrict access to that portion of the park, and would be expensive

A reasonable remedial action activity is construction of a final cover coupled with groundwater monitoring. Construction of a final cover will promote runoff from the landfill, minimize infiltration of surface water into the waste, and provide a continuous physical barrier between the waste and the public. Remedial action alternatives are discussed in sections following the discussion of exposed waste along Dry Creek.

4.1 Dry Creek

The eroding bank of Dry Creek should be corrected regardless of the action taken concerning the rest of the landfill. The options available for correcting the exposed waste are limited on the bank. Adding soil fill over the waste would result in some soil fill being deposited in Town Lake and is unacceptable.

The remaining option consists of excavating a limited amount of waste along the eroded top of bank and flattening the grade of the existing slope. The excavated waste would be disposed of offsite. The area would be backfilled with clean soil and revegetated. Permanent erosion control measures would be dependent upon the scope of the work conducted at the time. If final cover is constructed, grading would be established to divert runoff from sheet flow down the bank to concentrated flow down a Reno mattress lined chute.

Table 1 - Remedial Action Summary presents a summary of the remedial action alternatives most applicable to the Butler Landfill that are compatible with the future uses

outlined above. The alternatives are presented along with advantages, comments, cost ranges and recommended priorities. The alternatives presented may, in some cases, be combined and implemented in phases. The following discussion briefly outlines the recommended alternatives.

4.2 Groundwater Monitoring

A total of seven groundwater monitor wells have been installed at the site. Six of the groundwater monitor wells were installed and sampled as part of this project. Some elevated metals concentrations were identified. The locations of groundwater monitor wells and landfill gas sample locations are shown on Figure 2. A complete discussion of the analytical results is presented in the Phase 1, Task 5 report.

Continued groundwater monitoring on an established schedule will:

- establish groundwater gradients and any seasonal fluctuations
- monitor potential landfill gas migration
- monitor for changes in contaminant levels or constituents
- determine stability of any contaminant plume
- enable continuous monitoring of risk to human health and the environment from dissolved metals in groundwater

It is prudent to continue monitoring on a twice per year frequency before and after construction of any remedial action to enable verification of the improvement. Monitoring should provide a warning to any increase in environmental impacts. Construction of final cover will increase the potential for LFG migration as discussed in Section 4.4 Landfill Gas Management and warrants the installation of 3 to 5 additional wells to allow monitoring around the perimeter of the constructed final cover.

4.3 Regrading and Soil Cover

The standard practice for landfills is to construct what is called a "final cover" over the waste surface. The long-term performance standard for the final cover is to promote runoff of rainfall from the covered surface and to serve as a physical barrier between waste and potential receptors above grade. The Butler Landfill has soil cover over most of the waste, but it does not limit infiltration and it does not direct stormwater away from fill areas.

The performance standard for a Butler Landfill final cover is to improve drainage from the area and reduce infiltration of surface water into the waste. A final cover will also provide a physical barrier between the public and the waste fill. If constructed, the cover should consist of the following components from the existing ground surface upward:

- General soil fill as needed to achieve drainage and prepare a subgrade for the overlying low-permeability component.
- Low permeability soil layer of at least 1.5 feet compacted in six-inch thick lifts with density control. The hydraulic conductivity should be on the order of 1 x 10^{-5} cm/sec.
- The low permeability component should be overlain by at least 0.5 feet of topsoil capable of supporting vegetation.

The paved parking area under the Mopac expressway may generally function as a final cover in terms of a physical barrier with low permeability; however, the current problem of differential settlement in this area has rendered the existing pavement relatively ineffective for its intended purpose as a parking facility for automobiles and school buses. Pot-holes and low spots hold water and increase infiltration into the waste. The potential for continued settlement in the area makes the selection of a rigid pavement such as asphalt or concrete a poor choice for long-term usability. A geogrid may be added to the subgrade to limit differential settlement and improve the long-term performance of the pavement. Continued settlement is easier to accommodate using a relatively flexible pavement such as brick pavers or crushed stone. Brick pavers and crushed stone are typically more permeable than asphalt pavement; however, brick pavers and crushed stone placed over compacted soil should allow a limited amount of rainwater infiltration.

The City has indicated that an expansion of the parking area at Mopac is desirable to serve the Austin Nature and Science Center and the Hike and Bike Trail. At the site, the existing pavement is located under the Mopac expressway bridges and therefore receive a limited amount of rainfall. The area may be graded to reduce the volume of stormwater which flows onto the parking area. The effects of localized settlement, such as pot holes, may be reduced if a geotextile or geogrid is incorporated on the subgrade as part of the parking surface rehabilitation. A reworking of the parking area under Mopac and an expansion adjacent to the existing parking on either the east or west sides is compatible with constructing a final cover over the landfill.

The addition of a final cover may induce additional settlement to the landfill. Anticipated future settlement should be analyzed to determine what grades will provide long-term drainage off of the final cover. The final cover surface grading will need to accommodate the existing electrical service, piping, and appurtenances associated with the soccer field irrigation system. If final cover is constructed, adjustments to the existing monitor well

surface completions may to required to match final grade.

If the decision is made to proceed with construction of a final cover, the following general steps are necessary to complete the project:

- Field surveying to generate a tree survey and topographic map of the area with a contour interval of one foot
- Install additional ground water wells and continue sampling and analyses
- Final cover design, including construction plans and specifications
- Approvals from regulatory entities
- Construction

Approvals must be received from several entities for construction to begin on the site. Construction in the Edwards Aquifer recharge zone requires permitting through the TNRCC regional office. A site plan must be approved by the City of Austin Department of Review and Inspection. Building construction on the final cover should require permitting by the TNRCC. Prior to beginning design a proactive, coordination meeting should be held with the TNRCC Municipal Solid Waste Division to present the City's plan for improving the area and determine if the TNRCC has any specific concerns.

It is EMCON's understanding that the Texas Department of Transportation (TxDOT) owns the property under and immediately adjacent to the Mopac expressway bridges. Coordination with TxDOT will be needed regarding any construction in the vicinity included improving the existing parking area.

4.4 Landfill Gas Management

As part of the field investigation phase of this project, EMCON performed a soil gas investigation at the Butler Landfill site. During the soil gas investigation, methane and carbon dioxide readings were taken at 10 locations within the approximate limits of the refuse fill area as shown on Figure 2. In addition, the soil gas sample with the highest methane field reading was collected and submitted for laboratory analysis of volatile organic compounds.

LFG is present and likely still being generated in isolated areas at the Zilker Park site. The construction of the relatively impermeable final cover for drainage purposes at the site will decrease the ability of the LFG to vent to the atmosphere. Continued LFG generation along with the decrease in passive venting through the soil cover may lead to the buildup of LFG pressure beneath the final cover. This increased pressure may lead to

LFG migration off site through subsurface soils or LFG may come into contact with groundwater, potentially leading to VOC contamination of the groundwater. EMCON does not recommend a LFG collection system at this time, but does recommend groundwater monitoring at the site to track potential changes in subsurface conditions. If no structures are to be placed at the site, further LFG investigations are not warranted at this time. If LFG contamination of groundwater is evidenced, further LFG investigations or LFG migration remediation actions may be required to mitigate groundwater contamination.

4.5 Development on the Landfill

If structures are to be constructed on the site, such as the Zilker Zephyr train depot or train tracks, 30 Texas Administrative Code 330, Subchapter T, requires obtaining a development permit from the Texas Natural Resource Conservation Commission (TNRCC) prior to construction of such facilities.

A TNRCC development permit application consists of a Part A and Part B. Part A includes:

- Preamble
- Legal authority
- Evidence of competency
- Notice of appointment
- Notice of coordination
- Legal description
- Site drawing
- General location and topographic maps
- Aerial photograph
- General geology and soils statement
- Foundation plans
- Other plans
- Soil tests
- Certified copies of required notices
- Closure plan
- Operational requirements plan
- Site operating plan
- Structures gas monitoring plan
- Safety and evacuation plan

Part B of an application for a TNRCC development permit consists of construction plans and specifications for proposed structures and site development. Negotiations may be held with the TNRCC to determine if a development permit is necessary for such a

project. The costs for obtaining a permit to construct a train depot may exceed the cost of the building and track extension.

Construction of the final cover will require that future construction on the final cover be approved by the TNRCC. Subchapter T of 30 TAC 330 prohibits penetrations of the final cover system "*...without prior approval of the executive director. These include, but are not limited to, borings, piers, spread footings, foundations for light standards, fence posts, anchors, deadman anchors, manholes, on-site disposal systems, recreational facilities, etc.*" It is possible to discuss with the TNRCC the concept of writing a plan for the landfill which addresses construction of the final cover and provides a list of approved activities on the final cover which will not require separate written approval from the TNRCC, such as erecting a fence for special events.

4.6 Slurry Wall

A slurry wall is a trench that is dug and filled with a mixture of low permeability material to create a barrier to the flow of groundwater. Slurry walls reduce the lateral flow of groundwater and thus reduce the spread of waste constituents that may be mobilized in the groundwater. A slurry wall constructed around the Butler Landfill would reduce the potential for migration of metals or other contaminants from the site. In concept, slurry walls are simple. In practice, slurry wall benefits are more difficult to ascertain for this project. The first uncertainty is accurately identifying the limits of waste. The benefit of a slurry wall would be significantly reduced if the limits of waste were not accurately defined. Additional field investigation is necessary to accurately define the limits of waste. The construction process for slurry walls is relatively imprecise and verification of a continuous barrier is not possible in some situations. Since current data indicates that significant degradation of groundwater quality has not occurred, construction of a slurry wall is not warranted at this time. Construction of a final cover system over the site as previously described will hopefully preclude any need to construct a slurry wall around the site in the future.

5. CONCLUSIONS AND RECOMMENDATIONS

The suggested options for remedial action are summarized in Table 1 - Remedial Action Summary and are presented in ascending order of environmental protection and cost. The hierarchy presented in the table consists of monitoring groundwater, regrading and soil cover construction, landfill gas extraction system installation, and slurry wall construction. The remedial action options may be combined or adopted in phases if necessary.

Concerns regarding the Butler Landfill include:

- absence of soil cover over landfill, resulting in exposed inert waste and debris
- lack of positive drainage off of the landfill resulting in ponding of surface water
- infiltration of ponded surface water into waste
- elevated concentrations of metals in groundwater
- presence of landfill gas

EMCON recommends construction of a final cover over the landfill that consists of general fill, low permeability soil, and topsoil. The general fill will raise the elevation of low areas to prevent ponding and provide enough slope to provide drainage as settlement continues. A low permeability soil layer that is 1.5 feet thick with a hydraulic conductivity no more than $1x10^{-5}$ cm/sec above the random fill will reduce the rate at which rainfall infiltrates into the waste. A topsoil layer that is at least six inches thick will support vegetation and minimize long term erosion. The surface could continue to be used for overflow parking for Zilker Park events.

Construction of a final cover increases the potential for landfill gas to migrate away from the landfill. EMCON recommends semi-annual monitoring of existing groundwater monitor wells and the installation of 3-5 additional wells to detect any changes in water quality as a result of possible landfill gas migration. Reductions in monitoring frequency could be justified at a later time if degradation in groundwater quality is not observed. If LFG migration occurs, a change in groundwater quality would likely be detected and the need for a gas collection system could then be evaluated.

The exposed waste on the bank of Dry Creek should be corrected by excavating waste along the top of bank and backfilling with soil. Permanent erosion control protection in the form of geosynthetic matting or Reno mattresses would provide long-term protection.

6. LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

7. REFERENCES

U.S. Environmental Protection Agency, 1990, Seminar on Design and Construction of RCRA/CERCLA Final Covers

U.S. Environmental Protection Agency, 1988, Seminars - Requirements for Hazardous Waste Landfill Design, Construction and Closure

30 TAC 330.951-963 Subchapter T

EMCON, December 1997, Phase I, Task 1 - Preliminary Site Assessment Zilker Park Landfill Project

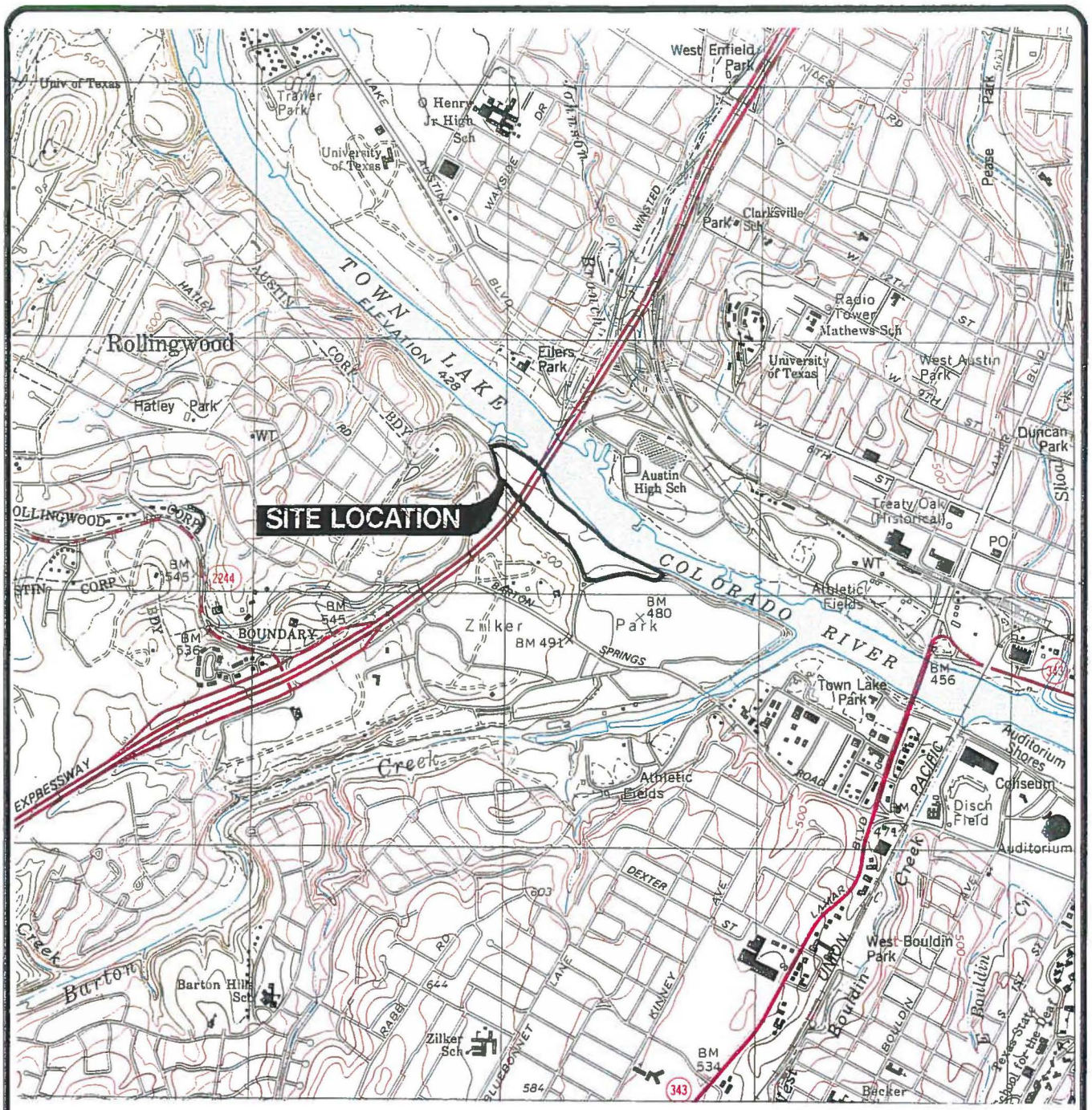
EMCON, June 1998, Phase I, Task 5 - Site Assessment Report Zilker Park Landfill Project

Table 1
ZILKER PARK
Remedial Action Summary

Remedial Action	Advantages	Comments	Estimated Capital Cost	Estimated Annual O&M Costs	Recommended Priority
Dry Creek	Correct existing problem of exposed waste on bank	Problem should be corrected regardless of other action taken	$25,000 to $35,000	—	High
Monitor groundwater	Detect and quantify impacts Compatible with construction Collection of landfill gas may not be warranted Gain more info. on groundwater quality and flow direction	Does not eliminate or minimize future impacts by itself May be performed concurrently with other remedial action activities	Additional 3 to 5 Wells $13,000 to $18,000	$7,000 to $11,000 per sampling event, with 2 events per year, initially	High
Regrading and soil cover	Eliminate current ponding of water Improve surface water drainage Exposed waste covered Reduce surface water infiltration Improve site aesthetics	No effect on lateral flow through waste Groundwater monitoring should be performed concurrently	$700,000 to $1,000,000	—	Moderate to High
Landfill gas extraction	Minimize for gas impacts to groundwater Minimize potential for landfill gas migration Eliminate potential odor problem	High capital cost Long-term operational and maintenance costs Groundwater monitoring, regrading and soil cover should be performed concurrently Additional investigation necessary to design gas extraction system	$200,000 to $300,000	$10,000 to $30,000	Low - Not necessary based on current information
Slurry wall	Significant reduction in lateral flow through waste	Additional investigation necessary to determine waste limits and formation to key slurry wall into Construction uncertainties Groundwater monitoring, regrading and soil cover should be performed concurrently LFG extraction may also be necessary	$2,800,000 to $3,400,000	—	Low - Current impacts do not warrant this action

Notes. 1 Other options are available, but no other options were determined to be applicable to this situation.
2 Other options include: 1.) installation of a system to remove and treat groundwater, 2.) exhuming waste and backfilling with clean soil ($10 million)
3. These costs are intended to be used for comparison of alternatives and are not budgetary estimates.
4 Dry Creek cost estimate based on assumption that all waste is municipal and is accepted without testing and minimal permitting is required.

I ZILKER [REM_ALTS XLS]Sheet1
10 1 98 7 17



ROAD CLASSIFICATION

Primary highway, hard surface

Light-duty road, hard or improved surface

Secondary highway, hard surface

Unimproved road

Interstate Route

U. S. Route

State Route

CONTOUR INTERVAL 20'

AUSTIN WEST, TEX.

SE/4 LAKE TRAVIS 15' QUADRANGLE

30097-C7-TF-024

1988

DMA 6444 IV SE-SERIES V882

N

0 500 1000 2000

SCALE IN FEET

EMCON

DATE	9-97
DWN	DED
APP	BJR
REV	

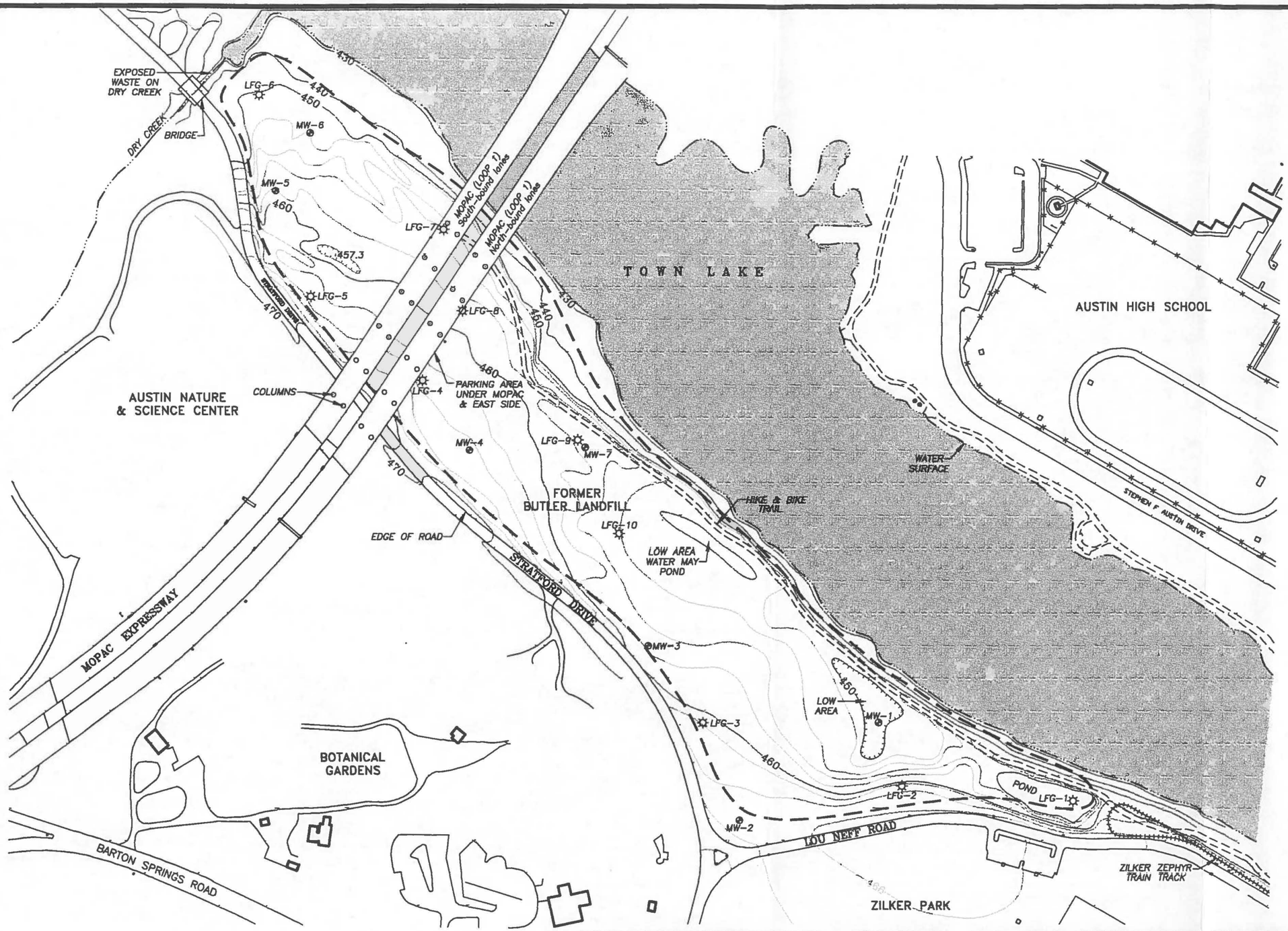
CITY OF AUSTIN
ZILKER PARK
TRAVIS COUNTY, TEXAS

SITE LOCATION MAP

FIGURE 1

PROJECT NO. 62786-002-001

FTWORTH/CADDSTA1 N:\DWG\96097021\034\SITELOC.dwg Xrefs: <NONE>
Scale: 1 = 1.0000 Date: 9/19/97 Time: 9:47 AM Operator: PJW



LEGEND

- GROUNDWATER MONITORING WELL
- LFG — LANDFILL GAS SAMPLE LOCATION
- APPROXIMATE FILL BOUNDARY

NOTES:
1. BASE MAP CREATED FROM CITY OF AUSTIN ENGINEERING DEPARTMENT. TOPOGRAPHIC MAPS DEVELOPED FROM PHOTOGRAPHY DATED 1977.

EMCON

DATE 10/2/98
DWN HCS
APP MJR
REV 1

CITY OF AUSTIN
ZILKER PARK
TRAVIS COUNTY, TEXAS

EXISTING CONDITIONS

FIGURE
2
PROJECT NO.
62786-002-001