PORTLAND PARKS & RECREATION

Healthy Parks, Healthy Portland

Thomas Cully Park Master Plan

December 2008

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Introduction

Purpose of the Master Plan

The Thomas Cully Park Master Plan proposes a general concept that will guide the preparation of detailed designs and construction documents. This plan comprises a set of recommendations and a development concept along with an outline of initial implementation steps.

In general, the master plan focuses on four major strategies:

1. Develop recreational facilities to serve the neighborhood;
2. Develop sports fields and facilities that will be used by people from throughout the city;
3. Encourage use of the park throughout the year and the day; and
4. Manage the landfill and methane collection system to ensure public health and safety.

Developing a park on a former landfill is an exciting opportunity for the City of Portland, more so when the site has as much potential as the Cully Park property. The idea of restoring landfills to become parks is also not a new idea. Appendix A includes a series of articles on recent examples from the U.S. When Cully Park is developed, it should provide a dramatic example of how the city converted a damaged landscape into a park that serves both neighborhood residents and visitors from throughout the area.

Location and Context

The Cully Park site comprises approximately 25 acres in the Cully Neighborhood in northeast Portland (see photo on page 3). The site is bounded by an active rail line on the north by one-story industrial uses to the east and west, and by residential and industrial uses to the south. The park's main entrance is from NE 75th Ave., which is accessed from NE Killingsworth St. Another street (NE 72nd Ave.) ends at the site's property boundary but does not provide access.

History of the Site

From the 1950s through 1980, the site was operated as a sand and gravel mine, covering approximately 25 acres and excavated to an average depth of about 60 feet. Once the sand and gravel were depleted, the site became a special waste landfill that accepted construction, industrial and non-putrescible municipal waste when the city's landfill was not open or during peak waste periods.

When the landfill was created, the bottom was sloped to a leachate pump station and the bottom of the landfill was lined with a 6" layer of soil and bentonite. Sand and perforated pipe were placed on this layer as part of the leachate collection system. The walls also were lined with a polypropylene liner.

The landfill is capped with a 30-mil polyvinyl chloride (PVC) geomembrane liner and approximately two feet of compacted soil and grass. Six active groundwater monitoring wells, a leachate sump, and several active flush mounted methane monitoring points are distributed throughout the site. Modification of some of the wells and monitoring points will be needed when the site is developed.

Since the landfill ceased operation in 1991, it has been maintained and monitored by DEQ, METRO, Portland Parks, and BES. The site continues to produce methane, which is collected on-site and burned in a small facility next to the site's main entry off of NE Killingsworth St. Portland Parks and Recreation acquired the site in 2002 with the intention of developing it as a park that would accommodate a variety of active recreational uses and to serve neighborhood needs.

The Planning Process

The master plan process began in May 2007 with the formation of a ten person Project Advisory Group (PAG). The PAG began its meetings in September and met five times over the next nine months, ending in May 2008. The committee's composition reflected the project's stakeholders, with representatives from the site's neighborhood groups, interested citizens, and city staff. The list of PAG members is on the inside cover.

AERIAL PHOTO OF THE CULLY PARK AREA

A planning charette was held in November 2007 that involved more than 40 people. In January and March 2008, two open houses were held to provide information and updates to the general public. In addition to the PAG meetings, city staff also briefed the Cully Association of Neighbors and the Columbia Slough Watershed Council during the project.

The charette attracted a diverse mix of ages and neighbors.

Existing Conditions

The Cully Park site is one of the city's most dramatic landscapes with its large expanse of open and uninterrupted space and its panoramic view of the Columbia River floodplain. Because of the site's elevation above the surrounding landscape and lack of buildings around its perimeter, the park feels larger than it actually is. Also, the proximity of an active rail line provides an interesting counterpoint to the more naturalistic character of the site. All of these aspects should be addressed as the park is designed and built. There are also several challenging site conditions that will have to be resolved. The following section outlines both the park's attributes as well as its issues.

Site Conditions

The Cully Park site is undeveloped and currently fenced to prohibit public access. The site is mowed by Portland Parks and Recreation staff and the methane collection system is managed by a variety of agencies (see page 9).

Topography and Slope

A topographic survey of the site was completed in 1998. According to this survey, the site has a general slope of 24:1 with the highest elevation in the southwest corner. Perimeter slopes are much steeper with a 4:1 slope ratio.

The highest point on the site is in the southwest corner where the elevation is approximately 115' above sea level. From this point, it drops at varying grades to a steep bank that surrounds the site. The highest banks are along the northern edge where the slope is approximately 17' high. Slopes along the southwestern edge are generally lower and less steep.

The highest banks are found along the north side of the site.

VIEWS

The views of the Columbia River floodplain and the surrounding landscape are among the site's most distinctive aspects. What is particularly unusual is the views are generally unobstructed with few buildings of any size around. As a result, visitors to the park will be able to see a broad and expansive vista of the Columbia River floodplain along with the hills in Clark County. The views are best to the north and east where Mt. Hood can be seen on clear days.

The site offers expansive views of the Columbia River floodplain.

Mt. Hood can also be seen from the site on clear days.

ACCESS

At present, there is no public access into the site. Only agency staff who maintain the site or monitor the methane collection system are allowed onto the site. Additional access is granted for special groups such as the PAG and special tours.

Future public access into the site is possible only from two existing streets -- NE 72nd Ave. and NE 75th Ave. Of the two existing roads, NE 75th Ave. would serve as the park's main entry unless a new access is developed. NE 72nd Ave. services 14 single-family residences and many hones in a mobile-home park while NE 75th Ave. services three to four businesses.

Several issues would have to be addressed if NE 75th Ave. was developed as the park's main entry. Future park use will generate periods of intense ingress and egress from NE Killingsworth St.. N 75th is close enough to the signalized intersection of NE 72nd Ave. and NE Killingsworth St. to make it unfavorable for a second traffic

The current entry to the site from NE 75th Ave. The locked gate is at the end of this road.

Looking south on NE 72nd. Ave. toward NE Killingsworth St.. This street is lined with single-family residences.

signal. This currently uncontrolled intersection would have to become a right turn in / right turn out to provide safe but limited access.

ADJACENT LAND USES

The site is bordered by a variety of low-intensity uses on all four sides. Residential and light industrial uses abut the site along the south and west sides. Single-family homes line NE 72nd Ave. which could function as a secondary access to the park. Two trailer parks are located along a portion of the site's southern edge.

An active rail line forms the northern edge of the park site, creating a clear and impenetrable edge. A series of industrial warehouses are found along the eastern edge of the site.

NE 72nd Ave. provides a direct connection from adjacent residences to the park. It also connects with the Roseway Blocks.

The industrial uses along the site's western edge.

Landfill and Methane Management

From the 1950s though 1980, the site was operated as a sand and gravel mine that was excavated to a depth of approximately 60 feet below existing site grades. In the 1980s, the site was converted to a demolition waste disposal site, which was first operated by MDC, then Riedel Waste Systems.

In the late 1980s, the landfill accepted non-putrescible domestic solid waste, which was diverted from the St. Johns Landfill. The landfill ceased operation in 1991 and was covered. The landfill cap consists of a 30-mil PVC geomembrane liner and approximately two feet of compacted soil.

Beginning in 1991, the site was monitored and maintained by the Oregon Department of Environmental Quality, METRO, Portland Parks, and BES. The City of Portland purchased the site in March 2002 for the proposed Cully Park and METRO began maintaining the site and monitoring it under contract to the City of Portland.

A limited landfill gas (LFG) control system, consisting of 35 methane gas extraction wells connected to a central blower, was completed in 1992. Additionally, a perimeter stormwater drainage system was installed to contain and dispose of surface water runoff from the landfill.

The methane burner that is located next to the main gate at NE 75th Ave.

By 1998, a series of problems, including underground fires, caused many of the methane gas extraction wells to malfunction, resulting in the conversion of all but eight extraction wells to passive vents.

The landfill was designated a DEQ Orphan site in 1999, and subsequently a new methane gas control system was installed, along with upgrades to site drainage, cover, and security. The methane generated is currently burned on-site for about four hours each day. Current site monitoring includes perimeter monitoring probes, active flush mounted methane extraction wells, and a leachate sump. Perimeter methane monitoring is conducted to verify that methane is not migrating offsite, which is a condition specified in the Post Closure Landfill Permit issued by DEQ.

Park and Recreation Needs

Several factors were considered in determining what kinds of improvements should be provided at Cully Park. This assessment included an analysis of other parks, a review of census statistics, a review of parks and schools in the area, and an examination of survey data for specific activities.

Some of the major issues that were identified during this assessment include:

- There is a need for recreational facilities to meet the demands of households with younger children. Over the last decade, the population of the neighborhood has changed significantly – there are more children and the ethnic composition has shifted as well. Between 1990 and 2000, the percentage of Hispanic residents quadrupled from four to seventeen percent.
- The Cully neighborhood has an overall shortage of parks and recreation opportunities. There are three other parks that are similar in the area but none is larger than five acres. This deficiency is especially acute in the areas around the Cully Park site, which includes large numbers of multi-family units.
- Because of this shortage, there is a need for basic recreational facilities and opportunities such as a playground, walking trails, flexible open space, picnic areas, and sports courts.
- Because of its size, the site can accommodate a range of recreational facilities that are needed throughout the city. These include soccer/lacrosse fields and baseball/softball fields. In a 2004 PP&R survey, participation in organized sports was highest for soccer (25%), softball (24%), baseball (18%), and basketball (16%).

The neighborhood around the Cully Park site includes many multi-family units.

POPULATION CHARACTERISTICS

The 2000 census shows a neighborhood population of about 13,000 people, an increase of 2,000 over the 1990 census. As shown in the table below, between 1990 and 2000, the age distribution ratio remained generally similar except for a decrease in the over 65 age group, which dropped from 14% to 9% of total population.

Parts of the neighborhood also have experienced an increase in households with young children. As an example of this trend, enrollment at Rigler Elementary School has increased 15% between 2003 and 2007, a contrast to many other schools in the Portland area which have seen declines in enrollment.

This change is likely due to an increase in Hispanic residents, who made up 17% of the neighborhoods' population (compared to 4% in 1990). This trend is reflected also in the ethnic composition for Rigler School. Between 1995 and 2004, the percentage of Hispanic students grew from 13% to 45% while the percentage of European-American students decreased from 52% to 19% in that period.

Note the changes between 1990 and 2000 in race and in the over 65 age group.

Population for the Cully Neighborhood: 1990 and 2000

Total Population	**1990***	**2000****
	11,272	**12,959**
Population by Race (Percent of Total)		
White	81	52
Black	9	9
Asian/Pacific Islander	7	7
Hispanic	4	17
Other	2	13
Tenure of Housing Units		
Homeowner	58%	61%
Renter	35%	39%
Ave. Household Size	2.56	2.77
Population by Age Group		
Under 5	8	8
5-17	18	19
18-64	59	64
Over 65	14	9

Source: * City of Portland Office of Neighborhood Association, Neighborhood Social Profiles (1990 Census)
** Portland Maps Detail Report/Profile of the Cully Neighborhood (Census 2000)

PARKS

The Cully Neighborhood has long been recognized as a park-deficient neighborhood, with very few parks to serve a relatively large area. Within the neighborhood's boundaries are three other parks that are similar, the largest of which is less than five acres.

Sacajawea Park is a 4.89 acre partially developed site next to Sacajawea School. There are no recreation facilities at the park but the school has play equipment, a baseball field and a soccer field. The owners of a 6.6-acre parcel north of the park have committed to the donation of a 3.38-acre portion of that property to the City for park purposes.

Sacajawea Park is a small park with very few recreational improvements.

Wellington Park features a variety of facilities such as a fully accessible playground.

Wellington Park, is about .75 mile (straight line distance) to the south. Welllington Park is 3.45 acres and includes a disabled access play area, disabled access restroom, paved paths, picnic tables, playground, soccer field, and wading pool or splash pad.

Whitaker Ponds Nature Park comprises approximately 14 acres north of NE Columbia Blvd. and along NE 47th Ave. The site abuts a larger parcel (20.6 acres) currently owned by Portland Public Schools (PPS) that includes Whitaker/Lakeside School, now being used by the Native American Youth and Family Center. (NAYA) . In addition to two freshwater ponds, the park includes a small education center, an outdoor shelter, a series of soft-surface trails, and two baseball/softball fields.

Summary of Park and Schools in the Vicinity of Cully Park

Parks and Schools Within A One-Mile Radius of Cully Park

Site	Size (ac.)	Facilities					
		Play ground	Softball/ Baseball	Soccer/ Football	Basket ball	Tennis	Rest rooms
Sacajawea Park	4.89	---	---	----	---	---	---
Wellington Park	3.45	---	---	---	---	---	---
Whitaker Ponds Nature Park	14.29	---	2 softball/ baseball	---	---	---	---
Whitaker Lakeside Middle School (NAYA)	21.5	yes	3 softball	0	2 indoor	0	NA
Scott Elementary School	5.7	yes	2 baseball	1 soccer	0	0	NA
Rigler Elementary School	8.8	yes	1 baseball	1 soccer	0	0	NA

Source: 2020 Refinement Plan, Portland Parks and Recreation, 2003.

PARKS AND SCHOOLS WITHIN THE CULLY NEIGHBORHOOD

A master plan for Whitaker Ponds Nature Park was prepared in 2006. The plan recommended that two ballfields at the park (see photo below) be relocated to the Cully Park site when it is developed. As a result, the Cully Park concepts include these two fields (see pages 30 - 31).

One of the two baseball/softball fields that are recommended for relocation from Whitaker Ponds NaturePark.

SCHOOLS

Two public schools – Rigler Elementary School and Scott Elementary School – are within a mile of the Cully Park site. Rigler School has two soccer fields, two softball fields, and a playground. Scott Elementary School has two softball fields, two soccer fields, three basketball courts, and a playground.

2020 PLAN

The Cully Neighborhood's park deficiency was noted in PPR's 2020 Plan. One of its recommendations is to "work with neighbors to plan and develop the new Thomas Cully Community Park at NE 75th and Killingsworth St., when conditions allow."

RECREATION ACTIVITIES

Over the last decade, Portland Parks and Recreation has conducted several scientific surveys of city residents to determine what activities and facilities are needed. Some of the most relevant findings for the master plan are noted below.

- A 2004 survey asked about the use of eight recreation facilities. One of the highest frequencies of use was registered for trails, with 52% of respondents saying they visited trails either daily, weekly, or monthly. The next highest facilities are playgrounds and sports fields, with slightly more than 35% saying they visited them either daily, weekly, or monthly.

- Previous studies by PP&R have pointed to a great demand for sports fields in general, and for soccer fields in particular. According to a PP&R survey in August 2004, about 23% of Portland residents (or someone in their household) participated in organized sports league over the previous 12 months.

  As shown in the table at left, baseball ranked third of the 12 activities listed, behind soccer and softball. This mirrored a 2001 survey found that 23% of respondents or their households had participated in an organized sports league over the previous 12 months.

- Of these, the most popular sports were soccer (25%), softball (24%), baseball (18%), and basketball (16%), according to the 2004 survey. Participation in organized sports was highest in the northeast and northwest quadrants of the city.

- When asked about participation in specific activities (a 1999 survey), the highest frequencies were expressed for walking for recreation/exercise and walking to enjoy nature, both with over 65% of respondents. The next highest activities were for bicycling and using group picnic areas, both with about 45% of respondents.

Participation in Organized Leagues by Sport

Soccer	24.0 %
Softball	23.6
Baseball	17.5
Basketball	15.8
Flag Football	2.7
Tennis	2.0
Lacrosse	1.4%
Volleyball	1.3%
Swimming	1.0%
Rugby	0.7%
Ultimate Frisbee	0.7%
Other	8.2%

Source: Survey of Residents and Park Users, Portland Park sand Recreation, 2004.

Master Plan Recommendations

A Vision for Cully Park

As it now stands, Cully Park is an unpolished jewel. But in the future, the park will develop into one of the city's real gems – a place that becomes an integral part of the neighborhood's identity and soul. Because the site is located where many major streets intersect, the park is at the geographic center of the Cully neighborhood. When developed, the park will emerge as a cultural center for the neighborhood.

The master plan envisions a variety of recreational features that will invite frequent use by neighbors. Walking trails, a playground, picnic tables, an off-leash area, athletic fields, and lots of open space will offer opportunities for both children and adults. From the park, visitors will enjoy expansive views of the forested areas that line the Columbia River. On clear days, they will also see Mt. Hood and Mount St. Helens. What they'll always enjoy is being in one of the largest open spaces in the city, a place where earth and sky appear to be limitless.

Recreational facilities for sports will ensure that the park is busy and active from spring to fall. Softball, baseball, and soccer fields will serve players from throughout the city in a setting that is truly distinctive.

The park is seen also as a catalyst for neighborhood improvement and a symbol of what the Cully neighborhood can be. In other cities, large parks often generate businesses and events that serve residents and draw outside visitors. Cully Park is large enough to host community festivals and cultural celebrations.

When Cully Park is developed, it will embody the city's commitment to restoring a landscape that was altered beyond recognition. Where it once served as a repository for refuse, the park will instead provide opportunities for people to grow and thrive. It will also demonstrate how a damaged site can be recreated to represent a model of environmental stewardship.

Creating Cully Park will undoubtedly demonstrate what all great parks can do - to bring people together, to restore damaged landscapes, and to strengthen communities.

Guiding Principles

The Master Plan is based on a set of fundamental principles that provide a foundation for the plan's recommendations and can guide future actions and activities at the park. The principles are based on the long-term vision for the park.

Overall Character and Purpose of the Park

- Develop the park to serve neighborhood recreation needs while providing facilities that meet citywide needs.
- Maintain and integrate the site's landfill operational facilities into the park's development.
- Enhance the expansive nature of the park and its views of the Columbia River floodplain, Mt. Hood, and Mount St. Helens.
- Buffer the park to protect it from incompatible uses and to minimize impacts on adjacent residential areas.

Park and Recreation Needs

- Provide recreational improvements that encourage use by visitors throughout the year and throughout the day.
- Provide safe and convenient ways for pedestrians and vehicles to access the park.
- Design the park to promote safety and security for visitors.

Park and Recreation Improvements

- Improve visibility of the park from adjacent streets, especially from NE Killingsworth St.
- Maintain a central open space in the middle of the park.
- Create a system of pedestrian trails throughout the park.
- Locate parking areas to minimize conflicts with pedestrian circulation.

Integration with the Community

- Encourage projects that create clearer and safer connections between adjacent residential areas and the park.
- Establish partnerships as a key strategy in the park's management, operations, programs, and improvement.

Overall Site Concept

Two concept plans were prepared for the master plan. One presumes no acquisition while the second proposes some acquisition of frontage along NE Killingsworth St.. If additional frontage is acquired, site access and visibility into the site will be improved. Additional recreational improvements could also be provided, depending on much land is acquired. In general, the two concepts are similar in the overall level of development that is proposed.

Both site concepts are based on several key ideas that provide a framework for future development and improvement at the site.

- ***Provide a mix of sports fields and recreational facilities that can be programmed for year-round use, if possible.*** There is a citywide need for sports fields and Cully Park is one of few new parks that has the size and location to accommodate this need. Two of the fields should be suitable for use by Lakeside Little League, as a replacement for fields that have been recommended for relocation in the Whitaker Ponds Master Plan.
- ***Develop recreational improvements that will serve neighborhood residents.*** These could include a playground, walking trails, benches, a covered shelter for picnics, community garden, restrooms, basketball court, an off-leash area, and other amenities that would draw local residents.
- ***Maintain the center of the park as an open space and concentrate parking and other vehicle-related facilities at the edges or corners of the park wherever possible.*** The middle of the site will thus be an area where visitors can enjoy the park's open spaces and recreation features.
- ***Minimize impacts on adjacent residential areas***. Although Cully Park is intended to be an active site, it must also be designed to minimize impacts on its neighbors. Development of the park must therefore be scaled to match the capacity of access roads, to minimize noise, and to control other secondary impacts.

Access and Circulation

The circulation system is a key part of managing the site in a positive way. It defines the various areas and character zones of the park, directs park users to appropriate locations, and provides opportunities for park visitors to enjoy the beauty of the park. Improving access into the park can also be integrated into the overall system of paths and trails such as the 40 Mile Loop and the city's bikeway and pedestrian network.

- Develop a new access point for vehicles and pedestrians into the park from NE Killingsworth St.

  Option 1 would use the existing right-of-way, which would have to be improved with sidewalks and possibly regraded and controlled with a right turn in / right turn out access.

  Option 2 would require acquisition of a parcel along NE Killingsworth St. east of the existing access. This option would provide greater visibility for the park along NE Killingsworth St. and would offer more queuing space for vehicles leaving the park. It also would include room for additional recreational facilities and/or parking for the park.

- Improve NE 72nd. Ave. as a secondary access to the park. In both options, NE 72nd. Ave. will serve mainly the off-leash area, the playground, and other uses in the western half of the park.

- Establish a network of fully accessible paths in the park. The paths should include connections to NE Killlingsworth St.. and to NE 72nd Ave. The system should provide a loop around the park with benches, viewpoints, and other amenities distributed along the path.

OPTION 1 - USE NE 75TH AVE. FOR PRIMARY PARK ENTRY

OPTION 2 - ACQUIRE ADDITIONAL FRONTAGE FOR A NEW PARK ENTRY AT NE 76th AVE.

Location of access road from NE Killingsworth St. is diagrammatic only.

Recreational Facilities

The park is intended to include a mixture of recreation facilities that can be programmed and those that are meant for more casual neighborhood use. Although the park's athletic fields will comprise a large part of the site, other recreational facilities are important to serve residents who live within proximity of the park.

- Develop the park to include a variety of recreational facilities that can meet citywide needs along with local neighborhood needs as well. Major recreation improvements include:

  Two baseball/softball fields that are meant to replace two fields that are recommended for removal in the Whitaker Ponds Master Plan (May 2006). These new fields should be comparable in size to the fields that will be removed at Whitaker Ponds.

  Because these fields will be programmed for a variety of leagues, they should include the appropriate support facilities such as permanent restrooms, concession building, bleachers, dugouts, fencing, and equipment storage.

  Two soccer/lacrosse fields. One should be a regulation field that can be programmed while the other can be a multi-use field that could be used mainly for children's leagues.

  A **playground** which is located to ensure security and is far enough from sports fields. Benches and other supporting facilities should also be in proximity to the playground.

  Two parking lots, located around the edges of the park to maintain a central open space for recreational use. Stormwater from the lots should be directed to on-site storage facilities such as bioswales.

  Restroom facilities to serve both daily visitors and those who visit the park for special events such as soccer games or community festivals. These could include permanent restroom structures as well as temporary restroom facilities.

  An **off-leash area l**ocated in the northwest corner of the park. This location is preferred because it is separated from other park activities, is easily accessible from a parking lot, and will have fewer impacts than other locations.

Picnic shelter that can accommodate groups for small gatherings. The shelter should be located in proximity to parking, restrooms, and other support facilities. It also should be easily seen from the parking lot.

Walking trails around the perimeter of the park and which will connect the park's major attractions. The trail will include benches, especially along the north edge with its views of the Columbia River floodplain.

- Include recreational facilities that attract visitors throughout the year, through each season, each day of the week, and at different times of the day. These improvements include walking paths, the playground, and the off-leash area. The development of a community garden along the western edge of the park also should be explored.

- Describe the park's history through interpretive signs, public art, and other techniques. Interpretive themes could include the site's cultural and Native American history, its location along the Columbia River floodplain, the landfill operation, and the methane collection system.
- Integrate environmental sustainability into the design and development of the park and its improvements. Stormwater should be managed on site through a variety of means such as bioswales, and permeable paving, where appropriate. Also, the large areas of lawn and open space should be maintained through environmentally responsible practices.

Landfill and Methane Management

Developing Cully Park will require particular care in both design and construction. Among the primary issues to be addressed are the fill that will be required, limited penetrations of the geomembrane liner, modifications to the methane and leachate control systems, and the placement of recreational improvements.

In addition, an active methane control system and a leachate collection system are currently operating at the site and will continue to operate for the foreseeable future. Creating a park at the site presents two basic environmental challenges to the methane control system: (1) short term impacts during redevelopment activities, and (2) long term impacts after the site is redeveloped. Several methane extraction well vaults will have to be relocated and reconfigured for park development.

A summary is provided below.

- Minimize differential settlement in roads and parking lots through techniques such as pre-loading, the use of geogrid, and other methods.
- Set back site improvements such as walkways and parking lots from the tops of slopes. The specific setback will vary depending on the depth of any fill and the resulting slope.
- Use mat foundations for ancillary structures such as bleachers, restrooms, concessions operations, etc. to minimize impacts to the landfill cap and gas control infrastructure.
- Minimize the infiltration of stormwater to control potential erosion around the landfill.
- Limit modifications to the wellheads and leachate sumps where practicable.
- Continue to monitor landfill leachate and air quality.

Acquisition

One of the problems with the current boundaries of the park is the lack of visibility from adjacent roads. To address this issue, one of the master plan options includes the acquisition of property along NE Killingsworth St.

- Explore the acquisition of property along NE Killingsworth St. to provide greater visibility into the park and to improve the potential to develop a more functional entrance into the park. Although any additional frontage would be helpful, the specific parcels shown in the plan offer particular advantages.:

  - it would allow an access road that is in proximity to the parking area at the southeastern corner of the park;

  - it would be sufficiently far from NE 72nd Ave. that a traffic signal could be provided for safer ingress and egress, and

  - grading would likely be less extensive because elevation differences along NE Killingsworth St. and the park site are relatively smaller than other locations.

- Develop the additional property, if it is large enough, to include additional recreational facilities. This could include improvements that cannot be accommodated at the primary park site. Other possibilities include facilities that complement the park's uses, such as indoor soccer, handball courts, other recreation uses that could be developed as a partnership with private providers.

Acquisition of frontage along NE Killingsworth St. is included in Option 2.

Implementation Strategy

Because the Cully park site is undeveloped, it will require substantial site work before any recreational improvements can be developed. Furthermore, access to the site is restricted, which precludes even informal use.

As a result, development of the park -- even if it is phased -- as shown in the master plan will occur only when there is sufficient funding. Until that occurs, the site will continue to be monitored. Acquisition of additional property along NE Killingsworth St. could be pursued as an initial step (see map on page 27).

ACQUISITION

- Explore the acquisition of additional property along NE Killingsworth St. to provide better visibility and access for the park.
- If feasible, initiate the acquisition process.

FUNDING

- Explore the possibility of external (non-city) funding sources that focus on the redevelopment of brownfield sites. Partnerships with other organizations and agencies also should be researched.

DESIGN AND LAND USE

- Prepare a more detailed design of the park up to the design development phase. Cost estimates should be refined and should provide a high level of confidence.
- Develop a phasing plan which will allow for a sequential improvement of the site if funds for the entire project cannot be secured.
- Initiate the permit approval process. Developing the site will require the approval of several regulatory permits from a variety of agencies. The key regulatory agencies for the project will be the City of Portland, the Oregon Dept. of Environmental Quality, and potentially the Oregon Dept. of State Lands and the U.S. Army Corps of Engineers.

A summary of permits and approvals is listed below.

City of Portland

- Pre-Application Conference
- Land Use Review: Type III Conditional Use Review
- Grading and Building Permits

Oregon Department of Environmental Quality

- Landfill Management Permit
- NPDES 1200C Erosion Control Permit – for construction
- Closure Permit: modification of existing permit for changes to the landfill. Particular areas of interest will be how the development affects the landfill cap, the active gas extraction system, monitoring wells, leachate collection system, stormwater management, and other infrastructure.

Oregon Dept. of State Lands/ U.S. Army Corps of Engineers

- Joint Removal/Fill Application: – May be necessary if wetland determination/delineation during design phase identifies jurisdictional wetlands

Option 1

- Ball Field
- Basketball Court
- Community Garden
- Community Gathering Place
- Off - Leash Area
- Parking Area
- Picnic Shelter
- Play Area
- Soccer Field
- Steep Slope - Undeveloped
- Lawn
- Parking
- Circulation

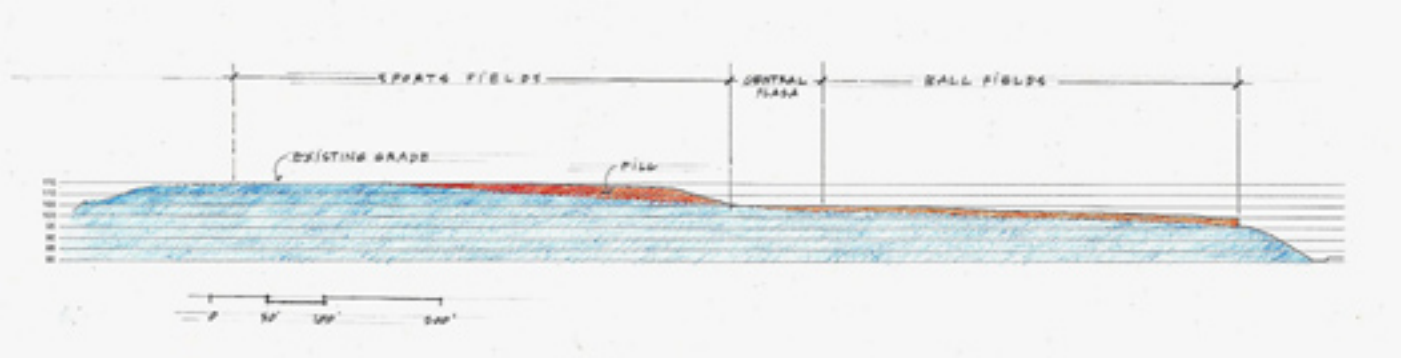
Option 2

Acquisition of frontage along NE Killingsworth St. is included in Option 2.

- Ball Field
- Basketball Court
- Community Garden
- Community Gathering Place
- Off - Leash Area
- Parking Area
- Picnic Shelter
- Play Area
- Soccer Field
- Steep Slope - Undeveloped
- Lawn
- Parking
- Circulation

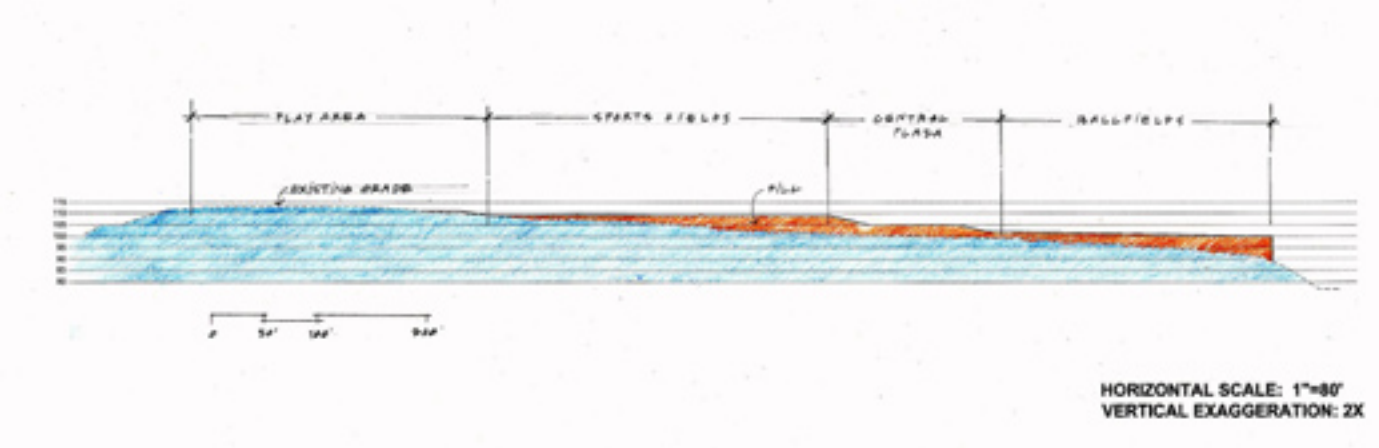
Option 1 Section

This option uses NE 75th Ave. for access into the park. Fill is required mainly for the parking lot and a portion of the large soccer field.



Option 2 Section

This option includes a new access road. Fill is required mainly for a large flat area for the two soft-ball/baseball fields, which are closer to the north slope than Option 1,



Summary of Costs

These estimates provide a general magnitude of costs for the two options as shown in the 2008 master plan and 2008 costs. Because the estimates are based on diagrammatic plans, many assumptions were made in preparing the costs. Note also that the estimates include a contingency that ranges from 20% to 40%. A more detailed estimate will be developed when construction drawings are being prepared.

Option 1

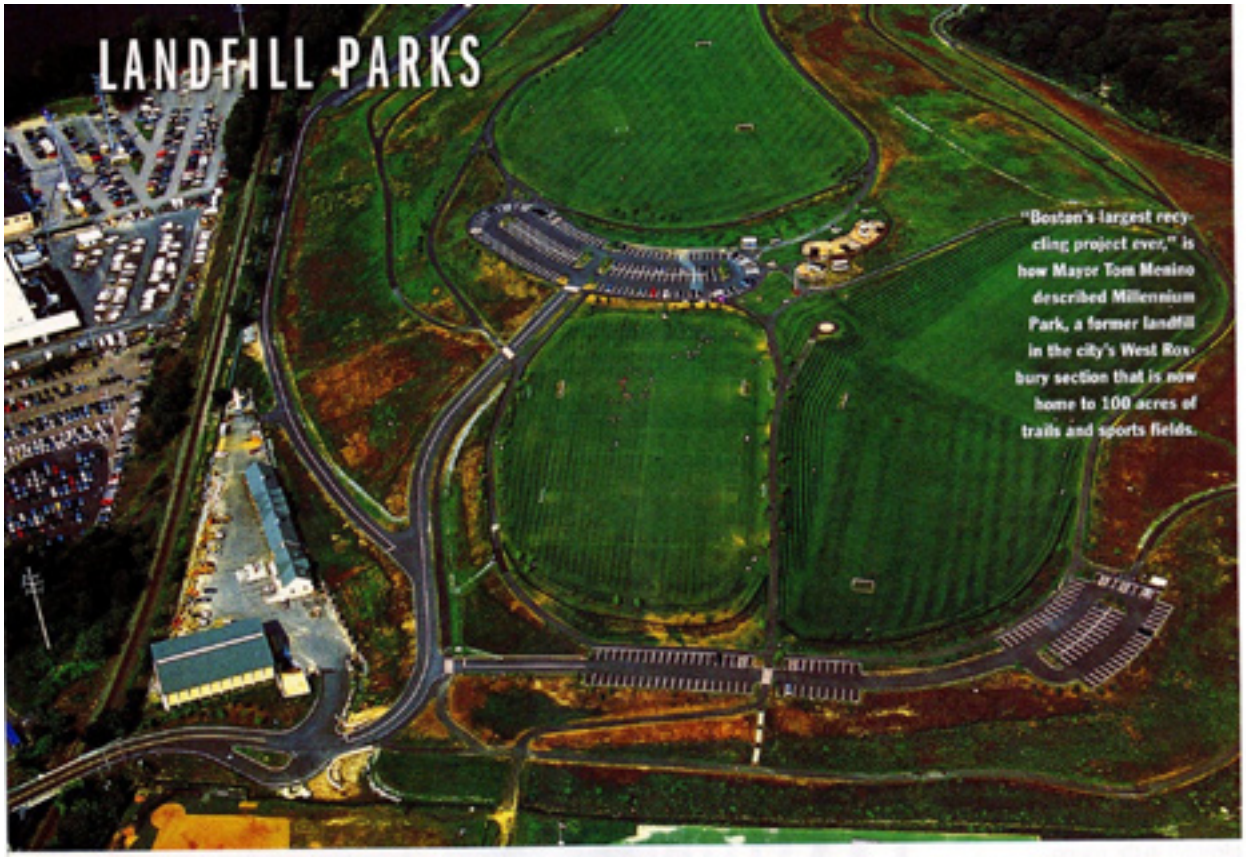
Site Preparation	$ 420,000 - 600,000
Street Improvements	$ 240,000 - 350,000
Earthwork & Erosion Control	$ 1,800,000 - 2,520,000
Paving	$ 900,000 - 1,260,000
Landfill Utilities	$ 180,000 - 260,000
Structures/Utilities	$ 720,000 - 1,000,000
Mechanical/Electrical	$ 120,000 - 170,000
Sports Fields & Courts	$ 2,400,000 - 3,360,000
Irrigation	$ 720,000 - 1,000,000
Planting	$ 420,000 - 590,000
Site Furnishings/Miscellaneous	$ 180,000 - 250,000
Off Leash Area	$ 60,000 - 85,000
Playground	$ 420, 000 - 590,000
Construction Sub-total	$ 8,580,000 - 12,035,000
Mobilization/Demobolization/Insurance/Bond (10%)	$ 858,000 - 1,203,500
Construction Total	$ 9,438,000 - 13,328,500
Soft Costs @ 25%	$ 2,359,000 - 3,309,625
Total Cost	**$ 11,797,500 - 16,548,125**

Option 2

Site Preparation	$ 450,000 - 630,000
Street Improvements - NE 72nd Ave.	$ 180,000 - 255,000
Access Improvements - NE 75th Ave.	$ 600,000 - 840,000
Earthwork & Erosion Control	$ 1,800,000 - 2,520,000
Paving	$ 960,000 - 1,350,000
Landfill Utilities	$ 180,000 - 255,000
Structures/Utilities	$ 840,000 - 1,180,000
Mechanical/Electrical	$ 120,000 - 170,000
Sports Fields & Courts	$ 2,400,000 - 3,360,000
Irrigation	$ 720,000 - 1,000,000
Planting	$ 600,000 - 840,000
Site Furnishings/Miscellaneous	$ 240,000 - 340,000
Off Leash Area	$ 60,000 - 85,000
Playground	$ 420,000 - 590,000
Construction Sub-total	$ 9,570,000 - 13,415,000
Mobilization/Demobolization/Insurance/Bond (10%)	$ 957,000 - 1,341,500
Construction Total	$10,527,000 - 14,756,500
Soft Costs @ 25%	$ 2,631,750 - 3,689,125
Total Cost	**$ 13,158,750 - 18,445,625**

Appendix A: Examples of Parks Built on Landfills

The articles in this section describe recent examples of parks that have been built on landfills. The articles are from Landscape Architecture magazine.



"Boston's largest recycling project ever," is how Mayor Tom Menino described Millennium Park, a former landfill in the city's West Roxbury section that is now home to 100 acres of trails and sports fields.

FROM DUMPS TO DESTINATIONS

The conversion of landfills to parks has great potential for cities.

By Peter Harnik, Michael Taylor, and Ben Welle

IMAGINE SUNBATHING, playing baseball, or flying a kite on top of a huge pile of garbage. Actually there's no need to imagine—you can simply head on out to Boston's Millennium Park. Fifteen years ago, known as the Gardner Street Landfill, it was a dump—literally. Today its 100 acres host sports fields, playgrounds, an outdoor classroom and amphitheater, six miles of walking and biking trails, and river access. As Mayor Tom Menino stated at its opening day on December 7, 2000, it is now "a place for people of all ages and backgrounds to come for a picnic, a friendly ball game, or some solitude."

No one has tabulated all the parks and public recreational sites created on old landfills. The number is certainly more than 250 and may well be over 1,000. They range from the famous—Flushing Meadow in New York (site of two world's fairs) and the appropriately named Mt. Trashmore in Virginia Beach—to the obscure, and from new inner-city basketball and tennis courts to expansive suburban golf courses and soccer complexes. One converted landfill in Berkeley, California, is home to an international kite festival, and another, in Albuquerque, New Mexico, hosts a celebration of hot air balloons.

It would be an overstatement to say that the nation's best urban parks are created from landfills, or even that capped landfills automatically make terrific parks. In an ideal world there would be certain real estate for landfills and different real estate for parks. (In an even more ideal world all trash would be recycled rather than discarded, and there would be no landfills at all.) But in a time of severe urban space and resource constraints, closed landfills present themselves as excellent locales for three big reasons—size, location, and cost—and communities from coast to coast have been jumping at the chance to use them.

Old landfills are so appropriate for conversion into parks that planners should not even wait until they are closed. Ideally, siting should be pre-envisioned by recreational planners, and layout should be predesigned by landscape architects well before the first bag of garbage is disposed of, years before a park is created.

The Earliest Landfill Parks

Landfill parks go back to at least 1916 (many years before the word "landfill" was coined), when Seattle created Rainier Playfield from the old Rainier Dump. In 1935 a more momentous conversion was completed in that

COURTESY OLMP, ENSSLEN & BROOKS INC.

very same city by the transformation of the 62-acre Miller Street Dump into a portion of the now-famous Washington Park Arboretum. The following year, New York City closed the putrid Corona Dumps—famously called the "Valley of Ashes" by F. Scott Fitzgerald in *The Great Gatsby*—and began preparing the land for construction of the 1939 World's Fair.

Following World War II, as the volume of trash in America mushroomed, so did the number of landfills—as well as the number that got filled up. The U.S. Environmental Protection Agency (EPA) estimates that as many as 3,500 landfills have closed since 1991; the number from earlier years is anyone's guess.

In theory, turning a landfill into a park is the ultimate in urban recycling and "sustainability," converting a noxious liability into an attractive asset, and in many cases it works beautifully. Even a superficial investigation of American big cities by the Center for City Park Excellence (CCPE) reveals more than 4,500 acres of successful landfill parks.

However, compared to a "greenfield" (virgin) site, an old landfill usually requires more time and much more planning to turn into a park. Indeed, numerous complex issues of toxicity, liability, and ground settling have conspired to keep localities and private land conservancies from undertaking some landfill-to-park projects. However, these challenges are not necessarily insurmountable. In fact, a similar set of hurdles has been faced and overcome by the rails-to-trails movement over the past 20 years.

A former dump usually represents one of the few large, open locations near the heart of a dense metropolitan area.

A former dump usually represents one of the few large, open locations near the heart of a dense metropolitan area. There is also the opportunity to correct what may have been a long-standing environmental injustice such as a nearby neighborhood that suffered the effects of a downwind stench. Finally, there's a good chance that the landfill—which may be as small as dozens of acres or as large as 1,000 or more—is inexpensive to buy, or free, or possibly that it even comes with some supporting funds for maintenance.

In Portland, Oregon, the parks department is getting a "free" park: All closure and conversion costs are paid by the solid waste department, which built up a reserve by tacking a per-ton fee on garbage disposed there. In Virginia Beach, where Mt. Trashmore required multiple fixes over decades, the original 1974 capping and the 1986 recapping were paid for by the public works department; the 2003 recapping—hopefully the last—was financed by the parks department through its capital improvement budget. In Fresno, California, the landfill isn't even being officially transferred over; the public utilities department will own it in perpetuity but will sign a management agreement with the parks and recreation department.

A cheap purchase price is important because preparation costs can be significant. Depending on the age and contents of the landfill, the amount of groundwater or soil contamination, and the planned recreational use, construction costs have ranged from $500,000 for a two-acre site to $30 million for a regional park of more than 100 acres. Costs depend on such factors as topography, availability of materials for the

CITY OF VIRGINIA BEACH AND BAUCH AERIAL PHOTO

fill and cap, cover design, and scale of the project; a rough calculation by CCPE puts the average at around $300,000 per acre. Responsibility for these and other costs may lie solely with the park developer or be shared by the landfill owner/operator.

Regulations and Resources

From a practical standpoint, of course, there are challenges that need to be anticipated and resolved. Consider 50-acre Mabel Davis Park, about four miles south of downtown Austin, Texas. Half of the park was a landfill that closed in the 1950s. The landfill was converted to a park in 1979, before adequate regulations were put in place, and Mabel Davis Park contained illegally dumped fertilizer and battery casings that caused leachate pollution. Also, topsoil was eroding due to unchecked runoff.

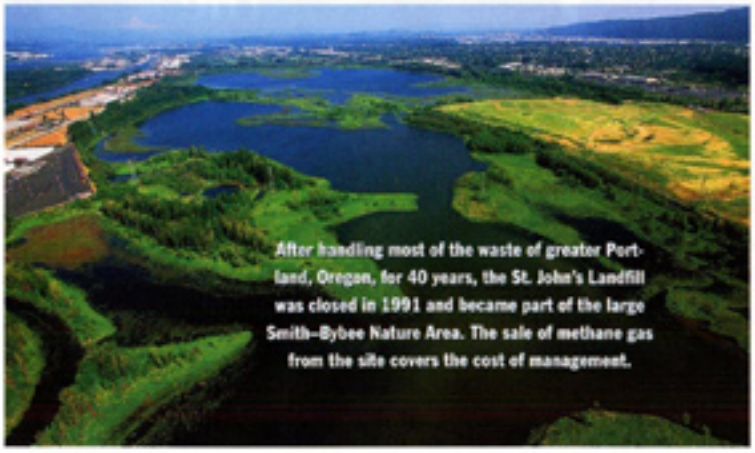
"After years of mounting problems, the city closed it in 2000 and began a remediation program to bring it up to EPA guidelines," says Christina Calvery, project manager for the Austin Department of Parks and Recreation. The $8.5 million project involved placing an 18-inch clay cap over illegally dumped materials and then covering that with additional fill. In addition, trees were removed from much of the area to prevent deep roots from piercing the landfill cover. The park reopened in December 2005. The story has a happy ending, but years of pollution followed by costly repairs could have been avoided if the park had been designed right.

The construction of municipal solid waste landfills has been regulated since November 1991 by the EPA. Today an owner/operator must install a final cover within six months of closure to minimize water infiltration and erosion. This cover must consist of an infiltration layer (18 inches of earthen material designed to impede the flow of water) and an erosion layer (6 inches of vegetated earthen material to prevent damage to the infiltration layer). The cover usually also has a gas-venting layer and a biotic layer (stone or a geosynthetic product designed to keep out burrowing animals).

The EPA requires that the owner/operator maintain the integrity of the cover, monitor groundwater contamination, and manage methane gas and leachate production for 30 years after the landfill is closed. There is also a financial requirement to cover post-closure care as well as cleanup if groundwater contamination occurs.

In some cases, government grants or loans may be available to help. In Providence, Rhode Island, the Trust for Public Land received a $200,000 EPA Cleanup grant to assist with capping costs for a former landfill being converted to a park.

An artist's conception depicts New York City's Fresh Kills Park, now being constructed on the site of a mammoth Staten Island landfill and slated to open in stages over a 30-year period. While hundreds of millions of tons of solid waste—including the World Trade Center debris—was placed here, more than half the site is composed of wetlands, waterways, and unfilled lowlands.



After handling most of the waste of greater Portland, Oregon, for 40 years, the St. John's Landfill was closed in 1991 and became part of the large Smith–Bybee Nature Area. The sale of methane gas from the site covers the cost of management.

Technical Issues

Technically, the two big challenges to reusing a landfill are gas production and ground settlement. Landfill gases—including methane, carbon dioxide, ammonia, and hydrogen sulfide—are created when buried waste decomposes. Methane may be released for 30 or more years after closure, and the EPA requires gas collection systems. (In parks built on pre-1991 landfills, there were occasional stories of picnickers being stunned to see a column of flames rising alongside their barbecue grills.)

As a matter of fact, methane collected from landfills can actually be sold to generate revenue for parks departments. An example is the former St. Johns Landfill, Portland, Oregon's primary disposal site for 50 years beginning in 1940. In 1991 Portland Metro closed the 240-acre dump, which is essentially an island of trash within the 2,000-acre Smith–Bybee Wetlands Natural Area, and began long-term restoration. Today, most of the methane gas produced by the landfill is piped two miles to heat the lime kiln of a cement company. The revenue,

LANDFILL PARKS

averaging $110,000 per year, helps pay for landfill closure operations.

Settlement is a bit tougher. Like cereal in a box, municipal landfills settle from 5 to 20 percent over a 2- or 3-decade period. That much settlement is impossible to prevent, causing foundations to break and sink, utility and irrigation pipes to burst, roads and paths to crack and heave, light poles to tilt, and sports fields to crumple. Obviously, if the ultimate reuse of a landfill is as a natural wildland, none of this matters. But most recreational reuses will require the construction of at least some trails, if not fields and various types of buildings; more intensive reuses may require amphitheaters, pro shops, eating and drinking facilities, and meeting rooms.

Foundations can be protected either through the use of deep pilings driven into the ground, which is costly and unreliable, or through careful planning. The key is to know exactly where the waste is. Since waste sits only in "cells" in certain areas of a landfill, park facilities can be safely constructed over undisturbed areas of the site, leaving the rest to support grass and shrubbery. For instance, in the current conversion of New York City's gargantuan Fresh Kills landfill, the city proposed building numerous significant structures. Planning Department Project Manager Jeffery Sugarman says the challenge was to identify areas best suited for them, which wasn't overwhelmingly difficult since only about 45 percent of the land area was actually used for waste disposal.

Parks also require utility and irrigation systems. While flexible electric and telephone cables can be buried within the upper layer of a landfill cover, that doesn't work for rigid gas, water, and sewer lines. (Pliable gas and sewer lines are extremely costly.) If utilities can't be laid within walls, second-best solutions include installing an aboveground watering system, using grasses that require little or no irrigation, or eliminating active recreation entirely. Usually a compromise can be found.

"Mabel Davis Park in Austin now contains flowers and grasses native to the central Texas plains that reduce the need for irrigation and maintenance," says Austin's Calvery, "thereby reducing leachate that would be produced by water filtering through the landfill material. At the same time, recreational areas can be attractively landscaped through trees planted far enough away from the landfill cover that roots will not puncture it."

Putting It All Together

With a surfeit of urban trash, a shortage of urban green space, and a rudimentary but improving land conversion technology, the landfills-to-parks movement is one with some good successes and huge potential for the future. Not only are there those 3,500 closed landfills, but the EPA reports that in 2002 there were still 1,767 landfills in operation nationally. To maximize this opportunity, much more planning can be undertaken, even before the first truckful of garbage is disposed of. Landfill design should be carried out cooperatively with a city or county park department and a landscape architect, to make sure that the landfill itself is in an appropriate place for a future park and that it can be converted into a useful facility.

With a surfeit of urban trash, a shortage of urban green space, and a rudimentary but improving land conversion technology, the landfills-to-parks movement is one with huge potential for the future.

Like everything else in our society, the landfill business is "sprawling" and "big-boxing"—shifting to ever-more-gigantic operations farther and farther from urban areas. Corpus Christi, Texas, is about to open a 2,000-acre landfill 10 miles outside the city, with projections that it won't be filled for 100 years. Colorado Springs's three landfills also have a century's worth of capacity left. Seattle now loads its waste onto trains and ships it over the Cascade Mountains to landfills in Washington state's eastern desert. It's unclear whether population sprawl in the twenty-second century will have caught up with the exurban landfill locations the way Manhattan grew over the farms that originally surrounded "distant" Central Park.

Advance planning can make the design of a landfill more amenable to eventually becoming a park. Most important, the "wall" areas of solid earth between trash-filled cells should be left thick enough that they can support not only underground pipes and conduits but also aboveground buildings and structures without any soil settlement. Moreover, efforts should be made to close portions of a landfill on a rolling basis so that older sections can be converted into parkland while newer ones are still accepting deliveries of waste. It may be possible to screen the sight and noise of the landfill from park users by constructing either permanent or temporary berms.

Before the United States finds itself involved in a broadscale, seamless landfills-to-parks movement, numerous challenges—technological, political, and legal—still need to be resolved. Back when land was cheaper and more easily available, it was not worth tackling the impediments, but now in many cases it is. With a three-pronged effort—to design safer waste dumps, work more closely with community activists, and assure protection from legal liabilities—communities will be able to create a vast new network of urban and suburban parks for a new generation of users. LAM

Peter Harnik is director of the Center for City Park Excellence at the Trust for Public Land and author of Inside City Parks. *Michael Taylor, a 2005 intern with the Trust for Public Land, is now a planner with the city of San Antonio. Ben Welle is a program associate at the Center for City Park Excellence.*

Adapted with permission from *Places: Forum for Design of the Public Realm*, vol. 18, issue 1, *www.places-journal.org*.

THE ULTIMATE SPECTACLE

What did it take to convert a decaying pile of trash into what Boston's mayor calls the harbor's newest jewel? By George Hazelrigg, ASLA

TODAY, SPECTACLE ISLAND is the new gateway for the 34 islands constituting the Boston Harbor Islands National Park Area. Since its June 2006 opening, the park has been a big hit with the public: After only a month, Spectacle Island attracted more visitors in a weekend than the hitherto most visited island in the harbor, Georges Island. The summit of the island's north drumlin—the highest point in Boston Harbor—offers a spectacular 360-degree panorama that includes Boston's skyline and lends itself to kite flying. Three kite weekends were already scheduled for the park's inaugural season. Informal jazz sessions are held on Sundays at the visitors center. Visitors enjoy hiking the trails amid abundant plantings and wildlife. Children now routinely swim in the beach area.

But 20 years ago, Spectacle Island lay abandoned, an open toxic dump known for its smoldering fires and contaminants leaching into the waters of one of America's dirtiest harbors. After a long history as a quarantine station, a summer resort with gambling and prostitution, and a plant that rendered horses into glue, Spectacle Island served for 47 years as a Boston city dump. It closed in 1959.

Then, in the late 1980s, Massachusetts initiated a $4.5 billion Harbor Cleanup, including construction of a modern sewage treatment plant on nearby Deer Island. At the same time, planning was under way for Boston's Central Artery Tunnel (CA/T, the "Big Dig") project, which would need to excavate 16 million cubic yards of dirt, clay, gravel, and debris. The CA/T needed to identify sites where the dirt and debris could be deposited economically. Agreements with city and state agencies led to the deposit of more than 3.5 million cubic yards of Big Dig material on Spectacle Island from 1993 through 1997, requiring more than 4,400 barge trips. In return for a site to deposit its material, the CA/T promised to cap the landfill and build trails, a marina, and a visitors center.

The task was daunting. The main trash dump area, in a "saddle" between the island's two glacially formed drumlins, formed a large 60- to 65-foot vertical cliff of exposed refuse on the island's east side. To accommodate the CA/T material, a containment dike made of compacted glacial till and large boulders had to be constructed far enough out to achieve a 3:1 slope. To build 3,100 feet of seawall along the shoreline for erosion protection, 600,000 tons of stone were brought in.

Originally, CA/T officials wanted to expand the island from 97 acres to 120 acres, but the state's Department of Environmental

MASSACHUSETTS TURNPIKE AUTHORITY

A 2003 aerial photograph, looking southwest, shows the island project nearing completion. Plantings continue to mature and give shape to the island.

LANDFILL PARKS

Protection (DEP) and the U.S. Army Corps of Engineers were opposed, and it was finally agreed to restrict the island to 105 acres. Height was also restricted. Although 60 feet of CA/T material was added to each drumlin, their heights were limited to accommodate flights into Logan Airport, four miles to the northwest.

Instead of the clay normally used for landfill caps, an 18-inch cap was made from screened glacial till extracted from the south drumlin and from nearby Deer Island. A sand drainage layer atop the cap was then covered with loam substrate, primarily mixed glacial till and sand, and a final layer of topsoil. The combined thickness of loam substrate and topsoil ranged from 2 to 5½ feet thick.

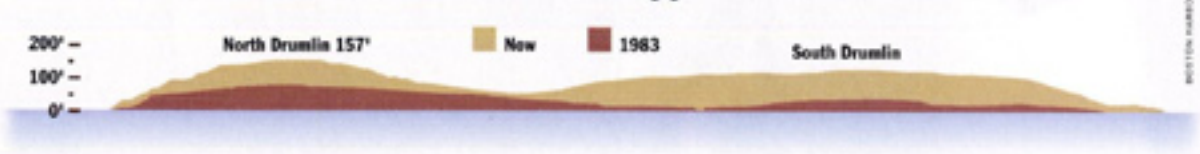
This was no ordinary topsoil. Instead of stripping the native soil off state farmlands, the Boston landscape architecture firm of Brown & Rowe (now Brown, Richardson & Rowe), which was responsible for the final grading and erosion control phase of the project, won approval to use manufactured soil (see "Gaining Ground," *Landscape Architecture*, August 1997). The manufactured soil was made from glacial till from the island and imported coarse sand—and, most important, composted sewage.

For the compost, the project contractor turned to a firm in New Hampshire that was to provide a mixture of 70 percent brewery waste and 30 percent "biosolids," or processed sewage solids. The brewery waste ran out in the first phase and the project began using 100 percent biosolids. In the end, the top layer was predominantly sand and biosolids and some glacial till, coarsely mixed with bulldozers. The Spectacle Island project was probably one of the largest-scale uses of biosolids by the late 1990s. For those landscape architects who might want to use manufactured soil on other projects, Brown & Rowe principal Clarissa Rowe, ASLA, says that mixing soil is a complex science and that landscape architects greatly benefit from working closely with a soil scientist. Phillip Craul, author of *Urban Soil in Landscape Design*, was engaged by Brown & Rowe as soil scientist for this project.

After testing to verify organic content, a top dressing of compost and then 30- to 40-year-old softwood bark from northern Maine were blown onto some areas of both

An early plan drawing of the island, *here*, shows the general layout of the island, including some five miles of walking trails and a visitors center with pier/marina. A section drawing, *below*, shows the profile of the island's two drumlins "before and after."

Instead of stripping soil off state farmlands, the Boston landscape architecture firm of Brown & Rowe won approval to use manufactured soil.



Erosion control walls and plantings, *left*, stabilized the drumlin slopes. The island's history has substantially changed over the past four centuries, *below*.

drumlins. The top dressing was repeated in the following seasons to ensure the required soil organic levels.

WHEN THE TOPSOIL was in place and graded, Brown & Rowe was left with a bare island without seed sources and a soil that was manufactured. The next step: planting.

Design plans called for more than 2,300 trees and 25,600 shrubs plus a variety of grasses to be planted. While aesthetics were a factor, the firm's primary concern was erosion control and plant survivability under the harsh conditions. Brown & Rowe's approach was to protect the site's 3:1 slopes with multilayered vegetation—grasses, shrubs, and woodland trees planted between 1997 and 2000—in linear bands along slope contours. In their plan, deciduous trees would be underplanted with grasses and legumes to help stabilize the slopes while the trees matured, shrubs would be surrounded with noncompetitive grasses and legumes to increase the soil's water retention until shrub roots had knitted together, and heights and densities would be alternated to counter winds buffeting the site. Rowe says they wanted plants that were self-seeding and naturalizing and needed no additional water after their establishment period. "Basically we designed for low or no maintenance," Rowe recalls.

Whether to use natives or exotics? While some who reviewed their plant list felt there were too many nonnatives, Rowe and her colleague Alison Richardson felt that exclusive reliance on natives would not work at the outset due to the natives taking much longer to establish themselves. They needed plants that could immediately withstand the winds, particularly in winter.

Even "low or no maintenance" plantings require water during their initial establishment. Irrigation pipes with sprinkler heads were brought in, and water was barged to a large tank on the north drumlin. Two water cannons were also employed. By the summer of 2002, the pipes were no longer needed.

The Evolution of Spectacle Island

THE ISLAND HAS EVOLVED in form and function since its days as a Native American fishing ground in 500 AD. In its latest incarnation, the island is a public park transformed from an open mountain of garbage with excavated material from the Big Dig.

1600s

1634 The island is granted to the city of Boston from England and renamed for its resemblance to a pair of spectacles. The land is used for pasture and timber cutting.

1700s

1717 A quarantine hospital is constructed on the south drumlin. After 20 years, the hospital is moved to Rainsford Island and Spectacle Island is used for picnics and excursions from the mainland.

1847

1847 Two resort hotels are constructed on the north drumlin. Gambling is the major attraction. A police raid in 1857 stops the gambling and the hotels soon close.

1857

1857 A horse rendering business is set up that processes 2,000 horses a year to produce hides, glue stock, horse hair, oil, and bones. Thirteen families live on the island. The business is abandoned in 1910.

1921 A plant for the reclamation of grease from garbage is established. The plant is abandoned in the 1930s, but the city continues to dump garbage until 1959.

1947

1960 Fire breaks out and burns underground for many years. Garbage is 100 feet deep in places along the original sandbar and on the north drumlin.

1987

1990–2000s The island leaks thousands of tons of eroding material into Boston Harbor and is an environmental hazard.

September 1992 Barges haul 7 million tons of dirt and fill to Spectacle Island. The island grows from 97 to 105 acres and up from 75 feet at its highest point to 157 feet.

2006 The island opens to the public.

What Grew, What Didn't

Plants that did best

Nonnative grasses, especially the pasture grasses

Northern bayberry *(Myrica pennsylvanica)*

Rugosa rose *(Rosa rugosa)*

Ural falsespirea *(Sorbaria sorbifolia)*

Roseacacia locust *(Robinia hispida)*

Others that did well

Sycamore maple *(Acer pseudoplatanus)*

Shadblow serviceberry *(Amelanchier canadensis)*

All pine *(Pinus)* species

Eastern arborvitae *(Thuja occidentalis)*

Pin oak *(Quercus palustris)*

Northern red oak *(Quercus borealis)*

Sweet fern *(Comptonia peregrina)*

Beach grass (a native grass)

Biggest unanticipated losses

Nearly all the flowering crabapple *(Malus)* species
(Destroyed by muskrat population)

Green Colorado spruce *(Picea pungens)*
(Attacked by insects in third year)

Various native and ornamental grasses and wildflowers

Lowbush blueberry *(Vaccinium angustifolium)*

Highbush blueberry *(Vaccinium corymbosum)*
(Present on island when visited in 1991)

All juniper *(Juniperis)* species
(Spider mites)

Volunteer species, brought by birds or wind

Common staghorn sumac *(Rhus typhina)*

Willows, black pussy *(Salix melanostachys)*, and white *(Salix alba)*

Quaking aspen *(Populus tremuloides)*

Common reed *(Phragmites australis)*

Cattails

Eurasian weeds (Queen Anne's lace, ragweed, buttercup, mugwort)

Second only to erosion control in the plant scheme was wildlife habitat creation, and this seems to have worked out well. Deer and coyote have occasionally been spotted on the island along with a great variety of birds. A less welcome addition was an early invasion of muskrats, believed to have been responsible for the death of nearly all the crabapple trees. During 2001 to 2002, before any visitors were on the island, project personnel shot at least 1,000 of the animals, ending the problem at least for the time being.

FOR LANDFILL REUSE projects, three factors are always considered: settlement, methane, and leachate. At Spectacle Island, the first two were never issues. After the first year of construction there was little or no settling. What little gas is produced is vented at heights that ensure the gases pose no threat to public health.

Leachate was a different matter. How much of it, including metallic salts and petroleum compounds, was entering harbor waters was difficult to measure. "Thousands of gallons" had been frequently cited in press articles and public statements over the years, yet some involved professionals believed that the leachate levels were far below that. In 1994, a mercury "hit" precluded sending the leachate to the new Deer Island treatment plant because of Environmental Protection Agency prohibitions and plant concerns. (There have been no signs of mercury since.)

The DEP was concerned that leachate from the uncontrolled dump might enter the harbor during cofferdam and dike construction. Interception trenches along the base of the dump's east-side bluff and well points were installed; leachate was pumped to ponds atop the dump, where much of it evaporated. It remains unclear when or whether leachate will recover to whatever earlier levels in fact existed, but that potential threat could not be ignored.

Piping the leachate off island, an expensive undertaking, was opposed by state and city representatives. In 1998, a system to recirculate the leachate within the landfill was proposed as a temporary measure to buy time while further treatment and disposal options were explored. With DEP approval, the system was put into service in 1999 and worked without problems through 2003. It failed the following year, shortly before the island's anticipated public opening. Subsequent efforts to correct the failure proved unsuccessful.

To the chagrin of its many public and private advocates, the park could not be publicly opened until the leachate disposal issue was resolved. In addition, agreements over the short- and long-term financial obligations of the CA/T and the island's owners—the state's Department of Conservation and

Looking toward the south drumlin, the visitors center and pier/marina are seen in the background. The four pier remnants extending into the water in the foreground are the only survivors of a rich and varied island past.

LANDFILL PARKS

Recreation and the city of Boston—and required documentation for DEP approval of the landfill's final closure and a post-closure use plan were not finalized until early 2006. The CA/T finally agreed to construct an underwater sewage pipe to pump leachate and septic water from Spectacle Island to nearby Long Island, where it will enter an existing line to the Massachusetts Water Resource Authority (MWRA) plant on Deer Island. Following necessary testing at Spectacle Island, the MWRA put aside its earlier concern that Spectacle Island leachate could contaminate its system, although there will be ongoing testing; the commitment to proceed with the pipe allowed the park to be opened. CA/T officials hope to have the pipe installed by the end of the year. In 2005, there was one large leachate offload: 408,000 gallons were barged to the Deer Island MWRA plant, and another barge transfer should not be necessary before the new pipe is ready.

DAILY FERRIES transport all visitors between the island and Boston's Long Wharf. Round-trip fees, $10 to $12 for adults and $7 for children (3 to 11), have been criticized as too high, particularly for inner-city residents. The ferries arrive at a visitors center and a 550-foot-long L-shaped pier with a 38-slip marina that were constructed near the center of the island's west side. Approximately 5 miles of Americans with Disabilities Act-compliant walking trails wind around the island's shoreline and up to the drumlin summits.

A swimming beach just to the north of the center was installed, the beach area was dredged, and sand was imported. Over time the sand began to erode and continues to migrate to and pile up under the dock area. Moving sand back every few years will be expensive, and the silt buildup remains an unresolved issue.

The visitors center includes green building features such as composting toilets and roof-mounted photovoltaic solar panels that produce electricity to power the park's maintenance vehicles. Potable water and electricity are piped in from Long Island. There was an early plan to use part of the center's graywater to irrigate the garden areas. The latter proved technically impossible, however, and the graywater is now held in a tank and barged off the island every week or so pending completion of the pipe to Long Island.

Sasaki Associates was contracted to be landscape architect for the visitors center area, but plans for the center and marina kept getting scaled down until there was little landscape left. In the end, says Sasaki principal Neil Dean, FASLA, Sasaki did consult briefly on the Brown & Rowe planting list, but the planting concept undertaken by Brown & Rowe was the big landscape story at Spectacle Island.

Now that the park has opened, how are the plantings doing?

Rowe says that they always knew the plant list was somewhat experimental and that some plants would thrive and some would not, but the wisdom of installing a wide range of species has been confirmed. The plants are beginning to form a forest and give shape to the island, and those plants that survived the early years are expected to continue thriving. Other than some mowing, there has been minimal maintenance required. Until 2001, CA/T environmental biologist Ralph DeGregorio eradicated invasive phragmites through spot applications and hand wiping and purple loosestrife by manual removal. Mugwort *(Artemisia vulgaris)*, a fast-growing colonizer that may be the greatest concern at Spectacle Island, is relatively easy to control by mowing and has been successfully managed to date. The National Park Service is participating in the development of long-term vegetation management plans for the island. A group of volunteers has begun mapping the locations of invasive species populations such as ailanthus, oriental bittersweet *(Celastrus orbiculatus)*, and multiflora rose *(Rosa multiflora)* in addition to those already mentioned.

Despite all the challenges, delays, and remaining tasks, Spectacle Island is living up to its new star status. One shortcoming: Despite the island's rich and varied history, the only obvious reminders are a few pier remnants from the horse rendering plant. That's hardly surprising, as 3.5 million cubic yards of excavated material have been dumped atop the 105-acre site. Walking around the island, I find it hard to picture its earlier lives or to remember that families supporting the rendering plant and dump actually lived on the island, maintained gardens, and sent kids to school up to the mid-twentieth century. The park's owners should find programmatic and visual ways to bring the island's history to life for contemporary visitors. LAM

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PROJECT CREDITS **Client (Materials Disposal System project):** Massachusetts Highway Department. **Contractor:** Cashman, Kiewit, Perini, and Atkinson. **Landscape architects of record:** Brown, Richardson & Rowe Inc. (Alison Richardson, Clarissa Rowe). **Management consultant:** Bechtel/Parsons–Brinckerhoff. **Owners:** The Commonwealth of Massachusetts Department of Conservation and Recreation and the city of Boston's Parks and Recreation Department. **Planting contractor:** M. O. N. Landscaping (Jaime Perriera, project representative). **Prime engineering consultant:** Century/ Weston & Sampson, Engineers (Mike Hanlon, Mike Scipione, chief engineers). **Programming:** National Park Service and the Island Alliance (Tom Powers, director). **Project horticulturist:** Ralph DeGregorio. **Project representative:** Mike Virta. **Soil scientist:** Phillip Craul.