Art Master Plan

BRIGHTWATER TREATMENT SYSTEM

Prepared for the King County Department of Natural Resources and Parks and the Cultural Development Authority of King County

Ellen Sollod • Jann Rosen-Queralt • Buster Simpson

December 2003

King County Brightwater TREATMENT SYSTEM

MITHŪN Streeter & Associates Architects

Hargreaves Associates

S²RQ sollod.rosen-queralt.simpson

cultural development authority of king county arts heritage historic preservation public art

HOW TO READ THIS BOOK

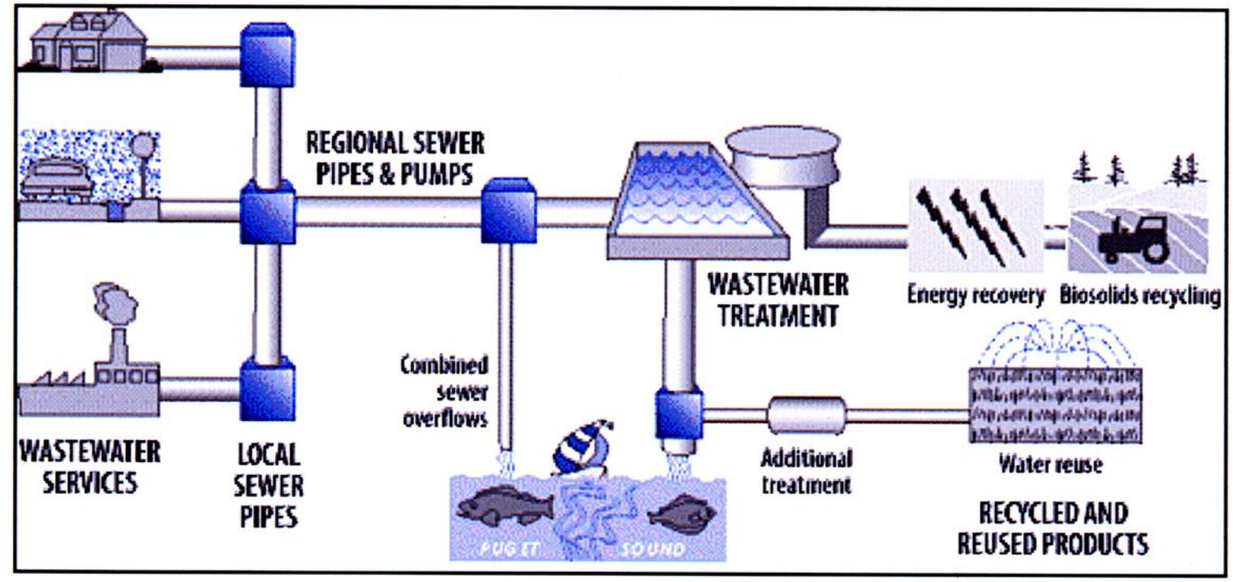
The Brightwater Art Master Plan for the Brightwater Treatment System describes a philosophical approach, criteria, guiding principles and art opportunities for the wastewater treatment plant and conveyance corridor. This booklet is intended to provide guidance to future artists involved in the project and to inform the general public about the context for art in the system.

This Master Plan includes a wide variety of maps, diagrams and illustrations intended to inform the reader about the site, art opportunities, conveyance system, approach to architecture, landscape architecture and engineering. Many of the maps and diagrams were prepared by Mithun, Inc., Hargreaves Associates, and Lehrman Cameron Studio. These maps and diagrams are proprietary and are for project use only.

A companion to this Art Master Plan is the Brightwater Art Concept Workbook prepared in April 2003. This workbook describes in detail thematic ideas that artists might reference in creating work. This is available on-line at http://www.culturaldevelopment.org. It is recommended that artists interested in being involved in the Brightwater project refer to this document.

Prepared for the King County Department of Natural Resources and Parks and the Cultural Development Authority of King County by Buster Simpson, Ellen Sollod, and Jann Rosen-Queralt, in association with Mithun, Inc., Hargreaves Associates, Lehrman Cameron Studio and CH2MHill.

Special thanks to Todd Metten and Sabrina Prielaida.



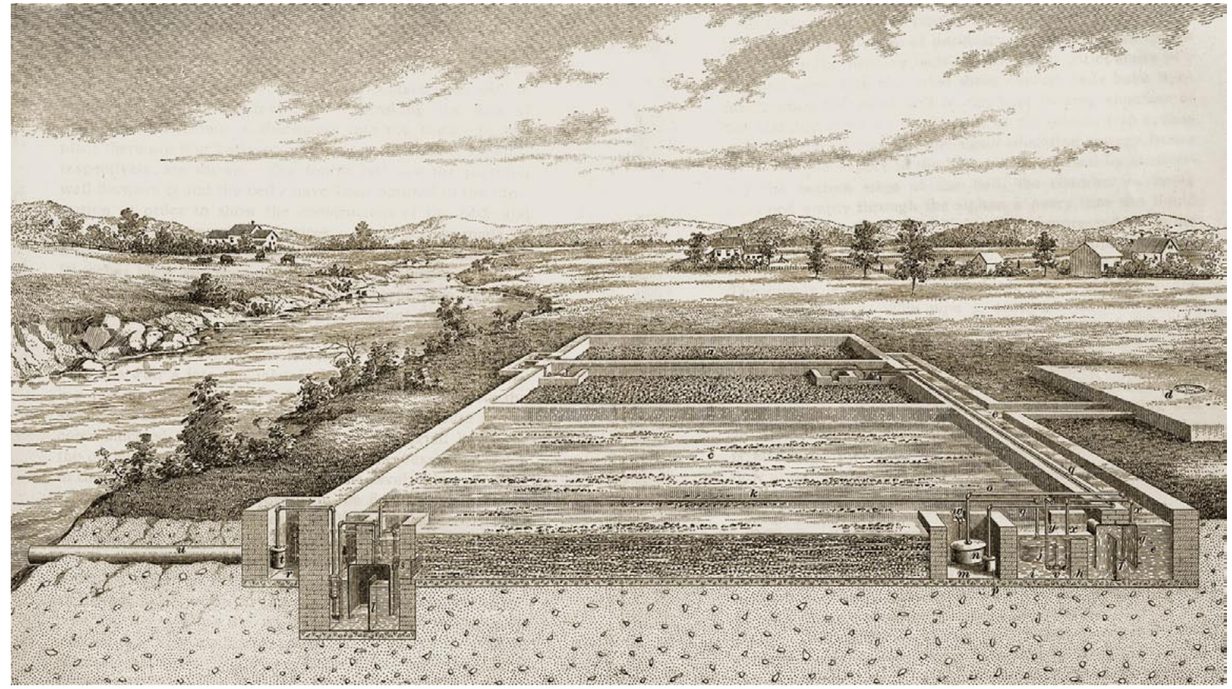


TABLE OF CONTENTS

How To Read This Book 2
Introduction 4
- Art Master Plan Approach 4
- The Five Threads 5
- Guiding Principles 5

The Brightwater Plant 6
- The Plant Site 6
- Surrounding Context 6
- Engineering, Architecture, Landscape Architecture Approaches 8
- Art Opportunities For The Plant Site 12
  - Human Intervention in the Water Cycle 14
  - Natural Water Systems 17
  - Culture and Community 18
  - Anomalies 20

The Conveyance Corridor 22
- Character Of The Area 22
- Art Opportunities Along The Conveyance Corridor 23

Artist Selection Methods 25
Appendices 26
- Route 9 – A Brief History 26
- Route 9 Site Design Guidelines 26
- Landscape Design Approach 26
- Engineering 27
- Building Concepts And Goals 28
- Pedestrian Circulation 29
- Schematic Layout 30

Bibliography 31
Photo Credits 32

INTRODUCTION

Long ago, Northwest coast tribes had a saying, "when the tide is out, the table is set." It was a time when First Peoples' relationship to their environment was second nature. With the advent of the industrial revolution, came what Victor Hugo refers to as the "Ditch of Truth," whereby city sewers became blatant, albeit honest, expressions of our disregard for natural systems.

Now, in this time, King County's intention is to make Brightwater a community amenity and to maximize opportunities to educate the public about the importance and function of wastewater management. By county ordinance, artists are involved in the planning and design of public infrastructure projects. Brightwater presents a new opportunity for artists to develop sensory reminders of our region's ethic of environmental stewardship and sustainability. This Art Master Plan presents a wide range of opportunities for artists to respond to this major infrastructure endeavor. Artists can contribute in this capacity as provocateurs, collaborators, makers, and thinkers.

Art Master Plan Approach

The Art Master Plan will be implemented by the Cultural Development Authority of King County in cooperation with the King County Department of Natural Resources and Parks, Wastewater Treatment Division. This plan is predicated on the principle of revealing the wastewater and storm water treatment systems and the natural water cycle through artwork that affords the viewer opportunities to experience, engage, and contemplate. The art should be of the highest aesthetic quality. The plan describes this being accomplished through a fully integrated approach to art, education, architecture, landscape architecture and engineering for the treatment plant and conveyance route. It proposes this be achieved through the involvement of lead artists as participants on the design team and through specific artwork commissions.

Artists participating in the Brightwater project are challenged to be visionaries and aestheticians in creating works that ingeniously expose the working processes of the system and engage the public in inquiry and discovery. The opportunity exists to showcase Brightwater as a vision of sustainability where art becomes a key component in support of mission.

The Five Threads

The Brightwater design team composed five notions that run through all elements of the system's design – art, architecture, engineering, landscape architecture, and education. These function as an overlay and reflect our design values.

- Transparent, exposed: We will endeavor to make the process readable and understandable to the public. This means finding ways to reveal the mystery behind how things work.
- Integrated: We will strive to reflect an integration of the natural water cycle with intervention of the treatment cycle.
- Concentrated, collective: We will concentrate on creating cohesive experiences that will provide a focus for public attention.
- Multiple experiences: We will recognize that many voices can make a richer chorus and that there is room for distinctive elements within the whole.
- Active, not static: We will embrace the seeds of change as the landscape matures, technology becomes more advanced and site requirements shift over time.

Guiding Principles

The artists' challenge is to explore intuitively Brightwater's mission to "help protect the delicate Puget Sound aquatic ecosystem and fully integrate the processes of wastewater, water reclamation and the natural systems of the site [system], within a framework that educates and sustains nature and our culture." We think of the wastewater treatment system – conveyance, plant, and marine outfall – as an opportunity to demonstrate through art the environmental connection between our lives, the region, and the world.

System-wide, commissioned artworks will correspond to these criteria:

- Be clear and articulate to the public.
- Reflect an understanding of the site and related communities.
- Integrate, where appropriate, with the architecture, engineering, and landscape architecture and complement the educational program.
- Reflect the Five Threads (referred to above) and, within them, explore one of the four themes of water, science, reclamation, and culture.
- Strive to demonstrate responsible stewardship in the making of artworks.
- Be poetic in delivery while efficient in production.
- Use humor when appropriate.
- Involve a collaborative mindset.

THE BRIGHTWATER PLANT

The Plant Site

The Route 9 site has experienced successive waves of development and corresponding physical degradation. Today auto wrecking yards and industrial parks are degrading the land with run-off and are leaching pollutants into the soil. It stands as a heavily traveled crossroads of Route 9 and Route 522 in unincorporated Snohomish County. The area has been and continues to be a place where people have passed through. Without a sense of center, few have rallied to protect the site's natural resources. (See *Appendices* for "Route 9 – A Brief History")

In converting this site to a wastewater treatment plant, we have the opportunity do so in an environmentally responsible fashion. We can honor this land, bring back the streams, and restore the wetlands. On a larger scale, Brightwater will contribute positively to the water quality in the region by utilizing advanced technology in wastewater treatment in a growing population center.

Surrounding Context

The proposed location of the Brightwater wastewater treatment plant is within the Little Bear Creek Watershed in Snohomish County north of Woodinville and the King County line. The urban growth boundary passes through the northern portion of the Brightwater site dividing industrial and commercial zoned land from low density and, increasingly, to new track housing to the north. Maltby, just north of the Brightwater site is becoming a new "town center". Within the area, there are a number of resource recovery industries, including paper recycling, glass cullet, concrete reprocessing, yard waste composting for the landscaping industry, and auto recycling yards. Brightwater will recycle water for reuse and solids for soil amenities and energy from the gas byproduct.

Little Bear Creek is the natural connector of this landscape as it flows to the Sammash River to the south. The Sammash River pedestrian and bicycle trail provides alternative transportation in the area. There is an active coalition of citizens working to protect Little Bear Creek and preserve its salmon-spawning habitat. The Brightwater will play an active role in water mitigation and protection of the watershed.

Bear Creek Grange
CLEFT OF THE ROCK
SUNDAY 10AM 5P
JOIN US
BENEFIT SALE GARAGE
RI 12-6 & SAT 9-3
HERE

Engineering, Architecture and Landscape Architecture Approaches

The pre-eminence of Brightwater's function as a wastewater treatment plant means that engineering directs the architecture and landscape strategies while informing the approach to art. Brightwater will include innovative processes that return the water and other resources to a higher level of reuse. The design team has attempted to create a holistically designed facility that tells this story and embraces new technologies. In this regard, during schematic design, artists have sought to instigate a broader vision of engineering by examining, distilling and illuminating basic technological assumptions. They have initiated discussion of models of sustainable approaches to reduce those that are water- and energy-dependant. They have done this by encouraging demonstration projects that use green roofs, on-site living machines, gray water and rainwater recovery. They have seen these experiments as assets that can be celebrated through a series of follies, features and functions. This facility has the capacity to be a laboratory and public forum to investigate and present future processing and sustainable options.

A brief review of the approaches to engineering, architecture and landscape architecture is included here to provide artists an overview of these disciplines' strategies. More detailed descriptions plus maps and diagrams are included in the *Appendices*.

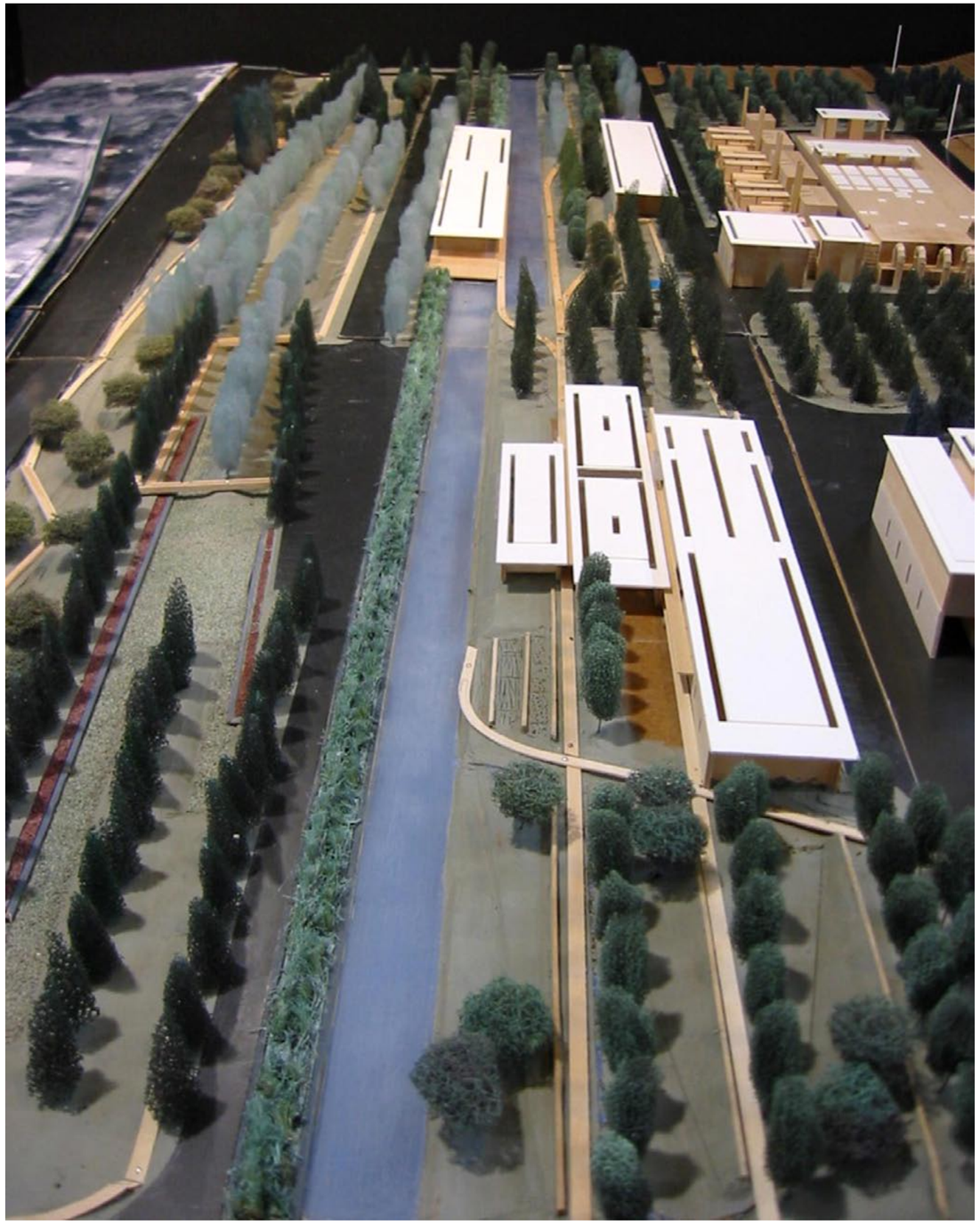
ENGINEERING

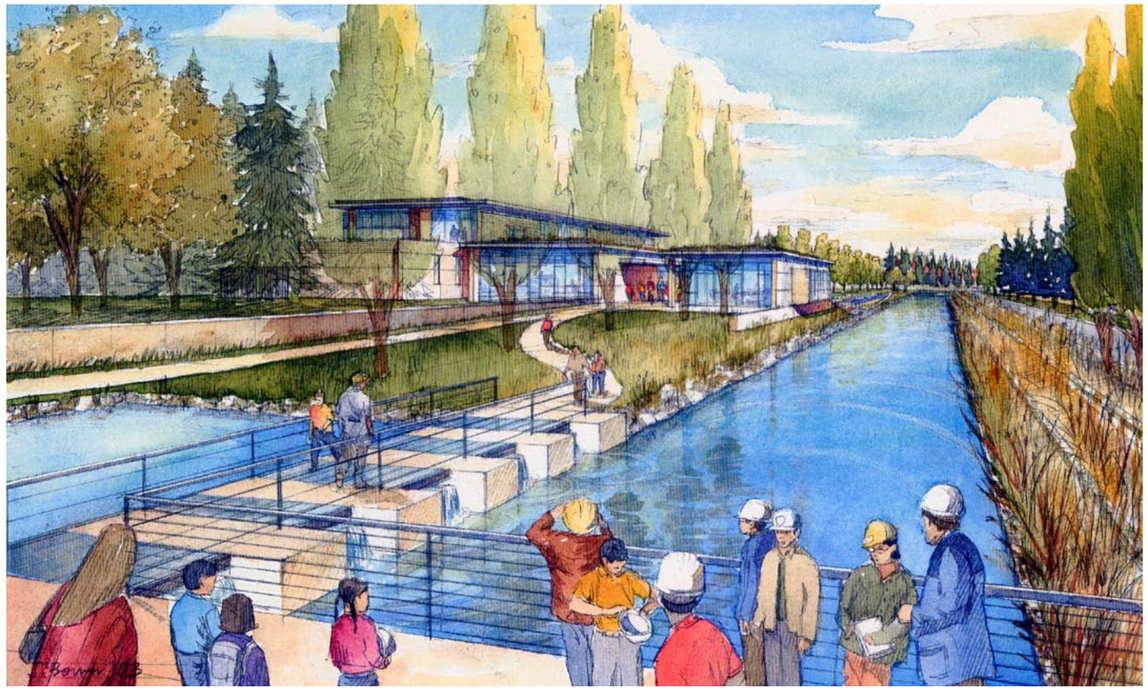
Engineering at Brightwater reflects several innovations in wastewater treatment that should be recognized. Membrane technology will be utilized so that less space is needed and a tertiary quality effluent could be produced. All process units will be either enclosed or covered and all the air will be collected and treated in multi-stage odor scrubbers prior to release to the atmosphere. Multi-staged lids will be used for odor control to increase efficiency and effect. Lastly, the plan calls for effluent reuse to irrigate the landscape and clean areas within mechanical and chemical areas of the plant.

ARCHITECTURE

The architectural intent is one of function in form, gesture of purpose, logic and economy, and sustainable practices. Site conditions and land use goals further inform the architecture approach. With the exception of a community/education center and administration building, the buildings function primarily to enclose industrial processes. The architecture is designed to be efficient and possess a workspace quality that acknowledges the importance of human capital. The architects have attempted to maximize natural light in enclosures in which people will work. The building vocabulary of extended, louvered roofs is intended to accommodate potential expansion. Materials are primarily concrete and glass. The County has established attaining a LEED™ (Leadership in Energy and Environmental Design) Silver rating as a goal for the facility.

To passing motorists (this being an auto centric area), the architecture seems to float topographically in the change in contours, emerging out of what will become a constructed wetlands and forest.





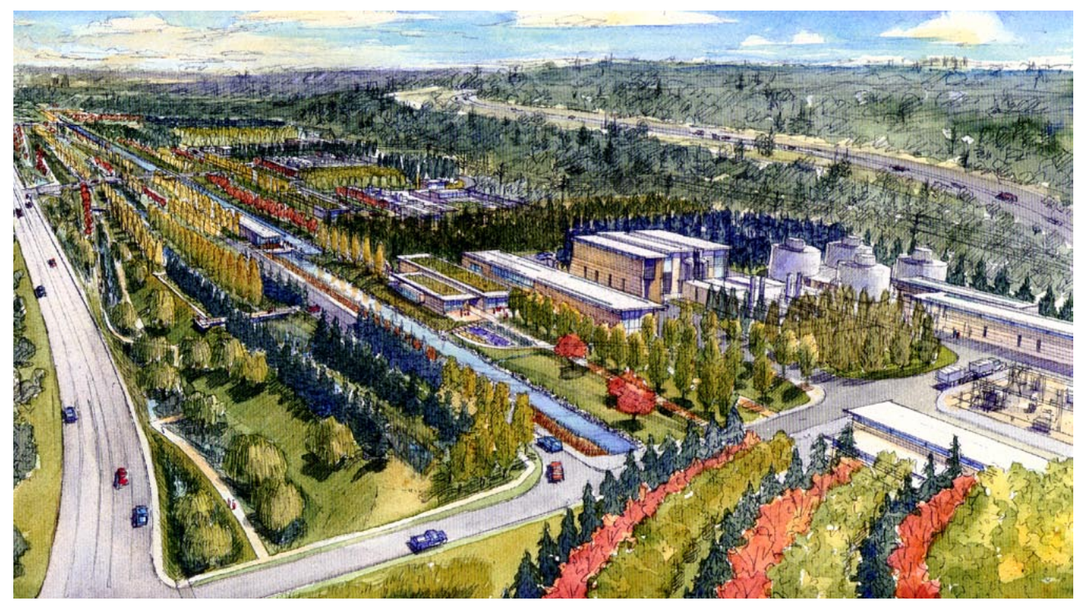
LANDSCAPE ARCHITECTURE

The landscape brings a living cohesiveness to the site and performs a mitigation task within the constructed wetlands and forest. It is a living and efficient metaphor of the process train with a responsibility to clean water naturally. Like the architecture, the landscape engages and capitalizes on the changing elevations to reveal and conceal longitudinal wetland switchbacks, slowing the flow of water cleansing, ultimately releasing clean, cool storm water run-off into Little Bear Creek. A goal is to reuse on-site as much as possible the soil excavated to create the plant.

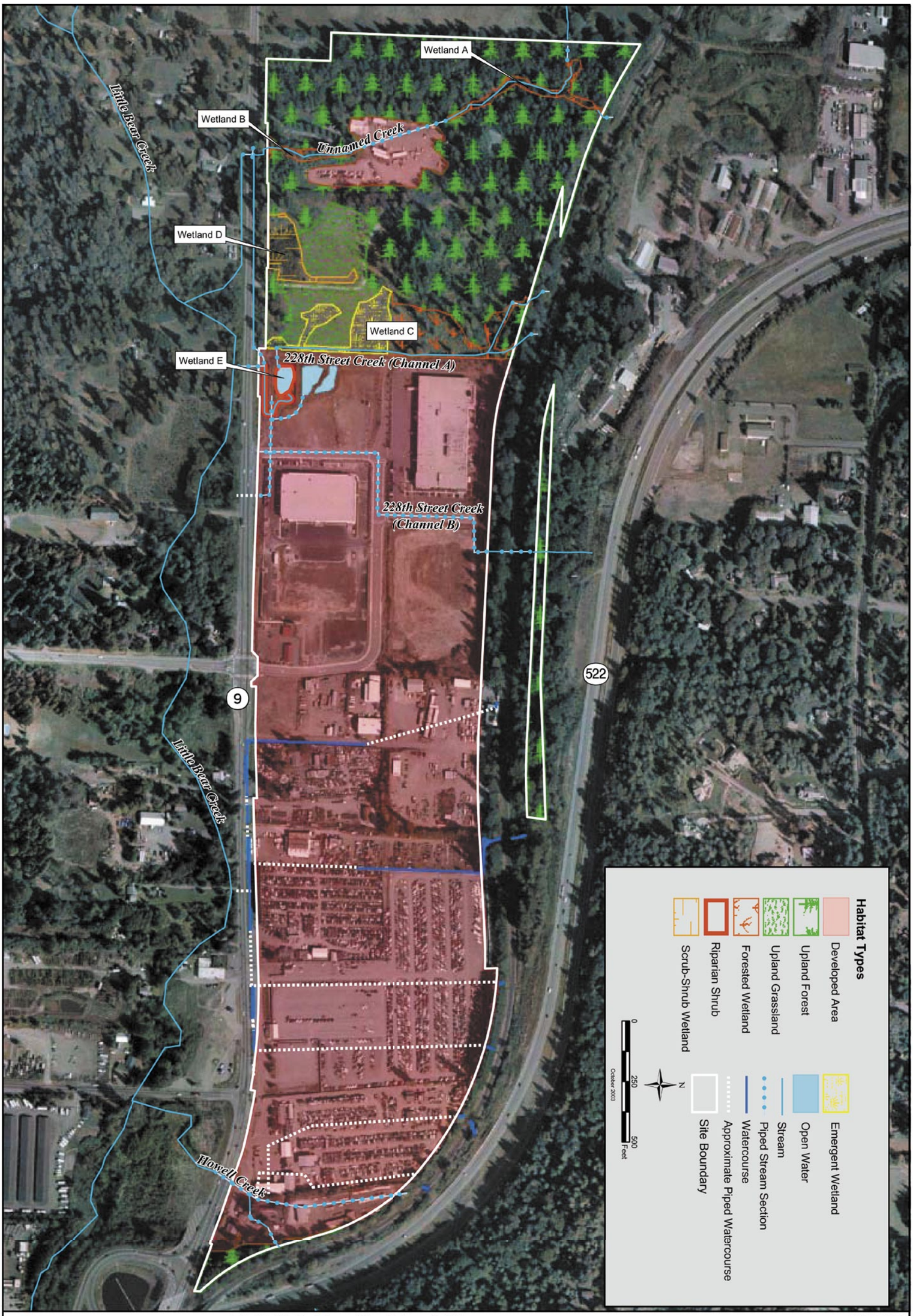
The landscape design approach responds to a unique intersection of divergent site uses as well as the site's natural and cultural context.

The design accommodates large storm water requirements, plant operations and potential expansion, site circulation, as well as habitat restoration and creation, and public recreation, art and education.The design uses site features to mediate the visual impact of the new facility and integrate the plant into the rural and industrial context. The improvement and expansion of existing wetlands, creeks, and forest within the landscape will also unite the site with the surrounding natural environment.

The design incorporates three landscape systems, planting, circulation and on-site-water handling. These systems integrate the industrial requirements of the plant with habitat enhancement and opportunities for public education and recreation.



Conceptual Renderings by Stephanie Bower



King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

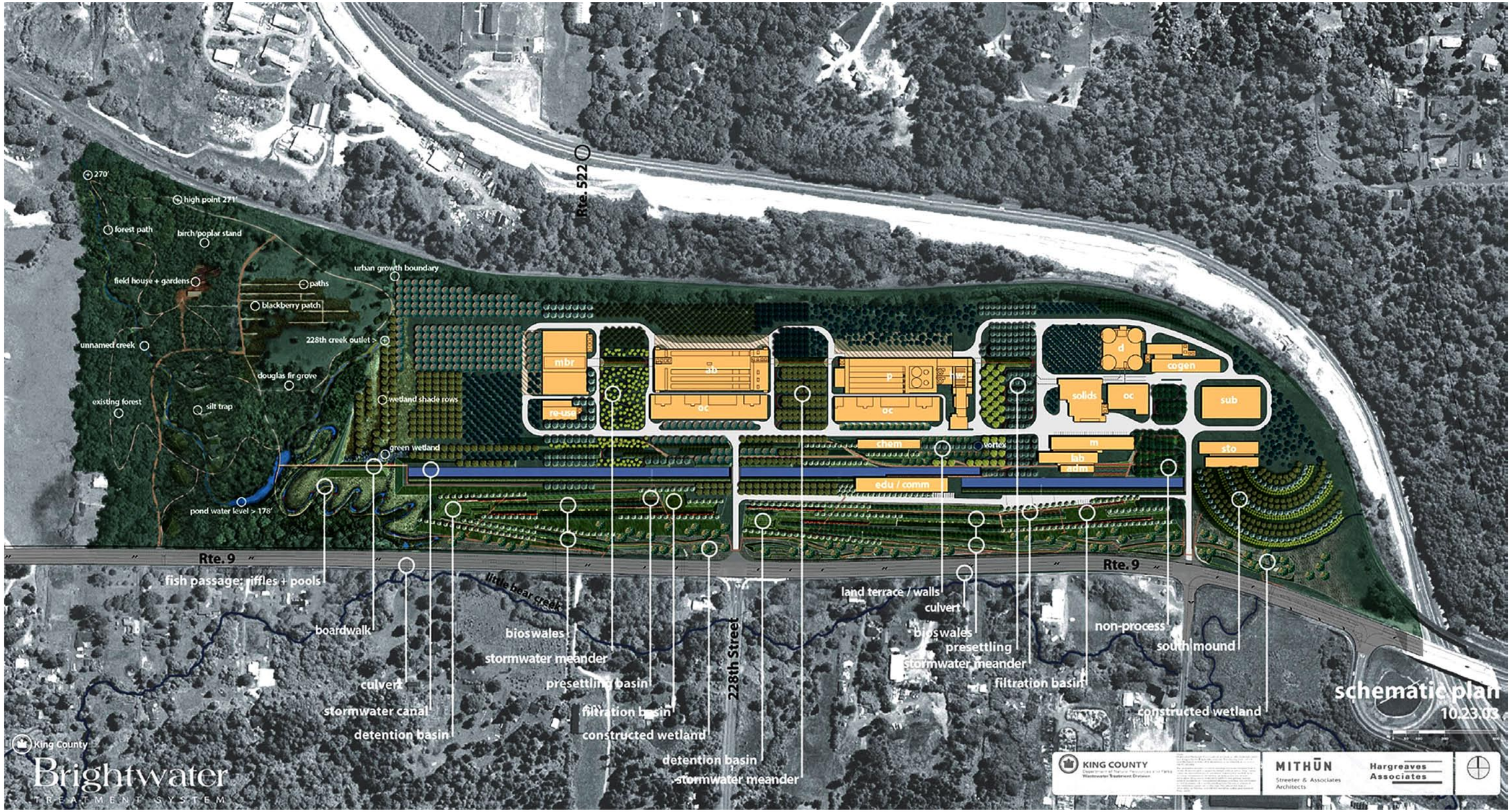
Sources: Aerial photos, King County (2002). Streams, wetlands and watercourses, Snohomish County (2002), Adolfson and Talasaea field surveys (2002, 2003), CH2MHILL CADD survey (2002), Reid Middleton CADD survey (2003)

File Name: EIS_rt9_habitats0303.mxd Prepared by: Adolfson Associates, Inc.

Figure 7-1

Habitat Types on the Route 9 Site

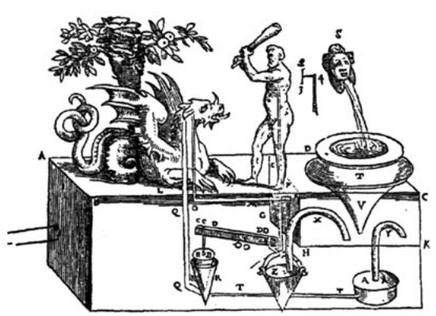
BRIGHTWATER FINAL EIS

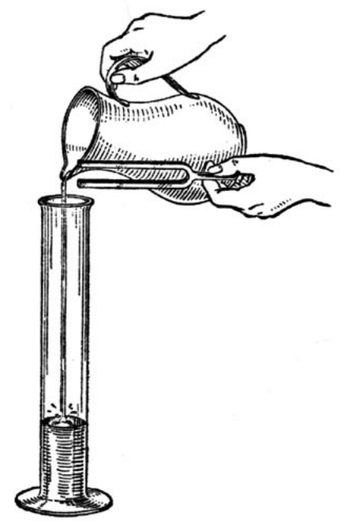

Rte. 522
270'
high point 271'
forest path
birch/poplar stand
field house + gardens
paths
blackberry patch
urban growth boundary
unnamed creek
228th creek outlet >
douglas fir grove
existing forest
silt trap
wetland shade rows
green wetland
pond water level > 178'
mbr
re-use
sb
oc
p
oc
d
cogen
solids
oc
sub
chem
vortex
m
lab
admin
edu / comm
sto
Rte. 9
Rte. 9
fish passage: riffles + pools
little bear creek
boardwalk
bioswales
stormwater meander
culvert
presettling basin
stormwater canal
filtration basin
detention basin
constructed wetland
228th Street
detention basin
stormwater meander
land terrace / walls
culvert
bioswales
presettling
stormwater meander
filtration basin
non-process
south mound
constructed wetland
schematic plan
10.23.03
King County
Brightwater
TREATMENT SYSTEM
KING COUNTY
MITHŪN
Streeter & Associates
Architects
Hargreaves
Associates

Art Opportunities For The Plant Site

One of the most important qualities art will possess is a high level of integrity. It will also play an essential role as a steward of change. An important part of mitigating the impact of this facility will be to provide public access to improved wetlands and natural resources on the site, providing a meaningful opportunity for community engagement both with the science of the wastewater and storm water systems and with nature. A proposed community education facility will provide people of all ages a gathering place.

The art program will provide synesthetic experiences and reflect a philosophy of environmental stewardship. Artworks will thematically coalesce around the broad topics of water, culture, science, and reclamation (see *Brightwater Art Concept Workbook* for further exploration of these thematic ideas). Wherever possible, art will be integrated into the infrastructure to articulate the system's functions and demystify the process. The art program will complement the education program, creating a different layer of experience and intuitive understanding for the public. Artworks will enhance the experience of the natural world and draw people together in a process of inquiry and discovery.





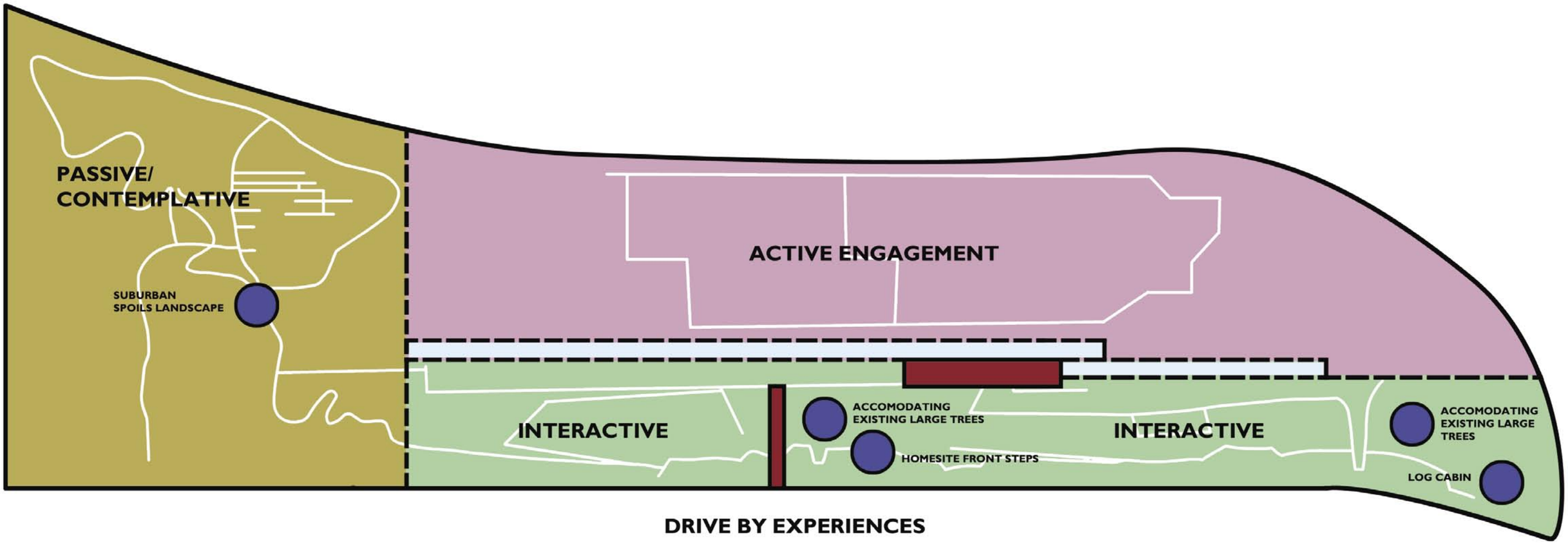
The Plan proposes that the artists who participated in schematic design continue their involvement as lead artists on the design team through the design development and construction document processes. These lead artists will be charged with influencing the character of specific functions on the plant site. These have been divided into three basic types: human intervention in the water cycle; the natural water cycle; and, culture and community. In this regard, the lead artists will guide the integration of art into such areas as the "street of alchemy", roof watershed, community/education facilities, and the north end naturalized zone. (The "street of alchemy" is a euphemism for the process by which wastewater is cleansed, also known as the process train.)

Working with the architects, landscape architects, engineers, and education consultant, the lead artists will also identify particular sites for which other artists will be engaged to carry out specific artwork commissions. It is expected that the lead artists will each create an integrated artwork for the plant. In addition, they will create a link between commissioned artists and the design team.

The site has been divided into three basic zones with different approaches to artwork

ZONE	*LOCATION*	*CHARACTER*	*NUMBER OF ART PROJECTS**
Human intervention in the water cycle	**Process train; roof watershed**	**Active engagement; interactive**	**4-6**
Natural water cycle	**North end naturalized areas**	**Passive; contemplative**	**2-4**
Culture and Community	**Education and community center; plant entry sequence; administration building**	**Animated; engaging**	**3-4 large scale 2-4 artist designed building parts 1 photographer-in-residence**

***This number will be refined during design development; future individual artist projects to be commissioned after the plant is operational may add to this number.**



DRIVE BY EXPERIENCES

- PROCESS TRAIN/STREET OF ALCHEMY
- CULTURE AND COMMUNITY
- ANOMALIES
- NATURAL WATER SYSTEMS
- STORM WATER/CONSTRUCTED WATERSHED

HUMAN INTERVENTION IN THE WATER CYCLE

Process Train/The Street of Alchemy

The alchemist's preoccupation with turning lead into gold is a fitting parable for Brightwater's mission of turning wastewater into a valuable resource. With just such an apt metaphor in mind, this transformative process provides an opportunity for artists, whose work is based on technical and scientific investigations to contribute in a meaningful way. The process train of Brightwater's wastewater treatment process is a rich resource. The integration of operations with education and art programming provides a conversation between function and revelation. Here art opportunities are meant to express and make transparent the episodic system of digestion and cleansing.

The education program envisions tours of the process train that inherently provide, opportunities for public access to view these technological phenomena. Art interventions along the tour route can provide episodic insights into the required mechanical, electrical and biological systems.

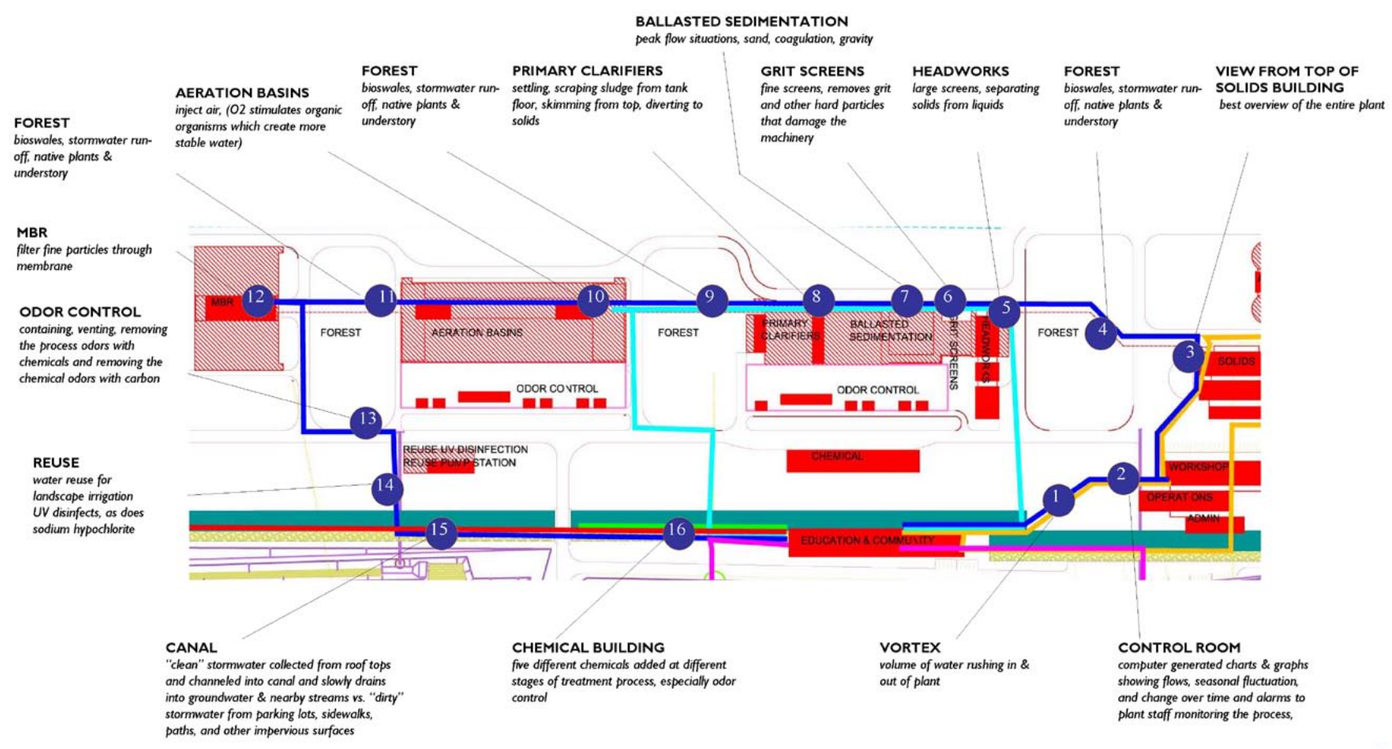
The tour can be divided into education about the liquid process and solid process. These include the headworks, grit screens, primary clarifiers, aeration basin, MBR, odor control, reuse, de-watering, anaerobic digesters, the gallery and co-generators. All are ripe for artistic interpretation, intervention and rendition. The artwork is intended to complement the educational components as they demystify the principles of hydraulics, physics or chemistry.

The vortex is where the influent arrives and effluent departs the plant site. At high flow, 170 MGB of effluent leaves the plant and enters the conveyance tunnel. It drops 100' and flows through a vortex in a pipe to reduce turbulence, the smell of chlorine and the momentum of cascading water. The engineering required to pump this magnitude of water in and out of the wastewater treatment process requires ingenuity and creative thought. The vortex is located below grade in a tunnel that houses two five-foot diameter pipes. Normally concealed, the vortex has the potential to expose and distill at one location the reason for the Brightwater facility: the simultaneous pumping in of society's detritus and the discharge of process water.

These and many other allegorical elements would give meaning and measure to the visitors' journey, while revealing the process. Whether the realization of these ideas is part funhouse, a hands-on experimental laboratory or a magic show is not as important as their potential as a means of communication that is a combination of improvisation, poetic metaphor and knowledge.

The table below describes functions along the process train.

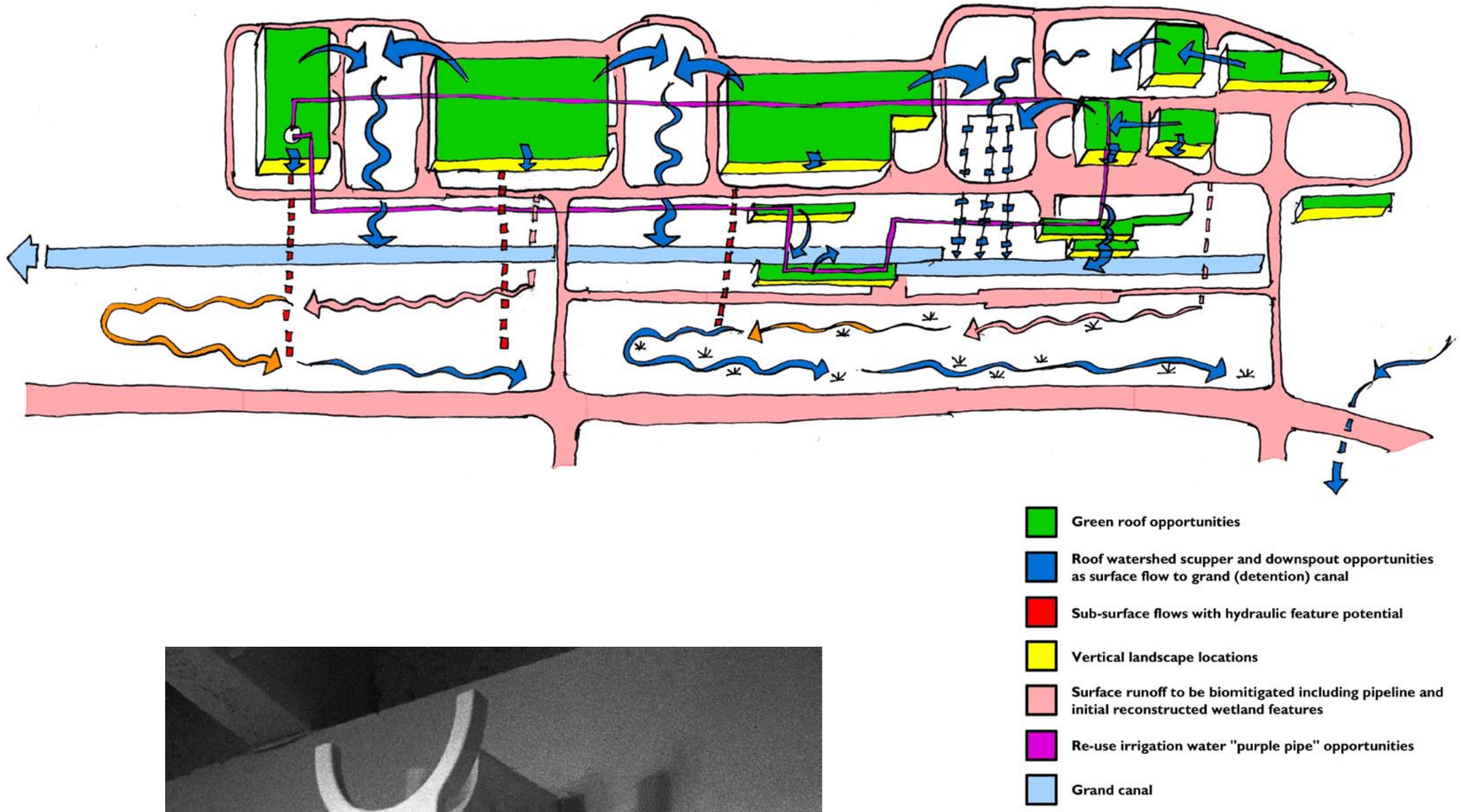
TREATMENT PROCESSES	DESCRIPTION
Vortex	Influent/effluent arrives and departs plant site, aka mouth/anus
Headworks	Extraction of particles too big to fit through the screens
Grit Screens	Removal of sand, gravel, & other inorganic matter
Primary Clarifiers	Sludge settles to bottom of tanks for removal
Aeration Basin	Bioreactor: air promotes growth of bacteria that breaks down waste
MBR	Membranes with tiny pores filter solids
Odor control	Venting and filters scrub air
Reuse	Effluent is used on-site for irrigation and cleaning; not potable
De-watering	Liquid removed from bio-solids
Anaerobic digesters	Stabilization of sludge by converting organic matter into methane gas & carbon dioxide
Gallery	Tunnel/roadway below plant buildings pipes connections between processes are visible
Co-generators	Biogas produced during anaerobic enables gas turbines / fuel cells to provide electrical power and heat

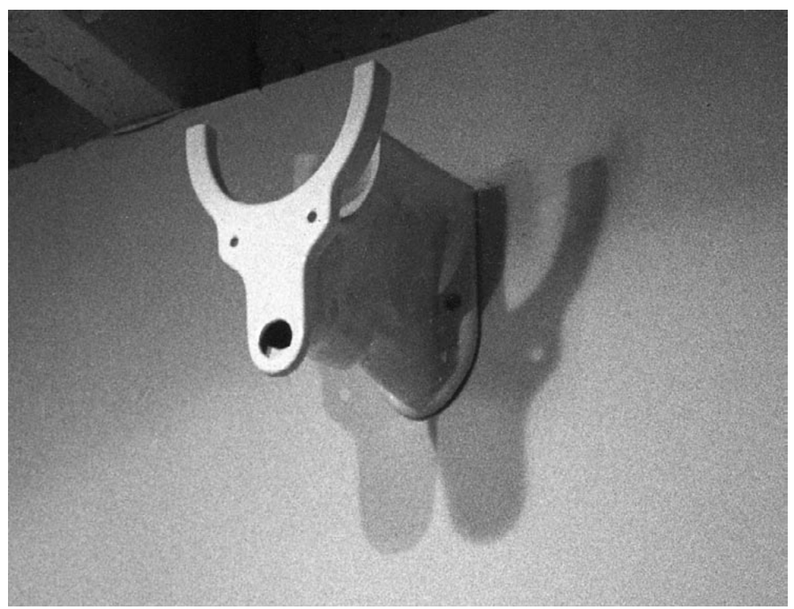


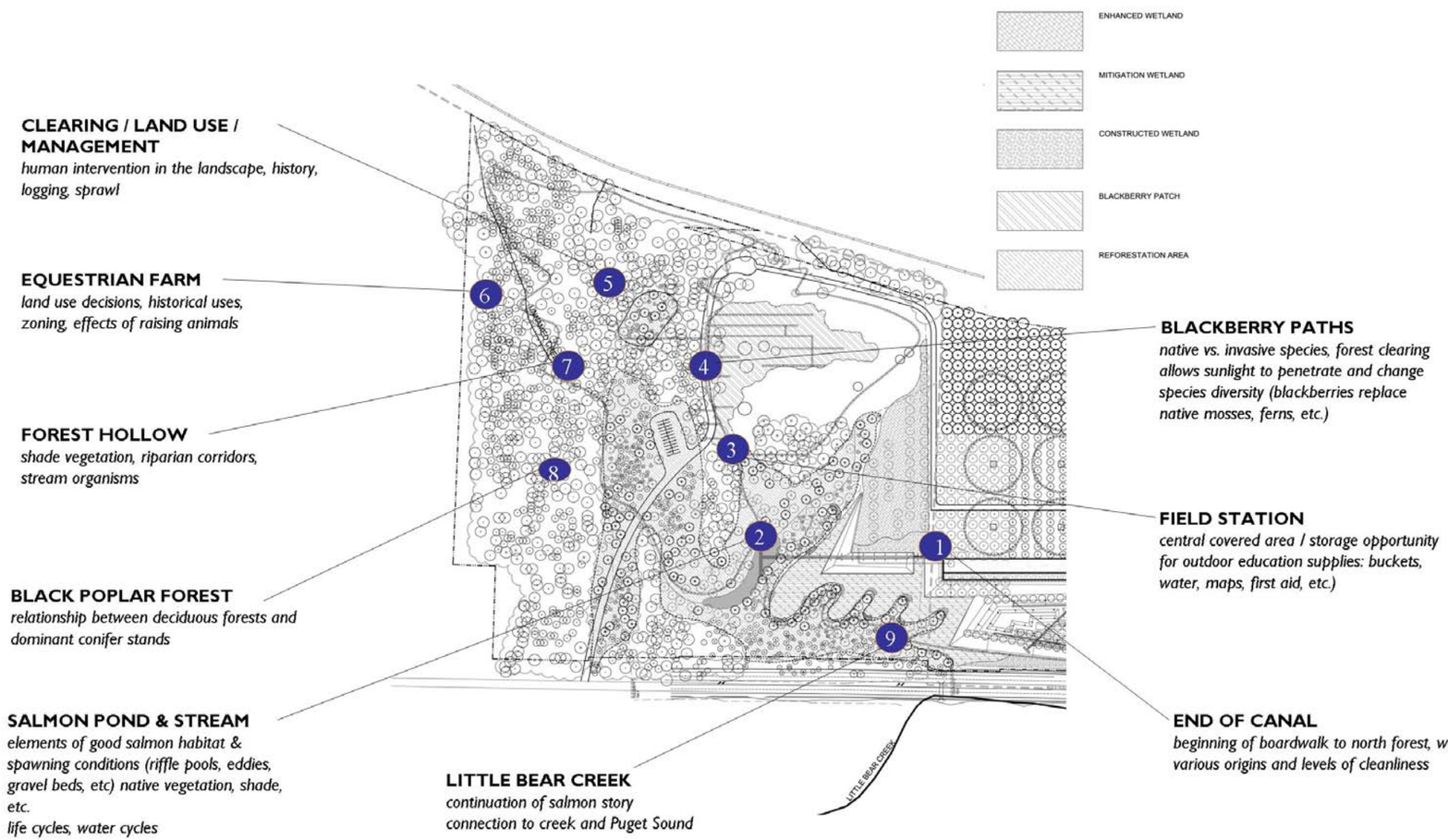
Stormwater System / Roof Watershed

Encroachment of land by human development is creating a profound impact upon watersheds worldwide. Surface paving and roofing interrupts the natural water systems, creating environmental liabilities. Brightwater provides an opportunity and platform to invert environmental liabilities into assets, by combining art and the needs for storm water management into a major design opportunity. In this way, art offers aesthetic options that offset human impact on ecosystems.

The Brightwater site will be required to mitigate onsite surface runoff and provide storm detention for both surface and roof watershed. We can achieve transparency of systems and provide the armature for art making by revealing the journey of rainfall from roof to surface and sub-surface, provided by legible engagements at scuppers, wall surfaces, gutters, detention canals and outfalls. The precipitation, irrigation, saturation, seeping, leaking, dripping, flowing, and water pressures will be the medium the art is made of. Drawing from the history of the wonders of hydraulic water features of Victorian English and Italian water gardens, their equivalent at Brightwater will include a sustainability overlay evident in the stormwater system and canal. The water lily pond of Monet will become the reconstructed wetlands tomorrow, while the tree farm of Weyerhaeuser becomes the biomitigating constructed forest.







NATURAL WATER SYSTEM

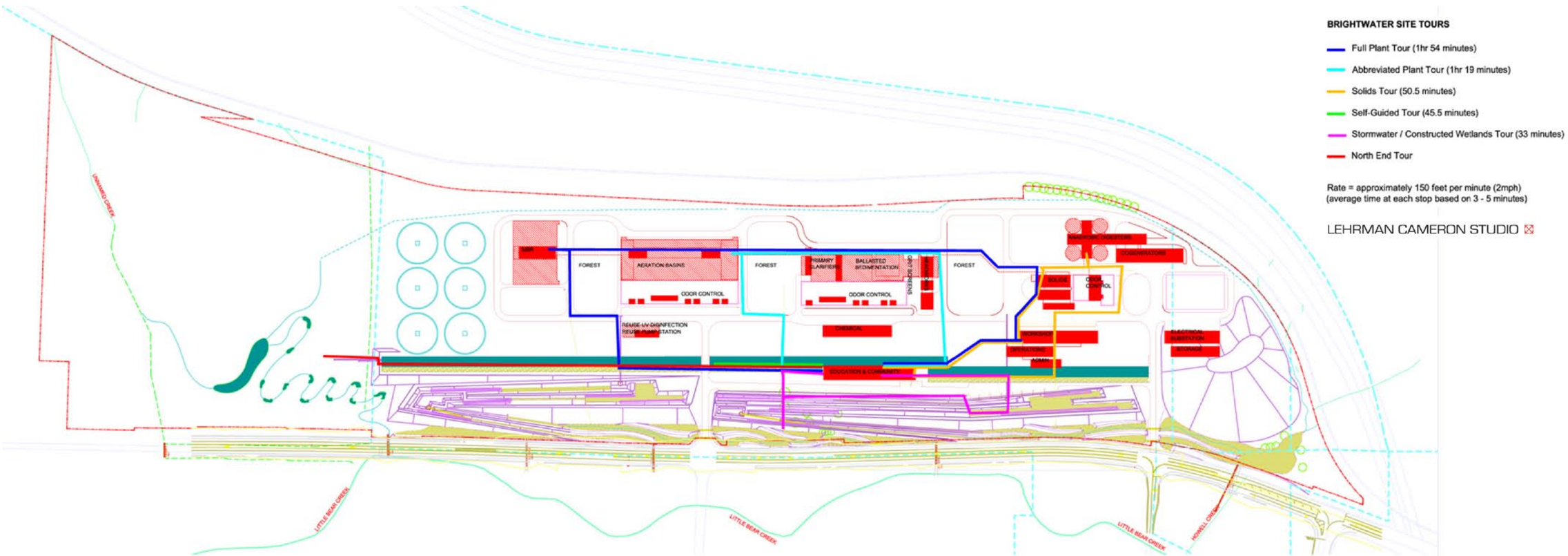
This area refers primarily to the naturalized north end where water will flow through naturalized channels to connect with Little Bear Creek. Artworks included in this area will provide places for contemplation along the walking paths and adjacent to the large pond. Two specific locations have already been identified as ideal for these works: the education field station and the high point overlook on the northeast edge of the property. The field station provides the opportunity for potential reuse of materials from the site, such as selected auto parts or elements from the log cabin (see *Anomalies,* page 21). Additional locations will be determined during design development. A greater variety of wildlife will be attracted by sustaining and improving emergent forests and wetlands. Artwork that complements habitat could be an integral part of this concept. Artists working here should incorporate natural materials – wood, stone, vegetation, etc. – to create places in harmony with nature.

CULTURE AND COMMUNITY

This area includes the primary points of contact between the public and the plant site. The entry from Route 9 will provide the community their first impression of the plant. The community center will be a gathering place unrelated to plant functions; while the adjacent education center will provide opportunities for active engagement of students, primarily middle school, with the treatment plant and its functions. The facility will include a permanent exhibition, labs, classrooms and an artist's studio.

The community/education centers will include several major artworks. These will complement the educational mission but will be more intuitive in nature than the didactic exhibition materials. One artwork might interpret the data gathered at Brightwater about the watershed and the treatment system through narrative imagery or digital interpretation. Another might create a connection between the plant site and the outfall, making metaphorically visible, the relationship to Puget Sound, using media, sound, light, or digital imaging along with more traditional media. The extruded architectural design of the buildings lends itself to an interpretive work within the glass curtain wall system. Artists may be engaged to make specific custom designed building elements such as light fixtures or floor designs. The covered plaza areas and the concourse to the secured plant side are also prime artwork opportunities

Included in this category will be three to five artist projects not tied to the project's construction schedule. The first of these will be a commission awarded to a photographer to document the site prior to demolition and during construction. In the first few years of the plant's operations, the others will be awarded. These projects may be temporary, permanent, or ones involving entropy and may occur in any of these following areas: north end reveals, street of alchemy, public access zone on the west side of the plant or as a special exhibition within the community facilities. These projects will give a continuing life to the art program after the permanent works are completed. They will lay the groundwork for a potential on-going art program as part of Brightwater's community outreach.



ANOMALIES

There are some existing elements on the proposed Brightwater site that possess a quality worth documenting and/or preserving and potentially incorporating into the new landscape. These "ready-mades" include historic remnants, living anomalies and cultural curiosities that speak to an historical context. These relics could provide the "layers of meaning" often lost when sites are redeveloped, leaving visitors no sense of past land use and social histories. The north portion of the site, with its large trees, mixed emergent forests and wetlands will remain primarily unaltered. To the south, where the processing plant is located major earthwork will refashion the topography. We recommend the following "ready-mades' be retained on site as anomalies, incidences and artifacts.

Accomodating Existing Large Trees

Large Douglas fir specimens and a significant Sycamore maple have been identified by the artist team. The trees' health has been assessed by a horticulturist and subsequently accommodated by the landscape architects for inclusion into the new landscape within the contouring of the reconstructed wetland ridges and depressions along Highway 9. This collaborative effort assures a vestige of a past landscape, as well as providing scale and enhanced habitat. This effort sends a positive message about working with rather than counter to pre-existing conditions.

Blackberry Bramble

There is an extensive Himalayan blackberry patch in the north end natural area. This can be groomed to provide a public picking grounds. Passageways into inaccessible areas of the bramble could be shaped, and buttress ladders supplied for an effective and enjoyable harvesting activity.

Homesite Front Steps

Along Highway 9 there is an early 20th century farmhouse with front steps made of river stone (perhaps gathered from Little Bear Creek). Within the past 20 years, the surrounding farmland has become primarily auto wrecking yards and this home became part of "Mustang Ranch" a wrecking yard specializing in recycling Ford Mustang auto parts. While the house will be cleared from the site, the steps should be removed and stored until the site is regraded and then re-sited in the same location and elevation. This location is on axis with a proposed pedestrian bridge and interpretive trail along the re-constructed wetlands.

Log Cabin

At the extreme southwest corner of the site is a log cabin that will be unaffected by site regrading. This cabin could remain for community use or its logs could be recycled for another project on site.

Suburban Spoils Landscape

In the north end, which is predominantly native forestland a landscape contracting firm has operated for many years and has serviced both King and Snohomish counties. At days end, returning crews have dumped yard waste, comprised of lawn clippings, leaves, extracted plants and woody debris in a 15,000 square foot clearing in the surrounding forest. In essence, this spoils pile with its seed bank and rootstock of discarded lawn debris represents a cross section of suburban plant life, now comprising a compost pile. The Suburban Spoils Landscape becomes, if a significant amount of exotic "volunteers" propagate, a metaphor of changing land use patterns and an illustration for the complexity and diversity in an indigenous context.

THE CONVEYANCE CORRIDOR

Character Of The Area

The service area includes northern King and south Snohomish Counties. Visual/aesthetic characterization of the conveyance corridor is complex due to the scope of the proposed routes and the wide range of topography, land use, and vegetative elements present along the route. It passes through natural and urban landscapes, along with mature and emerging suburban communities and residential environments within both King and Snohomish Counties. Land use within these communities largely dictates the visual character. The older, more established communities include the cities of Bothell, Lake Forest Park, Edmonds, Shoreline, Kenmore, and Mountlake Terrace. These communities have long-established commercial areas as well as places where development is increasing in density. Lake Washington provides a major visual landmark, in addition to numerous streams, forested areas, and other natural features that provide visual definition. The highest density of commercial development occurs adjacent to the major roadways in the area, including SR-522 and SR-104. Much of the commercial development along these roadways could be characterized as "strip commercial."

The actual conveyance corridor will be largely unseen due to the fact that it is primarily underground. Conveyance refers to the pipelines that carry wastewater to (influent) and from (effluent) the treatment plant. The conveyance system is comprised of pipes, pump stations, portals and the outfall. The pipes are placed underground close to the surface or in tunnels. Along the route, pump stations lift wastewater over hills and high points.

Portals are the locations where tunnels begin and end and in-between points where the tunneling machine enters and exits the tunnel, and dirt is hauled out during construction. Some locations will require small permanent above ground structures to allow for periodic tunnel maintenance and odor control. The outfall pipe discharges the treated wastewater to Puget Sound. It is located approximately 500 feet deep and 3,000 feet away from shore.

Art Opportunities Along The Conveyance Corridor

The County will endeavor to create community amenities at each of the portal sites along the conveyance route. In some cases, they will be visually accessible only; in others, there may be direct public access. In all cases, art will be used as a vehicle for expressing ideas of transparency, function and context.

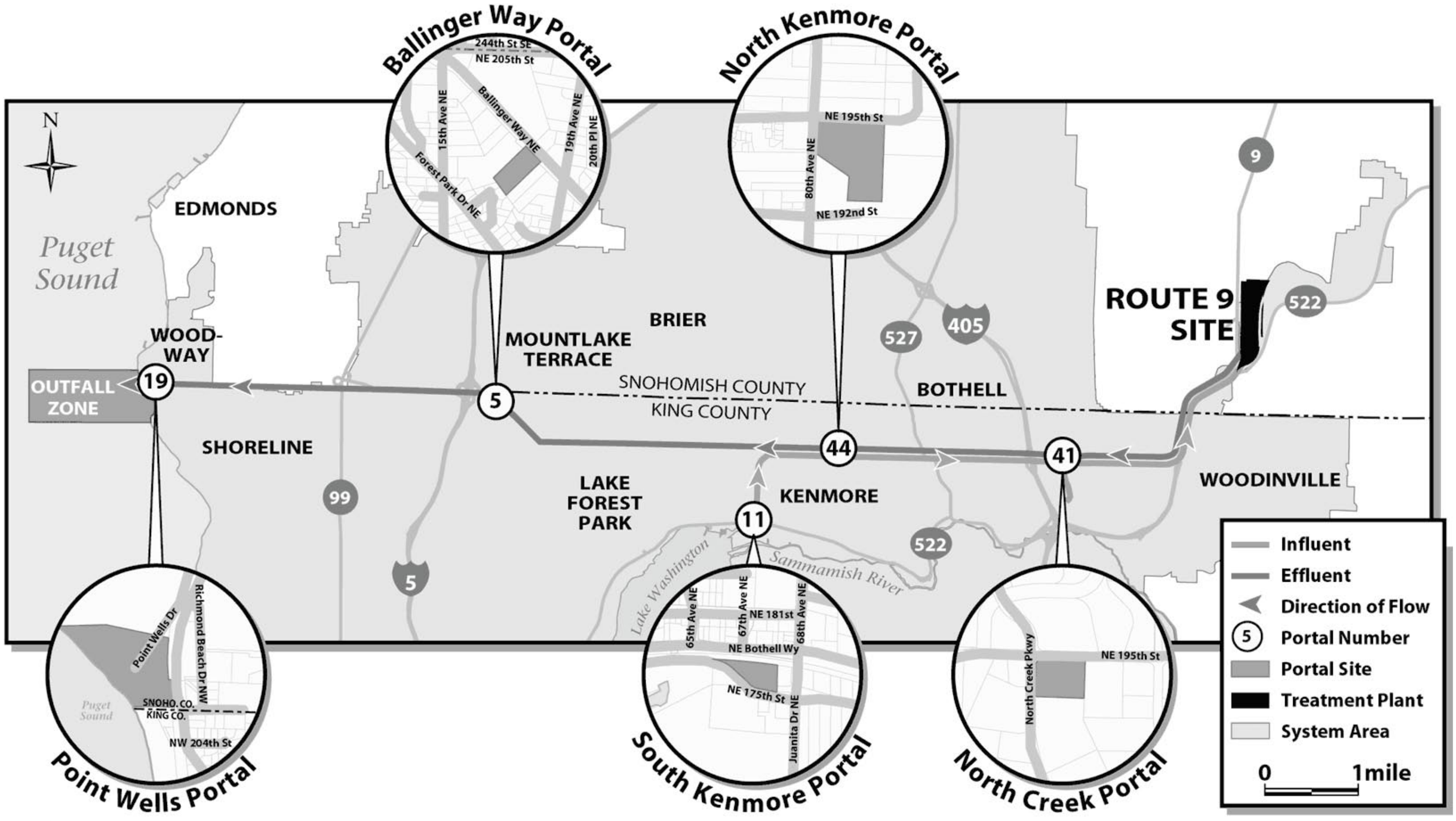
The concept for the conveyance portals is to create an episodic series of architectural/ sculptural follies that could be interpreted as "landmarks" as part of the County's wastewater treatment conveyance system. The structures will function as non-inhabitable shells, housing mechanical equipment for a pump station, as well as odor control and de-chlorination facilities that occur along the wastewater conveyance route. Their scale will be determined relative to their limited functions. Their purpose will be to provide security screening and enclosure as an amenity in the communities in which they will be located. These enigmatic building structures are envisioned to relate to each individual site context. The portal sites are located in proximity to a business park, retail and industrial areas and a rural area that is rapidly becoming suburban.

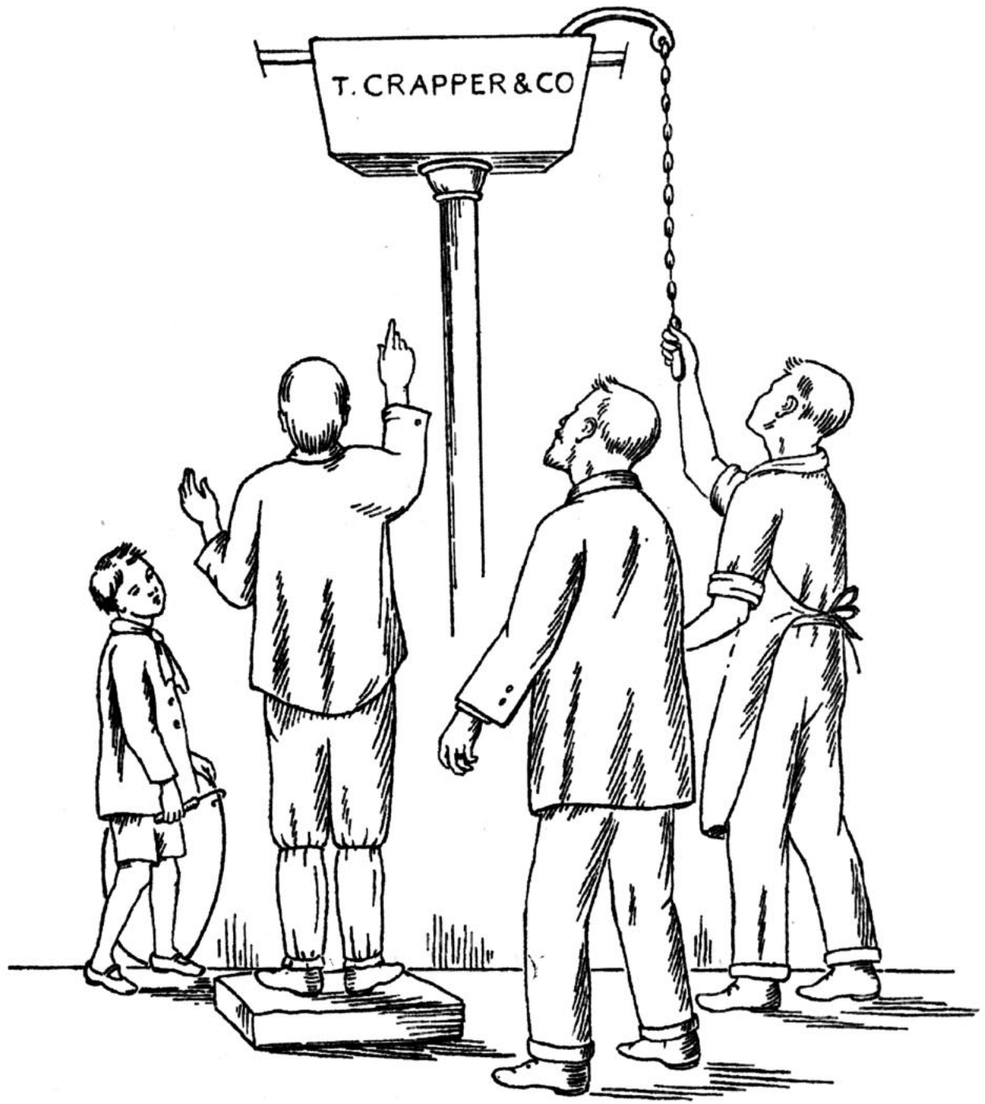
It is our intent that the artwork at the portal sites be fully integrated with the architecture and landscape architecture and engineering, blurring the boundaries between disciplines when and where appropriate. It should reflect an interest in sustainable design, social awareness and sensitivity to the context of each site.

We have identified ideas to be interpreted at each portal – (1) a variety of screening and scrim material should make up the architectural scheme so that changing light conditions reveal different characteristics of the structures and security fences; (2) a series of markers that reflect the alignment and connection between portals; (3) vernacular materials at each site; (4) innovative approaches to the collection and dispersal of storm water; (5) potential use of excavated materials as a resource, including boulders that may be unearthed and soil piles resulting from tunneling that create berms, depressions or domes, all of which serve as reminders of the tunneling.

Goals for the "best apparent candidate portal sites" relate to their geographic location and planned use. Portal 44/North Kenmore could provide a greenway through the site, a portion of which could evolve into a community garden. Portal 5/Ballinger Way the only influent portal along conveyance, presents a challenge to create a new standard for design in a retail area. Portal 11/South Kenmore provides an opportunity to introduce and encourage wildlife habitat because there is a need for storm water detention that could be created through a series of ponds. Portal 19/Point Wells is the outfall site and may provide a unique opportunity to design a pedestrian bridge to a beach or a viewing platform of Puget Sound. Portal 41/North Creek is the largest site containing an influent and effluent pump station and is consequently the largest structure. It is located in a business park near the Bothell campus of the University of Washington.

Smaller opportunities for individual commissions for ephemeral works such as billboards, community festivals, information dispersed thru the bus system, park and ride or billing inserts, etc. are other ways to reach out to people in both counties served by the conveyance route. We see this as a civic opportunity to broaden public awareness of the natural water system and their intervention in that system. These projects will reinforce a commitment to protecting water quality in the waterways of the region.


Ballinger Way Portal
244th St SE
NE 205th St
15th Ave NE
Ballinger Way NE
19th Ave NE
20th Pl NE
Forest Park Dr NE
North Kenmore Portal
NE 195th St
80th Ave NE
NE 192nd St
N
EDMONDS
Puget Sound
WOOD-WAY
OUTFALL ZONE
19
5
MOUNTLAKE TERRACE
BRIER
SNOHOMISH COUNTY
KING COUNTY
527
405
BOTHELL
ROUTE 9 SITE
9
522
SHORELINE
99
44
41
LAKE FOREST PARK
KENMORE
11
WOODINVILLE
Lake Washington
Sammamish River
Point Wells Portal
Point Wells Dr
Richmond Beach Dr NW
Puget Sound
SNOHO. CO.
KING CO.
NW 204th St
South Kenmore Portal
65th Ave NE
67th Ave NE
68th Ave NE
NE 181st
NE Bothell Wy
NE 175th St
Juanita Dr NE
North Creek Portal
North Creek Pkwy
NE 195th St
Influent
Effluent
Direction of Flow
Portal Number
Portal Site
Treatment Plant
System Area
0
1mile



ARTIST SELECTION METHODS

Art opportunities have been identified and prioritized for the plant site and along the conveyance route by the master plan artists. In this section an outline of selection methods will be described. Based on the master plan, selection methods are related to specific art opportunities that include site-specific work that varies in scale and degree of permanency and artist-made building parts. There are three types: open call and invitational, and direct selection.

Open Competitions

These competitions will be announced as a national or regional call for specific site works on the plant site or along the conveyance route. The scheduling of this will be determined during design development. There will be several significant competitions ($150,000+) and a number of smaller ones. It is recommend that at least one Master Plan artist serve on the selection panel. The selection panel should include a representative from the design team (either landscape, architecture or engineering, depending upon the emphasis of the project).

Invitational Competitions

This process is similar to open competitions, except that curators identify a pool of potential artists. These individuals are then contacted by the Cultural Development Authority to inquire about their interest and availability. Once an applicant pool is assembled, a selection panel will identify finalists through the same process as open competitions. It is recommended that one of the curators serve on the selection panel in addition to at least one of the Master Plan artists and a representative from the design team.

Direct Selection

This method was developed to address projects on the plant site that will be at a highly developed stage by the time design development begins. These are on the "critical path" which requires artist intervention now, because it will be difficult for an artist to have impact later. Additionally, this method is designed to take advantage of the "learning curve" that the Master Plan artists have achieved in order to bring other artists up to speed in a very short time.

Each master plan artist has been designated as "Lead Artist/Curator" for areas such as "Roof Watershed," "Process Train," or "Culture/Community" which involve multiple sites and potentially multiple artists. The Lead Artist will ensure that the overall framework for a particular area is realized in a cohesive way in conformance with the vision of the Art Master Plan. In this capacity, the "Lead Artist/Curator" acts as a "steward". They will invite artists for individual projects. They may contact curators or other arts professionals to assist them by suggesting potential candidates. Eligible artists would be ones that are currently on pre-approved rosters maintained by such agencies as the CDA Design Team or Artist Made Building Parts, Seattle Office of Arts and Cultural Affairs, Regional Arts and Culture Council, and the Phoenix Arts Commission.

APPENDICES

Route 9 - A Brief History

Disparate events have shaped the land and surrounding community: The area was heavily forested prior to logging in the late 1800's. The construction of the Hiram Chittendam Locks lowered Lake Washington by 9 feet and diminished the water in Little Bear Creek. Up until that time, there was steamboat service to Woodinville. Passage of the 18th Amendment in 1920 made the distillation of mash lucrative and Little Bear Creek provided an excellent water supply for this purpose. Little Bear Creek was channeled in 1926, forcing it to run on the west side of Route 9. Prior to this, it was a stream that meandered on both sides of the road. Agrarian activities ranging from poultry, mink and dairy farming to crops of strawberries, raspberries, sweet corn and cherries were at their height in the 1930's.

The Bear Creek Grange was organized in 1936 as a community cooperative to provide a cold storage facility and health care for residents. In the 1960's, as roadways came to dominate and dissect the landscape, the farms gave way to industrial uses–primarily auto wrecking yards and warehouses. Today, it functions as an important resource to the community, providing a gathering place for events and sponsoring various service programs. Suburban development has become the dominant land use in nearby areas in the last few decades. The area's future is a tenuous one. Residents have growing concerns about suburban encroachment and threats to the vitality of Little Bear Creek as salmon habitat. Permitted uses will lead to more industrial development, potentially further endangering wildlife and wetlands.

Route 9 Site Design Guidelines

During the siting process a series of design guidelines were developed in concert with the community to guide site development. These were included in the Draft EIS Aesthetics.

1. Use innovative landscape and site design to minimize the visual impact of plant structures.
2. Use engineering solutions for issues such as odor, noise, and safety as opportunities for aesthetic enhancement.
3. Design facility architecture and site improvements to enhance the area's rural and natural character and historical context.
4. Further the protection and understanding of natural systems on or near the site through enhancement and interpretation.
5. Use environmentally friendly plant and site design solutions.
6. Design facilities to support community uses on the site.
7. Protect and support signature activities of the area.
8. Integrate art into community experience of the site.
9. Control light leaving the site to preserve dark skies at night.
10. Protect and enhance quality of life and public health for the community.

Responsiveness to these guidelines is illustrated in the approach that has been taken in architecture, landscape architecture engineering and art.

Landscape Design Approach

by Marcel Wilson

The landscape design approach responds to a unique intersection of divergent site uses as well as the site's natural and cultural context. The design accommodates large storm water requirements, plant operations and potential expansion, site circulation, as well as habitat restoration and creation, and public recreation, art and education. The design uses site features to mediate the visual impact of the new facility and integrate the plant into the rural and industrial context. Improving and expanding existing wetlands, creeks, and forest within the landscape will also unite the site with the surrounding natural environment.

SYSTEMS

The design incorporates three landscape systems, planting, circulation and on-site-water handling. These systems integrate the industrial requirements of the plant with habitat enhancement and opportunities for public education and recreation.

The planting system consists of distinct forest patches, tree stands, tree bands, and low wetland swatches. Collectively, these plantings form a forest quilt. Plantings respond to specific site conditions, adjacencies, and program uses. Six, predominantly native, plant community types make up the forest quilt, including evergreen stands, deciduous stands, upland forest, riparian forest, emergent and submerged wetlands, and wetland meadows.

The pedestrian circulation system includes a series of recreational and educational loops across the site. Pathways lead pedestrians through woodlands, meadows, wetlands, and process facilities. The pathways incorporate boardwalks, bridges and lookouts.

The on-site water system provides for handling of 100% stormwater across the site. Clean water from plant roofs is conveyed to a clean water canal through bio-swale meanders within the plant zone. Dirty water collected from site roadways passes through a cleansing system of detention, presettlement and filtration basins, conveyance swales and constructed wetlands within the western portion of the site. This filtered water then drains to the clean water wetlands and creeks to the north and south to eventually join Little Bear Creek.

ZONES

These three systems unite four distinct landscape zones within the site; the secure plant zone, the stormwater collection and treatment zone, the northern forest habitat zone, and the southern hillside and wetland habitat zone.

Within the secure plant zone tall distinct patches of coniferous and deciduous trees surround process buildings and roads. Tall facility buildings require fast growing species to assist in reducing the scale of the facility. Tree stands reflect orthogonal planting patterns, maintaining clear sight lines for plant security while creating a distinctive, unifying patchwork quality. Plant species selected ensure moderate to minimal maintenance within this zone. A campus area, including the public education and community building, is located along the western edge of the process zone adjacent to a north/south oriented freshwater canal. The campus landscape is composed of a dynamic faceted ground plane, land terrace walls, and shifting tree bands. This area provides passive recreational and gathering opportunities for visitors as well as staff. An educational loop extends through the treatment facility.

The north/south canal distinguishes the stormwater collection and treatment zone, located along State Route 9. This wetland zone creates the foreground for the Brightwater site. These wetlands provide on-site stormwater collection and treatment, provide for public education and recreation opportunities, and create a visual buffer for the plant zone to the east. Extending from the north to the south of the site, this wetland landscape provides a varied and textural landscape of tree and wetland plantings. Fast growing trees and shrubs provide shade for cooling the waters, while emergent herbaceous and aquatic plants filter impurities. Selection of these species is based on their remediation potential, maintenance requirements and visual interest. A public system of trails and overlooks extends through this wetland landscape.

In the northern forest habitat zone various improvement are planned, including restoration of Unnamed Creek, relocation and expansion of existing salmon habitat, reforestation, enhancement of existing blackberry plantings, and enhancement and creation of wetlands. Improvements to the salmon habitat include construction of riffles and pools and forest plantings for shading waters. Additional constructed wetlands improve the quality of on and off-site run off water, enhancing water quality of Little Bear Creek watershed. The northern forest area also includes trails as part of the public trail system.

The southern hillside and wetland habitat zone includes construction of the south mound with hillside tree plantings, improvements to Howell Creek, and newly constructed wetlands. The south mound, constructed of on-site fill, assists in reducing the scale of the facility from Route 9 while providing visitors with an opportunity to view the Brightwater site. Clean site run-on water is also directed through newly constructed wetlands where riparian plantings shade waters. Combined with enhancement to Unnamed Creek to the north the quality of Little Bear Creek watershed is improved.

Engineering

by Jim Goetz

WEST POINT TREATMENT PLANT

–Basic wastewater treatment processes

- Primary treatment removes approximately 60% of the solids by skimming and screening and settling. Bags and sticks are separated and taken to a landfill while the grit (sand and gravel) are settle out, dewatered and trucked to a landfill. Primary clarifiers remove floating material and allow other solids to fall slowly to the bottom where they are removed. Solids are pumped to a separate processing building.
- Secondary treatment removes 90% of suspended solids / pollutants by combining primary treated wastewater with high-purity oxygen along with active micro-organisms ("friendly" bacteria) that consume the organic matter and then the water goes through secondary clarifiers. Then the wastewater flows by gravity into the secondary clarifiers where bacteria settle to the bottom. Some bacteria are discarded to the solids facility but most are returned to the aeration basin and reused.
- Water from the clarifiers is chlorinated and then flows through a contact chamber and onto a final pumping station. Just before being pumped into the final effluent line, the de-chlorination takes place.
    - NOTE:Tertiary treatment is not done here. If it were the water would be re-useable or put into a reservoir of freshwater where it is pumped to a station for nutrient removal and pumped back. This is not potable water that is a step beyond tertiary.
- Methane gas is a bi-product of digesters that are a part of the solids processing which helps to reduce the mass of the solids and provide a source for electricity to the plant (to run engines, pumps and lights). 25 –30% is recovered or re-useable For Brightwater this will be approximately 10-15% (check this out not the numbers but if this is out of the total produced or a percentage of the plants required needs.
- The bacteria in the solid waste digesters break down pathogens and organic matter. This is accomplished when the thickened solids liquid-wet cake) and passed through digesters that are an-aeromatic.
- Agricultural land, forest land, or greenways that receive bio-solids as fertilizer or irrigation from water that has gone through a tertiary treatment must be closely monitored so that:
    - Public access is restricted to those areas.
    - Crops irrigated are not the type that will absorb the trace of heavy metals left in the soil from the fertilizer.

BRIGHTWATER FACT AND FIGURES

- Plant is 500 million dollar project, which makes the mitigation approximately 100 million.
- Sewage will be brought in at the highest point on the site in order to utilize gravity as much as possible as the material is processed.
- The material coming in will have separate sewer and sanitation pipes.
- All construction on the site will have to adhere to 100-year storm guidelines so that water runoff may have to pumped into cisterns and run off slowly over the site.

BRIGHTWATER INNOVATIONS

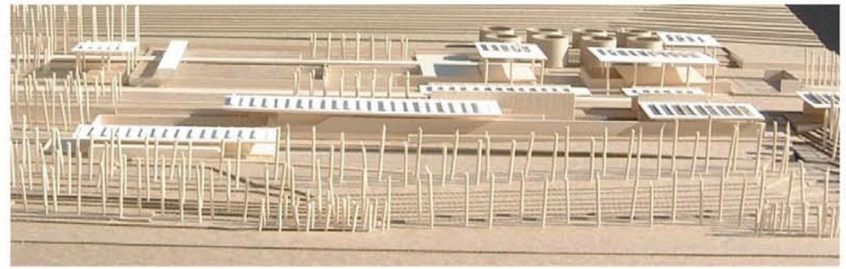
- Membrane technology – tubes or sheets separate solids from liquid in secondary sedimentation. This takes less space and produces a tertiary effluent (less than 5:5 parts more like 2:2 or 3:3). The system needs to be periodically flushed out to clean membranes,which takes more energy because the material is sucked out. The membranes need to be replaced every six years. Oxygen needs to be feed to the biorganisms, which give off carbon dioxide.
- Disinfect ion will be done by a series of low-level medium pressure UV lamps instead of chlorine. This requires more energy to run this system that a chemical (chlorine) one.
- Odor control of all areas (the primary and secondary digesters) will have multi-stage lids to contain air and air scrubbers. Some sort of visual access will be necessary to observe the water processes.
- Effluent reuse will be done within the plant (mechanical and chemical processes such as washing down areas, irrigation of park landscape, or thickening sludge with polymer) and off site (irrigation of cemeteries, golf course, agriculture that does not absorb soil nutrients).

IDEAS INSPIRED BY TOUR

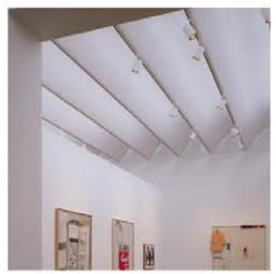
- Odor scrubber shapes are off the shelf but shapes may be added to them.
- Tanks are usually cylindrical or egg shaped but may have a facade around them that disguises that.
- Control station – computer monitors (rainfall, facility intake, water quality) and alarms

APPROVED DESIGN ELEMENTS

terrace into hill
roofs float, like a forest canopy
buildings emphasize the horizontal
with the grain of the site
overhead and diffuse daylight
terraces and courtyards



horizontal extension

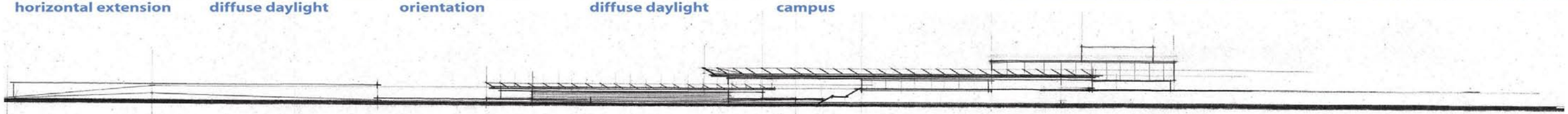


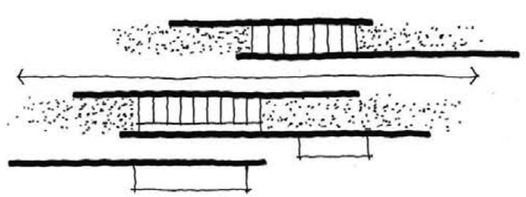
diffuse daylight

orientation

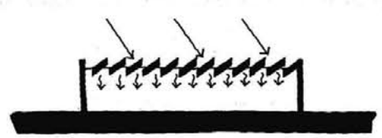
diffuse daylight

campus

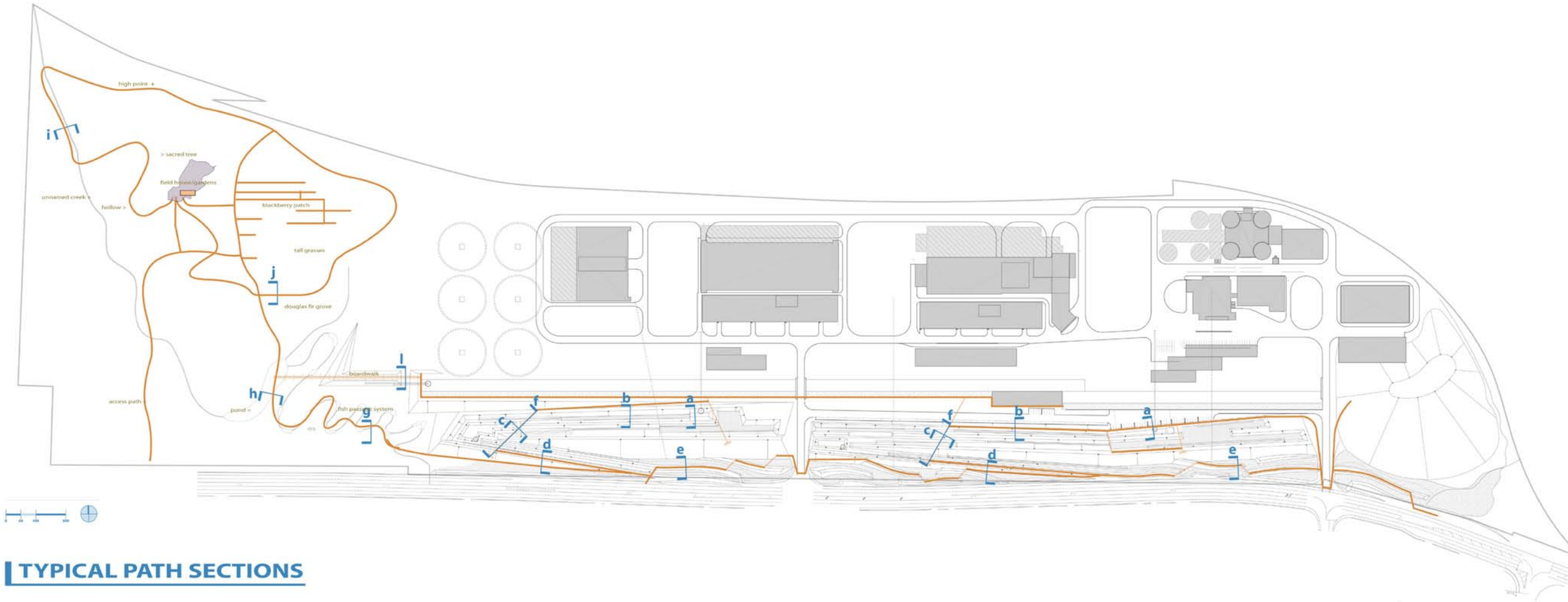




site grain



diffuse daylighting and ventilation



TYPICAL PATH SECTIONS

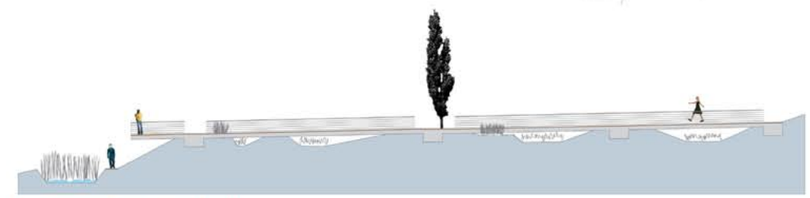

a_ filtration basin


b_ bioswale


c_ stormwater boardwalk


d_ constructed wetland


e_ constructed wetland


f_ stormwater boardwalk


g_fish passage


h_ pond edge


i_ creek path


j_ forest path


l_ gang-way

King County Brightwater TREATMENT SYSTEM

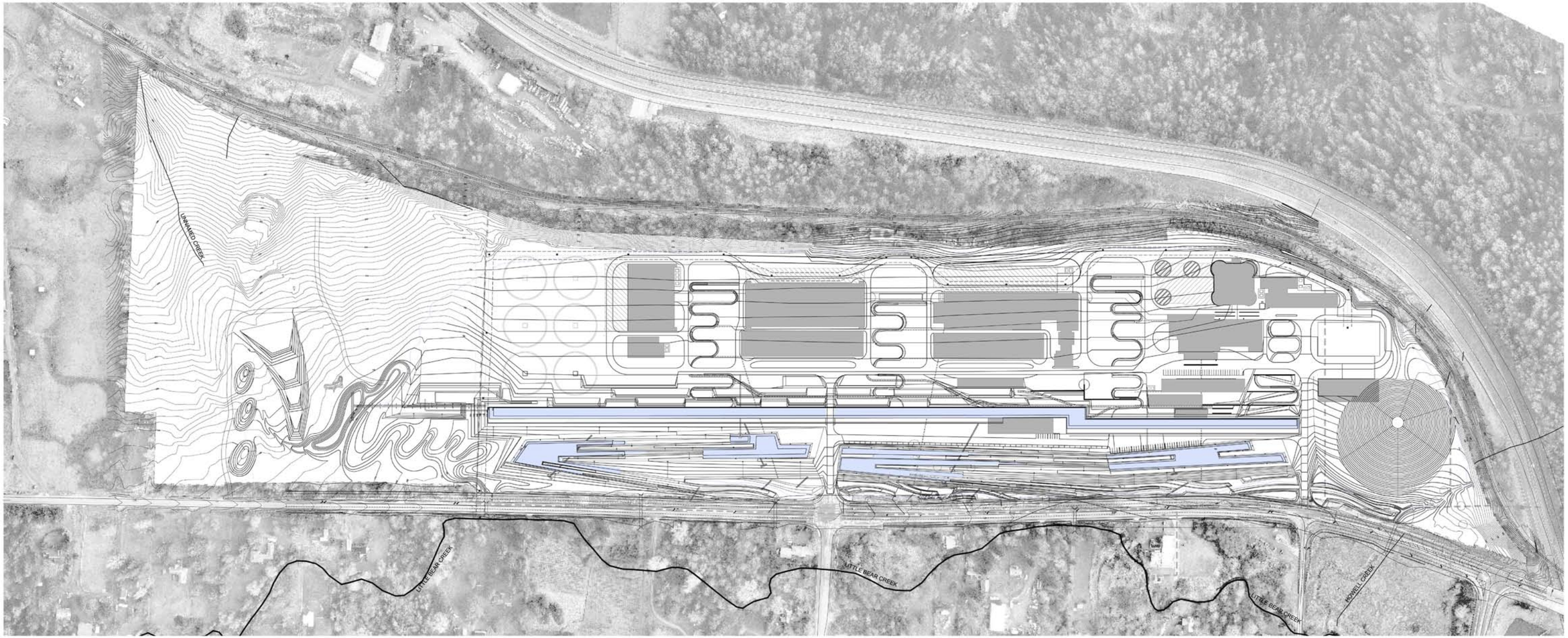
pedestrian circulation
master plan

KING COUNTY
Department of Natural Resources and Parks
Wastewater Treatment Division

MITHŪN
Streeter & Associates Architects

Hargreaves Associates

XX | XX
10.25.03



King County
Brightwater
TREATMENT SYSTEM

schematic layout

scale 1" = 100' - 0"
10.23.03

KING COUNTY
Department of Natural Resources and Parks
Wastewater Treatment Division

MITHŪN
Streeter & Associates
Architects

Hargreaves
Associates

BIBLIOGRAPHY

Art

Bach, Penny Balkin ed., *New Land Marks: Public Art, Community, and the Meaning of Place*, Editions Ariel, 2000.

Beardsley, John, Earthworks and Beyond: Contemporary Art in the Landscape, Abbeville Press, 1998.

Green Museum: a nonprofit, online museum of environmental art http://www.greenmuseum.org/

Mitchell, W.J.T., ed., *Art and the Public Sphere*, University of Chicago Press, 1993.

Oakes, Baile, Sculpting with the Environment, Van Nostrand Reinhold Company, 1997.

Sculpture Magazine, March 2000.

Spaid, Sue, *Ecovention: Current Art to Transform Ecologies*, Ram Publications, 2002.

Artist in Residence

"Artists & Communities—Sample Project Budget Format." *Mid Atlantic Arts*. 2003 http://www.midatlanticarts.org/PDFs/MAAF_ArtistsCommunities03.pdf

Artists Communities: A Directory of Residencies in the United States that offer Time and Space for Creativity, Alliance of Artists' Communities, 2000.

AIR Programs:

Artist-in-Residence Program at SF Recycling & Disposal, Inc. http://www.sunsetscavenger.com/artist_in_residence.htm

Artist Opportunities at the Exploratorium http://www.exploratorium.edu/arts/

Seattle City Light Artist-in-Residence http://www.seattle.gov/light/aboutus/Artist-In-Residence/

The STUDIO for Creative Inquiry http://www.cmu.edu/studio/index.html

Brightwater

Art Concept Workbook: Brightwater Treatment System, 2003.

Brightwater Notebook I: Phase One – Research, December, 2000.

Brightwater website: http://dnr.metrokc.gov/wtd/brightwater/index.htm

Contacts:

Michael Popiwny, Siting and Mitigation Manager
Major Capital Improvement Program, Wastewater Treatment Division, DNRP
206.684.6779
michael.popiwny@metrokc.gov

Susan Kaufman-Una, Senior Water Quality Planner
Major Capital Improvement Program, Wastewater Treatment Division, DNRP
206.684.1271
susan.kaufman-una@metrokc.gov

Randy Shuman (outfall), Manager, Science and Technical Support
Water and Land Resources, Department of Natural Resources and Parks, randy.schuman@metrokc.gov

Stan Hummel, Engineering Manager-Treatment Plant
206.684.1844
stan.hummel@metrokc.gov

Dung Gate/Dung Beetle

"Dung: Dung Gate." *The International Bible Encyclopedia*. 27 August 2003 http://www.searchgodsword.org/enc/isb/view.cgi?number=T2822

"Scarab Beetles." *Insecta Inspecta World*. 27 August 2003 http://www.insecta-inspecta.com/beetles/scarab/

Educational Materials:

Puget Sound:

"Clouds." Kids for Puget Sound. 15 January 2003 http://www.pugetsound.org/kids/kidsound/stories/story100.html

"Habitat is Home." *Kids for Puget Sound. 15 January 2003* http://www.pugetsound.org/kids/habitat/default

"Progress Report Number 6." *Puget Sound Environmental Learning Center. Spring/Summer 2002*

Water:

"Get to Know H_2O." *DCWASA*. 29 December 2002 http://www.dcwasa.com/education/get_to_know_h20.cfm

"Liquid of Life." *DCWASA*. 29 December 2002 http://www.dcwasa.com/education/liquid_of_life.cfm

"Use Water Wisely Outdoors." *DCWASA*. 29 December 2002 http://www.dcwasa.com/education/use_wisely_outdoors.cfm

"Water Background Information." *EPA Environmental Education Center*. 29 December 2002 http://www.epa.gov/teachers/background_water.htm

"Water Curriculum Resources." *EPA Environmental Education Center*. 29 December 2002 http://www.epa.gov/teachers/curriculumwater.htm

"Water Cycle." *DCWASA*. 29 December 2002 http://www.dcwasa.com/education/water_cycle.cfm

"Where Does the Water Go? *DCWASA*. 29 December 2002 http://www.dcwasa.com/education/where_does_water_go.cfm

Greenroofs

"Annotated Bibliography." Greenroofs. 29 December 2002 http://www.greenroofs.com/bibliography.htm

"Greenroof Concept." Greenroofs. 29 December 2002 http://www.greenroofs.com/concept.htm

"Potential Issues." *Greenroofs*. 29 December 2002 http://www.greenroofs.com/potential_issues.htm

Lushootseed People

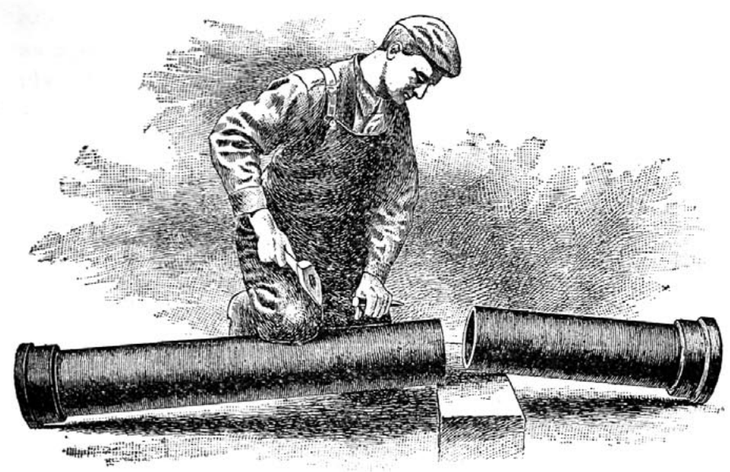
"The Lushootseed Peoples of Puget Sound Country." University of Washington Libraries Digital Collections. 15 January 2003 http://content.lib.washington.edu/aipnw/thrush/thrush.html

Mythology

Hyde, Lewis. Trickster Makes This World—Mischief, Myth, and Art. New York: Farrar, Straus and Giroux, 1998.

Reed, Katherine M., ed. "Earth Goddesses of the Pacific Northwest." Washington Geology. March 1997 vol. 25 no. 1.

"Writing Myths." *LitSite Alaska*. 16 January 2003 http://litsite.alaska.edu/uaa/workbooks/mythwriting.html



Parks and Recreation

"NYC's Riverbank State Park." New Yorkled. 19 October 2002 http://www.newyorkled.com/riverbankstatepk.htm

Paris Sewer System

Petroski, Henry. "Seeing Eye to Eye." *Paris Sewer System*. 4 October 2002 http://www.asee.org/prism/sept00/html/refractions.cfm

Puget Sound/Plant Connection

Bennington, Sara. "If You Build it, They Will Come." *Blueplanet*. Summer 2003, p. 24-38.

Vanderbilt, Tom. "Phyto Remediation." *ID Magazine*. June 20.

Route 9/Snohomish County History

Brightwater Background Survey, Larson Anthropological Archeological Services Limited, Gig Harbor, WA, 2002.

Freeman, Suzi, Gloria Kraft and Linda Pickard, *Village in the Woods: Woodinville's Early Days – 1870-1920*, Peanut Butter Publishing, Seattle, WA, 1993.

History Link (includes many related links): http://www.historylink.org

Inventory of the County Archives of Washington: No. 31 Snohomish County (Everett), prepared by the Washington Historical Records Survey Division of Community Service Programs Work Projects Administration, Seattle, 1942.

King County Snapshots: combined archives of the Museum of History and Industry, University of Washington and local heritage organizations: http://content.lib.washington.edu/imls/kcsnapshots/index.html

Klein, Fred and the Northshore History Boosters, *Slough of Memories: Recollections of Life in Bothell, Kenmore, North Creek, Woodinville 1920-1990*, Peanut Butter Publishing, 1992.

Mann, Elsie, *Full of Grace: Draft 7*, unpublished paper, Snohomish, WA, 2001.

Mann, Elsie, *Maltby and Neighbors: a Chronology*, unpublished paper, Snohomish, WA, 2002.

Contact information:

Elsie Mann 8108 197th St SE
360-668-6011 Snohomish, WA 98296
candemann@msn.com

River Reflections: Snohomish City – 1859 to 1910, Snohomish Historical Society, Snohomish, WA, 1975.

Shiach, William Sidney, ed. and Harrison B. Avrill, Assoc. Ed., *An Illustrated History of Skagit and Snohomish Counties, Their People, Their Commerce and Their Resources*, Interstate Publishing Company, Chicago, 1906.

The Snohomish Story: From Ox Team to Jet Stream, Snohomish Centennial Association, Inc., Snohomish, WA, 1959.

Stickney, Amy Eunice and Lucile McDonald, *Squak Slough 1870-1920*, Friends of the Bothell Library, Bothell, WA, 1977.

Whitfield, W. M., *History of Snohomish County Washington, vol. 1.*, Pioneer Historical Publishing Company, 1926.

Sewage

Brataas, Anne. "The Art of Sewage." St. Paul Pioneer Press.

Van Der Ryn, Sim, and Wendell Berry, *The Toilet Papers: Recycling Waste and Conserving Water*, Chelsea Green Pub Co, 2000.

Zacks, Stephen, "Aroma Therapy: New York City puts the "treat" in "sewage treatment," http://www.metropolismag.com/html/content_0601/ob/ob9.html

Social Theory
Dreicer, Gregory K. ed., *Me, Myself and Infrastructure: Private Lives and Public Works in America*, American Society of Civil Engineers, 2002.
Sennett, Richard, *The Conscience of the Eye: The Design and Social Life of Cities*, W.W. Norton & Company, 1992.
Soja, Edward W., *Postmodern Geographies: The Reassertion of Space in Critical Social Theory*, Verso Books, 1997.

Suquamish Culture
"Suquamish Culture." Suquamish. 17 October 2003
http://www.suquamish.nsn.us/SuqCult.htm

Vortex Tube
"Vortex Tube Phenomenon." Newman Tools Inc. 16 October 2003
http://www.newmantools.com/vortex.htm

Wastewater Treatment Facilities:
City of San Diego Metropolitan Wastewater
http://www.sannet.gov/mwwd/index.shtml
City of San Diego Metropolitan Wastewater - Point Loma
http://www.sannet.gov/mwwd/general/ptloma.shtml
Department of Environmental Protection Holds Groundbreaking Ceremony to Mark Start of Upgrade Construction at Newtown Creek Wastewater Treatment Plant
http://www.nyc.gov/html/dep/html/press/00-24pr.html
Interview Notes: Michael Singer, Artist and Co-designer of the City of Phoenix Solid Waste Facility
http://www.nyu.edu/icis/work/singer.html

King County DNR Wastewater Treatment Division
http://dnr.metrokc.gov/wtd/
West Point Treatment Facility:
http://dnr.metrokc.gov/wtd/westpoint/index.htm
"A Point Well Taken," Landscape Architecture, June 1999.
South Treatment Plant:
http://dnr.metrokc.gov/wtd/southplant/
King County Waterworks Gardens:
http://dnr.metrokc.gov/wtd/waterworks/
"Cleansing Art," Landscape Architecture, January 1997.

Public Art for the Cambridge Water Purification Facility
http://www.cambridgema.gov/~CAC/public_art_tour/map_03.html

West Boise Wastewater Treatment Education Center Arts Plan, Dwaine Carver/The Boise City Public Works Department and the Boise City Arts Commission, June 2003.

Water
"30 Years of Ocean Conservancy." Blueplanet. Fall 2002, p. 27-34.
Ball, Philip, *Life's Matrix: A Biography of Water*, University of California Press, 2001.
de Villiers, Marq, *Water: The Fate of Our Most Precious Resource*, Mariner Books, 2001.
Leopold, Luna B., et al., *Fluvial Processes in Geomorphology*, Dover Publications, 1995.
National Agricultural Library Water Quality Information Center
http://www.nal.usda.gov/wqic/
Outwater, Alice, *Water: A Natural History*, Basic Books, 1997.
Rothenberg, David, *Writing on Water*, MIT Press, 2001.
Rotily, Jocelyne, "The Spirit and Power of Water: A Study at the Confluence of Arts and Sciences." OLATS. 15 October 2001
http://www.olats.org/africa/projets/gpEau/introGPEau_Eng.shtml
"Water." Envirofacts Data Warehouse. 4 February 2003
http://oaspub.epa.gov/enviro/ef_home2.water
Water Environment Federation
http://www.wef.org/whoweare/
Wolverton, B.C., and John D. Wolverton, *Growing Clean Water: Nature's Solution to Water Pollution*, Wolverton Environmental Services, Inc., 2001.

Water Politics
"As Andean Glaciers Shrink. Water Worries Grow," Juan Forero, *NYT*, November 24, 2002, Sun.
"Drought on East Coast Raises Worries of Water Rationing" By Iver Peterson with Barbara Stewart, *NYT* February 20, 2002, Wed.
"Environmental War Clouds,: *NYT* Editorial, November 25, 2002, Mon.
"The History of Plumbing – Jerusalem"
http://www.theplumber.com/jerus.html
"The History of the Wall," April 8, 2001
http://www.peak.sfu.ca/the-peak/2001-1/issue13/op-thewall.html
"How to Get Water to the Poor," *NYT* Letter, September 2, 2002, Mon.
"In Race to Tap the Euphrates. The Upper Hand Is Upstream," *NYT* Series, August 25, 2002, Sun.
"U.S. Approves Water Plan in California, but Environmental Opposition Remains," Douglas Jehl, *NYT*, August 31, 2002, Sat.
"U.S. Eases Way for West to Control Big Volumes of Water," Douglas Jehl, *NYT*, October 13, 2002, Sun.
"Who Owns Water?" Maude Barlow, Tony Clarke, *The Nation*, September 2/9, 2002.

Watershed
"Assessed Rivers, Lakes, and Estuaries Meeting all Designated Uses." EPA Watershed Information Network. 15 January 2003
http://www.epa.gov/iwi/1999april/iii1_usmap.html
Constructed Wetlands Bibliography
http://www.nal.usda.gov/wqic/Constructed_Wetlands_all/index.html
Constructed Wetlands for Wastewater Treatment and Wildlife Habitat
http://www.epa.gov/owow/wetlands/construc/content.html
"The Definition." Puget Sound Online. 4 February 2003
http://www.psat.wa.gov/About_Sound/Define.htm
"The Green River Watershed." King County—Water and Land Resources Division. 3 February 2003
http://dnr.metrokc.gov/wlr/watersheds/green.htm
"Program Profiles: Puget Sound." *EPA Office of Water—Bringing Our Estuaries New Life. 4 February 2003*
http://www.epa.gov/owow/estuaries/programs/ps.htm
"Puget Sound—Watershed Profile." *EPA—Surf Your Watershed. 3 February 2003*
http://cfpub.epa.gov/surf/huc.cfm?huc_code=17110019
Restoring and Protecting America's Watersheds
http://www.cleanwater.gov/
"Shoreline Aerial Photos." Washington State Department of Ecology. 4 February 2003
http://apps.ecy.wa.gov/shorephotos/maps/ce.htm
Using Constructed Wetlands for Removing Contaminants from Livestock Wastewater
http://Ohioline.osu.edu/a-fact/0005.html
"Watershed Atlas." EPA Watershed Information Network. 15 January 2003
http://www.epa.gov/wateratlas/geo/maplist.html
"Window to My Environment—Turner Corner, WA." Window to My Environment:-EPA., 2003
http://134.67.99.109/wme/myWindow.asp?xl=-122.167097&yb=47.78639&xr=-122.118803&yt=47.82261
"Window to My Environment—Woodinville, WA." *Window to My Environment:-EPA, 2003*
http://134.67.99.109/wme/myWindow.asp?xl=-122.18732&yb=47.73601&xr=-122.13908&yt=47.77219

Wind Power
"Classroom: Wind Power." Now With Bill Moyers. 14 December 2002
http://www.pbs.org/now/classroom/wind.html
"In Depth Transcript: Bill Moyers Interviews Mark Hertsgaard." Now With Bill Moyers. 14 December 2002
http://www.pbs.org/now/transcript/transcript_hertsgaard.html
"Wind Power Primer," Now With Bill Moyers. 14 December 2002
http://www.pbs.org/now/science/wind.html

PHOTO CREDITS

All photos except those noted below are by the art master plan team.

Cover photo: manipulated image from nytimes, april 29, 2001, associated press.
Inside cover: international library of technology, water supply and purification/sewage/irrigation, international textbook company, 1923.
Page 12: swiss pavillion, worlds fair, 1938.
Page 19: "the circle," stan hera, haskell indian nations university.
Bibliography: "proposal for seattle," claus oldenberg.