This final report, covering benchmarks and goal setting, was created by the Center for Maximum Potential Building Systems, consultants for the Seaholm EcoDistrict development project for the City of Austin Economic Growth and Redevelopment Office and the Office of Sustainability, following the progress of the January 2013 EcoDistricts workshop.

Pliny Fisk III + Gail Vittori
Co-Directors

Brendan Wittstruck
Senior Design Associate

The information contained within this report represents the findings and recommendations of the Center for Maximum Potential Building Systems, and does not imply an endorsement by the City of Austin Office of Sustainability or other City of Austin department.
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APPENDIX
The Seaholm EcoDistrict is an effort between public, private, and non-profit stakeholders in Austin that is based on the efforts of sustainable urbanism championed by EcoDistricts (formerly the Portland Sustainability Institute).

**An EcoDistrict is a new model of public-private partnership that emphasizes innovation and deployment of district-scale best practices to create the neighborhoods of the future – resilient, vibrant, resource efficient and just.** (EcoDistricts)

**ECODISTRICT INITIATIVE**

PUBLIC SECTOR
City of Austin  
COA Economic Growth + Redevelopment Office  
COA Office of Sustainability  
COA Planning + Development  
COA Austin Energy  
COA Austin Water  
COA Parks + Recreation Department  
COA Bike Program  
COA Transportation + Parking  
COA Libraries  
COA Cultural Arts Division  
COA Public Works  
Capital Metro  
Austin Federal Courthouse

PRIVATE SECTOR
Trammell Crow Company  
Gables Residential  
Constructive Ventures  
Southwest Strategies/Seaholm Power LLC  
Lake|Flato Architects  
Bury + Partners  
HOLOS  
EcoDistricts [former the Portland Sustainability Institute]

COMMUNITY
Downtown Austin Alliance  
Center for Maximum Potential Building Systems  
Art Alliance of Austin  
Spring Condominium HOA

**JANUARY 2013 ECODISTRICT WORKSHOP ATTENDEES**
EXECUTIVE SUMMARY

Sustainability is a central organizing principle of the Seaholm Development District. The 65-acre District is anchored by three distinct parcels: to the west, the Southwest Strategies/Seaholm Power LLC mixed-use redevelopment on the former Seaholm Power Plant site; in the middle, the new Austin Central Library; and to the east, the Trammell Crow mixed-used redevelopment on the former Green Water Treatment Plant site.

In 2012, the Seaholm District was selected as one of ten projects in North America to participate in EcoDistricts’ Pilot Program. To further advance this work, the City of Austin’s Office of Sustainability contracted the Center for Maximum Potential Building Systems (CMPBS) to engage with diverse public, private, and non-profit sector stakeholders with an objective to identify quantitative and qualitative opportunities and benefits, articulate the project’s sustainability vision, goals, and process, develop an action agenda, and explore how emerging tools such as ecoBalance and Visible Green can add value to the EcoDistrict framework. Underscoring the assessment was the congruence between EcoDistricts’ eight key performance areas and the action areas of the Imagine Austin Vision Plan and the Office of Sustainability’s Rethink/Austin Plan.

The report concludes with recommended action areas acknowledging the Seaholm EcoDistrict’s unique opportunity to emerge as an exemplar of cohesive, healthy green building and urban design, ecological and social mindfulness, resilient infrastructure, and extraordinary innovation.

The following is a summary CMPBS’ key findings:

- Planning and implementation will benefit from clearly articulated ‘first principles’ to reinforce resilient, productive, place-based urbanism
- The Seaholm EcoDistrict’s geographic location makes it a special venue for Austin’s most progressive environmental urban design initiative to date
- EcoDistrict developers have committed to using green building practices that exceed code and contribute to Austin’s green building portfolio
- ‘District Thinking’ extends building scale practices to parcel-to-parcel and District-scale approaches, fulfilling shared resource needs by balancing production and storage capacities
- The Seaholm EcoDistrict has significant solar energy and water harvest and reclaim potential which offsets reliance on fossil fuel generated energy and municipally-supplied potable water
- Combined open space, vertical building surfaces and rooftop areas have the potential to grow more than one million pounds of food each year
- Green infrastructure can capture and treat more than 36 million gallons of stormwater each year
- District Benchmarks and Metrics provide a road map to guide planning, design and construction decisions, track implementation and performance, and provide feedback loops to promote continuous improvement
- The ecoBalance Conserve-Integrate-Cycle method benefits the economy and effectiveness of managing the Seaholm EcoDistrict’s resource flows and spatial utilization

1 formerly the Portland Sustainability Institute
CMPBS has identified several First Principles which have the potential to distinguish the Seaholm EcoDistrict as a pioneer for productive, resilient place-based urbanism:

- **DESIGN FOR SOURCE-USE BALANCE**
  Balancing the resource inequities and *EcoBalance* of the District-scale will allow for **more efficient and effective distribution of total resources** while supporting the operation of the District as a cohesive whole.

- **DESIGN FOR PEOPLE, PLACE & ECOLOGY**
  Develop place-based strategies for action and funding support ecosystems, stakeholders, residents, visitors, and the City’s economy and environmental health.

- **DESIGN FOR CLIMATE**
  Implement design guidelines that take advantage of solar, shade, prevailing breeze, vegetation and other regional climatic factors to improve performance and promote District-wide climate resilience.

- **EMBRACE INDEPENDENCE & INTERDEPENDENCE**
  District strategies must be viewed simultaneously as independent pieces and an interdependent assembly. Balance is achieved by recognizing the strengths and needs of the District’s parts and how they **support themselves and each other**.

- **ACKNOWLEDGE FEEDBACK LOOPS**
  It is critical to recognize within distinct Performance Areas the feedback loops that maintain **relationships and overlaps between categories**, particularly as they relate to maximizing benefits and outcomes.

- **PROMOTE VISIBILITY & ENGAGEMENT**
  The idea of *Visible Green* contends that any impact of measures taken to meet performance goals is amplified by its understandable manifestation visually accessible to those who come in contact with it. The key performance indicators should be **visible, legible, and interactive** to an empowered public
Designing and planning EcoDistrict development must address a range of scales at play within the District—from building details like fixtures and appliances to the intra-parcel infrastructure and systems design:

**BUILDING SCALE**
Individual buildings will be designed to meet City of Austin sustainability requirements. District developments are pursuing goals that exceed code and contribute to Austin’s green building portfolio.

**PARCEL RELATIONSHIPS**
Parcel-to-parcel relationships open the door to innovative and cost-effective water, energy, and stormwater solutions. A key example of this is the planned rainwater collection system within the existing vaults of the Seaholm power plant, which will be used to irrigate adjacent park land beyond the parcel boundary. In addition, the District Chiller provides chilled water service to many buildings within the District.

**DISTRICT THINKING**
Thinking at the District level further advances parcel-to-parcel integration and “cycling” opportunities. Buildings can contribute to each others’ resource needs by pooling their production and storage capacities, resulting in a more effective and productive use of aggregated District resources, peak load reductions, and resource use intensity balancing between developments.

---

1 District Chiller at Third and San Antonio Streets is part of the largest ice thermal system in Central Texas.
The District is made of distinct parts whose development is led by public and private stakeholders. In order to realize the benefits of District thinking, all of these parts must be considered individually and as part of the whole:

**BUILDINGS**

Buildings in the District will use established, measurable green building practices as a matter of course. District-level thinking introduces new ways buildings can support each other.

**OPEN SPACE**

Open space is habitat for people and nature, as well as an economic value generator for retail, commerce and home ownership. District public spaces can be carefully designed for productive, performative, and experiential social areas.

**INFRASTRUCTURE**

Infrastructure—both visible and hidden—is critical to EcoDistrict performance. Greening infrastructure means maximizing reliance on natural systems, enhancing environmental performance of conventional infrastructure through healthy, high-performance materials, and incorporating adaptability and multi-functionality in design and operation.

---

1. New and existing floor area numbers estimated based on schematic design footprint areas and number of stories
SITE NARRATIVE

The mid-century Walter E. Seaholm Power Plant was Austin’s first electrical powerhouse, anchoring an industrial district that supported the early growth of the City. It was constructed between 1950 and 1958 and operated until 1989.

The Green Water Treatment Plant opened in 1925, becoming one of the first water treatment plants in the world to employ a new lime-based treatment developed at the University of Texas at Austin. At its opening, it ranked among the country’s most innovative new models of drinking water treatment.

Today, the Seaholm and Green sites and their neighbors have the opportunity to once again be visible champions of environmental and urban innovation and influence. The sites’ history as energy and water production centers provides a clear district identity that will guide a poetic and performative comparison and contrast of new and old innovative technologies.

image credits [left to right]: Austin History Center/Austin Public Library; Wells Dunbar/Austin Chronicle; Brendan Wittstruck/CMPBS
**ECODISTRICT BOUNDARY**

The 65-acre Seaholm EcoDistrict project area is defined as the area:

- Bounded firmly to the south by the lateral center of Lady Bird Lake
- Bounded firmly to the west by Lamar Boulevard
- Bounded loosely to the east by San Antonio Street, and to include all Trammell Crow parcels on Blocks 1 and 23 as well as the existing Austin Music Hall, Austin Ballet, 360 Condominiums, and State of Texas District Chiller site
- Bounded loosely to the north by a line following or approximating Fourth Street, both banks of the Shoal Creek riparian zone, bisecting the westerly block between Third and Fifth Streets in such a way as to include Spring Condominiums and planned 311 Bowie development

Key relationships and partnerships exist beyond this physical boundary, including the Austin Federal Courthouse and Whole Foods.

---

**COMPLETED**

- Gables Phase I, AEGB 2-Star Rated, LEED Certified Silver; 13,000 sf Retail, 290 D.U.
- Spring Condominiums, AEGB 1-Star Rated; 246 D.U.
- 360 Condominiums, AEGB 1-Star Rated; 430 D.U.
- Ballet Austin, AEGB 1-Star Rated
- Austin Music Hall, AEGB 1-Star Rated
- Pfluger Bridge Extension

**PLANNED or UNDER CONSTRUCTION**

- Lower Shoal Creek Improvements
- Gables Phase II, Targeting AEGB Rating + LEED Certification; 189,000 sf
- Austin Central Library, Targeting LEED Gold Certification; 200,000 sf
- Seaholm Power Plant, Targeting AEGB 2-Star Rating; 85,000 sf
- Seaholm Retail, Targeting AEGB 3-Star Rating + LEED Gold Cert.; 66,000 sf
- Seaholm Residential Tower, Targeting AEGB 3-Star Rating + LEED Gold Certification; 298 D.U.
- 311 Bowie, Targeting AEGB Rating; 430 D.U.
- Energy Control Center Site, Targets T.B.D.; 15,000 sf Retail; 482 D.U.
- GWTP Office Tower, Targeting AEGB 3-Star Rating + LEED Gold Certification; 467,000 sf
- GWTP Residential Towers 1 + 2, Targeting AEGB 3-Star Rating + LEED Gold Certification; 832,000 sf
- GWTP Hotel, Targeting AEGB 3-Star Rating + LEED Gold Certification; 400 Rooms
- Seaholm Intake Structures, Targeting LEED Silver Certification
  - Austin Energy Power Substation Art Wall
- Second Street Bridge
- Bowie Underpass

* Indicates project construction work in progress
The “District-shed”, like a watershed ecology, recognizes the greater relationships around the District in its context within the City, hydrological impacts, and infrastructure loops.

The District-shed’s “soft” boundary addresses interests that may influence or be influenced by the District. Some immediate concerns that relate to the Seaholm EcoDistrict include:

- Neighbors & stakeholders
- Infrastructure routes
- The Shoal Creek watershed and its Conservancy
- Municipal, Civic and other governing agencies
- The Lady Bird Lake and Shoal Creek hike & bike trails
- Public transit modes servicing the District
The space and geographic location of the Seaholm EcoDistrict make it a special venue for Austin’s most progressive environmental urban design initiative to date.

Located directly north of Lady Bird Lake, the site enjoys protected southern exposure and access to prevailing summer breezes. Encompassing the mouth of the Shoal Creek watershed and abutting Lady Bird Lake, the site is rich in habitat and water resources.

The site area also has tremendous potential for connectivity, from the Pfluger Pedestrian Bridge across the Lake to the planned Lone Star Rail and Capital Metro Rail terminal.
DISTRICT DAILY VERTICAL SOLAR INSOLATION: 740-1290 BTU/sf/day

DISTRICT HAS PROTECTED SOLAR ACCESS

DISTRICT HAS PROTECTED PREVAILING WIND ACCESS

1 source: Sustainable Sources

DISTRICT YEARLY RAINFALL: 52,950,000 gallons

DISTRICT RECEIVES ENTIRE SHOAL CREEK WATERSHED

DISTRICT INCLUDES LADY BIRD LAKE

2 assumes 30” of rain annually; source: US Geological Survey
ECODISTRICT RESOURCES

The District’s site and land area provide access to a wealth of resources; these resources, if property managed and engaged, have the potential to significantly reduce operational costs and negative environmental burdens of the EcoDistrict development.

Based off initial estimates of usable surface areas, the District is positioned to produce significant electricity through photovoltaics and water heating through efficient solar-thermal installation—electricity uses that would otherwise be drawn at long-term cost from the City grid.

Similarly, the rainwater catchment potential—a long with the existing water storage cisterns left by the Seaholm Power Plant—is anticipated to outweigh, in some cases, the total outdoor water use of District developments. This—along with tested water reduction sources such as condensate capture and “purple pipe” effluent irrigation—represents a huge financial savings along with considerable environmental benefits specific to stormwater runoff issues and water quality in Shoal Creek and Lady Bird Lake.

Water access and solar potential also mean opportunities for localized food production—a proven economic and value generator, and a planning step that could further the unique visible identity of the Seaholm EcoDistrict.

DISTRICT BUILDING-INTEGRATED PHOTOVOLTAIC POTENTIAL = 3.67 MW
BASED ON CURRENT DESIGNS FOR SOUTH-FACING VERTICAL SURFACES

DISTRICT SOLAR THERMAL POTENTIAL = 35.1 million KWh
BASED ON CURRENT DESIGNS FOR ROOF SURFACE AREA

DISTRICT RAINWATER CATCHMENT POTENTIAL = 8.98 million gallons/year
BASED ON CURRENT DESIGNS FOR ROOF SURFACE AREA

DISTRICT STORMWATER CAPTURE+TREATMENT POTENTIAL = 36.6 million gallons/year
BASED ON CURRENT DESIGNS FOR OPEN SPACE

DISTRICT FOOD PRODUCTION POTENTIAL = 1,049,300 pounds/year
BASED ON CURRENT DESIGNS FOR ROOF + VERTICAL SURFACE AREA AND OPEN SPACE

1 assumes 10’ floor height and 10W/sf photovoltaics production
2 solar thermal standard of 75 kwh/sf
3 rainwater catchment standard of 600 gallons/inch rain/1000 sf
4 using rainwater catchment standard
5 using conservative estimate of 1 lb food per sf & 1/2 lb food per sf vertical surface
DISTRICT ROOF AREA: 468,000sf

- Green Roofs
- High Albedo Roof Surface
- Roof-mount Photovoltaics

DISTRICT VERTICAL SOUTHERN EXPOSURE: 368,600sf

- Rainscreens
- Living Walls
- Building-Integrated Photovoltaics

DISTRICT OPENSPACE AREA: 1,943,000sf

- Stormwater Capture + Treatment
- Habitat Development
- Street-Level Thermal Comfort
- Shading

1 based on current district designs for building footprints
2 based on current district designs for number of building stories (assumes 10’ floors)
The EcoDistrict framework comprises eight key performance areas (far right, inner circle). The City of Austin Office of Sustainability’s ten action areas align well with these EcoDistrict goals, as seen here (outer circle).

These performance areas integrate the priorities of the triple bottom line, and provide organization and feedback through the planning, design, construction, and operations phases of the Seaholm EcoDistrict.

The Imagine Austin vision plan for complete communities (near right) presents a comprehensive planning ethic for the City, supported by the specific EcoDistrict performance areas.
EQUITABLE DEVELOPMENT

HEALTH + WELL BEING

ACCESS + MOBILITY

WATER

ENERGY

COMMUNITY IDENTITY

LIVABILITY + COMPLETE NEIGHBORHOODS

ARTS + CULTURE

EQUITABLE DEVELOPMENT

HEALTH + SAFETY

ACCESS + MOBILITY

WATER

ENERGY

COMMUNITY IDENTITY

LIVABILITY + COMPLETE NEIGHBORHOODS

ARTS + CULTURE

EQUITABLE DEVELOPMENT

HEALTH + SAFETY

ACCESS + MOBILITY

WATER

ENERGY

COMMUNITY IDENTITY

LIVABILITY + COMPLETE NEIGHBORHOODS

ARTS + CULTURE
The Goal Summary is a process tool of assessing District progress. It consists of several operative categories:

- **CITY OF AUSTIN GOALS**
  City of Austin goals provide the strategic backdrop for neighborhood-scale development. Goals are pulled from City strategic plans and documents.

- **DISTRICT BENCHMARK**
  District Benchmark represents the sustainability performance levels and design features that have been committed to as a part of Master Developer Agreements and AEGB, LEED, and City of Austin requirements.

- **DISTRICT METRIC**
  District Metrics will provide the ability to measure results achieved in the District and provide direction for ongoing improvement.

- **DISTRICT OBJECTIVE**
  District Objectives provide specific goals that have been established as part of applying the EcoDistrict concept to the neighborhood.

- **DISTRICT STRATEGY**
  District Strategies are specific steps that may be taken to achieve the desired Objectives and Metrics results.

---

1 These are current goals anticipated to evolve as the planning process develops.
## Goal Summary Key

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<th>City of Austin Goals</th>
<th>District Benchmark</th>
<th>District Metric</th>
<th>District Objective</th>
<th>District Strategy</th>
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<td>Materials Management</td>
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*See page 27*

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<th>DISTRICT BENCHMARK</th>
<th>DISTRICT METRIC ¹</th>
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<tr>
<td>AFFORDABLE housing, workspace, services</td>
<td>• GWTP development to include affordable housing, minimum living wage agreement</td>
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<tr>
<td>LOCAL ECONOMY: jobs, opportunity</td>
<td>• Services and amenities to serve diverse populations</td>
<td>• TBD% local businesses</td>
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<td>DIVERSE communities, choices</td>
<td></td>
<td>• Diverse housing/use types</td>
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<td></td>
<td></td>
<td>• Access to services + nature</td>
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<td>HEALTHY behaviors + environments</td>
<td>• Low-VOC interior paints + coatings [AEGB BR 6]</td>
<td>• TBD% District restaurants feature</td>
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<td>ACTIVE lifestyles, amenities, population</td>
<td>• Ventilate per ASHRAE 62.1-2007 [LEED 2009 NC EQp1]</td>
<td>local + healthy foods</td>
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<td>NUTRITION: education, access, local food</td>
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<td>• TBD% District residents/tenants pursue active + healthy lifestyles</td>
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<td>CREATIVE economy + opportunity</td>
<td>• Preserve historic structures + reuse salvaged elements</td>
<td>• TBD% Historic structure preservation</td>
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<tr>
<td>PUBLIC ART: visibility + accessibility</td>
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<td>• TBD% Salvage reuse</td>
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<tr>
<td>HISTORIC PRESERVATION: interpretation, identity</td>
<td>• District branding + storytelling</td>
<td>• Visible metering displays</td>
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<td>• Comprehensive wayfinding + branding</td>
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<tr>
<td>COMPLETE STREETS: accessible, safe, connected</td>
<td>• District-wide car share + electric vehicles</td>
<td>• TBD% Vehicle emissions reduction</td>
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<td>MULTIMODAL transportation + transit options</td>
<td>• Urban rail stop</td>
<td>• TBD% Non-vehicle transit</td>
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<td>BIKE LANES</td>
<td>SIDWALK: 35</td>
<td>5 new miles per year</td>
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<td>• TBD% Parking integrated management + wayfinding</td>
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<td>• TBD% Vehicle emissions reduction</td>
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¹ This assessment establishes metrics of concern; most numerical targets are yet to be defined
<table>
<thead>
<tr>
<th>CITY OF AUSTIN GOALS</th>
<th>DISTRICT BENCHMARK</th>
<th>DISTRICT METRIC 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSERVATION:</strong> 140 gal/cap/day citywide by 2020</td>
<td>• 20% reduction [LEED 2009 NC WEp1]</td>
<td>• TBD% Potable water use reduction</td>
</tr>
<tr>
<td><strong>GENERATION:</strong> 1.3 B gal/year reuse</td>
<td>• Compliance with code per flow rates [AEGB BR 5]</td>
<td>• 100% Non-potable irrigation</td>
</tr>
<tr>
<td><strong>RESILIENCE:</strong> increased drought + flood planning</td>
<td>• 10% improvement relative to ASHRAE 90.1-2007 [LEED 2009 NC EA EP2]</td>
<td>• TBD% On-site renewables</td>
</tr>
<tr>
<td><strong>NET ZERO:</strong> 800MW citywide reduction by 2020</td>
<td>• 7.5% improvement in energy performance [AEGB BR 4]</td>
<td>• TBD% Greenhouse gas reduction</td>
</tr>
<tr>
<td><strong>RENEWABLES:</strong> 200MW citywide mix by 2020</td>
<td></td>
<td>• TBD% Heat island mitigation</td>
</tr>
<tr>
<td>70% citywide GHG reduction by 2030</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GREEN</strong> streets, infrastructure, access</td>
<td>Central Library + Seaholm to use existing infrastructure to store runoff for reuse</td>
<td>• TBD% Energy use reduction</td>
</tr>
<tr>
<td><strong>SHOAL CREEK</strong> restoration, stewardship</td>
<td>Second Street rain gardens to capture runoff from bridge to meet water quality code</td>
<td>• TBD% On-site renewables</td>
</tr>
<tr>
<td><strong>35% CANOPY:</strong> heat island reduction, shade</td>
<td>Riparian restoration project on Shoal Creek peninsula</td>
<td>• TBD% Greenhouse gas reduction</td>
</tr>
<tr>
<td><strong>ZERO WASTE:</strong> 90% citywide reduction by 2040</td>
<td>Central Library riparian restoration/stabilization</td>
<td>• TBD% Heat island mitigation</td>
</tr>
<tr>
<td><strong>RECYCLING:</strong> universal ordinance for resid./comm.</td>
<td>• Storage/collection of recyclables [LEED 2009 NC MRp1]</td>
<td></td>
</tr>
<tr>
<td><strong>BEST USE</strong> life cycle analysis, reduced toxicity</td>
<td>• Storage/collection areas for four primary recyclable waste streams [AEGB BR 7]</td>
<td>• TBD% Storage/collection for recyclables</td>
</tr>
<tr>
<td></td>
<td>• Construction debris recycling [AEGB BR 8]</td>
<td>• TBD% Waste reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• TBD% Construction emissions reduction</td>
</tr>
</tbody>
</table>
## DISTRICT OBJECTIVES

<table>
<thead>
<tr>
<th>EQUITABLE DEVELOPMENT</th>
<th>DISTRICT STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Address governance and process improvements at a policy level† †††</td>
<td>• Develop District governance mechanism for affordable housing planning, funding, and management</td>
</tr>
<tr>
<td>• Evaluate affordable housing and microhousing solutions††</td>
<td>• Identify policy barriers and opportunities to address them</td>
</tr>
<tr>
<td>• Promote diversity by providing amenities for all ages and levels of income††</td>
<td>• Pursue external funding sources (including Federal incentives, sponsorship, and underwriting)</td>
</tr>
<tr>
<td>• Establish District-wide Healthy Environments Plan††</td>
<td>• Provide mixed uses and residence types (including “microhousing”, live-work, and affordable models), public spaces and events, and seek local businesses as tenants</td>
</tr>
<tr>
<td>• Promote local and healthy food production and access</td>
<td>• Provide range of amenities to support racial, socioeconomic, and age diversity</td>
</tr>
<tr>
<td>• Empower healthy lifestyles, activities, education, and universal access††</td>
<td>• Provide equitable access to nature [see: Habitat + Ecosystem]</td>
</tr>
<tr>
<td>• Establish District-scale branding† †† †††</td>
<td>• Demonstrate sustainable techniques, materials and methods</td>
</tr>
<tr>
<td>• Establish District-wide Sustainability Management Association†</td>
<td>• Improve environmental conditions to enhance neighborhood vitality and health [see: Habitat + Ecosystem]</td>
</tr>
<tr>
<td>• Engage creative adaptive reuses that preserve historical identity of the site† †† †††</td>
<td>• Develop and implement District-wide integrated pest management, green housekeeping, and landscaping policies</td>
</tr>
<tr>
<td>• Establish District-wide Parking &amp; Transportation Plan† † ††</td>
<td>• Establish healthy materials guidebook to inform design, construction, tenant fit-out, and operational decisions</td>
</tr>
<tr>
<td>• Maximize design of diverse-use Complete Streets† ††</td>
<td>• Follow COA Construction Equipment Emissions Plan</td>
</tr>
</tbody>
</table>

†† Incorporates priorities from EcoDistrict workshop, January 2013; † Incorporates COA goal; ††† Incorporates additional CMPBS recommendation
## District Strategies

<table>
<thead>
<tr>
<th>District Objectives</th>
<th>District Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Promote District-wide net zero or net positive water use† †† †††</td>
<td>• Target ambitious percent improvement over code in District water use</td>
</tr>
<tr>
<td>• Establish District-wide Stormwater Management Plan†††</td>
<td>• Optimize use of reclaimed water sources (including rainwater, effluent, and condensate)</td>
</tr>
<tr>
<td>• Improve Shoal Creek and Lady Bird Lake water quality† †††</td>
<td>• Target keeping 100% of stormwater on site, capture a portion for reuse, and address COA code barriers to reclaimed water re-use</td>
</tr>
<tr>
<td>• Promote District-wide net zero or net positive energy use† †† †††</td>
<td>• Monitor, meter, and publicly display District water collection and use via interactive dashboard [see: Community Identity]</td>
</tr>
<tr>
<td>• Establish District-wide Energy Management Plan†††</td>
<td>• Reduce burden on centralized water and stormwater infrastructure through small-loop reclaim/treatment infrastructure</td>
</tr>
<tr>
<td>• Establish District-wide Ecosystem Stewardship Plan† ††</td>
<td>• Showcase District-wide stormwater management plan and comprehensive green infrastructure [see: Access + Mobility]</td>
</tr>
<tr>
<td>• Design beneficial, productive, and interactive landscapes† †† ††</td>
<td>• Partner to enrich stewardship of creek and lake, including water quality, erosion control, and wildlife protection [see: Habitat + Ecosystem]</td>
</tr>
<tr>
<td>• Promote District-wide zero waste infrastructure and developments† ††</td>
<td>• Encourage all developments to embrace and promote lake and creek access, use, and beautification</td>
</tr>
<tr>
<td>• Promote responsible building materials and practices</td>
<td>• Protect dark skies</td>
</tr>
<tr>
<td>• Establish District-wide Construction Waste Reduction Plan†</td>
<td>• Identify code barriers to open space uses and opportunities to address them [see: Equitable Development]</td>
</tr>
<tr>
<td></td>
<td>• Establish District-wide landscape management and integrated pest management plan [see: Heath + Well Being]</td>
</tr>
<tr>
<td></td>
<td>• Enrich District public and private open space by introducing food-producing landscapes, gardens, and beekeeping</td>
</tr>
<tr>
<td></td>
<td>• Match businesses with District productive spaces (such as gardens) to promote micro-economies and enhance District branding [see: Community Identity]</td>
</tr>
<tr>
<td></td>
<td>• Encourage implementation of green vertical surfaces (including State parking garage building)</td>
</tr>
<tr>
<td></td>
<td>• Encourage implementation of integrated agriculture</td>
</tr>
<tr>
<td></td>
<td>• Enact District-wide programs for waste reduction, reuse, recycling, and composting consistent with COA Zero Waste goals and according to highest waste outputs of building type and use</td>
</tr>
<tr>
<td></td>
<td>• Establish guidelines for high-performance healthy building materials</td>
</tr>
<tr>
<td></td>
<td>• Articulate and publicly display waste reduction performance of buildings and infrastructure via interactive dashboard [see: Community Identity]</td>
</tr>
<tr>
<td></td>
<td>• Create “boneyard” of salvaged building elements and items for reuse [see: Community Identity]</td>
</tr>
</tbody>
</table>

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† †† ††† indicates district-wide objectives.

† †† ††† indicates district-wide strategies.
The Conserve-Integrate-Cycle method describes scales of intervention, beginning with simple means of use reduction through conversation and concluding with District-scale cyclical thinking and full life-cycle understanding. The Conserve-Integrate-Cycle toolkit is a dynamic catalogue of green techniques and technologies, both tried-and-tested models and pilot project opportunities.

CONSERVE
Conserve is universally accepted as the most immediate metric for green building. Rating systems such as LEED and Austin Energy Green Building measure performance based on improvements relative to a baseline, such as for energy and water.

INTEGRATE
Integration establishes a relationship between systems, enabling a single intervention to fulfill multiple functions. Building systems integration commonly recognizes a scale of intervention: remote, touching, integrated, unified.

CYCLE
Cycle emphasizes the continuous flow of resources from source to use to re-source.
CONSERVE
RESOURCE-BASED CONSERVATION MEASURE

METHOD METHOD METHOD METHOD

SPACE-BASED CONSERVATION MEASURE

METHOD METHOD METHOD METHOD

INTEGRATE¹
LEVELS OF INTEGRATED SYSTEMS

REMOTE

TOUCHING

CONNECTED

MESHED/UNIFIED

CYCLE
EXAMPLES OF PERFORMANCE SYNERGIES BETWEEN INTEGRATED INTERVENTIONS

¹ from Richard Rush’s Building Systems Integration Handbook
Resource conservation generally deals with quantifiable metrics of resources available to a project. These include needs such as water and electricity as well as output streams such as construction and operational building debris, and wastewater.

The toolkit approaches each Performance Area with a series of conservation categories which include uses and input-output sources. For example, the Water toolkit includes water uses (including toilets, showers, faucets, appliances, HVAC, fire suppression, and irrigation) and sources (City water, rainwater, effluent, condensate reclaim, and others).

Each of these conservation categories can be indexed, as shown here, to include tested and experimental strategies by which conservation can be effected through increased production of sources or reduction of use intensity.
EXAMPLES OF ENERGY CONSERVATION METHODS

FENESTRATION
- Solar Orientation Optimization
- Low-e windows
  improved heat insulation
- Triple glazing with argon
- Vacuum-insulated glass units

LIGHTING
- Daylighting Optimization
- Compact fluorescent lighting
- Light-emitting diode [LED] lighting
- Daylight Sensors
  improved lighting efficiency

HEAT ISLAND REDUCTION
- Shading Device
  brise-soleil, louvers, screens
- High-albedo surface
  white roof, cool pavement
- Vegetation
  green roof, street trees, living wall
  cross-list: HABITAT + ECOSYSTEMS

EXAMPLES OF WATER CONSERVATION METHODS

TOILET
- Standard toilet
  Standard urinal
  1.6/1.0 gpf
- Low-flow toilet
  Low flow urinal*
  1.28/0.5 gpf
- Composting/foam toilet
  Waterless urinal
  zero gpf

SHOWER
- Standard showerhead*
  2.5 gpm
- Low-flow showerhead
  1.5 gpm
- Ultra low-flow showerhead
  1.25 gpm

FAUCET
- Private faucet*
  Public faucet
  2.2*/1.0 gpm
- Low-flow faucet
  1.0 gpm
- Ultra low-flow faucet*
  0.5 gpm

IRRIGATION
- Native/ Non-invasive adapted species
- Zero potable water use
- Zero water use for irrigation
  cross-list: HABITAT + ECOSYSTEMS

* Indicates current City of Austin code requirement
SPACE CONSERVATION

Space conservation is generally a more qualified metric than resource conservation, but adheres to similar principles of increasing production (incentivized spatial interventions) and reducing load (discouraged spatial conditions).

The toolkit similarly functions as an organizational system of conservation categories under the Performance Areas which address concerns relative to the District Strategies laid out in the Goal Summary (see page 24).

Examples of space conservation include considering dwelling unit diversity as a form of affordable housing that is empathetic to market concerns. The Space Conservation Toolkit outlines several housing types--from market-rate residential units to pilot microhousing--which facilitate the goals of the Equitable Development Performance Area. Likewise, the spatial implications of parking interventions illustrate both the myriad design options available and the space conservation they maintain.
EXAMPLES OF ACCESS+MOBILITY CONSERVATION METHODS

- Pedestrian + Bicycle Access
- Bus/Bus Rapid Transit
- Regional Rail/Light Rail
- Transit Pass Subsidies

EXAMPLES OF EQUITABLE DEVELOPMENT CONSERVATION METHODS

- Market-rate residential units
  Approx. 1 per 1200 sf
- Market-rate efficiency units
  Approx. 2 per 1200 sf
- Microhousing
  Approx. 3-4 per 1200 sf

SPATIAL CONSERVATION

- District parking reduction
- Bicycle Parking + Amenities
- Compact vehicle parking and Car sharing preferential parking
- Low emission + fuel efficient vehicle preferential parking
- Dynamic metering
EXAMPLES OF CONSERVATION IN ENERGY, WATER, ACCESS+MOBILITY, AND EQUITABLE DEVELOPMENT WITHIN DISTRICT
MARKET RATE RESIDENCES
MARKET RATE EFFICIENCIES
MICROHOUSING

PARKING REDUCTION
BICYCLE PARKING
COMPACT|CAR SHARE PARKING
LOW EMISSIONS PARKING

PARKING REDUCTION
BICYCLE PARKING
COMPACT|CAR SHARE PARKING
LOW EMISSIONS PARKING

EFFICIENT FIXTURES

PEDESTRIAN|BICYCLE
BUS|BUS RAPID TRANSIT
LIGHT RAIL

STREET TREES

BUILDING SHADING
WHITE ROOF
GREEN ROOF
LIVING WALL

NATIVE
NON-INVASIVE

STREET TREES

MARKET RATE RESIDENCES
MARKET RATE EFFICIENCIES
MICROHOUSING

TRANSIT PASS
SUBSIDIES

TRANSIT PASS
SUBSIDIES

PARKING REDUCTION
BICYCLE PARKING
COMPACT|CAR SHARE PARKING
LOW EMISSIONS PARKING

COMPACT|CAR SHARE PARKING

LOW EMISSIONS PARKING

PARKING REDUCTION
BICYCLE PARKING
INTEGRATED SYSTEMS

Integrated systems represent an additional tier of intervention toward efficiency. They can operate at all scales of the District but do not represent full cycles.

The taxonomy used here to draw and define integrated systems (near right) is borrowed from Richard Rush’s *Building Systems Integration Handbook*. The levels of integration are as follows:

REMOTE
Systems do not touch

TOUCHING
There is contact between systems, but they are not permanently connected

CONNECTED
Systems are permanently connected, but do not otherwise perform integrated function

MESHED/UNIFIED
Systems occupy the same space; this implies full integration between paired systems
EXAMPLES OF INTEGRATION METHODS AT VARIOUS SCALES

- Sink-in-toilet fixture
- Point-of-use greywater recycling
- Bike Showers with Wetland Treatment
- Condensate | Effluent Irrigation
- Photovoltaic Electric Vehicle Charging Stations
  Vehicle to Grid Energy (V2G/“Carbitrage”)
- Building-Integrated Photovoltaics
- Productive Green Roofs + Walls

- FAUCET
- TOILET
- HVAC
- PP
- IRRIGATION
- FOOD PRODUCTION
- ELECTRIC VEHICLE PARKING
- RENEWABLE ENERGY
- SHADE DEVICE
- BUILDING HEAT REDUCTION
- WINDOW
- RENEWABLE ENERGY
- BUILDING HEAT REDUCTION
EXAMPLES OF INTEGRATED SYSTEMS WITHIN DISTRICT

- Bike showers
- Greywater irrigation
- Point-of-use greywater
- Rainwater catchment
- Irrigation for food production
- Building-integrated photovoltaic glazing
- HVAC
- Rainwater catchment condensate reclaim
- Irrigation for food production
- Locally-sourced restaurant
- Sink-in-toilet fixtures
- Renewable energy transfer
- Vehicle-to-grid
POINT-OF-USE GREYWATER
RAINWATER CATCHMENT
IRRIGATION FOR FOOD PRODUCTION
RAINWATER CATCHMENT
CONDENSATE RECLAIM
IRRIGATION FOR FOOD PRODUCTION
BUILDING-INTEGRATED PHOTOVOLTAIC GLAZING
PRODUCTIVE GREEN ROOF
LOCALLY-SOURCED RESTAURANT
SINK-IN-TOILET FIXTURES
VEHICLE2GRID
ENERGY TRANSFER
BIKE SHOWERS
GREYWATER IRRIGATION
ENERGY TRANSFER
Cycle thinking advances the concepts behind integrated systems, understanding independent integrated interventions as a series of parts which can combine to create a larger scale, more complex “ecosystem” of design—with the ultimate goal of achieving complete life cycle balancing and dynamic flow.

The unique set of stakeholders that the Seaholm EcoDistrict has engaged allows it to seek cycles at a District scale, invoking multiple buildings, ownerships, and Performance Areas. Cycle thinking has the potential to produce a wide range of benefits to the District:

- Reduce operational costs by engaging productive waste reuse and closing end-use loops
- Identify synergies between Performance Areas to achieve multiple District Strategies
- Illustrate viability of full life cycle planning in urban settings
- Increase market value for retail, commercial, and residential uses
- Relieve burden on citywide infrastructure systems
Cycle thinking unifying district parts

Building + open space + infrastructure
EXAMPLES OF CYCLE THINKING WITHIN DISTRICT

- **Point-of-Use Greywater**
- **Rainwater Catchment**
- **Irrigation for Food Production**
- **Building Greywater**
- **Condensate Reclaim**
- **Effluent Reuse**
- **Water Collection Sharing**
- **resource use trade-offs**
- **Building-Integrated Photovoltaic Glazing**
- **HVAC**
- **Vehicle2Grid Energy Transfer**
- **Peak Load Energy Transfer**
- **Food to Local Restaurants**
- **Greywater for Green Roof Irrigation**
- **Rainwater Use in Toilets**
- **Showers Greywater Irrigation**
- **Integrated Agriculture for local food production**
- **Open space + street swales manage stormwater and treat runoff**
- **Integrated street swale system improves District-wide storm infrastructure resilience**

Open space + street swales manage stormwater and treat runoff.
Examples of cycle thinking within the district include:

- **Peak Load Energy Transfer**
- **Vehicle2Grid Energy Transfer**
- **Greywater for Green Roof Irrigation**
- **Rainwater Catchment Condensate Reclaim**
- **Irrigation for Food Production**
- **Building-Integrated Photovoltaic Glazing**
- **Productive Green Roof**
- **Locally-Sourced Restaurant**
- **Sink-in-Toilet Fixtures**

**Integrated Agriculture** for local food production

**Green roofs + rain gardens** manage stormwater runoff to improve lake and creek water quality

**Local restaurants** support economy of local food production and enable healthy eating choices
**ACTION AREAS**

This assessment supports several Action Areas for the first phases of the Seaholm EcoDistrict development. These Action Areas acknowledge efforts in green building, the potential for urban design, ecological mindfulness, and the specific potential and influence of the site:

- **AIM FOR NET POSITIVE**
  Net Positive envisions a project which produces benefits that exceed its consumption. Envision a Seaholm EcoDistrict that is resource self-sufficient, zero waste, and yields a net positive value for the City.

- **CREATE INTEGRATED CENTRAL INFRASTRUCTURE + MANAGEMENT PLANS**
  Adopt plans to administer best practices for mobility, parking, affordable housing, and water, energy, waste, and material systems.

- **BRAND THE DISTRICT**
  Embrace the historical character of the Seaholm and Green sites in branding the EcoDistrict character and promoting arts and environmental technologies.

- **MONITOR + DISPLAY PERFORMANCE METRICS**
  Adopt rigorous metering and sub-metering of District-scale performance metrics to instill a sense of healthy competition between the EcoDistrict’s developers and promote innovative, visible, and interactive public “Dashboard” displays of these metrics.

- **PROMOTE SEAHOLM BETA TO ADVANCE BASELINE**
  Take advantage of District-level planning to find innovative ways to push beyond standard conventions of green building, community design, and infrastructure, including advanced metrics, integration of systems, and empowerment of multiple scales of action.
second street bridge

seaholm intake structures

substation art wall

Image credits: City of Austin/Touchstone Architecture; City of Austin/Speak Up Austin; City of Austin
APPENDIX: CASE STUDIES

District thinking benefits from understanding a wide variety of precedents and examples.

These pages illustrate a cross-section of efforts that have gone into sustainable planning, green building, and local development in Austin.

Within these case studies are examples of successes and challenges, all of which will inform the planning and design processes of the Seaholm EcoDistrict.
Pilot project for EcoDistricts (formerly Portland Sustainability Institute) continues to advance the EcoDistricts framework and inform future district-scale developments.

New Urbanist-principled development project takes aim at LEED for buildings and neighborhood development Platinum certification.
**SFPUC Headquarters**  
San Francisco, CA

- **277,500 sf**
- **100% of wastewater treated on-site**
- **55% energy use reduction**
- **45% daylight harvesting**
- **7% PV and wind energy production offset**
- **40% reduced indoor potable water use**
- **30% building occupants within 15’ of operable window**
- Harvested rainwater used for landscape irrigation
- **Integrated Project Delivery**

High-visibility headquarters for public utility shows commitment to integrated environmental design

---

**Bullitt Center**  
Seattle, WA

- **50,000 sf**
- **82% indoor lighting is supplied by daylight**
- **100% wastewater treated onsite and used offsite as fertilizer**
- Building constructed with fly ash concrete and 95% post-consumer recycled rebar
- **56,000 gallon** rainwater collection system services 100% non-potable water needs
- Uses twenty-six 400-ft geothermal wells to reduce heating costs

Downtown commercial building seeks certification by Living Building Challenge

---

**BIPV Pilot, Willis Tower**  
Chicago, IL

- **--**
- Pythagoras Solar BIPV glass panels shade, reduce cooling costs, and generate electricity
- Project may grow to 2MW energy production
- Testing for market viability

High-profile mid-century building undertakes an energy-saving BIPV-shaded window pilot test program

---

**BP Helios Plaza**  
Houston, TX

- **400,000 sf**
- **400,000 gallon rainwater storage capacity offsets all water use excluding washing, cooking, and human consumption**
- Natural gas combined heat and power generator
- **First LEED Platinum certified building in Houston**

Houston area corporate campus invests in resilient environmental features for energy and water

---

**Plantagon Greenhouse**  
Linköping, Sweden

- **67,000+ sf**
- Hybrid office tower with south-facing integrated agriculture façade
- **190 ft** vertical growing space and 60 ft deep double-skin curtain wall
- Heat exchange between office and growing area minimizes energy costs
- District heating from trash-burning plant and CO₂ harvest from biogas plant
- Project broke ground in 2013

Hybrid office and food production model attracts investors for pilot building construction
The redevelopment of Austin’s former airport was guided by New Urbanist principles and enhanced environmental standards.

**Mueller Redevelopment**

*CMPBS served as sustainability and LEED consultant for masterplan and buildings*

**Austin, TX**

700 ac

Development governed by series of environmental guidelines:

- **fiscal responsibility**
- **economic development**
- **east Austin revitalization**
- **compatibility with surrounding neighborhoods**
- **diversity**
- **sustainability**

Pursuing LEED-ND Pilot Certification; Currently Stage 2 Plan Silver Certified

**Block 21**

*CMPBS served as LEED consultant for project*

**Austin, TX**

1,082,000 sf

- 30% reduction in potable water use + annual water savings of 2.4 m gallons
- 37% lighting energy use reduction
- 16% insulating + efficient windows energy use reduction
- 22% recycled content materials + 23% locally-sourced materials

Downtown Austin hotel and residential tower raises the bar for street life, energy + water efficiency, and design

**Livestrong Foundation**

*CMPBS served as LEED consultant for project*

**Austin, TX**

30,000 sf

LEED Gold adaptive reuse of existing building

- 30% indoor water use reduction (low-flow toilets + faucets)
- 50% outdoor water use reduction (native plants, water treatment)
- 95% remodeling building waste reused
- 90% stormwater captured for use

Adaptive reuse of Austin warehouse makes exemplary use of daylight and material efficiency and promotes quality design

**700 ac**

**image credit: ROMA**

**Block 21**

**photo credit: Ricardo B. Brazziell**

**Livestrong Foundation**

**photo credit: Hester+Hardaway**
center for maximum potential building systems
8604 FM 969, austin, texas 78724
[512] 928-4786
center@cmpbs.org