This final report, covering benchmarks and goal setting, was created by the Center for Maximum Potential Building Systems, consultants for the Seaholm EcoDistricts 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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center@cmpbs.org
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.

[CENTER FOR MAXIMUM POTENTIAL BUILDING SYSTEMS]

ECODISTRICT INITIATIVE

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.

PUBLIC SECTOR

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

COMMUNITY

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

PRIVATE SECTOR

Trammell Crow Company
- Gables Residential
- Constructive Ventures
- Southwest Strategies/Seaholm Power LLC
- Lake Flato Architects
- Bury + Partners
- HOLOS
- EcoDistricts (formerly the Portland Sustainability Institute)

[Image credit: Stacy Weitzner/Sunni Brown]

JANUARY 2013 ECODISTRICT WORKSHOP ATTENDEES
• 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

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 depth to the EcoDistrict framework. Undertaking 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 of 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 improvements
• The ecoBalance Conserve-Integrate-Cycle method benefits the economy and effectiveness of managing the Seaholm EcoDistrict’s resource flows and spatial utilization
• 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
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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.

### DISTRICT THINKING: SCALES

<table>
<thead>
<tr>
<th>Buildings</th>
<th>District Chiller at Third and San Antonio Streets is part of the largest ice thermal system in Central Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Space</td>
<td>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.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>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.</td>
</tr>
</tbody>
</table>

### DISTRICT THINKING: PARTS

The District is made of 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.

### DISTRICT THINKING: PARTS

<table>
<thead>
<tr>
<th>Total Building Footprint Area:</th>
<th>468,000 sf [10.7 ac]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total New Construction Floor Area:</td>
<td>4,827,000 sf</td>
</tr>
<tr>
<td>Total Existing Floor Area:</td>
<td>963,000 sf</td>
</tr>
<tr>
<td>Total Open Space Area:</td>
<td>1,943,000 sf [44.6 ac]</td>
</tr>
<tr>
<td>Total Infrastructure Area:</td>
<td>421,000 sf [9.5 ac]</td>
</tr>
</tbody>
</table>

1. Total Building Footprint Area includes the total floor area of all buildings within the District. This includes both new construction and existing buildings.
2. Total Open Space Area includes all publicly accessible green spaces within the District.
3. Total Infrastructure Area includes the total area of all infrastructure within the District, including streets, sidewalks, and utilities.

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

ECODISTRICT BOUNDARY

PLANNED or UNDER CONSTRUCTION

* Lower Shoal Creek Improvements
  - Gables Phase I, Targeting AEGB Rating + LEED Certification; 189,000 sq ft
  - Spring Condominiums, AEGB 5-Star Rated; 246 D.U.
  - Seaholm Power Plant, Targeting AEGB 2-Star Rating; 85,000 sq ft
  - Seaholm Retail, Targeting AEGB 3-Star Rating + LEED Gold Cert.; 66,000 sq ft
  - 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 sq ft; 482 D.U.
  - GWTP Office Tower, Targeting AEGB 3-Star Rating + LEED Gold Certification; 467,000 sq ft; GWTP Residential Towers 1 & 2, Targeting AEGB 3-Star Rating + LEED Gold Certification; 832,000 sq ft
  - GWTP Hotel, Targeting AEGB 3-Star Rating + LEED Gold Certification; 400 Rooms

- Seaholm Intake Structures, Targeting LEED Silver Certification

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

**ECODISTRICT RESOURCES**

- **SOLAR + WIND RESOURCES**
  - District has protected solar access
  - District has protected prevailing wind access

- **WATER RESOURCES**
  - District receives entire Shoal Creek watershed
  - District includes Lady Bird Lake

**District Daily Vertical Solar Insolation:**
740-1290 BTU/sf/day

**District Yearly Rainfall:**
52,950,000 gallons

1 assumes 30" of rain annually; source: Sustainable Sources
2 assumes 28" 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 properly 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—along 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 Vertical: Southern Exposure**
  - Vertical surfaces: 368,600 sf
  - Based on current district designs for number of building stories (assumes 10’ floors)

- **District Rainscreens and Living Walls**
  - Phase 1 based on current designs for building footprints
  - Phase 2 using conservative estimate of 1 lb food per 6’ x 12’ vertical surface

<table>
<thead>
<tr>
<th>RESOURCES</th>
<th>POTENTIAL</th>
<th>BASED ON CURRENT DESIGNS FOR</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>District Building-Integrated Photovoltaic Potential</strong></td>
<td>3.67 MW</td>
<td>ROOF SURFACE AREA</td>
<td>[1] assumes 10’ floor height and 5kW/sf photovoltaic production [2] Building-Integrated Photovoltaics (BIPV) [3] remote site of roof surface area [4] using rainwater catchment standard [5] using conservative estimate of 1 lb food per 6’ x 12’ vertical surface</td>
</tr>
<tr>
<td><strong>District Solar Thermal Potential</strong></td>
<td>35.1 million KWh</td>
<td>ROOF SURFACE AREA</td>
<td>[2] solar thermal standard of 75 kwh/sf</td>
</tr>
<tr>
<td><strong>District Stormwater Capture + Treatment Potential</strong></td>
<td>36.6 million gallons/year</td>
<td>OPEN SPACE</td>
<td>[4] stormwater capture standard of 600 gallons/1000 sf</td>
</tr>
<tr>
<td><strong>District Food Production Potential</strong></td>
<td>1,049,300 pounds/year</td>
<td>ROOF &amp; VERTICAL SURFACE AREA</td>
<td>[5] using rainwater catchment standard</td>
</tr>
</tbody>
</table>

### ECODISTRICT RESOURCES

- **District Vertical: Southern Exposure**
  - VERTICAL SURFACE AREA: 368,600 sf

- **District Rainscreens and Living Walls**
  - Phase 1 based on current designs for building footprints

- **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. Based on current district designs for building footprints
2. Based on current district designs for number of building stories (assumes 10’ floors)
3. Remote site of roof surface area
4. Stormwater capture standard of 600 gallons/1000 sf
5. Using rainwater catchment standard

---

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>POTENTIAL</th>
<th>BASED ON CURRENT DESIGNS FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Albedo Roof Surface</td>
<td>468,000sf</td>
<td>Green Roofs</td>
</tr>
<tr>
<td>Rainscreens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building-Integrated Photovoltaics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stormwater Capture + Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitat Development</td>
<td>1,943,000sf</td>
<td>Stormwater Capture + Treatment</td>
</tr>
<tr>
<td>Street-Level Thermal Comfort</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shading</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1. Remote site of roof surface area
2. Stormwater capture standard of 600 gallons/1000 sf
3. Using rainwater catchment standard
4. Using conservative estimate of 1 lb food per 6’ x 12’ vertical surface
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.

### Performance Areas Framework

<table>
<thead>
<tr>
<th>PROSPEROUS</th>
<th>EDUCATED</th>
<th>CREATIVE</th>
<th>NATURAL AND SUSTAINABLE</th>
<th>LIVABLE</th>
<th>MOBILE AND INTERCONNECTED</th>
<th>VALUES AND RESPECTS PEOPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Business Opportunities</td>
<td>Learning Opportunities for All Ages</td>
<td>Entertainment Events/Programs</td>
<td>Sustainable, Compact, and Walkable Development</td>
<td>Healthy &amp; Safe Communities</td>
<td>Range of Transportation Options</td>
<td>Access to Community Services</td>
</tr>
<tr>
<td>Technological Innovation</td>
<td>Community Partnerships with Schools</td>
<td>Support for Arts/Cultural Activities</td>
<td>Resource Conservation/Efficiency</td>
<td>Housing Diversity and Affordability</td>
<td>Multi-modal Connectivity</td>
<td>Employment, Food, and Housing Options</td>
</tr>
<tr>
<td>Education/Skills Development</td>
<td>Relationships with higher learning</td>
<td>Extensive Green Infrastructure</td>
<td>Extensive Green Infrastructure</td>
<td>Access to Community Amenities</td>
<td>Accessible Community Centers</td>
<td>Community/Civic Engagement</td>
</tr>
</tbody>
</table>

### Performace Areas

- **Prosperous**
  - Diverse Business Opportunities
  - Technological Innovation
  - Education/Skills Development

- **Educated**
  - Learning Opportunities for All Ages
  - Community Partnerships with Schools
  - Relationships with higher learning

- **Creative**
  - Entertainment Events/Programs
  - Support for Arts/Cultural Activities

- **Natural and Sustainable**
  - Sustainable, Compact, and Walkable Development
  - Resource Conservation/Efficiency
  - Extensive Green Infrastructure

- **Livable**
  - Healthy & Safe Communities
  - Housing Diversity and Affordability
  - Access to Community Amenities

- **Mobile and Interconnected**
  - Range of Transportation Options
  - Multi-modal Connectivity
  - Accessible Community Centers

- **Values and Respects People**
  - Employment, Food, and Housing Options
  - Community/Civic Engagement
  - Responsive/Accountable Government

---

**Imagine Austin Vision Plan**

Image credit: Imagine Austin/CMPBS
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

<table>
<thead>
<tr>
<th>CITY OF AUSTIN GOALS</th>
<th>DISTRICT BENCHMARK</th>
<th>DISTRICT METRIC</th>
<th>DISTRICT OBJECTIVE</th>
<th>DISTRICT STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUITABLE DEVELOPMENT</td>
<td></td>
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<tr>
<td>HEALTH + WELL BEING</td>
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<tr>
<td>COMMUNITY IDENTITY</td>
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<tr>
<td>ACCESS + MOBILITY</td>
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<td>WATER</td>
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<tr>
<td>ENERGY</td>
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<tr>
<td>HABITAT + ECOSYSTEM</td>
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<tr>
<td>MATERIALS MANAGEMENT</td>
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</tbody>
</table>

See pages 26, 27, 28, and 29 for further details.
CITY OF AUSTIN GOALS

DISTRICT BENCHMARK

DISTRICT METRIC 1

1 The assessment establishes metrics of concern; most numerical targets are yet to be defined

**AFFORDABLE** housing, workspace, services

**LOCAL ECONOMY:** jobs, opportunity

**DIVERSE** communities, choices

**HEALTHY** behaviors & environments

**ACTIVE** lifestyles, amenities, population

**NUTRITION:** education, access, local food

**COMPLETE STREETS:** accessible, safe, connected

**MULTIMODAL** transportation + transit options

**BIKE LANES** | **SIDEWALK:** 35 | 5 new miles per year

**Low-VOC** interior paints + coatings [AEGB BR 6]

**Ventilate per ASHRAE 62.1-2007** [LEED 2009 NC EQp1]

**Smoking restrictions** [LEED 2009 NC EQp2]

**Preserve historic structures + reuse salvaged elements**

**Public art**

**District branding + storytelling**

**District-wide car share + electric vehicles**

**Urban rail trips**

**Bus Rapid Transit service**

**Bike share stations**

**District restaurants feature local + healthy foods**

**District residents/tenants pursue active + healthy lifestyles**

**Visible metering displays**

**Comprehensive wayfinding + branding**

**District-wide car share + electric vehicles**

**Urban rail trips**

**Bus Rapid Transit service**

**Bike share stations**

**Storage/collection of recyclables** [LEED 2009 NC EQp2]

**Storage/collection areas for four primary recyclable waste streams**

**Construction debris recycling** [AEGB BR 7]

**Storage/collection for recyclables**

**30% improvement relative to ASHRAE 90.1-2007** [LEED 2009 NC EAp2]

**7.5% improvement in energy performance** [AEGB BR 4]

**Compliance with code per flow rates** [AEGB BR 5]

**Storage/collection of recyclables**

**30% reduction (LEED 2009 NC Wp1)**

**Compliance with code per flow rates** [AEGB BR 5]

**Parking integrated management + wayfinding**

**District-wide car share + electric vehicles**

**Urban rail trips**

**Bus Rapid Transit service**

**Bike share stations**

**Central Library + Seaholm to use existing infrastructure to store runoff for reuse**

**Second Street rain gardens to capture runoff from historic sites to meet water quality code**

**Riparian restoration project on Shoal Creek peninsula**

**Central Library riparian restoration/ stablilization**

**Riparian restoration**

**30% Cool roofs**

**100% Canopy cover**

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**Riparian restoration**

**30% Cool roofs**

**100% Canopy cover**

**10% improvement relative to ASHRAE 90.1-2007** [LEED 2009 NC EQp2]

**7.5% improvement in energy performance** [AEGB BR 4]

**Storage/collection of recyclables** [LEED 2009 NC EQp2]

**Storage/collection areas for four primary recyclable waste streams**

**Construction debris recycling** [AEGB BR 7]

**Storage/collection for recyclables**

**30% waste reduction**

**Construction emissions reduction**

**Central Library + Seaholm to use existing infrastructure to store runoff for reuse**

**Second Street rain gardens to capture runoff from historic sites to meet water quality code**

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DISTRICT OBJECTIVES

- Address park and green space improvements at a policy level††
- Evaluate affordable housing and microhousing solutions†††
- Promote diversity by providing amenities for all ages and levels of income††
- Promote local and healthy food production and access
- Promote healthy lifestyles, activities, education, and universal access
- Establish District-wide Healthy Environments Plan ††°
- Incorporate priorities from EcoDistrict workshop, January 2013; stormwater management, etc.
- Establish District-wide Parking & Transportation Plan††°
- Develop District design and performance criteria to guide development
- Solicit user feedback to evolve and expand active living and health-promoting educational opportunities
- Create a “boneyard” of salvaged building elements and items for reuse
- Provide range of amenities to support local, socioeconomic, and age diversity
- Develop District development framework for healthy and sustainable communities
- Demonstrate sustainable techniques, materials and methods
- Establish District-wide Stewardship Plan
- Establish District approach to parking and freight management, connection to trails, dynamic metering, connectivity, and car-sharing and alternative and fuel efficient vehicles
- Create District arts and cultural plan integrating physical artwork, artist tenants, and art programming
- Engage creative adaptive reuses that preserve historical identity of the site
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DISTRICT STRATEGIES

- Develop District governance mechanisms for affordable housing planning, funding, and management
- Identify policy barriers and opportunities to address them
- Expand current funding sources (including federal incentives, sponsorship, and underwriting)
- Provide market and demand-side tools (including “toolboxing”, low-wear, and affordable models), public spaces, and local business incentives on a case-by-case basis
- Promote range of strategies to support local, socioeconomic, and age diversity
- Promote District-wide net zero or net positive water use
- Develop District-wide net zero or net positive energy use
- Encourage implementation of integrated agriculture
- Partner to enrich stewardship of creek and lake, including water quality, erosion control, and wildlife protection
- Promote District-wide Construction Waste Reduction Plan

- Promote District-wide net zero or net positive water use
- Establish District-wide Stormwater Management Plan††°
- Improve Shrew Creek and Lady Bird Lake water quality††°
- Establish District-wide Energy Management Plan
- Promote District-wide net zero or net positive energy use
- Develop District-scale Ecosystem Stewardship Plan
- Design beneficial, productive, and interactive landscapes††°
- Promote District-wide zero waste infrastructure and development†°
- Create District-wide programs to reduce, reuse, and recycle waste
- Reduce burden on centralized water and stormwater infrastructure through small-loop reclaim/treatment infrastructure
- Identify policy barriers and opportunities to address them
- Establish EcoDistrict branding, including identity and signage
- Investigate governance models such as a Sustainability Management Association, Public Improvement District (PID), and/or relationship with Downtown Austin Alliance
- Establish District-wide net zero or net positive water use
- Target ambitious percent improvement over code in District energy performance
- Target ambitious percent improvement over code in District water use
- Target 100% of Downtown site, in support for mixed use, and allow CID code base to remain in local control
- Monitor creek, and publically display District-wide water collection and use via interactive dashboard (see: Community Identity)
- Reduce burden on centralized water and stormwater infrastructure through small-loop reclaim/treatment infrastructure
- Establish District-wide ecosystem management plan and comprehensive green infrastructure (see: Access + Mobility)
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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.

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RESOURCE CONSERVATION

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

- Solar Orientation Optimization
- Lighting:
  - Indications current City of Austin code requirement
  - Low-e windows: improved heat insulation
  - Triple glazing with argon
  - Vacuum insulated glass units
  - Compact fluorescent lighting
  - Light-emitting diode (LED) lighting
  - Daylight Sensors: improved lighting efﬁciency
  - Daylighting Optimization
  - Solar Orientation Optimization

EXAMPLES OF WATER CONSERVATION METHODS

- FENESTRATION:
- TOILET:
  - Standard toilet: 1.6 gpf
  - Standard urinal: 1.0 gpf
  - Low flow toilet: 1.28 gpf
  - Composting/foam toilet: zero gpf
  - Zero potable water use

- SHOWER:
  - Standard showerhead: 2.5 gpm
  - Low-flow showerhead: 1.5 gpm
  - Ultra low-flow showerhead: 1.25 gpm
  - Zero water use for irrigation

- FAUCET:
  - Standard 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

- RESOURCE 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.

**Space Conservation**

<table>
<thead>
<tr>
<th>DWELLING UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market-rate residential units: approx. 1 per 1200 sf</td>
</tr>
<tr>
<td>Market-rate efficiency units: approx. 2 per 1200 sf</td>
</tr>
<tr>
<td>Microhousing: approx. 3-4 per 1200 sf</td>
</tr>
</tbody>
</table>

**Examples of Access + Mobility Conservation Methods**

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

**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**

- Dynamic metering
- Compact vehicle parking and car sharing preferential parking
- Low emission + fuel efficient vehicle preferential parking
- District parking reduction
- Bicycle Parking + Amenities
- Pedestrian + Bicycle Access
- Transit Pass Subsidies
- Parking

**Examples of Spatial Conservation**

- 1200 sf Dwelling Units
- 18’ Bicycle Parking + Amenities
- 2’ Compact vehicle parking and car sharing preferential parking
- 18’ Low emission + fuel efficient vehicle preferential parking
- 18’ Dynamic metering
EXAMPLES OF CONSERVATION IN ENERGY, WATER, ACCESS+MOBILITY, AND EQUITABLE DEVELOPMENT WITHIN DISTRICT
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**

- **REMOTE**
  - Sink-in-toilet fixture
  - Point-of-use greywater recycling

- **TOUCHING**
  - Bike Showers with Wetland Treatment

- **CONNECTED**
  - Condensate (Effluent Irrigation)
  - Photovoltaic Electric Vehicle Charging Stations
  - Vehicle to Grid Energy (V2G/"Carbitrage")
  - Bike Showers with Wetland Treatment

- **MESHED/UNIFIED**
  - Building-Integrated Photovoltaics
  - Productive Green Roofs + Walls
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
- Condensing Exchanger
- Irrigation for Food Production
- Building Integrated Photovoltaic Glazing
- Vehicle2Grid Energy Transfer
- Productive Green Roof
- Locally Sourced Restaurant
- Sink-In-Toilet Fixtures

CENTER FOR MAXIMUM POTENTIAL BUILDING SYSTEMS

SEAHOLM ECODISTRICT FINAL REPORT
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
Examples of cycle thinking within district:

- Integrated street swale system improves District-wide storm infrastructure resilience.
- Local restaurants support economy of local food production and enable healthy eating choices.
- Open space + street swales manage stormwater and flood runoff.
- Building greywater + condensate reclaim provide water for irrigation.
- Green roofs + rain gardens manage stormwater runoff to improve lake and creek water quality.
- Integrated Agriculture for local food production

Examples of resource use trade-offs:

- HVAC
- WATER COLLECTION
- EFFLUENT COLLECTION

Examples of point-of-use greywater:

- SHOWERS
- SINK-IN-TOILET
- FIXTURES

Examples of peak load energy transfer:

- PEAK LOAD ENERGY TRANSFER
- VEHICULAR ENERGY TRANSFER

Examples of rainwater catchment:

- RAINWATER USE IN TOILETS
- RAINWATER FOR GREEN ROOF IRRIGATION

Examples of productive green roof:

- PRODUCTIVE GREEN ROOF

Examples of building integrated photovoltaic glazing:

- BUILDING-INTEGRATED PHOTOVOLTAIC GLAZING

Examples of condensate reclaim:

- CONDENSATE RECLAIM

Examples of irrigation for food production:

- IRRIGATION FOR FOOD PRODUCTION

Examples of greywater irrigation:

- GREYWATER IRRIGATION

Examples of vehicle2grid energy transfer:

- VEHICULAR ENERGY TRANSFER
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.

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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.

Lloyd EcoDistrict; Portland, OR

300 ac
First EcoDistrict development pilot program
Uses a five-phase, comprehensive approach for accelerating sustainable neighborhood development:
District Organization
District Assessment
Project Feasibility
Project Development
District Monitoring

Dockside Green; Victoria, BC, CANADA

30 ac
Attained Stage 2 LEED-ND Platinum certification
Will pay municipal penalty of $1/sf (up to $1M/building) for every building that fails to receive LEED-NC Platinum certification
100% Fresh air system utilizes heat recovery from the exhaust system and preheats incoming air
Energy Star appliances average 47% energy savings over the Canadian Model National Energy Code base energy rating
Residential metering measures domestic hot and cold water use, heating bills, and electricity usage
100% sewage treated on site and used for flushing toilets, landscape irrigation and water features

New Urbanist-principled development project takes aim at LEED for buildings and neighborhood development Platinum certification

Pilot project for EcoDistricts (formerly Portland Sustainability Institute) continues to advance the EcoDistricts framework and inform future district-scale developments.

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Bollard Center

-Sustainability goals: 50% of wastewater treated onsite, 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.

-Building constructed with fly ash concrete and 95% post-consumer recycled rebars.

-56,000 gallon rainwater collection system services 100% non-potable water needs.

-Harvested rainwater used for landscape irrigation.

-Integrated Project Delivery:

-First LEED Platinum certified building in Houston.

-Project broke ground in 2013.

-The project broke ground in 2013.

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