District Water Reuse System Schematic

1. Wastewater collected for treatment
2. Stormwater collected for treatment where appropriate
3. Biological treatment
4. Final polishing and disinfection
5. Storage for nonpotable reuse

Processes:
- Cooling Water
- Laundry Water
- Flush Water
- Discharge to Sewers
- Stormwater overflow
- Membrane Backwash
- UV/Ozone Disinfection
- To Irrigation
- Reuse Water Reservoir
District Water Reuse

Rain

Watershed (Cedar River)

Municipal water supply

Storm Water Management and Storage

Potable Water
Non-Potable Water

Domestic Water Use

Toilets
HVAC

Solids discharged to Public Sewer

Non-Potable Water for Irrigation

Bio-solids
Nutrients
Bio-gas

Ground recharge

drinking showers
Yesler Terrace
Seattle Housing Authority (SHA)

- Public corporation chartered to build and manage low-income housing.
  - Approximately 27,000 people housed in Seattle through SHA programs.
  - Average annual resident income is less than $15,000 per year.
Housing Programs

• SHA owns roughly 5,200 units of Public Housing in
  - High Rise Buildings
  - Family Units (3+ bedrooms)
  - Senior Housing

• Provide over 8,000 Section 8 vouchers
Previous Redevelopments

- Holly Park/New Holly: ‘95-’07
- Rainier Vista: ‘99-Present
- High Point: ‘00-Present

Key Features
- Increased Open Space
- Community Gardens
- Rationale Street Grid
- Natural Stormwater Drainage/Pervious Pavement
- “Breathe Easy” homes for asthma sufferers
Housing Added by Redevelopment

Adding Housing through SHA's Redevelopments

TOTAL NEW HOMES
4,682

1,084
New Homes for Sale

230
Market-rate Rentals

300
Affordable Home Ownership Units

739
Tax-credit Rentals on-site

50 Assisted Living Units on-site

811
Federally subsidized off-site

322
Elderly & Disabled Housing on-site

1,146
Public Housing on-site

Prior to Redevelopment

After Redevelopment

no income restrictions

80% AMI

60% AMI

50% AMI

30% AMI
• 561 housing units on 36 acres
• 1,200 residents
• Second oldest operating public housing development in U.S.
• Buildings have reached useful life. Not cost effective to rehab.
• Original infrastructure still in use, but failing.
Citizen’s Review Committee

- Membership includes stakeholders, neighboring institutions, service providers
- Expanded membership with additional residents
- Continues to monitor planning efforts to ensure Guiding Principles are followed
Core Values & Guiding Principles

Guiding Principles:

• Social Equity
• Economic Opportunity
• Environmental Stewardship & Sustainability
• One-for-One Housing Replacement

Additional information available at www.seattlehousing.org
561 replacement units:
30% of Area Median Income (AMI) = up to $26,050/year for a family of four

100 additional 30% units

290 very low income units:
30 - 60% AMI = up to $52,080/year for a family of four

850 low income/workforce units:
60 - 80% AMI = up to $64,200/year for a family of four
Zoning

- Yesler Terrace is currently under original L3 zoning, which limits building height to 30 feet.
- Building heights for Yesler will promote a more dense & urban environment than any of the previous SHA redevelopments.
- SHA currently working with City on zone change process.
Site Concept Key Elements

- **Integrated Housing:** Low-income housing and towers proportionately located
- **Multi-modal Transit Options:** streetcar, bus, bicycle
- **Parks throughout**
- **Neighborhood Retail**
- **Office Uses**
- **Natural drainage**
- **Community Gardens**
Housing

Number of Residential Units
5,000
561 Extremely Low Income Units
290 Very Low Income Units
950 Low Income Units
3,199 Market Rate Units
Including 250 Mixed Income Units in the Adjacent Property
Water, Sewer, & Storm Facilities
Financial challenges

- No sources currently identified to replace existing public housing
- Cost to replace existing public housing estimated at $200M
- Cost of new infrastructure & open space estimated at $80M
  - Includes extensive bicycle & pedestrian improvements
  - Most efficient infrastructure that can be financed
  - Significant open space improvements
Sustainable District Study

• Evaluation of neighborhood/district scale opportunities for infrastructure, energy, and transportation needs with respect to greatest possible efficiency.

• Measured benefit, and commensurate cost, of such systems against traditional, or minimum code required approaches.

• Evaluated everything from stormwater collection & management systems to building material performance, with emphasis on designs that promote conservation.
Sustainable District Study

Also evaluated:

- The most effective method of reducing the project’s carbon footprint
- Ways to reduce operational costs for individual buildings
- Best approaches to maximizing infrastructure Investment
- How integrating different types of systems enhances efficiency
Assumptions

Energy

• Energy code upgrades over next 20 years assumed to reduce demand by 25% over current code reqs. This reduction was considered as the baseline/business as usual.

• Baseline energy use/demand = 28,000 megawatts

Water

• Total potable water demand estimated at 600K+ gallons/day

• Sewer flows at 500K+ gpd.
Water Findings

- Stormwater runoff reuse by itself would not provide enough water to meet demand.
- Greywater (sinks, showers, & laundry) reuse would meet flushwater demands, but would not provide enough water to meet total demand.
  - Additional collection & distribution lines not cost effective. Might as well collect and reuse all wastewater.
- Total wastewater (sinks, showers, laundry, & flushwater) reuse could reduce demand for:
  - Potable water by 51%
  - Sewer discharge by 60%
- Annual savings from potable water use and sewer discharge currently est. at $300K+.
Energy Findings

- Biomass as fuel source problematic due to storage space needed for storage.
- Wind not considered viable given the site’s location.
- Photo-Voltaics not considered feasible as a power/plug load source due to cost of panels at this time.
- Sewer heat recovery not fully evaluated due to lack of available data regarding Harborview Hospital’s demand and discharge rates.
Energy Findings

CCHP (Combined Cooling, Heat, and Power):

- Would provide sufficient heat, cooling, and power for all demand, including plug loads.
- Would produce substantial amount of excess heat and power that could be sold back to the grid.
- Site constraints limit opportunity to use renewable fuel sources due to limitations on storage.
- Would require a 10,000sf central plant/site.
- Not considered scalable under this scenario. Would prove problematic due to project phasing.
- Upfront costs estimated between $102-109M depending upon fuel source (natural gas, biogas, anaerobic digestion).
Geo-Exchange/Solar Hot Water System preferred:

- Would provide heat, but not power.
- Allow for 25% reduction in energy use beyond baseline. 40% reduction in peak demand.
- Reduction in GHG of 4,200 metric tons of CO₂/year.
- Smallest land use requirement for installation of equipment and operation.
- Least expensive upfront capital cost ($70M), scalable over time to coincide with demand and phasing.
Due to the upfront capital costs involved, SHA by itself is not in a position to attempt to finance and own any of the systems evaluated.

City of Seattle utilities (SPU & SCL) not interested in owning these systems.

Private utilities potentially will be interested in financing and owning both the water reuse and heating systems.

Allowing the private market to determine and develop system is the solution at this time.

Significant reductions in energy and water use are feasible for the project and partnership w/hospitals would only improve economics.