

Appendix B – Eco-Charrette Report

Appendix B-1: Factoria Recycling and Transfer Station - Eco-Charrette – Final Report.
June 24, 2010. Prepared for King County Department of Natural
Resources and Parks-- Solid Waste Division. HDR Engineering, Inc.

Appendix B-2: Initial Guidance from the Salmon-Safe Assessment Team regarding The
Factoria Recycling and Transfer Station – Site Design Evaluation. July 15,
2010. Salmon-Safe, Inc.

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King County

Department of
Natural Resources and Parks
Solid Waste Division



ECO-CHARRETTE FINAL REPORT

JUNE 24, 2010

DELIVERABLE # D 130.1.4



HDR



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Part 1: Eco-Charrette

Introduction and Purpose

The King County Department of Natural Resources and Parks, Solid Waste Division (KCSWD) has goals for the Factoria Recycling and Transfer Station (Factoria RTS) Project that include environmental stewardship, creation of resources from solid waste, and green building principles. To meet these goals, the Factoria RTS project team is using an integrated, sustainable design process. As part of the sustainable design process, the design team conducted an Eco-Charrette with the project team and KCSWD staff. The Eco-Charrette consisted of two workshops: Day 1: Sustainable Design Process and Day 2: LEED Scorecard Review.

The purpose of this report is to summarize the Eco-Charrette results and include a summary of environmental site characteristics, a preliminary LEED score, and a LEED strategy to use moving forward. This report presents the sustainable design and LEED strategies evaluated during preliminary site design and layout. As design and coordination with the project team and stakeholders continue to final design, the strategies may change and evolve. The sustainable design and LEED strategies will continue to be updated and tracked through monthly progress reports.

The following sections describe the project background and setting, then summarize the Eco-Charrette results for Day 1: Sustainable Design Process and Day 2: LEED Scorecard Review. Appendix A contains the current LEED scorecard, which includes minor updates since the Eco-Charrette. Appendix B summarizes the team roles and responsibilities for each LEED credit. Appendix C includes the meeting notes and the interactive Strengths, Weaknesses, Opportunities, and Threats (SWOT) summary.

Project Background and Setting

The Factoria RTS is one of eight County transfer stations where waste is collected, transferred into large tractor-trailers, and subsequently hauled to the Cedar Hills Regional Landfill (CHRLF) in Maple Valley, Washington. Commercial haulers and business and residential self-haul customers use the Factoria RTS. The Factoria RTS was constructed in the 1960s and is nearing the end of its useful life.

The County intends to maintain operation of the existing transfer station during construction of its replacement on adjacent property. The new Factoria RTS will include the following features:

- Enclosed solid waste transfer and processing area
- Employee/administration facility and education center

- Scalehouse with weigh station plaza
- Fueling facility
- Maintenance shop
- Household hazardous waste (HHW) collection area
- Recycling facility
- Vector truck decant area

Construction of the new facilities is planned to occur in two phases to limit disruption to site operations. The first construction phase is expected to include the new Factoria RTS, administration and employee areas, a maintenance shop, fueling facility, vector truck decant area, and access roads. The second construction phase will include a new facility for HHW and recycling functions, improved onsite and offsite access roads, new truck scales and a scalehouse facility.

The Factoria RTS is situated on an approximately 8.7-acre parcel that is constrained by steep topography, wetlands, streams, and a large utility corridor easement occupied by Olympic Pipeline high-pressure liquid petroleum lines and Puget Sound Energy (PSE) overhead power lines. The transfer station operation and household hazardous waste (HHW) collection are contained within one large building on the site. Southeast 32nd Street terminates at the Factoria RTS entrance, where a small scalehouse is located to weigh vehicles upon entering and exiting the site. To maintain existing operations, the County purchased adjacent property northwest of the site that contains two warehouse buildings, bringing the total size of the project site to approximately 10.7 acres. The photo below is an aerial image of the site. Appendix D includes full-page aerial snapshots of the site.

Factoria RTS Aerial View



Day 1. Introduction to the Sustainable Design Process

The sustainable design process is an integrated process that must be implemented during planning, design, construction, and operation. The integrated process includes an outward-in approach:

- Site opportunities
- Site constraints
- Energy conservation and renewable energy opportunities
- LEED structure
- Framework for cost and schedule

Day 1 of the Eco-Charrette provided an overview of the sustainable design process, and then focused on site and energy conservation opportunities. During Day 1 of the Eco-Charrette the project team discussed the site starting with regional and community levels, then focused on the site itself. This approach allowed the project team to brainstorm in an open forum about opportunities and ideas, experiences, and lessons learned. It was helpful to welcome all ideas before focusing on LEED requirements, because it may be possible to innovate and include ideas that otherwise may not have been brought forth.

After discussing the KCSWD mission and the Factoria RTS goals, some of the key design criteria were also discussed:

- Enclosed solid waste transfer and processing area
- HHW collection
- Recycling facility
- Separate public and commercial users from KCSWD transfer vehicles
- Minimize customer time onsite
- Increase vehicle capacity
- 900 tons/day capacity (by 2042)

KC Department of Natural

Resources and Parks Mission: To foster environmental stewardship and strengthen communities by providing regional parks, protecting the region's water, air, land, and natural habitats, and reducing, safely disposing of, and creating resources from wastewater and solid waste.

Factoria RTS Goals:

- Maintain existing operations safely and efficiently while the new facility is constructed.
- Architectural excellence. Design and construct a facility that will enhance the local community, achieve at least a LEED Gold rating, and tie into the overall plans for the area (trails and mass transportation facilities).
- Develop the Eastgate property to potentially provide funding for the Factoria RTS project and to secure support for the Factoria RTS project from the City of Bellevue
- Diversion. Increase waste diversion through improved public recycling opportunities and the transfer facility design.

- 3 days' storage capability
- Ability to efficiently compact waste
- Minimum roof clearance for collection trucks
- Wetland mitigation
- Traffic flows and site access
- Retaining walls/grading
- Trailer parking
- Stormwater features
- Sustainable features
- Flexibility for expansion and additional services

Once the sustainable design process, guiding principles, goals, and key design criteria were discussed for the framework, the project team participated in an interactive Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. The SWOT analysis was framed by a discussion of the built and natural environments in the context of the community and the site. The discussion also focused on energy efficiency and operations and maintenance.

The opportunities and concerns resulting from this exercise will serve as a point of reference throughout design, construction, and ideally, operation of the facility, especially the operations and maintenance (O&M) discussions. While some ideas may contribute to the LEED strategies, other ideas might contribute to best management practices or “pilot” ideas where the KCSWD might choose to lead by example and test new strategies.

The detailed results of the SWOT analysis are included in Appendix C as meeting notes as well as a reproduction of the flip chart notes that were used throughout the Eco-Charrette. The Eco-Charrette results section below includes select ideas from the SWOT analysis that could be considered with a specific LEED credit.

Day 2: LEED Scorecard Review

Day 2 of the Eco-Charrette provided an overview of the LEED certification process, and then focused on each of the LEED credits using the information developed from the SWOT analysis and project team experience on LEED projects and other transfer stations in the region. The one-page LEED scorecard that resulted from Day 2 of the Eco-Charrette (with minor updates from follow up) is

included in Appendix A. The one-page scorecard, the Eco-Charrette Results Summary Section below, and the detailed LEED requirements and strategies reflect the process and ways to reference the ideas as they were presented and developed.

From this, the design team developed a detailed LEED strategy included later in this report that will be used throughout the design and LEED certification process. The LEED strategies will evolve and be tracked separately throughout the design process. Updates will be given in monthly progress reports to the Factoria RTS project team.

The LEED Green Building Certification Program™

What is LEED? The LEED Green Building Certification Program™ is a priority program of USGBC. As stated by USGBC, LEED is a “voluntary, consensus-based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a whole building perspective over a building’s life cycle, providing a definitive standard for what constitutes a green building. LEED is based on accepted energy and environmental principles and strikes a balance between known effective practices and emerging concepts. LEED is a self-assessing system designed for rating new and existing commercial, institutional, and high-rise residential buildings.” More about LEED and USGBC can be found at <http://www.usgbc.org/>.

LEED Structure

LEED is an assessment system based upon earning points in seven different categories that include several credits and a series of prerequisite criteria. The project will be registered using LEED® for New Construction & Major Renovations™ rating system, Version 2009, normally referenced as LEED for New Construction.

LEED allows design teams to pick and choose the credits and points in each credit that they wish to pursue to achieve a desired level of certification. However, it is important to realize that EVERY prerequisite must be met for ANY level of LEED certification. Therefore, it is wise to confirm project compliance for each prerequisite throughout the design and construction process.

LEED Certification

There are four levels of certification for LEED:

LEED Rating Level	Points Required (out of 110)
LEED Certified	40-49 points
Silver Level	50-59 points
Gold Level	60-79 points
Platinum Level	80+ points

LEED Categories	Prerequisites Required	Points Offered
Sustainable Sites	1	26
Water Efficiency	1	10
Energy and Atmosphere	3	35
Materials and Resources	1	14
Indoor Environmental Quality	2	15
Innovation in Design Process	0	6
Regional Priority Credits	0	4
TOTAL	8	110

Design and Construction Credits

Two types of credits can be earned through the LEED process – “design” (D) and “construction” (C). Design credits may be submitted to the Green Building Certification Institute (GBCI) for review at the end of the Design Phase, which is at the end of Construction Documents Phase. The submittal for construction credits occurs at the end of Substantial Completion. There are 61 sets of LEED documentation for prerequisites and credits: 40 possible sets to be submitted in the design phase and 21 possible sets for the construction phase.

Submittals for design credits will be reviewed and comments will be provided, as necessary. Design review credits are awarded at this time; however, the GBCI reserves the right to review them again during the construction credit review. The benefit of this submittal for design credits is to directly assess where a project stands with GBCI before finishing construction; this can help the team prioritize its efforts for moving forward. It is also acceptable for the team to delay a USGBC design submittal and to submit all the D and C credits after construction is completed.

It is important to note that the contractor bears significant LEED responsibilities for the Construction Phase credits, primarily for many of the Materials and Resources Credits (MR). The contractor must collect data from subcontractors and suppliers per LEED requirements and the specifications, calculate the data, upload the documentation and calculations, and fill out the templates. The contractor also has secondary responsibilities for some of the other LEED credits.

LEED Credit Responsibility

Every LEED credit is assigned a team member who has primary responsibility for confirming and documenting the sustainable best practice being pursued. The team member with primary responsibility is the individual who ultimately manages and signs the LEED online credit. The secondary responsibility can be held by one or more team members who are involved or necessary to document the sustainable measure or the party responsible for implementation, but this

individual(s) does not manage the online LEED template (for example, the civil engineer normally has primary responsibility for the LEED Sustainable Sites Prerequisite 1, Construction Activity Pollution Prevention credit, but the contractor has the secondary responsibility to implement it). Appendix B includes a summary of credits and credit responsibility for the project team.

Eco-Charrette Results Summary

This section summarizes ideas and issues from the Day 1 SWOT analysis that relate to the LEED credit review completed during the Day 2 LEED scorecard review. Listing the select SWOT analysis ideas does not imply definite implementation of each idea, but each one will certainly be considered and used to further inspire ideas as the sustainable design process moves forward.

As mentioned above, the GBCI allows a design phase review (D) and a construction phase review (C). In addition to the preliminary credit status and SWOT ideas and issues, the submittal phase is also noted in the summary below. Appendix A includes the scorecard with the same preliminary status plus the points for each credit. Part 2 of this report, the Detailed LEED Strategy, provides additional detail and references for the below summary and the scorecard points.

Yes	Maybe	No	Submittal Phase	
<h3>Sustainable Sites Category</h3> <p>During the Eco-Charrette, the project team emphasized the importance of being part of the community using the currently developed location in ways that would contribute to their neighbors through education, circulation and minimization of queuing time, trail connections, and building aesthetics. In addition, stormwater management practices that worked with the landscape, utilized the slopes, and possibly integrated with functional art were discussed. Another main topic was the intent of the alternative transportation credits and how it may be met in ways other than Factoria RTS employees using mass transit and bicycles, but providing those options as part of the community and growth in the area.</p>				
Y			C	Prereq 1 Construction Activity Pollution Prevention Will be met by contractor. O&M Notes: None.
	M		D	Credit 1 Site Selection Previously developed or “current site”. Expansion will take approximately 0.5 acre of wetland. Seeking unique resolution. <ul style="list-style-type: none"> • Off-site mitigation in perpetuity likely better for watershed. • Restoration on-site (more likely to be part of stormwater management

Yes	Maybe	No	Submittal Phase	
				<p>than mitigation).</p> <ul style="list-style-type: none"> Potential for encumbering other King County-owned property for environmental and/or open space benefits. <p>O&M Notes: None.</p>
		N	D	<p>Credit 2</p> <p>Development Density and Community Connectivity</p> <p>May need to develop improved pedestrian access to services and to transit. Additional field work and coordination needed to confirm a yes or no; neighborhood density must also be met (10 du /ac).</p> <ul style="list-style-type: none"> Opportunities for connecting to Factoria Mall and Eastgate Park and Ride. Work with other neighbors like PSE and transit for potential to increase ridership. Paint scheme could work within neighborhood. <p>O&M Notes: None.</p>
		N	D	<p>Credit 3</p> <p>Brownfield Redevelopment</p> <p>Assume that the site is not a brownfield, nor is it perceived to be a brownfield.</p> <p>O&M Notes: None.</p>
	M		D	<p>Credit 4.1</p> <p>Alternative Transportation – Public Transportation Access</p> <p>Design team needs to confirm distance and access to bus stops.</p> <ul style="list-style-type: none"> Work with neighbors like PSE and transit for potential to increase ridership. Improve pedestrian access to transit. <p>O&M Notes: None.</p>
Y			D	<p>Credit 4.2</p> <p>Alternative Transportation – Bicycle Storage and Changing Rooms</p> <p>Bicycle storage and changing rooms will be provided.</p> <ul style="list-style-type: none"> Improve meeting intent by providing educational features and trail connections. <p>O&M Notes: Must consider safety, security, and no salvaging policies when locating facilities to minimize operations issues.</p>
Y			D	<p>Credit 4.3</p> <p>Alternative Transportation – Low-Emitting and Fuel-Efficient Vehicles</p> <p>Will be met by providing preferred parking for low-emitting and fuel-efficient vehicles.</p>

Yes	Maybe	No	Submittal Phase	
				O&M Notes: None.
Y			D	Credit 4.4 Alternative Transportation – Parking Capacity Will not exceed local requirements and will provide preferred vanpool/carpool spaces. O&M Notes: None.
	M		C	Credit 5.1 Site Development – Protect or Restore Habitat Must confirm site layout before acreage can be confirmed. <ul style="list-style-type: none"> • Shared/underground parking strategies. • Removal of invasive species. • Green/living walls O&M Notes: Active maintenance required for removal of invasive species.
Y			D	Credit 5.2 Site Development – Maximize Open Space This credit was listed as a “yes” during the Eco-Charrette because the Factoria RTS thought it was an important credit to achieve if possible; however, must confirm site layout before acreage can be confirmed. <ul style="list-style-type: none"> • Innovation potential through providing open space in neighborhood. • Vegetated roof. • No-mow landscape. • Use plantings that discourage problem birds. O&M Notes: Temporary above-ground irrigation to be removed. Annual – bi-annual walk-through to remove invasives and invasive seedlings. Ornamental landscaping, if implemented, requires active maintenance such as weeding and pruning.
Y			D	Credit 6.1 Stormwater Design – Quantity Control Will be met through standard site design practice. <ul style="list-style-type: none"> • Use of gravity (steep slopes on site) instead of pumps. • Pervious pavement where practical. • Collect rainwater from roof and site (also using gravity), possibly for energy. • Incorporate “functional art” into stormwater management solution. • Use of waterwall to reduce dust. O&M Notes: Hardscape surfaces need to meet loading requirements.
Y			D	Credit 6.2 Stormwater Design – Quality Control Will be met through standard site design practice.

Yes	Maybe	No	Submittal Phase		
				<ul style="list-style-type: none"> • Use of gravity (steep slopes on site) instead of pumps. • Pervious pavement where practical. • Collect rainwater from roof and site (also using gravity). • Use on-site wetlands and natural landscape for retention, bioswales. 	<p>O&M Notes: Hardscape surfaces need to meet loading requirements. Explore strategies that provide alternative to gutters to reduce maintenance.</p>
Y			D	Credit 7.1	Heat Island Effect – Nonroof Use combination of strategies to meet credit requirements (SRI index of at least 29 for hardscape, covered parking, grid pavement).
					<p>O&M Notes: Strategically select and locate trees.</p>
Y			D	Credit 7.2	Heat Island Effect – Roof Potential combination of strategies to meet credit (Energy Star compliant roof, vegetated roof, solar PV). <ul style="list-style-type: none"> • Balance reflective roof materials with consideration for neighbors/aesthetics.
					<p>O&M Notes: Roof access and safety considerations for maintenance and education.</p>
Y			D	Credit 8	Light Pollution Reduction Use newer light fixtures; be sure to coordinate with contractor.
					<p>O&M Notes: None.</p>
Water Efficiency Category					
Y			D	Prereq 1	Water Use Reduction – 20% Reduction Required Required and achievable.
					<p>O&M Notes: None.</p>
Y			D	Credit 1.1	Water Efficient Landscaping – Reduce by 50% Will be met through plantings and efficient landscaping. <ul style="list-style-type: none"> • No-mow landscape.
					<p>O&M Notes: Monitoring, winterization.</p>
Y			D	Credit 1.2	Water Efficient Landscaping – No Potable Use or No Irrigation Will be met with through plantings and efficient landscaping.

Yes	Maybe	No	Submittal Phase	
				<ul style="list-style-type: none"> • “Functional art” idea could also apply here. <p>O&M Notes: Educational or other features could require cleaning, flushing, or other maintenance.</p>
Y			D	Credit 2 Innovative Wastewater Technologies Will be met through using water-conserving features. <ul style="list-style-type: none"> • Low-flow toilets, <u>not</u> no-flow toilets or urinals. • Reuse rainwater. <p>O&M Notes: New technologies may require change in procedures. Monitor untested technology. Use equipment with readily available replacement parts.</p>
Y			D	Credit 3 Water Use Reduction, 30%/35%/40% The Factoria RTS project is expected to earn at least two of the four credit points offered (a 30% reduction in domestic water consumption) using water-conserving fixtures and strategies. <p>O&M Notes: Use tested products and technologies.</p>
Energy and Atmosphere Category				
Y			C	Prereq 1 Fundamental Commissioning of the Building Energy System Required and will be met through engaging of commissioning agent. <p>O&M Notes: Initial training will be conducted. See enhanced commissioning credit for additional O&M notes.</p>
Y			D	Prereq 2 Minimum Energy Performance Requirement will be met through standard design practices. <p>O&M Notes: None.</p>
Y			D	Prereq 3 Fundamental Refrigerant Management Requirement will be met through standard design practices. <p>O&M Notes: None.</p>
Y			D	Credit 1 Optimize Energy Performance Goal to achieve 5 of the 19 available credit points. <ul style="list-style-type: none"> • Shared heat generation with BCC. • Natural daylighting. • Biomass conversion.

Yes	Maybe	No	Submittal Phase	
				<ul style="list-style-type: none"> • Wind energy, free anemometer available to test potential, roof or flagpole mounted. • Hook compactor up to closer source of energy. • Use local substation for back-up energy instead of generator. • Bloom box and/or fuel cell technology. • Solar photovoltaics (PV). • Liquified natural gas (LNG). • Daylight-sensitive light bulbs. • Seek funding sources for additional optimization opportunities. • Geothermal technology (see Eastgate Elementary example). • Innovation potential for reduced waiting times? • Heat tracing control needs to be optimized/centralized and added to commissioning. • Use local substation for back-up energy instead of generator. <p>O&M Notes: Northwest ambient lighting must be considered, manager needs control; facilities open at dark in winter; light sensors require maintenance due to dust.</p> <p>Maintenance of new technology; need on-going multiple grid training for new technologies, not just one initial training. Workshare across departments could be beneficial to utilize skills with limited resources, although union issues must be clear.</p>
Y			D	Credit 2 On-site Renewable Energy <p>Will likely be met through various solar PV options. It can be difficult to get to 5% for a building like this, but the project team thought it was important to achieve this credit at some level. Other strategies will be explored through sustainable design process.</p> <p>O&M Notes: Provide training on any specialty systems.</p>
Y			C	Credit 3 Enhanced Commissioning <p>Enhanced commissioning should be an integral component of design, construction, and operation of the project. This and other KCSWD efforts will help continue to improve overall efficiencies.</p> <p>O&M Notes: Staff training as part of commissioning is helpful. Ongoing, multiple grid training should be a part of the staff training program, not just one training session at time of commissioning. Creating training DVDs for innovation in design; put training in the specs. Film commissioning or other initial training.</p> <p>Maintenance of new technology; workshare across departments could be beneficial to utilize skills with limited resources, although union issues must be clear.</p> <p>Be aware of components. New technologies can require components from long distances and potentially difficult to get.</p>

Yes	Maybe	No	Submittal Phase		
	M		D	Credit 4	Enhanced Refrigerant Management Due to facility type, small HVAC unit may present challenge in achieving, but will attempt. O&M Notes: Any specialty systems should receive specific training.
Y			C	Credit 5	Measurement & Verification Current policies and programs complement this credit. O&M Notes: Be aware of SCADA; database is currently in place that tracks all maintenance and components.
	M		C	Credit 6	Green Power Can be expensive, and while it promotes environmental stewardship, it may have no direct benefit to project. O&M Notes: None.
Materials and Resources Category					
Y			D	Prereq 1	Storage and Collection of Recyclables Required and will be met. O&M Notes: None.
	M		C	Credit 1	Building Reuse Will incorporate where practical, but may not be enough (55%) for this new construction project to achieve credit. <ul style="list-style-type: none"> • Move and reuse the scalehouse • Use ground asphalt as base for pouring concrete • Reuse or specify salvaged doors where practical and for educational purposes. O&M Notes: Potential on-site processing could increase logistical issues.
Y			C	Credit 2	Construction Waste Management Yes. As a transfer facility, expect to achieve exemplary performance for this credit. O&M Notes: None.

Yes	Maybe	No	Submittal Phase		
	M		C	Credit 3	Material Reuse – 5%, 10% Implemented where practical as a good practice, but may not be enough to meet credit. O&M Notes: Some reused materials may not have the maintainability of new construction.
Y			C	Credits 4	Recycled Content Will be met through preferences in specifications. <ul style="list-style-type: none"> No wheatboard. O&M Notes: Recycled products need to be reviewed for maintainability.
Y			C	Credits 5	10%/20% Extracted, Processed, and Manufactured Locally Will be met through research and specifications. O&M Notes: None.
		N	C	Credit 6	Rapidly Renewable Materials Will be included as sustainable practice, but not likely enough to earn credit. O&M Notes: None.
Y			C	Credit 7	Certified Wood Will be met as a best design practice. <ul style="list-style-type: none"> No wheatboard. O&M Notes: None.
Indoor Environmental Quality Category					
Y			D	Prereq 1	Minimum Indoor Air Quality Performance Factoria RTS will comply with this prerequisite. O&M Notes: None.
Y			D	Prereq 2	Environmental Tobacco Smoke (ETS) Control Factoria RTS will comply with this prerequisite. O&M Notes: None.

Yes	Maybe	No	Submittal Phase		
Y			D	Credit 1	Outdoor Air Delivery Monitoring This credit will be met by providing monitoring systems for at least CO ₂ . <ul style="list-style-type: none"> Carefully evaluate scalehouse air delivery where trucks are idling. <p>O&M Notes: Training for any special equipment will be specified. Monitoring logs or other minor maintenance could be required. Gas phase detectors require regular recalibration.</p>
Y			D	Credit 2	Increased Ventilation Because of the facility type, the project team thought this credit was achievable. The design team will do additional research to confirm as the energy required to provide ventilation can outweigh the benefits in the resulting energy balance. <p>O&M Notes: Training for any special equipment will be specified. Monitoring logs or other minor maintenance could be required.</p>
Y			C	Credit 3.1	Construction IAQ Management Plan – During Construction This credit will be met; must follow up with contractor. <p>O&M Notes: None.</p>
Y			C	Credit 3.2	Construction IAQ Management Plan – Before Occupancy This credit will be met. <ul style="list-style-type: none"> Make sure this is scheduled correctly to avoid overlap with staff moving in. <p>O&M Notes: None.</p>
Y			C	Credit 4.1	Low-Emitting Materials – Adhesives and Sealants Requirement will be met and written into specifications. <p>O&M Notes: None.</p>
Y			C	Credit 4.2	Low-Emitting Materials – Paints and Coatings Requirement will be met and written into specifications. <p>O&M Notes: None.</p>
Y			C	Credit 4.3	Low-Emitting Materials – Flooring Systems Requirement will be met and written into specifications. <ul style="list-style-type: none"> Minimal carpet, if any, should be part of flooring system for this type of facility. <p>O&M Notes: None.</p>

Yes	Maybe	No	Submittal Phase		
Y			C	Credit 4.4	Low-Emitting Materials – Composite Wood and Agrifiber Products Requirement will be met and require some additional review by design team and contractor. <ul style="list-style-type: none"> • No wheatboard.
					O&M Notes: None.
Y			D	Credit 5	Indoor Chemical and Pollutant Source Control Requirement will be met using dedicated exhaust fans and other features.
					O&M Notes: None.
M			D	Credit 6.1	Controllability of Systems – Lighting Additional research to determine how tipping floor will be reviewed and interpreted. <ul style="list-style-type: none"> • Tipping floor staff will not be allowed to control lighting. Still a possibility for administrative facilities.
					O&M Notes: None.
M			D	Credit 6.2	Controllability of Systems – Thermal Comfort Additional research to determine how tipping floor will be reviewed and interpreted. <ul style="list-style-type: none"> • It is not feasible for tipping floor staff to control thermal comfort in this facility. Still a possibility for administrative facilities.
					O&M Notes: Multiple zones of thermal control will require additional equipment which will increase maintenance needs.
M			D	Credit 7.1	Thermal Comfort - Design Additional research to determine if KCSWD wants to include design parameters for thermal comfort and if is feasible.
					O&M Notes: None.
M			D	Credit 7.2	Thermal Comfort - Verification Can be met through employee survey and adjustments made. Need further coordination to determine if it is feasible/practical.
					O&M Notes: Survey will need to be conducted and potentially adjustments made, but no ongoing considerations.

Yes	Maybe	No	Submittal Phase		
Y			D	Credit 8.1	Daylight and Views – Daylight Credit will be met using roof skylights and translucent wall panels where feasible. O&M Notes: Improved natural lighting can increase safety as well. Designer should be aware of operations so that “blind spots” are not created for equipment drivers and staff which could risk safety.
	M		D	Credit 8.2	Daylight and Views – Views Additional design will reveal a yes or no. Challenge for achieving this additional daylighting is the need for solid push walls up to 12'. O&M Notes: Polycarbonate panels are not as durable for typical abuse in these facilities and are not favored over other more durable materials.
Innovation in Design Category					
Y			C	Credit 1.1	Construction Waste Management – 95% or More As a transfer station project, the project team would like to see 100% diversion. O&M Notes: None.
Y			D	Credit 1.2	Education KCSWD goals as part of the community to provide educational features. <ul style="list-style-type: none"> Kiosk at Shoreline visited infrequently; customers like the tires and photos (public art). O&M Notes: Photos not difficult to maintain (previous Shoreline concern)
Y			C	Credit 1.3	Recycled Content – 30% or More Project team expects to achieve exemplary performance credit by specifying preference to cost-comparable materials with high recycled content. O&M Notes: None.
Y			D	Credit 1.4	Green Cleaning or Other Design team has sample programs and specifications for green cleaning supplies. O&M Notes: Issue with “dirty” appearance of tipping floor. Keep this and other maintenance issues in mind when choosing green programs.

Yes	Maybe	No	Submittal Phase		
Y			S	Credit 1.5	Salmon Safe Certification A team of specialists will work with Factoria Project Team to certify the project as Salmon Safe which is consistent with LEED sustainable sites, especially those that relate to stormwater. This is a fairly new program to improve water quality for salmon by working with various businesses and projects to manage their site in way that will improve salmon habitat. O&M Notes: None.
Y			D	Credit 2	LEED Accredited Professional (AP) The design team has over 6 LEED APs. Sharon Wright and David Gibney will be the LEED APs for this credit (only one AP need submit certificate). O&M Notes: None.
Regional Priority					
	N		D	Credit 1.1	SS 3 Brownfield Redevelopment Project site is not registered or perceived as a brownfield.
Y			D	Credit 1.2	SS 4.2 Alt. Transportation: Bicycle Storage and Changing Rooms Credit will be met.
Y			D	Credit 1.3	SS 4.4 Alt Transportation: Parking Capacity Credit will be met.
	N		D	Credit 1.4	EA 1: Optimize Energy Performance 48%/44% Likely not achievable with this type of facility.
Y			D	Credit 1.5	EA 2: On-Site Renewable Energy Project team goal is to meet this credit.
	N		C	Credit 1.6	MR 1.1: Building Reuse With this newly constructed facility, this credit is not likely achievable.

Part 2: Detailed LEED Strategy

Part 2 of the Eco-Charrette Report provides a summary of LEED as a metric tool for green building. It provides a detailed explanation of select LEED terms and ideas. Then, based on the Eco-Charrette discussion, provides a detailed summary of LEED requirements and LEED strategies for meeting or not meeting the requirements to achieve LEED credit.

The Factoria RTS goal is to achieve a LEED Gold certification. The LEED scorecard review resulted in a score of 60. It is better to start with a preliminary score several points above the project goal in case the Green Building Certification Institute (GBCI), which reviews the application, denies an anticipated credit for an unforeseen reason. Mainly due to site location, some credits with higher points available (like community connectivity and public transportation access) may not be achievable. However, these need to be verified, and alternative approaches will be explored to finalize those preliminary findings. The KCSWD team was open to taking LEED certification all the way to platinum, so the design team will look for opportunities to improve on the preliminary rating. Cost and maintenance are key considerations for sustainable design and will be reviewed as opportunities for LEED credit or other sustainable features arise.

General Report Notes

This LEED preliminary assessment and strategy represents information known at the time of the report's creation. The report is intended to serve as a "live" document, representing current design knowledge. The assessment described in this report does not guarantee that a specific certification level will be achieved by the project.

Project Registration and Certification – Factoria RTS will be registered within the USGBC LEED Online certification system. Online credit templates will be assigned to the different disciplines responsible for filling out the template information and providing required documentation.

LEED Goal – Achieving LEED Gold is the goal for Factoria RTS. To achieve this goal, it is imperative that the design, construction, and operation stakeholders fully understand their roles and responsibilities and are committed to fulfilling them. LEED is not an afterthought, and for many credit points, there is only one opportunity to "get it right".

LEED Credit Interpretation Rulings (CIRs) – In some cases, it may be a challenge for the LEED project team to interpret the requirements of a prerequisite or credit because the project's circumstances are not directly applicable. To address those issues, USGBC has implemented an on-line process to review the project's circumstances and to develop a Credit Interpretation Ruling (CIR). There is a cost for each CIR, and most projects should budget some funds to work through unique issues using the CIR process. The latest requirements are slightly different than previous requirements. A current project can only refer to previous CIRs as an indication of what the interpretation may be. Each

project's unique circumstances will be reviewed on a case-by-case basis and will require a \$220 review fee for each CIR submittal.

LEED Roles and Responsibilities – Appendix B provides detailed information about LEED roles and responsibilities. The table in Appendix B includes a column indicating the responsible parties for each credit, as known at this time. Appendix B identifies the primary responsibility for parties responsible for confirming and documenting each LEED credit; in addition, team members may have a secondary responsibility as well. During the Construction Documentation Phase, the team can identify the secondary responsibilities.

“Yes” Credits – Based on what is known at this time, the project team believes it is feasible to pursue this credit. Indicating a "yes" is not a guarantee that USGBC will award this credit when the project is submitted for review.

“Maybe” Credits – Based on what is known at this time, indicators put achievement of this credit in doubt; however, the benefits associated with the credit merit pursuing it further. Current information indicates the possibility of meeting the credit's intent and requirements.

“No” Credits – There are not enough benefits to pursue this credit further, or, restrictions make earning the credit point infeasible. If new information comes to light in a future phase of the project, it is still possible to revisit this credit.

Cost and Schedule Impacts – Only general cost and schedule impacts are listed in this report. Many of the credits will have no cost impact because they are an integral part of the project design and will occur whether or not the project pursues a LEED rating. Other ideas associated with LEED ratings that generate costs (such as energy modeling or commissioning) and which represent sound, conservative value to the Factoria RTS should be executed, regardless of LEED.

LEED Prerequisite and Credit Summaries

Below are brief LEED category narratives with each prerequisite and credit point addressed for applicability to the Factoria RTS project. NOTE: Text in italics is from the LEED 2009 Rating System which can also be downloaded here: <http://www.usgbc.org/Store/>.

Sustainable Sites Category

One of the first choices a building owner must make is deciding where to build. The right site selection, combined with an integrated design approach, can substantially improve how the building serves the owner and its occupants. Such variables as energy performance, interior lighting, heating and cooling, and water use are all affected by site design. Because site development/design is one of the first design issues, devoting special attention to siting a building well provides a positive “trickle down” effect on subsequent sustainable design opportunities.

LEED Sustainable Sites Prerequisite 1.0, Construction Activity Pollution Prevention

Site construction creates multiple opportunities for erosion and subsequent sedimentation within existing water bodies. The sustainable sites prerequisite requires the contractor to create and implement an Erosion and Sedimentation Control (ESC) Plan. The contractor must submit the ESC Plan for approval by the civil engineer or local regulatory agency prior to commencing site work. The ESC Plan must meet or exceed the Environmental Protection Agency’s 2003 Construction General Permit or local ESC standards and codes, whichever is more stringent. In addition, the contractor’s submittal should specifically list each measure to be taken, and should include a means of tracking routine inspection and maintenance of these measures throughout the duration of construction. This is typically done with an inspection log kept in a 3-ring binder.

Status: Yes LEED Submittal Phase: Construction

Construction erosion control mitigation measures and Best Management Practices (BMP) are required by the City of Bellevue. Erosion control and pollution prevention provisions will be included in construction plans, specifications, and permits. The Factoria RTS project will meet all requirements for this prerequisite as a matter of standard practice. The importance of careful documentation required of the contractor and sub-contractors must be clearly communicated during bidding.

LEED Sustainable Sites Credit 1.0, Site Selection (1 point)

The site selection credit awards developments that do not harm natural habitats or endangered and/or threatened species. This credit point requires little more than a signed LEED Letter Template and supporting documentation in the form of narratives and pre-construction photographs.

Do not develop on:

- *Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)*
- *Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency)*
- *Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists*
- *Within 100 feet of any wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent*
- *Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act*
- *Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt)*

Status: Maybe **LEED Submittal Phase:** Design

The existing Factoria RTS facility is located on a previously developed site; however, expansion of the site will require clearing and grading in previously undeveloped adjacent areas. The undeveloped area has approximately 0.5 acre of wetlands that will be filled. This credit is currently listed as a “maybe”. On and/or off-site mitigation is planned for the project. However, traditional mitigation like wetland and habitat replacement and enhancement does not meet the intent of the LEED requirement. One idea was to create or innovate a solution on the Eastgate property accompanied by a deed restriction to ensure that the habitat is never developed. Additional research of CIRs and projects will be completed before either confirming that this credit cannot be reached through mitigation or innovation, or until a project CIR is submitted.

Cost Impact:

The cost of a project CIR is \$220 plus staff time. It is anticipated that the cost impact of meeting this credit through mitigation or similar requirements will not be much higher than the cost of planned mitigation. However, some ideas, including use of the Eastgate property, may have initial costs associated with providing mitigation, and long-term costs associated with encumbering the property.

Schedule Impact:

None at this time.

Operation and Maintenance Considerations:

Mitigation, preservation, or enhancement may require some monitoring and adaptive management of natural areas.

LEED Sustainable Sites Credit 2.0, Development Density and Community Connectivity (5 points)

The development and community connectivity credit offers five points for selecting sites that promote development density *(to the level of a typical downtown 2-story development, approximately 60,000 gsf/acre)* OR for choosing a site that is within a ½ mile of a residential zone *(average of 10 living units/acre)* and 10 Basic Service amenities. These include:

- | | |
|------------------------|--------------------------|
| 1. Bank | 12. Senior Care Facility |
| 2. Place of Worship | 13. Park |
| 3. Convenience Grocery | 14. Pharmacy |
| 4. Day Care | 15. Post Office |
| 5. Cleaners | 16. Restaurant |
| 6. Fire Station | 17. School |
| 7. Beauty Shop | 18. Supermarket |
| 8. Hardware | 19. Theater |
| 9. Laundry | 20. Community Center |
| 10. Library | 21. Fitness Center |
| 11. Medical/Dental | 22. Museum |

Status: No LEED Submittal Phase: Design

The Factoria RTS site is located in a developed light industrial and commercial zone. This credit is currently listed as a “no”. From a windshield survey and aerial photo evaluation, there does not appear to be enough services within a ½ mile radius nor is the surrounding development at 60,000 sf per acre. Additional research and coordination with the City of Bellevue is being conducted to confirm the densities of the nearby residential zones and the plans for the neighborhood that might bring additional services with pedestrian access to the Factoria RTS to see if the credit is achievable. If the Factoria RTS offers a HHW swap, a café, or other service, it may be counted as one of the 10 needed basic services (one on-site service per project reviewed and possibly allowed by GBCI).

Exemplary Performance:

An additional credit may be earned if the project density is double the average density within the calculated area, or if the average density within an area twice as large as the calculated [base] area is at least 120,000 sf/acre. This project is not expected to meet the exemplary performance criteria.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 3.0, Brownfield Redevelopment (1 Point)

Urban sites are often undeveloped because they are, or may be, contaminated from previous site uses. Developers tend to avoid buying or building on such sites because of the financial liability posed by regulations requiring site remediation. LEED rewards projects that build on brownfield sites because doing so promotes environmental stewardship (via site remediation) and helps decrease urban sprawl, thus protecting natural habitats.

Note: In some cases, no cleanup or remediation may be required to earn this credit point. If the perception is that a site may be contaminated, and a developer has had Level 1 and Level 2 testing performed (the latter only if required) and then proceeds to build on the site, the site may be classified by the local, state, or federal brownfield specialist.

Status: No LEED Submittal Phase: Design

The Factoria RTS site is currently County-owned and does not have a brownfield classification or a known perception of a brownfield. A hazardous materials assessment is underway at the site, but it is not anticipated that hazardous waste or other conditions will be found that require cleanup to the extent that the site would meet the intent of this credit. Unless unanticipated site assessment results are found, the County will not pursue this credit.

Regional Priority:

Brownfield redevelopment is a regional priority in the Factoria RTS project area, and if this credit is pursued and met, one additional credit would be available.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 4.1, Alternative Transportation-Public Transportation Access (6 Points)

To reduce extensive use of single-occupancy vehicles and their heavy reliance on petroleum, and to provide people with healthier alternatives for commuting to work, LEED offers six points for promoting alternative transportation. To earn these credit points, a project needs to *build within a half mile walking distance of an existing (or planned and funded) commuter rail, light rail or subway system (measured from a main building entrance) OR locate the project within ¼ mile walking distance of one or more stops for two or more public or campus bus lines that are usable by the building occupants (measured from a main building entrance).*

Status: Maybe **LEED Submittal Phase:** Design

The project team believes that there are enough bus stops within a 1/4-mile walking distance, but this will need to be confirmed on the ground with a measuring wheel. This credit is listed as a “maybe” because the main entrance locations, radii, and bus stops need to be confirmed.

Exemplary Performance:

One exemplary performance credit is available to the Alternative Transportation “set of credits” (SS 4.1 – 4.4) by developing a comprehensive transportation management plan to reduce personal automobile use or by doubling transit ridership based on the threshold that the base credit would provide. In most cases, this is at least 50 transit rides per day. The Factoria RTS facility is evaluating ways to reduce traffic in the area, but the facility will not have enough employees to support the additional transit ridership needed to achieve exemplary performance. This project is not expected to meet the exemplary performance criteria.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 4.2, Alternative Transportation-Bicycle Storage and Changing Rooms (1 Point)

Pedestrian access provides participants with a healthy way to commute while reducing negative impacts on the environment. Alternative transportation is promoted by providing racks for securing bicycles and lockers/shower facilities. To earn this credit point, *bicycle storage and changing facilities must be provided to accommodate a percentage of all FTEs (Full Time Equivalents or 8-hour shifts in each 24-hour workday) as follows:*

Bicycle storage: 5% of all FTEs during the busiest shift, within 200 yards of the building entrance

Changing/shower facilities: 0.5% of all FTEs Private stalls and changing rooms (or separate rooms for each gender) are required, (again within 200 yards of the building entrance.)

Status: Yes LEED Submittal Phase: Design

The Factoria RTS is pursuing this credit, and it is listed as a “yes”. The Factoria RTS will provide secure bicycle racks and shower facilities.

Exemplary Performance:

Exemplary performance credit is available for developing a comprehensive transportation plan. The Factoria RTS will not pursue the exemplary performance credit.

Regional Priority:

Establishing facilities to promote bicycle use is a regional priority in the project area. The Factoria RTS will pursue the regional priority credit.

Cost Impact:

Minimal cost impact.

Schedule Impact:

None.



Bicycle Storage Rack

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 4.3, Alternative Transportation-Low-Emitting and Fuel-Efficient Vehicles (3 Points)

LEED rewards forward-thinking projects that design their developments to embrace emerging fuels for automobiles. Three options are available for earning this credit point:

Option 1: Provide low-emitting and fuel-efficient vehicles for 3% of Full-Time Equivalent (FTE) occupants AND provide preferred parking for these vehicles.

OR

OPTION 2: Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

OR

OPTION 3: Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).

For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

“Preferred parking” refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Status: Yes LEED Submittal Phase: Design

Pursuing this credit point is a “yes”. The most cost-effective way to earn this credit is to assign 5% of the preferred parking spaces to low-emitting and fuel-efficient vehicles only.

Exemplary Performance:

Exemplary performance credit is available for developing a comprehensive transportation plan. The Factoria RTS will not pursue the exemplary performance credit.

Regional Priority:

Reducing parking and promoting fuel-efficient vehicles are regional priorities in the project area. The Factoria RTS will pursue the regional priority credit (1 extra point).

Cost Impact:

Minimal.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 4.4, Alternative Transportation-Parking Capacity (2 Points)

Carpooling is a proven method for reducing automobile emissions while reducing traffic congestion. One way to promote carpooling is to reward participants with preferred parking, i.e., car spaces close to the building. For non-residential projects, there are two options for providing preferred parking:

OPTION 1 — NON-RESIDENTIAL

Size parking capacity to meet, but not exceed, minimum local zoning requirements, AND, provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.

OR

OPTION 2 — NON-RESIDENTIAL

For projects that provide parking for less than 5% of FTE building occupants: Provide preferred parking for carpools or vanpools, marked as such, for 5% of total parking spaces.

Status: Yes LEED Submittal Phase: Design

Like SS Credit 4.3, the easiest method for earning this credit point is to provide preferred parking. The Factoria RTS will also need to commit to not providing more parking than is required by local code. The team considers this a “yes” credit point.

Exemplary Performance:

Exemplary performance credit is available for developing a comprehensive transportation plan. The Factoria RTS will not pursue exemplary performance credit.

Cost Impact:

Minimal.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Sustainable Sites Credit 5.1, Site Development-Protect or Restore Habitat (1 Point)

Construction is inherently disruptive to existing site environments and ecosystems. Careless site construction can result in environmental damage such as the following:

- Lost habitat
- Destroyed vegetation
- Watershed contamination

To avoid these consequences, sustainable site design promotes minimizing site disturbance. LEED Sustainable Sites Credit 5.1 promotes conservative approaches to site development by limiting disruption to existing site soils or by replanting native or adaptive vegetation on previously developed sites. Two compliance options are available for this credit point:

OPTION 1: On greenfield sites, limit all site disturbance to 40 feet beyond the building perimeter; 10 feet beyond surface walkways, patios, surface parking and utilities less than 12 inches in



Invasive Species Removal and Plantings using Hessian Matt.



Hessian Matt Plantings one year later.

diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

OR

OPTION 2: On previously developed or graded sites, restore or protect a minimum of 50% of the site area (excluding the building footprint) or 20% of the total site area (including building footprint), which is greater, with native or adapted vegetation. Native/adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds. Projects earning SS Credit 2 and using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted and provide the habitat and biodiversity intent of the credit.

Status: Maybe LEED Submittal Phase: Construction

Strategies to minimize site disturbance footprints, such as stacking the building and underground parking, would increase the cost of the project and could interfere with the building's main function. Strategies such as shared parking with neighboring properties would lessen construction cost for parking; however, these strategies may not be feasible for customers visiting the facility. Restoration of habitat involving invasive species removal would increase the cost for landscape, although this cost might be offset if a bare-root or plug-type native restoration planting was used and was approved by the City of Bellevue.

Schedule Impact:

Any strategies that involve increased structural design of the building or underground parking would increase the time needed for design and construction.

Operation and Maintenance Considerations:

Once established, native habitat areas generally require little or no supplemental water, no mowing, and no chemicals such as fertilizer or pesticides in 2 to 3 years. If invasive species removal is required to restore habitat, these areas will require active maintenance to ensure that invasive species do not become re-established. Active maintenance should involve a "walk-through" of the habitat areas approximately once per month during the growing season to remove any invasive species seedlings/saplings. Volunteer conservation groups or other community resources such as community colleges may assist with this.

LEED Sustainable Sites Credit 5.2, Site Development-Maximize Open Space (1 Point)

Creating building and development footprints that are as small as possible is another way to reduce site disturbance and to promote urban density and maximize open space. LEED provides three options to earn this credit point:

OPTION 1: Reduce the development footprint (defined as the total area of the building footprint, hardscape, access roads and parking) and/or provide vegetated open space within the project boundary to exceed the local zoning's open space requirement for the site by 25%.

OR

OPTION 2: For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint.

OR

OPTION 3: Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project's site area.

Note: The definition of "open space" for LEED purposes may differ from the definition used by a municipality. Consult the LEED Reference Guide for details.

Status: Yes LEED Submittal Phase: Design

Depending on the final site layout, the Factoria RTS may include enough vegetated open space to earn the credit point for maximizing open space. Depending on the slope gradient, sloped areas may be considered open space, as can wetlands and stream buffers, if these are vegetated. This credit was listed as a "yes" during the Eco-Charrette because the Factoria RTS project team thinks it is an important credit to achieve if possible. In order to use other innovations to contribute to this credit, the project must earn SS Credit 2, Development Density and Community Connectivity. SS Credit 2 is currently listed as a "maybe," since SS Credit 2 will be difficult to achieve due primarily to the required residential densities and number of services in the area.

Exemplary Performance:

Exemplary performance credit is available for essentially doubling the open space required by the credit. The project team does not anticipate that exemplary performance will be achieved.

Cost Impact:

Providing landscape planting in areas disturbed by construction activity will require temporary irrigation until plants are established. Use of a habitat restoration strategy may reduce the cost. Strategies to minimize site disturbance footprints, such as stacking the building uses and underground or tucked parking, would increase the cost of the project and could interfere with the building's main function. Strategies such as shared parking with neighboring properties would lessen construction cost for parking; however, these strategies may not be feasible for customers visiting the facility.

Schedule Impact:

Any strategies that involve increased structural design of the building or underground parking would increase time for design and construction.

Operation and Maintenance Considerations:

Once established, native habitat areas require little or no supplemental water, no mowing, and no chemicals such as fertilizer or pesticides. Any temporary, above-ground irrigation system can be removed. Active maintenance would involve a once per year or once every 2 years "walk-through" of the habitat areas to remove invasive species seedlings. If the landscape planting was more ornamental, it would require active maintenance such as weeding, some pruning, and mulching.

Sustainable Sites Credit 6.1, Stormwater Design-Quantity Control (1 Point)

Stormwater creates unique problems for site designers – it threatens groundwater quality by transporting contaminants from paved surfaces to water tables. During intense rainfall, stormwater volumes can harm natural water bodies by washing out riverbeds and creating soil erosion.

Limiting or reducing impermeable surfaces is the easiest design and construction measure to reduce potential harm from stormwater. For instance, some driveways and access roads can be constructed with engineered gravel rather than with asphalt or concrete. Gravel allows rainwater to seep into the ground, providing natural recharging of water tables, and it is also less expensive upfront and throughout its life.

Installing recessed continuous swales filled with coarse aggregate or constructed wetland vegetation is another means of managing stormwater. These features allow water to seep back into the ground, filtered by the vegetation, or, if volumes are large, to drain into water harvesting ponds via buried connecting culverts.



Stormwater Low Impact Development and Public Art in City of Anacortes.

Such ponds can collect water from paved surfaces and allow it to percolate back into the ground or be harvested for site irrigation or other recycled uses on-site.

LEED compensates for the fact that different building sites have varying amounts of impervious cover. Accordingly, USGBC has drafted these requirements for this credit point based on specific site conditions:

CASE 1 — EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

CASE 2 — EXISTING IMPERVIOUSNESS IS GREATER THAN 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Status: Yes LEED Submittal Phase: Design

The Factoria RTS will pursue Case 1 since the existing impervious surface is less than 50% of the site. The project team will implement a stormwater management plan that prevents the post-development peak discharge from exceeding the pre-development peak discharge for the one- and two-year 24-hour design storms. The Eco-Charrette resulted in several ideas and themes to implement low-impact development measures for stormwater management, including restoration of on-site critical areas, use of the slope gradient and landscape to collect rainwater, water reuse at the facility, installation of a vegetated roof, and use of permeable paving where appropriate.

Exemplary Performance:

Only one credit is available through exemplary performance for SS Credits 6.1 and 6.2 through innovative design. No standardized path is defined for this. Instead, the project team must establish an approach which clearly exceeds the credit requirements and document this approach. While every design effort will be made to develop innovative ideas for stormwater management, it may not

be cost-effective to pursue exemplary performance credits that are planned to be achieved through other innovations.

Cost Impact:

The cost impact would be minimal since stormwater quantity control is required as part of basic design. The potential for cost savings would increase depending on innovations in design.

Schedule Impact:

None.

Operation and Maintenance Considerations:

It is likely that multiple BMPs will be incorporated into the project. Often structural (e.g. physical as opposed to operational) BMPs require regular observation and some maintenance for proper operation. Monitoring of water flows may be required.

Sustainable Sites Credit 6.2, Stormwater Design-Quality Control (1 Point)

LEED Sustainable Sites Credit 6.2 offers a credit point for projects that reduce stormwater contaminants by removing Total Suspended Solids (TSS) and phosphorous extant in stormwater runoff. Stormwater that runs across developed lands is subjected to a variety of pollutants: fertilizers, pesticides, petroleum byproducts, and more. Allowing these contaminants to seep into natural water bodies, including groundwater, poses environmental threats at several points. Structural and non-structural strategies can be used to promote infiltration and capture and treat runoff. For example, engineered bioswales and detention basins can retain phosphorus on-site, allowing it to be filtered and absorbed via vegetated swales and filter strips.

To earn this credit point, LEED requires the following:

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs). BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria.

Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

Status: Yes LEED Submittal Phase: Design

This credit point should be earned as a result of complying with local environmental code requirements. Treatment will likely consist of a combination of structural and non-structural strategies. Some of the ideas mentioned in SS Credit 6.1 above may contribute to the final overall water quality solutions. The design team will plan early and evaluate the site holistically to meet local and state requirements, thus achieving this credit, currently listed as a “yes”.

Cost Impact:

At a minimum, quality control will be part of the standard design. Incorporating additional landscape design or functional art could increase first costs.

Schedule Impact:

Innovative design ideas could require additional time for design and construction. Some water quality monitoring may be required.

Operation and Maintenance Considerations:

Innovative design ideas could require additional time for operation and maintenance.

Sustainable Sites Credit 7.1, Heat Island Effect—Non-roof (1 Point)

As the built environment is developed and replaces natural landscapes, it removes the natural cooling capacity of the vegetation that occurs through shade and evapotranspiration. Dark, non-reflective surfaces used for parking, roofs, and walkways absorb the sun and transfer heat through convection and conduction back to surrounding areas; this is called a “heat island” effect. Buildings affected by heat islands require more air conditioning. Air conditioning increases the temperature of the outside air, which then requires more energy to air condition.

Several sustainable site design measures can easily reduce heat islands, including shading, evaporative cooling, increased light reflectivity, and reduced thermal massing. Native and adaptive vegetation groundcover in lieu of hard surfaces throughout the site serves to cool surfaces with biomass while reducing irrigation demand.

OPTION 1: Use any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

- *Provide shade from existing tree canopy or within five years of landscape installation; landscaping (trees) must be in place at the time of occupancy.*
- *Provide shade from structures covered by solar panels that produce energy used to offset some non-renewable resource use.*

- *Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29.*
- *Have hardscape materials with an SRI of at least 29.*
- *Have an open grid pavement system (at least 50% pervious).*

OR

OPTION 2: Place a minimum of 50% of parking spaces under cover (defined as under ground, under deck, under roof, or under a building). Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof, or be covered by solar panels that produce energy used to offset some non-renewable resources use.

Status: Yes LEED Submittal Phase: Construction

This project may be able to earn this credit point, but doing so will likely add construction cost. At least 50% of the impermeable surfaces must not be asphalt, and if concrete is used in its place, the mix specified must meet the SRI criteria described above. HDR has a compliant concrete mix that has been independently tested to meet the SRI criteria. This mix is cost comparable with typical concrete mixes. During the Eco-Charrette, the team thought it was important and possible to achieve this credit, so the credit is listed as a “yes”. The design team will continue to explore options related to appropriate shading (while discouraging bird and vermin habitat), use of concrete, covered parking, and other architectural techniques.

Exemplary Performance:

Exemplary performance credit is available by demonstrating that 100% of the nonroof impervious surfaces have been constructed with high-albedo or open grid paving, or will be shaded within 5 years, or that 100% of the parking spaces are under cover. Achievement of exemplary performance is unlikely due to operational needs and upfront and O&M costs. The project team does not anticipate achieving the exemplary performance credit.

Cost Impact:

Option 1 offers project-specific opportunities including tree shading and high albedo paving. The use of light-colored concrete paving for areas other than needed specifically for functional needs will have additional costs over paving all of the hardscape for heavy loads, but the additional costs are anticipated to be nominal. Recent changes in the materials market and fiber reinforcement have made the cost of concrete more competitive with that of asphalt.

Schedule Impact:

No schedule impact is anticipated.

Operation and Maintenance Considerations:

Concrete paving is more durable than asphalt and will offer better long-term reliability. Although the retention of some of the on-site trees and the installation of new tree plantings will contribute to ground surface shading, trees that are not strategically selected and/or located may contribute to leaf maintenance or to road clearance issues for high-clearance vehicles.

Sustainable Sites Credit 7.2, Heat Island Effect—Roof (1 Point)

Rooftop materials play a significant role in the formation of heat islands. In fact, the surface of a light-colored roof may be 70°F cooler or more than that of a dark roof because it reflects light rather than absorbing it and its associated heat. LEED Sustainable Sites Credit 7.2 recognizes the role roofs play in reducing the heat island effect, and rewards a credit point for project roofs that meet the criteria of the EPA Energy Star Roofing program. Three compliance options are available:

OPTION 1: Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface.

OR

OPTION 2: Install a vegetated roof for at least 50% of the roof area.

OR

OPTION 3: Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria: $(\text{Area of SRI Roof} / 0.75) + (\text{Area of vegetated roof} / 0.5) \geq \text{Total Roof Area}$.

Status: Yes LEED Submittal Phase: Design

This credit point is earned by most LEED projects and the Factoria RTS is no exception. Specifying a compliant white Energy Star membrane roof or a compliant white finish metal roof is cost-neutral and common. This credit is a “yes” either by installing a vegetated roof or by using the cost-neutral white roof approach.

Note: The use of photovoltaics reduces the overall percentage of roof area required for compliance.

Exemplary Performance:

An exemplary performance credit is available by demonstrating that 100% of the project’s roof area (excluding mechanical equipment, skylights, and solar PV panels) consists of a vegetated roof system. The design team will evaluate the feasibility of achieving this level of roof vegetation; however, the costs and tradeoffs of this strategy will be considered carefully because the project likely has more

efficient and feasible alternatives for achieving the five allowable exemplary performance/innovation credits.

Cost Impact:

The use of white roof materials would have no cost impact. Vegetated roof costs may exceed the cost of a standard metal standing seam roof. Additional research will be conducted to provide more detail on cost and O&M considerations.

Schedule Impact:

No schedule impacts are anticipated.

Operation and Maintenance Considerations:

Vegetated roofs require initial maintenance, but can be designed for infrequent maintenance by vegetated roof specialists. Additional research will be conducted to provide more detail on cost and O&M considerations.

Sustainable Sites Credit 8.0, Light Pollution Reduction (1 Point)

Light pollution is the predominance of artificial light spilling out into the night sky. Light pollution causes harm to the environment by visual disruption of nocturnal animals, leading to increased avian mortality rates and reduced birth rates. Another problem with light pollution is aesthetic. Our ability to view constellations in the night sky is greatly hampered by artificial lights “fogging” the view. The haze of light pollution is an indicator of careless lighting design and pervasive overuse of electricity.

A careful lighting review should be conducted early in the design process to ensure that the project will meet the LEED credit criteria (see the Illuminating Engineering Society of North America’s Recommended Practice Manual: Lighting for Exterior Environments).

To earn this credit point, LEED requires the following:

FOR INTERIOR LIGHTING:

Option 1: All non-emergency interior luminaries, with a direct line of sight to any openings in the envelope (translucent or transparent), shall have its input power reduced (by automatic device) by at least 50% between the hours of 11 PM and 5 AM. After hours override may be provided by a manual or occupant sensing device provided that the override last no more than 30 minutes.

OR

Option 2: All openings in the envelope (translucent or transparent) with a direct line of sight to any non-emergency luminaries shall have shielding (for a resultant transmittance of less than 10%) that will be controlled/closed by automatic device between the hours of 11PM and 5AM.

AND

FOR EXTERIOR LIGHTING:

Only light areas as required for safety and comfort. Lighting Power Densities shall not exceed ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) for the classified zone. Meet exterior lighting control requirements from ASHRAE/IESNA Standard 90.1-2007, Exterior Lighting Section, without amendments (with errata but without addenda).

Note: Full, not “semi-full” or “semi-cut-off” fixtures should be standard on all exterior fixtures including pole-mounted parking lot lights and building-mounted area lights. No illumination should spill off the site that would violate the IESNA criteria. All illumination levels should be prescribed and documented in the construction drawings on lumen contour plans. Some lighting strategies are as follows:

- Discrete illuminated bollards should be considered for lighting walkways rather than pole-mounted floodlights.
- Downlight fixtures should be used at entrances and vestibules.
- Full cut-off fixtures should be standard on all exterior fixtures including pole-mounted area lights, parking lot lights and building-mounted area lights.
- Office spaces that have windows to the outdoors should have diffuse lighting.
- Light Emitting Diode (LED) lighting/signage should be used as much as practical. Not only will the overall illumination be less, but the energy savings potential is significant.

Status: Yes LEED Submittal Phase: Design

Achieving this credit point is cost-effective and represents no real operational sacrifices. In fact, by using newer light fixtures, the overall nighttime illumination can be more even color neutral, and use less energy. This credit requires consultation with an electrical engineer who understands the credit requirements and a contractor who will carefully review light fixture compliance during construction. This credit is considered a “yes”.

Cost Impact:

Little, if any, additional cost is associated with attaining this credit.

Schedule Impact:

No schedule impact is anticipated from attaining this credit.

Operation and Maintenance Considerations:

No additional O&M considerations beyond the regular procedures.

Water Efficiency Category

Buildings require large volumes of water for mechanical operation and occupant needs. Using large volumes of water increases maintenance and life-cycle costs for building operations and increases consumers' costs for additional municipal supply and treatment. Implementing water efficiency measures can reduce potable water withdrawals, and often saves building owners money. In addition, sustainable water use protects natural water bodies from contamination.

LEED Water Efficiency Prerequisite 1: Water Use Reduction-20% Reduction Required

Water Use Reduction Prerequisite 1 requires the design team to calculate a domestic use baseline using only the following code-compliant fixtures and fittings:

- Water closets
- Showers
- Urinals
- Kitchen sink faucets
- Lavatory faucets
- Pre-rinse spray valves

Status: Yes LEED Submittal Phase: Design

Achieving a 20% potable water reduction is easy with simple fixture specifications. Meeting this requirement is straightforward.

LEED Water Efficiency Credit 1.1, Water Efficient Landscaping-Reduce by 50% (2 Points)

Depending on climate and the type of landscaping, the amount of water used for irrigation can frequently surpass that used for domestic purposes. Often, potable water is used for irrigation. This not only wastes a life-sustaining resource, but also wastes the energy required to make water fit for human consumption.

To reduce water used for landscaping, irrigation systems should include drip irrigation lines, low-flow bubblers, and low-volume pivoting heads. Most systems warrant the slight initial cost of a "smart" controller system, coupled with integrated flow meters. These systems can be monitored and managed remotely via the Internet. These systems measure flow volumes and can even account for current evapotranspiration rates, adjusting water volumes accordingly. Typically, the combination of these above-mentioned features will easily reduce water consumption for irrigation by over 50%.

LEED requires that a mid-summer baseline case be determined on which to base the 50% reduction. Details on how this is calculated are found in the LEED Reference Guide. This guide notes that the reduction in irrigation volumes can be attributed to any combination of the following:

- Plant species factor
- Irrigation efficiency
- Use of captured rainwater
- Use of recycled wastewater
- Use of water treated and conveyed by a public agency specifically for non-potable water

Status: Yes LEED Submittal Phase: Design

USGBC calculates the reduction of irrigation water use by comparing a base case with the design case. If the design case irrigation system is a typical irrigation system for our project area, it is likely that the project would achieve 2 credits. The typical system includes items such as weather-based controllers, moisture sensors, flow sensors, high-efficiency heads, and/or drip lines. This would be in addition to native-adapted plants and mulching to help reduce water needs and evotranspiration.

Cost Impact:

No significant cost impact would result from designing a compliant irrigation system appropriate for this region.

Schedule Impact:

No significant schedule impact would result from attaining this credit.

Operation and Maintenance Considerations:

A typical system would require regular monitoring and maintenance for winterizing the system.

LEED Water Efficiency Credit 1.2, Water Efficient Landscaping-No Potable Use or No Irrigation (2 Points)

The intent of this credit is to entirely eliminate the use of potable water for irrigation. To earn this second credit point the project must achieve WE Credit 1.1 and:

Use only captured rainwater, recycled wastewater, recycled greywater, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation.

OR

Install landscaping that does not require permanent irrigation systems. Temporary irrigation systems used for plant establishment are allowed only if removed within one year of installation.

Status: Yes LEED Submittal Phase: Design

This credit is listed as a “yes”. The project team anticipates the temporary use of irrigation for plant establishment. If we use captured rainwater and install a temporary, above-ground system that is removed after the first year of plant establishment, it is likely that the project would achieve these credits.

Cost Impact:

The main cost impact would be design of a rainwater capture and storage system.

Schedule Impact:

There is no significant schedule impact.



Above-ground temporary irrigation.

Operation and Maintenance Considerations:

After the first-year, the temporary system would be dismantled. If the system is kept for educational purposes, additional annual maintenance may be required.

LEED Water Efficiency Credit 2, Innovative Wastewater Technologies (2 Points)

The innovative wastewater technologies credit encourages the use of these technologies to reduce the amount of potable water used for sewage conveyance. Appropriately implemented, this approach can pay off for many building and occupant types. For example, a typical office building’s domestic potable water consumption is usually 50 to 60% for sewage conveyance. Simple, inexpensive flush fixtures can be installed to help meet the requirements of this credit point. Two options are available to achieve this credit:

OPTION 1: Reduce potable water use for building sewage conveyance by 50% through the use of water conserving fixtures (water closets, urinals) or non-potable water (captured rainwater, recycled greywater, and on-site or municipally treated wastewater).

OR

OPTION 2: Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.

Option 1 alternative technologies include the following:

- Composting toilets
- Harvested rainwater in lieu of potable water for toilet fixtures
- Waterless or low-flush (1/8 gallon per flush [gpf]) urinals
- Dual-flush fixtures (0.8 gpf for urine; 1.6 gpf for feces)

Status: Yes **LEED Submittal Phase:** Design

This credit is listed as a “yes”. The design team expects to achieve this credit using low-flow toilets and other water-conserving fixtures. Reclaimed water will need to be provided in the design for flushing.

Cost Impact:

Since on-site treatment will not be provided, harvested rainwater must be utilized and will require equipment for storage, filtration and distribution. A redundant plumbing supply system will be required for flush fixtures, increasing the overall plumbing installation costs. Additional costs for this credit could approach five figures.

Schedule Impact:

None.

Operation and Maintenance Considerations:

Filter and pump maintenance will be required for the reclaimed water distribution system. Provided waterless urinals are avoided, no additional maintenance for fixtures will be required.

LEED Water Efficiency Credit 3, Water Use Reduction, 30%/35%/40% (4 Points)

These LEED credits require a reduction in use of potable water in the building of at least 30 per cent (to earn two credit points, 35% for three credit points, 40% for four credit points) below baseline, not including water for irrigation, after meeting fixture performance requirements of the Energy Policy Act of 1992 and 2005, and the 2006 requirements of the Uniform Plumbing Code or International Plumbing Code. Baseline conditions are determined using these fixture maximum flows for the programmed number of building occupants.

Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, and commercial pre-rinse spray valves (for food service applications).

In most public buildings it is very easy to reduce total potable use by 30%. If low-flow lavatory faucets are installed with timers and sensors and if dual flush toilets are installed the total reduction will exceed 30%. These low-flow/low-volume flush fixtures cost very little more than standard fixtures and have identical installation and maintenance.

Note that the greatest water savings presently available on the market (not including waterless fixtures) are found in low-flow urinals. Since women do not use these fixtures, the calculations will show more savings for male users. The default gender dispersion for LEED is 50%/50%, but if KCWSD can show that employees are, will be, or have been predominantly male, greater savings can be demonstrated.

Status: Yes **LEED Submittal Phase:** Design

Achieving 35% or more reduction in potable water consumption is straightforward with little added first cost, so this credit is listed as “Yes” with 2 points. Using 0.5 gallons per minute (gpm) lavatory faucets controlled with timers and motion activation, low-flush urinals (1/8th gpf), and dual flush toilets will significantly reduce total potable water demand. In addition low-flow shower heads and available hand sanitizers in lavatories will further reduce water consumption. The Factoria RTS Project is expected to earn at three of the four credit points offered (a 35% reduction in domestic water consumption).

Cost Impact:

Minimal.

Schedule Impact:

None.

Operation and Maintenance Considerations:

Filter and pump maintenance will be required for the reclaimed water distribution system. Provided waterless urinals are avoided, no additional maintenance for fixtures will be required.

Energy and Atmosphere Category

The impact that energy use has on the environment is broad and long-lived. In fact, almost every aspect of conventional energy use poses some threat to the natural environment. Creating energy requires fuels to be burned. Throughout most of the world, the majority of electricity generation is powered by coal or natural gas. Burning coal creates NO₂ and SO₂, the two air pollutants largely responsible for smog and acid rain. In addition, harvesting of various fuel sources from the Earth – whether the source is coal, natural gas, oil or wood – is destructive to natural habitats. Transporting and processing these fuels places additional burden on the environment.

Sustainable energy management promotes energy efficiency as the first means to reduce these negative impacts. Combined with energy efficiency is the use of renewable energy resources such as solar power or wind turbines. It is this two-tier approach that will eventually result in energy-efficient buildings that integrate well with their environment.

LEED Energy & Atmosphere Prerequisite 1, Fundamental Commissioning of the Building Energy Systems

Commissioning is a quality assurance/quality control process that is managed by an experienced commissioning agent (CxA). The CxA reviews the design as it develops, reviews the construction drawings for completeness and accuracy, witnesses the installation of key building systems during construction, and verifies their correct operation afterward. Commissioning usually includes writing a report and preparing training materials for facility operators.

Two levels of commissioning are available for LEED: this prerequisite (required) and the elective credit point (EA-3, Enhanced Commissioning). The following commissioning process activities shall be completed by the commissioning team:

- *Designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities.*
- *The CxA shall have documented commissioning authority experience in at least two building projects.*
- *The individual serving as the CxA shall be independent of the project's design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the Owner.*
- *The CxA shall report results, findings and recommendations directly to the Owner.*
- *For projects smaller than 50,000 gross square feet (sf), the CxA may include qualified persons on the design or construction teams who have the required experience.*

- *The Owner shall document the Owner's Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents.*
- *Develop and incorporate commissioning requirements into the construction documents.*
- *Develop and implement a commissioning plan.*
- *Verify the installation and performance of the systems to be commissioned.*
- *Complete a summary commissioning report.*

Status: Yes LEED Submittal Phase: Construction

The design team strongly recommends that a commissioning agent is engaged with the start of the design phase. Bringing a commissioning agent into the project as early as possible offers the best return on investment, best potential for design improvement, highest probability to discover and eliminate mistakes and the most opportunity for constructive guidance to the design team and owner.

Cost Impact:

No significant cost impact, and provides a valuable service in verifying system operations.

Schedule Impact:

No schedule impact as long the commissioning coordination is planned for and built into the overall schedule.

Operation and Maintenance Considerations:

Having a commissioning agent will help with operations and maintenance through independent verification that building systems are operating as designed. Enhanced commissioning also verifies that manuals and training on the equipment have been provided.

LEED Energy & Atmosphere Prerequisite 2, Minimum Energy Performance

Through the minimum energy performance prerequisite, LEED requires that all LEED-certified buildings achieve a level of efficiency that meets the ASHRAE Energy Standard for Buildings Except Low-Rise Residential. Specifically, any LEED-certified building must comply with both of the following:

- The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) of ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda).

- The prescriptive requirements (Sections 5.5, 6.5, 7.5, and 9.5) or performance requirements (Section 11) of ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda).

Using normal building design standards, most buildings will have no difficulty nor incur any additional cost in meeting these requirements. However, as with every LEED prerequisite, it is prudent to frequently verify that all prerequisite requirements are being fulfilled throughout the design and construction process.

Status: Yes LEED Submittal Phase: Design

The Factoria RTS project will be designed to include innovative HVAC equipment and modern, yet proven, building control systems. This project will fully meet this prerequisite.

Cost Impact:

No cost impact anticipated.

Schedule Impact:

No schedule impact anticipated.

Operation and Maintenance Considerations:

No operations and maintenance impacts anticipated.

LEED Energy & Atmosphere Prerequisite 3, Fundamental Refrigerant Management

Refrigerants used in cooling systems are known to deplete the ozone layer. To help reduce this effect, LEED requires that no CFC-based refrigerants be used in new base building HVAC&R systems. LEED furthermore directs that when reusing existing base building HVAC equipment, the owner must complete a comprehensive CFC phase-out conversion prior to project completion.

Today, virtually no LEED-restricted refrigerants are sold, as most countries have agreed to abide by the Montreal Protocol. For most projects, meeting this requirement is merely a formality; however, because every prerequisite must be met for any level of LEED certification, it is wise to confirm project compliance early in the process and again throughout the process.

Status: Yes LEED Submittal Phase: Design

HVAC equipment with refrigerants that do not comply with this prerequisite is virtually non-existent on the market today. The project will meet this prerequisite.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Energy & Atmosphere Credit 1, Optimize Energy Performance (1 - 19 Points)

Energy efficiency is a concept that needs little explanation. Because it directly affects the bottom line, building owners want their projects to use as little energy as possible. In many instances, building owners are willing to spend more at the beginning of a project in order to create a project that uses less energy once built.

Because there is such an important relationship between energy conservation and environmental impacts, LEED Version 2009 offers up to 19 credit points for optimizing energy performance.

Option 1, Whole Building Simulation, is the only applicable option for achieving credit for the Factoria RTS facility. Energy modeling is required to prove compliance for any EA 1 credit points. The energy modeling process should not be used merely to determine the energy performance of a designed or built building. Instead, energy modeling should be used as an iterative back-and-forth design tool to compare design options, different wall and roof assemblies, and different sizes and types of glazing, shading, etc. Energy modeling software is very sophisticated and requires substantial expertise to produce data that is accurate and relevant, and which gives the owner confidence in making decisions based on its accuracy. By coupling data for different building configurations with first cost comparisons and anticipated energy cost increases, a life-cycle analysis can be readily performed. This process (energy modeling coupled with life-cycle analysis) makes it much easier to arrive at construction “investment” decisions regarding energy efficiency at the beginning of a project.

Of all the LEED credit points offered, this one offers the greatest potential for saving money over the life of the building.

Status: Yes LEED Submittal Phase: Design

As part of the sustainable design process, the design team will perform energy modeling for this project. A baseline model, using minimum values for insulation, lighting, and equipment efficiency, will be constructed based on the general dimensions and parameters. A proposed model will be constructed under the guidelines of ASHRAE 90.1 2007 – Appendix G based on these same

dimensions and parameters. The proposed model includes reduced lighting power density (indoor and exterior), reductions in energy use from artificial lighting due to daylighting controls, higher efficiency HVAC units and insulation values in conditioned spaces that are superior to minimum code requirements. Energy savings can be demonstrated for reduced fan use due to natural ventilation, high-efficiency water heating and superior glazing. To achieve maximum energy efficiency, the design team will place emphasis first on load reduction, then on critical envelope design, “free cooling” strategies, and enhanced lighting control systems.

While it is too early to predict the overall efficiency improvements this project will achieve, the mechanical engineer and sustainable design team are comfortable with considering 20% as readily achievable. This represents earning 5 credit points. The challenge with this credit is that the processing equipment (compactors) is a significant load element that does not allow for improved energy efficiencies. Data for compactor use at the Shoreline Recycling and Transfer Station indicate that the compactors pull their maximum amp draw for only a small portion of each cycle and more typically operate at a reduced load. This data will demonstrate a smaller compactor energy use which will favorably affect the outcome of the model and provides optimism that more than 5 points can be achieved in this category.

Regional Priority:

Increased energy performance is a regional priority in the project area. Due to the type of facility, it is unlikely that energy optimization will reach the 50% needed for an additional credit. The Factoria RTS will not pursue the regional priority credit.

Cost Impact:

No significant cost impacts are anticipated. High efficiency lights and HVAC systems are readily available.

Schedule Impact:

No schedule impact anticipated.

Operation and Maintenance Considerations:

The team will specify training be provided on all energy-consuming systems.

LEED Energy & Atmosphere Credit 2, On-Site Renewable Energy 1%, 3%, 5%, 7%, 9%, 11%, 13% (1 - 7 Points)

High first costs, long payback periods, and added complexity can make on-site renewable energy an unattractive approach to earning a LEED credit point. Also, the cost may be prohibitive for providing 1% to 13% (for 1 to 7 credit points) of the total energy via on-site renewable energy generation.

Status: Yes **LEED Submittal Phase:** Design

While it is possible that PV panels could be installed on the rooftop or integrated into the building envelope, the added first cost vs. simple payback may not support such an effort. Making this determination is based on four unknowns: (1) how much electricity the building will consume, (2) how much on-site renewable energy can be generated, (3) how much the on-site generation system will cost, and (4) how much local utility-grid power costs.

Generating 5% of the annual energy cost using on-site renewable energy will be a challenging goal, but the credit is currently listed for 3 points, which reflects the 5% level. Note that any energy savings achieved for this credit could apply toward the energy optimization credit (EA 1) as well.



Rooftop Solar Panel, St. Paul, MN.

Cost Impact:

Minimal to substantial cost impacts, it depends on the approach and level of renewable energy provided, and if the County owns the system or chooses to use a public-private partnership, for example, by leasing the roof space for a private company to install a PV system.

Schedule Impact:

Once a decision is made on the preferred approach, the steps can be built into the existing schedule without significant impact.

Operation and Maintenance Considerations:

Considerations are tied to the renewable technologies installed.

LEED Energy & Atmosphere Credit 3 - Enhanced Commissioning (2 Points)

Two credit points are offered if a project team successfully fulfills the following requirements for additional commissioning:

Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1 and in accordance with the LEED-NC 2.2 Reference Guide:

- 1. Prior to the start of the construction documents phase, designate an independent Commissioning Authority (CxA) to lead, review, and oversee the completion of all commissioning process activities. The CxA shall, at a minimum, perform Tasks 2, 3, 6 and other team members may perform Tasks 4 and 5.*
 - a. The CxA shall have documented commissioning authority experience in at least two building projects.*
 - b. The individual serving as the CxA shall be—*
 - i. independent of the work of design and construction;*
 - ii. not an employee of the design firm, though they may be contracted through them;*
 - iii. not an employee of, or contracted through, a contractor or construction manager holding construction contracts; and*
 - iv. (can be) a qualified employee or consultant of the Owner.*
 - c. The CxA shall report results, findings and recommendations directly to the Owner.*
 - d. This requirement has no deviation for project size.*
- 2. The CxA shall conduct, at a minimum, one commissioning design review of the Owner's Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission.*
- 3. The CxA shall review contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and the Owner.*
- 4. Develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.*
- 5. Verify that the requirements for training operating personnel and building occupants are completed.*
- 6. Assure the involvement by the CxA in reviewing building operation within 10 months after substantial completion with O&M staff and occupants. Include a plan for resolution of outstanding commissioning-related issues.*

The value of commissioning to the owner is that he or she has a third-party reviewing the design process, making suggestions, and catching mistakes while the project is still in the inception and drawing stage, not under construction or completed and occupied. The third-party review then carries on through construction, insuring that systems are correctly installed and operated properly. While this level of commissioning costs more, for most projects over 10,000 sf the added initial costs are often recovered (via avoided mistakes and improvements made to the design) by the time the project is completed. Enhanced commissioning is a very conservative, sound investment in time and money.

Status: Yes **LEED Submittal Phase:** Construction

Enhanced commissioning should be an integral component of design, construction, and operation of a project. The design team believes that the Factoria RTS will elect to include enhanced commissioning in the process, and considers this credit point as a “yes”.

Cost Impact:

No significant cost impact, and provides a valuable service in verifying system operations.

Schedule Impact:

No schedule impact as long the commissioning coordination is planned for and built into the overall schedule.

Operation and Maintenance Considerations:

Having a commissioning agent will help with operations and maintenance through independent verification that they systems are operating as designed. Enhanced commissioning verifies manuals and training on the equipment has been provided.

LEED Energy & Atmosphere Credit 4, Enhanced Refrigerant Management (2 Points)

LEED offers this credit point for projects that use environmentally safer refrigerants (ones with low ozone depletion potential). Two options and one additional requirement are available to earn this credit point:

OPTION 1: Do not use refrigerants. (This suggests natural and unconditioned air ventilation only, something not practical in most environments.)

OR

OPTION 2: Select refrigerants and HVAC&R that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment shall

comply with the formula provided in the Reference Guide, which sets a maximum threshold for the combined contributions to ozone depletion and global warming potential.

AND

Do not install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs or Halons).

Note: Small HVAC units (defined as containing less than 0.5 lbs of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 lbs of refrigerant, are not considered part of the “base building” system and are not subject to the requirements of this credit.

Status: Maybe LEED Submittal Phase: Design

The current status of this credit is a “maybe”. The formula used to determine ozone depletion potential is based largely on the amount of refrigerant in the system per ton of cooling capacity. Since the conditioned area (the administration building) is relatively small, smaller cooling units will satisfy the loads. For these smaller sizes, the industry has yet to reliably produce units that don’t exceed allowable refrigerant volumes; therefore it will not likely be possible to achieve this credit. The project team will confirm, however, before finalizing the status.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

The team will specify training with any special equipment.

LEED Energy & Atmosphere Credit 5, Measurement and Verification (3 Points)

LEED EA Credit 5 requires implementation of a formal plan for long-term and continuous measurement of building energy efficiency and water conservation performance.

Specifically, the following must be assessed:

- Lighting efficiency
- Lighting control performance
- Boiler efficiency
- Variable load motor performance
- Chiller efficiency and cooling load
- Constant load motor performance
- HVAC system performance
- Water use metering (including irrigation)

Per the LEED Reference Guide, the project team must *develop and implement a Measurement & Verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), or Option B: Energy Conservation Measure Isolation, as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003.*

The M&V period shall cover a period of no less than one year of post-construction occupancy.

Provide a process for corrective action to ensure energy savings are realized if the results of the M & V plan indicate that energy savings are not being realized.

Notes: The M&V plan can be written by the mechanical engineer or the commissioning agent. Either is a good choice because he or she will understand the building systems listed above. The difficult aspect to this credit point is the follow-through after the project is occupied.

Sub-metering: It is important that sufficient sub-meters be installed to provide the capability of distinguishing where a problem may be occurring. For example, if potable water is supplied to an evaporative cooling tower and to a chiller or other HVAC unit, the different systems should have individual sub-meters installed. That way, if there is a spike in the water utility bill, it will be easier to determine where the problem lies. Also, if only one building system is using a particular resource, then the utility bill can serve effectively as the meter. For example, if natural gas is used only to provide domestic hot water from a single boiler, there is no need to install a separate gas meter.

The value of an M&V plan to the Factoria RTS is that it will help staff (1) be aware of any power or water consumption anomalies, (2) be prepared to troubleshoot where the excess consumption is taking place, and (3) help ensure that there are no disruptions to operations due to a building equipment malfunction. It is perhaps this last reason that the Factoria RTS should insist that an appropriate M&V plan be implemented, regardless of LEED.

Status: Yes LEED Submittal Phase: Construction

King County has already demonstrated the importance of monitoring through current policies. The current monitoring and metering like that done at Shoreline through the Director's Office Energy Group will inform this and future projects for efficiencies and maintenance. The continued

improvement, measurement, and verification of these systems will help to continually improve sustainable design and energy efficiency implementation for the County. This credit is listed as a “Yes”.

Cost Impact:

The added costs for M&V include the fee (nominal) to write the M&V plan, the cost of added meters or sub-meters, and the cost to pay facility staff to implement the M&V plan as written, with potential return on investment of additional metering.

Schedule Impact:

No schedule impacts.

Operation and Maintenance Considerations:

The team will specify training with any specialty systems. Also need to verify the equipment is working correctly prior to final facility acceptance.

LEED Energy & Atmosphere Credit 6, Green Power (2 Points)

To meet the Green Power credit at least 35% of each building’s electricity must be powered by utility-supplied renewable sources, such as wind power, photovoltaic panels, and bio-mass power generation for a period of 2 years. The project must engage in at least a 2-year renewable energy contract. For the purposes of this credit, “renewable sources” are defined by the Center for Resource Solutions (CRS) Green-e products certification requirements; the Web site is: <http://www.green-e.org>.

To Determine the Base Electricity Use:

Use the annual electricity consumption from the results of EA Credit 1.

OR

Use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use.

Note – All purchases of green power shall be based on the quantity of energy consumed, not the cost.

Status: Maybe LEED Submittal Phase: Construction

This credit point is expensive and while it promotes environmental stewardship, implementing it provides no tangible direct benefit to Factoria RTS. The actual cost to purchase either green power or

Green Tags will not be known until the final energy model is complete. The design team will report this cost to the KCSWD project team once it has been calculated. For the time being this credit is listed as “maybe”. The design team will also coordinate with PSE (who also happens to be a neighbor of the facility) to further pursue opportunities for green power credit as well as other energy and site related credits.

Cost Impact:

As stated above, there is additional cost with this credit.

Schedule Impact:

No schedule impacts.

Operation and Maintenance Considerations:

None.

Materials and Resources Category

The materials used in creating a building have a large impact on how sustainable a building is. Harvesting, mining, transporting, processing, fabricating, shipping and installing building materials causes increased pressure on eco-systems. Selecting more sustainable building materials and minimizing of disposal of materials that leave the building are addressed in this category.

LEED Materials & Resources Prerequisite 1, Storage and Collection of Recyclables

This LEED prerequisite requires the implementation of a recycling program. Dedicated spaces must be reserved at each main collection area (break rooms, copier rooms, etc.). LEED requires these areas to serve the entire building and be dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, plastics, glass and metals.

This is a low-cost feature which provides life-long environmental benefits.

Note: The actual implementation of the recycling program, including bins, signage, and pick-up is the owner's responsibility. The design team is responsible for making sure that these spaces are included in the design. In larger facilities this will also include a recycling storage area on the loading dock or shipping/receiving area.

Status: Yes LEED Submittal Phase: Design

This project will provide the required spaces to implement a robust recycling program. It will meet this prerequisite.

Cost Impact:

None.

Schedule Impact:

No schedule impacts.

Operation and Maintenance Considerations:

None.

LEED Materials & Resources Credits 1.1, 1.2, Building Reuse, Maintain Existing Walls, Floors & Roof, Building Reuse, Maintain 50% of Interior Non-structural Elements (1 - 4 Points)

Any time an existing building can be re-used the environment benefits. The owner and occupants will likely benefit from reduced construction & demolition costs and preserved cultural resources. LEED offers up to three credit points for projects that are able to reuse existing structures. The credit points are offered for successfully re-using defined percentages of existing walls, flooring and the roof. In addition, if 50% of the interior non-structural interior partitions can be preserved, the project can earn the third credit point.

Status: Maybe LEED Submittal Phase: Construction

This credit is listed as “maybe” for 3 of the 4 points because the project team thought it was important to confirm the feasibility of achieving the requirements of this credit. This project is entirely new construction, and it is not likely that any building reuse implemented as a best practice will be enough to earn these credit points, but the design team will evaluate. If we re-use parts from other buildings in our new buildings then the cost contribution for those materials falls under MR credit 3. It is not likely we can re-use parts to the extent that their cost contribution is 2% of the construction cost, and thus it will be a challenge to achieve.

The on-site paving and foundation materials can be recycled for reuse with site fill, building pad base, road base and new paving components. The possibility of re-using the scalehouse will also be evaluated.

Regional Priority:

Building reuse is a regional priority in the Factoria RTS project area. The design team will evaluate the feasibility of reusing existing structures.

Cost Impact:

Additional costs for on-site processing of foundation and paving materials.

Schedule Impact:

On-site processing of materials may incur additional schedule impacts for set-up.

Operation and Maintenance Considerations:

On-site processing may have logistical problems for locating equipment and noise impacts to the local community.

LEED Materials & Resources Credit 2, Construction Waste Management, Divert 50%/75% from Disposal (1 - 2 Points)

Construction and demolition wastes represent a large percentage of all landfill volumes, approximately 30%. As landfills across the globe are closing due to the lack of space, the cost of dumping is increasing. Many construction companies are implementing construction waste management (CWM) plans to reduce these tipping fees. Many contractors are finding out that with a little additional planning and continuous monitoring they are able to not just reduce their construction waste costs but in some cases actually earn money by implementing the CWM plan.

This LEED credit point is the responsibility of the contractor. The contractor in turn must receive cooperation from their subs. Ideally the contractor would be aware of these special requirements during the design process and would show up on ground breaking day ready to place the recycling bins. However, if a project is a design-bid-build delivery specifications need to be critically drafted to require cooperation from all construction team members on the job site. These specifications should direct the contractor to submit and have approved (prior to ground breaking) a CWM plan for the duration of the construction.

To successfully implement a construction waste management plan the job site must accommodate several dumpster bins, each for a separate type of building material to be recycled, such as gypsum wall board, wood products, steel fixtures, etc. Another option to be explored is a service provider who collects all debris in one container and sorts it off-site. They provide the volume of each material diverted from the landfill to the contractor.

Many project teams across the United States are finding out that diverting at least 75% of construction waste from entering the landfill is quite possible. In fact, some are actually earning a LEED Innovation in Design Credit Point if the team is able to prove that it has diverted 95% or more of all construction & demolition waste from the landfill.

Note: This credit is calculated by weight or by volume but the metric must remain the same for all materials. Accordingly, it often makes the most sense to use weight as the metric because the recycling of heavier items, concrete and steel in particular, makes a higher diversion rate possible.

Status: Yes LEED Submittal Phase: Construction

This credit is a “yes”. The design team will include CWM as a project into the specifications. The team is prepared to review the contractor’s submitted construction waste management plan, and provide general guidance. Implementation is ultimately the contractor’s responsibility and this should be clearly communicated as early as possible. We are prepared to provide guidance and/or oversight on this process throughout construction. KCSWD also offers assistance through the Green Tools Program (<http://your.kingcounty.gov/solidwaste/greenbuilding/jobsite-waste.asp>).

Most importantly, this credit is also dependent on the availability of local service providers and markets to take recycled materials and materials for reuse, and provide the required documentation. The project team should continue to track this issue through the next phases of design to confirm viability of implementation.

The KCSWD and the project team agreed during the Eco-Charrette that since Factoria RTS is a transfer facility, the goal should be to divert 100% of the construction and demolition waste.

Note: The team expects to earn an Innovation and Design Credit for Construction Waste Management of 95% or more through Exemplary Performance.

Cost Impact:

Demolition and recycling transport costs, construction waste management administration can add to contractor costs. Some of these costs may be offset by payment from recyclers.

Schedule Impact:

Administration of construction waste management may incur minor delays.

Operation and Maintenance Considerations:

None.

LEED Materials & Resources Credits 3, Materials Reuse, 5%/10% (1 - 2 Points)

Like re-using an existing building, it is also beneficial to re-use parts of buildings whenever feasible. To earn this credit point LEED requires project teams to:

Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5%, (or 10% for two credit points) based on cost, of the total value of materials on the project.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3– 7.

Note: There are some projects where using salvaged materials is inappropriate, such as justice or healthcare facilities. Most projects that are able to claim either of these two credit points are smaller, privately owned, or non-profit agency buildings.

Status: Maybe LEED Submittal Phase: Construction

This credit is listed as “maybe”. It is not likely feasible to reuse enough building materials and products to reach the required threshold for this credit. However, the design team will look for opportunities to meet the credit. An example of this would be recommendation of an assessment of the existing Transfer Station steel structure. This structure may have potential for reuse at another County facility, providing additional years of use after retrofitting for current codes and refurbishment of corrosion, etc. At a minimum, the project team agreed that this a good practice and should be incorporated into the design to the extent possible for sustainable design, education, and aesthetics. For example, it may be possible to reuse doors on some of the Factoria RTS facilities.

Exemplary Performance:

Innovation in Design credit is available for this credit. However, the project team does not anticipate achieving this level of building reuse.

Cost Impact:

Costs for structure assessment. Costs related to refurbishment and relocation may exceed replacement costs.

Schedule Impact:

None.

Operation and Maintenance Considerations:

Refurbished and relocated structure may not meet the maintainability criteria required of a new structure.

LEED Materials & Resources Credits 4.1-2, Recycled Content, 10%/20% (post-consumer + ½ pre-consumer) (1 -2 Points)

Many building materials are available with various percentages of recycled content, including carpet, concrete, paint, and wall board. Recycled content is an important opportunity to reduce embodied energy in building materials. Embodied energy is the sum of the energy it took to harvest/mine the raw resources used to make the material, to manufacturer and transport it, to install and maintain it, etc. By reducing embodied energy a project can minimize several impacts to the environment resulting from the manufacturing steps above. Recycled content also reduces landfill volumes and supports emerging enterprises in the construction industry

It is impressive to realize just how many building materials can be made with recycled content (and in many cases are already being made). Some examples include:

Structural Steel – Steel can automatically be considered to be composed of at least 25% recycled content per LEED criteria and is often documented to reach 75-95%. Because steel costs are high the contribution of recycled content from steel is often the single biggest contributor to earning these credit points.

Concrete – Concrete can use fly ash and crushed rubble (possibly from demolition of onsite roads) in the material mix, which count toward recycled content. Regardless of either material, since this credit is calculated on cost, the usual contribution of concrete for recycled content is small.

Carpeting – Almost all commercial carpet is made with recycled content but the overall amount can vary significantly. Since carpet is usually not a large percentage of overall construction cost the contribution to total recycled content is normally small.



Recycled Gumwood.

Ceiling Tiles – Like carpet ceiling tiles contain recycled content, usually in the form of recycled newspaper or recycled ceiling tiles. However the total contribution is a small percentage.

Floor Tiles - Can often be 100% recycled content.

Gypsum Drywall – Most drywall is 5-10% recycled content.

It is important to note that the LEED Calculation for this credit point is for a combined value of post-consumer content plus half of post-industrial content as a percentage of all construction materials. This figure includes site materials but excludes mechanical and electrical equipment. Here are the specifics from the LEED Reference Guide:

Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation.

Only include materials permanently installed in the project.

Furniture may be included, providing it is included consistently in MR Credits 3–7.

Recycled content shall be defined in accordance with the International Organization of Standards document, ISO 14021—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling).

Post-consumer material is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.

Pre-consumer material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Status: Yes LEED Submittal Phase: Construction

The construction specifications will direct the contractor to give preference to cost-comparable materials with high recycled content. The project team listed this credit as a “yes” for 2 points which requires 20% recycled content based on cost.

Exemplary Performance:

An Innovation in Design credit is available for reaching 30% or more recycled content. The project team expects to earn this additional point due to the fact that steel is high in recycled content and that proportionality there will be a significant amount of steel materials in this project.

Cost Impact:

Minor additional costs. Although some products may have a premium category for sustainability compliance, most manufacturers offer products that have recycled content at no added cost.

Schedule Impact:

None.

Operation and Maintenance Considerations:

The design team will work with manufacturers to identify “green” products that do not compromise maintenance concerns.

LEED Materials & Resources Credit 5, 10%/20% Extracted, Processed & Manufactured Locally (1 - 2 Points)

Using building materials manufactured and/or harvested in close proximity to the construction site is another opportunity to reduce embodied energy. Purchasing regional materials may be difficult in some instances, such as curtain wall systems. Heavy materials such as concrete and steel will most likely be harvested if not manufactured within 500 miles of the site. Sourcing Local/Regional products should be done by the project team, based on products defined in their product binder.

This credit is also calculated by cost.

Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost, or 20% for two credit points) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation.

Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3– 7.

For specific details on how to calculate the amount of Local/Regional content consult the LEED Reference Guide for details.

Status: Yes LEED Submittal Phase: Construction

Because the Factoria RTS is located in the northwest where building materials manufactured and harvested regionally are available, this credit is listed as “yes” for 2 points.

Exemplary Performance:

An Innovation in Design Credit is available for achieving a total value of 30% or more of regionally harvested, extracted, and manufactured materials. During the Eco-Charrette, the team determined that it would be difficult to achieve the exemplary performance credit. The design team will, however, further evaluate the possibility of achieving this credit by contacting manufacturers and suppliers that can provide content data.

Cost Impact:

Regional availability can limit bidders therefore promoting higher pricing.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

**LEED Materials & Resources Credit 6, Rapidly Renewable Materials
(1 Point)**

Building materials made from rapidly renewable resources, such as wood, cork or bamboo provide another way to reduce the impact a building can have on the environment. This credit point requires that a project:

Use rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle or shorter) for 2.5% of the total value of all building materials and products used in the project, based on cost.

Unfortunately, most public projects will have few opportunities to use these materials. Most rapidly renewable building materials are wood products or natural fiber fabrics that this project is not likely to use.

Since this credit is also based on cost it is difficult to procure enough building materials made from rapidly renewable resources to earn this credit point. Again, typically this point is earned by small privately-owned or non-profit agency buildings.

Note: "Rapidly renewable" = harvested within a 10-yr. cycle or less (ex. cork, bamboo, linoleum)

Status: No LEED Submittal Phase: Construction

Although renewable building materials can certainly be included as part of the Factoria RTS project, it is doubtful that their total construction value will equal 2.5% of the total. This credit is listed as a "no".

Exemplary Performance:

An Innovation in Design Credit is available for achieving 5% or more of rapidly renewable materials content. Factoria RTS is not expected to earn this point.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Materials & Resources Credit 7, Certified Wood (1 Point)

Harvesting trees to make building products is often very damaging to the environment. The Forest Stewardship Council is dedicated to promoting environmentally friendly means of sawing trees. A wood product bearing the FSC stamp was harvested from a carefully managed forest, such that replanting is an on-going activity. LEED Materials & Resources Credit 7 – Certified Wood rewards the purchase of FSC wood products as follows:

Use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.

Only include materials permanently installed in the project.

Furniture may be included, providing it is included consistently in MR Credits 3–7.

Note: Most basic wood building products are available as FSC wood, and usually with little if any added cost. To learn more about the FSC program link to: www.fscus.org.

Status: Yes LEED Submittal Phase: Construction

This credit point is becoming easier to earn as more FSC products are introduced to the market. The design team has FSC requirements in the standard specifications. Careful coordination between the contractor and their subs and close scrutiny for non-compliant wood products in all submittals will be necessary to meet this Credit. Factoria RTS is expected to earn this credit point; it is listed as a “yes”.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

County staff has indicated a concern for interior casework constructed of wheatboard. Proper specifications that identify high quality FSC cores and durable veneers and/or laminates will provide longer working life and minimal maintenance.

Indoor Environmental Quality Category

The average person will spend most of his or her life indoors, yet too often little concern is given to the overall safety and well being of occupants. To promote sustainable indoor environments green designers incorporate day lighting, natural ventilation, individual control of personal environments, and interiors that are free of toxins. What's the result? An interior environment that safeguards occupant health, is pleasant to dwell in, and reduces operating costs.

LEED Indoor Environmental Quality Prerequisite 1, Minimum Indoor Air Quality Performance

LEED requires a minimum threshold of indoor environmental quality through this prerequisite. Most contemporary buildings will meet this standard without too much added concern, but again, it pays to bring this to the attention of the mechanical engineer early in the design process. Specifically LEED requires that a project:

Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda). Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent. Naturally ventilated buildings shall comply with ASHRAE 62.1-2007, paragraph 5.1 (with errata but without addenda).

Status: Yes LEED Submittal Phase: Design

HDR mechanical engineers have confirmed that all ventilation systems will meet ASHRAE 62.1-2007 and the Washington State Ventilation and Indoor Air Quality Code. This is considered best practice in HVAC design and is not normally difficult. Factoria RTS will meet this prerequisite.

LEED Indoor Environmental Quality Prerequisite 2, Environmental Tobacco Smoke Control

Second hand smoke is not only obnoxious to the non-smoker; significant research indicates it is a real health hazard to some. To ensure that building occupants aren't exposed to secondhand smoke, LEED requires that smoking be controlled via the following:

OPTION 1: Prohibit on-property smoking within 25 feet away from entries, outdoor air intakes and operable windows. Provide signage to either allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.

OR

OPTION 2: Prohibit smoking in the building except in designated smoking areas, and

- Prohibit on-property smoking within 25 feet away from entries, outdoor air intakes and operable windows. Provide signage to either allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.*

AND

- Locate designated smoking rooms to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure with respect to the adjacent spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pascals (Pa) (0.004 inches of water gauge).*
- Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces with the smoking rooms' doors closed to the adjacent spaces.*

Status: Yes LEED Submittal Phase: Design

Factoria RTS will fully comply with this prerequisite through a “no smoking” policy or designated areas.

Cost Impact:

None.

Schedule Impact:

None.

Operation and Maintenance Considerations:

None.

LEED Indoor Environmental Quality Credit 1, Outside Air Delivery Monitoring (1 Point)

Including monitoring systems to verify air freshness is a good practice for two reasons: (1) it will help ensure that occupants are receiving enough oxygen to promote alertness, and (2) it will regulate

systems to not supply too much outside air, which often requires cooling or heating. This wastes energy.

Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions (either airflow value or CO₂ level) vary by 10% or more from the value expected at design conditions, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

FOR MECHANICALLY VENTILATED SPACES

Monitor carbon dioxide concentrations within all densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 sq. ft.). CO₂ monitoring locations shall be between 3 feet and 6 feet above the floor.

Provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of plus or minus 15% of the design minimum outdoor air intake rate, as defined by ASHRAE 62.1-2007 (with errata but without addenda) for mechanical ventilation systems where 20% or more of the design supply airflow serves non-densely occupied spaces.

FOR NATURALLY VENTILATED SPACES

Monitor CO₂ concentrations within all naturally ventilated spaces. CO₂ monitoring shall be located within the room between 3 feet and 6 feet above the floor. One CO₂ sensor may be used to represent multiple non-densely occupied spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants. Note: CO₂ monitoring equipment is required in densely occupied spaces, in addition to outdoor air intake flow measurement.

Status: Yes LEED Submittal Phase: Design

There are several business reasons for including CO₂ monitoring in these buildings. (1) healthy air for all occupants, (2) better staff productivity from more oxygen, (3) energy savings. It is our recommendation that King County provide CO₂ sensors to better regulate air flow. Accordingly, we consider this credit point as a "Yes".

Note: the best CO₂ systems are dual, meaning there are CO₂ sensors inside the building and a CO₂ sensor is located outside next to a fan unit air intake. The exterior CO₂ sensor samples the quality of the air, measuring how many ppm of CO₂ there is. The interior CO₂ sensors do the same thing. The system should be designed to provide interior air within a threshold of acceptable ppm of CO₂. By "knowing" how good the exterior air is the building control system can better regulate and limit the volume of outside air entering the building, thus saving energy and money. However, if the exterior

CO₂ sensor is not carefully calibrated it can be sending faulty information to the air handler unit(s) and can actually use far more energy than would the system without the CO₂ sensor. Therefore, careful & frequent calibration is necessary for this system to operate to its potential.

Carbon Dioxide is a good measure of indoor air quality in enclosed and conditioned spaces. The majority of this project, however, will include ventilated, un-conditioned spaces with vehicle traffic. For these areas, carbon monoxide and nitrogen dioxide (from gasoline and diesel exhaust respectively) are more important gases to monitor for the well being of the occupants. Previous LEED CIRs have confirmed that measuring these potentially harmful emissions meets the intent of this credit. However, previous CIRs no longer apply as precedents with LEED 2009, so it is not confirmed for this project.

Some potential obstacles in earning this credit are as follows: The range of gas sensors is limited. Since the transfer station tipping floor is a large open space, it is difficult to find a sensor with a range that can reach the most interior spaces. Also, it is difficult to locate sensors at the recommended heights on tipping floor walls, as most walls are push walls and sensors on push walls will be potentially covered by refuse and easily susceptible to damage. Also, ventilation will be provided to the tipping floor either through louvered openings or a series of supply fans. It is impractical to measure airflow delivery for these un-ducted systems.

Note: Because of these conditions, the team may elect to submit a CIR to get affirmative direction from the USGBC.

Cost Impact:

Low to Moderate, \$5,000 to \$15,000, depending on the amount of gas phase sensors required.

Schedule Impact:

None

Operation and Maintenance Considerations:

The team will specify training on specialty equipment. There is some added cost to calibrate sensors periodically.

LEED Indoor Environmental Quality Credit 2, Increased Ventilation (1 Point)

Providing occupants with fresh air is highly desirable. People working in environments with higher levels of oxygen are more productive, more alert, and tend to get sick less often than those whose work environments are oxygen-deficient. LEED promotes providing occupants with an assertive goal of achieving an air change rate well above normal standards:

FOR MECHANICALLY VENTILATED SPACES

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE 62.1-2007 (with errata but without addenda) as determined by EQ Prerequisite 1.

FOR NATURALLY VENTILATED SPACES

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust "Good Practice Guide 237" [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

AND

Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

OR

Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2007) Chapter 6 (with errata but without addenda), for at least 90% of occupied spaces.

Note: While this sounds logical, if not a bit technical, the reality of this credit is that it is difficult to do for most building types. Even with an underfloor air delivery system, in order to provide that much air, the velocity would likely be so high that it would feel uncomfortable to occupants. In addition, it would also require additional fan motor power, thus consuming energy. Very few projects are able to incorporate laminar air flow designs that will achieve this level of air changes per hour. However, this project may be able to achieve this change rate since the required outdoor air levels will be so low.

Status: Yes LEED Submittal Phase: Design

This type of facility may overcome some of the challenges listed above. The credit was listed during the Eco-Charrette as "yes". It is likely that the exhaust requirements of the restrooms and locker rooms in the administrative area will exceed the fresh air required by ASHRAE. Since all exhaust air must be made up by fresh air, the base design may meet the 30% higher goal for fresh air without embellishment.

In the transfer station areas the codes do not typically address the specific uses encompassed by this project. The closest reasonable comparison is to a warehouse or parking garage, which require 0.06 – 1.5 CFM/SF. Our transfer station ventilation best practices call for 10-12 air changes per hour, which is equal to 5 CFM/SF for a 30 ft tall structure. This easily exceeds the 30% requirement and since the air is unconditioned the negative energy impacts are limited to fan use.

Cost Impact:

None to minimal unless a natural ventilation system is selected, in which case additional design fee will be needed to model air movement through the space.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

The design team will specify training with any specialty equipment.

LEED Indoor Environmental Quality Credit 3.1, Construction IAQ Management Plan, During Construction (1 Point)

It is equally important that air quality be protected during the construction process. Construction is an inherently dirty process. Too often indoor air quality in an occupied building is compromised during construction by the infiltration of dust entering air ducts and contaminants being absorbed in interior finishes. Fortunately, the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) has created an industry standard for best management practices to reduce both of these during construction. LEED references this standard for this credit point:

- *Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:*
- *During construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-2008.*
- *Protect stored on-site or installed absorptive materials from moisture damage.*
- *If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-1999 (with errata but without addenda). Replace all filtration media immediately prior to occupancy.*

Status: Yes LEED Submittal Phase: Construction

A construction IAQ ensures the project is turned over to the client in a clean condition. The IAQ Management plan is relatively easy for the contractor to execute once they get started with it. The design team will incorporate these credit requirements into the specifications. Factoria RTS should earn this credit point.

Cost Impact:

No significant cost impacts anticipated.

Schedule Impact:

No schedule impacts.

Operation and Maintenance Considerations:

Will not affect operation and maintenance.

LEED Indoor Environmental Quality Credit 3.2, Construction IAQ Management Plan, Before Occupancy (1 Point)

This second Construction IAQ Management credit point is offered as a means to quantifiably assure that indoor air quality is contaminant-free prior to occupancy. There are two compliance paths: a building flush-out period or air quality testing, both as follows:

OPTION 1 — Flush-Out

After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 (cubic feet) cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

OR

If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

Note: ALL finishes must be installed prior to flush-out.

OPTION 2 — Air Testing

Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency

Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the Reference Guide.

The Air Testing procedure is not difficult and comes at a relatively moderate price. When compared to the amount of time it might take to implement the 14,000 cf flush-out it may be more cost effective to pay for the air quality test. Industrial safety experts and more progressive mechanical engineering firms are able to offer this service. The design team will evaluate which approach is the most cost effective.

Note: there are specific technical LEED-specific criteria that should be reviewed prior to conducting the air quality tests. More than one LEED project has lost this credit point because the testing procedure used did not satisfy these criteria. Be sure to consult the LEED Reference Guide for details.

Status: Yes LEED Submittal Phase: Construction

The project team recommends implementing this credit point as the follow-up needed to ensure optimal clean air at occupancy. The design team will incorporate these credit requirements into the specifications and we consider this credit point a “Yes”.

Cost Impact:

Minimal cost impact.

Schedule Impact:

Minimal schedule impact, the testing dates need to be built into the schedule. The impact would be if the test failed and needed additional purging.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 4, Low-Emitting Materials

In the following four credit points (IEQ 4.1-4) the general intent is to prevent toxins from being used inside the building interior. The problem with using interior materials that contain these toxins is that they tend to off-gas for the life of the building, often creating a dangerous interior environment. If the quality of air is sufficiently contaminated and if the building’s ventilation is ineffective this can result in what is known as Sick Building Syndrome (SBS). SBS has been documented repeatedly to be

responsible for billions of dollars of lost productivity due to illness and subsequent absenteeism. Fortunately project teams can easily avoid using toxic finishes and materials, all with no additional cost.

LEED Indoor Environmental Quality Credit 4.1, Low-Emitting Materials: Adhesives & Sealants (1 Point)

All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following reference standards:

Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168. Volatile organic compound (VOC) limits are listed in the table found at the website listed below and correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

South Coast Rule #1168 October 3, 2003 Amendment by the South Coast Air Quality Management District (of California)

Green Seal Standard 36 (GS-36), Effective October 19, 2000 www.greenseal.org

Note: The use of a VOC budget is permissible for compliance with this credit.

Status: Yes LEED Submittal Phase: Construction

The design team will include these requirements into the specifications. There are plenty of manufacturers who make fully compliant products at comparable cost to non-compliant products. There should be no additional effort required other than careful submittal review for compliance and additional education during any pre-bid conferences for subs. Factoria RTS is expected to earn this credit point.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 4.2, Low-Emitting Materials: Paints & Coatings (1 Point)

Paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the following criteria:

Architectural paints and coatings applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, and May 20, 1993.

Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed the VOC content limit of 250 (grams per liter) g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

Clear wood finishes, floor coatings, stains, primers, and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

Note: The use of a VOC budget is permissible for compliance with this credit.

Status: Yes LEED Submittal Phase: Construction

The design team includes these requirements into their normal specification. Multiple manufacturers make fully compliant products at the same cost. Factoria RTS should earn this credit point.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 4.3, Low-Emitting Materials: Flooring (1 Point)

All flooring must comply with the following as applicable to the project scope.

All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.

All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/L.

All of the hard surface flooring must be certified as compliant with the FloorScore standard (current as of the date of this Rating System, or more stringent version) by an independent third-party. Flooring products covered by FloorScore include vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring, wall base, and associated sundries.

An alternative compliance path using FloorScore is acceptable for credit achievement according to the following stipulations. 100% of the non-carpet finished flooring must be FloorScore-certified, and it must comprise, at minimum, at least 25% of the finished floor area. Potential examples of unfinished flooring include floors in mechanical rooms, electrical rooms, and elevator service rooms

AND

Concrete, wood, bamboo, and cork floor finishes such as sealer, stain and finish must meet the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

AND

Tile setting adhesives and grout must meet SCAQMD Rule #1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

OR

All flooring products will meet the testing and product requirements of the California Department of Public Health Standard Practice for The Testing Of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

Status: Yes LEED Submittal Phase: Construction

The Carpet and Rug Institute has been very aggressive in promoting their standards throughout the industry and most mills offer compliant carpet in roll and tiles, all at equivalent cost. Factoria RTS is expected to earn this credit point.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 4.4, Low-Emitting Materials: Composite Wood Products

Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as: particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Materials considered fixtures, furniture, and equipment (FF&E) are not considered base building elements and are not included.

Note: This credit point requires carefully drafted specifications and especially careful scrutiny of contractor submittals to ensure full compliance. Some wood products tout being “eco-friendly” or “environmental”, but for this particular credit what counts is that there is ZERO added urea-formaldehyde. (The word “added” is included in the requirement because all wood naturally contains trace amounts of urea-formaldehyde, as do most living things. But, in the manufacture of plywood and composite particle board products urea-formaldehyde is often added as a preservative to deter mold, mildew and other organisms.)

Status: Yes LEED Submittal Phase: Construction

This can be a tricky credit to track as many wood products may appear to comply but when the product is “dissected” often non-compliant components (for example, a particleboard substrate) does in fact contain urea-formaldehyde. Panel Source International is a central website which offers multiple products that meet this and other sustainable criteria (found at

<http://www.panelsource.net/>). This credit will require some additional submittal review work on behalf of the contractor and design team, more so than the previous IEQ 4 credits 4.1, 4.2, or 4.3. The design team will include specifications that require compliance for this credit and we will pursue it for the Factoria RTS project.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 5, Indoor Chemical and Pollutant Source Control (1 Point)

This LEED credit point promotes proper handling of chemicals and reducing pollutants in interior spaces. The requirements call for full-height partitions in copier rooms to isolate ozone, negative pressure in all chemical mixing rooms (such as janitor closets) and floor grate systems to keep outside surface pollutants from entering the buildings. Chemical storage room, wet janitorial closets, and copier areas are continuously exhausted to the atmosphere, with full-height walls to segregate these spaces from the surrounding office areas.

Here are the LEED specifics:

Employ permanent entryway systems at least ten feet long in the primary direction of travel to capture dirt and particulates from entering the building at all regular entry points directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users.

Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas and copying/printing rooms), exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 0.50 cfm/sq.ft., with no air recirculation.

The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.

In mechanically ventilated buildings, provide regularly occupied areas of the building with new air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air.

Provide containment (a closed container for storage for off-site disposal in a regulatory compliant storage area, preferably outside the building) for appropriate disposal of hazardous liquid wastes in places where water and chemical concentrate mixing occurs.

Note: this credit point is not difficult to achieve but it does require early coordination with the owner, the architect and the mechanical engineer. There may be some slight added first costs to earn this credit.

Status: Yes LEED Submittal Phase: Construction

Factoria RTS projects will likely earn this credit point. The project should include interior and possibly exterior walk off mats within vestibules at the main entries. The required full-height partitions and required ventilation in a few janitorial and chemical storage rooms can easily be provided. Hazardous chemical storage room (if any) will be exhausted with dedicated exhaust fans. Rooms will be fully exhausted and kept under negative pressure relative to the adjacent areas as required by code. The minimum filtration requirement will likely be exceeded as a best management practice. We consider this as a “Yes” credit point.

Cost Impact:

Added costs should be very minor for walk-off mat(s), and isolated chemical mixing areas.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

No operations and maintenance impact.

LEED Indoor Environmental Quality Credit 6.1, Controllability of Systems, Lighting (1 Point)

Part of indoor environmental quality includes providing occupants the ability to adjust their own personal immediate environments. LEED addresses both lighting and thermal comfort in these two credit points.

Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences.

AND

Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences.

Status: Maybe LEED Submittal Phase: Design

Owner representatives assertively expressed they had little interest in providing individual lighting controls on the tipping floor or other warehouse spaces. It was felt that a lack of such controls by individuals working on the floor would disqualify this project from pursuing this credit point. However, previously submitted CIRs indicate this credit may be achievable. The design team will research further and possibly submit a CIR for this credit if necessary.

Cost Impact:

Minimal cost impact, if any.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

Except for staff policies mentioned in the status, none.

LEED Indoor Environmental Quality Credit 6.2, Controllability of Systems, Thermal Comfort (1 Point)

Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. Operable windows can be used in lieu of comfort controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62.1-2007 paragraph 5.1 Natural Ventilation (with errata but without addenda).

AND

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences.

Conditions for thermal comfort are described in ASHRAE Standard 55-2004 (with errata but without addenda) to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control for the purposes of this credit is defined as the provision of control over at least one of these primary factors in the occupant's local environment.

Status: Maybe LEED Submittal Phase: Design

Ultimately, in order to determine whether this project can earn this credit point the design team must submit a Credit Interpretation Request to the GBCI. A previous CIR was submitted which closely matches the condition at Factoria RTS. However, the warehouse described is not open-air as is the Factoria tipping floor, and thus the means to provide thermal comfort controls is significantly restricted.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

None, pending outcome of equipment or strategy.

LEED Indoor Environmental Quality Credit 7.1, Thermal Comfort, Design (1 Point)

The purpose of this credit point is to ensure that the mechanical design has taken into account the weather climate in which the building exists, and what functions the occupants are performing inside the building. This credit requires the mechanical engineer to be able to quantitatively prove the HVAC system will consistently provide interior climates throughout the year that are within a defined parameter of comfort factors, including humidity and temperature.

Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda).

Demonstrate design compliance in accordance with the Section 6.1.1 Documentation.

Status: Maybe LEED Submittal Phase: Design

At this time the project design team needs to model design concepts in relation to Section 5.3 of ASHRAE 55-2004. The ability of Factoria staff occupants to maintain comfort in the tipping floor, performing their specific tasks, will need to be taken into consideration in order to determine whether the project complies, but as the tipping floor is open-air and un-conditioned, there will be no possible way to keep the space conditions within the ASHRAE requirements. Until this review happens the team should continue to consider this credit point a “Maybe”.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

None, pending outcome of equipment or strategy.

LEED Indoor Environmental Quality Credit 7.2, Thermal Comfort, Verification (1 Point)

This credit point will need to be developed by the mechanical engineer and or the commissioning agent, but it should be implemented by the building owner or facility manager. One of the positive aspects to this credit point is that it references a widely used HVAC standard (ASHRAE 55) and that it urges both the owner and the mechanical engineer to design and operate with future accountability in mind, as follows:

Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004 (with errata but without addenda).

Note: Thermal Comfort: Verification is contingent on the successful completion and award of the previous credit -Thermal Comfort: Design.

Status: Maybe LEED Submittal Phase: Design

Earning this credit point is certainly achievable if the County wishes to include it. The commitment to remedy comfort conditions should more than 20% of the occupants respond with complaints must

be taken into account. While the design team can supply an appropriate occupant survey, it cannot implement this credit point; it is up to the client to execute. This credit has no direct design implications in order to comply with the credit point. Thus, until we have final confirmation from the County, this credit point can remain in the “Maybe” column until we can discuss this at a later date.

Cost Impact:

No cost impact.

Schedule Impact:

No schedule impact.

Operation and Maintenance Considerations:

Survey will need to be conducted and adjustments made if indicated by survey response, but other than that there are no ongoing considerations.

LEED Indoor Environmental Quality Credit 8.1, Daylight and Views, Daylight 75% of Spaces (1 Point)

USGBC has completely changed the criteria for this credit point from LEED-NC Version 2009. Please refer to page 77 of the LEED 2009 Reference Guide for these specific and lengthy Credit Requirements (<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220>).

Note: Of all of these calculation methods, the quickest, and perhaps most accurate is to measure the light inside the building in comparison to the amount of incident light outside. The computer Simulation method is expensive and time consuming. The Calculation method is tedious and very time consuming.

Note: It takes a significant amount of glazing properly located in the envelope to provide enough daylight to earn this credit point. To achieve this normally requires narrow floor plates (25' - 30' max, depending on floor-to-ceiling height). This can be impractical in many design scenarios.

Status: Yes **LEED Submittal Phase: Design**

This Credit is a “Yes”. The project team believes that the transfer facility and administrative building should be able to achieve this level of daylighting. The design team will integrate extensive use of translucent wall panels and translucent roof skylights into the design of the Transfer Station, Recycling and HHW structures. The Office and Education Center



Site concept with translucent windows.

will be arranged so that daylight can penetrate interior spaces through generous glazing. Interior partitions will take advantage of high glass for privacy and will use either skylights with light wells and clerestories. Solatube® light conduits can be used for hard to reach interior spaces.

Cost Impact:

Glazing areas typically are more expensive than traditional walls and windows in cost per square foot but will offset artificial lighting costs through automatic lighting controls.

Schedule Impact:

None.

Operation and Maintenance Considerations:

Improved natural lighting will improve the workspace environment as well as safety.

LEED Indoor Environmental Quality Credit 8.2, Daylight and Views, Views for 90% of Spaces (1 Point)

In addition to the benefits of daylight, providing building occupants with a visible connection with the outdoors has been proven to reduce stress, and promote well-being. Making sure enough occupants will have a view (as defined by LEED) will take additional design & coordination time. But for the psychological benefit it can provide building occupants, the time and effort is well worth it.

Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and 7'6" above finish floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria:

- *In plan view, the area is within sight lines drawn from perimeter vision glazing.*
- *In section view, a direct sight line can be drawn from the area to perimeter vision glazing.*

Line of sight may be drawn through interior glazing. For private offices, the entire square footage of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For multi-occupant spaces, the actual square footage with direct line of sight to perimeter vision glazing is counted.

Status: Maybe LEED Submittal Phase: Design

This credit point goes beyond the requirements of the previous credit point. It is considered a "Maybe" because of interpretation of the Transfer Station area which requires solid push walls up to 12' heights. Other strategies will be evaluated for the balance of the wall surface at the qualifying height. The Administration and Staff Areas will be arranged so that proximity to exterior walls will be

close. The design team believes the extensive use of shaded and thermal glass will promote views for staff and visitors as well enhance the architectural quality of the design.

Cost Impact:

Glazing areas typically are more expensive than traditional walls and windows in cost per square foot but will offset artificial lighting costs through automatic lighting controls.

Schedule Impact:

None.

Operation and Maintenance Considerations:

Polycarbonate panels are used in some commercial and office facilities, but are not as durable for the typical abuse in a transfer station facility and are not favored over other more durable materials.

Innovation In Design Category

LEED Innovation in Design Credit 1 (5 Points)

LEED encourages designers to think innovatively. Accordingly, LEED offers up to five credit points for achieving exceptional project sustainability. The feature or action must clearly demonstrate true design and/or construction innovation. Some examples of past credit points awarded to other projects include:

- A green cleaning program
- A composting program at a prison
- Using worms to aerate soil at a secure Department of Defense facility
- Providing a green education program at a green building

Furthermore, project teams can earn points for achieving exemplary performance in most of the regular LEED credit points. For example if a project is able to divert 95% or more of its construction waste from the landfill it can claim an Innovation in Design (ID) credit point. In fact, most ID credit points (statistically, over 90%) are awarded for achieving exemplary performance.

Status: Yes LEED Submittal Phase: Design

At this time the team anticipates achieving 5 Innovation in Design Credits. The following Innovation in Design ideas have been discussed so far to achieve these credits:

ID Credit 1.1, *Exemplary Performance, Construction Waste Management, 95+% Diversion Rate*

ID Credit 1.2, *Green Public and Staff Education Program*

ID Credit 1.3, *Recycled Content 30% or more*

ID Credit 1.4, *Green Cleaning and Integrated Pest Management Program*

ID Credit 1.5, *Salmon Safe Certification*

Innovative credits that follow the LEED exemplary performance approach are generally developed at the end of the project when the LEED calculations for the prescribed credits are completed and the results exceed the available credits. The design team will apply for these innovation credits as applicable.

LEED Innovation in Design Credit 2, LEED Accredited Professional (1 Point)

LEED offers this credit point for including a LEED AP on the project team. Having a LEED AP on their team will make the process smoother and more successful. Plus, the project can easily earn this credit point for their participation.

Status: Yes LEED Submittal Phase: Design

There are several LEED Accredited Professionals on the Factoria RTS design team. This credit is a “yes.”

Cost, Schedule, and Operation and Maintenance Impact:

None.

Regional Priority Category

LEED Regional Priority Credits (4 Points)

USGBC recognizes that different projects will have unique challenges and opportunities that depend on the region in which they are sited. To reward projects that take this into consideration LEED 2009 offers up to six options and four total credit points in this category for projects that have responded to regional conditions based on project location. For example, a project in a very dry environment could be rewarded for earning a specified LEED Water Efficiency Credit point. The Regional Priority Credits available to Factoria RTS based on zip code are:

- SS 3 Brownfield Redevelopment
- SS 4.2 Alt. Transportation: Bicycle Storage and Changing Rooms
- SS 4.4 Alt. Transportation: Parking Capacity
- EA 1: Optimize Energy Performance 48%/44%
- EA 2: On-Site Renewable Energy
- MR 1.1 : Building Reuse

Status: Yes LEED Submittal Phase: Varies depending on credit

During the workshop the project team identified three credits: SS 4.2, SS 4.4, and EA 2 as achievable and therefore (potentially) earning three Regional Priority credit points.

Factoria RTS General LEED Assessment

The Factoria TRS project team has reviewed LEED 2009 to determine the feasibility of meeting each LEED Prerequisite and Credit point. The following summary table and the LEED scorecard in Appendix A reflect the outcome of these discussions. Based on what is known about this project at this time, the Factoria Recycling & Transfer Station appears to be a reasonable candidate to successfully pursue a LEED Gold Certification Rating.

June 2010 Factoria RTS LEED Assessment

LEED Categories	Prerequisites Required	Points Offered*	Factoria RTS "Yes"	Factoria RTS "Maybe"	Factoria RTS "No"
Sustainable Sites	1	26	12	8	6
Water Efficiency	1	10	9	1	0
Energy and Atmosphere	3	35	13	4	18
Materials and Resources	1	14	7	5	2
Indoor Environmental Quality	2	15	10	5	0
Innovation in Design Process	0	6	6	0	0
Regional Priority Credits	0	4	3	0	3
TOTAL	8	110	60	23	29

***NOTES:**

- 110 Points are offered in the LEED system. Of 6 Regional Priority Categories/Credits, only 4 points maximum are offered. All 6 Regional Credits are tracked for the project. Therefore, Factoria RTS "yes", "maybe", and "no" credits will total as 112 points.
- Over 20 credits offer approaches to achieving exemplary performance and possible Innovation in Design Process points. The maximum points offered toward project certification for each project is 6 points.

Appendix B-2: Initial Guidance from the Salmon-Safe Assessment Team regarding The Factoria Recycling and Transfer Station – Site Design Evaluation. July 15, 2010. Salmon-Safe, Inc.

July 16, 2010

Ryan Asman
Engineer
HDR Inc.
500 108th Avenue Northeast
Bellevue, WA 98004-5549

Dear Ryan:

I have attached the report from Salmon-Safe's independent assessment team regarding our concept plan document review and initial site assessment of the Factoria Recycling and Transfer Station.

The Salmon-Safe team identified multiple challenges that diminish the certification potential for this site. As mentioned in the report, the HDR design represents an improvement from existing stormwater conditions at this highly developed site. However, Salmon-Safe certification is intended to recognize projects that go beyond improving degraded conditions to those that result in meaningful protection or restoration of habitat and watershed processes.

The Salmon-Safe team's report does outline a number of measures that could be implemented should HDR and King County decide to pursue Salmon-Safe certification.

We have appreciated the opportunity to work with HDR and King County and provide input regarding this project.

Please feel free to call with any questions.

Sincerely,

Dan Kent
Executive Director



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SALMON-SAFE INC.

Initial Guidance from the Salmon-Safe Assessment Team regarding The Factoria Recycling and Transfer Station

SITE DESIGN EVALUATION

July 15, 2010

SUMMARY

The Salmon-Safe Site Design Evaluation and Assessment Team reviewed concept plan documents for the new Factoria Transfer Station and visited the site on June 10, 2010. The current plan falls short of requisite and pre-requisite benchmarks required for eventual Salmon-Safe certification for a number of reasons detailed in this report.

Given King County's commitment to salmon preservation and the sensitivity of this site to salmon preservation and recovery, the Evaluation Team has provided specific objectives, recommendations and examples of measures that would likely need to be incorporated in the design for serious consideration for Salmon-Safe certification. Accepting these recommendations would go beyond mitigation to more fully protect and improve the site's contribution to salmon habitat in the watershed.

SALMON-SAFE - BACKGROUND

In 2000, Salmon-Safe began an initiative to apply the Salmon-Safe label to urban restoration efforts and land management. Salmon-Safe implemented this initiative with the objective of significantly advancing urban restoration efforts while developing urban aquatic protection guidelines and a citizen education campaign that can be transported throughout the Northwest.

Working closely with independent scientists and a project team from the city of Portland, Salmon-Safe developed a comprehensive urban park system certification framework oriented toward reducing water quality and fish habitat impacts from park operation and management. In 2004, the Portland Park system became the first Salmon-Safe certified park system in the country. In 2005, Salmon-Safe expanded this urban effort to include corporate and university campuses. The urban park standards were revised to apply directly to campus situations. In 2005, Salmon-Safe certified Nike World Headquarters, the first corporate campus to be certified under the program, and has since certified other urban sites in Washington and Oregon.

An interdisciplinary team with expertise in salmon habitat and restoration, integrated pest management (IPM), and stormwater treatment conducts the certification evaluation for Salmon-Safe. The assessment team conducts a comprehensive assessment of the overall management policies and planning related to habitat and water quality protection of the campus. The team also conducts a field review of the campus management practices and habitat conditions to evaluate whether such management is consistent with Salmon-Safe's site-specific standards for avoiding harm to stream ecosystems.

OVERVIEW OF THE PROJECT

HDR, Engineering Inc. (HDR) was awarded a contract from King County for the design of the Factoria Recycling and Transfer Station (FRTS) to replace the existing transfer station. HDR has completed conceptual designs for the proposed project. The new FRTS would involve re-developing 10.7 acres, which includes the existing facility, warehouses, small forested wetlands, and streams. The proposed site includes portions of the headwaters of Sunset and East Creek. A perennial tributary of East Creek flows through a ravine along the east edge of the property and then into a forested wetland in the northeast portion of the property.

The proposed redevelopment would not include the ravine, but would require filling a second forested wetland that occurs in the center of the property. Overall, the proposed project requires a massive amount of earthmoving to establish various grades. Impervious surface will increase from approximately 3 acres to 6 acres - 56 percent of the site. The location of the project, on slopes in the headwaters, increases the potential for stormwater impacts, in terms of changes in water quality and quantity, on downstream salmon-bearing streams where there has been a substantial investment in protecting and restoring habitat. The Eastgate Property, 14.6 acres of developed land adjacent to nearby I-90, may have been a preferred alternative from an environmental perspective, but was not chosen by the county due to its perceived higher value for other commercial re-development purposes.

INITIAL EVALUATION OF FRTS

Assessment Dates

The initial concept review and field assessment of FRTS took place on June 10, 2010.

Salmon-Safe Assessment Team

The interdisciplinary assessment team assigned to the development and operation of the Factoria Recycling and Transfer Station project by Salmon-Safe includes the following individuals:

Peter Bahls: Aquatic Ecologist and Salmon Biologist, Northwest Watershed Institute. Mr. Bahls received an M.S. in Fisheries Science and Aquatic Ecology from Oregon State University, and a B.S. in Environmental Studies-Biology from Middlebury College, Vermont. He worked for six years as the salmon habitat biologist for the Port Gamble S'Klallam Tribe, followed by three years as the principal fish biologist for David Evans and Associates. In 2001 he founded Northwest Watershed Institute, a non-profit organization that provides scientific and technical assistance in watershed assessment and restoration. Mr. Bahls was the scientific lead for the development of Salmon-Safe's park and corporate campus standards and served as team leader for FRTS assessment.

Dr. Richard Horner: Stormwater management expert, University of Washington. Dr. Horner received engineering B.S. and M.S. degrees from the University of Pennsylvania and the Ph.D. in civil and environmental engineering from the University of Washington

in 1978. Following 13 years of college teaching and professional practice, he joined the University of Washington research faculty in 1981. His principal research interests involve analyzing the effects of human activities, especially in urban areas, on freshwater ecosystems and solutions that protect these resources. Dr. Horner founded the Center for Urban Water Resources Management in 1990 to advance applied research and education in these areas. He now splits his time between private practice and the University of Washington, where he is Research Associate Professor of Landscape Architecture and holds adjunct appointments in Civil and Environmental Engineering and the Center for Urban Horticulture.

Carrie Foss: Urban IPM Coordinator, WSU Puyallup. Ms. Foss manages the WSU IPM Certification Program and the Pesticide Safety Education Program in western Washington. Landscape maintenance personnel are trained in plant problem diagnosis, integrated pest management, personal safety and environmental protection through lectures and workshops. Carrie earned a Bachelor of Science degree in botany from the University of Washington and a Master of Science degree in plant pathology from the University of Hawaii. Her background includes plant problem diagnosis, research on beneficial microorganisms and management strategies for turf and ornamental diseases. Carrie has been evaluating IPM practices for Salmon-Safe urban projects, starting with the Portland Parks assessment in 2003.

Peter Bahls and Rich Horner participated in the initial June 10 concept review and site assessment, assisted by staff from Salmon-Safe and Network for Business Innovation & Sustainability (NBIS).

Assessment Process

The HDR staff assembled design concepts and other material that were reviewed by Salmon-Safe assessment team members prior to and during the initial field assessment. The evaluation team met with HDR staff responsible for designing the site and had an opportunity to ask questions and tour the site. At the end of the field review, the evaluation team members, supported by Salmon-Safe staff, met to review Salmon-Safe standards against notes taken during the process. On June 23, 2010 the team and Salmon-Safe staff finalized recommendations based on the initial assessment.

Discussion and Recommendations

In the judgment of the Salmon-Safe team, the project is a marginally suitable candidate for Salmon-Safe certification because of the site's physical limitations for the purpose of the expanded recycling and transfer station.

Challenges for Salmon-Safe certification for this project include:

- 1) A high percent impervious surface for the site that will be difficult to fully treat for water quality and quantity: impervious surface will increase from approximately 3 acres to 6 acres - 56 percent of the site.
- 2) Filling of existing wetlands and most forest on-site.
- 3) Alternative project location that is environmentally preferred but was not chosen.
- 4) Sensitivity of the site due to nearby headwater tributaries of salmon-bearing streams.

- 5) Massive cut and fill earthmoving that may disrupt patterns of groundwater hydrology and associated stream flows, and increase risk of construction-related sediment discharges.
- 6) High truck volume at the site, increasing stormwater pollutant risks
- 7) A relatively small portion of the site available for on-site water quality and quantity treatment.
- 8) A relatively small portion of the site protected as natural area
- 9) Low opportunity for major mitigation measures on adjacent properties
- 10) Lack of in-depth study of projected impacts of the new facility with its structures, impervious surfaces and land regrading.

These constraints greatly increase the risk of water quality and quantity impacts to downstream salmon bearing streams. The challenges of the site and surrounding properties also limit the opportunities for effective and meaningful mitigation without major expense.

We recognize that the HDR design likely represents an improvement from existing stormwater conditions at this highly developed site. However, the Salmon-Safe certification is intended to recognize those projects that go beyond simply improving degraded conditions to those that result in meaningful protection or restoration of habitat and watershed processes.

Moving the project towards Salmon-Safe certification

The Evaluation Team provides the following guidance on the measures that will likely be necessary for eventual Salmon-Safe certification.

- 1) More detailed and comprehensive assessments and mapping
 - Assessment of surface and groundwater drainage patterns and wetlands on the site.
 - Assessment demonstrating conclusively that the proposed project will not impact stream flow and stormwater flows.
 - Thorough assessment of the stream and wetland mitigation opportunities in the watershed (up and downstream).
- 2) Complete treatment of stormwater runoff for water quantity and quality designed to treat up to 95% of the storms. Specific standards that would need to be met are provided in Appendix A, Salmon-Safe Stormwater Standards for Industrial Sites. Potential treatment methods are suggested as follows -
 - Green roof for the entire structure.
 - Special treatment for stormwater drainage from road system used by heavy trucks.
 - Extensive use of rain gardens to infiltrate flows.

- Water storage tanks.
- 3) Significant salmon and wetland restoration on adjacent or nearby properties in the watershed to mitigate for the loss of on-site forest and forested wetlands and potential impacts on water quantity and quality. Possible projects include -
- Wetland and riparian restoration on downstream Fowler property by removal of a portion of the parking lot fill (50 foot or wider strip) running along the edge of East Creek tributary, setback with earthen berm, and replanting.
 - Removal of undersized culvert on East Creek in association with above mentioned project.
 - Permanent protection by conservation easement or deed restriction of forested habitat remaining along the headwaters of East creek that drain into the site.
 - Implement other priority restoration opportunities identified in a watershed restoration assessment conducted by HDR, but with agency and outside review.

CONCLUSION

Salmon-Safe and the Assessment Team appreciate the opportunity to provide this early guidance regarding the potential for certification of the Factoria Recycling and Transfer Station. This site has multiple challenges that diminish its potential to serve as a flagship Salmon-Safe site without very significant effort but we welcome further opportunities to remain engaged in this project should HDR and King County seek to implement the above recommendations.

APPENDIX A.

SALMON-SAFE INC.

Salmon-Safe Stormwater Standards for Industrial Facilities

Requirements

For stormwater quantity control, an industry¹ seeking Salmon-Safe Certification, except as noted², shall engage the necessary expertise to—

- perform a detailed technical assessment and implement stormwater management practices to prevent surface stormwater discharge from the site of $\geq 95\%$ of the average annual runoff volume; or if it can be convincingly demonstrated that meeting the goal on-site is infeasible, compensating for any shortfall by contributing to a surface stormwater runoff retention project in the same watershed; and
- At a minimum, demonstrate the ability to match developed stormwater discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow³.

For stormwater quality control, an industry seeking Salmon-Safe Certification shall engage the necessary expertise to perform a detailed technical assessment and implement stormwater management practices with the goal of reducing potential pollutant mass emissions⁴ by $\geq 95\%$. Credit toward reduction shall be assigned as follows:

- Any area isolated from contact with precipitation or runoff receives 100% credit.
- Any structures having non-contaminating building materials and from which runoff is diverted away from industrial area⁵ or parking lots receives 100% credit.
- For any area from which the runoff is extracted from surface discharge by infiltration, evaporation, and/or harvesting for consumption, the percentage represented by the fraction—

Volume extracted \div 95% of average annual runoff volume from that area

Note: The percentage can exceed 100% if an amount larger than the target volume is extracted.

¹ Defined as an entity required to have an industrial general stormwater permit or an individual stormwater permit under the National Pollutant Discharge Elimination System

² Exceptions are discharge to marine waters; lakes larger than 100 acres; for Washington, any other water body listed by the Washington Department of Ecology as Flow Control-Exempt Waters in Appendix I-E of the Stormwater Management Manual for Western Washington; and for Oregon, the main-stem of the Willamette and Columbia Rivers.

³ Site must demonstrate the ability to comply with Minimum Requirement #7 in the Washington Department of Ecology's Stormwater Management Manual for Western Washington, or equivalent.

⁴ Site area serves as a surrogate for pollutant mass loading, thus accounting for use of the term "potential pollutant mass loading."

⁵ Defined as area hosting industrial activity, materials, wastes, or transport

- For any area from which the runoff is directed to treatment, the percentage represented by the fraction—

(Volume treated ÷ 95 percent of average annual runoff volume from that area) * (Demonstrated average pollutant concentration reduction percentage of pollutants subject to monitoring under the site's permit¹) + (Any runoff volume reduction afforded by the treatment ÷ 95 percent of average annual runoff volume)

Note: The percentage can exceed 100% if an amount larger than the target volume is treated.

Stormwater Quality Control Example

A site is 10 acres in area and is required to monitor for copper, zinc, and oil and grease.

Strategy (note: values in red font can be manipulated to achieve requirement):

- 2.5 acres of industrial area can be isolated from contact with precipitation or runoff.

Credit—(2.5 acres ÷ 10 acres) * (1) = 0.25

- 2 acres of buildings with galvanized or other contaminating surfaces can be coated with inert material and have runoff diverted from industrial area.

Credit—(2 acres ÷ 10 acres) * (1) = 0.20

- 2 acres can have all water harvested and consumed.

Credit—(2 acres ÷ 10 acres) * (1) = 0.20

- 2 acres can direct runoff from ≤ 97 percent of the average annual runoff volume for infiltration and evaporation.

Credit—(2 acres ÷ 10 acres) * (97%) ÷ (95%) = 0.20

- 1.5 acres can direct runoff from ≤ 85 percent of the average annual runoff volume to advanced filtration treatment with average percentage pollutant concentration reduction of 83% but no volume reduction.

Credit—(1.5 acre ÷ 10 acres) * [(85%) ÷ (95%)] * 0.83 = 0.11

Total credit: 0.25 + 0.20 + 0.20 + 0.20 + 0.11 = 0.96 (96%, > 95% minimum requirement)

Note: If the credit is insufficient, any or all of the values in red font can be manipulated to achieve the requirement.

¹ Treatment performance must be demonstrated on the basis of objective, quality controlled data such as provided by the International Stormwater Best Management Practices Database.