

Variation Alternative B-1—Additions & Alterations to Treatment Bldg

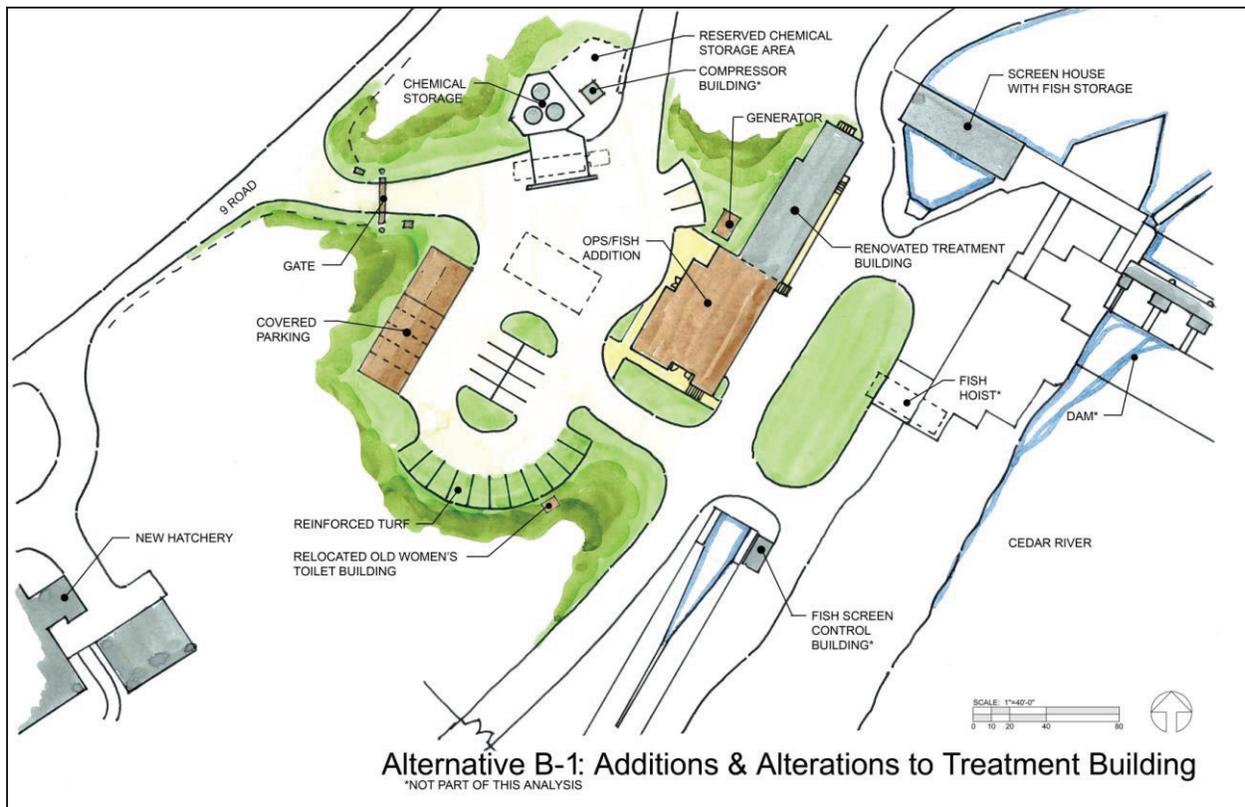


Figure 9-13. Variation - Alternative B-1

The project team explored using part of the screen house under Revised Alternative B for materials storage. Removing the existing screen motor housings and patching the openings in the concrete floor structure would make the majority of the screen house floor area available for alternative use. This modification eliminates the need to construct an enclosed addition to the green garage for storage. It places the fish program storage closer to the dam and it provides additional functionality for the screen house.

This alternative consists of the following:

- Retain chemical storage facility platforms at both entry and treatment building
- Retain screen house—renovate for storage use, use roof for photovoltaic panels
- Relocate and expand green garage to provide covered parking.
- Retain, renovate and expand treatment building
- Fish program and operations located in treatment building addition
- Structured formal parking lot
- Drive to dam located south of treatment building addition.

PARK IMPROVEMENTS

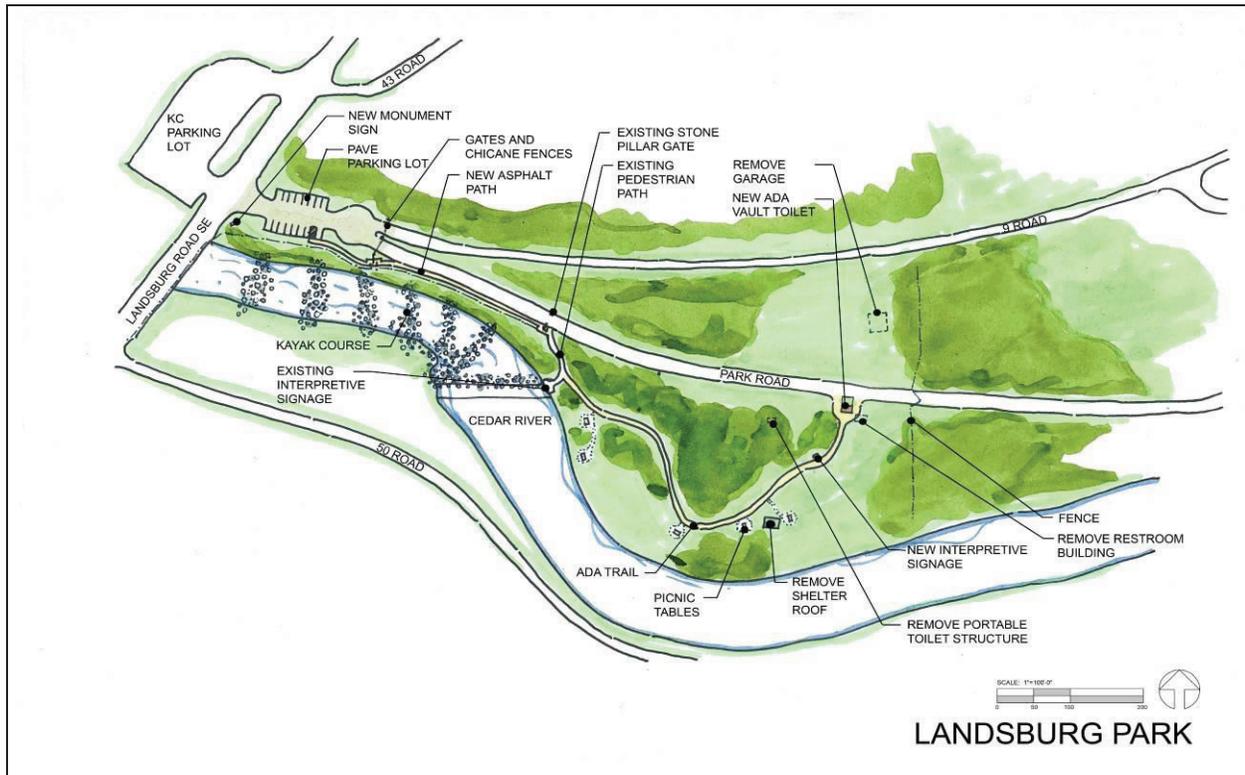


Figure 9-14. Park Improvement Plan

A single site development plan associated with the Park and the Landsburg Road SE/9 Road Gate area was developed. The modest improvements proposed for this part of the site are directly related to the 2008 Master Plan and the direction received by the project team from the steering committee. The plan consists of the following:

- Improved signage for park
- Paving and striping of parking lot, including ADA stalls
- Installation of a paved pedestrian route linking parking, existing environmental exhibits and picnic area
- Habitat restoration as part of remediation for dam/treatment site development.
- New vault toilet restroom facilities
- Removal of park garage, old restroom building, portable toilets and roof of picnic shelter.

LEGAL AND REGULATORY ASSESSMENT OF ALTERNATIVES

The legal and regulatory differences between the revised site development alternatives are minor and should not contribute to a preference for one over the other, as described below.

Building Code

Construction Type

Building types for the improvements would be designated as follows:

- Additions to Green Garage (Alternatives B/B-1): Type II-B
- Additions and Renovations to Treatment Building (Alternatives B/B-1): Type V-B
- New Operations/Fish Facility (Alternatives A/A-1): Type V-B or Type II-B

Occupancy Separations

The following occupancy separation considerations apply to the revised alternatives:

- In Revised Alternative A/A-1, the ops/fish facility requires one hour separation between first floor and second floor
- In Revised Alternative A/A-1, the ops/fish facility requires a one-hour fire separation between the parking area (considered garage—U occupancy) and adjacent areas, as well as a fire sprinkler system.
- In Revised Alternative A/A-1 a two-hour separation without fire sprinkler system in the garage is permitted between floors.
- In Revised Alternative B/B-1, the green garage/carport/storage requires one hour fire separation between carport and other occupancy.

Change in Occupancy Classification

With the decision to change from chlorine gas to liquid sodium hypochlorite, the H-4 High Hazard occupancy designation is changed to F-1 Factory Industrial Moderate Hazard Occupancy. This has significant benefit to the design effort. The requirements for the F-1 occupancy are less onerous, more prescriptive in nature and therefore more predictable.

Fire Protection

The King County fire marshal will likely require any alternative to provide fire sprinkler systems in the new occupied facilities. This was the case for Landsburg's new Cedar River Sockeye Hatchery. While the code does not require the installation of fire sprinklers outright, the fire marshal can make fire protection improvements a condition of the permit. In locations like Landsburg with significant fire department response times, fire protection is increasingly becoming a development requirement. With the availability of the hatchery's river-fed fire pump and fire water service loop, the installation of fire sprinkler systems in the proposed facilities is achievable.

Land Use and Zoning

All revised alternatives require review of historic district restrictions through the King County permit process. All will require critical areas mitigation due to intrusion into the stream buffer zone. The difference in anticipated mitigation expense for the alternatives is insignificant.

Environmental Permits

Table 9-1 indicates the permits expected to be required for either revised alternative.

TABLE 9-1. CRITICAL AREAS/SHORELINE PERMIT SUMMARY FOR REVISED ALTERNATIVES		
Agency	Permit Type	Notes
King County	Shoreline Substantial Development Permit ^a	Permit would authorize upland improvements associated with a redeveloped facility.
King County	Clearing and Grading Permit	Permit would accompany a proposal to modify a critical area buffer.
SPU	SEPA	SPU can act as the lead agency.
Ecology	NPDES	Permit is necessary when more than an acre of ground disturbance is proposed.
WDFW	Hydraulic Project Approval	Permit authorizes in-water work.

a. Assumes that the new SMP regulations will apply.

DEVELOPMENT OF ALTERNATIVES FOR CONCEPTUAL PRICING

Alternative Development Process

After selection of revised alternatives for evaluation, the project team looked at plan elements in greater detail. Each discipline made recommendations for improvements with emphasis on sustainability, minimum environmental impact, durability and service life. Conceptual budgets for evaluation of the alternatives were prepared in coordination with a cost estimator who relied on pricing documents developed by the project team.

Pricing Documents

- Building floor plans, including conceptual electrical and communications plans
- Site development plans, including grading, paving, landscape and above-grade improvements
- Site utility plans, including drainage, power, domestic water, river water and fire water
- Discipline narratives describing systems for architecture, mechanical, electrical, communications/SCADA and civil.

Assumed Systems and Technologies

The project team specified similar technologies and systems for each alternative to be evaluated. For example, if pervious paving is specified in one alternative, it is specified in the other as well. This was done to provide fairness in pricing. Table 9-2 summarizes the materials, systems and technologies used in pricing for all alternatives. Conceptual drawings used for the pricing process are provided at the end of this chapter.

**TABLE 9-2.
MATERIALS, SYSTEMS AND TECHNOLOGIES USED FOR PRICING DEVELOPMENT SITE
PLAN ALTERNATIVES**

Item	Specification
Fences and Gates	
Gates (vehicle gates not included)	Self-closing chain-link gate with card-reader lock (to hatchery and at south entry to dam)
Fencing	Chain-link with barbed wire overhang top typical
Paving Systems	
Park parking lot	Asphalt concrete
Park ADA walk and dam/treatment site	Porous asphalt concrete paving; base designed for truck traffic
Curbing, walks and stairs at dam/treatment site	Concrete
Reinforced turf at selected parking areas	Custom grass mix in geo-textile membrane
Landscaping	
Plants	All native species of trees, shrubs and ground cover; draught tolerant
Irrigation	Limited to rain gardens; non-potable
Signage	
Park and gate	Monument sign, ADA parking sign, restroom signs
Dam/treatment site	Road sign, ADA parking sign, building signs
Sanitary Sewer	
Tank	1500-gallon septic with outlet filter
Pump chamber and pump	1500 gallons, 1-hp effluent pump with 2" outlet
Miscellaneous	Ball and check valve, control panel with timed dosing, 4" connecting pipe, 3" transport line to drain field
Drain field trenches	455 square feet—152 feet of active, 9 feet on center, 12" soil cover
Reserve area	Reserved for future—455 square feet—152 feet of active, 9 feet on center
Surface Water Drainage	
Structures and piping	SPU standards
Infiltration trenches	Roof and footing drain collection
Rain gardens	Native plants in depressed bowl for sheet flow absorption
Domestic Potable Water	
Piping and valves	SPU standards
Domestic Non-Potable Water	
Piping and valves	SPU standards
Fire Water	
Piping and valves	SPU standards
Hydrants	2 AWWA C502

**TABLE 9-2.
MATERIALS, SYSTEMS AND TECHNOLOGIES USED FOR PRICING DEVELOPMENT SITE
PLAN ALTERNATIVES**

Item	Specification
Site Power and Lighting	
Distribution	PVC Schedule-40 underground raceways, with copper feeders and service laterals, and a liquid-filled pad-mount utility service transformer
Photovoltaic system	Mono-crystalline type silicon wafer cells in a common integrated photovoltaic panel with nominal rated DC output of 318 watts per panel at standard test conditions; system size based on estimates for net-zero energy use of joint operations center building, and located on the roof of the existing screen building
Metering	Two metering points are required, one for the site and one for the fish-hatchery wells. Meters for the site will be located in the ops/fish facility with CTs located in the switchboard assembly and remote metering instrumentation; the metering for the wells will be located near the pad-mount transformer serving the site and will be a pedestal-style meter with main disconnecting means
Site lighting	Will use rectilinear shoe-box style luminaires in the parking, drive and entry gate areas. Luminaires will be mounted on poles of 20' height or less. Foundations will be cast-in-place concrete tube-forms with steel reinforcement, and extended above grade to provide physical protection from vehicular traffic damage
Site Communications	
SCADA	All existing field instruments and wiring will remain
Telephone/fiber optic	Approximately 50 feet of underground conduit and cabling from the communications room in the new building will be required to connect to an existing communications junction box; new conduit, fiber optic cable, telephone cable and a new hand-hole will be required to distribute the communications infrastructure between the new hatchery and the new facility
Green Garage Relocation	
Foundation	Conventional 6" concrete slab on grade with thickened edge footing
Building systems	Retain and reinstall
Electrical	A single feeder will be extended between the new switchboard in the joint operations building and the relocated green garage. The service inside the green garage will be improved to replace the overheating building transformer and provide additional electrical capacity for added loads
Green Garage Addition	
Foundation	Conventional 6" concrete slab on grade with thickened edge footing
Building	Conventional unconditioned pre-engineered metal building (match green garage) with hollow metal man-door and manual coiling metal door
Carport	Pre-engineered metal carport with concrete spot footings and steel post supports
Fire protection	Wet—pipe fire sprinklers—Light Hazard. Fire detection/alarm system

**TABLE 9-2.
MATERIALS, SYSTEMS AND TECHNOLOGIES USED FOR PRICING DEVELOPMENT SITE
PLAN ALTERNATIVES**

Item	Specification
Electrical	The service inside the green garage will be improved to provide additional electrical capacity for added loads
Park Restroom Facility (Vault Toilets)	
Vault	Pre-cast concrete with plastic liner and cleanout
Building	Two room pre-fabricated frame structure; two steel doors, standing seam steel roof, steel doors and ADA compliant restroom/fixtures; natural lighting only; hand sanitizer—no water provided
Ops/Fish Facility and Addition to Treatment Building	
Foundation	Conventional reinforced concrete walls and spread footings
Exterior walls	Concrete—using insulated concrete forms; metal siding with rain screen
Window/exterior doors	Operable thermally broken; triple-glazed; day-lighting reflectors
Roof	Energy star standing seam metal roofing over rigid insulation on metal deck/framing
Interior finishes	Porcelain tile floor, gypsum wallboard, wood doors in hollow metal frames, ceramic tile in restroom/showers
Ventilation	Operable skylights and window vents; fan exhaust: <ul style="list-style-type: none"> • 1.5 cubic feet per minute per square foot in lab and bathrooms • 1.0 cubic feet per minute per square foot in locker rooms, in wet areas
Cabinets/counters	Plastic laminate, commercial grade
Hardware	Electronic lock/card-readers for exterior doors; other locks/hardware commercial grade
Furnishings	City of Seattle standard systems furniture
HVAC	Ground-loop (geothermal) heating system including the following: <ul style="list-style-type: none"> • Two 120,000-btu/hour water-to-water heat pumps • Ground loop system • Five vertical wells—300 feet deep • Closed loop • 40 gpm circulated; 2 pumps, 1.5 hp each • Fresh water; no glycol necessary • Expansion tank • Separate hydronic system on load side of heat pumps • Finned tube radiators at perimeter • 20 gpm circulated; 2 pumps, 1 hp each • Expansion tank
Water heating	Hot water generated by a ground loop water-water heat pump; 80-gallon geothermal hot water storage tank with electric booster heat (like water furnace “Geo-Storage-80”); coupled to hydronic geothermal heating system
Fire protection	Wet—pipe fire sprinklers—Light Hazard. Fire detection/alarm system
Potable water system and fixtures	Reduced pressure backflow preventer and 50-gallon hydro-pneumatic tank; potable water piped to all sink faucets, drinking fountains, showers, hose bibs; fixtures all commercial type, auto-flush

**TABLE 9-2.
MATERIALS, SYSTEMS AND TECHNOLOGIES USED FOR PRICING DEVELOPMENT SITE
PLAN ALTERNATIVES**

Item	Specification
Non-potable water system and fixtures	Reduced pressure backflow preventer and 10-gallon hydro-pneumatic tank; non-potable water piped exclusively to provide flushing water at water closets and urinals assuming a 1.5" non-potable water service; includes a separate sampling system with a small pump in the treatment building and piped to a separate tap in the lab, 3/4" pipe
Electrical service metering	Net metering will be used due to application of a grid-tie connected PV system
Lighting fixtures	Interior fixtures will be predominantly fluorescent with semi-direct recessed fixtures in offices and similar areas; some recessed fluorescent down-lighting where appropriate to minimize over-lighting spaces such as circulation hallways; utility spaces to use surface-mounted fluorescent industrial-style fixtures, wrap-around lens fixtures, or lens recess troffers as appropriate for ceiling conditions
Lighting controls	Occupancy sensors for offices and similar spaces and in corridors; daylight dimming controls for perimeter spaces with windows, and for spaces with skylights; daylight controls will automatically reduce lighting energy use when solar contribution is sufficient for visual tasks
Special systems	<ul style="list-style-type: none"> • Fire alarm • Intrusion detection • Access control • CCTV
Data/communications	<ul style="list-style-type: none"> • Telephone equipment and wiring • Network server • Firewall, router, Ethernet switches • Cabling to appropriate desks, workstations, etc. • Patch panels • Network cabling
SCADA	New control panel including: <ul style="list-style-type: none"> • Industrial control enclosure with back panel/swing panel • Panel light • Panel thermostat • Panel heater • Uninterruptible power supply • Ethernet switch • PLC with required input and output modules, chassis and power supplies • Control relays and power supplies • SCADA computer workstations

Alternative Conceptual Pricing Plans

Plans used to develop conceptual construction cost estimates and illustrate project scope are included at the end of this chapter in the following order:

- Landsburg Park
 - Existing (3D)
 - Proposed (3D)
 - Plan
- Dam/Treatment Site
 - Existing (3D)
 - Alternative A (3D)
 - Alternative A-1 (3D)
- Alternatives A & A-1
 - Site Plan
 - Utilities Plan
 - Power & Comm Plan
 - Ops/Fish Bldg Plan
- Dam/Treatment Site
 - Alternative B (3D)
 - Alternative B-1 (3D)
- Alternatives B & B-1
 - Site Plan
 - Utilities Plan
 - Power & Comm Plan
 - Treatment Bldg Addition
 - Storage Facility

CHAPTER 10. SITE DEVELOPMENT ALTERNATIVE PERFORMANCE AND COST EVALUATIONS

SUMMARY DESCRIPTION OF ALTERNATIVES

Subsequent to development of Alternatives A, A-1, B and B-1 and the status quo base case, SPU economists recommended an assessment of an alternative base case that would address the primary deficiencies identified in the Master Plan but not the entire adopted project program. This alternative is designated “Base Case 2” in the evaluations presented in this chapter, and the initial, no-action based case is designated the “Status Quo Base Case.”

Table 10-1 summarizes each alternative presented in Chapter 9 as well as Base Case 2, listing key work elements related to proposed construction, renovation, and demolition.

TABLE 10-1. SUMMARY DESCRIPTION OF ALTERNATIVES					
	Alt A	Alt A-1	Alt B	Alt B-1	Base Case 2
Demolition/Removal					
Removes park garage, old park restrooms, park shelter roof and portable toilet shelter	Y	Y	Y	Y	N
Removes old analyzer building, garden tool shed, fish storage shed, fish trailer and old men’s restroom	Y	Y	Y	Y	N
Removes green garage	N	Y	N	N	N
Removes fish trailer	Y	Y	Y	Y	Y
Removes old generator building	Y	Y	Y	Y	N
Site Development					
Adds ADA access path to Landsburg Park features	Y	Y	Y	Y	N
Paves and stripes parking area at Landsburg Road gate - provides ADA parking, signage	Y	Y	Y	Y	N
Adds fencing to secure dam/treatment site	Y	Y	Y	Y	N
Adds pervious paving for drives and parking at dam/treatment site suitable for chemical delivery truck turning requirements	Y	Y	Y	Y	N
Adds structured delineated parking at dam/treatment site	Y	Y	Y	Y	N
Adds new electrical service and distribution at dam/treatment site	Y	Y	Y	Y	Y
Adds new 8” fire water service line with hydrants and new 3” potable water line from hatchery site	Y	Y	Y	Y	Y
Building Relocations					
Retains green garage	Y	N	Y	Y	Y
Relocates green garage	Y	N	Y	Y	N

**TABLE 10-1.
SUMMARY DESCRIPTION OF ALTERNATIVES**

	Alt A	Alt A-1	Alt B	Alt B-1	Base Case 2
Building Additions					
Adds new covered parking to green garage	N	N	Y	Y	N
Adds new storage structure to green garage	N	N	Y	N	N
Adds new ADA accessible single story high performance Operations/Fish wing to Treatment Building	N	N	Y	Y	N
Adds photovoltaic panels to screen house to provide ~70% of electrical power needs	Y	Y	Y	Y	N
Building Renovations					
Renovates Treatment Building to provide secure SCADA/IT—Server Room	Y	Y	Y	Y	Y
Removes screen enclosures and patches floors in screen house for use as storage area	N	N	N	Y	N
Restores historic Old Women’s Restroom (exterior only)	Y	Y	Y	Y	N
New Buildings					
Constructs new ADA accessible separate high performance Operations/Fish building (Two-story with half-floor parking/storage under)	Y	N	N	N	N
Constructs new ADA accessible separate high performance Operations/Fish building (Two-story with full-floor parking/storage under)	N	Y	N	N	N
Constructs new modular wood frame ops/fish facility (not high performance).	N	N	N	N	Y
Constructs new ADA accessible double vault toilet structure at Landsburg Park	Y	Y	Y	Y	N
Storage Locations					
Locates all storage on lower level of new Operations/Fish Building	N	Y	N	N	N
Locates storage on lower level of new Operations/Fish Building and in relocated green garage	Y	N	N	N	N
Locates all storage in green garage and green garage Addition	N	N	Y	N	N
Locates storage in green garage and in screen house	N	N	N	Y	N
Operations/Fish—Facility Features					
Provides men’s and women’s restrooms, copy room and break/meeting room.	Y	Y	Y	Y	Y
Provides lab, men’s and women’s locker rooms with showers, wet gear mud room and exterior access toilet	Y	Y	Y	Y	N
Provides Fish Program space: Group Office for four, Supervisor Office and Electrical Equipment Storage	Y	Y	Y	Y	Y
Provides Operations space: Supervisor Office and Operator’s Room	Y	Y	Y	Y	Y
Provides mechanical room, janitor closet, electrical room and office storage..	Y	Y	Y	Y	Y
Two-story building places Fish staff and Operators at higher elevation with more commanding view of dam and river	Y	Y	N	N	N
Uses green design features with goal of net zero energy consumption through use of efficient envelope, ground source heat pump loop & solar panels	Y	Y	Y	Y	N
Provides complete fire protection and security system	Y	Y	Y	Y	N

RISK EVALUATION

Tables 10-2 through 10-5 summarize identified risks associated with each alternative, the status quo base case, and Base Case 2, in the following categories:

- **Health, Safety and Welfare**—These risks pertain to the well-being of SPU staff working at the Landsburg facility and those who visit the dam/treatment site, hatchery or Landsburg Park for business, educational, recreational or other purposes.
- **Environmental**—These risks pertain to the well-being of the natural environment. They are also relevant to the City of Seattle’s commitment to the greening of city-owned facilities.
- **Operational and Business Performance**—These are risks related to the business and utilitarian functions at the site, risks associated with project development, and financial risks.
- **Social**—Social risks are associated with the implied social contract between the City of Seattle and the public and between SPU and its customers.

The risk evaluation shows that the greatest risks are associated with the status quo base case, followed by Base Case 2.

TABLE 10-2. ALTERNATIVE RISK MATRIX; CATEGORY 1—HEALTH, SAFETY AND WELFARE				
Risk	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Low staff moral: Facility does not meet sanitation standards: no potable water, one toilet and no showers.	Low risk— Development of Alt A & A-1 should resolve all of these issues	Low risk— Development of Alt B & B-1 should resolve all of these issues.	Significant Risk— The site does not provide facilities on par with other SPU out of town facilities.	Low risk— Resolves potable water and toilet needs.
Complaints or legal action: Treatment Building, Fish Trailer and park are not ADA accessible.	Low risk— Development of Alt A & A-1 should resolve all of these issues.	Low risk— Development of Alt B & B-1 should resolve all of these issues	Significant Risk— SPU does not provide accessible facilities or routes at the dam/treatment site or park.	Significant risk— SPU does not provide accessible facilities or routes at the dam/treatment site or park.
Unsafe conditions for operators: In summer night shift operators often leave the door open for ventilation, putting them at risk for assault by an intruder.	Low risk— Development of Alt A & A-1 should provide for a more secure working environment at all times.	Low risk— Development of Alt B & B-1 should provide for a more secure working environment at all times.	Significant Risk— The current working environment, particularly for the night shift at this remote site, can be a bit frightening for the staff.	Low risk— Modular building should offer better security.
Loss of facilities to fire: Facilities do not have fire sprinklers, have limited fire water available and significant response time from local fire station.	Low risk— Alt A & A-1 would provide fire sprinklers, detection, notification and fire flow expansion from new hatchery fire pump.	Low risk— Alt B & B1 would provide fire sprinklers, detection, notification and fire flow expansion from new hatchery fire pump.	Significant Risk— Site has no fire suppression system. Fire flow to the single hydrant from the water tank is limited. Fire department response time is long.	Moderate risk— Fire water line and capacity increased but no fire sprinklers.

**TABLE 10-3.
ALTERNATIVE RISK MATRIX; CATEGORY 2—ENVIRONMENTAL**

Risk	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Damage to the natural environment: Construction activities or the resulting site development can damage the natural environment.	Low risk –Alt A & A-1 provide protection of the environment throughout construction & provide green solutions for stormwater.	Low risk –Alt B & B-1 provide protection of the environment throughout construction and provide green solutions for stormwater.	NA	Low risk —Base Case 2 provides protection of the environment throughout construction and provides green solutions for stormwater.
Loss of natural areas: Expansion of the dam/ treatment facilities could cause loss of natural areas.	Low risk –Alt A & A-1 provide little loss of natural areas since facilities are planned to occupy areas previously developed. To compensate for this loss the development would restore some areas of Landsburg Park to a natural state.	Low risk –Alt B & B-1 provide little loss of natural areas since facilities are planned to occupy areas previously developed. To compensate for this loss the development would restore some areas of Landsburg Park to a natural state.	NA	Low risk —Base case 2 provides little loss of natural areas since facilities are planned to occupy areas previously developed. To compensate for this loss the development would restore some areas of Landsburg Park to a natural state.
Flood damage: An extreme flood event could cause damage to facilities.	Moderate risk –Alt A & A-1 include a basement level for parking and storage 1 foot below the screen house floor and 3 feet below the Treatment Building floor. Based on discussions with SPU staff charged with the design of a proposed spillway at the site, the basement could take on water during the most extreme flood event if the spillway is not constructed.	Low risk — Development of Alt B & B-1 would place the expansion of the Treatment Building at the current floor elevation. Floodwaters have not historically reached that elevation.	Low risk – Floodwaters have not historically reached the floor elevation of the existing Treatment Building.	Low risk —Ops/fish facility would likely be located above any possible flood event.

TABLE 10-4.
ALTERNATIVE RISK MATRIX; CATEGORY 3—OPERATIONAL AND BUSINESS PERFORMANCE

Risk	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Continued frequent burn-out of electronics and telemetry: Operators share space with electronics. Dust and dirt make their way into that area, resulting in early equipment failure.	Low risk —Alt A & A-1 provide a clean, secure and temperature-controlled server room and pave driveways responsible for summer dust.	Low risk —Alt B & B-1 provide a clean, secure and temperature-controlled server room and pave driveways responsible for summer dust.	Significant Risk —No change in burn-out rate.	Low risk —Base Case 2 would create a secure temperature-controlled server room.
Frequent interruption of Operators: Site’s only conventional restroom facility is in the work area. Work area must function as a meeting room, as there is no conference space.	Low risk —Development of Alt A & A-1 provide separate restroom and meeting facilities.	Low risk —Development of Alt B & B-1 provide separate restroom and meeting facilities.	Significant Risk —No change.	Low risk —Separate restroom and break room are provided.
Work flow inefficiencies: Operator and operations supervisor offices are not co-located. Inappropriate mixing of functions (kitchen-lab). Lack of standard facilities (showers, lockers, break room etc.).	Low risk —Development of Alt A & A-1 should resolve these issues.	Low risk —Development of Alt B & B-1 should resolve these issues.	Significant Risk —No change.	Moderate risk —No shower/locker facilities provided. Location of modular building would not be adjacent to dam/greenhouse, creating inconvenience for operators.
Disruption of operations: Poor circulation layout for chemical delivery trucks. Trucks often must exit through a manual gate on the Park Road. Unstructured parking often requires moving vehicles blocking circulation path.	Low risk —Development of Alt A & A-1 should resolve these issues by providing adequate turning paths and grades as well as structured parking.	Low risk —Development of Alt B & B-1 should resolve these issues by providing adequate turning paths and grades as well as structured parking.	Significant Risk —No change.	Significant risk —No change.

TABLE 10-5.
ALTERNATIVE RISK MATRIX; CATEGORY 4—SOCIAL

Risk	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Poor public image for SPU due to the following: <ul style="list-style-type: none"> • No ADA access at site and park • No permanent toilet facilities at park. • Failure to maintain and preserve historic buildings 	Low risk —Development of Alt A & A-1 should eliminate these issues.	Low risk —Development of Alt B & B-1 should eliminate these issues.	Significant Risk —No change.	Significant risk —No change.

EVALUATION OF OPERATIONAL AND BUSINESS PERFORMANCE

The differences between Alternatives A, A-1, B and B-1 as they relate to facility operations and business performance are minimal. All alternatives would satisfy the program requirements identified in Chapter 2, but site organizational structure and location of functions would vary. With Base Case 2, some of the program requirements would be satisfied, but significant operational issues would remain. Deficiencies in operational and business performance of the status quo base case are documented in Chapter 2. SPU staff and management will need to assess possible impacts of the proposed alternatives on the way they conduct their business.

Storage and Parking Locations

The greatest variable among the four main alternatives is the location and arrangement of storage facilities and covered parking. Evaluation of the alternatives for operational effectiveness is best left to the on-site SPU staff who fully understand the functional implications of possible changes. Tetra Tech explored the possibility of accommodating part of the storage needs in the existing screen house. This could be accomplished at minimal expense with the removal of the existing screen motor housings and the infill of openings in the concrete deck. According to Paul Faulds, SPU Senior Environmental Analyst for the Landsburg fish program, the screen house would be an ideal location for the equipment frequently needed for work activities at the river. Use of the screen house for storage would work well with any alternative and would require less new construction at the site. This option is specifically included in Alt B-1. Under the Status Quo Base Case and Base Case 2, no changes to the existing storage facilities are proposed and no covered parking is provided. Table 10-6 summarizes covered parking and storage facilities included in each alternative.

TABLE 10-6. STORAGE AND COVERED PARKING		
	Storage	Covered Parking
Alt A	Storage is provided in the green garage (Operations) and under the ops/fish facility (Operations & Fish). Green garage is relocated southeast of the new ops/fish facility.	Parking is located under the new ops/fish facility at the Park Road level.
Alt A-1	Storage is provided in the relocated green garage (Operations) and under the ops/fish facility (Operations & Fish).	Parking is located under the new ops/fish facility at the Park Road level.
Alt B	All storage is provided in the relocated and expanded green garage. Location is south of the fluoride facility and about 150feet from the ops/fish facility entrance.	Parking is provided in an addition to the relocated green garage. Location is south of the fluoride facility and about 150feet from the ops/fish facility entrance.
Alt B-1	Storage is provided in the relocated green garage and in the screen house facility. The green garage is south of the fluoride facility and about 150feet from the ops/fish facility entrance. Screen house is adjacent to the dam.	Parking is provided in an addition to the relocated green garage. Location is south of the fluoride facility and about 150feet from the ops/fish facility entrance.
Base Case 2	No changes to existing storage are proposed. Par k garage, green garage, fish storage and garden tool shed are retained.	No covered parking is provided.
Status Quo Base Case	No changes to existing storage are proposed. Par k garage, green garage, fish storage and garden tool shed are retained.	No covered parking is provided.

Locations of Support and Office Spaces

Spaces for support and office functions are of similar size and similar construction for Alternatives A, A-1, B and B-1. Operations and Fish Program support and office spaces are consolidated into a single facility in each alternative. All four alternatives locate the office and support facilities as close to the dam as possible. They also improve the location of the existing fish program offices and provide program amenities that will improve program performance. The most notable differences among the alternatives are the locations of these facilities and their finish floor elevations. Alternatives A and A-1 have two stories, providing a better view of the river and dam, but requiring more stair-climbing during the work day. Alternatives B and B-1 have finish floor elevations matching that of the existing Treatment Building.

Base Case 2 places the operators farther from the dam and Treatment Building in an area where the Fish Trailer currently resides, and it does not provide locker and shower facilities.

ENVIRONMENTAL AND SOCIAL EVALUATION

The environmental and social differences between Alternatives A, A-1, B and B-1 are minor and are best measured against the status quo base case alternative. The proposed alternatives are all environmentally responsible, strive for minimum impact on the natural environment and increase sustainability of the developed site. Goals set for these alternatives include net-zero energy consumption for the new office and support facilities, high performance construction with a minimum achieved rating of LEED Gold, and restoration of previously disturbed natural areas. Base Case 2 provides a code-compliant approach with no ambition for a net-zero or high-performance ops/fish facility.

Environmental

All alternatives are fairly compact and entail minimum disturbance of previously undeveloped portions of the site. Alternatives A and A-1 entail less intrusion into the natural/undisturbed land area, but they result in greater changes to existing site grades. All alternatives rely on porous paving and rain garden to achieve water quality objectives for surface water. Because office and support areas are planned to be located near the river, some remediation of previously developed areas will be required for all alternatives. Conceptual plans call for remediation to be achieved at Landsburg Park.

Social

The Landsburg site is a unique point of interface between the general public and SPU. With an active public park, the new Cedar River Sockeye Hatchery and numerous visitors during the autumn fish run, the Landsburg site provides an opportunity to showcase SPU's stewardship of the watershed, its support of the sockeye sports fishery and its high-quality drinking water. The dual aspects of utilitarian workplace and educational/recreational site distinguish Landsburg from other SPU facilities. Because Landsburg is listed on the National Register of Historic Places, SPU's stewardship must include historic preservation.

Alternatives A, A-1, B and B-1 are all the same in their responses to these circumstances. All would satisfy the program requirements established in Chapter 2. Park improvements are modest and include improvements for parking, ADA accessibility, more permanent restroom facilities and removal of non-functional facilities. The alternatives make significant improvements at the dam/treatment site. Each will provide a modern, organized and professional facility that will showcase SPU's commitment to sustainability and green design. Additionally, they call for the retention of the historic screen house and the restoration and relocation of at least one of the historic restroom buildings at the site.

Base Case 2 does not resolve all program requirements listed in Chapter 2. It includes no improvements to the park, no improvements to site circulation or parking and no restoration of historic structures.

COMPARISON AND EVALUATION OF ALTERNATIVES

Evaluation Criteria

Tetra Tech worked with SPU to establish criteria for evaluating the alternatives. Sources for criteria includes objectives identified in the Master Plan, specific direction from executives, direction from the steering committee, updated program requirements and issues established through workshops and interviews with user groups. The identified criteria are as follows:

- Environment and Health:
 - Minimize short- and long-term impact on the natural environment at the site.
 - Minimize impermeable surface area and manage surface water in an environmentally sensitive manner.
 - Apply green design building principals and seek to achieve a net zero energy footprint.
 - Provide accessibility for disabled individuals and meet ADA standards at Landsburg Park and staff facilities.
 - Provide potable drinking water and protect staff facilities with a fire sprinkler system.
- Functionality:
 - Eliminate non-functional facilities and consolidate staff and storage facilities at the site.
 - Provide adequate security for employees and facilities.
 - Locate storage facilities for efficiency of operations.
 - Locate staff offices as close as possible to out of office work areas,
 - Resolve site circulation issues related to chemical delivery, pedestrian and vehicle circulation and parking.
 - Meet emergency response requirements.
 - Provide flexibility for future expansion.
- Constructability and Practicality:
 - Minimize disruption of business functions during the construction process and allow continuous operation of diversion operations.
 - Be relatively uncomplicated and straightforward to construct.
 - Make use of existing structures to minimize construction.
 - Provide for a direct, practical and uncomplicated construction sequence.
- Social:
 - Result in a facility that reflects well on SPU and the City of Seattle.
 - Respect the historic characteristics of the site.
 - Be compatible with visitor activity during the salmon run season.
 - Address concerns regarding cultural resources and social equity.

Tables 10-7 through 10-10 describe how each alternative meets each of the identified criteria.

**TABLE 10-7.
EVALUATION CRITERIA COMPARISON OF ALTERNATIVES;
CATEGORY 1—ENVIRONMENT AND HEALTH**

Criterion	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Minimize short and long-term impacts on natural/undeveloped areas of the site	Development is concentrated at dam/treatment site. Green garage relocation, drive & parking impact natural areas to the west. Alt A has less impact on natural areas than Alt B. Alt A-1 with no green garage has the least impact. Impacts are generally short-term.	Development is concentrated at dam/treatment site. Green garage relocation, drive and parking impact natural areas to the west. Both A Alts have less impact than B Alts. Alt B-1 has less impact than Alt B. Impacts are generally short-term.	No new impact on natural/ undeveloped parts of the site.	Development is concentrated in the area currently occupied by the Fish trailer; modest short- and long-term site impact.
Minimize quantity of impermeable surface and stormwater runoff	Less impermeable surface than B Alts due to two-story ops/fish facility. Alt A-1 has the least amount of impermeable surface.	More impermeable surfaces than the A Alts. Alt B-1 has somewhat less than Alt B.	Makes use of graveled areas for driveways and parking. (King County considers impermeable.)	Makes use of graveled areas for driveways and parking. (King County considers impermeable.)
Maximize energy efficiency and green design principals	High performance building using solar energy and ground source heat for HVAC. River water is used for toilet flushing. Pervious paving and rain garden reduces runoff.	High performance building using solar energy and ground source heat for HVAC. River water is used for toilet flushing. Pervious paving and rain garden reduces runoff.	Facilities have antiquated thermal envelopes, HVAC and lighting, not in line with green design principals.	Meets code and LEED requirements but will not provide for a high-performance building.
Provide appropriate ADA access for employees and visitors to site features	Provides accessible parking, accessible route, office and restroom facilities. Organized spaces for visitor and overflow parking are provided.	Provides accessible parking, accessible route, office and restroom facilities. Organized spaces for visitor and overflow parking are provided.	Provide an accessible parking stall at the dam. Existing Treatment Building does not provide accessibility.	Retains ADA parking stall at the dam, and the new modular ops/fish facility will be ADA accessible.
Provide potable water, permanent sanitary and shower facilities	Provides all of these.	Provides all of these.	Provides none of these.	Provides potable water but no shower facilities or permanent Park toilets.

**TABLE 10-8.
EVALUATION CRITERIA COMPARISON OF ALTERNATIVES;
CATEGORY 2—FUNCTIONALITY**

Criterion	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Provide facility consolidation & elimination of non-functional facilities	Meets this goal	Meets this goal	Provides none of these.	Consolidates operations and fish office facilities but does not consolidate storage.
Provide the appropriate level of security for employees and facilities	Meets this goal	Meets this goal	Does not provide adequate security for operators during night shifts & warm weather when door is open.	Provides increased security but does not complete fences and gates for the dam/treatment site.
Locate storage facilities appropriately to support work activities	Alt A storage in green garage & ops/fish; Alt A-1 storage only in ops/fish facility.	Alt B storage in green garage and its addition. Alt B-1 in green garage and screen house.	Does not consolidate storage.	Does not consolidate storage.
Provide office and support facilities in appropriate locations to support site activities	Meets this goal	Meets this goal	Meets this goal	Location for operators is farther from work zone.
Vehicular/pedestrian circulation for delivery & parking supports site activities & events	Circulation is good for delivery and truck turn-around. Separation of Treatment Building from new Operations/Fish Building allows retention of pedestrian access to the dam area.	Circulation is good for delivery and truck turn-around. The addition to the Treatment Building results in a pedestrian connection to upper part of site that is farther south than Alt A or Base Case.	Severe circulation problems. Trucks often have to exit through Park Road manual gate.	Severe circulation problems. Trucks often have to exit through Park Road manual gate.
Meet emergency response requirements	Provides organized parking and leaves dam area clear for truck access and better in-out circulation.	Provides organized parking and leaves dam area clear for truck access and better in-out circulation.	Provides mostly ad-hoc parking.	Provides mostly ad-hoc parking.
Provide flexibility for future expansion	Permits expansion of ops/fish facility to the southwest along the river with realignment of driveway. Additional area available for new functions near proposed green garage site. More space available in Alt A-1, which does not include the green garage.	Permits expansion of ops/fish addition to the southwest along the river with realignment of driveway. Less expansion area uphill than in A Alts.	Yes.	Yes.

**TABLE 10-9.
EVALUATION CRITERIA COMPARISON OF ALTERNATIVES;
CATEGORY 3—CONSTRUCTABILITY**

Criterion	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Provide minimum disruption to operations during implementation/construction	Separation of the Operations/Fish Building from the Treatment Building should result in fewer disruptions during construction if properly phased.	The addition to the Treatment Building results in more work immediately adjacent to operators, which may be more disruptive during construction but could be minimized through proper phasing.	No disruption.	Separation of the Operations/Fish Building from the Treatment Building should result in fewer disruptions during the construction process if properly phased.
Provide uncomplicated, relatively straightforward construction	With a free-standing new structure, the A Alts should be the easier to build, but require more excavation and site work.	As a renovation/addition, the B Alts are slightly more complicated to construct.	Not applicable	Uncomplicated and easy to construct.
Minimize construction by making use of existing structures	Alt A reuses green garage and Treatment Building. Alt A-1 reuses only the Treatment Building.	Alt B reuses green garage and Treatment Building. Alt B-1 does the same and reuses the screen house for storage.	Yes.	Yes.
Allow for efficient schedule and sequence of work	Sequences of work in A Alts and B Alts are likely similar.	Sequences of work in A Alts and B Alts are likely similar.	Not applicable.	Sequence of work is similar to the alternatives without site improvements and pacing.

**TABLE 10-10.
EVALUATION CRITERIA COMPARISON OF ALTERNATIVES;
CATEGORY 4—SOCIAL**

Criterion	Alternatives A & A-1	Alternatives B & B-1	Status Quo Base Case	Base Case 2
Provide the appropriate public face for SPU	Cleans up the site, creating an orderly and professional work environment and ADA accessibility. Provides appropriate facilities at Landsburg Park.	Cleans up the site, creating an orderly and professional work environment and ADA accessibility. Provides appropriate facilities at Landsburg Park.	Dam/treatment site has a ramshackle appearance. Non-functional and deteriorating structures remain. No ADA access at park or dam /treatment site.	Ramshackle appearance. Non-functional and deteriorating structures remain. No ADA access at park.
Respond to the historic characteristics of the site	Retains screen house and rehabilitates and retains one of the historic restrooms.	Retains screen house and rehabilitates and retains one of the historic restrooms.	Renovation and maintenance of the existing historic restrooms was included in the 2007 Master Plan but no work has been accomplished to date.	No renovations of historic structures included.
Provide compatibility with visitor activity during salmon run and tour events	Provides permanent restroom facilities at the park for visitors and good access at the dam/treatment site for van or bus visitor drop off and accessible circulation to fish program activities at the river.	Provides permanent restroom facilities at the park for visitors and good access at the dam/treatment site for van or bus visitor drop off and accessible circulation to fish program activities at the river.	Does not provide permanent restroom facilities at the park.	Does not provide permanent restroom facilities at the park.
Address cultural resources and social equity concerns (including tribal concerns)	Preserves and restores two historic toilet buildings and retains the historic screen house.	Preserves and restores one of two existing historic toilet buildings and retains the historic screen house.	Preserves but does not restore historic resources.	Preserves but does not restore historic resources.

Alternative Evaluation Matrix

Tetra Tech developed a scoring matrix to compare the ability of alternatives to satisfy the identified evaluation criteria. The matrix allows for scoring of alternatives for each criterion, weighting by individual criteria and by category, and ranking of the alternatives, as follows:

- Each alternative was given a score of 1 to 5 for each criterion, with 1 representing alternatives that least meet the criterion and 5 representing those that best meet the criterion.
- Weighting factors between 1 and 3 were assigned to all the criteria within a single category, with the factors adding to a total of 10. Higher weighting factors are giving to criteria considered to be more important.
- The weighting factor was applied to the score for each criterion, providing a total criteria-based score for each category.

- Weighting factors were assigned to each category to indicate relative importance of the categories. A factor of 3.5 was assigned for the functionality and constructability categories, and a factor of 1.5 was assigned for the environment/health and social categories.
- The criteria-based total for each category was multiplied by the weighting factor for that category to give a category-weighted total.
- Category-weighted totals for all four categories were summed to give a total weighted score.
- Ranks were assigned based on total weighted scores, with the highest score ranked 1 and the lowest score ranked 5.

The evaluation scoring was done by SPU staff with specific interest in the Landsburg facilities. Table 10-11 summarizes the results. Base Case 2 is not included in this table because the scoring process was conducted before Base Case 2 had been identified and developed.

TABLE 10-11. ALTERNATIVE EVALUATION CRITERIA SCORING MATRIX											
Criteria	Weight	Alternative A		Alternative A-1		Alternative B		Alternative B-1		Status Quo Base Case	
		Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted
Environment/Health											
Minimize short and long-term impacts on natural, undeveloped areas of the site	2.50	3.00	7.50	4.00	10.00	3.00	7.50	4.00	10.00	3.00	7.50
Minimize quantity of impermeable surface and stormwater runoff	2.50	3.00	7.50	4.00	10.00	3.00	7.50	4.00	10.00	2.00	5.00
Maximize energy efficiency and green design principals	1.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00
Provide appropriate ADA access for employees and visitors to site features	1.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00
Provide potable water, permanent sanitary and shower facilities	3.00	5.00	15.00	5.00	15.00	5.00	15.00	5.00	15.00	1.00	3.00
Total Criteria Score	10.00		40.00		45.00		40.00		45.00		17.50
Category-Weighted Total	1.5		60		68		60		68		26
Functionality											
Provide facility consolidation & elimination of non-functional facilities	1.25	4.00	5.00	4.50	5.63	4.50	5.63	5.00	6.25	1.00	1.25
Provide the appropriate level of security for employees and facilities	2.00	5.00	10.00	5.00	10.00	3.00	6.00	3.00	6.00	3.00	6.00
Locate storage facilities appropriately to support work activities	1.50	4.00	6.00	4.00	6.00	4.50	6.75	5.00	7.50	2.00	3.00
Provide office and support facilities in appropriate locations to support site activities	1.00	4.50	4.50	4.00	4.00	5.00	5.00	5.00	5.00	2.00	2.00

**TABLE 10-11.
ALTERNATIVE EVALUATION CRITERIA SCORING MATRIX**

Criteria	Weight	Alternative A		Alternative A-1		Alternative B		Alternative B-1		Status Quo Base Case	
		Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted
Vehicular/ pedestrian circulation for delivery & parking supports site activities & events	1.25	4.50	5.63	4.50	5.63	5.00	6.25	4.50	5.63	1.50	1.88
Meet emergency response requirements	2.00	4.50	9.00	4.50	9.00	5.00	10.00	4.50	9.00	1.50	3.00
Provide flexibility for future expansion	1.00	4.00	4.00	4.00	4.00	5.00	5.00	4.50	4.50	1.50	1.50
Total Criteria Score	10.00		44.13		44.25		44.63		43.88		18.63
Category-Weighted Total	3.5		154		155		156		154		65
Constructability											
Provide minimum disruption to operations during implementation/ construction	2.60	3.50	9.10	4.00	10.40	3.50	9.10	4.00	10.40	5.00	13.00
Provide uncomplicated, relatively straightforward construction	2.50	3.50	8.75	3.50	8.75	4.00	10.00	4.00	10.00	5.00	12.50
Minimize construction by making use of existing structures	2.50	3.00	7.50	3.00	7.50	3.00	7.50	4.50	11.25	5.00	12.50
Allow for efficient schedule and sequence of work	2.40	4.00	9.60	4.00	9.60	4.00	9.60	4.00	9.60	5.00	12.00
Total Criteria Score	10.00		34.95		36.25		36.20		41.25		50.00
Category-Weighted Total	3.5		122.33		126.88		126.70		144.38		175.00
Social											
Provide the appropriate public face for SPU	2.70	4.00	10.80	3.50	9.45	3.00	8.10	3.00	8.10	2.00	5.40
Respond to the historic characteristics of the site	2.70	3.00	8.10	4.00	10.80	2.50	6.75	3.00	8.10	5.00	13.50
Provide compatibility with visitor activity during salmon run and tour events	2.30	5.00	11.50	5.00	11.50	5.00	11.50	5.00	11.50	2.00	4.60
Address cultural resources and social equity concerns (including tribal concerns)	2.30	4.00	9.20	4.00	9.20	4.00	9.20	4.00	9.20	2.00	4.60
Total Criteria Score	10.00		39.60		40.95		35.55		36.90		28.10
Category-Weighted Total	1.5		59		61		53		55		42
Total Weighted Score			396		411		396		421		309
Alternative Ranking			3		2		3		1		5

Insights From Conversations with Scorers

Discussions with scorers revealed that there were aspects of each alternative that appealed to participants. These are noted here with the understanding that in developing final plans it may be appropriate for some kind of hybrid solution to be developed.

- Operations staff supported the two-story development included in Alternatives A and A-1 for its improved views of the dam and the site.
- Operations staff supported the centralized separate storage and parking complex included in Alternative B.
- Fish Program staff supported the storage concept included in Alternative B-1 with their tools and supplies located in the existing screen house and near their work areas along the river.
- Scorers noted that Alternatives A and A-1, which develop new space in a physically separate facility rather than as an addition, may be less disruptive to operations during construction.

FINANCIAL EVALUATIONS OF ALTERNATIVES

Construction Cost Estimates

Tetra Tech developed budget-level construction cost estimates for Alternatives A, A-1, B, B-1, and Base Case 2. Each professional discipline provided pricing documents to the team's cost estimator, consisting of written narratives and drawings. All construction costs were estimated in 2010 dollars using the following assumptions:

- It was assumed that the work would be completed by private contractors rather than by SPU staff.
- Pricing was based on 2010 construction costs for the Puget Sound region.
- A contingency of 20 percent was added to reflect the conceptual level of design.
- It was assumed that competitive bids for all trades would be received and that the contractor would be required to pay prevailing wages.
- No escalation allowance was included.
- Estimated costs do not include soft costs such as design fees, surveys, temporary facilities, agency permits and review fees, SPU internal management costs, geotechnical investigations, field testing, taxes on construction costs and the like.
- The estimate made use of the Construction Specifications Institute's Master Format.

Detailed cost information and copies of the cost estimates are provided in the appendix. Table 10-12 summarizes the results.

40-Year Operation and Maintenance Life-Cycle Cost Estimates

Tetra Tech developed 40-year operation and maintenance (O&M) life-cycle cost estimates for Alternatives A, A-1, B, B-1, Base Case 2 and the Status Quo Base Case. All costs were estimated in 2010 dollars. The estimates include three categories of expense: maintenance, capital maintenance and utilities. SPU defines capital maintenance as any single maintenance expense exceeding \$5,000 in any given year.

**TABLE 10-12.
CONSTRUCTION COST SUMMARY**

	Estimated Construction Cost ^a				
	Alt A	Alt A-1	Alt B	Alt B-1	Base Case 2
Demolition	\$95,000	\$95,000	\$95,000	\$95,000	-0-
Site Improvements and Utilities	\$1,325,000	\$1,325,000	\$1,377,000	\$1,377,000	\$249,000
Park & Parking Lot Improvements	\$287,000	\$287,000	\$286,000	\$286,000	-0-
Improvements to Treatment Building	\$123,000	\$123,000	\$281,000	\$281,000	\$165,000
Fish/Control Building	\$2,049,000	\$2,049,000	\$1,733,000	\$1,733,000	\$865,000
Green Garage Relocation & Improvements	\$82,000	\$207,000	\$285,000	\$217,000	-0-
Renovate/relocate Old Restroom Building	\$45,000	\$45,000	\$45,000	\$45,000	-0-
PV System on Screen House	\$178,000	\$178,000	\$178,000	\$178,000	-0-
Total	\$4,184,000	\$4,309,000	\$4,280,000	\$4,212,000	\$1,279,000

a. Excludes soft costs (permits, taxes, design fees etc.), SPU internal costs and renovation of screen house exterior. Includes removal of screen motor housings and floor patching for screen house in Alt B-1. Includes 20% estimating contingency. All estimates in 2010 dollars.

To estimate maintenance and capital maintenance costs for existing facilities, Tetra Tech used O&M data from the 2008 Master Plan, adjusted to 2010 dollars. Maintenance and capital maintenance associated with the development alternatives were produced using software designed by Whitestone Research. The software uses the Unifomat system, which organizes building information according to building systems. Future electrical utility costs associated with existing facilities are based on billing records provided by Puget Sound Energy. Electrical utility costs for new construction are based on a conceptual energy modeling study conducted by Tetra Tech. Detailed year by year estimates are included in the report appendix. Table 10-13 summarizes the results.

**TABLE 10-13.
40-YEAR MAINTENANCE AND OPERATION COST SUMMARY**

	Estimated Total 40 Year Maintenance & Operations Cost ^a					
	Alt A	Alt A-1	Alt B	Alt B-1	Status Quo Base Case	Base Case 2
Maintenance	\$1,699,185	\$1,607,465	\$1,838,301	\$1,807,812	\$1,058,586	\$1,792,990
Capital Maintenance	\$1,322,057	\$1,304,631	\$1,321,607	\$1,321,607	\$255,497	\$255,497
Utility Costs	\$44,688	\$44,688	\$44,688	\$44,688	\$14,000	\$20,000
Total	\$3,065,930	\$2,956,784	\$3,204,596	\$3,174,107	\$1,328,083	\$2,224,687

a. Excludes all soft costs (permits, taxes, fees and internal procurement or management costs. Assumes all work by private vendors. Includes estimated electrical utility costs only. Communications utility costs are excluded. All estimates in 2010 dollars.

PROJECT TEAM REVIEW

At an internal workshop to evaluate the proposed alternatives, the Tetra Tech project team identified two of the four original alternatives as preferred: Alternatives A-1 and B-1. The team concluded that the most appropriate alternative may not be entirely represented by either scheme. The two preferred alternatives are summarized below.

Alternative A-1

Alternative A-1 most closely meets the goals of the Master Plan, particularly in its ability to consolidate facilities. Its key advantages are as follows:

- Minimum site disturbance and minimum developed site area (least site development and minimum amount of paved surfaces).
- Two-story scheme provides good visibility of dam site from Operations area (same as Alternative A).
- Consolidation of office and storage functions in a single facility (most consolidated scheme).
- Places storage for Fish Program close to work area at the river. (same as Alternative A).

Figure 10-1 shows key elements of this alternative.



Figure 10-1. Alternative A-1

Alternative B-1

The team determined that Alternative B-1 made the best use of existing serviceable facilities, particularly in using the existing screen house to meet some of the facility's storage needs. Its key advantages are as follows:

- Makes use of the existing screen house for storage, resulting in decreased site development and creating additional purpose for the historic screen house.
- Places storage for Fish Program close to the work area at the river.
- Provides a covered area away from the Operations area where dirty or noisy work can take place (same as Alternative B).

Figure 10-2 shows key elements of this alternative.

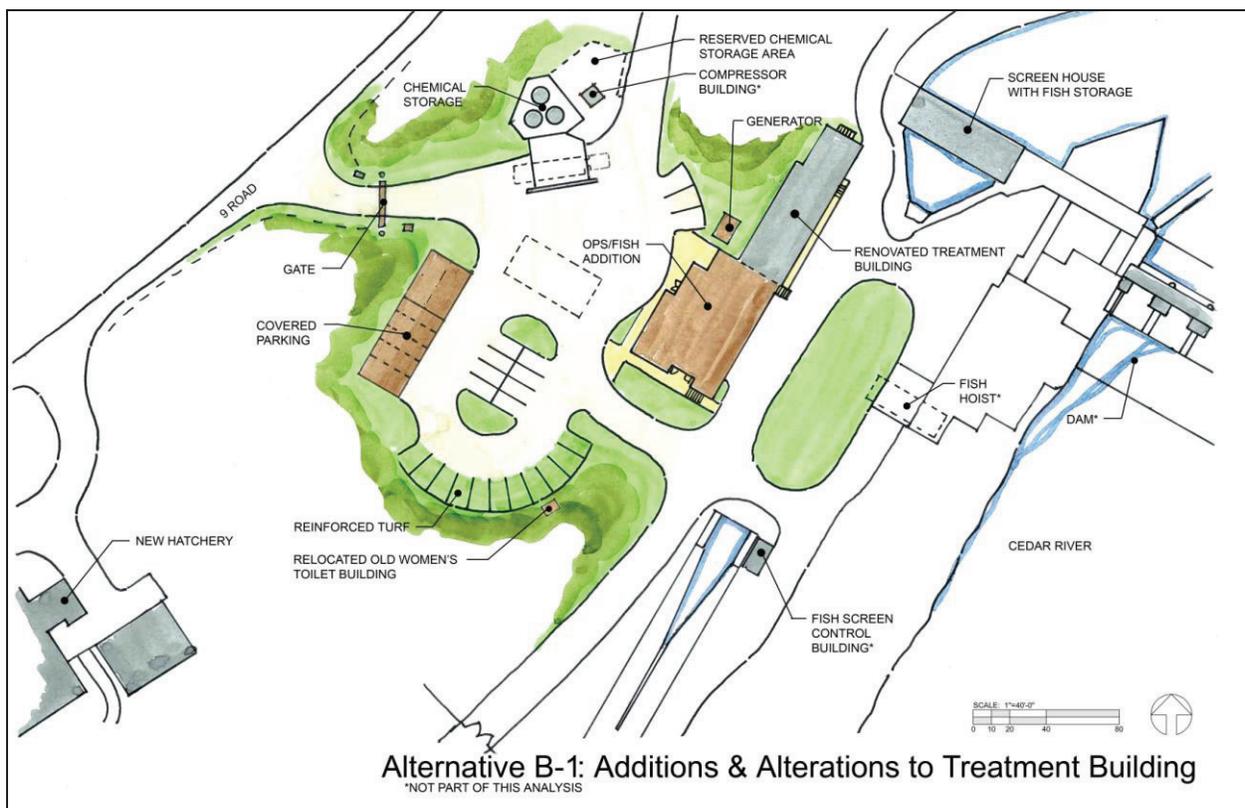


Figure 10-2. Alternative B-1

Issues and Opportunities

The project team identified the following issues and opportunities:

- The current Treatment Building chlorine cylinder platform has been reserved for possible sodium hypochlorite tank location. If the space is not needed for that purpose, then this area can be used as part of the Alternative B-1 Treatment Building addition.
- Flood risk associated with Alternative A-1 cannot be eliminated without the construction of SPU's planned spillway. If the spillway construction is not to be completed prior to the construction of the Landsburg development project, the two story scheme may not be a preferred alternative.

- Alternative A-1 can be modified to make use of the opportunity to provide storage space in the existing screen house facility by reducing storage space under the building.
- Alternative B-1 can be modified to provide improved views from the Operator's work stations by raising the finish floor elevation in the proposed Treatment Building.
- Alternative B-1 can be modified to become a separate independent structure from the existing Treatment Building.

RECOMMENDATIONS

The project team recommends the measures described below.

Highest Recommended Alternative

The project team's highest recommendation is to construct Alternative A-1, but provide storage for the Fish Program in the screen house. The team feels that the reuse of the screen house both for storage and as a site for photovoltaic panels is a practical commitment to sustainability and historic preservation. To undertake this alternative, it should be assured that SPU will make a commitment to the dam spillway design and construction.

Second Highest Recommended Alternative

The project team recommends Alternative B-1 if it is determined that Alternative A-1 is not suitable. The team recommends that this facility be constructed at a higher elevation than the existing Treatment Building to improve Operator views of the dam. If the Treatment Building's chlorine gas canister platform is not required, this area should be incorporated into the completed project as part of the Operations and Fish facility. If preferred by SPU, the Treatment Building addition should be constructed as a separate, stand-alone, one-story facility.

Include the Sodium Hypochlorite Work in the Landsburg Permitting/Construction

The work described in the alternatives should be permitted and constructed together with Water Quality's planned change in treatment technology from chlorine gas to sodium hypochlorite. The change in treatment technology will require some modifications to the Treatment Building as well as construction of a tanker truck fill station and tank storage platform with spill containment. Coordinating these civil and architectural improvements with the other planned work will be critical to success. Joining these projects should result in an improved facility design as well as a reduction in permit and project management costs. This approach should also require a shorter construction period, reduced disruption to work activities and lower overall construction costs.

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Seattle Public Utilities
Landsburg Facility Development Project Preliminary Engineering Report

APPENDIX A.
APPENDIX TITLE

June 2011

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APPENDIX B.
APPENDIX TITLE

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APPENDIX C.
APPENDIX TITLE

June 2011