

SEATTLE CITY COUNCIL

Transportation and Utilities Committee

Agenda

Wednesday, December 1, 2021

9:30 AM

Public Hearing

Remote Meeting. Call 253-215-8782; Meeting ID: 586 416 9164; or Seattle Channel online.

Alex Pedersen, Chair Dan Strauss, Vice-Chair M. Lorena González, Member Lisa Herbold, Member Tammy J. Morales, Member Debora Juarez, Alternate

Chair Info: 206-684-8804; <u>Alex.Pedersen@seattle.gov</u>

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Council Chamber Listen Line: 206-684-8566

For accessibility information and for accommodation requests, please call 206-684-8888 (TTY Relay 7-1-1), email <u>CouncilAgenda@Seattle.gov</u>, or visit <u>http://seattle.gov/cityclerk/accommodations</u>.



SEATTLE CITY COUNCIL Transportation and Utilities Committee Agenda December 1, 2021 - 9:30 AM Public Hearing

Meeting Location:

Remote Meeting. Call 253-215-8782; Meeting ID: 586 416 9164; or Seattle Channel online.

Committee Website:

http://www.seattle.gov/council/committees/transportation-and-utilities

This meeting also constitutes a meeting of the City Council, provided that the meeting shall be conducted as a committee meeting under the Council Rules and Procedures, and Council action shall be limited to committee business.

Pursuant to Washington State Governor's Proclamation No. 20-28.15 and Senate Concurrent Resolution 8402, this public meeting will be held remotely. Meeting participation is limited to access by the telephone number provided on the meeting agenda, and the meeting is accessible via telephone and Seattle Channel online.

Register online to speak during the Public Comment period and at the Public Hearing at the 9:30 a.m. Transportation and Utilities Committee meeting at <u>http://www.seattle.gov/council/committees/public-comment.</u>

Online registration to speak at the Transportation and Utilities Committee meeting will begin two hours before the 9:30 a.m. meeting start time, and registration will end at the conclusion of the Public Comment period and the Public Hearing during the meeting. Speakers must be registered in order to be recognized by the Chair.

Submit written comments to Councilmember Pedersen at <u>Alex.Pedersen@seattle.gov</u> Sign-up to provide Public Comment at the meeting at <u>http://www.seattle.gov/council/committees/public-comment</u> Watch live streaming video of the meeting at <u>http://www.seattle.gov/council/watch-council-live</u> Listen to the meeting by calling the Council Chamber Listen Line at 253-215-8782 Meeting ID: 586 416 9164 One Tap Mobile No. US: +12532158782,,5864169164#

Please Note: Times listed are estimated

- A. Call To Order
- B. Approval of the Agenda
- C. Public Comment
- D. Items of Business
- 1. <u>Appt 02072</u> Appointment of Jose Ulises Nino Rivera as member, Seattle Bicycle Advisory Board, for a term to August 31, 2023.

Attachments: Appointment Packet

Briefing, Discussion, and Possible Vote

Presenter for Items 1 and 2: Simon Blenski, Seattle Department of Transportation (SDOT)

- 2. <u>Appt 02073</u> Appointment of Diane Teh-Mei Walsh as member, Seattle Bicycle Advisory Board, for a term to August 31, 2023.
 - Attachments: Appointment Packet

Briefing, Discussion, and Possible Vote

3. <u>Appt 02074</u> Appointment of Amin Amos as member, Seattle Transit Advisory Board, for a term to August 2, 2023.

Attachments: Appointment Packet

Briefing, Discussion, and Possible Vote

Presenter for Items 3 and 4: Nico Martinucci, SDOT

4.	<u>Appt 02075</u>	Appointment of Autumn Sharp as member, Seattle Transit Advisory Board, for a term to August 2, 2023.
	<u>Attachments:</u>	Appointment Packet
		Briefing, Discussion, and Possible Vote
5.	<u>Appt 02076</u>	Appointment of Robin Schwartz as member, Seattle School Traffic Safety Committee, for a term to March 31, 2023.
	<u>Attachments:</u>	Appointment Packet
		Briefing, Discussion, and Possible Vote
		Presenter: Jennifer Meulenberg, SDOT
6.		Proposal to Waive Street Vacation Fees for Affordable Housing Projects
	<u>Supporting</u> <u>Documents:</u>	<u>Central Staff Memo</u> <u>Council Bill 120227 - Legislation Text</u>
		Council Bill 120227 - Summary and Fiscal Note
		Briefing and Discussion
		Presenter: Lish Whitson, Council Central Staff

7.	<u>Res 32031</u>	A RESOLUTION ratifying the 2021 Update to the Green/Duwamish
		and Central Puget Sound Watershed or Water Resource
		Inventory Area (WRIA 9) Salmon Habitat Plan, Making Our
		Watershed Fit for a King.

Attachments: Att 1 - Salmon Habitat Plan 2021 Update

<u>Supporting</u>

Documents: Summary and Fiscal Note Presentation

Briefing, Discussion, and Possible Vote

Presenters: Andrew Lee, Interim Director, and Martha Neuman, Seattle Public Utilities; Matt Goehring, King County; Brian Goodnight, Council Central Staff

8.	CB 120230	AN ORDINANCE relating to the City Light Department, the Seattle
		Department of Parks and Recreation, and the Seattle Department
		of Transportation; declaring certain real property rights to be
		surplus to the needs of City Light; authorizing the General
		Manager and Chief Executive Officer of Seattle City Light to
		execute an easement agreement with King County, allowing the
		temporary use of a portion of City Light property to resolve the
		encroachment of an existing structure located on the west side of
		Boeing Field within the Northeast Quarter of Section 29 Township
		24 N Range 4 E and the Southeast Quarter of Section 29
		Township 24 N Range 4 E, and increasing the temporary use area
		authorized by Ordinance 126328 by approximately 207 square
		feet; and transferring jurisdiction of certain properties located in
		the Georgetown neighborhood in Section 29 Township 24 N,
		Range 4 E, from the City Light Department to the Seattle
		Department of Parks and Recreation and to the Seattle
		Department of Transportation.
	Attachmonts:	Att 1 Tomporary Easement Agreement

Attachments: Att 1 – Temporary Easement Agreement

Att 2 – Property to be Transferred to Seattle Parks and Recreation (Parcel 1) Att 3 – Property to be Transferred to Seattle Department of Transportation (Parcel 2) Att 4 – City Light Retained Jurisdiction for its Electrical Infrastructure on the Flume Property (Parcel 1 & 2) Att 5 – Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset

<u>Supporting</u>

Documents:Summary and Fiscal NoteSummary Att 1 – Diagram of Vicinity

Presentation

Public Hearing, Briefing, and Discussion

Presenters: Debra Smith, General Manager and CEO, Mike Haynes, Bill Devereaux, Tim Croll, and Maura Brueger, Seattle City Light (SCL); Eric McConaghy, Council Central Staff 9. <u>CB 120233</u> AN ORDINANCE relating to the City Light Department; directing the transfer of certain funds in the Light Fund into the Rate Stabilization Account in 2021; and amending Section 21.49.086 of the Seattle Municipal Code to simplify the operation of the Rate Stabilization Account.

<u>Supporting</u>

Documents: Summary and Fiscal Note

Presentation

Briefing, Discussion, and Possible Vote

Presenters: Debra Smith, General Manager and CEO, Kirsty Grainger, Chris Ruffini, and Maura Brueger, SCL; Eric McConaghy, Council Central Staff

10.Res 32030A RESOLUTION relating to the City Light Department;
acknowledging and approving the City Light Department's
adoption of a biennial energy conservation target for 2022-2023
and ten-year conservation potential.

Supporting

Documents: Summary and Fiscal Note

Summary Att A - 2022 Conservation Potential Assessment—Volume <u>I</u>

Presentation

Public Hearing, Briefing, Discussion, and Possible Vote

Presenters: Debra Smith, General Manager and CEO, Craig Smith, Robert Cromwell, Kali Hollenhorst, and Jennifer Finnigan, SCL; Eric McConaghy, Council Central Staff

E. Adjournment

SEATTLE CITY COUNCIL



Legislation Text

File #: Appt 02072, Version: 1

Appointment of Jose Ulises Nino Rivera as member, Seattle Bicycle Advisory Board, for a term to August 31, 2023.

The Appointment Packet is provided as an attachment.

8

City of Seattle Boards & Commissions Notice of Appointment

Appointee Name:								
Jose Ulises Nino Rivera								
Board/Commission Name:		Position Title:						
Seattle Bicycle Advisory Board		Member						
	City Council Cor	firmation required?						
Appointment OR	🖂 Yes							
	No							
Appointing Authority:	Term of Position: *							
City Council	9/1/2021							
Mayor	to							
Other: Fill in appointing authority	8/31/2023							
	🗆 Serving remain	ning term of a vacant position						
Residential Neighborhood:	Zip Code:	Contact Phone No.:						
Roosevelt	98105							
Background:								
Jose has degrees in Computer Science and Biolo	ogy, and currently	is a Staff Software Engineer at Lyft						
where he develops open-source networking software infrastructure. His professional career has helped								

him develop systems-level thinking applicable to urban infrastructure. He co-founded and led Uplyft Unidos, Lyft's Latinx employee resource group. Jose served as the 2020-2021 Get Engaged member on SBAB. He is excited to continue to serve on the board and advocate for bicycle transportation. He hopes to use his tenure to focus on the role of bicycle infrastructure in Seattle's climate action goals.

Authorizing Signature (original signature):	Appointing Signatory:
\mathcal{A}	Jenny Durkan
Jenny A. Durken	Mayor
11/8/21	

Jose Ulises Nino Rivera

EDUCATION

JOHNS HOPKINS UNIVERSITY MENG IN COMPUTER SCIENCE

May 2016 | Baltimore, MD GPA: 4.0

DIVERSITY

Founded and led Uplyft Unidos, Lyft's LatinX Employee Resource Group. Focused on LatinX recruiting, successfully hosting several networking events, and interview batch days resulting in several dozen hires.

WRITING

INFOQ | MITIGATING CASCADING FAILURE AT LYFT This article was also published in InfoQ's service mesh eMagazine.

LYFT ENG | PUBLIC ARTICLES Several blog posts from my time at Lyft.

SPEAKING ENGAGEMENTS

QCON LONDON 2020 March 02nd, 2020, London, UK Next Generation Client APIs in Envoy Mobile

ENVOYCON/KUBECON NA 2019

San Diego, CA Envoy Mobile in Depth: From Server to Multi-platform Library

VELOCITY 2019 | San Jose, CA and Berlin, Germany

- How Lyft Migrated to a Service Mesh
- Deploying hybrid topologies with Kubernetes and Envoy: A look at service discovery

KUBECON NA 2018 December 12th, 2018 | Seattle, WA

- Keynote: Envoy Project Update
- Evolving Legacy Systems into Kubernetes at Lyft: A Hybrid Environment

GONORTHWEST July 17th, 2018 |

Seattle, WA Go in the Envoy Ecosystem

KUBECON EUROPE 2018 May 2nd, 2018 | Copenhagen, Denmark Developer Productivity with Envoy

EXPERIENCE

LYFT | SENIOR SOFTWARE ENGINEER

Q2/2019 - Present | Seattle, WA

Client Networking Team

- Designed, implemented, and open sourced Envoy Mobile, a new client networking library based on the Envoy project.
- Focused on the implementation of the library's core networking aspects: DNS, HTTP, threading design, bridging platform (iOS, Android) stacks with the native C++ core.
- Architected and implemented a revamped version of the HTTP stack that allows for extensibility via HTTP filters. This platform will enable future work around smart network behavior, security, compression, and protocol experimentation (QUIC).
- Created a real-time time-series metrics pipeline to extract metrics out of Lyft's mobile clients.
- Led cross-company collaboration to build solutions on top of the Envoy Mobile platform.

LYFT | SENIOR SOFTWARE ENGINEER

01/01/2019 - Present | Seattle, WA

Tech Lead (since Q3 2018) for Lyft's Networking team.

- Defined the team's roadmap for H2 2018 and H1 2019, advancing projects involving multiple teams across Lyft's Infrastructure org. The roadmap focuses on projects for developer productivity, and site reliability through self healing systems. The network team's work was foundational in decomping Lyft's monolith and building Lyft's modern, service-oriented architecture.
- Created onboarding documentation and curricula that was used to onboard half a dozen new Network team members.

LYFT | SOFTWARE ENGINEER

08/15/2016 - Present | Seattle, WA

Server Networking Lead in Lyft's Networking team. Our team standardizes how machines at Lyft handle traffic and communicate.

- Member of the team that implemented and open sourced Envoy, a C++ Edge/Service communications bus. Current maintainer of the project. Focused on Envoy's Outlier Detection, Rate limit, Concurrency, and Control Plane subsystems.
- Developed, open source, and maintain Ratelimit. Ratelimit is a go/gRPC generic rate limit service used in production at Lyft and other industry peers to enable network and application level global ratelimiting in a distributed system.
- Designed, implemented, and rolled out Lyft's control plane solution for Envoy. The platform has enabled Lyft to deploy data plane changes at unprecedented speed. Moreover, the modern control plane has been crucial in Lyft's migration to Kubernetes based infrastructure, making an internally hybrid service mesh transparent to service owners.

FLATIRON HEALTH | SOFTWARE ENGINEERING INTERN

06/01/2015-08/15/2015 | New York City, NY

• Engineer a highly parallel Apache Spark cluster to improve Flatiron's data pipeline efficiency.

RESEARCH

SARIA LAB | RESEARCH ASSISTANT

Spring 2015 - Spring 2016 | Baltimore, MD

• Designed and developed Dashan: a modular, multi-level system to extract, organize, and analyze Electronic Medical Records. The system has been deployed to several hospitals in the Hopkins Medical System.

Seattle Bicycle Advisory Board

12 Members: Pursuant to Resolution 31572, all members subject to City Council confirmation, 2-year terms:

- 7 Mayor- appointed
- 5 City Council- appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
8	м	3	1.	Member	Yasir Alfarag	9/1/2021	8/31/2023	2	Mayor
2	F	5	2.	Member	Kashina Groves	9/1/2020	8/31/2022	1	City Council
3	м	4	3.	Member	Jose Ulises Nino Rivera	9/1/2021	8/31/2023	1	Mayor
1	F	4	4.	Member	Andrea Lai	9/1/2021	8/31/2023	2	City Council
1/9	F	1	5.	Member	Diane Teh-Mei Walsh	9/1/2021	8/31/2023	1	Mayor
			6.	Member	Vacant	9/1/2021	8/31/2023		City Council
6	М	2	7.	Member	Andrew Dannenberg	9/1/2020	8/31/2022	2	Mayor
6	F	1	8.	Member	Meredith Hall	9/1/2020	8/31/2022	1	City Council
6	F		9.	Member	Sarah Udelhofen	9/1/2020	8/31/2022	2	Mayor
6	М	2	10.	Member	Patrick Taylor	9/1/2020	8/31/2022	1	City Council
9	F	3	11.	Member	Maimooma Rahim	9/1/2020	8/31/2022	1	Mayor
			12.	Get Engaged Member	Vacant	9/1/2021	8/31/2022	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART (9) (1) (2) (3) (4) (5) (6) (7) (8) Caucasian/ American Black/ Hispanic/ Indian/ Pacific Middle Non-Male Female Transgender NB/O/U Asian African Other Multiracial Latino Alaska Hispanic Islander Eastern American Native 3 3 2 2 1 1 1 Mayor 1 3 1 2 1 Council

1

4

1

1

Total Key:

Other

4

6

*D List the corresponding *Diversity Chart* number (1 through 9)

1

**G List gender, M= Male, F= Female, T= Transgender, NB= Non-Binary, O= Other, U= Unknown

1

RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

SEATTLE CITY COUNCIL



Legislation Text

File #: Appt 02073, Version: 1

Appointment of Diane Teh-Mei Walsh as member, Seattle Bicycle Advisory Board, for a term to August 31, 2023.

The Appointment Packet is provided as an attachment.



Appointee Name:								
Diane Teh-Mei Walsh								
Board/Commission Name:		Position Title:						
Seattle Bicycle Advisory Board	Member							
	City Council Co	nfirmation required?						
Appointment <i>OR</i> Reappointment	🔀 Yes							
	No No							
Appointing Authority:	Term of Position: *							
	9/1/2021							
Mayor	to							
Other: Fill in appointing authority	8/31/2023							
	🗌 Serving rema	ining term of a vacant position						
Residential Neighborhood:	Zip Code:	Contact Phone No.:						
West Seattle	98116							
	•							

Background:

Diane has a background in landscape architecture and previously worked at SDOT in the Public Space Management Program. She typically bikes with her kids in tow, transporting them to school, parks, and playdates. Diane believes an inclusive bicycle program should address the economic, social/cultural, physical and perceived safety barriers to make the transportation system more equitable.

Authorizing Signature (original signature):	Appointing Signatory:
\mathcal{A}	Jenny Durkan
Jenny A. Ducken	Mayor
O	
Date Signed (appointed):	
11/8/21	

DIANE TEH-MEI WALSH



EXPERIENCE

PLANNING AND DEVELOPMENT SPECIALIST II, PUBLIC SPACE MANAGEMENT PROGRAM, Seattle, WA

The Seattle Department of Transportation

Work primarily focused on shoreline street ends program coordination, piloting the play streets program, and other PSM program development work. Responsibilities included overseeing project management, directing the strategic planning process by planning and evaluating priorities for program work, assisting with program budget management, policy development, facilitating community stewardship, and ensuring equitable public outreach and engagement.

PUBLIC SPACE MANAGEMENT GRADUATE INTERN, Seattle, WA

The Seattle Department of Transportation

• An internship spanning my third year within UW's Master of Landscape Architecture program. Supported the development of Public Space Management program areas by conducting best practices and precedent research pertaining to neighborhood and business amenities, alley activation, play streets, pavement to plaza programs, and landscape infrastructure management. Prepared presentations for public meetings, conferences, and other public outreach events. Supported the Shoreline Street End program as well as the coordination and development of the pilot Play Streets program.

CREW LEADER & PRO-CREW MEMBER, Oakland, CA

The Student Conservation Association

Co-led two summer high school crews in San Mateo County performing conservation-related work.
 Responsible for ensuring a healthy, safe, and fun work environment for students from underserved communities.
 Incorporated environmental education days to foster a sense of stewardship for the environment and facilitated team-building and leadership activities to promote confidence and job-readiness skills.

• Participated in two pro-crews; Lassen Volcanic National Park (re-vegetation of Jeffrey Pines), Sonoran Desert National Monument (ecological restoration).

LOCAL PRODUCE CONSULTANT, San Francisco, CA

The San Francisco Wholesale Produce Association

• Responsible for outreach to small, local growers and local wholesalers who were interested in new marketing avenues and local sourcing. Assisted in facilitating relationships between interested parties. Projects included: a market-wide pilot study to evaluate amount of local produce at the market and to assess opportunities to increase total volume of local produce; a study of wholesale farmer's market operations around the country; and marketing efforts to increase the visibility of the SFWPM within the Bay Area.

May 2009—May 2010

June 2014—June 2017

July 2013—May 2014

March 2008—April 2010

RESEARCH & DEVELOPMENT ASSISTANT, San Francisco, CA

The Sierra ClubSeptember 2007—January 2008·Research of prospective donors – individual, corporate and foundation. Responsible for acknowledgements of
major gifts.

'PARKS FOR PEOPLE' INTERN & RESEARCH/DEVELOPMENT INTERN, San Francisco, CA

 The Trust for Public Land
 February 2007—September 2007

 • Responsible for various aspects of community outreach, research of potential project sites, and the creation of fliers and Powerpoint presentations. Research of prospective donors – individual, corporate and foundation.

EDUCATION

UNIVERSITY OF WASHINGTON, Seattle, WA	2011-2014
Master's of Landscape Architecture	
GARDEN FOR THE ENVIRONMENT, San Francisco, CA	2007
· Gardening and Composting Educator Training Program. Awarded a Master Gardener Certificate.	
UNIVERSITY OF CHICAGO, Chicago, IL	2002-2006
· B.A. Major in Environmental Studies, Thesis: "A Study of Community Gardens as Catalysts for Positiv	e Social
Change."	
INTERNATIONAL HONORS PROGRAM, England, Tanzania, India, New Zealand, Mexico	2004-2005

• Third-year study abroad program examining the environmental and cultural impacts of globalization through critical studies in development economics, environmental management, and social movements around the globe.

SKILLS

SOFTWARE: Adobe Creative Suite, Microsoft Office, Google SketchUp, ArcGIS, AutoCAD **LANGUAGES**: English, French

Seattle Bicycle Advisory Board

12 Members: Pursuant to Resolution 31572, all members subject to City Council confirmation, 2-year terms:

- 7 Mayor- appointed
- 5 City Council- appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
8	м	3	1.	Member	Yasir Alfarag	9/1/2021	8/31/2023	2	Mayor
2	F	5	2.	Member	Kashina Groves	9/1/2020	8/31/2022	1	City Council
3	м	4	3.	Member	Jose Ulises Nino Rivera	9/1/2021	8/31/2023	1	Mayor
1	F	4	4.	Member	Andrea Lai	9/1/2021	8/31/2023	2	City Council
1/9	F	1	5.	Member	Diane Teh-Mei Walsh	9/1/2021	8/31/2023	1	Mayor
			6.	Member	Vacant	9/1/2021	8/31/2023		City Council
6	М	2	7.	Member	Andrew Dannenberg	9/1/2020	8/31/2022	2	Mayor
6	F	1	8.	Member	Meredith Hall	9/1/2020	8/31/2022	1	City Council
6	F		9.	Member	Sarah Udelhofen	9/1/2020	8/31/2022	2	Mayor
6	М	2	10.	Member	Patrick Taylor	9/1/2020	8/31/2022	1	City Council
9	F	3	11.	Member	Maimooma Rahim	9/1/2020	8/31/2022	1	Mayor
			12.	Get Engaged Member	Vacant	9/1/2021	8/31/2022	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART (9) (1) (2) (3) (4) (5) (6) (7) (8) American Caucasian/ Black/ Hispanic/ Indian/ Pacific Middle Non-Male Female Transgender NB/O/U Asian African Other Multiracial Latino Alaska Hispanic Islander Eastern American Native 3 3 2 2 1 1 1 Mayor 1 3 1 2 1 Council

1

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1

Total Key:

Other

4

6

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1

RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

SEATTLE CITY COUNCIL



Legislation Text

File #: Appt 02074, Version: 1

Appointment of Amin Amos as member, Seattle Transit Advisory Board, for a term to August 2, 2023.

The Appointment Packet is provided as an attachment.



Appointee Name: Amin Amos					
Board/Commission Name: Seattle Transit Advisory Board		Position Title: Member			
Appointment <i>OR</i> Reappointment	City Council Confirmation required?				
Appointing Authority: City Council Mayor Other: Fill in appointing authority	Term of Position: * 8/3/2021 to 8/2/2023				
Residential Neighborhood: Capitol Hill	Zip Code: C 98102 I	ontact Phone No.:			
Background: Amin's earliest experiences with transit were bu became available. Making transit accessible and proud owner of a Mariners-themed ORCA card o	is-oriented and ex d enjoyable to use and Mt. Baker is h	panded to other modes as they are his primary objectives. He's a is favorite transit station.			
Authorizing Signature (original signature): Jenny A. Durken	Appointing Sign Jenny Durkan Mayor	natory:			

Date Signed (appointed): 11/8/21

*Term begin and end date is fixed and tied to the position and not the appointment date.

Amin Amos

SUMMARY

I have a background in technical support engineering and business analysis. I am ultimately interested in helping build and improve technical products and processes.

EXPERIENCE

Support Engineer, Mux, Seattle, WA (Remote) 11/2020 - Present Respond to customer-developer inquiries regarding video-on-demand and live streaming products • Review and modify externally facing technical documentation • Submit and review code changes for JavaScript and Python SDKs • Create scripts and reusable functions to improve customer experience • Troubleshoot API request and response errors • Format, create, and track customer feature requests and engineering bugs • Assist Sales team with urgent customer questions • Technical Support Engineer, Apptio, Bellevue, WA 08/2019 - 11/2020 Translate bug reports from customers into actionable user stories for the engineering team • Answer customer questions related to product functionality via email and phone Investigate discrepancies in data or financial logic to mitigate unexpected results or performance issues • Write scripts in vanilla JavaScript to automate repetitive tasks • Explain and demonstrate REST API best practices to customers • Technical Analysis Senior Associate I, ThreeBridge Solutions, Minneapolis, MN 08/2018 - 03/2019 Consulted as a Technical Business Analyst for a data warehouse migration project Collaborated with data architects to ensure technology recommendations reflected business needs • Interviewed stakeholders; documented and organized requirements • Proofread and edited technical and non-technical deliverables • Technical Analysis Associate II, ThreeBridge Solutions, Minneapolis, MN 01/2017 - 10/2018 Consulted as SAP Business Analyst at Fortune 500 medical supply firm • • Investigated financial anomalies, traced source of non-standard transactions Performed software acceptance testing for new billing solution • Produced reports using SAP Business Intelligence and Microsoft Excel • Researched new SAP Finance features, wrote test cases and assisted with business requirements • Trained business users on SAP Finance processes • CREDENTIALS AWS Certified Cloud Practitioner 05/2020 - 03/2023 Cloud native services will become more popular over time. This is Amazon's first certification in a path to other exams.

Flatiron School - Software Engineering

Started my software development journey with this immersive educational program. Technical course subject matter included object orientation, DOM manipulation, and REST APIs. Beyond code I explored cultural facets like blogging, tech conferences, and open source software.

Hamline University, St. Paul, MN Bachelor of Business Administration - Finance

TECHNICAL SKILLS

Python, Ruby on Rails, HTML, CSS, JavaScript, SQL, Amazon Web Services (S3, EC2), Agile (Scrum, Kanban), Customer Success, Requirements Gathering

06/2019 - 03/2020

12/2016

19

Seattle Transit Advisory Board

12 Members: Pursuant to Resolution 31572, all members subject to City Council confirmation, 2-year terms:

- 7 Mayor- appointed
- 5 City Council- appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
6	м	3	1.	Member	Bryce Kolton	8/3/20	8/2/22	2	City Council
		4	2.	Member	Emily Walton Percival	8/3/20	8/2/22	1	City Council
5	м	4	3.	Member	Andrew Martin	8/3/20	8/2/22	2	City Council
6	F	6	4.	Member	Michelle Zeidman	8/3/21	8/2/23	3	City Council
			5.	Member	Vacant	8/3/21	8/2/23		City Council
1	F	3	6.	Member	Keiko Budech	8/3/20	8/2/22	2	Mayor
6	F	3	7.	Member	Barbara Wright	8/3/20	8/2/22	2	Mayor
		1	8.	Member	Art Kuniyuki	8/3/20	8/2/22	1	Mayor
	F	7	9.	Member	Erin Tighe	8/3/21	8/2/23	4	Mayor
6	F	7	10.	Member	Autumn Sharp	8/3/21	8/2/23	1	Mayor
2	М	3	11.	Member	Amin Amos	8/3/21	8/2/23	1	Mayor
6	М	3	12.	Get Engaged Member	Andrew Parker	9/1/20	8/31/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART (1) (2) (3) (4) (5) (6)

	Male	Female	Transgender	NB/ 0/ U	Asian	Black/ African American	Hispanic/ Latino	American Indian/ Alaska Native	Other	Caucasian/ Non- Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	2	4			1	1				3			
Council	2	1							1	2			
Other													
Total	4	5			1				1	5			

Key:

*D List the corresponding *Diversity Chart* number (1 through 9)

**G List gender, M= Male, F= Female, T= Transgender, NB= Non-Binary, O= Other, U= Unknown

RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

(9)

(7)

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SEATTLE CITY COUNCIL



Legislation Text

File #: Appt 02075, Version: 1

Appointment of Autumn Sharp as member, Seattle Transit Advisory Board, for a term to August 2, 2023.

The Appointment Packet is provided as an attachment.



Appointee Name: Autumn Sharp		
Board/Commission Name: Seattle Transit Advisory Board		Position Title: Member
Appointment <i>OR</i> Reappointment	City Council Co	onfirmation required?
Appointing Authority: City Council Mayor Other: Fill in appointing authority	Term of Position 8/3/2021 to 8/2/2023	on: * ining term of a vacant position
Residential Neighborhood: Lower Queen Anne	Zip Code: 98109	Contact Phone No.:
Background		

Background:

Autumn Sharp is the Communications Manager for Transportation Choices Coalition. In this role, she develops key messages to inform Washington State's decision-makers about transportation issues, creates communications to engage the public, and leverages data driven strategies to advance TCC's advocacy and policy goals. Prior to joining TCC, Ms. Sharp led the Communications & Development team at Tucson Audubon, advocating for environmental and racial justice. She is a life-long bus rider and transit commuter, and passionate about ensuring that Washington's diversity of multimodal options are safe, affordable, accessible to all Washingtonian's, and built from a cornerstone of equity.

Authorizing Signature (original signature):	Appointing Signatory:		
	Jenny Durkan		
Conner A. Ducken	Mayor		
Johns			
Date Signed (appointed): 11/8/21			

AUTUMN SHARP, MFA

COMMUNICATIONS MANAGER

SKILLS

Writing & Editing Strategic Communications Content Creation & Management **Project Management Editorial Direction & Calendars** Social Media Management E-newsletter Production Article Writing **Blog Posts** Marketing Materials Voice, Style, & Brand Standards SEO Best Practices **Google Analytics** Leadership Mentoring & Performance Coaching Community Outreach **Relationship Building**

TECHNOLOGY

HTML CSS WordPress Canva Neon CRM Mailchimp Campaign Monitor Zoom Microsoft Teams Slack

PROFILE

A self-starting, creative, and strategic communications professional who leverages exceptional storytelling skills combined with data analysis and key partnerships to advance organizational goals. Passionate about social impact and advocating for social justice through strategic communications that makes a positive difference in the world and people's lives. Skilled in responding to competing priorities with speed and attention to detail, I contribute outstanding process improvement, collaboration, and 100% reliability to exceed expectations.

RELEVANT EXPERIENCE

COMMUNICATIONS MANAGER

TRANSPORTATION CHOICES COALITION | SEATTLE, WA | 2021 - PRESENT Keep the pulse on politics and public dialogue to help develop key messages and execute communications strategies that advance TCC's advocacy campaigns and policy goals. Strengthen and amplify TCC's mission and work, and build support for transportation choices within WA through messaging and education.

- Member of the Racial Equity Action Plan (REAP) committee.
- Developed narrative theme and visual storyline for annual gala fundraiser.

COMMUNICATIONS & DEVELOPMENT MANAGER

TUCSON AUDUBON SOCIETY | TUCSON, AZ | 2019 - 2021

Excelled in a newly created role leading the communications and development teams at an environmental and bird conservation nonprofit to increase organizational visibility, impact, and financial support through strategic communications.

- Led the organization successfully through crisis communications related to both the coronavirus pandemic and the Christian Cooper birding incident.
- Facilitated organization-wide discussions and implementation of Diversity, Equity, & Inclusion (DE&I) initiatives as a co-leader of the DE&I committee.
- Grew social media engagement across nine unique platforms by 30%. Increased Instagram followers by 150% and created a robust, online community of engaged activists.
- Increased open rates of e-newsletters from 22% to 36% and click-through rates from 2.2% to 6.7% by redesigning the template and improving content quality.

TECHNOLOGY

G Suite Office 365 Microsoft Office

EDUCATION

MSc Ethnobotany*, Distinction University of Kent Canterbury, UK *Anthropology and Botany

MFA Creative Writing Pacific University

Forest Grove, OR

BA English Portland State University Portland, OR

AWARDS

Winner Academy of American Poets Prize

International Scholarship Recipient \$11k Award for Winning Essay

LANGUAGES

English | Fluent Spanish | Intermediate

INTERESTS

Boating, Travel, Botany, Birds, Gardening, Community Engagement, Dining Out

RELEVANT EXPERIENCE (continued)

DIVERSITY, EQUITY, & INCLUSION/HUMAN RESOURCES INTERN

JEFFERSON COUNTY GOVT. | COLORADO STATE UNIVERSITY | GOLDEN, CO | 2018 - 2019 Completed a suite of graduate courses in Diversity, Equity, & Inclusion (DE&I) and Human Resources Management. In connection with the graduate program, collaborated with an HR team of 26, supporting a staff of 3K.

- Participated in a pilot program for innovating human-centered design solutions for Diversity, Equity, & Inclusion (DE&I) initiatives in the community.
- Produced project management documents and tools to support a countywide "Stay Interview" project.
- Developed the framework for a countywide internship program with a focus on a diverse and inclusive recruitment pipeline.

GENERAL MANAGER

CHEFSTABLE GROUP | PORTLAND, OR | 2016 - 2017

Led a staff of 55+ employees at an upscale, chef-owned dining concept featuring Italian cuisine with over \$2.5Mil gross annual sales.

- Improved P&L through building relationships, targeted marketing, social media strategy, community outreach, and strong financial acumen.
- Advised leadership on HR policies, change management, and conflict resolution.

OPERATIONS & EVENTS MANAGER

OBA RESTAURANTE | PORTLAND, OR | 2014-2015

Recruited, trained, scheduled, and supervised 40+ employees in one of Portland's most popular fine-dining establishments featuring Latin American cuisine with annual gross sales of \$4.5Mil.

- Increased profits through establishing a consistent brand voice across communications channels, leveraging a data-driven marketing strategy, creation of email lists and email campaigns, and advancing media relations.

WRITER & CONSULTANT

FREELANCE | PORTLAND, OR | 2010-2013

Increased visibility, impact, and revenue for clients as a freelance writer, editor, and communications consultant for nonprofits, food & beverage, legal, and small business industries.

Prior to earning my MFA, I managed several popular, independent food & beverage businesses to fund my education goals while excelling as a local leader and business manager.

Seattle Transit Advisory Board

12 Members: Pursuant to Resolution 31572, all members subject to City Council confirmation, 2-year terms:

- 7 Mayor- appointed
- 5 City Council- appointed

Roster:

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
6	м	3	1.	Member	Bryce Kolton	8/3/20	8/2/22	2	City Council
		4	2.	Member	Emily Walton Percival	8/3/20	8/2/22	1	City Council
5	м	4	3.	Member	Andrew Martin	8/3/20	8/2/22	2	City Council
6	F	6	4.	Member	Michelle Zeidman	8/3/21	8/2/23	3	City Council
			5.	Member	Vacant	8/3/21	8/2/23		City Council
1	F	3	6.	Member	Keiko Budech	8/3/20	8/2/22	2	Mayor
6	F	3	7.	Member	Barbara Wright	8/3/20	8/2/22	2	Mayor
		1	8.	Member	Art Kuniyuki	8/3/20	8/2/22	1	Mayor
	F	7	9.	Member	Erin Tighe	8/3/21	8/2/23	4	Mayor
6	F	7	10.	Member	Autumn Sharp	8/3/21	8/2/23	1	Mayor
2	м	3	11.	Member	Amin Amos	8/3/21	8/2/23	1	Mayor
6	М	3	12.	Get Engaged Member	Andrew Parker	9/1/20	8/31/21	1	Mayor

SELF-IDENTIFIED DIVERSITY CHART (1) (2) (3) (4) (5) (6)

	Male	Female	Transgender	NB/ 0/ U	Asian	Black/ African American	Hispanic/ Latino	American Indian/ Alaska Native	Other	Caucasian/ Non- Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	2	4			1	1				3			
Council	2	1							1	2			
Other													
Total	4	5			1				1	5			

Key:

*D List the corresponding *Diversity Chart* number (1 through 9)

**G List gender, M= Male, F= Female, T= Transgender, NB= Non-Binary, O= Other, U= Unknown

RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.

(9)

(7)

(8)

SEATTLE CITY COUNCIL



Legislation Text

File #: Appt 02076, Version: 1

Appointment of Robin Schwartz as member, Seattle School Traffic Safety Committee, for a term to March 31, 2023.

The Appointment Packet is provided as an attachment.



Appointee Name: Robin Schwartz						
Board/Commission Name: School Traffic Safety Committee			Position Title: <i>Member</i>			
Appointment <i>OR</i> Reappointment	City Council Co Yes No	onfir	mation required?			
Appointing Authority: City Council Mayor Other: Fill in appointing authority	Term of Position: * 4/1/2020 to 3/31/2023					
Residential Neighborhood: South Park	Zip Code: <i>98108</i>	Со	ntact Phone No. <i>:</i>			
Background: Robin Schwartz has spent many hours working and volunteering in the Duwamish Valley and for Concord Intl. Elementary School over the last 10 years. Her focus has been equity, especially with regards to resources from City of Seattle and Seattle Public Schools.						
Authorizing Signature (original signature): Jenny A. Durken	Appointing S Jenny Durkar Mayor	igna י	atory:			
Date Signed (appointed): 11/15/21						

Robin Schwartz



OBJECTIVE

As an engaged member of the SPS community and one who is particularly concerned with Title 1 school communities, I would like to help elevate the voices of my peers to achieve more safe outcomes for our students.

SUMMARY

I have spent many hours working and volunteering in the Duwamish Valley and for Concord Intl. Elementary School over the last 10 years. My focus has been equity, especially with regards to resources from City of Seattle and Seattle Public Schools.

COMMUNITY INVOLVEMENT

Member, Concord International Elementary School PTA, 2013/2014 Board Member, Concord International Elementary School PTA, 2014-2021 Member of the following groups: South Park Neighborhood Association, Georgetown Community Council, Greening Concord Steering Committee, Duwamish Valley Affordable Housing Coalition, Friends of Duwamish Waterway Park Founder/admin of SPS Title 1 Schools community group (an online group)

EMPLOYMENT

Development and Advocacy Manager, Duwamish River Cleanup Coalition 2017-present Teacher, the Learning Tree Montessori Preschool, Seattle, WA 2013-2017 Nanny 2006-2013 Teacher, the Learning Tree Montessori Preschool, Seattle, WA 1995-2006

EDUCATION

B.A., Interdisciplinary Arts and Sciences, University of Washington Bothell 2006

Seattle School Traffic Safety Committee

11 Members: Pursuant to Ordinance 124168, 6 members subject to City Council confirmation, 3-year terms:

- 6 Mayor- appointed
- 5 Other Appointing Authority: Seattle Police Department, Seattle Department of Transportation, Seattle Public Schools, King County Metro

*D	**G	RD	Position No.	Position Title	Name	Term Begin Date	Term End Date	Term #	Appointed By
				Seattle Police					
				Department					
			1.	Representative	Vacant	4/1/2019	3/31/2022	1	Chief of Police
				Seattle					
				Transportation					Director of
6	F	3	2.	Representative	Jennifer Meulenberg	4/1/2019	3/31/2022	1	Transportation
				Seattle Public					
				School District					Superintendent
				No. 1					of Seattle Public
6	M	1	3.	Representative	Richard Staudt	4/1/2019	3/31/2022	1	Schools
				Seattle Public					
				School District					Superintendent
	_	_		No. 1		4/4/2040	a /a / /a a a		of Seattle Public
6	F	/	4.	Representative	Yvonne Carpenter	4/1/2019	3/31/2022	1	Schools
	_	~	-	Representative	Manu Ellan Dura II	4/4/2010	2/24/2022	2	N4
6	F	6	5.	of Parents	Iviary Ellen Russell	4/1/2019	3/31/2022	2	iviayor
				King County					Matus Tususit
			6	Representative	Vecent	4/1/2021	2/21/2024		
<u> </u>			0.	Mombor At	Vacant	4/1/2021	5/51/2024		General Manager
		1	7	Member At	Pohin Schwartz	4/1/2020	2/21/2022	1	Mayor
		-	7.	Large	RODITI SCHWartz	4/1/2020	5/51/2025	-	Iviayor
			8		Vacant	4/1/2019	3/31/2022	1	Mayor
<u> </u>			0.	Member At	Vacant	4/1/2015	3/31/2022	-	Wayor
	F	5	9	large	Marilyn K. Firman	4/1/2021	3/31/2024	2	Mayor
	· ·	-	5.	Pedestrian		1/ 1/ 2021	3,51,2021	_	indyor
				Safety					
6	F	3	10.	Representative	Margaret McCaulev	4/1/2020	3/31/2023	2	Mavor
-	-	-		Bicycle Safety		.,_,	3,,	_	
6	м	6	11.	Representative	Leland Bruch	4/1/2020	3/31/2023	2	Mayor

Roster:

SELF-IDENTIFIED DIVERSITY CHART			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	Male	Female	Transgender	NB/ 0/ U	Asian	Black/ African American	Hispanic/ Latino	American Indian/ Alaska Native	Other	Caucasian/ Non- Hispanic	Pacific Islander	Middle Eastern	Multiracial
Mayor	1	3								3			
Council													
Other	1	2								3			
Total	2	5								6			

Key:

***D** List the corresponding *Diversity Chart* number (1 through 9)

**G List gender, M= Male, F= Female, T= Transgender, NB= Non-Binary, O= Other, U= Unknown

RD Residential Council District number 1 through 7 or N/A

Diversity information is self-identified and is voluntary.



Legislation Text

File #: Inf 1949, Version: 1

Proposal to Waive Street Vacation Fees for Affordable Housing Projects



November 29, 2021

MEMORANDUM

То:	Transportation and Utilities Committee and
	Finance and Housing Committee
From:	Lish Whitson, Analyst
Subject:	Council Bill 120227: Exempting affordable housing projects from street vacation fees

On December 1, the Transportation and Utilities Committee will receive a briefing on <u>Council</u> <u>Bill (CB) 120227</u>, which would exempt some affordable housing projects from compensating the City for street and alley vacations. On December 7, the Finance and Housing Committee will discuss and may vote on CB 120227. The CB would have the effect of reducing affordable housing permitting costs. It would at the same time reduce income to the Seattle Department of Transportation when a vacation is required to facilitate an affordable housing project. This memorandum provides a brief background on street vacations and compensation and the bill.

Background

Streets, alleys, and other rights-of-way are distinct from other public property. They typically consist of easements across abutting private property. By providing space for circulation, access, and utilities, they provide benefits to both the public and the abutting property owners. Because of their unique nature, Washington State law (Revised Code of Washington (RCW) Chapter 35.79) requires a separate process for disposing of rights-of-way. State law dictates many aspects of the vacation process. For example, only abutting property owners may petition the City for a vacation.

If the Council approves a vacation, <u>RCW 35.79.050</u> provides that:

...the owners of property abutting upon the street or alley, or part thereof so vacated, shall compensate such city or town in an amount which does not exceed onehalf the appraised value of the area so vacated. If the street or alley has been part of a dedicated public right-of-way for twenty-five years or more, or if the subject property or portions thereof were acquired at public expense, the city or town may require the owners of the property abutting the street or alley to compensate the city or town in an amount that does not exceed the full appraised value of the area vacated.

<u>SMC 15.06.092</u> repeats this idea that the City can require compensation for right-of-way to be vacated prior to final approval, but is not required to receive compensation. The Council has the authority to choose whether to require compensation for the appraised value of the right-of-way. The SMC exempts City, State and Federal governments from paying this compensation.

The Council updated its <u>Street Vacation Policies</u> in 2018. Since then, it has received petitions for vacations from approximately one affordable housing project a year. For the two most recent affordable housing projects to petition the City for a street or alley vacation, the <u>Willow</u> <u>Crossing</u> and <u>Grand Street Commons</u> projects, the value of the right-of-way that was vacated is over \$450,000. However, this value is much less than the millions of dollars typically provided by downtown alley vacations.

Under RCW 35.79.050, at least half of the vacation compensation must be "dedicated to the acquisition, improvement, development, and related maintenance of public open space or transportation capital projects within the city or town." It is the City's practice to allocate most of the funding received from vacations to transportation or open space purposes. In 2022, under the 2022-2027 Capital Improvement Program, street vacation funds are allocated to the Central Waterfront project, bridge load rating and seismic improvements, non-arterial street resurfacing and restoration, and the SR-520 project.

Council Bill 120227

CB 120227 would remove the requirement to compensate the City for the appraised value of the vacated right-of-way for affordable housing projects funded through City, County, State or Federal funding, provided that the projects will have rent and income levels consistent with the City's <u>Housing Funding Policies</u>. Those policies require rents to be <u>affordable</u> to households earning less than 60 percent of Area Median Income.

CB 120227 would reduce the costs to develop affordable housing projects that require a street or alley vacation but would also reduce the funding available for transportation and open space capital projects. Affordable housing projects would still be required to pay the costs of reviewing the vacations. In 2022, that cost will be \$10,130.

Next Steps

The Transportation and Utilities Committee is scheduled to discuss the bill at its December 1 meeting. The Finance and Housing Committee is scheduled to consider and vote on the bill on December 7. If the Finance and Housing Committee votes on December 7, the City Council could take up the bill as early as December 13.

cc: Esther Handy, Director Dan Eder, Deputy Director Aly Pennucci, Policy and Budget Manager



Legislation Text

File #: CB 120227, Version: 1

CITY OF SEATTLE

ORDINANCE

COUNCIL BILL

AN ORDINANCE related to street vacations; amending Section 15.62.090 of the Seattle Municipal Code to exempt publicly funded affordable housing projects from compensating the City for vacations.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 15.62.090 of the Seattle Municipal Code, last amended by Ordinance 121661, is

amended as follows:

15.62.090 Compensation for vacation ((-,))

A. Ordinances vacating any street or alley or part thereof shall not be passed by the City Council until a sum equal to one-half ((($\frac{1}{2}$))) of the appraised value of the area vacated is paid to the City; ((;)) provided, that if the street or alley has been a part of a dedicated public right-of-way for ((twenty-five)) <u>25</u> years or more, the City shall be compensated in an amount equal to the full appraised value of the area vacated. In certain circumstances, provision of other valuable consideration acceptable to the City may be made in lieu ((Θ)) <u>of</u> up to one-half ((($\frac{1}{2}$))) of the payment; provided, that such consideration shall not be acceptable if it is required for the street vacation, it is considered a public benefit to meet the public benefit requirements of the street vacation, or it is required by other regulatory action. Acceptable consideration shall be quantified in dollars, which shall then be credited to the required payment.

<u>B.</u> City, State, and federal agencies shall be exempt from such payment, but shall pay to the City all costs incurred by the City in processing the vacation request.

<u>C. Petitioners shall be exempt from such payment if before passing the ordinance vacating a street or</u> alley, the project receives public funding or federal low-income housing tax credits and is subject to a regulatory agreement, covenant, or other legal instrument recorded on the property title and enforceable by The City of Seattle, Washington State Housing Finance Commission, State of Washington, King County, U.S. Department of Housing and Urban Development, or other similar entity as approved by the Director of Housing that restricts units at rent and income levels consistent with the City's Housing Funding Policies as adopted by Ordinance 125308 and subsequently amended. Petitioners exempt from compensating the City for the value of the right-of-way under this subsection 15.62.090 C shall pay to the City all costs incurred by the City in processing the vacation request.

<u>D.</u> As contemplated by RCW 35.79.035(3), <u>notwithstanding the provisions of subsections 15.62.090.B</u> <u>or 15.62.090.C</u>, the full market value shall be paid upon vacation of streets abutting upon bodies of water.

((B)) <u>E</u>. Conveyance of other property acceptable to the City may be made in lieu of the payment required by subsection <u>15.62.090</u>.A or <u>15.62.090</u>.D, whether required to mitigate adverse impacts of the vacation or otherwise. The full appraised value of the land conveyed shall be credited to the required payment. When the value of the in-lieu parcel is less than the payment required by subsection <u>15.62.090</u>.A or <u>15.62.090</u>.A or <u>15.62.090</u>.D, the petitioner shall pay the difference to the City. When the value of the in-lieu parcel exceeds the payment required by subsection <u>15.62.090</u>.A or <u>15.62.090</u>.D, the City shall pay the difference to the petitioner.

Section 2. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the	day of	, 2021, and signed by
me in open session in authentication of it	ts passage this day of	, 2021.

President _____ of the City Council

pproved / returned un	nsigned / vetoed th	s day of	, 2021.
	Jen	ny A. Durkan, Mayor	
iled by me this	day of	,	2021.
	 Mo	nica Martinez Simmons. (City Clerk

(Seal)

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Legislative	Lish Whitson/(425) 390-2431	

* Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.

1. BILL SUMMARY

Legislation Title:

AN ORDINANCE related to street vacations; amending Section 15.62.090 of the Seattle Municipal Code to exempt publicly funded affordable housing projects from compensating the City for vacations.

Summary and background of the Legislation:

This bill would amend Section 15.62.090 of the Seattle Municipal Code (SMC) to exempts affordable housing projects that receive street or alley vacations from requirements to pay the fair market value of the street or alley.

Under Washington State law, RCW 35.79.030, for most street or alley vacations, the City "may require the owners of the property abutting the street or alley to compensate the city or town in an amount that does not exceed the full appraised value of the area vacated."

SMC 15.62.090 exempts City, State and federal agencies from making that compensation. The bill would also exempt projects that receive public funding or federal low-income housing tax credits and is subject to rent and income limits consistent with the City's Housing Funding Policies. Such projects would still need to pay the for the costs of the City's review of the vacation, currently \$6,500.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? _____ Yes X_ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget?

___Yes <u>_X</u>_No

Does the legislation have other financial impacts to The City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs? Yes, the bill would reduce the amount of funding the Seattle Department of Transportation (SDOT) receives to the Street Vacation Fund and decrease costs to the Office of Housing for the construction of affordable housing on sites that require a street or alley vacation. Given the low number of vacations that the City considers each year, it is difficult to estimate the fiscal impact of this change. However, the City has received two vacation requests for affordable housing projects that require a street or alley vacation over the last three years. The value of the right-of-way to be vacated on these sites, both in the Rainier Valley, is
Lish Whitson LEG Affordable Housing Street Vacations SUM D1

estimated to be approximately \$500,000 each based on assessed land values near these properties. One of those projects is planned to be funded through Federal Low-Income Tax Credits and the other to be funded through City affordable housing funds. Consequently, the proposed legislation could reduce SDOT's by an average of \$333,333 a year and increase funding available for affordable housing projects financed by the Office of Housing by \$166,667 a year.

Is there financial cost or other impacts of not implementing the legislation?

If not adopted, affordable housing projects would continue to compensate SDOT for the value of the right-of-way, increasing costs to develop those projects and maintaining SDOT's funding.

3.a. Appropriations

This legislation adds, changes, or deletes appropriations.

Appropriations Notes:

Under State law, at least half of street vacation compensation is required to be used for transportation or parks and open space capital projects. The City's practice is to appropriate all of those funds to SDOT for transportation capital projects, except when the project involves a park project. Decisions regarding the timing of petitioners' compensation of the City for a street vacation is made by petitioners. Typically, the City receives compensation at the end of construction. Because of this uncertainty, street vacation compensation is not appropriated to SDOT until those funds are received.

3.b. Revenues/Reimbursements

_____ This legislation adds, changes, or deletes revenues or reimbursements.

Revenue/Reimbursement Notes:

As with appropriations, SDOT's street vacation revenue is not budgeted until compensation is received.

3.c. Positions

____ This legislation adds, changes, or deletes positions.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department? This legislation affects SDOT and OH, both of which have been consulted in developing the legislation.

- **b.** Is a public hearing required for this legislation? No.
- **c.** Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation? No.
- **d. Does this legislation affect a piece of property?** No.
- e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public? The proposed bill will reduce the costs of developing some affordable housing projects, increasing the number of units that can be built overall and increasing access to housing in Seattle by low-income residents. Given significantly lower median incomes of Black and Indigenous households, the legislation would disproportionately support Black and Indigenous communities.
- f. Climate Change Implications
 - 1. Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way? No.
 - 2. Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects. No.
- **g.** If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s). Not applicable.

List attachments/exhibits below: None



Legislation Text

File #: Res 32031, Version: 1

CITY OF SEATTLE

RESOLUTION

A RESOLUTION ratifying the 2021 Update to the Green/Duwamish and Central Puget Sound Watershed or Water Resource Inventory Area (WRIA 9) Salmon Habitat Plan, Making Our Watershed Fit for a King. WHEREAS, the 2021 Update to the WRIA 9 Salmon Habitat Plan ("WRIA 9 Plan") is an addendum to the 2005 WRIA 9 Salmon Habitat Plan, and includes new science, revised habitat goals and recovery strategies, an updated capital project list, and a monitoring and adaptive management plan; and
WHEREAS, 17 local governments in WRIA 9 ("Parties") have partnered through an inter-local agreement ("ILA") since 2001 to jointly fund development and implementation of the WRIA 9 Plan to address a shared interest in, and responsibility for, long-term watershed planning and salmon recovery in the Green/Duwamish and Central Puget Sound Watershed ("Watershed"); and
WHEREAS, in March 1999, the National Oceanic and Atmospheric Administration ("NOAA") Fisheries listed

the Puget Sound Chinook salmon evolutionary significant unit, including the Green River Chinook salmon population, as a threatened species under the Endangered Species Act ("ESA"); and

WHEREAS, local jurisdictions have authority over certain habitat-based aspects of Chinook survival through land use and other policies and programs, and the State of Washington and tribes, who are the legal comanagers of the fishery resource, are responsible for addressing harvest and hatchery management; and

WHEREAS, the WRIA 9 partners recognize participating in the ILA and implementing priorities in the WRIA

9 Plan demonstrates their commitment to address the ESA listing of Chinook salmon; and

WHEREAS, coordination and cooperation among federal, state, and local agencies, tribes, businesses, nongovernmental organizations, landowners, citizens, and other interests are essential to implement and

File #: Res 32031, Version: 1

adaptively manage a salmon recovery plan; and

- WHEREAS, the Puget Sound Partnership is the Puget Sound region's lead agency for planning and implementing the Puget Sound Salmon Recovery Plan, approved by NOAA Fisheries; and
- WHEREAS, the WRIA 9 Plan is one of 15 watershed-based chapters of the Puget Sound Salmon Recovery Plan; and
- WHEREAS, The City of Seattle supports cooperation at the WRIA level to set common priorities for actions among partners, efficient use of resources and investments, and distribution of responsibility for actions and expenditures; and
- WHEREAS, habitat protection and restoration actions to increase Chinook salmon productivity trends are necessary throughout the watershed, in conjunction with other recovery efforts, to avoid extinction in the near term and restore WRIA 9 Chinook salmon to viability in the long term; and
- WHEREAS, salmon recovery is interrelated with flood risk reduction, water quality improvement, open-space protection, recreation, economic development, and tribal treaty rights; and
- WHEREAS, The City of Seattle has a strong interest to achieve multiple benefit outcomes for people and fish across the watershed; and
- WHEREAS, the WRIA 9 Plan recognizes that salmon recovery is a long-term effort, and focuses on a ten-year implementation time horizon to allow for evaluation of progress and adaptation of goals and implementation strategies; and
- WHEREAS, it is important to provide jurisdictions, the private sector, and the public with certainty and predictability regarding salmon recovery actions in WRIA 9; and
- WHEREAS, if insufficient action is taken at the local and regional level, Chinook salmon populations in WRIA 9 are unlikely to improve and the federal government could list Puget Sound Chinook salmon as an endangered species, thereby decreasing local flexibility; and
- WHEREAS, the Parties previously took formal action to ratify the 2005 Salmon Habitat Plan; NOW,

File #: Res 32031, Version: 1

THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. The City of Seattle ratifies the Green/Duwamish and Central Puget Sound Watershed, Water Resource Inventory Area 9 Salmon Habitat Plan Update, Making Our Watershed Fit for a King ("WRIA 9 Plan"), attached to this ordinance as Attachment 1. Ratification is intended to convey The City of Seattle's support for the following:

A. Protecting and restoring habitat based on best available science with the intent to achieve sustainable, resilient, and harvestable populations of naturally spawning Chinook salmon.

B. Pursuing a multi-benefit approach to WRIA 9 Plan implementation that integrates salmon recovery, flood hazard reduction, water quality improvements, open space and recreation, and equity and social justice to improve outcomes for people and fish.

C. Using the WRIA 9 Plan as a source of best available science to inform local government actions, including, but not limited to land use, shoreline, and transportation planning/permitting.

D. Using capital project guidance, programmatic actions, and policy outlined with the WRIA 9 Plan to inform local priorities for implementation via grants, capital improvements, ordinances, and other activities. Ratification does not obligate any partner to implement any specific actions or adhere to specific timelines for such actions.

E. Working collaboratively with local, state, federal partners, and tribes to support and fund implementation of the WRIA 9 Plan, including monitoring and adaptive management to address scientific uncertainty, tracking, and communicating progress, and refining strategies to ensure cost effective investments.

Adopted by the City Council the	day of		_, 2021, and signed by
me in open session in authentication of its adoption	this	_day of	, 2021.

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President	of the	City	Council
		2	

The Mayor concurred the _____ day of _____, 2021.

Jenny A. Durkan, Mayor

Filed by me this ______ day of ______, 2021.

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:

Attachment 1 - Green/Duwamish and Central Puget Sound Watershed, Water Resource Inventory Area 9 Salmon Habitat Plan Update

Salmon Habitat Plan 2021 Update





MAKING OUR WATERSHED FIT FOR A KING



GREEN/DUWAMISH AND CENTRAL PUGET SOUND WATERSHED Water Resource Inventory Area 9 (WRIA 9)

Approved by the WRIA 9 Watershed Ecosystem Forum on February 11, 2021



Salmon Habitat Plan 2021 Update MAKING OUR WATERSHED FIT FOR A KING

Green/Duwamish and Central Puget Sound Watershed

Water Resource Inventory Area 9 (WRIA 9)

Approved by the WRIA 9 Watershed Ecosystem Forum on February 11, 2021

Alternate formats available

Voice: 206-296-6519 TTY Relay: 711

For Additional Copies of this Plan:

King County Water and Land Resources Division 201 South Jackson Street, Suite 201 Seattle, WA 98104 206-296-6519

Recommended Citation:

Water Resource Investory Area 9 (WRIA 9). 2021. Green/Duwamish and Central Puget Sound Watershed Salmon Habitat Plan 2021 Update. Making Our Watershed Fit for a King. Approved by the Watershed Ecosystem Forum February 11, 2021.

File Archive:

2102_10102L_W9SHP-REPORTt.indd King County IT Design and Civic Engagement Unit archives

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- Appendix F: Monitoring and Adaptive Management Plan

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Foreward

On behalf of the Green Duwamish and Central Puget Sound Watershed (WRIA 9) Watershed Ecosystem Forum, we are pleased to present this update to the 2005 WRIA 9 Salmon Habitat Plan, "Making Our Watershed Fit for a King" (2005 Plan). The 2021 WRIA 9 Salmon Plan Update (Plan Update) represents a renewed commitment to salmon recovery efforts in WRIA 9 and provides a science-based framework for identifying, prioritizing and implementing salmon recovery actions over the next 10-15 years. It refines and adds key recovery strategies based on new science and ensures resources will continue to be directed to where they provide the greatest benefit for Chinook salmon.

The original 2005 Plan translated science into actions. Plan implementation by multiple WRIA 9 entities in the last 15 years helped leverage over \$200 million of local, state and federal funding to realign more than 2 miles of levees to reconnect floodplains, restore over 4,500 feet of marine shoreline and revegetate 500 acres of riparian habitat. While we recognize these achievements, we also acknowledge that salmon recovery is a long-term endeavor that requires continued coordinated action. Chinook salmon numbers remain critically low and human population growth and climate change are only magnifying the challenges we face in salmon recovery.

Chinook salmon are an integral part of our regional identity. The Watershed Ecosystem Forum - a regional partnership of 17 local governments, state resource agencies, business interests and non-profit organizations – is collectively committed to implementing actions that will improve watershed conditions for our salmon populations. Plan implementation supports more than just salmon recovery; it supports tribal treaty rights, community flood hazard reduction, water quality improvement, open space protection, and outdoor recreation.

While the Green/Duwamish and Central Puget Sound Watershed has faced numerous challenges, we are optimistic about the future of our watershed. The downstream fish passage facility at Howard Hansen Dam, clean-up of the Lower Duwamish Waterway Superfund sites, and a regional commitment to integrated floodplain management reflect a projected investment of hundreds of millions of dollars over the next 10-15 years. As we work towards an improved future, we are reminded of a quote from a historical planning guide for the Green River corridor:

As we look at the Green River corridor, we must say, 'This is the way the people want it to be.' Therefore, in each locality, someone should steadily be asking, 'is this the way we want it to be, now and in the future?' The ultimate condition of the Green River Basin should be the result of informed and far-sighted public decisions.

River of Green, 1978

We look forward to collaborating with all our local, state, federal, and tribal partners in realizing our collective vision for this watershed and welcoming back ever stronger runs of salmon.

Sincerely,

Lion Ci. Schold

Councilmember Lisa Herbold City of Seattle Co-Chair WRIA 9 Watershed Ecosystem Forum

Councilmember Nancy Tosta City of Burien Co-Chair WRIA 9 Watershed Ecosystem Forum

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Financial Support

Funding provided by the WRIA 9 Interlocal Agreement among 17 local government partners and Cooperative Watershed Management funds provided by the King County Flood Control District.

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Executive Summary

This document updates the 2005 Green/Duwamish and Central Puget Sound Watershed (WRIA 9), Making Our Watershed Fit for a King, Salmon Habitat Plan. The 2005 Plan served as the blueprint for salmon habitat recovery in WRIA 9 for 15 years. It is fitting that the Puget Sound Regional Council awarded the original 2005 Plan a Vision 2020 Award. Although the Plan Update reflects over a decade of new science regarding salmon conservation and recovery since the award, the core recovery strategies and underlying scientific framework remain largely valid today and continue to provide an important foundation for salmon recovery. The Plan Update - designed to be a stand-alone document - is intended to update, not replace, the 2005 Plan. The two documents, along with the 2014 Duwamish Blueprint and the 2016 Regreen the Green, provide a science-based framework for identifying, prioritizing and implementing salmon recovery actions.

This document provides a status update for Green River Chinook salmon using the National Oceanic and Atmospheric Administration (NOAA)-approved viable salmon population (VSP) criteria. Over 20 years have passed since the listing of the Puget Sound Chinook salmon evolutionarily significant unit (ESU) under the Endangered Species Act (ESA). Despite significant investments and large-scale restoration projects, Green River Chinook salmon remain listed as Threatened. Population abundance, productivity, diversity and spatial distribution have not improved, and in some cases have continued to decline.

A Strategic Assessment Update summarizes new research findings that address important data gaps identified in the 2005 Plan. New information related to habitat use and fish productivity, climate change, temperature, and contaminants supported a reassessment of functional linages between priority stressors, habitat conditions, and VSP parameters. This information serves as the foundation for the other core elements of the Plan Update.

Although the Plan Update maintains existing NOAA-approved VSP goals, it introduces new 10-year habitat goals (implementation targets) that represent continued progress towards the long-term necessary future conditions for achieving a viable salmon population, as outlined in 2005 Plan. The numerical targets for key habitats serve as a benchmark for evaluating plan implementation over time and informing ongoing adaptive management.

The Plan Update outlines a portfolio of 12 recovery strategies – including embedded policies and programs – to address priority pressures; increase salmon abundance, productivity, and diversity; and build long-term population resiliency. Successful



PHOTO: ELI BROWNELL

PAGE

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Green River Natural Area

implementation hinges on partner coordination and investment to ensure local land use planning, capital investment programs, and community outreach messaging are consistent with identified watershed priorities.

An updated list of capital projects was developed in partnership with interlocal agreement member jurisdictions, non-profit partners, state agencies, and others engaged in salmon recovery. The updated project list identifies 127 capital habitat projects across the five subwatersheds. Individuals projects are ranked within their specific subwatershed – not across subwatersheds. Projects are tiered based on overall benefit towards recovery and to provide context for the level of financial need. Tier 1 projects have significant potential to advance recovery and substantively contribute to habitat goals. Tier 2 and Tier 3 have moderate and limited potential, respectively, to advance recovery and contribute to achieving habitat goals.

The Monitoring and Adaptive Management Plan (MAMP) outlines monitoring priorities intended to help evaluate progress and inform strategic adaptation of the recovery strategies. The MAMP establishes a framework for (1) tracking implementation goals, (2) assessing project effectiveness, (3) evaluating habitat status and trends, (4) evaluating the population status of Green River Chinook salmon, and (4) prioritizing research and monitoring investments. This framework will guide data collection to support regular assessment of progress and allow the WRIA to reassess prioritization and sequencing of recovery actions.



Background

The 2005 Green/Duwamish and Central Puget Sound Watershed Salmon Habitat Plan, Making Our Watershed Fit for a King, represented the culmination of over five years of technical reconnaissance, research, and policy development. The Plan was a local watershed-based response to the federal government's 1999 listing of Puget Sound Chinook salmon as "threatened" under the Endangered Species Act. The 2005 Plan – which received a Puget Sound Regional Council Vision 2020 Award – translated a tremendous wealth of science into discrete policy recommendations and management actions necessary to support recovery of natural origin Green River Chinook salmon.

The 2005 Plan provided the blueprint for Chinook salmon recovery in the Green/Duwamish and Central Puget Sound for 15 years. It helped watershed partners leverage upwards of \$200 million dollars of local, state and federal funding for salmon recovery. Plan implementation resulted in nearly 2 miles of levee setbacks, over 4,500 feet of marine shoreline restoration, and approximately 500 acres of revegetation. Despite of these accomplishments, the continued decline of Chinook salmon – both locally and regionally – highlights the urgent need for expanding and accelerating recovery efforts.

This Salmon Habitat Plan Update represents the next chapter of salmon recovery efforts in the Green/ Duwamish and Central Puget Sound Watershed. It provides a science-based framework for identifying, prioritizing and implementing salmon recovery actions over the next 10-15 years. The integration of over a decade of new science informed important refinements to recovery priorities and investment strategies outlined in the 2005 Plan. These refinements reflect the watershed's commitment to adaptive management and ensure that limited resources are directed to where they can provide the greatest benefit towards Chinook salmon recovery. Although the focus of this plan is on Chinook salmon recovery, implementation will also provide parallel benefits to other salmon and steelhead.

Regional Salmon Recovery Context

This addendum updates the Green/Duwamish and Central Puget Sound watershed chapter of the National Oceanic and Atmospheric Administration (NOAA)-approved 2007 Puget Sound Salmon Recovery Plan. The Green River Chinook salmon population is one of six Chinook salmon populations in the Central/South sub-basin and one of 22 remaining populations in the Puget Sound Chinook salmon evoFigure 1. Green/Duwamish and Central Puget Sound Chinook salmon recovery timeline.

Chinook Salmon Recovery Timeline Green River Chinook salmon escapement Railroad 1870 8,000 Northern Pacific Railroad survey triggers land boom Natural spawners 750k 7.000 Source: WDFW salmonid Logging 1881 stock inventory 6,000 First splash dam built for logging in Washington 5.000 **Population 1890** Seattle population 42,000 4,000 650k White River 1906 3,000 Diverted out of the Green River into the Puyallup River 2,000 Harbor Island finished 1909 1,000 Much of the Duwamish Estuary filled for industry 550k MILD PUCKI SOUND CHINOOK SHI MON RUN SIZE 450k WRIA 9 Chinook Diverted away from the Green River, salmon abundance goals: Green River 1919 returning natural origin 1,000-4,200 Private levee construction begins spawning adult fish by 2025 throughout the river 350k 27,000 returning natural origin spawning adults by 200 **Population 1950** spawning adults by 2055 Seattle 465,000 250k **Green River 1963 Puget Sound** Howard Hanson Dam Built Wild Chinook 150k 4 **Population** 50k 0k 1999 1870 1881 1890 1906 1909 1913 1916 1919 1950 1963 1975 2009 2016 2019 Puget Sound Lowest number Chinook of natural origin listed as spawners (182)

Why does the data on salmon abundance begin to improve in 1975?

The quality of data on annual salmon population runs improves starting in 1975, when the Washington Department of Fisheries (predecessor to the Washington Department of Fish and Wildlife) initiated data collection in response to the federal court mandate to develop and share annual abundance of salmon returning to individual rivers in Puget Sound.

14

Population 2016 Seattle: 689,000

recorded in the

Green River

threatened

species

lutionary significant unit (ESU). NOAA ESU recovery criteria require status improvement in all populations and two to four viable populations in each of the sub-basins.

The Puget Sound Partnership (Partnership), the state agency leading the region's collective effort to restore and protect Puget Sound, serves as the regional salmon organization for the 15 lead entities within the Puget Sound, advised by the Puget Sound Salmon Recovery Council. The Partnership co-manages the Puget Sound Acquisition and Restoration Fund and works in partnership with the Governor's Salmon Recovery Office and Recreation and Conservation Office (RCO) on statewide salmon recovery issues. The Salmon Recovery Funding Board, facilitated by the RCO, is a Governor-appointed 10-person board with a primary responsibility for making grants and loans for salmon habitat projects and salmon recovery activities. This salmon recovery infrastructure, and the grant and loans for habitat project implementation, is supported through state and federal funds from NOAA's Pacific Coast Salmon Recovery Fund and the State Salmon Recovery Funding. Additionally, within Puget Sound, salmon recovery is supported by the Puget Sound Acquisition and Restoration Fund.

WRIA 9 Organizational Structure

Water Resource Inventory Area (WRIA) 9 serves as a lead entity for salmon recovery under the State of Washington's watershed-based framework for salmon recovery established under RCW 77.85. It is a watershed-based organization comprised of local, state and federal partners, non-profit organizations, business interests, and citizens. Per statute, WRIA 9 is mandated to "compile a list of habitat projects, establish priorities for individual projects, define the sequence for project implementation, and submit these activities as the habitat project list. The committee shall also identify potential federal, state, local, and private funding sources."

The 17 local governments within the Green/Duwamish and Central Puget Sound Watershed (WRIA 9) formalized a partnership under an interlocal agreement (ILA) (WRIA 9 ILA) in 2000. The initial ILA (2000–2005) funded a strategic, science-based assessment of the watershed and a long-term, comprehensive recovery plan for the Green River Chinook salmon population. Following approval of the 2005 Salmon Habitat Plan, the local government partners forged a 10-year ILA from 2007–2017 intended to guide plan implementation and adaptive management. The ongoing commitment to watershed-based salmon recovery was renewed in 2017. The current ILA extends through 2025.

The WRIA 9 Watershed Ecosystem Forum (WEF) serves as the advisory body for plan implementation and adaptive management. It is comprised of elected officials from the ILA partners and other watershed stakeholders. The Management Committee serves as the executive committee to the WEF. It directs work plan development and manages the ILA budget. The Implementation Technical Committee (ITC) is a technical- and policy-focused subcommittee that supports plan implementation and adaptive management. The ITC defines monitoring and research priorities, interprets new technical information as it relates to salmon recovery, and provides science-based recommendations to WEF.

Equity and Social Justice

Salmon recovery efforts within the Green/Duwamish and Central Puget Sound watershed overlap with numerous communities experiencing deeply entrenched social, economic, and environmental inequities. Race and place influence opportunity and quality of life. People of color, immigrants, and low-income residents experience inequities in access to key determinants of equity - including access to parks and natural resources. Although best available science drives project identification and prioritization, equity and social justice (ESJ) issues should be carefully considered. Applying an ESJ lens to habitat projects can help ensure salmon recovery efforts align with ESJ initiatives and do not inadvertently reinforce existing inequities. Integrating residents and community-based organizations into project design can help build community support and achieve multi-benefit outcomes that advance equity in the watershed.



Chapter 2: Green/Duwamish and Central Puget Sound Watershed – A Snapshot

The Green/Duwamish and Central Puget Sound Watershed spans 575 square miles of diverse landscape, ranging from an industrial waterfront to preserved old growth forest. This section provides a high-level overview of the five subwatersheds (Upper Green, Middle Green, Lower Green, Duwamish, and Nearshore) that serve as an overarching framework for salmon recovery. It also provides context for the strategies and actions outlined in subsequent chapters. For a more comprehensive review, please refer to the Chapter 3 of the 2005 Salmon Habitat Plan.

The Upper Green Subwatershed extends upstream of Howard Hanson Dam, river mile 64.5, and represents approximately 45 percent of the Green/ Duwamish River watershed. Historically, the Upper Green provided important spawning and freshwater rearing habitat for Chinook salmon. It encompasses between 78-165 miles of suitable instream habitat, although fish passage has been blocked by a combination of the Tacoma Headworks Diversion Dam and Howard Hanson Dam since 1911.

Checkered ownership in the subwatershed complicates coordinated land management. Although the primary land use is commercial forestry, the Upper Green also serves at the primary municipal water supply for the City of Tacoma. Additionally, a road and railroad alignment have constrained the river in places, the Upper Green Subwatershed is largely undeveloped and contains relatively high-quality, yet currently inaccessible, aquatic habitat. Long-term recovery of Chinook salmon depends on providing fish passage to the Upper Watershed.

The Middle Green Subwatershed extends between river miles 64.5 and 32. It includes the two largest tributaries to the Green River – Soos and Newaukum Creeks. Low-velocity habitats, including off-channel habitats, sidechannels, floodplain wetlands, and river edge, provide important rearing and refuge habitat for juvenile Chinook.

Land use in the Middle Green is characterized predominantly by agricultural lands and rural residential development. Land use development adjacent to river and tributaries has resulted in loss of riparian habitat contributing to elevated instream temperatures. Modified flow regimes have disrupted natural transport of large wood and sediment. In addition, a network of training levees designed to restrict lateral channel migration – as opposed to prevent flooding – have simplified channel complexity along some reaches. Restoring floodplain connectivity and expanding rearing habitat capacity are critical to increasing Chinook salmon productivity. **The Lower Green River Subwatershed** flows from river mile 32 downstream to river mile 11. It serves as an important migratory corridor for adult upstream migration and juvenile downstream migration. Available rearing and high-flow refuge habitat is limited compared to the Middle Green – many reaches currently lack large wood, side channels, sloughs, and slow-water edge habitats. The Lower Green River also supports Chinook salmon spawning upstream of approximately river mile 25.

The Lower Green River valley is the second largest warehouse and distribution center on the west coast. The floodplain is heavily developed and characterized by a combination of industrial, commercial, and urban residential development. The 1906 diversion of the White River left the floodplain perched above the mainstem channel and disconnected historic off-channel habitats. An extensive network of flood control facilities (27 miles of levees and revetments) currently restricts floodplain connectivity and limits channel complexity. A corresponding loss of riparian tree canopy contributes to elevated instream temperatures. An integrated, multi-benefit approach to floodplain management is needed to balance fish habitat needs with flood risk reduction and other community priorities in this subwatershed.

The Duwamish Subwatershed extends from river mile 11 at the Black River Pump Station downstream to the north end of Harbor Island. The extent of salt influence – as depicted by the saltwater wedge – varies based on flows and tide, but can extend upstream as far as the Foster Bridge (RM 10.2) during low flows and high tides. Juvenile Chinook rear in the estuarine waters of the Duwamish as they undergo the physiological transition from fresh to saltwater habitats.

Extensive dredge and fill of the Duwamish has transformed the estuary into an industrial waterway, characterized by straightened channel with armored banks and a lack of riparian tree canopy. More than 98 percent of the historical tidal wetlands have been transformed into commercial and industrial land uses. The U.S. Environmental Protection Agency declared the Lower Duwamish Waterway a "Superfund" site in 2001 due to legacy contamination, and clean-up is not expected to be complete for another decade. Sediment cleanup and restoration of estuarine habitat are essential to increasing juvenile Chinook salmon survival. The Nearshore Subwatershed extends 92 linear miles from Elliott Bay south to the Pierce County boarder, including Vashon Island. It represents the interface of upland and aquatic habitats; shallow productive zone and deep water habitats; and fresh and marine waters. The nearshore is a dynamic environment – shaped by wave energy and sediment transport that support high species diversity. A variety of habitats, including beaches, eelgrass beds, and pocket estuaries, provide important foraging habitat and a migratory corridor to the Pacific Ocean for juvenile Chinook salmon.

Development along the marine shorelines has altered significant stretches of the nearshore ecosystem. Approximately two-thirds of WRIA 9 shoreline is armored, which has disrupted natural sediment delivery and transport. The intensity of shoreline development varies substantially across the watershed. The highest intensity development is located along the industrial and commercial shores of Elliott Bay. The mainland shoreline from Seattle south to Federal Way is predominantly residential. Vashon Island is predominantly rural. Improving nearshore habitat is essential to increasing juvenile salmon residence times, growth rates, and overall marine survival.







Chapter 3: The Chinook Salmon Life Cycle – Connecting a Diverse Watershed

The Green/Duwamish and Central Puget Sound Chinook salmon life cycle provides a common thread linking together a diverse watershed. Each of the five distinct subwatersheds plays a critical role in the Chinook salmon life cycle. Recovery of a viable salmon population hinges on collective action across the watershed to improve aquatic habitat. The conceptual life cycle model presented in the 2005 Salmon Habitat Plan remains an important tool for assessing aquatic habitat needs in relationship to priority stressors that adversely impact survival at distinct life history stages and across different life history types. Understanding aguatic habitat needs throughout the life cycle and how they relate observed bottlenecks in survival allows recovery managers to strategically focus limited resources where they are expected to provide the largest benefit to recovery objectives. Figure 5 highlights the relationship between the subwatersheds and specific life history phases.

Adult Upstream Migration/ Spawning

Chinook salmon enter the Green/Duwamish between July and October. Timing of river entry and upstream migration is impacted by water temperature and flow. Spawning generally occurs mid-September through October, between approximately river miles 25 and 61. Spawning primarily occurs within the Lower and Middle Mainstem Green River and Newaukum Creeks. Additional spawning occurs in Soos, Burns and Covington Creeks. Fish passage to the upper watershed has been blocked by a combination of the Tacoma Headworks Diversion Dam (1911) and Howard Hanson Dam (1961). Although fish passage was provided at the Tacoma facility in 2007, a downstream fish passage facility has not been completed at Howard Hanson Dam. The dams also block natural gravel delivery and transport; however, available spawning habitat does not appear to be a limiting factor in Chinook recovery.

Egg Incubation/Emergence

Egg incubation and alevin emergence generally occurs September through January within the same reaches where spawning occurs. Timing is variable and influenced by water temperatures – warmer temperatures drive an earlier emergence. Highflow events and sedimentation during this critical development period can scour redds and result in high mortality. As a result, flow management at Howard Hanson Dam influences incubation/ emergence success.

Juvenile Freshwater Rearing/ Migration

Juvenile Chinook salmon rear in the Lower and Middle Green subwatershed from mid-December to mid-July. The length of the freshwater rearing period varies among life history types (Figure 5) and is influenced by habitat availability and flows. Subyearling Chinook rely on low-velocity habitats, including mainstem river margins, pools, and offchannel habitats. Rearing habitat availability is a limiting factor for Chinook productivity. Extensive flood control facilities and floodplain development have disconnected floodplain habitats, reduced habitat complexity, and eliminated much of the historic freshwater rearing habitat. Instream flows influence accessibility of off-channel rearing habitats. During low-flow periods, off-channel habitats and floodplain wetlands may become disconnected from the mainstem. In contrast, high-flow events may flush juvenile Chinook downstream if they are unable to access suitable refuge habitat. Given the connection to instream flows, flow management at Howard Hanson Dam can impact habitat connectivity/ availability during the rearing period.

Juvenile Estuary Rearing

Subyearlying Chinook salmon generally migrate downstream into the Duwamish estuary between February and July, with fry-type life histories predominantly entering earlier in the year (Feb-Mar) than parr (May-Jun). Residence times in the Duwamish vary considerably, with some fish spending days and others (i.e., estuarine reared fry) spending weeks to months in the estuary. The Duwamish Estuary specifically the transition zone (RM 1-9) - is critical for juvenile salmon making the physiological transition from fresh to salt water. Juvenile Chinook salmon rely on shallow, low gradient habitats (e.g., marshes, mudflats, and tidal sloughs) to escape stronger currents and support efficient foraging and growth prior to entering Puget Sound. Extensive industrial development along the Duwamish has transformed the estuary to an industrial waterway, resulting in extensive loss of slow water rearing habitats and contamination of sediments. The lack of high-quality habitat may contribute to accelerated downstream migration and reduced survival upon entry into Puget Sound.

Figure 4. The Salmon Cycle

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Figure 5. Primary Chinook salmon life history types in the Green River (updated and modified from Ruggerone and Weitkamp 2004).

Marine Nearshore Rearing

Juvenile Chinook salmon generally rear in the Puget Sound nearshore from later winter through fall. Shallow nearshore habitats support foraging, growth, and refuge from predators, while also providing a migratory corridor to offshore waters. Although considerable uncertainty surrounds marine nearshore habitat use by juvenile Chinook salmon, it is widely accepted that the early marine rearing period is a critical period of growth that strongly influences long-term survival. The Central Puget Sound marine nearshore waters not only support Green River Chinook, but also at least eight different stocks of Puget Sound Chinook salmon. Shoreline development has extensively modified nearshore habitat and processes in WRIA 9. The most intense shoreline modifications are located in urbanized Elliott Bay, with more natural shorelines located along the largely rural Vashon Island.

Ocean Migration

By fall, most Green River Chinook exit the Strait of Juan de Fuca and migrate north along the outer coast of Vancouver Island. While Chinook salmon may spend up to five years in marine waters, most Green River Chinook spend two to three years at sea before returning to spawn. In addition to predators, Chinook salmon are subject to various commercial fisheries during their marine migration.



Chapter 4: Current Population Status and Recovery Goals

Recovery goals provide a framework from which to evaluate both plan implementation and overall progress towards Chinook recovery. Tracking population metrics and habitat conditions provides important data used to evaluate current population status and overall habitat conditions. This information serves as a key input for informing ongoing adaptive management.

Viable Salmon Population Criteria – Current Status and Goals

The Viable Salmon Population¹ (VSP) concept – as defined by National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) – provides the foundation for all established recovery goals for Chinook salmon within the Green/Duwamish and Central Puget Sound Watershed. NMFS defines a viable salmon population as a population that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year timeframe (McElhany et al. 2000). The VSP goals outlined in this section remain unchanged from the 2005 Plan and are presented in Table 1. They are based on recovery planning targets developed by a team of scientists (Puget Sound Technical Recovery Team) appointed by NOAA to support the original 2007 Recovery Plan for Puget Sound Chinook.

Four parameters are used to assess the viability of salmon populations: abundance, productivity, spatial structure and diversity. These parameters are reasonable predictors of extinction risk, reflect general processes important to all salmon populations, and measurable over time.

Abundance

Abundance is the number of individuals in the population at a given life stage or time. The number of natural origin Green River Chinook spawners is the primary abundance indicator. Chinook abundance indicates an overall decline since before the first plan was adopted in 2005 (Figure 6 and Table 1). In 2009, the number of Natural Origin Spawners (NOS) was the lowest ever recorded, with less than 200 fish. For five of the past 10 years (2010–2019), the number of NOS has been below the planning target range (1,000 -4,200 NOS) for WRIA 9.

¹ NOAA technical Memorandum NMFS-NWSSC-42: Viable salmonid populations and the recovery of evolutionarily significant units.

Table 1. Viable Salmon Population (VSP) Goals

VSP Parameter	Indicator	2006-2010 (average)	2011-2015 (average)	2016-2019 (average)	10-Year Goal	50-100 Year Goal
Abundance	Natural Origin Spawners	1975 (average)	963 (average)	2041 (average)	1000-4200 ²	27,000
Productivity	Egg-to-Migrant Survival	2.9%	8.7%	5.3%ª	>8%	>8%
	Percent Hatchery Origin	56.4%	60.6%	68.2%	Decreasing	<30%
Diversity	Proportion 5-6 yr- old Spawners	19.2	9.6%	N/A	Increasing	>15%
	Relative Abundance of Parr	46%	30.6%	32.8%ª	No Target ³	No Target
Spatial Diversity	Spawning Distribution	Spawning in Green River mainstem (below Howard Hanson Dam), Newaukum Creek and Soos Creek		Spawning above Howard Hanson Dam	Maintain spawning distribution	

Data Source: WDFW Salmonid Stock Inventory and NOAA Salmon Population Summary Database

°2016-2018

² A range is used because the productivity of each year's run varies depending on a variety of factors. If fish are experiencing high productivity, fewer adults are needed to reach future targets than if they are experiencing low productivity, which would require more fish returning to reach future targets.

³ No target established because it is not considered a reliable metric of diversity. However, relative abundance of fry and parr does provide important information for projecting future abundance.

Productivity

Productivity or population growth rate is the ratio of abundance in the next generation as compared to current abundance. The WRIA uses WDFW data to track egg-to-migrant survival rates as a primary means of evaluating productivity (WRIA 9 ITC 2012). Egg-to-migrant survival rate is defined as the proportion of fertilized eggs that survive to migrate as fry or parr into the Lower Green, as quantified by the Washington Department of Fish and Wildlife (WDFW) smolt trap at river mile 34. Although, the average rate for wild Chinook populations is 10.4 percent (Quinn 2005), the WRIA set a target of 8 percent because the elevated proportion of hatchery fish on the spawning grounds is assumed to reduce reproductive fitness (see VSP diversity metric below). Between 2006 and 2018, the survival rate has ranged from 0.09 percent to 11 percent, with an average of 5.7 percent (Table 1). While the long-term average is below the target, the egg-to-migrant survival rate has exceeded the 8 percent target in five of the last 10 years of data.

VSP-Spatial Structure

The WRIA has not directly tracked a specific indicator or metric for spatial structure. However, natural origin adults predominantly spawn in Newaukum Creek and the mainstem Green River. Recent changes to hatchery operations will maintain the area in Soos Creek above the weir as a natural production emphasis area with only natural-origin adults passed above the weir. Adult Chinook will not be passed upstream of Howard Hanson Dam (HHD) in order to access the upper watershed until downstream fish passage is provided at HHD. A 2019 Biological Opinion (BiOp) issued by the National Oceanic and Atmospheric Administration (NOAA) found that the construction of a downstream fish passage facility at HHD was necessary for the recovery of Chinook salmon, steelhead, and Southern resident orcas. It sets a 2030 deadline for construction and operation of a downstream fish passage facility. For the spatial structure of the population to improve, natural origin spawners are needed within both of these areas that were part of their historic range.





Data Source: WDFW Salmonid Stock Inventory and NOAA Salmon Population Summary Database.

VSP-Diversity

Diversity is the variety of life histories, sizes, and other characteristics expressed by individuals within a population. WRIA 9 has used three metrics to measure diversity:

- Percentage of hatchery origin spawners. The target is for fewer than 30 percent hatchery origin Chinook spawners (HSRG 2004). The target has not been met since 2002, and since plan adoption in 2005, the proportion of hatchery fish on the spawning grounds has ranged from 35 percent to 75 percent and has appeared to be increasing (Table 1);
- Percentage of juvenile Chinook that outmigrate as parr. Based on recent analyses, this indicator is influenced by basic habitat capacity, the number of natural origin spawners, and the streamflows experienced during rearing (Anderson and Topping 2018). As such, tracking the percentage of parr is no longer recommended as a reliable metric for evaluating diversity of the population. However, the metric does continue to provides important population-level information related to productivity; and
- Proportion of natural origin adults that return as five- and six-year old fish, with a simple target of an increasing percentage of older fish returning over time. Since 2005, there have been no six-year old fish, thus monitoring data reflect only five-year old Chinook. Excluding 2009, which was an outlier year with the lowest return of adults on record, the proportion of five-year olds has ranged from a high of 17 percent to a low of 1 percent (Table 1). The average percent return from 2006 to 2015, 14.4 percent, is similar to the average over the last 46 years of 15.4 percent.

Habitat Goals – Implementation Targets

Habitat goals outline both the necessary future ecological conditions to support a viable salmon population and shorter term implementation targets designed to assess plan implementation progress. WRIA 9 developed goals for key ecological indicators that reflect priority habitat needs and environmental stressors that span all life stages of Chinook salmon – adult migration, spawning, incubation and emergence, stream rearing, downstream migration, estuary rearing, and nearshore foraging. The indicators and associated goals presented in Table 2 are organized by subwatershed. This Plan Update does not outline specific goals related to marine migration outside of WRIA 9 boundaries.

WRIA 9 developed long-term goals – or necessary future conditions – during the development of the 2005 plan using scientific guidance developed by the Puget Sound Technical Recovery Team. The 2004 WRIA 9 Strategic Assessment and 2005 Salmon Habitat Plan summarize the full suite of necessary future conditions to support a viable salmon population in the Green/Duwamish and Central Puget Sound Watershed. They were not amended as part of this Plan Update. The subset of necessary future conditions outlined in Table 2 represents a strategic subset that can be readily assessed related to project implementation across shorter intervals of time.

Table 2 also outlines updated short term - 10 year - habitat targets used to directly track plan implementation. The 10-year targets were developed by the WRIA 9 Implementation Technical Committee based on a review priority stressors, limiting factors, implementation progress under the 2005 Plan, and a review of common indicators proposed for regional tracking by the Puget Sound Partnership. Specific targets are intended to be aspirational and reflect the significant level of investment needed to substantively advance recovery within the watershed. The Monitoring and Adaptive Management chapter summarizes recommended methodology and timelines for periodic assessments of these and other longer-term status and trends indicators (e.g., water temperature, contamination).

Necessary Future Conditions and Implementation Targets					
Habitat Indicator	Necessary Future Cond. (2005 Plan)	10-year Target 2005 Plan (achieved)	Current Condition	Recommended 10-year Target (2030)	
Marine Nearshore					
Shoreline Armor	65% of shoreline in natural condition	Restore 13,500 ft of shoreline (1500 ft restored – net gain of 70 ft of armor).	36%/33 mi of shoreline in natural condition	Remove 3,000 ft of hard armor and achieve a net reduction in hard armor.	
Marine Riparian Vegetation	65% of marine shoreline characterized by riparian tree cover	No target developed	40%/36 mi of shoreline has riparian tree cover	Revegetate 60 ac and/or 3.25 mi (~3.5% gain) of shoreline.	
Shoreline Conservation	Not applicable	Protect 5 mi of shoreline. (4 mi protected).	9.5 mi of adjacent upland protected as natural lands	Acquire 2 mi of shoreline for permanent protection, prioritizing beaches and feeder bluffs.	
Duwamish	_	_			
Shallow Water Habitat	173 ac of shallow water habitat in the transition zone (RM 1-10) (30% of historic)	Restore 26.5 ac of shallow water habitat (~6 ac restored)	Unknown	Create 40 ac of shallow water habitat between RM 1-10.	
Riparian Forest	65% of each bank of the river has > 165 ft of riparian tree cover- age (586 ac total)	No target was developed	69 ac/12% of 165 ft buffer contains tree cover	Revegetate 170 ac (~29% of 165-ft buffer)/9.8 mi of streambank.	
Lower Green					
Off-Channel Habitat	45% of historical off-channel habitat. Restore 2.8 mi of side channels, 450 ac of floodplain wetlands, and 5,039 ac of connected 100-yr floodplain habitat (total of 8,839 ac of connected 100-yr floodplain).	Restore 16.5 ac of reconnected off-channel and riparian habitat (20.7 ac restored)	3,800 ac of connected 100-yr floodplain that is accessible to juvenile fish	Restore 240 ac of floodplain habitat. Side Channels: 550-ft high flow/ 3,740-ft low flow Floodplain Tributaries: 3,080 ft Backwater: 75 ac Floodplain Wetland: 66 ac Other 100-yr Floodplain: 99 ac	
Riparian Forest	75% of each bank of the river to >165 ft wide (828 ac total)	No target was developed	222 ac/27% of 165-ft buffer contains tree cover	Revegetate 250 ac (~30% of 165-ft buffer)/ 8.52 mi of high-priority, unforested shoreline	

Table 2. Green/Duwamish and Central Puget Sound Habitat Goals.

(continued on next page)

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Necessary Future Conditions and Implementation Targets, continued						
Habitat Indicator	10-year Target Necessary Future 2005 Plan Habitat Indicator Cond. (2005 Plan) (achieved) Current Condition		Recommended 10-year Target (2030)			
Lower Green, cont	inued					
Large woody debris	1,705 pieces per mi (21 key pieces)	No target developed.	2004: 54 pieces/ mi. 2014: 48.5 pieces/ mi.	Achieve 425 pieces/mi.		
Bank armor	No new, decreasing amount	No new, decreasing amount	2014: 42 mi of river bank armored (17.7-mi levees; 9.8 mi maintained revetments; 14.5 mi of semi-armored roads acting like levees and natural banks)	Set back 1 mi of levee.		
Middle Green						
Floodplain connectivity/lateral channel migration	Floodplain subject to lateral channel migration represents 65% of historical conditions	Restoration of 50 ac of off-channel habitat and riparian vegetation (45 ac restored)	2017: 1,751 ac or 55% of historic floodplain connected	Reconnect 200 ac of floodplain as measured by area subject to lateral channel migration.		
Riparian forest	 > 65% of Channel Migration Zone (1,424 of 2,190 ac) and up to 165 ft wide where possible 	No target developed	2005: 50.3% 2009: 50.5% of the Channel Migration Zone forested	Revegetate 175 ac (8% of Channel Migration Zone).		
Large wood debris	10 jams/mi	No target developed	2006: 2.2 jams/mi 2015: 3.8 jams/mi	Achieve 5 jams/mi.		
Bank armor	No new, decreasing amount	No new, decreasing amount (>1% reduction)	2004 : 25% armored 2009 : 24% armored	Set back 1 mi of revetment/ levee.		
Upper Green						
Fish passage	Up and downstream fish passage at Howard Hanson Dam	Fish passage provided (upstream passage provided)	Upstream passage facility complete. Downstream passage not complete.	Provide downstream passage at Howard Hanson Dam.		
Bank armor	No new, decreasing amount	No new, decreasing amount	2004: 15% armored 2009: 15% armored	Remove/setback 0.5 mi of bank armoring.		


Chapter 5: Strategic Assessment Update -New Science on Priority Pressures

The 2005 Strategic Assessment provided the scientific foundation for the Salmon Habitat Plan. Although the majority of science remains relevant today, new research findings have refined our understanding of priority pressures and limiting factors related to Viable Salmon Population (VSP) criteria. The 2005 Strategic Assessment evaluated functional linkages between priority pressures; habitat conditions; and Chinook abundance, diversity, productivity and spatial structure. The functional linkages were used to create a series of conservation hypotheses that outlined how improvements in habitat conditions and natural processes will drive changes in VSP parameters.

From 2017-2018, WRIA 9 produced a series of white papers as addendums to summarize new research and address priority data gaps in the original 2005 Strategic Assessment. White papers included *Fish Habitat Use & Productivity* (Higgins 2017); *Water Temperature* (Kubo 2017); *Contamination* (Colton 2018); and Climate Change (Engel, Higgins and Ostergaard 2017). This chapter provides a summary of the highlights of those papers as they relate to priority pressures impacting Chinook salmon in the Green/ Duwamish Watershed. These refinements in our understanding of priority pressures informed both the recovery strategies presented in Chapter 6 and the prioritization of capital projects in Chapter 7.

Priority Pressures (Basin of Focus)

Addressing priority habitat stressors is critical to restoring a viable salmon population in the Green/ Duwamish and Central Puget Sound Watershed. The following stressors have clear functional linkages to one or more VSP parameters (abundance, productivity, diversity, and spatial structure). Applicable research and monitoring information is highlighted to reflect new research and best available science since the 2005 Plan.

Altered Instream Flows (Middle Green, Lower Green)

Watershed Status

Operations at Howard Hanson Dam (HHD) and the Tacoma Headworks diversion dam regulate instream flows within the mainstem Green River below river mile 64.5. Water storage, diversion, and release are jointly managed by the U.S. Army Corps and Tacoma Water utility. Although flood risk reduction is the primary mission of HHD, water storage also supports Tacoma municipal and industrial uses, and fish conservation uses. In 2007, Tacoma Water's Additional Water Storage Project provided capacity to store an addition 20,000 acre-feet (ac-ft) for municipal use.

Figure 7. Howard Hanson Dam spring water storage and allocation.



Source: United States Army Corps of Engineers, Seattle District.

Water capture and storage generally occur between late February and June 1. Figure 7 depicts how a spring water storage target of 49,000 ac-ft is legally allocated between municipal and fish conservation uses. Phase 2 of the Additional Water Storage Project (to be completed at a later date following downstream fish passage) would raise the conservation pool to 1,177 feet and store an additional 12,000 ac-ft of water. The U.S. Army Corps convenes a bi-weekly Green River Flows Management Coordination Committee to inform water capture and a subsequent flow augmentation period that extends from July 15 to November depending on fall rainfall. Augmentation of flows is intended to support Chinook salmon migration and spawning, maximize summer rearing habitat, and minimize dewatering of steelhead redds. Limited Fish Conservation and Ecosystem Restoration allotments frequently require tradeoffs among these ecological benefits - especially in dry and/or warm vears with low snowpack. The Tacoma Water Habitat Conservation Plan establishes a minimum stream flow of 225 cubic feet per second (cfs) at the Auburn

gauge. During the summer of 2015, the minimum flow at the Auburn gauge reached 226 cfs.

Although flows are not regulated in tributaries, instreams flows are impacted by stream withdrawals and groundwater wells used to support residential and agricultural uses. In 2018, the Washington Legislature passed the Streamflow Restoration Law to offset the impacts of future permit exempt domestic groundwater withdrawals and help restore instream flows. The law was in response to a 2017 Washington State Supreme Court decision (Hirst Decision) that restricted building permits for new residential homes that would be reliant on permit-exempt wells. The legislature appropriated \$300 million over 15 years to support implementation of projects to improve stream flows across the state. The Washington State Department of Ecology is developing a Watershed Restoration and Enhancement Plan to identify and prioritize water offset projects in WRIA 9.

Research/Monitoring

Flow management at HHD dictates instream habitat conditions within the mainstem Green River. As a result, water storage and subsequent release timing not only impacts natural hydraulic processes, but also influences available salmon habitat and productivity. Maintaining minimum instream flows of 250 cfs during dry summer months provides important benefits to available fish habitat. However, associated water capture and storage has reduced the frequency and magnitude of high – habitat forming – flows while prolonging the duration of moderate flows (Higgins 2017). Moderate flows between 5000-8000 cfs are not sufficient to drive process-based habitat formation, but do have the potential to scour redds (R2 Resource Consultants 2014).

Flows above 8,800 cfs are needed to initiate lateral channel migration and support creation of off-channel habitats that are critical for juvenile Chinook rearing (Konrad et al. 2011).

Long-term juvenile Chinook outmigration data collected by WDFW highlights the function relationship between instream flows and Chinook productivity (Anderson and Topping 2018). High flows (between ~8,000-10,000 cfs) from November through mid-January appear to scour eggs, sharply reducing the overall productivity of the number of juveniles per spawner. High flows (~6,000-8,000 cfs) during the typical fry outmigration period (mid-January through the end of March) reduce the number of parr produced in the Middle Green, likely because fish are flushed into habitats downstream of the trap. The frequency of spring flows (April through June) above 1,200 cfs appears to increase the number of parr produced. This is likely due to increased connectivity to off-channel habitats, like side-channels. A separate study (R2 Resource Consultants 2013) showed that, at flows below 1,200 cfs, side channel habitats become less connected to the mainstem and overall habitat complexity decreases.

Climate Change (Watershed-wide)

Watershed Status

Climate change science was not incorporated into the 2005 Plan because future climate scenarios were unclear. However, climate change has been the focus of intense research, both global and regional, over the last decades. This research highlights the need to prepare for the current and future impacts of climate change and incorporate what we know about climate change into salmon recovery actions.

Climate change will directly impact salmon recovery work in the Green/Duwamish and Central Puget Sound watershed. The UW Climate Impacts Group (Mauger et al. 2015) and others predict that Pacific Northwest precipitation patterns will change, bringing warmer, wetter falls, winters, and springs. Floods will be more intense and more frequent, with peak flows expected to increase by 28-34 percent by 2080. As winters become warmer and wetter, the watershed is projected to shift from mixed rain and snow to a rain-dominated basin with less mountain snow melting earlier in the spring. The decrease in amount and earlier disappearance of the snow pack will exacerbate drought-like summer low flow conditions in currently snow-dominated areas of the watershed. Summertime rain is expected to decrease by ~22% by 2050. A projected 4-5°F increase in air temperatures will increase water temperature in both rivers and the ocean. Nearshore and estuary areas will be impacted by sea level rise, food web alteration and ocean acidification. A changing climate will exacerbate typical climate variability, causing environmental conditions that will negatively impact our salmonids and their habitat. The potential impacts to various life histories of salmonids, including Chinook salmon, as a result of climate change are summarized in Figure 8.

Climate Change Impacts on WRIA 9 Salmonids

Adapted from Beechie et al. (2012). Fish timing represents typical fish behavior.



Increased summer temperature may decrease growth or kill juvenile salmon where temperatures are already high and block/delay migration. May also decrease spawning fecundity (e.g. Chinook).

Increased winter floods may increase scour of eggs, or increase mortaility of rearing juveniles where flood refugia are not available, displace juveniles to less desira ble habitats.

Decreased summer low flow may contribute to increased temperature, decrease rearing habitat capacity for juvenile salmonids, and decrease access to or availability of spawning areas. Loss of spring snowmelt may

decrease or eliminate spawning opportunities for steelhead, may alter survival of eggs or emergent fry for other salmonid species, cause early dewatering of offchannel and side channel habitats, and reduce connectivity to the floodplain.



Research/Monitoring

A changing climate will exacerbate typical climate variability causing environmental conditions that will negatively impact our salmonids and their habitat. The summer of 2015 likely provided a glimpse of the future ecological conditions in the Green/Duwamish watershed. A warm, wet winter with extreme low snowpack levels, coupled with a dry, hot summer, created dire conditions for salmon. (DeGasperi 2017) The Muckleshoot Indian Tribe reported adult Chinook salmon dying in the stream just below the Soos Creek hatchery (H. Coccoli, pers. comm.), and Washington Department of Fish and Wildlife (WDFW) data indicated higher than typical numbers of female Chinook mortality with high egg retention (pre-spawn mortality) (Unpublished WDFW data). Other sublethal impacts associated with temperatures in excess of 17°C can include developmental abnormalities, altered growth rates, and non-fertilization of eggs; altered migration timing; altered predator/prey relationship; and reduced disease resistance.

Sea level in Puget Sound rose 20 centimeters from 1900-2008 and scientists project sea level will rise an additional 0.6 meters by 2100. A 1-foot increase in water surface elevation means an order of magnitude increase in high water events—so a 100-year event turns into a two year event (Mauger et al. 2015). Sea level rise will have myriad effects on the marine nearshore habitats, including increased bank/bluff erosion, landslides, and lost nearshore habitats (e.g., eelgrass, forage fish spawning habitat, estuary mudflats, etc.) due to the "coastal squeeze" adjacent to armored shorelines. In addition, increased risk of erosion could contribute to a growing demand for additional shoreline armoring.

Water temperatures as measured on July 4, 2015, exceeded the potential lethally threshold (22°C) for salmonids downstream of the Green River Gorge (DeGasperi 2017).



Figure 9. Coastal squeeze in nearshore graphic along the Puget Sound Nearshore refers to the shallow areas where forage fish spawn and are being squeezed out of existence by shoreline armoring and sea level rise (Coastal Geologic Services).

A growing body of research is focusing on the potential impacts of ocean acidification on the Puget Sound ecosystem. Ocean acidification is driven by the absorption of carbon dioxide and is expected to impact survival, growth and behavior of marine organisms. In addition to observed impacts to calcifying organisms (e.g., oysters and crab) there is more recent evidence that ocean acidification may impair sense of smell in salmon, impede growth in herring and other species, and alter plankton populations which may have a cascading impact on marine food webs. Experiments have shown that coho salmon's ability to avoid predators declines and risk of being eaten increases in low pH waters (Dunagan 2019). Although considerable uncertainty surrounds the potential impacts of ocean acidification on salmon, there is potential for it to exacerbate the issue of marine survival.

Elevated Water Temperatures (Watershed-wide)

Watershed Status

Water temperature is a key determinant of the biological integrity of a river - especially as it relates to cold-water dependent salmonids. High water temperatures can act as a limiting factor for the distribution, migration, health and performance of salmon. Washington State's water quality standards are protective of viable salmonid habitat in the Green River by assigning a numeric criterion of 16°C, above which the water body is considered impaired (WAC 173-201A-602). A supplemental criterion of 13°C, in effect between September 15 and July 1 further protects salmonid habitat. The widespread removal of tall, native trees along the riparian corridor - especially in the middle and lower Green River - allows solar-atmospheric radiation to rapidly warm water as it moves downstream below HHD. As a result, large stretches of the Green River, Soos Creek and Newaukum Creek regularly exceed established water quality standards for temperature. In 2011, the Washington State Department of Ecology developed total maximum daily loads (TMDLs) for the Green River and Newaukum Creek that outlined an implementation plan for improving temperatures. Another TMDL for Soos Creek is under development.

The Green/Duwamish experienced widespread potentially lethal water temperatures in 2015 (DeGasperi 2017). In response, WRIA 9 led the development of the *Re-Green the Green: Riparian Revegetation Strategy* (2016) to emphasize the critical need for increasing riparian canopy and to prioritize revegetation efforts within the watershed. The strategy was adopted as an addendum to the 2005 Salmon Habitat Plan. It incorporated solar aspect shade maps published in 2014 by the Muckleshoot Indian Tribe to prioritize areas where increased tree canopy – and thus shade – could provide the largest benefit to preventing elevated water temperatures. It also established revegetation goals that were directly incorporated into this Plan Update. WRIA 9 developed a Re-green the Green grant program using Cooperative Watershed Management funds from the Flood Control District to accelerate revegetation efforts across the watershed.

Research/Monitoring

In addition to periodic exceedances of potential lethal water temperatures, a review of 7-DMax water temperatures at Whitney Bridge (RM 41.5) shows that instream temperatures regularly exceed established thresholds for sublethal impacts to salmon. Figure 10 shows 7-DMax temperatures from 2001-2016 in relation to key Chinook salmon life history stages. These data suggest migration, early spawning, egg incubation, yearling and parr rearing all potentially subject to sublethal impacts associated with elevated water temperatures.

A literature review completed for WRIA 9 (Kubo 2017) provides a summary of potential temperature-related impacts to Chinook salmon. Adult fish migrating upstream may be subject to increased metabolic demand, delayed migration, increased disease exposure, decreased disease resistance, and even direct mortality. Spawning fish may experience reduced gamete guality and guantity and reduced fertilization success. Chinook eggs may be subject to reduced embryo survival, decreased hatching-emergence condition, increased abnormalities, and altered metabolic rates. Juveniles and outmigrants may be subject to reduced feeding and growth rates, increased disease susceptibility, and accelerated onset of smoltification and desmoltification. Although many impacts may be sublethal, they can contribute to an increase in delayed mortality.

Protecting and restoring mature riparian tree canopy, protecting cold water sources, and promoting hyporheic exchange between the river/floodplain and the alluvial aquifer are essential to build ecological



Figure 10. Plot of 7-DMax water temperatures for the 2015 and 2016 calendar years measured by King County at the Whitney Bridge station (GRT10) compared to 7-DMax temperatures measured from 2001-2014. State standards for designated uses are noted by the orange line and potentially lethal impacts are indicated by the red line. State standards for designated uses include core summer salmonid habitats (July 1 – September 15) as well as spawning and incubation periods (September 16 – July 1). Timing of specific Green River Fall Chinook lifestages included below.

resilience to rising temperatures and moderate the impacts associated with climate change. By 2080, it is expected that the number of river miles exceeding salmonid thermal tolerances (>18°C) will increase by 70 miles in the Green/Duwamish watershed (G. Mauger 2016). One study suggests that warming of 2-5.5°C could result in the loss of 5-22 percent of salmon habitat by 2090 (O'Neal 2002).

Predicted temperature increases, lower summer flows and altered precipitation patterns are likely to exacerbate temperature-related stress for Chinook salmon. Source: Adapted from King County 2016.

Fish Passage Barriers (Watershed-wide) Watershed Status:

Fish passage barriers are a critical obstacle to Chinook salmon recovery in the watershed. The presence of Howard Hanson Dam and the Tacoma Headworks Diversion facility block access to approximately 40 percent of the historical Chinook salmon spawning and rearing habitat (NOAA 2019). This barrier alone blocks access to somewhere between 78-165 miles of suitable fish habitat. The 2005 Plan assumed fish passage would be provided by 2015. Tacoma completed an upstream trap and haul facility at the headworks facility in 2007; however, downstream fish passage at Howard Hanson Dam has not been completed. In 2019, the NOAA Fisheries released a biological opinion (BiOp) that concluded U.S. Army Corps operations at Howard Hanson Dam would "jeopardize the continued existence of ESA-listed Puget Sound (PS) Chinook salmon, PS steelhead, and Southern Resident killer whales (SRKW), and that the proposed action is likely to result in the adverse modification of these three species' critical habitat designated under the ESA." In issuing the jeopardy opinion, NOAA stated that without fish passage the population's abundance, productivity, and spatial diversity could not achieve established viability criteria, thus increasing the risk of extirpating the population.

In order to avoid jeopardizing ESA-listed Chinook, the BiOp concluded that the U.S. Army Corps must provide operational downstream fish passage no later than February 2031. The resulting facility would be required to satisfy established performance criteria, including achieving 98 percent survival of all fish passing through the facility. The BiOp states that if established performance standards are satisfied, the Upper Green watershed could support self-sustaining populations of Chinook salmon and steelhead, "dramatically improving the likelihood that the Chinook salmon population would achieve a highly viable status."

In addition to HHD, an unknown number of smaller fish passage barriers impact Chinook salmon movements within the watershed. There is a growing recognition that a number of barriers associated with smaller tributaries adjacent to roads, revetments and flood control structures block juvenile access to critical rearing habitats. One of the larger existing barriers is the Black River Pump Station. The pump station is a flood control facility built in 1970, located near the mouth of the Black River. While the facility was originally constructed with both upstream and downstream fish passage facilities, they are outdated and currently do not meet federal fish passage criteria (Jacobs 2020). In its current state, the facility limits both upstream and downstream fish passage and restricts access to over 50 miles of stream, including Springbrook Creek, Panther Lake Creek, Garrison Creek, and Mill Creek. Although the majority of stream habitat is primarily suitable for coho and steelhead, Chinook salmon have been found in the system, and the area immediately upstream of the facility could provide important rearing and refuge habitat for juvenile Chinook.

Research/Monitoring

A 2019 study evaluating the use of small non-natal tributaries (streams that do not support Chinook spawning) by juvenile Chinook highlighted the importance of these habitats for both juvenile rearing and flood refuge. Juvenile Chinook were identified in eight of the nine tributaries sampled in the Lower Green River basin and were found up to 480 meters above the confluence with the Green River. The results demonstrated (1) widespread use of non-natal tributaries for extended lengths of time; (2) heavily urbanized streams with a large amount of impervious surfaces appear capable of supporting non-natal juvenile rearing; (3) juvenile upstream passage is an important consideration for fish barriers; and (4) variability in flapgate performance for juvenile fish passage (King County 2019). A follow-up study was funded by WRIA 9 in 2019 to assess flapgate performance and identify potential retrofit and replacement options to improve juvenile passability.

Non-natal tributaries provide important rearing and refuge habitat in the Lower Green subwatershed.

Long-term fish-in fish-out monitoring by WDFW indicates that Chinook salmon population productivity is limited by available rearing habitat and that parr outmigrants disproportionately contribute to the abundance of returning adults (Anderson and Topping 2018). Restoration of non-natal tributaries has the potential to complement ongoing restoration efforts in the Lower Green River mainstem to provide additional capacity to support fry growth into parr prior to outmigration to the Duwamish estuary. Larger (basins >100 acres), low-gradient (<2%) tributaries likely provide a large amount of rearing habitat and support higher densities of juvenile Chinook (King County 2019; Tabor et al. 2011; Tabor and Moore 2018; Tabor, Murray and Rosenau 1989; Scrivener et al. 1994; Bradford et al. 2001).

Figure 11. Representative tributary mouth habitats associated with flapgate flood control structures.



Source: King County, 2019: Juvenile Chinook Use of Non-natal Tributaries in the Lower Green River

Land Conversion (Watershed-wide)

Watershed Status

Located within the greater Seattle metropolitan area, population growth and economic development have significantly modified the watershed, its underlying hydrology, and the salmon habitat within it. In addition to legacy impacts (Chapter 3 of 2005 Plan), the watershed experienced tremendous population growth and development in the 15 years since the 2005 Salmon Plan. The population of King County population swelled approximately 25 percent, adding an additional 444,000 residents (U.S. Census Bureau 2019; King County 2006). During the same timeframe, 46,000 new housing units were constructed in the watershed (WA Dept. of Commerce 2017). The extensive development pressures within the watershed – especially in the Nearshore, Duwamish and Lower Green watershed – have degraded large portions of the watershed from natural conditions. In addition to direct habitat loss, land conversion contributes to increased impervious coverage and stormwater runoff. Refer to the Stormwater section in this chapter for additional information on stormwater impacts on salmon. Approximately 32 percent of the watershed is located within established urban growth areas (UGAs). Competition for scarce available land contributes to high restoration/acquisition costs and the loss of restoration priorities to redevelopment pressures.

Research/Monitoring

Despite the tremendous growth and development pressure, growth management efforts have concentrated new housing construction within urban growth areas. Only about 3 percent of housing units constructed in the watershed since the 2005 Plan have occurred outside of UGAs (WA Dept. of Commerce 2017). While this is a positive outcome, a compree hensive assessment of changes in forest cover and impervious surfaces has not been completed since 2006. In addition, the basin-wide effectiveness of critical area and shoreline protections has not been assessed. A WRIA 9-funded study of marine shoreline development from 2016-2018 observed a net increase in shoreline armoring and permit compliance rates below 50 percent (King County 2019). Additional information about the status of marine shorelines is presented in the Shoreline Armoring section.

Levees and Revetments (Middle and Lower Green)

Watershed Status

An extensive network of flood containment and training levees and revetments protect economic development and agricultural land in the Lower and Middle Green River valleys. In total. there are approximately 36 miles of levees and revetments in the watershed. Over 27 miles of facilities provide flood protection for the Lower Green River valley – the second largest warehouse and distribution center on the west coast. The valley contains \$7.3 billion of structures and associated content, supports over 100,000 jobs, and generates an annual taxable revenue of \$8 billion (Reinelt 2014).

Flood control facilities degrade floodplain function and reduce habitat complexity. They disconnect large portions of the historical floodplain, off-channel habitats, and tributaries – all important juvenile salmon rearing and refuge habitats. Associated vegetation maintenance standards limit riparian revegetation and contribute to elevated instream temperatures. Facilities also disrupt sediment delivery and filtration, water storage and recharge, and large wood input to the river channel. In addition to the direct impacts of the facilities, they also support land use development on historic floodplains habitats. Due to the diversion of the White and Black rivers, much of the "connected" floodplain is perched above the river channel and only connected during very high flows. Current flows with a 100-year flood event equate to an historic two-year event (King County 2010). At these flows, only 18 percent (3,518 of 19,642 acres) of the historic Lower Green River floodplain is connected (Higgins 2017). The loss of juvenile ChiT nook salmon-rearing habitat reduces juvenile survival and overall population productivity. Restoration of floodplain habitat in the Lower Green River valley not only requires levee setbacks, but also requires extensive fill removal to reconnect perched floodplains across a larger range of flows.

Research/Monitoring

Since the 2005 Plan, studies have shown higher growth rates for Chinook salmon accessing floodplains when compared to fish rearing exclusively in the mainstem. Increased growth likely results from increased food availability and foraging efficiency in floodplain habitats (Henning 2004; Sommer et al. 2001; Jeffres, Opperman and Moyle 2008; and Lestelle et al. 2005). This research also suggests that any increased risk of stranding during retreating flows is offset by the potential for increased growth rates. These studies emphasize how important floodplain habitats are to juvenile Chinook growth and provide an important context for understanding how the magnitude of habitat loss in the Lower Green and to a lesser extent in the Middle Green have impacted juvenile Chinook production locally.

Analysis of juvenile life history success in adult Green River Chinook salmon (2015-2017) found parr outmigrants disproportionately contribute to adult returns relative to their abundance. Although parr comprised 3-56 percent of the out-migrating juveniles, more than 97 percent of returning adults were found to have exhibited the parr life history. In comparison, the parr life history is reflected in 64 and 76 percent, respectively, of the adult returns in the Skagit and Nooksack watershed (Campbell and Claiborne 2017; Campbell et al. 2019). These data indicate that Chinook salmon life history success varies between watersheds and that productivity (adult spawner abundance) in the Green is currently driven by parr production, as juveniles exhibiting the fry life history rarely survive to adulthood.

An analysis of long-term juvenile outmigration data collected by WDFW identified a density-dependent relationship between adult spawner abundance and relative parr abundance (Anderson and Topping 2018). Figure 6 shows that adult escapements in excess of 3,000 fish did not generally result in increased parr production. In contrast, fry production was observed to be density independent. Juvenile Chinook require rearing and refuge habitats (e.g., off-channel habitats, side-channels, etc.) to grow into parr prior to outmigration. When considered in concert with the Campbell and Claiborne studies, these results highlight the importance of reconnecting floodplains and restoring rearing habitat to increasing Chinook returns.

Sediment Contamination (Duwamish)

Watershed Status

Industrial and commercial development in the Duwamish estuary not only led to dredge and fill of historical estuarine wetlands, but also left a legacy of persistent contaminants within the working waterfront. Two Superfund sites require additional clean-up in the Duwamish, the Lower Duwamish Waterway (LDW) and Harbor Island/East Waterway (EW). Both sites contain elevated levels of polychlorinated biphenyls (PCBs), arsenic, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), as well as dioxins and furans. The EPA's Record of Decision for the LDW (2014) outlines the cleanup plan for the 412 acre site, which includes 105 acres of dredging or partial dredging, 24 acres of capping, 48 acres of enhanced natural remediation and 235 acres of monitored natural attenuation. Although early action areas (Slip 4, Terminal 117, Boeing Plant 2/Jorgensen Forge, Diagonal Combined Sewer Overflow [CSO], and Norfork CSO) resulted in cleanup of approximately 50 percent of PCB contamination, cleanup will not be completed until after 2031. Cleanup options for the EW site are under development.



Figure 12. Spawners-recruit plots showing abundance of fry and parr produced based on estimated adult Chinook salmon escapement (Anderson and Topping 2017).

Productivity in the Green/Duwamish is currently constrained by available rearing habitat in the Lower and Middle Green rivers.

Transport pathways carry contaminants from sources to surface waters, as well as within surface waters. Contaminants reach the Green/Duwamish receiving waters via point discharges (permitted industrial, stormwater and CSOs discharges), overland flow (stormwater runoff), groundwater, and direct atmospheric deposition, as well as by spills/leaks and bank erosion. Fish are exposed to chemicals through multiple routes including water passing through their gills and/or its ingestion, direct sediment contact and/or its ingestion, and/or through consumption of contaminated prey. Chinook experience greater chemical exposure during the juvenile phase than during the adult phase due to the comparatively different lengths of time they spend in the Duwamish during these life stages (Colton 2018).

Although the 2005 Salmon Plan hypothesized that sediment cleanup would benefit Chinook salmon, limited scientific data were available on the potential impacts of sediment contamination on productivity at the time.

Research/Monitoring

A growing body of research findings suggests that contaminant exposure for juvenile Chinook salmon in the Duwamish and Elliott Bay is affecting juvenile Chinook salmon growth, disease resistance, and immunosuppression, and ultimately marine survival. Juvenile Chinook salmon rearing in industrial estuary and nearshore habitats (e.g., Duwamish, Puyallup and Snohomish) contain elevated levels of organic contaminants as compared to those rearing in less developed watersheds (Skagit and Nisqually) (O'Neil et al. 2015; Varanasi et al. 1993). Juvenile Chinook salmon whole body PCB tissue concentrations from the Duwamish and associated nearshore areas have exceeded adverse impact thresholds (O'Neil et al. 2015; Johnson 2007). PCB levels in wild fingerlings have also been shown to have significantly higher PCB levels than their hatchery counterparts, suggesting that wild Chinook have a longer residence time within the Duwamish estuary (Nelson, et al. 2013).

An examination of 37 years of hatchery data from 20 hatcheries across 14 watersheds found 45 percent lower smolt-to-adult survival rates for hatchery Chinook that outmigrate through contaminated estuaries as compared to uncontaminated estuaries (Meador 2014). The study evaluated the findings against the total amount of estuary habitat, length of freshwater habitat between each hatchery and estuary, as well as growth rates and did not find these factors could explain observed variation in survival rates. Because wild Chinook – especially the fry outmigrant life history type – are more dependant on and have longer residence times in estuarine habitat, the observed decline in survial may be more pronounced in wild Chinook salmon.

A recent study by scientists at the NOAA Northwest Fisheries Science Center estimated the potential impact remediation of the Lower Willamette River Superfund site would have on Chinook salmon recovery (Lundin et al. 2019). The study used a combination of field and laboratory-collected exposure, growth, and disease resistance data to estimate acute and delayed mortality rates for juvenile Chinook. These estimates were then incorporated into a life cycle model that estimated sediment remediation could improve juvenile survival by 54 percent and increase population abundance by 20 percent. This study provides a population-scale assessment of the potential impacts of legacy pollutants on Chinook salmon and suggests that remediation in the Duwamish could be a significant driver for Chinook recovery.



Figure 13. Chinook salmon that enter the estuarine waters as fry (< 60 mm) experience very low marine survival rates. In contrast to less developed watersheds, estuarine-reared fry in the Green/Duwamish are not contributing significantly to adult returns.

The research on potential adverse impacts to juvenile Chinook as a result of contaminant exposure is consistent with a recent analysis of juvenile life histories expressed by adult Chinook salmon in the Green/Duwamish River. Analysis of otoliths from returning adult salmon allow resource managers to back-calculate size upon entry in marine waters, allowing differentiation between parr and fry migrants. Otolith collection from adult Chinook salmon (2015-2017) indicate that less than 3 percent of fish returning to the watershed entered marine waters as a fry migrant, despite representing between 44 and 97 of the total juvenile outmigrants (Campbell and Claiborne 2017; Campbell et al. 2019). Additional research is needed to assess the relative importance of contamination in relation to other stressors (i.e., existing estuarine habitat quality and capacity) in contributing to poor marine survival.

Research suggests that juvenile Chinook that enter the Duwamish as fry - as opposed to parr experience very low survival and do not substantively contribute to population abundance as measured by adult escapement.

Chemicals of emerging concern (CECs) are another area of emerging research. The EPA defines CECs as "chemicals and other substances that have no regulatory standard, have been recently 'discovered' in natural streams (often because of improved analytical chemistry detection levels), and potentially cause deleterious effects in aquatic life (e.g., endocrine disrupters) at environmentally relevant concentrations" (EPA 2008). CECs include hormones, pharmaceuticals and personal care products (PPCPs), and industrial process chemicals. An analysis of iuvenile Chinook whole body tissue in several Puget Sound estuaries detected 37 of 150 surveyed PPCPs (Meador et al. 2016). Metabolic disruption consistent with starvation was also observed in juvenile Chinook collected adiacent to waste water treatment plants in Sinclair Inlet and the Puyallup River (Meador 2018). The potential impacts to Chinook salmon growth, reproduction, and behavior are not well understood.

Stormwater (Nearshore, Duwamish, Lower and Middle Green)

Watershed Status

Stormwater runoff and associated hydrological modifications resulting from forest conversion and land use development within the Green/Duwamish watershed adversely impact water quality and salmon habitat. Approximately 59 and 24 percent, respectively, of the 165-foot riparian buffer in the Duwamish and Lower Green is characterized by impervious surfaces (King Co. unpublished data, 2013). Although watershed-wide data are not available, the impacts associated with the loss of forest cover and increase in impervious surfaces are not confined to riparian areas. At the basin-wide scale, these levels of impervious coverage can contribute to a two-three fold increase in stormwater runoff above natural conditions (Paul and Meyer 2001). Increased runoff contributes to rapid changes in flows, with larger peak flows and lower low flows; increased pollutant transport and degradation of water quality; shifts in benthic macroinvertebrates communities; elevated water temperatures; increased bank erosion and sediment transport capacity; and altered channel morphology and hydraulics.

The majority of the development within the watershed – and across Puget Sound – predates existing critical area ordinances and low-impact development standards designed to mitigate impacts to aquatic ecosystems. As a result, stormwater runoff is recognized within the region as one of the more significant challenges facing both salmon and Puget Sound recovery efforts.

Research/Monitoring

Since the 2005 Plan, a significant body of research has focused on stormwater toxicity impacts to salmon in urban creeks. Consistently high levels of mortality (up to 90 percent) in adult coho salmon have been observed in urban watersheds, with the extent of mortality rate related to an urbanization gradient and, more specifically, density of motor vehicle traffic (Scholz 2011; Feist 2017). More recent studies have connected observed mortality events to pollutants associated with highway runoff (Scholz 2016; Peter 2018). Although Chinook salmon do not appear vulnerable to acute toxicity as a result of roadway runoff exposure (Scholz 2019), more research is needed to evaluate potential sublethal impacts.

Although studies have shown treatment of runoff can prevent acute toxicity, the large capital expenditures associated with stormwater retrofits have precluded widespread implementation. A comprehensive needs and cost assessment for stormwater retrofit within the Green/Duwamish and Central Puget Sound watershed was completed in 2014. The study evaluated 278 square miles of the watershed, excluding Seattle and areas upstream of Howard Hanson Dam. An estimated \$210 million per year would need to be spend over the next 30 years to build necessary regional facilities, retrofit roads and highways, and retrofit non-forested lands not redeveloped within the next 30 years (King County 2014).

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Shoreline Armoring (Nearshore)

Watershed Status

The Green/Duwamish and Central Puget Sound watershed encompasses 92 linear miles of marine shoreline. Associated nearshore habitats provide not only important rearing and migratory habitat for juvenile salmon, but also spawning habitat for forage fish (e.g., sand lance and surf smelt), which are important prey items for salmon, birds and marine mammals. Delivery of sediment and trees from natural bluffs helps sustain nearshore habitat complexity (beaches, spits, eelgrass beds, etc.) and shoreline resilience to coastal erosion and sea level rise.

The degradation of marine shorelines and associated ecological functions has implications not only for Chinook salmon recovery, but also for the ESA-listed southern resident orca population. Shoreline armor – especially along feeder bluffs – disrupts sediment supply and transport, altering nearshore habitat quantity and quality. Shoreline land use ranges from commercial and industrial waterfront in Elliott Bay, urban residential between Seattle and Federal Way, to rural residential and undeveloped shorelines along Vashon Island. Approximately 65 percent of the shoreline is currently armored and only 22 of 52 drift cells have greater than 50 percent of historical feeder bluffs intact (King County 2019; WRIA 9 2012).



Figure 14. Shoreline modification identified during Marine Shoreline Monitoring and Compliance Project (Ecology).

Research/Monitoring

Recent research reinforces assumptions in the 2005 Plan about the importance of nearshore habitats to salmon. The range of physical and biological impacts in response to shoreline armoring varies across spatial and temporal scales. Shoreline armoring impacts wrack and log accumulation, juvenile fish utilization, forage fish spawning, beach profiles, sediment grain size, and marine riparian vegetation. In particular, drift cells with a high proportion of armoring tend to be characterized by skinnier beaches, coarser sediments, fewer drift logs, fewer prey species (Dethier et al. 2016).

Natural shorelines convey important benefits to juvenile Chinook salmon. Small juvenile salmon preferentially use low-gradient, unarmored shorelines (Munsch, Cordell and Toft 2016). Riparian vegetation associated with unarmored beaches provide a source of terrestrial prey items for juvenile Chinook and benefit forage fish egg survival by moderating substrate temperatures and maintaining humidity (Rice 2006; Toft, Cordell et al. 2007). Even small-scale beach restoration projects (i.e., Olympic Sculpture Park) have resulted in measurable increases in larval fish abundance, juvenile salmon, and invertebrate diversity as compared to adjacent armored shorelines (Toft, Ogston et al. 2013).

The magnitude of unpermitted shoreline modifications threatens to negate investments in shoreline restoration and undermine the goal of "no net loss" established within the Shoreline Management Act. From 2013-2018, the watershed saw a net increase of 364 feet of shoreline armor despite armor removal and restoration of 382 feet shoreline during the same timeframe. Only 42 percent of observed shoreline modifications were permitted by local governments prior to construction (King County 2019).

Although juvenile Chinook from the Green/Duwamish River have been observed to use the marine shorelines throughout Central Puget Sound, considerable uncertainty surrounds the relative importance of non-natal coastal streams and pocket estuaries. A study in the Whidbey Basin found abundant use of non-natal coastal streams (32 of 63 streams) by juvenile Chinook. The presence of juvenile Chinook was influenced by (1) distance to nearest natal Chinook salmon river; (2) stream channel slope; (3) watershed area; and (4) presence and condition of a culvert at the mouth of a stream. The importance of non-natal coastal streams to juvenile Chinook salmon dropped significantly beyond 7 km from the mouth of a Chinook bearing river (Beamer, et al. 2013). Additional research is needed to prioritize non-natal coastal streams in WRIA 9 with respect to potential contribution towards Chinook salmon recovery.

Despite the recognized importance of natural shorelines and significant regional investment in armor removal, WRIA 9 continues to experience a net increase in shoreline armoring.



Chapter 6: Recovery Strategies

WRIA 9 developed 11 overarching recovery strategies to organize watershed priorities and guide future investments. These strategies outline priority areas of focus intended to advance salmon recovery over the next 10-20 years. Recovery strategies are not prioritized. Implementation across the portfolio of recovery strategies is necessary to address priority pressures; increase salmon abundance, productivity, and diversity; and build long-term population resiliency. Successful implementation hinges on partner coordination and investment to ensure local land use planning, capital investment programs, and community outreach messaging are consistent with identified watershed priorities.

WRIA 9 hosted a series of subwatershed workshops to review and update policies and programs from the 2005 Salmon Habitat Plan. Revised policies and programs are organized by recovery strategies – as opposed to subwatershed – to reduce redundancy and improve alignment with other Puget Sound salmon plan updates. This structure is intended to provide project sponsors and other recovery partners a streamlined communication tool for a shared understanding of what needs to happen, where, and what policy considerations are necessary at the local and regional level to advance Chinook salmon recovery.

Strategy: Restore and Improve Fish Passage

Location: All Subwatersheds

Fish passage barriers block access to important spawning and rearing habitat and can exacerbate localized flooding issues. Legacy transportation and flood control infrastructure were not regularly designed for fish passage and/or elevated flood flows associated with climate change. Although addressing fish passage barriers was a priority in the 2005 Plan, a 2018 U.S. Supreme Court ruling affirmed that the State has a treaty-based obligation to address culverts under state-maintained roads in order to preserve tribal harvest rights within their usual and accustomed areas. This ruling has reinforced the need and elevated the urgency for addressing identified barriers in a systematic and strategic manner.



Figure 15. Juvenile fish passage barriers block juvenile Chinook salmon access to important rearing habitat in non-natal tributaries. Photos: Mike Perfetti.



Figure 16. Healthy juvenile Chinook (right) and coho (left) salmon sampled from a non-natal tributary in 2018. Photo: Chris Gregersen.

Programs

» Fish Passage Barrier Removal

WRIA 9 partners should work towards a comprehensive inventory of fish passage barriers in the Green/Duwamish and Central Puget Sound Watershed, and prioritize barrier removal across the watershed to maximize the benefit of fish passage investments. Although the majority of existing barriers in the watershed impact coho salmon and steelhead, special consideration should be given to removing barriers to non-natal tributary rearing habitats. Recent fish monitoring studies have demonstrated the importance of non-natal tributaries to juvenile Chinook and remedying these barriers will expand available rearing habitat and increase Chinook productivity. Recent fish monitoring studies have demonstrated the importance of non-natal tributaries to juvenile Chinook (King County 2019; Tabor and Moore 2018) and remedying these barriers will expand available rearing habitat and increase Chinook productivity.

Many partner jurisdictions do not have the capacity to implement a programmatic approach to barrier identification and removal; instead, barrier removal is driven by infrastructure repair needs and local capital improvement programs. Some, such as the City of Seattle, have an inventory and prioritized list of fish passage barriers but lack sufficient funding for implementation. To support a more comprehensive approach to fish passage, WRIA 9 partners should leverage available technical assistance from Washington Department of Fish and Wildlife (WDFW) Fish Passage and King County Fish Passage Restoration Programs to assess and prioritize barriers for removal outside of their scheduled capital improvement programs to expedite highpriority barrier removals. Jurisdictions should apply for funding for high-priority projects through the Brian Abbott Fish Barrier Removal Board. Regional coordination among WRIA 9 partners on fish barrier removal priorities should help identify synergies and accelerate barrier removal in priority subwatersheds. Programmatic improvements within the County Fish Passage Restoration Program may support increased efficiencies within other jurisdictions. Fish passage accomplishments and lessons learned should be shared regularly to expedite barrier identification and increase coordination across the watershed.

Policies

» Fish Passage (FP) 1: Provide efficient and safe fish passage where built infrastructure (e.g., road crossings and flood control facilities) intersects instream habitats. Fish passage design considerations should not only facilitate adult upstream migration, but also ensure juvenile salmonid access to rearing habitat provided in non-natal tributaries. Project sponsors should use WDFW Water Crossing Design Guidelines (2013) to assess feasibility and support alternative development.

Strategy: Protect, Restore and Enhance Floodplain Connectivity

Location: Lower and Middle Green

The process of channel migration within the floodplain creates side channels, back-water sloughs, and other off-channel habitats that are critical for juvenile salmon rearing and refuge. Floodplains also facilitate an exchange of nutrients and organic material between land and water, and provide important flood storage capacity that can mitigate flood damages to adjacent



communities. The historic loss of floodplain habitat within the Green/Duwamish watershed resulted in a loss of habitat complexity, increased peaks flows and water velocities, and a loss of groundwater storage and important cold water recharge during summer months. Flow regulation at Howard Hanson Dam and the diversion of the White River into the Puyallup River has reduced the frequency and magnitude of flood events and left much of the floodplain perched well above the current river channel. Reconnecting floodplains and restoring floodplain habitats is essential to increasing both the available rearing habitat and corresponding salmon productivity of the system.

Figure 17. The Lower Russell Road Levee Setback Project is a multi-benefit project that provides flood risk reduction, habitat restoration, and recreational enhancements.

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Programs

None identified. Implementation relies on individual capital projects that will be identified in project list.

Policies

- » Floodplain Connectivity (FC) 1: Support multi-benefit flood risk reduction projects that also enhance salmon habitat by allowing rivers and floodplains to function more naturally. Multi-benefit projects can (1) reduce community flood risk;
 (2) provide critical salmon habitat; (3) increase floodplain storage; (4) improve water quality;
 (5) replenish groundwater; (6) expand public recreation opportunities; and (7) strengthen community and ecological resilience to extreme weather events due to climate change.
- » FC2: Wherever possible, flood protection facilities should be (re)located away from the river edge to reconnect floodplains and re-establish natural riverine processes. During conceptual design of alternatives, project sponsors should evaluate opportunities to pursue relocation of existing infrastructure and real estate acquisition to support levee setbacks. A process-based approach to restoration is ideal for species recovery; however, where a levee setback is infeasible due to the constraints of past land use activity, alternative facility designs (e.g., levee laybacks) should strive to incorporate planting benches and wood structures that mimic lost ecosystem services and improve critically needed edge habitat.

- » FC3: Local government should utilize critical areas and shoreline regulations and associated land use policies to protect creek riparian areas and associated floodplains to increase the flood storage capacity of these areas.
- » FC4: Vacating and relocating roads should be evaluated as tools to support salmon restoration priorities where impacts are negligible and/or can be mitigated. Coordinating transportation infrastructure improvements with salmon habitat needs (e.g., floodplain reconnection and fish passage) can improve outcomes and reduce project costs. Road vacation policies should be updated to consider level of use and road standards.

Strategy: Protect, Restore, and Enhance Channel Complexity and Edge Habitat

Location: Lower, Middle and Upper Green

Flood protection facilities (e.g., Howard Hanson Dam, revetments, and levees) and loss of riparian habitat have disrupted sediment transport, simplified habitat complexity, contributed to a loss of rearing and refuge habitat, and impeded natural recruitment of spawning gravels. Although process based restoration is preferred, ongoing intervention is necessary to replace/mimic natural processes where they cannot be restored.



Setback:

Relocation of the toe of the levee/revetment landward of ordinary high water to provide for increased erosion and channel migration.

Programs

» Middle Green River Gravel and Wood Supplementation Program

The U.S. Army Corps of Engineers and Tacoma Public Utilities should continue gravel and wood supplementation in the Middle Green River to account for disruption of natural sediment transport and wood recruitment caused by Howard Hanson Dam. Up to 14,000 tons of spawning gravels are deposited annually at two sites located near river mile 60, just downstream of the Tacoma Headworks Facility. High flows during the winter months engage the deposited gravel and naturally distribute it downstream. Regular monitoring of gravel distribution should inform quantity, size gradation, and timing to maximize benefits for salmonids.

The U.S. Army Corps Corps should continue to transport large wood (> 12 in. diameter; > 20 ft. in length; >4 ft. diameter root ball) that is stranded in the reservoir to below the Tacoma Headworks Facility. Large wood increases channel complexity, provides habitat for juvenile fish, and provides nutrients and substrate for aquatic insects. The upper watershed is heavily forested and large wood is transported to the reservoir during high flow events, but is unable to move downstream of the dam without intervention. Existing quantities of large wood downstream of the dam remain significantly below recommended wood volumes (Fox and Bolton 2007) to support salmon recovery. Periodic surveys should be completed to monitor large wood volumes and ensure project success.

Policies

Channel Complexity (CC) 1: Project designs should incorporate best available science related to climate change predictions and anticipated changes to seasonal instream flow patterns to enhance channel complexity and edge habitat across a range of flows. Lower spring and summer flows could make restored rearing habitat inaccessible during juvenile Chinook outmigration. Special consideration should be given to project designs that ensure juvenile salmon rearing habitat remains accessible in low flow years.

» CC2: For habitat restoration projects calling for the addition of large woody debris, placement of wood should consider risk to river users, such as boaters and swimmers.

Strategy: Protect, Restore, and Enhance Riparian Corridors

Location: All Subwatersheds

Healthy riparian corridors provide a critical role in providing cool and clean water for salmon. Riparian vegetation shades instream habitat and moderates water temperatures; reduces erosion by stabilizing streambanks; captures rainwater and filters sediment and stormwater pollutants; provides terrestrial nutrient and food inputs; and is a source of large wood, which is critical to habitat complexity. Restoring riparian corridors is essential to addressing high summertime water temperatures and building long-term resilience to predicted changes associated with climate change. The Washington State Department of Ecology (Ecology) developed total maximum daily loads (TMDLs) for the Green River and Newaukum Creek in 2011 that outlined an implementation plan for improving temperatures. Another TMDL for Soos Creek is under development. Refer to the "Integrate Agricultural Protection and Salmon Recovery Initiatives" strategy for a discussion of riparian corridors within agricultural lands.

Programs

» Re-Green the Green Revegetation Program

The 2016 Re-Green the Green Strategy prioritizes riverine, estuarine and marine areas for revegetation, establishes interim goals, and outlines strategies for securing necessary funding. Riparian revegetation priorities are based on the solar aspect shade maps developed by the Muckleshoot Indian Tribe (2014). This effort identified and prioritized shorelines where shade is critically needed to reduce instream water temperatures that frequently exceed water quality standards.

WRIA 9 should continue to run an annual grant program that supports program implementation across priority shoreline areas. As of 2020, approximately \$500,000 of annual Cooperative Watershed Management Funds provided by the King County Flood Control District have been set aside to support Re-Green the Green project implementation by WRIA 9 partners. This funding is intended to provide a baseline level of revegetation funding that can be leveraged to access other sources of funding. Riparian revegetation projects help improve water quality, lower water temperatures, stabilize shorelines, contribute insects (prey) for juvenile salmonids, increase stormwater infiltration, and improve aquatic habitat quality when trees fall into the river.

» Implement coordinated and comprehensive approach to noxious/invasive weed removal along river and marine shorelines

WRIA 9 partners should coordinate with the King County Noxious Weed Removal Program to prioritize and sequence weed removal efforts through the watershed. Noxious weed control should be conducted in parallel with priority riparian revegetation efforts. Ongoing invasive removal on restoration sites is critical until native plants become established (~ five years).

Invasive plants spread quickly, impede growth and establishment of natives, and degrade riparian habitats by destabilizing riverbanks and reducing tree canopy needed to help maintain cool water temperatures. Priority species impacting the riparian community in the Green/Duwamish include knotweed species (Class B), purple loosestrife (Class B), policeman's helmet (Class B), English ivy (Class C), Himalayan blackberry (Class C), and reed canary-grass (Class C).

» Long-term Restoration Site Stewardship and Maintenance

WRIA 9 partners should explore potential funding sources for a professional stewardship/maintenance crew to provide long-term site maintenance of restoration sites across the watershed. Salmon recovery funding generally does not provide for site maintenance beyond several years, and maintenance typically falls outside the scope of regular park maintenance operations. A shared maintenance crew would provide cost savings to jurisdictions for maintenance of the growing portfolio of restoration sites.

Priority tasks for a crew would include invasive species removal, planting as needed, and litter cleanup. In addition to these basic functions, this crew could play an important role in helping to manage the growing challenge of encampments within the Green River corridor. This program would ensure a regular staff presence at restoration sites to assist with outreach and public safety in addition to enhancing long-term ecological outcomes. In

Figure 18. Progress towards the watershed revegetation goals established in the WRIA 9 Re-Green the Green Strategy.



*414 (17%) acres out of the 2,384 acre goal established in the 2016 Re-Green the Green Strategy. The goal reflects a proportion of the total riparian buffer (developed and undeveloped) that has less than 50% tree cover.

addition, a shared crew would address stewardship and maintenance needs at sites that are not suitable for citizen volunteers.

Policies

- » Riparian Corridor (RC) 1: Protect and enhance riparian corridors to help achieve temperature water quality standards established to protect salmon migration, spawning and rearing. Local governments should support implementation of the Green River and Newaukum Creek TMDLs by protecting and re-establishing mature riparian vegetation within established stream buffers.
- » RC2: Revisit levee vegetation guidelines to improve revegetation opportunities along flood facilities. Guidelines must balance the critical need for riparian shade (i.e., Ecology TMDL) with the need to inspect the structural integrity of facilities and maintain public safety. Remote sensing (i.e., ground-penetrating radar, drones, or boat inspections) may provide a viable alternative to traditional visual inspections that require a clear zone.
- » RC3: Project sponsors who receive WRIA 9 funding should request funding for up to three years post-construction maintenance funding for plant establishment, and should document the ability to maintain habitat restoration and protection projects to ensure long-term objectives are achieved. Maintenance may include, but is not limited to, noxious weed and invasive plant control, revegetation, and deterrence of undesired uses such as dumping and occupancy that can damage habitat.
- » RC4: River corridor trails should be compatible with salmon recovery priorities. Trail design standards should balance the need for riparian tree canopy to maintain cooler water temperatures with needs for important recreational view corridors and sightlines for user safety. Trail design/placement should also not preclude reconnection of critically needed floodplain habitats. Trails offer residents an opportunity to connect with the river; interpretive signage should highlight the presence of salmon and the ecological importance of riparian and floodplain habitat.

» RC5: Encourage regional efforts to develop a Bonneville Power Authority (BPA) mitigation program for power transmission impacts across Puget Sound. The BPA has a significant footprint within the Upper Watershed and the Soos Creek Basin where vegetation management and tree removal under transmission lines precludes adequate riparian canopy cover. Although the BPA has established mitigation programs for Columbia basin operations, a comparable program does not exist within Puget Sound.

Strategy: Protect, Restore, and Enhance Sediment and Water Quality

Location: All Subwatersheds

Clean, cold water is essential for salmon growth and survival. A growing body of evidence suggests cleanup of legacy industrial contamination and stormwater pollution control may improve early marine survival and increase Chinook productivity. Recent scientific literature suggests contaminant exposure pathways (e.g., legacy industrial contamination, stormwater runoff, municipal wastewater discharges, etc.) are having sublethal and lethal impacts on juvenile Chinook salmon. Although the acute toxicity of stormwater runoff to coho salmon in urban watersheds is well documented, potential sublethal impacts to juvenile Chinook salmon as a result of contaminate exposure pathways are not well understood.

Programs

Green/Duwamish Watershed Pollution Loading Assessment (PLA)

Ecology should continue to lead development of a pollutant loading assessment (PLA) that will (1) include a watershed-based model to evaluate cumulative effects of pollution; (2) assess relative contribution of toxic pollutants from different sources/pathways in the watershed; and (3) help prioritize source control efforts. The PLA is essential to maximizing effectiveness of Lower Duwamish Waterway cleanup and avoiding subsequent recontamination.

The PLA is an interim strategy for improving water quality – it is not a TMDL or another regulatory

instrument. It represents a foundational effort that will inform future actions to address source control issues. Following its completion, WRIA 9 partners should coordinate with Ecology to address priority pollutant sources within their jurisdictions.

Implement Pollution Identification and Control (PIC) Programs

The Vashon-Maury Pollution Identification and Control (PIC) program provides incentives (technical support and financial) to replace or repair failing septic systems, and address other pollution sources (e.g., animal waste) contributing to water quality degradation in the marine nearshore. Failing or inappropriately sited septic systems have resulted in water quality concerns and closure of beach and shellfish harvest areas – especially within Quarter Master Harbor. While the direct impact on shellfish harvesting is a human health concern, the water quality pollution can negatively affect various parts of the nearshore ecosystem that supports Chinook salmon.

Although the 2005 Salmon Plan focused on Quarter Master Harbor, PIC programs should be expanded to other nearshore areas as warranted to identify pollution sources, provide technical support, and offer financial incentives to remedy failing septic systems and other sources of pollution. Over the last decade, investments made by Public Health— Seattle & King County and other partners have resulted in improved water quality and reopening of 493 acres of shellfish harvest areas.

Creosote Removal Program

WRIA 9 organizations should partner with the Washington Department of Natural Resources Creosote Removal Program to identify and remove creosote-treated debris and derelict structures from marine and estuarine waters. Creosote structures leach chemicals and can create toxic conditions for organisms that live within beach and marine sediments, as well as disrupt the marine foodweb. Studies have found creosote exposure can contribute to mortality of herring eggs and alter growth and immune function of juvenile salmonids. Derelict structures can also interrupt sediment transport and displace aquatic vegetation.

Since adoption of the 2005 Plan, the program has removed over 21,000 tons of creosote debris and

8.0 acres of overwater structures from Puget Sound. However, thousands of derelict creosote pilings remain within Puget Sound. WRIA 9 partners should continue efforts to inventory and prioritize focus areas based on concentration of creosote debris and potential impacts to forage fish and juvenile salmon rearing.

Policies

- » Water Quality (WQ) 1: Promote Low-Impact Development (LID) and green infrastructure (natural and engineered systems) to address stormwater runoff. Given the magnitude of development constructed prior to existing stormwater controls, extensive stormwater retrofits are needed to address legacy sources of water pollution. LID techniques should mimic, where possible, pre-disturbance hydrological processes of infiltration, filtration, storage, evaporation and transportation. LID techniques include:
 - Vegetation conservation: native vegetation and small-scale treatment systems;
 - Site design: clustering of buildings and narrower and shorter roads;
 - Retention systems: bioretention, bio-swales, rain gardens, wetlands and vegetated roofs;
 - Porous or permeable paving materials: sidewalks, trails, residential driveways, streets, and parking lots; and
 - Rainwater catchment: rain barrels and cisterns.

Green Infrastructure: Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life.

- American Rivers

- » WQ2: Support local and regional watershed-based stormwater management initiatives (e.g., Our Green Duwamish, STORM, etc.) that prioritize programs and projects that can effectively demonstrate largescale, watershed-wide, water quantity and water quality improvements that benefit salmon recovery. Potential priorities include:
 - Collaborative source control strategies such as education and outreach, business inspections, pollution prevention, and programmatic maintenance;
 - Regional retrofit programs focused on restoring natural hydrology and the removal of toxics; and
 - Green Stormwater Infrastructure (GSI) incentive programs that promote the voluntary use of GSI.
- » WQ3: Source control efforts across multiple sectors (commercial, industrial, and agricultural) should ensure that water and sediment quality support salmon growth and survival. Source control sufficiency is a critical milestone that must be achieved to initiate contaminated sediment cleanup. Ensuring implementation, maintenance, and enforcement, where necessary, of source control best management practices will help reduce pollutant loading into water bodies and ensure pollutants don't undermine sediment cleanup efforts in the Duwamish. Incentives to promote effective source control include spill prevention and response, technical support, and hazardous waste vouchers to local businesses.
- » WQ4: Protect and enhance rural and urban forests, which provide diverse social, economic and ecological benefits. In Rural Areas of King County, at least 65 percent of each sub-basin should be preserved as natural forest cover and impervious coverage should not exceed 10 percent of a subbasin. Where forest cover exceeds this threshold, the goal of no net loss in forest cover should be pursued. In Urban Growth Areas, local governments should adopt goals to achieve 30-40 percent ecologically healthy urban tree canopy coverage and reduce impervious surfaces. Adopting goals specific to riparian canopy could help prioritize riparian restoration. Local education, outreach, and incentive programs should be supported to increase urban forestry programs and associated tree canopy coverage.



Figure 19. Stormwater-induced mortality in coho salmon in Miller Creek, Normandy Park. Although stormwater toxicity is not lethal to Chinook salmon, potential sublethal impacts are not well understood. Photo: Matt Goehring.

- » WQ5: Ensure cost-share agreements between the U.S. Forest Service, Washington Department of Natural Resources, Tacoma Water, and private landowners are maintained and that road maintenance and abandonment plans achieve sediment reduction goals. Support opportunities to abandon unnecessary forest roads as they are identified to reduce overall road density.
- » WQ6: Support regional and state legislative efforts to reduce the risk of oil spills in Puget Sound and ensure the state remains a leader in oil spill prevention and response. Over 20 billion gallons of oil are transported through Washington each year by vessel, pipeline and rail. A catastrophic spill could cost the region over \$10 billion and impact over 150,000 jobs. It would also cause significant harm to aquatic ecosystems and disrupt maritime industry, recreation, and tourism.

» WQ7: Local governments should adopt the Interagency Regional Road Maintenance Endangered Species Act Program Guidelines, as amended, for maintenance of existing infrastructure. Governments should participate in the associated Regional Forum to support ongoing adaptive management to improve outcomes.

Strategy: Protect, Restore and Enhance Marine Shorelines

Location: Marine Nearshore

Marine nearshore habitats, including beaches, pocket estuaries, eelgrass beds, inlets, and deltas, provide important rearing and migration habitat for juvenile Chinook salmon and many other animals in Puget Sound. They are also critical spawning habitat for forage fish – a key prey species for Chinook salmon. Decades of alteration and armoring of the Puget Sound marine shoreline has reduced shoreline length and habitat complexity, disrupted sediment supply and transport, and eliminated forage fish spawning habitat. Restoring natural shorelines will increase nearshore productivity and salmon growth and survival in the marine environment.

Programs

 » Develop/maintain a "Toolbox" of Shore Friendly Alternatives for Privately-Owned Shorelines (aka Do-it-yourself approach for residential shoreline improvement)

WRIA 9 partners should develop a "shoreline toolbox" to provide shoreline owners guidelines for implementing shore friendly alternatives that clearly outline stewardship concepts and best management practices for private shorelines. It should not only outline the range of alternatives for different shoreline types (e.g., beach and bluffs), but also highlight important design, feasibility, maintenance, and permitting considerations when considering shoreline improvements. Topic areas should include native shoreline vegetation, erosion control, shoreline access, docks, and stormwater management.

The toolbox should be designed to supplement shoreline workshops and technical assistance programs and could be made available online to provide guidance to property owners who may elect to take a "do-it-yourself approach" to shoreline management. It should be tailored to reach private landowners and contractors and connect them with available local and regional resources. The toolbox should draw from regional efforts such as WDFW's Marine Shoreline Design Guidelines, the Shore Friendly King County collaborative, Green Shores for Homes, and Green Shorelines for Lake





Figure 20. Before and after Phase II restoration of Seahurst Park in the City of Burien. Construction was completed in 2014. Photos: Hugh Shipman.

Washington and Lake Sammamish, and highlight local examples of shore-friendly approaches within WRIA 9.

» Expand Shore-Friendly Technical Assistance and Cost-Share Programs to Accelerate Armor Removal and Soft Shoreline Protection (aka Supported Approach for Residential Shoreline Improvement)

Access to technical information about shoreline erosion and protection alternatives and the financial costs associated with marine shoreline armor removal have been identified as key barriers to motivating shoreline landowners to consider soft shoreline protection. Soft shoreline protection is less preferred than outright removal, but preferable to traditional hard armor in that it helps maintain and enhance some natural marine shoreline functions (e.g., sediment transport and delivery). Bulkhead removal is expensive and site-specific erosion risk is not conducive to the use of standard models or templates for soft shore protection. In addition, many landowners and consultants are unfamiliar with how to design/implement successful soft shoreline protection projects. Technical assistance to help landowners better understand risk, to provide design and permitting support, and to assist with access to cost-share funding should help to overcome existing barriers to armor removal on private property and promote expansion of soft shoreline protection alternatives.

The King Conservation District (KCD) has historically provided technical assistance on environmentally friendly ways to manage shoreline properties, including shore-friendly alternatives to traditional bulkheads. The KCD also has a cost-share incentive program to encourage revegetation and removal of existing armor and/or soft shore protection designs where site-specific conditions allow. In 2020, KCD established a Shore Friendly King County collaborative between multiple partners. This program is seen as part of a local adaptation of the regional Shore Friendly approach to reducing marine shoreline armoring. Although this is an existing program, additional resources are needed to expand capacity. Landowners are identified through parallel marine shoreline landowner workshops. Priority should be given to currently unarmored shorelines and armored properties where site-specific factors (e.g., structure location, fetch, bank/bluff geology,

etc.) make armor removal and/or soft shoreline protection alternatives feasible.

» Implement Acquisition Strategy to Protect and Restore Functioning Nearshore Habitats

Acquisition of priority marine shorelines supports conservation and restoration of critical nearshore processes and rearing habitats used by multiple stocks of juvenile Chinook - including Green/Duwamish Chinook. A number of planning efforts have identified and prioritized conservation of nearshore habitats within WRIA 9, including the Prioritization of Marine Shorelines of WRIA 9 for Juvenile Salmon Habitat Protection and Restoration (2006), Vashon-Maury Island Greenprint (2007), and the Puget Sound Nearshore Ecosystem Restoration Project Strategies for Nearshore Protection and Restoration in Puget Sound (2012). Although many of the highest priority sites have been specifically identified as unique projects within the Habitat Plan, WRIA 9 should support opportunistic acquisition of other functioning nearshore habitats if they become available.

Although the bulk of the acquisition opportunities for functioning habitats are located on Vashon-Maury Islands, additional opportunities exist on the mainland nearshore. Successful implementation of a nearshore acquisition strategy requires consistent outreach to landowners and operational flexibility to capitalize on acquisition opportunities before they are lost. The sale of properties previously unavailable for decades frequently can represent a once in a generational opportunity to protect a priority stretch of marine shoreline. Individual acquisition opportunities should be evaluated based on ecological value/potential of nearshore habitat and risk of development. Available funding sources to support acquisition include King County Conservation Futures, King County Flood Control District Cooperative Watershed Management Program and Coastal Erosion Program, Washington Department of Fish and Wildlife Estuary and Salmon Restoration Program, and various Washington State Recreation and Conservation Office grant programs.

Policies

» Nearshore (NS) 1: Avoid shoreline infrastructure or stabilization except where demonstrated to be necessary to support or protect a legally-established primary structure, critical public infrastructure, or shoreline use in danger of loss or substantial damage. Support armor removal and alternative approaches to shoreline stabilization (e.g., setbacks and relocations) where feasible to reduce impacts to existing natural shoreline processes. Protection and restoration of important sediment sources (e.g., feeder bluffs) is needed to restore nearshore processes and sediment transport. Where the need for bank stabilization is supported by analysis of a geotechnical engineer, "soft" shoreline stabilization techniques (e.g., bioengineering techniques and vegetation enhancement) should be required where feasible. "Soft" stabilization measures should be designed to preserve or restore natural shoreline processes (e.g., sediment transport). "Hard" shoreline stabilization should only be allowed where softalternatives do not provide adequate protection. Refer to WDFW Marine Shoreline Design Guidelines, Green Shores for Homes, Integrated Streambank Guidelines, and Stream Habitat Restoration Guidelines for additional guidance.

Primary Structure: Structural improvement that is essential to the primary use of the property. Structures that function as secondary or subordinate to the primary use of a property are considered an accessory use.

- » NS2: Encourage multiple family/neighborhood use of docks, boat ramps, and beach access stairs. Local jurisdictions should minimize impacts to the nearshore marine environment by encouraging consolidation/joint-use of structures that could serve multiple landowners. Opportunities to pursue joint-use should be evaluated during development and redevelopment. Boat docks, ramps and beach access stairs can shade aquatic vegetation, disrupt juvenile salmon migration and foraging, alter nearshore sediment transport and degrade nearshore habitats (e.g., eelgrass). Possible incentives include permit streamlining, fee reductions, and dimensional incentives (e.g., increased length, width, etc.).
- » NS3: Jurisdictions should promote derelict vessel prevention and coordinate with Washington State Department of Natural Resources (WADNR) on derelict vessel removal. Derelict vessels can contribute to contamination of aquatic lands, degrade water quality, and damage sensitive aquatic habitats (e.g., eelgrass). Although the WADNR Derelict Vessel Removal Program has removed more than 580 vessels from marine waters, local efforts are critical to ensuring effective prevention and rapid response.
- » NS4: Support beach nourishment, where appropriate, to offset interruption of natural sediment supply and transport caused from extensive shoreline modifications (e.g., bulkheads, etc.). Beach nourishment has been used successfully to protect shorelines, restore natural beach profiles, and enhance nearshore habitats.
- » NS5: Support regional efforts to identify and test actions to increase juvenile survival during outmigration through Puget Sound and increase local efforts to stabilize or improve foodweb function such as forage fish habitat protection and restoration.

Strategy: Protect, Restore and Enhance Estuarine Habitat

Location: Duwamish

The Duwamish estuary provides critical rearing habitat for juvenile salmon as they make the physiological transition from fresh to saltwater habitats. Industrial development within the Duwamish valley drove extensive fill of tidal wetlands, armoring of shorelines, and navigational dredging. The modifications straightened the estuary and eliminated 98 percent of the historic wetlands. Despite the magnitude of loss of habitat, the Duwamish continues to play a critical role in supporting juvenile Chinook salmon. Both cleanup of legacy industrial contamination within the Lower Duwamish Superfund Site and restoration of shallow water rearing habitat are needed to increase juvenile salmon survival and overall productivity within the watershed.

Program

» Implement and Adaptively Manage the Duwamish Blueprint

The Duwamish Blueprint outlines strategic guidance for governments, businesses, non-profit organizations and citizen groups working to improve the estuarine ecosystem and increase juvenile salmonid productivity. It identifies approximately 100 acres of shallow water habitat restoration potential within the Duwamish estuary transition zone (RM 1-10). Many of the habitat opportunities are conceptual and have not been prioritized. Periodic evaluation of conceptual opportunities is needed to elevate and refine project ideas as the Duwamish landscape changes (e.g., Superfund cleanup, Natural Resource Damage Assessment [NRDA], and real estate availability).

Restoration in the Duwamish is complex, expensive, and will require flexibility, innovation, and extensive coordination and collaboration to be successful. The former Duwamish Blueprint Working Group, which was convened to develop the Blueprint, would provide a framework to facilitate coordination across key partners. WRIA 9 partners should leverage the Blueprint Working Group to identify opportunities to enhance partnerships to (1) pursue larger project footprints; and (2) overcome barriers to implementation. Given limited land availability, WRIA 9 should opportunistically evaluate potential acquisitions and consider elevating conceptual projects as part of adaptive management based on habitat benefit, acquisition feasibility, and readiness.

Policies

- » Duwamish Estuary (DE) 1: Engage in the Lower Duwamish Waterway (LDW) Superfund cleanup process to coordinate and sequence potential salmon habitat projects with Superfund activities to maximize benefits to salmon recovery. Strategic acquisition should be prioritized over habitat project construction prior to competition of the LDW cleanup to avoid potential contaminated sediments and minimize potential for re-contamination.
- » DE2: Engage with NRDA trustees and potentially liable parties to inform project development and design and maximize potential benefit to salmon recovery. NRDA settlements within the Duwamish will result in large capital investments in habitat restoration that should provide a significant lift to salmon recovery. Coordination with the NRDA process will also support identification of potential synergistic opportunities, and help identify and resolve barriers to maximize restoration outcomes. For example, it may be possible to leverage NRDA settlements to expand existing and/or planned restoration projects.



Figure 21. Duwamish Gardens created 1.3 acres of shallow water rearing habitat in a critically important transition zone of the Duwamish Estuary. Subsequent monitoring has documented extensive use of the site by juvenile Chinook salmon. Photo: Mike Perfetti. Although NRDA has a broader scope than Chinook salmon recovery, priority NRDA habitats significantly overlap with salmon recovery needs in the Duwamish (e.g., estuarine marshes, intertidal mudflats, and riparian habitats). Tracking NRDA project implementation will be important to understanding the status of habitat restoration efforts in the Duwamish. Given the existing uncertainty associated with juvenile Chinook survival in the Duwamish, WRIA 9 should engage with the trustees to share emerging research, exchange lessons learned in restoration, inform adaptive management of restored sites, and identify priority sites for restoration.

» DE3: Encourage the U.S. Army Corps of Engineers and the Port of Seattle to identify strategies for dredging that: (1) minimize impacts to salmon habitat and (2) improve salmon habitat through use of beneficial re-use where suitable. Soil contamination may limit opportunities for re-use.

Strategy: Protect, Restore and Enhance Instream Flows and Cold Water Refugia

Location: Lower, Middle and Upper Green

Green River flows are regulated to support both flood control and water supply needs. The Tacoma Water Habitat Conservation Plan requires maintenance of minimum instream flows during summer months. Although water capture and storage behind Howard Hanson Dam (HHD) support maintenance of minimum instream flows and periodic flow augmentations during summer and early fall, it can also reduce the frequency of high flow events that drive lateral channel migration (i.e., habitat forming flows) and availability of juvenile Chinook rearing habitat throughout spring. Low snowpack and drought conditions exacerbate already difficult tradeoffs in timing of water release designated for fish conservation purposes. Water temperatures also regularly exceed established water quality standards for Salmon Core Summer Habitat and Spawning Habitat.

Climate change forecasts predict the watershed will experience reduced snowpack, lower summer time flows, and elevated instream temperatures. These changes will impact the already difficult reservoir refill strategies at HHD, potentially putting greater stress on refilling earlier and having a bigger impact on juvenile Chinook habitat. Prolonged low flows can cutoff access to critical rearing habitats and exacerbate high instream temperatures. High water temperatures can delay adult migrations, contribute to increased susceptibility to disease, and even be lethal above 23°C. Protecting instream flows and cold water refugia is essential to strengthening watershed resilience to climate change. Cold-water refugia are characterized as being at least 2°C colder than the daily maximum temperature of adjacent waters.

Programs

» Develop Watershed Management Plan to Address Permit-Exempt Well Development

WRIA 9 partners should coordinate on development of the Ecology's Watershed Restoration and Enhancement Plan to assess and offset potential consumptive impacts of new rural, domestic water use on stream flows in the Green/Duwamish watershed. Maintaining legally established minimum instream flows has proven challenging during recent years with below average precipitation. Climate change models indicate that changes in precipitation patterns could exacerbate streamflow issues and further stress salmon.

Implementation of the plan is required to not only offset permit exempt domestic water use, but also provide for a net ecological benefit. The legislature plans to direct \$300 million in funding through 2035 to benefit fish and streamflows. WRIA 9 should position itself to leverage this funding source to support implementation of appropriate projects in this plan that meet the flow or net ecological benefit guidance and/or develop additional project elements that do so. If instream flows remain problematic in the future, additional consideration should be given to integrating other categories of water use into an expanded Watershed Management Plan and implementation program.

» Develop a Strategy to Protect and Restore Habitat in the Upper Green River and its Tributaries

Conduct a planning effort to develop a long-term, comprehensive approach to protecting and restoring ecosystem processes in the Upper Green River subwatershed. Current checkerboard ownership *Figure 22.* Before (2013) and after (2019) restoration photos of the Big Springs Creek. The project protected cool waters from a natural spring.





complicates land management and a strategic approach is needed to leverage the relatively intact upper watershed to maximize benefits for salmon and steelhead recovery. Access to the upper watershed has long been identified as critical to longterm salmon recovery. However, the delay of fish passage and the degraded condition of the lower watersheds have resulted in limited investments in the upper watershed.

Projected shifts in temperature and precipitation patterns associated with climate change further emphasize the critical importance of this landscape to long-term salmon recovery. A number of assessments should be completed to inform a strategic approach to management of the upper watershed, including:

- Visualizing Ecosystem Land Management Assessments (VELMA): Quantify long-term effects of forest management and climate scenarios on salmon habitat (i.e., hydrological flow regimes and instream temperatures);
- Model intrinsic habitat value of stream segments within the upper watershed to inform conservation and restoration priorities;
- Beaver Assessment: Assess current activity, model potential benefits, and explore potential reintroduction if warranted; and

 Assess important wildlife migratory corridors and key landscape level linkages to inform acquisition priorities.

The results of these assessments should be used to prioritize salmon recovery investments in the upper watershed with respect to potential land consolidation, land use management changes, and potential road abandonment.

Policies

- » Stream Flows (SF)1: Support reevaluation of the U.S. Army Corps of Engineers water storage schedule and Fish Conservation Guide Curve at HHD to increase benefits for salmonids while maintaining downstream flood control benefits. The current water capture period overlaps the juvenile Chinook rearing period and impacts accessibility and/or amount of important rearing habitats during outmigration. Utilize the existing Green River Flow Management Coordination Committee to assess fish habitat needs based on best-available science and basin-specific climate change projections.
- » SF2: Protect existing cold water refugia and enhance water storage and hyporheic exchange by reconnecting historic floodplain habitats to instream habitats. These habitats facilitate heat dissipation and provide an influx of cooler waters to moderate seasonal fluctuations in stream tem-

peratures and flows, providing physiological and ecological benefits for cold-water salmonids.

- » SF3: Support forest management and harvest rotation programs that increase hydrologic function and improve base flows to minimize impacts on salmonid habitat, support climate change resiliency, and maintain viable silviculture. Additional research is necessary to quantify potential benefits.
- » SF4: Manage groundwater in conjunction with surface water withdrawals to provide instream flows and water temperatures that support adult salmonid spawning and juvenile rearing. Local governments, water purveyors, and state and federal regulators should:
 - Protect groundwater resources and critical aquifer recharge areas;
 - Manage groundwater and surface water withdrawals seasonally to maximize the benefits to salmonid habitat;
 - Develop drought management plans to supply safe and reliable drinking water while minimizing impacts to salmonids during periods of drought;
 - Ensure rural domestic use does not adversely impact salmonid habitat;
 - Support water rights acquisition programs that can augment chronic low flows; and
 - Limit or preclude mining and other significant excavation activities that could adversely impact groundwater hydrology.
- » SF5: Support expansion of reclaimed/recycled wastewater to reduce demands on stream and ground withdrawals. Reclaimed wastewater can be used safely and effectively for non-drinking water purposes such as landscape and agricultural irrigation, heating and cooling, and industrial processing. Reclaimed water is available year-round, even during dry summer months or when drought conditions can strain other water resources.

See also policies SW4-6 above.

Strategy: Expand Public Awareness and Education

Location: All subwatersheds

Education and outreach are fundamental to protecting and restoring salmon. It raises awareness, builds political support, and promotes positive behaviors that benefit salmon. Long-term salmon recovery will not be successful without public support. Broadbased community support provides political leverage to protect and expand local, state and federal investments in habitat restoration. It is also helps promote positive behavior change and minimize behaviors that can negatively impact salmon or undermine recovery investments. For example, ecological gains associated with marine shoreline restoration in WRIA 9 have been predominantly offset by new armor installations. General outreach is not sufficient to drive widespread and long-lasting behavior change. Targeted social marketing strategies must identify and overcome both real and perceived barriers to promote positive behaviors that contribute to salmon recovery.

Programs

Implement a Comprehensive Communications Plan to Promote Behavior Change that Expedites Salmon Recovery in WRIA 9

Integrate lessons learned from the regional Shore Friendly programs into a locally adapted communication plan designed to increase implementation of behaviors that support salmon recovery. Key outcomes include:

- Increased public recognition of the urgency around salmon recovery and connection to southern resident orcas;
- Improved public understanding and stewardship of riverine and nearshore ecosystem processes that support salmon and forage fish;
- Technical assistance provided to interested shoreline residents;
- Target audiences make informed decisions based on knowledge of Shore Friendly practices, climate resilience, and adaptation;
- A suite of tools and incentives developed to address identified barriers to adoption of desired behaviors;

- Messaging and outreach tailored to contractors and realtors;
- The value of riparian vegetation is communicated to the public, including riverside landowners, elected officials, and trail/park users; and
- Partners conducting outreach and education receive positive reinforcement and feedback from the salmon recovery community.

Additional effort is needed to refine target audiences and develop associated social marketing approaches. The intent of the communication plan should be to build awareness, expand stewardship, and promote advocacy. A regional Social Marketing Strategy to Reduce Puget Sound Shoreline Armoring was developed for the Washington Department of Fish and Wildlife in 2015. A Green/Duwamish River Revegetation Outreach and Engagement Plan was developed in 2019. These plans provide an existing framework that can be expanded to integrate other priority salmon recovery issues.

» Expand Volunteer Stewardship

Increase citizen participation through new stewardship programs and by expanding and supporting existing stewardship programs that engage volunteers in restoring, maintaining, and monitoring habitat protection and restoration projects. These projects not only benefit salmon recovery, but also improve stormwater retention, carbon sequestration and wildlife habitat and include important themes and messages for participants to change behavior at home. Local volunteer programs should:

- Foster environmental stewardship and personal connection to salmon recovery;
- Educate people about threats to salmon and the role of habitat in salmon recovery;
- Leverage additional resources to implement recovery actions; and
- Expand the constituency to advocate for salmon recovery.

The Green/Duwamish Watershed has a number of volunteer stewardship programs that play an instrumental role in invasive vegetation removal and native revegetation. Many of these programs provide long-term stewardship of large capital restoration sites. Traditional salmon recovery funding is not available to fund long-term (beyond two to three years) stewardship and maintenance of restoration sites. As a result, local funding or creative partnerships are essential to ensure restoration projects achieve desired outcomes into the future.

» Expand Community Science Monitoring

Develop and implement community science programs to address data gaps and foster watershed stewardship among residents. Community science programs can provide capacity to collect important long-term monitoring data while serving as an outreach tool to educate residents about local natural resource issues. They can also create opportunities to introduce students to scientific research and provide important data for resource managers.

Since 2005, citizen science programs include:

- Beach Nearshore Ecology Team (BeachNet): The Vashon Nature Center coordinates a forage fish monitoring program that collects data on forage fish presence/absence, spawning timing, beach substrate preferences, and intertidal and upland habitat conditions within the marine reserve. Data are shared with WDFW and is used to inform protection of spawning beaches. BeachNet also contributes to shoreline restoration monitoring in partnership with University of Washington, King County, and the Washington State Department of Natural Resources.
- Miller-Walker Basin Community Salmon Investigation (CSI): The CSI program has conducted 10 years of salmonid spawning surveys to assess long-term trends in salmon abundance and the urban runoff mortality syndrome in coho salmon. Data are shared with local jurisdictions and resource managers. A partnership with the UW Tacoma Center for Urban Waters has helped identify both the suite of toxic chemicals contributing to coho mortality and priority areas within this watershed to focus future stormwater improvements.

» Shoreline Workshops and Technical Assistance

Implement workshops to educate target audiences (landowners, landscapers, contractors) about shoreline stewardship and common misconceptions about shoreline erosion. Promote alternative approaches to shoreline management that provide for the use and enjoyment of property in a manner that benefits fish and wildlife. Priority focus areas include:

- · Shoreline processes and salmon habitat;
- · Erosion control;
- Noxious/invasive weed control;
- Revegetation guidance;
- Natural yard care; and
- Stormwater management.

Workshops should connect target audiences with local and regional resources (e.g., technical assistance) designed to overcome barriers to improving shoreline stewardship. Materials and messaging



should be tailored to specific subwatersheds and groups of landowners to increase effectiveness. The Green Shores for Homes program developed in 2015 is an available tool to guide the design of improved shoreline conditions for Puget Sound properties.

Policies

- » Education and Stewardship (ES)1: Support educational programs that integrate watershed science and salmon into problem-based learning exercises for school children. These programs instill a sense of place, encourage appreciation of natural resources, and promote environmental literacy among the next generation of future decision makers.
- » ES2: Support diverse outreach and education programs that promote awareness of salmon recovery and positive behavior change. Programs should employ community-based social marketing to identify and overcome barriers to targeted behaviors. Priority focus areas include shoreline stewardship, riparian revegetation, and stormwater management.

Strategy: Integrate Agricultural Protection and Salmon Recovery Initiatives

Location: Lower and Middle Green

Salmon recovery and the preservation of viable agriculture are two regional priorities that intersect in the Middle and Lower Green floodplain and along Newaukum Creek. King County designated over 16,295 acres of land within the Green River watershed for agriculture within three Agricultural Production Districts (APD). Some additional, but relatively small amounts of agricultural activities occur within the cities of Kent and Auburn. Over 5,763 acres of land within the APD have been enrolled within the Farm-

Figure 23. A community volunteer examines a salmon carcass as part of the Miller/Walker Basin Community Salmon Investigation. The program has leveraged community support and a partnership with the University of Washington to advance our understanding of stormwater runoff impacts on local salmon. Photo: Miller/ Walker Stewardship Program. land Preservation Program (FPP). Restrictive covenants on FPP properties are designed to permanently protect agricultural use and open space.

The 2005 Plan acknowledged that salmon recovery and agricultural production operate within a shared landscape along the Green River valley. It prioritized sequencing of restoration projects over the first 10 years of plan implementation to focus first on existing public lands, then on lands within the rural and urban growth areas, and finally on lands within the APD, but not enrolled in the FPP. The plan acknowledged that projects that negatively impact tillable surface may need to be reconsidered at a later date.

This Plan Update acknowledges that the implementation of high-priority salmon projects critically needed to advance salmon recovery will result in localized loss of existing farmland. Research indicates that rearing habitat availability in the Lower and Middle Green River is the primary limiting factor for Chinook productivity within the watershed. Collaboration between agricultural and salmon recovery interests will be necessary to identify and advance shared priorities and ensure salmon and agriculture can coexist productively within a shared landscape. Lessons learned from other watersheds should be reviewed for applicability within the Green River watershed.

Programs

» Farm Conservation Planning

Farm conservation plans can help landowners protect natural resources while achieving their land use goals. They can also help access and leverage agricultural incentives to improve conservation practices on agricultural lands. Priorities include stream and wetland buffer revegetation and livestock management. Agriculture is widespread throughout the Middle and Lower Green and farmland preservation is a regional priority. Expanding riparian buffer revegetation on Green River valley farms has the potential to greatly benefit salmon recovery, especially where agricultural lands overlap with high priority areas identified by the Muckleshoot solar aspect shade maps (2014). Limiting livestock access to stream buffers can also greatly improve water quality and riparian conditions.

Available incentive programs include:

- King Conservation District rural services programs (e.g., Land Owner Incentive Program, Farm Conservation Technical Assistance, and Agricultural Drainage Program)
- King County Small Habitat Restoration Program
- USDA Farm Service Agency Conservation Reserve Enhancement Program
- King County Livestock Program (i.e., BMP cost share)

Landowner recruitment is essential to program success. Additional resources and strategies are needed to expand participation.

Policies

» AG1: Protect, enhance, and restore high quality salmon habitat in the Agricultural Production Districts in a manner that strives to reduce loss of viable agricultural land and ensure the long-term viability of agriculture. Projects that displace tillable farmland should strive to provide benefits to adjacent farm lands in attempt to offset impacts.

Local governments, state and federal agencies, non-profits, and special purpose districts should work with agricultural landowners in the Agricultural Production Districts to:

- Correct water quality problems resulting from agricultural practices;
- Implement best management practices for livestock and horticulture;
- Prevent additional degradation or clearing of forested riparian buffers;
- Encourage landowners to pursue voluntary sustainable actions for fish, farms, and soils;
- Conduct compliance monitoring and regulatory enforcement where necessary to protect critical habitats;
- Identify opportunities where salmon recovery projects can provide parallel benefits (e.g., flood risk reduction and drainage improvements) to adjacent agricultural lands; and
- Limit the extent of actively farmed lands displaced by priority salmon restoration projects.

» AG2: Evaluate the effectiveness of the regulatory flexibility given to agricultural landowners that obtain a farm plan from the KCD. If the flexibility leads to better habitat and water quality outcomes, other opportunities should be explored to provide additional flexibility. If the flexibility has not led to better outcomes, the County should evaluate if there are improvements to the regulatory structure (e.g. require some amount of the farm plan be implemented versus implementation being voluntary) that would improve the outcomes of the flexible approach.

Strategy: Integrate Salmon Recovery into Land Use Planning

Location: All Subwatersheds

Historical population growth and development within the watershed displaced habitat, altered natural hydrology, and polluted local waters. Local land use plans should provide a blueprint for future growth and development that is consistent with salmon recovery. Land use decisions should reinforce the importance of preservation of intact, functional habitats and provide a pathway for restoration of priority habitats. While the Salmon Habitat Plan is not a regulatory document, integration of identified recovery strategies and habitat priorities within local land use plans, policy and decision-making can accelerate implementation and ultimately dictate success of recovery efforts within the Green/Duwamish.

Programs

» Incentivize Voluntary Restoration Practices

Local governments and state agencies should promote landowner adoption of voluntary conservation and restoration actions through implementing associated incentive programs. Regulatory complexity, fees, access to technical assistance, and project costs have all been identified as barriers to expanding adoptions of voluntary best management practices on private property. Priority areas to address include invasive removal and native revegetation along shorelines, soft shoreline stabilization, and green stormwater infrastructure. Jurisdictions should review existing barriers and evaluate incentive opportunities, including:

- Streamlined permitting process;
- Reduced fees for restoration projects;
- Free technical assistance (e.g., engineering, planting plans, etc.);
- Cost share/financing programs; and
- Regulatory flexibility.

Voluntary adoption of best management practices by private landowners has been sporadic. Additional targeted investments are needed to expand implementation beyond early adopters. Improving coordination and consistency across regulatory jurisdictions (i.e., local, state and federal governments) is also needed to improve consistency and reliability of the permitting process and increase adoption of best management practices. A coordinated effort across the watershed to identify targeted practices and assess best practices related to available incentives could reduce costs and improve efficiency. Using the Green Shores for Homes or similar programs as an incentive-based program to increase the number of properties that voluntarily improve shoreline conditions on their property should be explored.

» Regulatory Compliance Monitoring and Associated Enforcement

Jurisdictions should assess regulatory compliance with shoreline master programs, critical area protections, floodplain regulations, and agricultural regulations (e.g., Livestock Management Ordinance) to assess and improve protection of salmon habitats. Regulatory compliance is fundamental to achieving no net loss of ecological function along marine and freshwater shorelines and to ensuring that ongoing impacts to salmon habitat do not undermine salmon recovery investments. Periodic compliance monitoring should be used to assess the status of jurisdictions and the status of local regulatory implementation and to inform a strategic approach to address shortcomings. If a regulatory framework is not achieving intended outcomes, local jurisdictions should assess changes to staffing levels, outreach and education, technical training for staff, interagency coordination, and enforcement to improve compliance rates.

A WRIA 9 Marine Shoreline Monitoring and Compliance Project (2018) found that only 42 percent of shoreline modifications between 2013-2018
obtained local permits. Even fewer shoreline modifications obtained a WDFW Hydraulic Project Approval. Furthermore, more new shoreline armor (mostly unpermitted) was constructed than removed through restoration projects. These results indicate that unpermitted shoreline modifications are undermining salmon recovery investments and overall efforts to achieve "no net loss of ecosystem function" as required through the Shoreline Management Act. Jurisdictions should take a programmatic approach to identify and address barriers (e.g., permit fees, regulatory uncertainty/confusion) to improve shoreline compliance rates and achieve outcomes that protect salmon habitat. Coordination and sharing of lessons learned across jurisdictions and the larger Puget Sound are recommended to improve efficiency.

Policies

- » Land Use (LU)1: Ensure salmon recovery priorities are integrated into long-range planning efforts, including Shoreline Master Programs, Comprehensive Plans, and Open Space and Parks Plans. Planning documents should be consistent with the Salmon Habitat Plan and support implementation of habitat protection and restoration priorities. WRIA 9 should provide technical assistance to promote compatibility.
- » LU2: Land use development, annexation, and capital improvement programs within the watershed should be consistent with the salmon recovery plan and promote progress towards achieving the necessary future conditions (and associated implementation targets) for a viable salmon population. Development proposals should be evaluated with respect to impacts on key habitat indicators and identified habitat projects for the respective subwatershed.
- » LU3: Local governments should use comprehensive plans and associated land use policies to direct growth and development within existing Urban Growth Areas (UGAs) to protect ecologically important landscapes in rural areas. Specifically, avoid future expansions to existing UGAs that could result in additional land conversion and landscape degradation.

- » LU4: Strictly apply and improve compliance with critical area, shoreline, vegetation conservation, floodplain, and agricultural regulations designed to protect important ecological habitats. Avoid use of variances in priority areas identified for protection and restoration in the salmon habitat plan.
- » LU5: Local governments should support flexible development tools that encourage protection and/ or restoration of ecologically important salmon habitat. Possible tools include, but are not limited to, transferable development rights, mitigation banking/ reserve programs, incentive zoning, Green Shores for Homes, and Public Benefit Rating System tax programs.
- » LU6: WRIA 9 partners should incorporate sea level rise projections into long-range planning documents, habitat project designs, and development standards to promote long-term ecosystem resiliency. Nearshore habitats adjacent to armored shorelines could be lost as water levels rise (i.e., coastal squeeze) if shorelines remain fixed. Lowlying shoreline areas should be identified to support landward migration of nearshore habitat as sea levels rise where appropriate.
- » LU7: Encourage certified development standards (e.g., Built Green, Salmon-Safe Certification, and Green Shores for Homes) that minimize the impacts of urban development on the natural environment. Incentives could include reductions in flexible development standards, expedited permitting, and reduced or waived permit costs.
- » LU8: Incorporate Salmon-Safe Certification standards into best management practices for park and grounds maintenance procedures. Certification is available for parks system, golf courses, and urban development. Salmon-Safe Certification is a peer-reviewed certification and accreditation program that promotes practices that protect water quality, improve watershed health and restore habitat.
- » LU9: Local governments should evaluate shorelines and critical areas, open space (e.g., parks and golf courses), and public lands with respect to identified salmon habitat priorities and notify WRIA 9 staff prior to approving significant land use conversion, or pursuing sale/exchange of public lands.

» LU10: Incorporate Green Shores for Homes Certification standards into best management practices for residential shoreline development. The WRIA should support municipal efforts to establish a Green Shores for Homes certification process during permit review to help expedite permitting. Green Shores for Homes is an EPA-funded certification and accreditation program that was developed by technical Shore Friendly design of shoreline properties.

Plan Implementation and Funding

Location: All Subwatersheds

The WRIA 9 2016-2025 Interlocal Agreement provides a framework for managing and coordinating implementation of the Salmon Habitat Plan. It recognizes that salmon recovery transcends political boundaries and calls for strong collaboration between local, state, and federal partners. Success hinges on strong relationships, strategic coordination, and collective action. Working effectively across such a diverse landscape as the Green/Duwamish and Central Puget Sound requires creative partnerships with non-traditional partners. Leveraging shared resources to implement multi-benefit projects will help overcome land availability constraints and high restoration costs.

Programs

» Basin Stewardship

Support and expand existing basin stewardship programs across the Green/Duwamish subwatersheds. Basin stewards are instrumental to implementation of the salmon habitat plan. They advocate for salmon recovery, coordinate across diverse stakeholders, and build on-the-ground relationships that facilitate large capital restoration projects. Key tasks for basin stewardship include:

- Coordinating and implementing restoration projects;
- Coordination and collaboration across jurisdictions;
- Securing grant funding (including grant writing) for restoration and acquisition projects;
- Promoting voluntary stewardship on private property;

- Responding to citizen inquiries concerning watershed issues; and
- Expanding public education and outreach opportunities

Basin stewardship covers the Middle and Lower Green River sub-basins, Miller and Walker Creek basins, and Vashon Island. Priorities for expansion include mainland nearshore and Duwamish sub-basins.

» Land Conservation Initiative (LCI)

The LCI represents a coordinated effort to preserve river corridors, urban open space, trails, natural lands, farmland and forestlands. It is a regional collaboration between King County, cities, business people, farmers, environmental partners, and others to strategically preserve our last, most important places. The initiative sets forth the goal of conserving and preserving 65,000 acres of high conservation value lands throughout King County within the next 30 years. The primary funding source is the Conservation Futures Tax (CFT) fund, which is a property tax on all parcels in the county.

The LCI is an important funding source for pursuing open space acquisitions throughout the Green/ Duwamish watershed. WRIA 9 partners should leverage the LCI to execute high-priority land acquisitions within the Green River Corridor to improve hydrological integrity, support salmon recovery, and expand recreational opportunity. Much of WRIA 9 is mapped as an "opportunity area" where households lack access to open space. Implementation of the LCI has the potential to align salmon recovery investments with needed investments to address equitable access to open space throughout the watershed.

» U.S. Army Corps Green/Duwamish Ecosystem Restoration Program (ERP)

WRIA 9 partners should continue to engage U.S. Army Corps leadership to advocate for appropriation of funding to implement ERP projects. The original collaborative effort resulted in identification of 45 projects, 29 of which were carried forward in the 2005 Salmon Habitat Plan. U.S. Congress authorized \$113 million in 2000 to be cost shared between the federal (65%) and local partners (35%). Since the 2005 Plan, 13 of the original projects have been completed, with seven completed under the ERP authorization (e.g., North Winds Weir, Codiga Farms, Riverview Side Channel) and six completed by local sponsors (e.g., Porter Levee Setback, Fenster levee Setback, and Gale Creek).

The Congressionally authorized ERP represents an important federal resource to support critically needed and underfunded salmon restoration work in the watershed. As of 2016, the ERP has only been allocated 8.25 percent of the authorized amount. A 2018 Green/Duwamish ERP Comprehensive Cost Update removed 12 projects based on the ratio of perceived habitat value to cost and the presence of hazardous materials. However, the recommended "de-scoped" plan still includes a number of high-priority projects including NE Auburn Creek and the Hamakami, Turley, and Lones levee setback projects. The cost update for the modified ERP scope is \$260 million and the congressionally authorized cost adjusted for inflation is \$269 million.

Policies

» Implementation (I)1: The WRIA 9 2016-2025 Interlocal Agreement outlines the governance, funding, and decision-making structure for coordination and implementation of the Salmon Habitat Plan.

- » I2: Process-based habitat restoration where feasible – is preferable to other approaches that rely on more intensive human intervention. However, the magnitude of alteration within portions of the watershed render true restoration of degraded processes infeasible in some locations. Rehabilitation and substitution projects require additional monitoring and maintenance to ensure desired functions are achieved. WRIA 9 should support periodic investments in adaptive management of completed projects to ensure maximize long-term ecological benefits.
- » I3: Support use of mitigation funds to implement priority salmon habitat enhancement projects. Offsite mitigation programs (e.g., in-lieu fee and mitigation banking) can help improve ecological function in critical locations (e.g., Chinook Wind in the Duwamish Transition Zone) as a means of offsetting unavoidable impacts in less sensitive areas of the watershed. Development of mitigation opportunities should be coordinated with the WRIA to ensure proposals are consistent with and do not preclude identified salmon recovery priorities. The WRIA should explore the potential for innovative partnerships that could combine mitigation and restoration funding to expand the overall ecosystem benefit of habitat projects. However, habitat improvements

Figure 24.

The Riverview Park **Project created** approximately 800 ft of side channel to increasing juvenile Chinook rearing and refuge habitat in the Lower Green River. The project, sponsored by the City of Kent, was constructed in 2012 in partnership with the U.S. Army Corps of Engineers under the Green/Duwamish Ecosystem Restoration Project.

Photo: City of Kent.



associated with mitigation funds must be tracked as separate and discrete from those achieved with restoration-based grant funding.

- » I4: Salmon recovery planning and habitat project development should integrate social justice and equity considerations. Public access and recreational improvements should be considered where demonstrated need exists and when compatible with salmon recovery goals. WRIA 9 should seek multiple benefit solutions that consider displacement and social justice issues.
- » I5: Coordinate Salmon Habitat Plan implementation with other watershed-wide and regional initiatives to identify synergies, leverage available funding, avoid conflicts, and improve salmon recovery outcomes. Existing watershed-wide and regional initiatives include the King County Flood Hazard Management Plan, King County Flood Control District Lower Green River Corridor Plan, Lower Duwamish Waterway Superfund Cleanup, Puget Sound Action Agenda, Our Green Duwamish, WRIA 9 Watershed Restoration Enhancement Committee, and the Puget Sound South Central Action Area Local Integrating Organization.
- » I6: Support examining new funding sources and financing strategies for implementing priority habitat projects and programs throughout Puget Sound. The WRIA 9 Watershed Forum will seek representation on regional committees tasked with the examination of public and private funding strategies at the local and regional level.
- » I7: Salmon recovery funding should support adaptive management of previously constructed projects where monitoring data shows design changes are necessary to improve habitat function.

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Chapter 7: Capital Projects

Salmon recovery capital projects preserve, enhance, create or restore the habitats and physical processes that support salmon. Projects include acquisition, restoration, and/or enhancement approaches.

Although significant progress has been made implementing projects identified in the 2005 Salmon Habitat Plan, many projects remain unfunded and under-resourced. Since 2005, 165 projects have been completed or are in progress, totalling over \$160 million of investments. While many of the remaining projects identified within the 2005 Plan are still viable, other opportunities have been lost to development and/or a change in ownership.

This update provides a current, comprehensive list of potential capital projects that align with established goals for Chinook salmon recovery in WRIA 9. A couple of plan amendments added new projects to the 2005 Plan, including: a 2007 plan amendment; and the 2014 Duwamish Blueprint. As part of the 2020 update, all projects described in the plan (and its amendments) or the appendices of the plan were evaluated for inclusion in updated project list.

WRIA 9 staff developed an updated list of capital projects in partnership with ILA member jurisdictions, non-profit partners, state agencies, and others engaged in salmon recovery. Partners were asked to submit projects and provide specific project information including a project sponsor, location, scope, goals, alignment with recovery strategies, and projected habitat gains. In some cases, an identified project did not have a clear sponsor, but was included due to the perceived importance of the project. The request for projects primarily targeted Chinook salmon-focused projects, but several coho salmon projects were accepted.

A few additional project guidelines were developed in refining the project list:

- Policies and Programs Project submittals were not required for actions that fell within the scope of larger programmatic actions (e.g., fish barrier removal).
- Discrete footprint Projects were required to articulate a specific project footprint to support evaluation of feasibility and magnitude of ecological benefit.
- Implementable within 10-15 years Project sponsors were directed to submit projects that could be implemented within a 10-15-year timeframe, provided adequate funding and landowner willingness.

Project Prioritization

A team of subject matter experts was recruited to review, evaluate and tier projects for inclusion in the Plan. This four-person prioritization team brought expertise in restoration ecology, fish biology, and habitat project management, and over 50 years of knowledge from working in the Green/Duwamish River and Central Puget Sound. A balance of interests was represented to eliminate bias for specific projects. The review process evaluated all conceptual projects based on their full potential to provide habitat lift. Future constraints identified during design and feasibility could impact overall project scope and associated benefits.

Project prioritization was based on subject matter expert evaluation of:

- Habitat Quality (lift): the relative importance and value of a specific proposed habitat; and
- Habitat Quantity (size): the potential amount (acreage and shoreline length) of habitat created or enhanced based on the entire project footprint.

The scoring process was weighted so that habitat quality comprised 75 percent of the score and habitat quantity comprised 25 percent of the score. The tiering process assumes habitat benefits are positively correlated with size. Larger projects not only provide more habitat, they allow increased habitat heterogeneity. Smaller, more homogeneous habitats, are less resilient to perturbations, and site constraints can be problematic for optimizing habitat. A small modifier was added to allow consideration of high-value geographic locations (e.g., proximity to existing restoration sites, feeder bluff, etc.). Potential lift reflects the projected immediate and long-term habitat benefits to addressing limiting factors for Chinook salmon recovery. Processed-based restoration was considered to provide more certainty of long-term benefits.

A total of 118 projects were submitted and ranked as part of the project solicitation process. Projects were ranked within a specific subwatershed – not across subwatersheds. Given the large number of projects, projects were tiered based on overall benefit and to provide an indication of priority for financial support from the WRIA. Tiers were defined as follows:

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- **Tier 1** high potential; substantially contribute to recovery goals in each subwatershed.
- **Tier 2** moderate potential; clear alignment with Chinook salmon recovery goals.
- **Tier 3** limited potential; associated with Chinook recovery (or not primary species impacted); compliments broader recovery efforts in the subwatershed.

A simplified scoring methodology based on habitat quantity and quality provides a foundation for longterm planning by setting high-level implementation priorities within each subwatershed. Tiers were assigned to projects by identifying natural breakpoints in the full list of projects within a subwatershed. These established breakpoints serve as a scoring baseline for projects received through future biennial calls for projects. Future proposed projects will be scored under the same criteria and assigned a tier. The proposed project will be added to the tiered list for future funding, with near-term funding priority given to those projects previously identified as in need of funding.

The final list of projects was approved unanimously by the Implementation Technical Committee and Watershed Ecosystem Forum in 2019 and will serve as the comprehensive list of recovery actions that help achieve recovery goals, and ultimately toward the delisting of Chinook salmon in Puget Sound.



Figure 25. Number of projects by subwatershed.

Capital Project Information by Subwatershed containing:

- Subwatershed project location maps
- Subwatershed project listings with tier rankings
- Project fact sheets with site maps

Marine Nearshore Subwatershedp. 76
Duwamish Estuary Subwatershedp. 102
Lower Green River Subwatershedp. 116
Middle Green River Subwatershedp. 146
Upper Green River Subwatershed p. 160





Tier 1 (Score 18+) 17 projects

- NS-7.....Cove Creek Pocket Estuary Restoration
- NS-8Dillworth and Gorsuch Creek Pocket Estuaries
- NS-11.....Beaconsfield on the Sound
- NS-15.....McSorley Creek Pocket Estuary and Feeder Bluff restoration
- NS-21.....Corbin Beach Acquisition and Restoration
- NS-23......Point Heyer Nearshore Acquisitions
- NS-24.....Cross Landing Pocket Estuary Restoration
- NS-28......Big Beach Reach Acquisition and Restoration

- NS-29......Maury Island Natural Area Revegetation and Reclamation
- NS-43......Dockton Reach Preservation and Restoration
- NS-45......Tahlequah Creek Mouth Restoration
- NS-49......Arroyos Park Bulkhead Removal
- NS-53......Perkins Lane Protection and Restoration
- NS-61......Manzanita Reach Acquisition and Restoration
- NS-62.....Spring Beach Acquisition and Restoration
- NS-63......Green Valley Creek Acquisition and Restoration
- NS-66......Camp Kilworth Protection

Tier 2 (Score 7-18) 8 projects

- NS-13......Massey Creek Pocket Estuary and Fish Passage Project
- NS-14......Raab's Lagoon Acquisition and Restoration
- NS-25.....Judd Creek Pocket Estuary
- NS-27......Piner Point Acquisition and Restoration
- NS-31.....Discovery Park Feeder Bluff Protection and Restoration
- NS-44.....Portage Salt Marsh Restoration
- NS-60 Ellisport Creek Mouth Restoration
- NS-67......Des Moines Creek Estuary Restoration

Tier 3 (Score <7) 14 projects

- NS-2.....Myrtle Edwards Park Pocket Beach Shallow Water Habitat
- NS-16......Dash Point State Park Estuary Restoration and Water Quality Improvements
- NS-22......Smith Cove Shallow Water Rehabilitation
- NS-35.....Lower Shinglemill Creek habitat restoration
- NS-39......Walker Creek Headwaters Land Acquisition
- NS-40Salmon Creek Fish Barrier Removal
- NS-42......Miller Creek Regional Detention Facility
- NS-54.......West Galer Street/32nd St. Boat Ramp Shoreline Armor Removal and Restoration

- NS-58......Tsugwalla Creek Pocket Estuary Restoration Project
- NS-59......Mileta Armor removal and shoreline restoration
- NS-68......Longfellow Creek Fish Passage and Floodplain Restoration
- NS-70 Fauntleroy Creek Fish Passage
- NS-72Perkins Lane Protection and Restoration Project/Perkins Lane Utility Access Road
- NS-73......Beall Creek Salmon Habitat Project





Tier 1 Project: NS-7 Cove Creek Pocket Estuary Restoration

Green / Duwamish & Central Puget Sound





LOCATION MAP

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PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury Island (KI - 13-28; KI - 11-7)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$600,000

PROJECT DESCRIPTION:

Protect and improve riparian vegetation, improve tributary access, remove armoring and fill, increase vegetated shallow nearshore and marsh habitats, protect and enhance pocket estuaries and tributary stream mouths.

PROIECT TYPE:

KEY HABITAT:

Restoration

Nearshore

Pocket Estuary

Acquisition

Nearshore

Feeder Bluff

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: NS-8 **Dillworth and Gorsuch Creek Pocket Estuaries**









PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 12 - 4)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$3,000,000

PROJECT DESCRIPTION:

Acquire properties at the mouth of Dillworth and Gorsuch Creeks to restore stream delta and pocket estuary habitat.

PROIECT TYPE:

KEY HABITAT:

Restoration

Riparian

Acquisition

Nearshore

Pocket Estuary

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Increased rearing habitat
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT







Tier 1 Project: NS-11 Beaconsfield on the Sound







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Normandy Park (KI-7-3)

Bankside jurisdiction: Normandy Park

Project sponsor: Normandy Park

Budget: \$600,000

PROJECT DESCRIPTION:

Protect and restore 1085 ft. of active feeder bluff along mainland marine nearshore.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

Shoreline armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

PROJECT TYPE:

KEY HABITAT:

Nearshore

Feeder Bluff

Restoration

Acquisition



Tier 1 Project: NS-15 McSorley Creek Pocket Estuary and Feeder Bluff Restoration







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Des Moines (KI - 8 - 3)

Bankside jurisdiction: Des Moines

Project sponsor: King County/ State Parks

Budget: \$20,838,000

PROJECT DESCRIPTION:

Restore historic pocket estuary, protect feeder bluffs, remove marine shoreline armoring and enhance low-impact recreational activities.

PROIECT TYPE:

Planning/

Design

KEY HABITAT:

Feeder Bluff Pocket Estuary

Enhancement/ Planting

Nearshore

Restoration

Acquisition

Nearshore

Monitoring &

Assessment

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Recreation opportunities
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT





Tier 1 Project: NS-21 Corbin Beach Acquisition and Restoration

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury Island (KI 11-2)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$3,500,000

PROJECT DESCRIPTION:

Acquire to protect and restore nearshore habitat by removing shoreline debris, hard armor, and derelict docks.

PROIECT TYPE:

KEY HABITAT:

Nearshore

Feeder Bluff

Restoration

Acquisition

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: NS-23 **Point Heyer Nearshore Acquisitions**



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 13 - 2)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$10,000,000

PROJECT DESCRIPTION:

Acquire properties to protect and restore beach feeding processes and salt marsh at spit.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Habitat preservation
- Recreation opportunities
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT







KEY HABITAT:

Acquisition

Nearshore

Feeder Bluff



Riparian

Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update



Tier 1 Project: NS-24 Cross Landing Pocket Estuary Restoration

Green / Duwamish & Central Puget Sound







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 13 - 23)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$3,500,000

PROJECT DESCRIPTION:

Acquire beach feeding parcels, remove fill, restore salt marsh, remove road, and reroute road drainage.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT







KEY HABITAT:

Nearshore

Pocket Estuary

- Kan

Riparian

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Tier 1 Project: NS-28 Big Beach Reach Acquisition and Restoration

Green / Duwamish & Central Puget Sound







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury Island (KI 13-20)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$15,000,000

PROJECT DESCRIPTION:

Acquire to protect and restore about 209 acres of upland and nearshore habitat with approximately 4615 feet of bluff-backed beach shoreline.

PROIECT TYPE:

KEY HABITAT:

Nearshore

Feeder Bluff

Restoration

Acquisition

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT





Tier 1 Project: NS-29 Maury Island Natural Area Revegetation and Reclamation







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PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 14 - 2)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$1,050,000

PROJECT DESCRIPTION:

Remove invasive species, add topsoil, and revegetate about a mile of marine shoreline.

PROJECT TYPE:

Restoration

KEY HABITAT:

Nearshore

Feeder Bluff

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Recreation opportunities
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: NS-43 Dockton Reach Preservation and Restoration

Green / Duwamish & Central Puget Sound









PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 13 - 8)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$2,600,000

PROJECT TYPE:



Scoping/ Reconnaissance

KEY HABITAT:



Nearshore Feeder Bluff

PROJECT DESCRIPTION:

Restore 2000 feet of marine shoreline in the Maury Island Aquatic Reserve.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: NS-45 **Tahlequah Creek Mouth Restoration**





PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury Island (KI - 13 - 21, KI - 13 - 22)

Jurisdiction: Vashon/Maury

Project sponsor: Vashon/Maury

Budget: \$7,000,000

PROJECT DESCRIPTION:

Acquire properties, restore creek meander and fish passage, remove bulkhead, and restore nearshore, estuary and marsh habitat.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

PROJECT TYPE:



Acquisition Restoration

KEY HABITAT:



Nearshore Nearshore

Feeder Bluff Pocket Estuary





Tier 1 Project: NS-49 Arroyos Park Bulkhead Removal

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: City of Seattle (KI -5 - 1)

Bankside jurisdiction: City of Seattle

Project sponsor: Seattle Parks and Recreation

Budget: \$2,500,000

PROJECT DESCRIPTION:

Remove approximately 700 feet of rip rap and timber bulkhead along the shoreline.

Primary strategy

Protect, restore and enhance marine shorelines.

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020

KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

Benefits:

- Habitat preservation
- Recreation opportunities
- Shoreline armor reduction

Contribution to goals metrics:

- Shoreline armor
- Shoreline conservation





Planning/ Restoration Design

KEY HABITAT:





Tier 1 Project: NS-53 Perkins Lane Protection and Restoration





<section-header>



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PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: City of Seattle (KI - 3 - 2)

Bankside jurisdiction: City of Seattle

Project sponsor: Seattle Parks and Recreation

Budget: TBD

PROJECT DESCRIPTION:

Acquire properties to remove old bulkheads and fill.

PROJECT TYPE:

KEY HABITAT:

Nearshore Feeder Bluff

Restoration

Acquisition

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Habitat preservation
- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: NS-61 **Manzanita Reach Acquisition and Restoration**









PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 10 - 3)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$15,000,000

PROJECT DESCRIPTION:

Acquire properties to remove old bulkheads and fill.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



PROJECT TYPE:



KEY HABITAT:

Nearshore

Pocket Estuary



Riparian



Tier 1 Project: NS-62 **Spring Beach Acquisition and Restoration**







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 10 - 3)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$5,000,000

PROJECT DESCRIPTION:

Acquire to protect and restore shoreline and forage fish habitat.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT







KEY HABITAT:

Nearshore



Pocket Estuary

Riparian



Tier 1 Project: NS-63 **Green Valley Creek Acquisition and Restoration**







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Vashon/Maury (KI - 13 - 26)

Bankside jurisdiction: Vashon/Maury

Project sponsor: King County

Budget: \$4,000,000

PROJECT DESCRIPTION:

Acquire undeveloped lots along the Green Valley Creek, restore creek mouth, and remove hard shoreline armor.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Reconnect historic feeder bluffs
- Shoreline armor reduction

Contribution to goals metrics:

- Marine riparian vegetation
- Shoreline armor
- Shoreline conservation





PROIECT TYPE:



KEY HABITAT:

Acquisition

Nearshore

Pocket Estuary



Riparian



Tier 1 Project: NS-66 Camp Kilworth Protection







PROJECT FACTS

Subwatershed: Nearshore (NS)

Drift cell: Federal Way (KI - 10 - 3)

Bankside jurisdiction: Federal Way

Project sponsor: Forterra and Kilworth Environmental Education Preserve (KEEP)

Budget: \$3,100,000

PROJECT DESCRIPTION:

Protect 900 feet of active feeder bluffs that occurs in the first third of the drift cell.

Primary strategy

Protect, restore and enhance marine shorelines.

Benefits:

- Improved forage fish spawning habitat
- Reconnect historic feeder bluffs

Contribution to goals metrics:

Shoreline armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: WDOE Shoreline Photo Viewer Images, 2020 KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

KEY HABITAT:

Acquisition

PROJECT TYPE:

Nearshore Feeder Bluff

Tier 2 Project: NS-13 Massey Creek Pocket Estuary and Fish Passage Project



📃 Park

Public Lands

Acquire and restore the stream, create fish passage, remove the jetty and rock from the south bank, and create a pocket estuary.

Tier 2 Project: NS-14 **Raab's Lagoon Acquisition and Restoration**



connectivity by removing the weir and bulkhead.



Tier 2 Project: NS-25 Judd Creek Pocket Estuary



PROJECT DESCRIPTION:

Restore habitat with wood placement, removal of derelict barge, and additional vegetation near mouth of Judd Creek.

Harbor

Tier 2 Project: NS-27 **Piner Point Acquisition and Restoration**



PROJECT DESCRIPTION:

96

Acquire remaining properties, remove bulkheads, and restore feeder bluffs.

Public Lands/Easements

📃 Park

Public Lands/Easements

Tier 2 Project: NS-31 **Discovery Park Feeder Bluff Protection and Restoration**



and restore feeder bluffs.

Tier 2 Project: NS-44 **Portage Salt Marsh Restoration Project**



and restore habitat to salt marsh.

Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update

Tier 2 Project: NS-60 **Ellisport Creek Mouth Restoration**



PROJECT DESCRIPTION:

Acquire and restore habitat at Ellisport Creek stream mouth, and allow for fish passage.

Table 3.

Marine Nearshore Subwatershed Tier 3 Projects

Tier 2 Project: NS-67 **Des Moines Creek Estuary Restoration**



Nearshore

Nearshore

Bankside

Budget:

TBD

Remove approximately 500 feet of hard shoreline armor and pull back fill material to create a more natural shoreline and stream transition.

Project No.	Project Name	Project Type	Project Description		Sponsor	River mile and Bank side/Nearshore jurisdiction	Primary Strategy (pick 1)	Jurisdiction	Goal alignment
NS-2	Myrtle Edwards Park Pocket Beach Shallow Water Habitat	• Planning/Design • Restoration • Scoping/Reconnaissance	Remove shoreline armor and restore natural beach adjacent to a previously created pocket beach.		Seattle Parks and Recreation	Nearshore KI - 4 - 1 - NAD	Protect, restore and enhance marine shorelines	City of Seattle	Marine riparian vegetation Shoreline armor
NS-16	Dash Point State Park Estuary Restoration and Water Quality Improvements	Restoration Scoping/Reconnaissance	Project will remove armoring to restore estuary and re-align creek to more sinuous route. Improve water quality in park through parking lot improvements, reduce erosion associated with stormwater runoff, creosote-treated pedestrian bridge replacement, and wetland enhancement.		Washington State Parks & Recreation	Nearshore KI - MA - 014	Protect, restore and enhance marine shorelines	City of Federal Way	LG- Off-channel habitat
NS-22	Smith Cove Shallow Water Rehabilitation	Planning/Design	Remove some level of shoreline armor and plant native vegetation along a stretch of barren riprap. The riprap leads to a protected sandy pocket beach that exists at all tidal elevations. There may be additional opportunity for nearshore restoration on adjacent Port property. The Port also has a marine habitat restoration pilot site adjacent to this project.		Seattle Parks and Recreation	Nearshore KI - 3 -2/3 - 3 - NAD, KI - 3 - 3	Protect, restore and enhance marine shorelines	City of Seattle	Marine riparian vegetation Shoreline armor
NS-35	Lower Shinglemill Creek Habitat Restoration	Restoration	Add LWD into stream reach west of Cedarhurst Road.		King County	Nearshore KI - 11 - 4	Protect, restore and enhance marine shorelines	Vashon/Maury	Marine riparian vegetation Shoreline conservation

(continued on next page)

Public Lands

Table 3. Marine Nearshore Subwatershed Tier 3 Projects, continued

Project No.	Project Name	Project Type	Project Description		Sponsor	River mile and Bank side/Nearshore jurisdiction	Primary Strategy (pick 1)	Jurisdiction	Goal alignment
NS-39	Walker Creek Headwaters Land Acquisition	Enhancement/Planting Restoration & Acquisition Scoping/Reconnaissance	The project plan is to seek partnership or acquisition opportunities with the property owners within the project area, with the goal of acquiring and restoring additional contiguous areas beyond the current city-owned wetland parcels within the project site.		City of Burien	Nearshore KI - 7 - 3	Protect, restore and enhance marine shorelines	City of Burien	Shoreline conservation
NS-40	Salmon Creek Fish Barrier Removal	Planning/Design Restoration	The project plan is to seek a partnership or acquisition opportunities with the property owners within the project area, with the goals of removing the fish-barrier weir at the mouth of the creek, and removing and replacing a culvert with a modern fish passable one.		City of Burien	Nearshore KI - 5 - 1	Protect, restore and enhance marine shorelines	City of Burien	Marine riparian vegetation Shoreline armor Shoreline conservation
NS-42	Miller Creek Regional Detention Facility	Planning/Design	The project plan is to identify one or more large commercial properties in Burien that have no existing stormwater treatment or flow control, and partner with them to construct regional stormwater facilities on their site(s).		City of Burien	Nearshore KI - 7 - 3	Protect, restore and enhance sediment and water quality	City of Burien	Shoreline conservation
NS-54	West Galer Street/32nd St. Boat Ramp Shoreline Armor Removal and Restoration	 Planning/Design Restoration Scoping/Reconnaissance 	Remove/reduce shoreline armoring, remove fill, relocate an SPU-owned pump station if feasible, and re-vegetate shoreline. Potential acquisition of adjacent properties.		Seattle Public Utilities	Nearshore KI - 3 - 2	Protect, restore and enhance marine shorelines	City of Seattle	Shoreline armor
NS-58	Tsugwalla Creek Pocket Estuary Restoration Project	Restoration & Acquisition	Restore fish passage and salt marsh habitat at mouth of creek.		King County	Nearshore KI - 13 - 15 / KI - 13 - 14	Protect, restore and enhance marine shorelines	Vashon/Maury	 Marine riparian vegetation Shoreline armor Shoreline conservation
NS-59	Mileta Armor Removal and shoreline restoration	Restoration	Remove shoreline armoring, evaluate and improve fish passage.		King County	Nearshore KI - 13 - 10	Protect, restore and enhance marine shorelines	Vashon/Maury	 Marine riparian vegetation Shoreline armor Shoreline conservation
NS-68	Longfellow Creek Fish Passage and Floodplain Restoration	 Acquisition Planning/Design Restoration Restoration & Acquisition Scoping/Reconnaissance 	This project will evaluate restoration opportunities at five sites along a 1.7-mile section of Longfellow Creek. Future restoration may include: floodplain reconnection, fish passage improvements (culvert replacements or daylighting), stream channel realignment, stream channel and riparian restoration, wetland creation and/or enhancement.		Seattle Public Utilities	RM 0 / left bank	Protect, restore, and enhance riparian corridors	City of Seattle	DUW - Riparian forest
NS-70	Fauntleroy Creek Fish Passage	 Acquisition Planning/Design Restoration Restoration & Acquisition 	Replace two aging fish passage barrier culverts with new culverts that meet fish passage standards. Includes partial daylighting and stream channel restoration.		Seattle Public Utilities	Nearshore / KI - 5 - 1	Restore and improve fish passage	City of Seattle	Marine riparian vegetation Shoreline armor
NS-72	Perkins Lane Protection and Restoration Project/Perkins Lane Utility Access Road	 Planning/Design Restoration Scoping/Reconnaissance 	Assess feasibility of modifying the utility service road and sewer access points in order to remove shoreline armor and restore to a natural beach.		Seattle Public Utilities	Nearshore KI - 3 - 2	Protect, restore and enhance marine shorelines	City of Seattle	 Marine riparian vegetation Shoreline armor Shoreline conservation
NS-73	Beall Creek Salmon Habitat Project	Restoration	Replace current surface water extraction system with a fish friendly system to allow for the return of salmon and other salmonids		Water District 19	2923039086/Water District 19	Protect, restore and enhance marine shorelines	Water District 19	Marine riparian vegetation Shoreline armor Shoreline conservation



Duwamish Estuary Subwatershed



Tier 1 (Score 18+) 8 projects

DUW-2.....Rendering Plant DUW-7.....Chinook Wind DUW-7a....Chinook Wind - Extension DUW-25...Desimone Oxbow Restoration DUW-29...Seattle City Light North/Hamm Creek DUW-32...Duwamish River People's Park & Shoreline Habitat (Terminal 117) DUW-64...U-Haul River Project DUW-66...Terminal 25 South

Tier 2 (Score 7-18) 9 projects

DUW-3.....Seattle LA Freight Revetment Setback DUW-18Codiga Off-channel Habitat Expansion DUW-22 ...Cecil Moses DUW-24 ...Carrossino Restoration DUW-26 ...S 104th St. Bank Stabilization/Restoration DUW-60 ...Herring's House Park Fish Access Improvement DUW-61George Long DUW-63 ...S.115th St. Road Setback DUW-67.....Codiga to TCC Corridor

Tier 3 (Score <7) 2 projects

DUW-14....Duwamish Waterway Park DUW-19....Southgate Creek Restoration





Tier 1 Project: DUW-2 **Rendering Plant**

Central Puget Sound



PROIECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 10.1 - 9.7/ right bank

Bankside jurisdiction: City of Tukwila

Project sponsor: City of Tukwila

Budget: \$9,730,000

PROJECT DESCRIPTION:

Acquire and restore seven + acres with side channel and backwater habitat enhancements and reforestation.

PROJECT TYPE:





Scoping/ Design Reconnaissance



Acquisition

Restoration

KEY HABITAT:













Duwamish Mudflat Marsh







Floodplain



Side Channel

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased rearing habitat
- Sediment quality improvement

Contribution to goals metrics:

- DUW Riparian forest
- DUW Shallow water habitat

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth, 2020 KCIT-DCE file: 2010_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: DUW-7 Chinook Wind

Green / Duwamish & Central Puget <u>Sound</u>



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 6.7/ right bank

Bankside jurisdiction: City of Tukwila

Project sponsor: King County

Budget: \$14,900,000

PROJECT DESCRIPTION:

Expand and enhance low velocity, shallow water rearing rearing habitat (shallow subtidal and intertidal) in the Duwamish transition zone.

PROJECT TYPE:





KEY HABITAT:





Duwamish Mudflat







Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased habitat connectivity
- Sediment quality improvement

Contribution to goals metrics:

- DUW Riparian forest
- DUW Shallow water habitat

Project Area Map: Ortho2019KCNAT aerial photo

KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: DUW-7a Chinook Wind Extension

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 6.8/ right bank

Bankside jurisdiction: City of Tukwila

Project sponsor: City of Tukwila

Budget: \$1,418,000

PROJECT TYPE:





KEY HABITAT:



Edge



)uwamish Duwamis Mudflat Marsh



Riparian

PROJECT DESCRIPTION:

Expand and enhance the land between Chinook Wind Mitigation and Duwamish Gardens to create a unified park and rest.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased habitat connectivity
- Recreation opportunities
- Sediment quality improvement

Contribution to goals metrics:

- DUW Riparian forest
- DUW Shallow water habitat

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2010_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT


Tier 1 Project: DUW-25 Desimone Oxbow Restoration



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 6.5 -5.3/left bank

Bankside jurisdiction: City of Tukwila

Project sponsor: Unknown

Budget: \$84,193,945

PROJECT TYPE:



Planning Design



Acquisition

Restoration

Planting





PROJECT DESCRIPTION:

Acquire and restore 45.4-acre site located on the western shore of the Duwamish River between river miles 5 and 6 resulting in 23.6 acres of marsh created, 10.8 acres of vegetation, and 34.4 acres refuge habitat created.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased rearing habitat
- Sediment quality improvement

Contribution to goals metrics:

- DUW Riparian forest
- DUW Shallow water habitat
- LG Off-channel habitat

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: DUW-29 Seattle City Light North/Hamm Creek



PROJECT AREA MAP







PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 5.0 -4.8/ left bank

Bankside jurisdiction: City of Seattle

Project sponsor: Seattle City Light

Budget: TBD

PROJECT DESCRIPTION:

Create off channel habitat and shallow water esturarine habitat in the area north of the existing Duwamish 230 kV - 26 kV substation.

PROJECT TYPE:

Restoration

KEY HABITAT:

Nearshore Pocket Estuary

Tributary

Backwater

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased rearing habitat
- Sediment quality improvement

Contribution to goals metrics:

- DUW - Shallow water habitat

Site Photo: Wash. Dept. of Ecology Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: DUW-32 **Duwamish River People's Park & Shoreline Habitat (Terminal 117)**

Green / Duwamish & Central Puget Sound





LOCATION MAP

Public



PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish 4.5 - 4.1 / left bank

Jurisdiction: Port of Seattle

Project sponsor: Port of Seattle

Budget: TBD

PROJECT TYPE:





nancement/ Planning, Planting Design Restoration

KEY HABITAT:



Edge

PROJECT DESCRIPTION:

Restore approximately 13.5 acres and 2,050 linear feet of upland and aquatic habitats. The project will expand off-channel habitat as well as establish marsh vegetation and riparian forest, restore estuarine shoreline via removal of armoring, and add large wood.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased habitat connectivity
- Recreation opportunities
- · Sediment quality improvement

Contribution to goals metrics:

• DUW - Shallow water habitat

Site Photo: Wash. Dept. of Ecology Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

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Tier 1 Project: DUW-64 **U-Haul River Project**

Central Puget Soun



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish RM 6.5 - 6.3/ right bank

Bankside jurisdiction: City of Tukwila

Project sponsor: City of Tukwila

Budget: \$11,770,000

PROJECT TYPE:



0





Planning/ Scoping/ Design Reconnaissance

KEY HABITAT:





PROJECT DESCRIPTION:

Acquire and restore 4.4-acre parcel by creating off-channel mudflat, marsh, and riparian habitat.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased rearing habitat
- Recreation opportunities
- Sediment quality improvement

Contribution to goals metrics:

- DUW Riparian forest
- DUW Shallow water habitat

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth, 2020 KCIT-DCE file: 2010_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: DUW-66 Terminal 25 South

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Duwamish (DUW)

River mile: Duwamish 0.4 / right bank

Jurisdiction: Port of Seattle

Project sponsor: Port of Seattle

Budget: TBD

PROJECT DESCRIPTION:

Restore critically needed estuarine in the East Waterway. Project will expand off-channel habitat as well as establish marsh vegetation and riparian forest, restore estuarine shoreline via removal of armoring & creosote pile, and add large wood.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased rearing habitat
- Sediment quality improvement

Contribution to goals metrics:

- DUW - Shallow water habitat

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

Enhancement/

Planting



Restaration

Planning/ R Design

Restoration

KEY HABITAT:





Marsh

Duwamish Edge Mudflat

Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update

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Tier 2 Project: DUW-3 Seattle LA Freight Revetment Setback



Park

PROJECT DESCRIPTION:

Acquire properties, setback the revetment, create shallow water edge habitat with backwater refuge for salmonids, and improve shoreline conditions in this freight district in Tukwila.



Foster Golf Links

0 150 300 600 f

Tier 2 Project: DUW-18 **Codiga Off-channel Habitat Expansion**



Expand Codiga Park habitat restoration project by turning the backwater area into a side channel to increase rearing and refuge for salmon during higher flows.



Tier 2 Project: DUW-22 **Cecil Moses**



PROJECT DESCRIPTION:

Enhance access to and expand existing off-channel habitat to increase quality and quantity of available rearing habitat in the transition zone by expanding existing inlet/outlet, removal of tire revetment, and potential acquisition and restoration of adjacent downstream creek parcel.

Incorp. Area Boundary Public 🔲 Park

Tier 2 Project: DUW-24 **Carrossino Restoration**



PROJECT DESCRIPTION:

Acquire properties and create shallow mudflat, marsh, and backwater habitats.



Green River Tukwi

Tier 2 Project: DUW-26 S. 104th St. Bank Stabilization/Restoration



PROJECT DESCRIPTION:

Acquire properties, abandon and remove the road, and create shallow water edge and backwater habitat in the transition zone.



Tier 2 Project: DUW-60 Herring's House Park Fish Access Improvement

PROJECT FACTS	PROJECT	KEY		
Subwatershed:	TYPE:	HABITAT:		
Duwamish (DUW)	ÂÖ		West Duwamish	
River mile:	Planning/	Nearshore	Greenbelt	
RM 1.1 / left bank	Design	Pocket Estuary		RM
Bankside			E DUW-60	• Terminal
jurisdiction:		man and a second		108
City of Seattle	Restoration	Riparian	Pigeon Point Herrinos	Park
Project sponsor:			Park House Park	Juwe
Seattle Parks and			(Tualtwx)	misl
Recreation		Cide Channel		n Riv
Budget: \$1,250,000		Side Channel	Puget	ę
			Park	
PROJECT DESCRIPTION	V:		Kello	aa

Adaptively manage an older restoration project to increase fish use by expanding channel opening width, removing shoreline armor and considering a bridge over the channel for recreational access.



Incorp. Are Boundary

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Tier 2 Project: DUW-61 **George Long**



Park

PROJECT DESCRIPTION:

Create backwater refuge and riparian habitat at the uppermost limit of the transition zone.

Tier 2 Project: DUW-63 S. 115th St. Road Setback





PROJECT DESCRIPTION:

Relocate local road and create shallow water edge, backwater mudflat, marsh, and riparian habitat as part of the Duwamish Hill Preserve Master Plan.

KCIT-DCE VC folder: 2010_10202w_DUW-63.ai

GIS file Q:\20009\WRIA9_ProjectMaps.mxc

Tier 2 Project: DUW-67 Codiga to TCC Corridor



Table 4 Duwamish Estuary Subwatershed Tier 3 Projects

Codiga Park to the Tukwila Community Center.

Proj#	Project Name	Project Type	Project Description	Sponsor	River mile and Bank side/Nearshore jurisdiction	Primary Strategy (pick 1)	Jurisdiction	Goal Alignment
DUW-14	Duwamish Waterway Park	 Acquisition Planning/Design Restoration Scoping/Reconnaissance 	Acquire adjacent properties, pull back bank armoring, revegetate. incorporate recreational uses.	Seattle Parks and Recreation	RM 3.6/left bank	Protect, restore and enhance marine shorelines;	City of Seattle	Marine riparian vegetation Shoreline armor Shoreline conservation
DUW-19	Southgate Creek Restoration	Other Planning/Design Restoration Acquisition Scoping/Reconnaissance	This project would improve fish passage, water quality and flooplain/flood- control in Southgate Creek, which is piped and channelized through most of its lower reach; the confuence of the Green would be improved for off-channel, tributary Chinook use. Studies are required.	City of Tukwila	RM 7.90/left bank	Protect, restore and enhance instream flows and cold water refugia	City of Tukwila	DUW - Riparian forest DUW - Shallow water habitat

Lower Green River Subwatershed

45 projects

Tier 1 (Score 18+) 13 projects

- LG-3...... Horsehead Restoration Project
- LG-6...... Wrecking Yards Restoration Project
- LG-8...... Lower Mill Creek Channel Restoration
- LG-22..... Wetland Floodplain Off-Channel Habitat Reconnection
- LG-28..... North Green River Park
- LG-29..... North of Veteran's Drive Floodplain Reconnection

- LG-33 Midway Creek Wetland Complex
- LG-34 Johnson Creek Floodplain Project
- LG-35 P-17 Stormwater Pond Connection
- LG-39 Port of Seattle Mitigation Site Floodplain Connection
- LG-40..... Downey Side Channel Restoration
- LG-42..... Lower Russell Road: Habitat Area A
- LG-45..... Teufel Off Channel Habitat Restoration

Tier 2 (Score 7-18) 19 projects

- LG-1..... Reddington Habitat Creation
- LG-5 Northeast Auburn Creek Restoration
- LG-7..... Mullen Slough
- LG-10 Boeing Levee Setback Habitat Rehabilitation
- LG-12..... Briscoe Park Off-channel Habitat
- LG-17...... Fort Dent Revetment Setback
- LG-18..... Black River Marsh
- LG-19...... Lower Springbrook Reach Rehabilitation
- LG-23..... 8th Street Bridge to 104th Ave Park Off-Channel Habitat
- LG-26..... Valentine Revetment Setback

- LG-27..... 8th Street Acquisitions
- LG-30 Mill Creek to Washington Ave Bridge Acquisitions and Restoration
- LG-31...... South of Veteran's Drive Floodplain Reconnection
- LG-32..... Foster Park Floodplain Reconnection
- LG-37..... Strander Boulevard Off-channel Habitat Creation
- LG-46..... Mill Creek Protection and restoration near Emerald Downs
- LG-49..... Horseshoe Bend Levee Riparian Habitat Improvements
- LG-51 Milwaukee 2 Improvements
- LG-55 Frager Road Levee Setback

Tier 3 (Score <7) 13 projects

- LG-2 Olson Creek Restoration
- LG-15..... Nelsen Side Channel
- LG-16 Gilliam Creek Fish Passage and Riparian Rehabilitation
- LG-20 Riverview Plaza Off-channel Habitat Creation
- LG-21...... Best Western Revetment Setback
- LG-38 Fenster Slough Wetland Connection
- LG-43..... Panther Creek at East Valley Road Improvement Project

- LG-52..... Panther Creek at Talbot Road South Fish Passage Improvement
- LG-53 Signature Pointe Levee Improvements
- LG-54 SR 516 to S 231st Way Levee
- LG-56 Kent Airport Levee Setback
- LG-57..... Barnaby Truong Off-Channel Habitat Creation
- LG-58 Briscoe Levee Riparian Habitat Improvements



Figure 28. **Lower Green River Subwatershed Projects**



Note:

Note: The use of the information in this map is subject to the terms and conditions found at: www.kingcounty.gov/services/gis/Maps/terms-of-use.aspx. Your access and use is conditioned on your acceptance of these terms and conditions.

KCIT-DCE File: 2011_20202L_W9SHP_ProjMap_LGR.ai LPRE

GIS File: Q:\20009\WRIA9_Watershed.mxd KLINKAT



Tier 1 Project: LG-3 Horsehead Restoration Project

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP







120

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 25.7 - 26.5 / left bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$11,100,000

PROJECT DESCRIPTION:

Create approximately 13 acres of backwater habitat and revegetate 3,000 feet of river bank.

PROJECT TYPE:

Restoration

KEY HABITAT:

Floodplain

Riparian

Backwater

Edge

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- LG Large woody debris
- LG Off-channel habitat
- · LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo VC file: 2010_10202L_W9SHRPfact_HORSEHEAD.ai GIS file Q:\20009\WRIA9_ProjectMaps.mxd



Tier 1 Project: LG-6 **Wrecking Yards Restoration**

Central Puget Sound



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 24.1 - 24.9 / left bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$37,000,000





KEY HABITAT:

Edge Backwater









Side channel Riparian Wetland

PROJECT DESCRIPTION:

Acquire, remediate and restore wrecking yards with side channels and backwater features.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- LG Off-channel habitat
- · LG Riparian forest

Site Photo: Google Earth Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-8 Lower Mill Creek Channel Restoration





PROJECT AREA MAP







122

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 23.7/left bank (Mill Creek 0.3-2.3)

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$23,900,000

PROJECT DESCRIPTION:

Improve aquatic habitat by remeandering the tributary channel, revegetating, and adding large wood to the creek channel.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- · LG Large woody debris
- LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tributary

Acquisition

PROJECT TYPE:

Edge



Restoration



Tier 1 Project: LG-22 Wetland Floodplain Off-channel Habitat Reconnection

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 27.2 - 27.6 / right bank

Jurisdiction: King County

Project sponsor: King County

Budget: \$1,165,000

PROJECT TYPE:



KEY HABITAT:



PROJECT DESCRIPTION:

Acquire and restore approximately 30 acres of floodplain wetlands and provide access to 2,000 feet of non-natal tributary rearing habitat. Project would address an existing fish barrier at the mouth of the creek and setback 1,800 feet of Green River Road. Project design will need to consider future location of the Green River Trail.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Habitat preservation
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- LG Off-channel habitat
- LG Riparian forest

Site Photo: Google Earth Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-28 North Green River Park





PROJECT AREA MAP







124

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 26.5 - 27.3 / right bank

Jurisdiction: King County

Project sponsor: King County

Budget: \$17,100,000







PROJECT DESCRIPTION:

Restore floodplain habitat by removing revetments, restoring reconnecting floodplain wetland, creating side channels and backwater features, and integrating stream channel from the adjacent project (LG-22). Project design will need to preserve or relocate important regional recreational amenities (i.e., soccer fields and Green River access).

Riparian

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- LG Bank armor
- LG Off-channel habitat

Site Photo: Google Earth Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-29 North of Veterans Drive Floodplain



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 18.9 - 19.2/ left bank

Bankside jurisdiction: City of Kent

Project sponsor: City of Kent

Budget: TBD

PROJECT DESCRIPTION:

Reconnect floodplain wetland to river, improve wetland area, while preserving Frager Road Trail's connection to the Green River.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Recreation opportunities

Contribution to goals metrics:

LG - Off-channel habitat

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Planting

Floodplain



Restoration

Enhancement/ Planning/ Design









Tier 1 Project: LG-33 Midway Creek Wetland Complex



PROJECT AREA MAP



LOCATION MAP



126

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 19.6 - 21.1/ left bank

Bankside jurisdiction: City of Kent

Project sponsor: City of Kent

Budget: TBD

Backwater Floodplain Riparian

KEY HABITAT:

PROJECT TYPE:

Acquisition Enhancement/ Planning/ Planting

Monitoring & Restoration

Design

Scoping/

Reconnaissance

(\$)

Assessment



PROJECT DESCRIPTION:

Restore Midway Creek and floodplain wetland complex by removing wetland fill and improving fish passage to enhance connectivity between the Midway Creek and the Green River. Project design should maintain/enhance regional trail connectivity.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- LG Off-channel habitat
- LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-34 Johnson Creek Floodplain

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 17.2 - 17.8/ left bank

Bankside jurisdiction: City of Kent

Project sponsor: City of Kent

Budget: TBD



PROJECT TYPE:

70'



PROJECT DESCRIPTION:

Acquire properties, setback road and trail, reconnect floodplain, and create off-channel habitat to improve water quality and increase fish access.

Floodplain

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- · LG Off-channel habitat
- · LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



out Watershed Fit For Tier 1 Project: LG-35 P-17 Pond Connection Reconnection



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 13.7-13.9/ left bank

Bankside jurisdiction: City of Tukwila

Project sponsor: City of Tukwila

Budget: \$37,000,000

PROJECT TYPE:



Restoration



ROF

Design

Planning/

Scoping/ Reconnaissance

KEY HABITAT:





PROJECT DESCRIPTION:

Relocate the City of Tukwila's stormwater pond; clean and connect the existing pond to the river, setback the levee to create up to 7 acres of off channel habitat.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

LG - Off-channel habitat

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-39 Port of Seattle Mitigation Site Floodplain Connection

Green / Duwamish & Central Puget Sound





PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 27.9 - 28.2 / left bank

Jurisdiction: City of Auburn

Project sponsor: Port of Seattle

Budget: TBD

PROJECT DESCRIPTION:

Connect the Port of Seattle's existing wetland mitigation site with the 100-year floodplain. Within the ~78 acres of reconnected floodplain, approximately 11 acres would be available as regularly inundated off-channel rearing habitat for Chinook salmon. The Port also owns an adjacent 34 acre site to the west which could support restoration of additional wetland habitat and further enhance floodplain connectivity. Project Design will need to address future Green River Trail alignment around this project area.

PROJECT TYPE:

Restoration

KEY HABITAT:

Riparian

Wetland

Floodplain

Backwater

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

• LG - Off-channel habitat

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT





Tier 1 Project: LG-40 **Downey Side Channel Restoration**

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





130

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 21.5 - 22/ left bank

Bankside jurisdiction: City of Kent

Project sponsor: City of Kent

Budget: \$6,800,000

PROJECT DESCRIPTION:

PROJECT TYPE: Monitoring & Restoration Assessment

KEY HABITAT:



Create network of side channels to provide rearing habitat and increase flood storage capacity, add large wood to create habitat complexity, cover and refuge, and lower peak flood elevations during 100-year flood events.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- LG Large woody debris
- LG Off-channel habitat
- LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-42 Lower Russell Road: Habitat Area A

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: RM 17.9 - 18.3/ right bank

Bankside jurisdiction: City of Kent

Project sponsor: City of Kent

Budget: TBD

Monitoring & Restoration Assessment KEY HABITAT:

PROJECT TYPE:

Planning/ Design

Enhancement/

Planting



PROJECT DESCRIPTION: Create off-channel habitat by grading and reshaping the bank, widening the channel, restoring channel complexity and meanders, excavating low benches, installing large wood,

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity

and planting native vegetation.

Increased rearing habitat

Contribution to goals metrics:

- · LG Large woody debris
- LG Off-channel habitat
- · LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: LG-45 Teufel Off Channel Habitat Restoration

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





132

PROJECT FACTS

Subwatershed: Lower Green (LG)

River mile: 20 - 20.8 / left bank

Jurisdiction: Kent

Project sponsor: King County Flood Control District

Budget: \$12,525,000 -\$33,975,000



PROJECT TYPE:

Upland Wetland

PROJECT DESCRIPTION:

Restore 36 acres by creating side channel and backwater habitat on a largely undeveloped shoreline in City of Kent.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Flood risk reduction
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- · LG Large woody debris
- LG Off-channel habitat
- LG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

Tier 2 Project: LG-1 **Reddington Habitat Creation**



PROJECT DESCRIPTION:

The previous Reddington Levee Setback project was done with a focus on flood risk reduction benefits and left two areas waterward of the levee that have room for side channel and/or backwater type habitats. This project would design and create additional habitat integrated with the existing habitat features on site.



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Tier 2 Project: LG-5 **Northeast Auburn Creek Rehabilitation**

PROJECT FACTS Subwatershed: Lower Green (LG) River mile: 25.3 / left bank Jurisdiction: King County Project sponsor: King County	PROJECT TYPE: Construction	KEY HABITA Edge Fi Riparian Tr	NT: Noodplain Vibutary	Green River Trail	S 266th St S 266th St	Horse Nat	ehead Bend ural Area
Budget: \$5,500,00		Wetland			East Valley Hw	UNINCORPORATE KING COUNTY	D

Park

PROJECT DESCRIPTION:

Enhance floodplain and stream habitat by creating off channel rearing and high flow refuge habitat for juvenile salmon. Project will improve fish passage, which is currently partially obstructed by a flapgate at the mouth of the creek.



170

Tier 2 Project: LG-7 **Mullen Slough**

PROJECT FACTS Subwatershed: Lower Green (LG) **River mile:**

21.5 / left bank (Mullen Slough 1 - 2

Jurisdiction: King County

Project sponsor: King County

Budget: \$9,600,000

PROJECT DESCRIPTION:

This project would remeander and revegetate the tributary, increasing quantity and quality of aquatic habitat.

PROJECT

TYPE:

Restoration

S

Acquisition

KEY HABITAT:

Floodplain

Tributary

Edge

Riparian



Tier 2 Project: LG-10 **Boeing Levee Setback Habitat Rehabilitation**

PROJECT FACTS	PROJECT	KEY	
Subwatershed:	TYPE:	HABITAT:	
Lower Green (LG)			8 s 200th st RM
River mile:			Three
17 - 17.8 / right bank	Enhancement/ Planting	Edge	TUKWILA Fishing
Jurisdiction:			Green River Trail
City of Kent			Site - Kent Trails
Project sponsor:	Restoration	Floodplain	
City of Kent	210		LG-10
Budget:	0 ⁺ 0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	KENT
TBD	Scoping/ Reconnaissance	Riparian	

PROJECT DESCRIPTION:

Balance future habitat, flood protection and recreation on the site. Explore opportunities to add alcove habitat, excavate low benches and alcoves, install large wood, and plant native riparian vegetation, while maintaining/enhancing the recreational trail user experience.



Tier 2 Project: LG-12 **Briscoe Park Off-channel Habitat**

	DROUTET		(5)		41
PROJECT FACTS	PROJECT	KEY	SEATAC		
Subwatershed:	TYPE:	HABITAT:	Same		137-
Lower Green (LG)				Can I	
River mile:	Enhancement/	Edge	- Composit		
RM 15.6 - 16.1 / right bank	Planting		A State	11 The	
Bankside jurisdiction:			Lat Start	LG-12	
City of Kent			42		
Project sponsor:	Restoration	Floodplain	EN DE	Briscoe Park	Trans
City of Kent			and the second second	AURS	
Budget:		min a			
TBD		Riparian	NO LA AL	RM 16	
				TUKWILA	-

River

Public Lands

📃 Park

ncorp. Area Boundary

Green River Trail-Kent

PROJECT DESCRIPTION:

bank armor, excavating perched floodplain, installing large wood, and planting riparian vegetation. Project design needs to address potential impacts to recreational amenities at Briscoe Park.



Tier 2 Project: LG-17 Fort Dent Revetment Setback



PROJECT DESCRIPTION:

Setback portions of the Fort Dent revetment to create shallow water habitat, riparian forest, and off-channel habitat.

Tier 2 Project: LG-18 **Black River Marsh**



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Create an island at the confluence of the Black, Green,

and Duwamish Rivers, and increase edge habitat, flood storage, and off-channel refuge. Revegetate the shoreline along the Black River up to the Black River Pump Station.



Tier 2 Project: LG-19

Lower Springbrook Reach Rehabilitation



Improve the aquatic and riparian habitat for Lower Springbrook Creek with riparian plantings, large woody debris, pool construction, channel branch excavation, and potential two-stage channel.

Public Lands

Park

Tier 2 Project: LG-23 8th Street Bridge to 104th Ave Park Off-Channel Habitat



Park

📃 Park

Public Lands

Public Lands

(CIT-DCE VC folder: 2010 10202w LG-23.ai GIS file Q:\20009\WRIA9 ProjectMaps.mxd

PROJECT DESCRIPTION:

Acquire private properties and restore off-channel and riparian habitat, including up to 0.25 miles of potential side channel.

Tier 2 Project: LG-26 Valentine Revetment Setback



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unnamed fish stream into the historic channel and

install a fish friendly culvert.

PAGE

Tier 2 Project: LG-27 8th Street Acquisitions



Narro

PROJECT DESCRIPTION: Acquire properties and restore off-channel and

riparian habitat.

Tier 2 Project: LG-30

Mill Creek to Washington Ave Bridge Acquisitions and Restoration

Public Lands

Park

ncorp.

PROJECT FACTS Subwatershed:	PROJECT TYPE:	KEY HABITAT:	181) THE STREET Greenbelt
Lower Green (LG)	<u>S</u>		
River mile: RM 23.2- 23.7 / left bank	Acquisition	Edge	Create Park #4
Bankside			
jurisdiction: City of Kent	Restoration	Floodplain	S LG-30
Project sponsor: City of Kent		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Budget: TBD		Riparian	
DROIECT DESCRIPTION	NI.		River 24

SCRIPTION:

Acquire left bank properties from Mill Creek (Auburn) to Washington Ave. S. bridge and install native plantings.

Incorp. Are Boundarv

Park Public

(CIT-DCE

Tier 2 Project: LG-31 South of Veterans Drive Floodplain Reconnection



PROJECT DESCRIPTION:

Create off-channel habitat in small triangle of flat land behind Frager Road.

Tier 2 Project: LG-32 **Foster Park Floodplain Reconnection**

PROJECT FACTS PROJECT **KEY** TYPE: HABITAT: Subwatershed: Lower Green (LG) 676 **River mile:** Scoping/ Edge RM 23.9 - 24 / Reconnaissance right bank Bankside Floodplain jurisdiction: Planning/ City of Kent Design **Project sponsor:** City of Kent Riparian **Budget:** TBD **PROJECT DESCRIPTION:**

Restore off-channel habitat within the park, while balancing flood protection and recreation.

📃 Park

Public

139

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GIS file Q:\20009\WRIA9_ProjectMaps.mx

(CIT-DCE VC folder: 2010_10202w_LG-32.ai

Incorp. Area

Incorp. Area Boundary

Public Lands

📃 Park

Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update

Tier 2 Project: LG-37 **Strander Boulevard Off-Channel Habitat Creation**



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Tier 2 Project: LG-46 Mill Creek Protection and Restoration Near Emerald Downs

PROJECT FACTS Subwatershed:	PROJECT TYPE:	KEY HABITAT:		
Lower Green (LG)				a superior and
River mile: RM 23.7 / left bank	Restoration	Floodplain	AUBURN -	
(Mill Creek RM 3.0 - 4.4)		~~~		
Bankside	Acquisition	Riparian	29th St NW	
jurisdiction:			LG-46-	India Conception
King County				
Project sponsor:		Tributary		an Lice
King County			WILL C	erurbu
Budget:		White		
TBD		Wetland		
PROJECT DESCRIPTION: Acquire property and restore creek meander of the existing channel, revegetate the riparian zone and				E. C folder: 2010
associated wetland hab capacity to reduce exist	itat, and increase o ting flood risks.	Park 🔲 Public Lands		

This project would connect an isolated wetland area in between two railroad tracks with the river creating floodplain connection and use for salmonid rearing



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and refugia.

Public

📃 Park

Incorp. Area Boundary

Tier 2 Project: LG-49 Horseshoe Bend Levee Riparian Habitat Improvements



PROJECT DESCRIPTION:

Setback levee segments, and install large wood structures along the riverbank to provide salmon habitat.

Tier 2 Project: LG-51 Milwaukee 2 Improvements



Upland

PROJECT DESCRIPTION:

Excavate a backwater channel, remove all invasive vegetation and hardscape, and replace with native plants and trees. Place large wood within the project area. The project increases rearing and refuge habitat for salmon. The project must balance flood protection and recreation goals, including regional trail improvements.



ncorp. Area

🗌 Park 🔛 Publ

10202w_LG-51.ai : 2010 (CIT-DCE VC folder:

Acquisition

Tier 2 Project: LG-55 Frager Road Levee Setback



PROJECT DESCRIPTION:

Reconstruct the toe, slope and levee crest to a stable configuration with a fully bioengineered solution, including a vegetated bench.

Public Lands

📃 Park
Table 5 Lower Green River Subwatershed Tier 3 Projects

Proj#	Project Name	Project Type	Description		Sponsor	River mile and Bank side/ Nearshore jurisdiction	Primary Strategy (pick 1)	Jurisdiction	Goal Alignment
LG-2	Olson Creek Restoration	Restoration	Improve quality of aquatic habitat through setting back the banks, adding large wood to channel, and expanding riparian vegetation along the creek. Increase amount and quality of flood refuge habitat by reconnecting southern grassy area at lower flows and restoring as a wetland. This project will build off of a KCDOT project to fix the fish passage barrier at the mouth in 2020.		King County	RM 28.4 / right bank	Protect, restore and enhance instream flows and cold water refugia	City of Auburn	LG - Large woody debris LG - Off-channel habitat LG - Riparian Forest
LG-15	Nelsen Side Channel	Acquisition Enhancement/Planting Planning/Design Restoration	This project reconnects a segment of the former river channel that was discon- nected with construction of I-405 and rerouting of the river.		City of Tukwila	RM 12.5 /right bank	Protect, restore, and enhance channel complexity and edge habitat	City of Tukwila	LG - Large woody debris LG - Off-channel habitat LG - Riparian Forest
LG-16	Gilliam Creek Fish Passage and Riparian Rehabilitation	 Enhancement/Planting Planning/Design Restoration 	This project will replace a large flapgate that inhibits salmonid usage of the Gilliam Creek tributary, and restore nearly 300 lineal feet of the lowest stretch of Gilliam Creek.		City of Tukwila	RM 12.5 / left bank	Restore and improve fish passage	City of Tukwila	LG - Off-channel habitat
LG-20	Riverview Plaza Off-channel Habitat Creation	 Enhancement/Planting Planning/Design Restoration 	This City-owned parcel once had a modest picnic area for viewing, but those have since been removed. There are several, large cottonwood trees in this low bank area with opportunities to create shallow water habitat while preserving most or all of the trees. It is waterward of the levee and Green River Trail.		City of Tukwila	RM 12.7 / left bank	Protect, restore, and enhance channel complexity and edge habitat	City of Tukwila	LG - Large woody debris LG - Off-channel habitat LG - Riparian Forest
LG-21	Best Western Revetment Setback	Acquisition Restoration	This project would setback this revetment to the extent possible. There is a hotel 80' landward; setting it back somewhat could create some edge habitat. Should look for opportunities in the event of property redevelopment.		City of Tukwila	RM 12.7 / right bank	Protect, restore and enhance floodplain connectivity	City of Tukwila	1. Off-channel habitat 2. Riparian 3. Large Woody Debris Forest
LG-38	Fenster Slough Wetland Connection	 Enhancement/Planting Planning/Design Restoration 	Reconnect approximately 1/2 acre of wetland area to the Green River that is currently cut off by the Fenster II Levee. The area has the potential to provide backwater/off-channel and riparian habitat functions.		City of Auburn	RM 40 / left bank	Protect, restore and enhance floodplain connectivity	City of Auburn	LG - Off-channel habitat
LG-43	Panther Creek at East Valley Road Improvement Project	Acquisition Enhancement/Planting Planning/Design Restoration	The project is intended to provide daylighting and habitat improvements of Pan- ther Creek from river mile 0.5 to 0.0 and the adjacent East Valley wetlands. This includes improving hydrologic and hydraulic function through repairing and/or replacing the existing culverts at East Valley Road and Lind Ave SW.		City of Renton	RM 11 / right bank	Restore and improve fish passage	City of Renton	LG - Off-channel habitat
LG-52	Panther Creek at Talbot Road South Fish Passage Improvement	• Acquisition • Other • Planning/Design	The project intends to provide fish passage and improved conveyance through a culvert replacement along Panther Creek at the Talbot Road South culvert.		City of Renton Surface Water Utility	RM 11 / right bank	Restore and improve fish passage	City of Renton	LG - Off-channel habitat
LG-53	Signature Pointe Levee Improvements	Enhancement/Planting Planning/Design Restoration Acquisition	Setback levee segments and slope. Install large wood and native riparian plants. Address potential for recreational impacts of moving the trail further from the river and closer to residential units.		City of Kent	RM 23.15 - 21.75 / left bank	Protect, restore, and enhance channel complexity and edge habitat	City of Kent	LG - Bank Armor LG - Large woody debris LG - Off-channel habitat
LG-54	SR 516 to S 231st Way Levee	• Planning • Scoping/ • Reconnaissance	Balance habitat, flood protection, and recreation. Set back existing levee to allow for more flood storage and habitat improvements. These potential improvements include flatter riverbank side slopes, log jams along the river, and increased riparian plantings.		City of Kent	RM 21.75 - 19.2 5/ left bank	Protect, restore and enhance floodplain connectivity	City of Kent	LG - Bank Armor LG - Off-channel habitat LG - Riparian Forest
LG-56	Kent Airport Levee Setback	 Planning/Design Restoration Acquisition 	Setback the levee, incorporate current stormwater pond into riparian buffer, and install native plants.		City of Kent	RM 24.1 - 23. 8/ left bank	Protect, restore, and enhance channel complexity and edge habitat	City of Kent	LG - Riparian Forest
LG-58	Briscoe Levee Riparian Habitat Improvements	Enhancement/Planting Planning/Design Restoration	Re-grade side slopes that are overly steep, remove non-native invasive plant species, and plant new native vegetation in areas that have not already been improved. The project also includes installation of large wood structures along the river's edge throughout the length of the levee reach where feasible.		City of Kent	RM 17.0 - 16.1 / right bank	Protect, restore, and enhance channel complexity and edge habitat	City of Kent	LG - Off-Channel Habitat
Prace Prace Prace 144 Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update 145									



Middle Green River Subwatershed

14 projects

Tier 1 (Score 18+) 8 projects

- MG-3..... Flaming Geyser Floodplain Reconnection
- MG-9 Lones Levee Restoration
- MG-11..... Turley Levee Setback
- MG-13..... Hamakami Levee Setback
- MG-19..... Lower Soos Creek Channel Restoration
- MG-21..... Whitney Bridge Reach Acquisition and Restoration
- MG-24.... Meyer/Imhof Levee Setback
- MG-26.... Newuakum Creek Tributary Acquisition and Restoration

Tier 2 (Score 7-18) 5 projects

- MG-6 Middle Newaukum Creek Riparian Planting and Large Woody Debris Placement
- MG-10..... Burns Creek Restoration
- MG-16..... Ray Creek Restoration
- MG-20.... Auburn Narrows Floodplain Restoration
- MG-22.... Kanaskat Reach Restoration

Tier 3 (Score <7) **1 project**

MG-25.... Little Soos Restoration - Wingfield Neighborhood





Tier 1 Project: MG-3 Flaming Geyser Floodplain Reconnection



PROJECT AREA MAP







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PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 42-44/both banks

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$6,000,000

PROJECT DESCRIPTION:

Remove levee, relocate gravel in the levee under-structure into the river channel, place large wood in river channel and associated wetland, and extensively the revegetate riparian zone throughout state park.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Water temperature reduction

Contribution to goals metrics:

- MG Bank armor
- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Planning/

Design

Restoration



Tributary



Tier 1 Project: MG-9 Lones Levee Restoration

Green / Duwamish & Central Puget Sound







PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 38/right bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$5,500,000

PROJECT TYPE:



PROJECT DESCRIPTION:

Remove existing levee, install setback feature to protect agricultural land, place large wood in river channel and remnant river channel, and reintroduce gravel from remnant levee into river channel.

Primary strategy

Protect, restore and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- MG Bank armor
- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

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Tier 1 Project: MG-11 Turley Levee Setback

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP



LOCATION MAP



PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 37 / left and right bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$6,000,000

PROJECT DESCRIPTION:

Acquire land, remove existing levee, setback new revetment away from river channel, and increase complexity with large wood in river channel and associated wetland.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- MG Bank armor
- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

PROJECT TYPE:



Side channel Tributary





Tier 1 Project: MG-13 Hamakami Levee Setback

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP







PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 35/right bank

Bankside Jurisdiction: King County

Project sponsor: King County

Budget: \$6,000,000

PROJECT DESCRIPTION:

Acquire land, remove levee, relocate gravel in the levee under-structure into the river channel, construct revetment away from river, and place large wood in river channel and associated wetland.

Backwater

Tributary

PROJECT TYPE:

Acquisition Restoration

KEY HABITAT:

Riparian Side channel

Wetland

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- MG Bank armor
- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: MG-19 **Lower Soos Creek Channel Restoration**



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 33.3/right bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$1,500,000

PROJECT TYPE:

Acquisition Restoration

KEY HABITAT:





Tributary

Wetland

PROJECT DESCRIPTION:

Restore habitat and increased water quality with placement of large trees in streams and associated wetlands, and plant native trees and shrubs along riparian edge.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

Water temperature reduction

Contribution to goals metrics:

- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: MG-21 Whitney Bridge Reach Acquisition and Restoration

Green / Duwamish & Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: 41 / left and right bank

Jurisdiction: King County

Project sponsor: King County

Budget: TBD

PROJECT DESCRIPTION:

Acquire approximately 40 acres, and install several hundred pieces are large wood on ~3,500 lineal feet of river.

PROIECT TYPE:

KEY HABITAT:

Restoration

Riparian

Acquisition

Floodplain

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Habitat preservation
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT





Tier 1 Project: MG-24 Meyer/Imhof Levee Setback

Green / Duwamish 8 Central Puget Sound



PROJECT AREA MAP





PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: 40.5 - 41.5 / right bank

Jurisdiction: King County

Project sponsor: King County

Budget: \$1,500,000

PROJECT TYPE:



KEY HABITAT:





PROJECT DESCRIPTION:

Acquire land, remove levee, construct set-back structure away from the River, add wood to floodway, and revegetate with native plants.

Primary strategy

Protect, restore, and enhance floodplain connectivity.

Benefits:

- Habitat preservation
- Increased habitat connectivity
- Increased rearing habitat

Contribution to goals metrics:

- MG Bank armor
- MG Floodplain connectivity/lateral channel migration
- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Tier 1 Project: MG-26 **Newuakum Creek Tributary Acquisition**



PROJECT AREA MAP







PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 40.4/left bank

Bankside jurisdiction: King County

Project sponsor: King County

Budget: \$3,500,000



KEY HABITAT:



Wetland

PROJECT DESCRIPTION:

Restore habitat and improve water quality with placement of large wood in the stream channel and associated wetlands, revegetating the riparian area.

Primary strategy

Protect, restore, and enhance channel complexity and edge habitat.

Benefits:

- Habitat preservation
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

- MG Large woody debris
- MG Riparian forest

Project Area Map: Ortho2019KCNAT aerial photo KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT

Tier 2 Project: MG-6

Middle Newaukum Creek Riparian Planting and Large Woody Debris Placement



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PROJECT DESCRIPTION:

Place large wood in the stream channel between RM 6 - 10 and remove hardened streambanks.

Tier 2 Project: MG-10 **Burns Creek Restoration**

PROJECT FACTS

Subwatershed: Middle Green (MG)

River mile: RM 33 / right bank

Bankside iurisdiction: King County

Project sponsor: King County

Budget: \$1,500,000



Restoration

PROJECT

TYPE:



Floodplain





KEY





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PROJECT DESCRIPTION:

Restore lower two miles of Burns Creek by acquiring several parcels or portions of parcels, place large trees with rootwads attached in streams and associated wetlands, plant native trees and shrubs to significantly improve fish and wildlife habitat, wetlands, and water quality in an area which is very important for over-wintering salmon.





Tier 2 Project: MG-16 Ray Creek Restoration



Park

Urban Growth

Urban Growth

Incorp. Area Boundary

Park 🔲 Public

Incorp. Area

PROJECT DESCRIPTION:

Acquire several conservation easements of at least 100' buffers, place large wood in stream, and plant native trees and shrubs in riparian buffer. Build fencing for livestock exclusion to immediately improve of fish and wildlife habitat, wetlands, water quality in a degraded area.

Tier 2 Project: MG-20 Auburn Narrows Floodplain Restoration



PROJECT DESCRIPTION:

Remove gravel road in floodway, expand notch of previously-constructed side channel, add large wood, and plant native vegetation.



Green-Duwamish and Central Puget Sound Watershed Salmon Habitat 2021 Update

Tier 2 Project: MG-22 Kanaskat Reach Restoration



Pa

Public Land

PROJECT DESCRIPTION:

Acquire about 3.5 acres, remove large house/garage/ septic, convert 3,300 lineal foot gravel road to backcountry trail, and extensively revegetate site.

Table 6

Middle Green River Subwatershed Tier 3 Projects

Proj. No.	Project Name	Project Type	Project Description	Sponsor	River mile and Bank side/Nearshore jurisdiction	Primary Strategy (pick 1)	Jurisdiction	Goal alignment
MG-25	Little Soos Restoration - Wingfield Neighborhood	Education and outreach Planning/design Restoration Scoping/reconnaissance	Little Soos Creek at stream mile 1 runs through City of Covington owned open space through the Coho Creek development. The stream historically has been armored, disconnected from its floodplain and a paved trail adjacent to the creek is often flooded in the winter. There is an opportunity to restore in stream and floodplain habitat in the stream through reconnecting the creek to its floodplain, restoring side channels, removing artificial armoring, adding large wood, and revegetating the riparian zone.	Mid Sound Fisheries Enhancement Group	RM 33.3/right bank	Protect, restore, and enhance riparian corridors;	City of Covington	• MG - Floodplain connectivity/lateral channel migration • MG - Riparian forest





Tier 1 Project: UG-4 Howard Hanson Downstream Fish Passage

Green / Duwamish &



PROJECT AREA MAP







PROJECT FACTS

Subwatershed: Upper Green (UG)

River mile: King County (RM 64)

Bankside jurisdiction: King County

Project sponsor: King County/Army Corps of Engineers

Budget: Unknown

Planning/ Design Scoping/ Reconnaissance KEY HABITAT: KEY HABITAT: Comparison Riparian Side channel Vipland

PROIECT TYPE:

PROJECT DESCRIPTION:

Creation of downstream fish passage at the Howard Hanson dam is the highest priority project within the Green/Duwamish watershed as it would have an immediate and dramatic impact on all Viable Salmonid Population (VSP) parameters of Chinook and steelhead.

Primary strategy

Restore and improve fish passage.

Benefits:

- Increased habitat connectivity
- Increased rearing habitat
- Water temperature reduction

Contribution to goals metrics:

UG - Bank armor

Project Area Map: Ortho2019KCNAT aerial photo Site photo: Google Earth KCIT-DCE file: 2011_10202L LPRE GIS file Q:\20009\WRIA9_ProjectMaps.mxd KLINKAT



Chapter 8: Implementation Strategy

There are three major funding sources that support implementation of the projects and programs prioritized within the Salmon Habitat Plan – Salmon Recovery Funding Board (SRFB), Puget Sound Acquisition and Restoration Fund (PSAR), and King County Flood Control District Cooperative Watershed Management (CWM) grants. The WRIA also supports project sponsors in seeking funding from various other local, state and federal sources.

Annual Funding Package

WRIA 9 develops an annual funding package of projects based on anticipated allocations. The proposed funding package is reviewed and approved by the WRIA 9 Implementation and Technical Committee (ITC) and Watershed Ecosystem Forum (WEF). This funding package serves as the WRIA 9 Lead Entity's habitat project list, as defined in RCW 77.85.050.

Several factors are considered when building the annual project list for funding. Primarily, the WRIA supports projects from the list that demonstrate readiness to proceed and have a high likelihood of success, and where WRIA funding is critical to moving the project forward. Project tiering (Chapter VII) will assist the ITC and WEF in making tough funding choices when there are more projects in need than funding available. Project planning efforts with partners have allowed the WRIA to project out-year project funding needs which provides time to anticipate funding shortfalls and seek outside support. This long-term planning effort also allows sponsors to align salmon projects with other jurisdictional priorities, like those within their jurisdiction's Capital Improvement Plans and Transportation Improvement Plans, as well as realistically phase large projects that span multiple years.

Yearly, project sponsors assess the status of their projects and funding needs and notify the WRIA 9 Habitat Project Coordinator of their intent to apply for WRIA funding, and for how much. Projects undergo a technical review by WRIA staff and the ITC. For those projects competing for SRFB funding, projects undergo an additional rigorous technical review by the SRFB review panel.

Salmon Recovery Funding

Salmon Recovery Funding Board (SRFB) funding is administered through the Recreation and Conservation Office (RCO). It is a fund source of combined state salmon funds and federal Pacific Coast Salmon Recovery Funding (PCSRF). This annual fund is allocated by a SRFB approved interim allocation formula based in NOAA's Chinook delisting criteria. For several years, the Green/Duwamish watershed has received \$295,895 annually to support implementation of the Plan.

Puget Sound Acquisition and Restoration Fund

(PSAR) is co-managed by the Puget Sound Partnership and the RCO. This is a Puget Sound specific fund source appropriated through the State budget process, within RCO's budget request. In 2007, Governor Christine Gregoire formed PSAR in direct response to the growing need to restore habitat for salmon and other wildlife within Puget Sound. The Green/Duwamish has received just over \$1.1 million biennially to support implementation of the Plan. RCO serves as the fiduciary for both PSAR and SRFB funding, so all projects funded through SRFB and PSAR are reviewed and approved through the SRFB process.

King County Flood Control District Cooperative Watershed Management Funds (CWM) are provided by the King County Flood Control district (KCFCD). The KCFCD is a special purpose government created to provide funding and policy oversight for flood protection projects and programs in King County. Funding for CWM is a small portion of the tax assessment to support salmon recovery projects within the four WRIAs in King County. In 2020, CWM funding was doubled, and WRIA 9 now receives \$3.63 million annually to support high priority projects and programs. The FCD approves project lists annually.

Other Local, State and Federal Funding Sources -

In addition to these funding programs, sponsors are encouraged to compete for other local, state and federal funds. It typically takes multiple funding sources to implement projects due to project complexity and cost. Many projects are initiated with and sustained by local funding provided by the sponsoring jurisdiction. Other state and regional grant programs that support salmon recovery include, but are not limited to, the Estuary and Salmon Restoration Program (ESRP), Floodplains by Design (FbD), Brian Abbott Fish Barrier Removal Board (FBRB), Aquatic Lands Enhancement Account (ALEA), and Washington Wildlife and Recreation Program (WWRP). Additionally, many of the projects within King County are supported through the County's Conservation Futures Tax (CFT), a program passed by the Washington State Legislature in the 1970s to ensure citizens have are afforded the right to a healthy and pleasant environment. This fund specifically protects urban parks and greenways, watersheds, working forests, and salmon habitat as well as critical links connecting regional trails and urban greenbelts.

WRIA 9 CWM Funding Allocation

High-Priority Capital Projects – CWM funding (> 65%) and all SRFB/PSAR capital funding. The WRIA invests the majority of annual funding on high priority capital projects that protect and restore critical habitats. These projects are identified through planning efforts like the Duwamish Blueprint, Middle Green Blueprint, and the Lower Green River Corridor planning process. More recently, projects incorporated in this Plan Update were solicited from partner organizations.

Regreen the Green small grant program - Up to \$500,000 of CWM funding. This grant program originated in 2016 after the completion of the "Re-Green the Green Revegetation Strategy" to support implementation of the priority sites identified in the plan. It has served as a primary source of funding to those focusing on revegetation efforts along critical areas in the Green/Duwamish. Additionally, this program has supported successful coalition building, landowner outreach campaigns, and network development that helps achieve broader Plan engagement goals.

Monitoring, Research and Adaptive Management

 Up to 10% of CWM funding. This funding is essential to informing adaptive management and maximizing return on investment with respect to salmon recovery. This funding allocation also supports the Green River smolt trap managed by Washington Department of Fish and Wildlife.

Stewardship, Engagement and Learning – Up to 5% of CWM funding. This funding supports Stewardship, Engagement and Outreach efforts designed to increase awareness around salmon recovery and promote positive behavior change.

Outyear Project Planning (6-year HCPIP)

WRIA 9 maintains a Habitat Capital Project Implementation Plan (HCPIP) that identifies all projects with expected funding needs for three biennium (6 years). While these numbers are estimates they provide a sense of the magnitude of funding needed per year. This implementation plan supports staff in working with partners to properly sequence and support projects throughout the project life cycle, and to seek out additional funding to compliment WRIA directed funds. In many cases, WRIA directed funding sources are inadequate to support the full scope of a project but enable project sponsors to leverage other local, state and federal funds. The HCPIP will be updated annually based on evolving project needs, and will be published beinnially along with a call for projects.

To ensure projects acquire, restore, rehabilitate, or create the type and amount of habitat that they was described in the original project description for the 2020 Salmon Habitat Plan capital project solicitation (or subsequent calls for projects), project sponsors will be required present to the ITC or project workgroup (below) for at least one of the significant milestones of the project design process.

This team <u>will</u> support ranking and tiering of any new proposed large capital restoration projects and provide input on design for WRIA funded projects.

Performance Management

Projects receiving funding through grants directed by WRIA 9 are often subject to various pressures from other local, state, and regional funders, stakeholders, and interested parties during project development. In order to make sure projects acquire, restore, rehabilitate, or create the type and amount of habitat that they described in the projects original description for the Salmon Habitat Plan, project sponsors will be required to present to the ITC or project workgroup (below) for at least one of the significant milestones of the project design process. For very large projects that will likely seek PSAR Large Capital funding, or large-scale complex projects with multiple objectives, the WRIA may request sponsor design teams include a WRIA technical representative to support WRIA 9 salmon recovery project priorities.

An ad hoc project workgroup will be established to support elements of project development, made up of three to five members of the ITC. This team will rank and tier newly proposed large capital restoration projects and provide input on design for WRIA-funded projects. The goal of this workgroup would be to provide feedback that will maximize salmon benefits, incorporate lessons learned from previous projects, ensure projects meet the highest possible outcomes for salmon, and help reduce project costs by addressing issues early in design.

It is anticipated that project sponsors will work with the Habitat Project Coordinator to present to the project workgroup or the ITC as follows, or if major changes/updates were made to the design:

- 1. Alternatives analysis Project Workgroup
- 2. 30% design Full ITC
- 3. 90% design Full ITC

Project sponsors are expected to maintain fidelity to the original habitat deliverables. Naturally projects will evolve as more is learned about project design and feasibility. The project sponsor is responsible for alerting the WRIA if substantive modifications to the original scope are required. Modifications to the scope of the project may invoke a full project team review to affirm the project tier and may require subsequent approval from the ITC or WEF. Failure to notify the WRIA of these changes, or use of funding outside of the approved scope, could result in the withholding of future funding or constitute a breach of contract.



Chapter 9: Monitoring and Adaptive Management

Adaptive Management Framework

The 2005 Salmon Habitat Plan outlined a science-based blueprint for prioritizing Chinook salmon recovery efforts in the Green/Duwamish and Central Puget Sound Watershed. This Plan Update reflects an ongoing commitment to adaptive management to ensure prioritization and sequencing of investments reflect best available science and maximize benefits to Chinook salmon, in terms of established viable salmon population criteria. WRIA 9 convenes a regular Implementation and Technical Committee (ITC) to oversee monitoring and adaptive management of the Salmon Habitat Plan. The ITC informs monitoring priorities, evaluates plan implementation and recovery progress, and makes formal policy and funding recommendations to the Watershed Ecosystem Forum.

In 2020, WRIA 9 developed a Monitoring and Adaptive Management Plan (Appendix F) that outlines a framework to:

- Prioritize research and monitoring investments to address important data and knowledge gaps;
- Support status and trends monitoring to assess established habitat-related recovery goals and viable salmon population metrics;

- Promote collaboration among partners engaged in research and monitoring within the watershed; and
- Guide adaptive management of the Salmon Habitat Plan.

The WRIA 9 Monitoring and Adaptive Management Plan (MAMP) outlines three categories of monitoring intended to help evaluate and inform strategic adaptation of recovery efforts (Figure 31). Each category of monitoring is intended to answer underlying questions related to implementation progress, effectiveness of actions, and overall impact on Chinook recovery.

- Implementation Monitoring: Is the plan being implemented as intended? Are we on track to meet established habitat targets?
- Effectiveness Monitoring: Are habitat projects functioning as expected? Are habitat status and trends improving throughout the watershed?
- Validation Monitoring: Are salmon recovery efforts benefiting the Green River Chinook salmon population (i.e., VSP criteria)? Are the underlying scientific assumptions of the plan accurate?





Periodic assessment of these questions allows watershed partners to reassess plan implementation, underlying recovery strategies, and/or reallocate resources to maximize outcomes.

Implementation Monitoring

The Plan Update outlines numeric targets for key habitats (Table 2, Chapter IV) linked to Chinook salmon productivity and recovery. The targets are intended to inform tracking and assessment of plan implementation (i.e., projects constructed, specific habitat gains, funding secured) in relation to established long-term goals. Regular evaluation of implementation progress feeds into an adaptive management decision framework (Figure 32). This framework connects decision makers (i.e., Watershed Ecosystem Forum) with important monitoring and research findings, informing corrective actions to recovery strategies when necessary.

Effectiveness Monitoring

Effectiveness monitoring is designed to assess if habitat restoration projects are functioning as intended and achieving physical and biological performance standards. It includes both project-level and cumulative habitat conditions. Capital habitat project implementation can take over a decade from conceptual design to construction and costs millions of dollars. Effectiveness monitoring is essential to ensure large capital investments maximize benefits to salmon and help identify potential design improvements and cost efficiencies that can be adapted into future projects.





Routine Monitoring

Routine project effectiveness monitoring evaluates whether restored habitat is functioning the way it was intended 3-10 years after the project is built. Project specific monitoring plans should be designed to assess project-specific goals and objectives. Project sponsors are encouraged to begin development of a monitoring plan at the project's 30 percent design milestone to allow for pre-project monitoring that can be essential for verifying if future changes are due to the project's actions or natural variability. The MAMP (Appendix F, Table 2) outlines routine physical and biological monitoring recommendations based on project type and subtype. The highlighted indicators and metrics are designed to be relatively affordable and consistent with regulatory permit monitoring requirements. Project sponsors are generally expected to undertake routine monitoring for WRIA-funded projects and report monitoring results to the ITC.

Enhanced Fish Monitoring

Enhanced monitoring is focused on understanding how fish use a restoration project type. Unlike routine project monitoring, which asks whether a certain type of habitat was created and sustained, enhanced monitoring is meant to evaluate how fish utilize the habitat, and which restoration techniques convey the most benefit. Projects should be evaluated with a combination of Before-After Control-Impact or reference/control sites research designs. Enhanced fish monitoring is outside the scope of monitoring for many project sponsors, nor is it frequently required by regulatory agencies. Due to the costs associated with enhanced monitoring, WRIA 9 intends to continue to financially support enhanced fish monitoring of select projects. The MAMP (Appendix F, Table 3) also outlines a prioritization framework (certainty of benefit, process-based vs. engineered design, project type frequency, and project cost) for WRIA-directed invest-

ments to support enhanced monitoring. Monitoring results should be reported to the ITC and inform necessary maintenance and/or design modifications.

Cumulative Habitat Conditions

The Salmon Habitat Plan outlines a suite of projects, programs, and policies intended to improve cumulative habitat conditions across the watershed. Monitoring status and trends in cumulative habitat conditions allows us to assess the overall effectiveness of plan implementation. It provides data on the net change (improving, no change, degrading) in specific habitat conditions over time that supports evaluation of habitat restoration in relation to ongoing impacts to, and loss of, habitat. This information will help identity any gaps in the watershed's approach to salmon recovery and help (re)direct partner resources to potential areas of concern. The MAMP (Appendix F, Table 4) outlines priority habitat metrics recommended for inclusion as part of a periodic cumulative habitat assessment that are consistent with the WRIA 9 Status and Trends Report 2005-2011 (ITC 2012). The WRIA 9 ITC should complete a cumulative habitat conditions every five years.

Validation Monitoring Viable Salmon Population Criteria

The National Oceanic and Atmospheric Administration (NOAA) developed the viable salmon population (VSP) concept as a tool to assess the conservation status of a population. NOAA defines a viable salmonid population as "an independent population of any Pacific salmonid (genus Oncorhynchus) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame" (McElhany, et al. 2000). Four parameters are used to assess population status: abundance, productivity; spatial structure, and diversity. These measures of population status indicate whether the cumulative recovery actions in our watershed are improving the population's overall viability and longterm resilience.

The MAMP (Appendix F, Table 5) outlines recommended metrics to evaluate VSP criteria that should be monitored to assess the population status of the Green River Chinook salmon population. Additional NOAA-approved VSP targets are presented in Chapter IV, Table 1. Although VSP parameters are not a direct measurement of habitat conditions, habitat availability, distribution and quality are inherently reflected in VSP criteria. Tracking trends in the recommended VSP parameters allows resource managers to evaluate how the population is responding overtime to the net impact of conservation actions and ongoing land use development activity in the watershed. Over a long enough timeframe, results can also inform recalibration of recovery strategies if the conservation status of the population does not improve or continues to decline.

The VSP concept - and conservation status of Green River Chinook salmon - is influenced by a variety of factors outside the scope of this plan (i.e., habitat). The Puget Sound Salmon Recovery Plan emphasizes that the conservation status of the Puget Sound Chinook salmon Evolutionary Significant Unit is ultimately linked to the "Four H's" - habitat, hydropower, hatcheries and harvest, "Each of these factors independently affects the (Shared Strategy Development Committee 2007) status of salmon populations, but they also have cumulative and synergistic effects throughout the salmon life cycle. The achievement of viability at the population and ESU level depends on the concerted effort of all three factors working together, not canceling each other out, and adjusting over time as population conditions change" (Shared Strategy Development Committee 2007).

Research and Data Gaps

The Salmon Habitat Plan Update reflects an update to the scientific framework (i.e., Strategic Assessment) of the original 2005 Plan. New scientific data improved our understanding of the functional linkages between environmental stressors, habitat, and population productivity, abundance, diversity and spatial distribution. This information is reflected in updates to the WRIA 9 recovery strategies and embedded projects, policies, and programs. Best avilable science is used to recalibrate the magnitude and sequencing of our strategic investments, maximizing the effectiveness of our investments.

Numerous data gaps and uncertainties remain. Ongoing investments in research and monitoring will be essential to informing adaptive management of recovery strategies and ensuring that plan implementation and associated funding decisions remain science driven. Additional information on research priorities and data gaps can be found in the Habitat Use and Productivity, Temperature, Climate Change, and Contaminant white papers in Appendices A-D. These papers build on the existing 2004 WRIA 9 Chinook Salmon Research Framework which utilized a conceptual life-cycle model to organize and prioritize research efforts to inform recovery planning.



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Published by the

Green/Duwamish and Central Puget Sound Watershed

Water Resource Inventory Area 9 (WRIA 9)



Salmon Habitat Plan 2021 Update

MAKING OUR WATERSHED FIT FOR A KING

Approved by the WRIA 9 Watershed Ecosystem Forum on February 11, 2021

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:			
Seattle Public Utilities	Martha Neuman – 206-496-4917	Akshay Iyengar/4-0716			

* Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.

1. BILL SUMMARY

Legislation Title: A RESOLUTION ratifying the 2021 Update to the Green/Duwamish and Central Puget Sound Watershed or Water Resource Inventory Area (WRIA) 9 Salmon Habitat Plan, Making our Watershed Fit for a King.

Summary and background of the Legislation: This resolution would ratify the update of the 2005 Green/Duwamish and Central Puget Sound Watershed (WRIA 9), Salmon Habitat Plan, *Making Our Watershed Fit for a King*. The update is an addendum to the 2005 plan ratified by Council through Resolution 30824. The 2005 Plan served as the blueprint for salmon habitat recovery in WRIA 9 for 15 years.

WRIA 9 is the lead entity for salmon recovery in the Green/Duwamish and Central Puget Sound under the State of Washington's watershed-based framework for salmon recovery. It is a watershed-based organization comprised of local, state, and federal partners, non-profit organizations, business interests, and citizens. The 17 local governments within WRIA 9 formalized a partnership under an interlocal agreement (ILA).

The Puget Sound wild Chinook population was listed as threatened species in 1999. The population has continued to decline since 2005 and is consistently below the planning targets set by the National Marine Fisheries Service.

The Plan Update reflects over a decade of new science regarding salmon conservation and recovery with the core recovery strategies and underlying scientific framework largely the same. The 2005 plan and 2021 Update, along with the 2014 Duwamish Blueprint and the 2016 Regreen the Green, provide a science-based framework for identifying, prioritizing, and implementing salmon recovery actions.

The Plan Update outlines 12 recovery strategies to address priority pressures; increase salmon abundance, productivity, and diversity; and build long-term population resiliency. Successful implementation hinges on partner coordination and investment to ensure local land use planning, capital investments, and community outreach are consistent with watershed priorities.

The Update includes a revised list of 127 capital projects developed in partnership with member jurisdictions including Seattle, non-profit partners, state agencies, and others engaged in salmon recovery. Some of these projects are sponsored by the City of Seattle.

The Update also includes a Monitoring and Adaptive Management Plan intended to help evaluate progress and inform strategic adaptation of the recovery strategies.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ____ Yes ____ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ____ Yes ____ No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs? Yes. Seattle will likely implement projects in the plan. The projects could be funded through grants and ratepayer dollars. Project costs would come through the budget process.

Is there financial cost or other impacts of *not* **implementing the legislation?** Implementation of the WIRA 9 plan is critical for recovery of the Puget Sound Chinook population. Without implementation and the investments outlined in the plan, the salmon population will likely further decline.

4. OTHER IMPLICATIONS

- **a.** Does this legislation affect any departments besides the originating department? No.
- **b.** Is a public hearing required for this legislation? No.
- **c.** Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation? No.
- **d. Does this legislation affect a piece of property?** No.
- e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?

There are no perceived race and social justice implications for ratification of the habitat plan.

- f. Climate Change Implications
 - 1. Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?

No.

2. Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.

Ratification of the plan will not increase or decrease Seattle's resiliency or ability to adapt to climate change. Implementation of the plan could increase climate change resiliency.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s). Not applicable

List attachments/exhibits below:

Green/Duwamish and Central Puget Sound Salmon Habitat Plan Update Approval Transportation and Utilities Committee Seattle City Council

December 1, 2021



Seattle Public Utilities
Resolution Overview

Request to ratify the 2021 Update to the Green/Duwamish and Central Puget Sound Watershed or Water Resource Inventory Area (WRIA) 9 Salmon Habitat Plan, Making our Watershed Fit for a King

- The update is an addendum to the 2005 plan ratified by Council through Resolution 30824.
- The 2005 Plan served as the blueprint for salmon habitat recovery in WRIA 9 for 15 years.
- Plan Update is will be final once all partners act on it (per the bylaws WRIA 9 Ecosystem Forum bylaws).

Salmon Habitat Plan 2021 Update





MAKING OUR WATERSHED FIT FOR A KING



GREEN/DUWAMISH AND CENTRAL PUGET SOUND WATERSHED Water Resource Inventory Area 9 (WRIA 9)

Approved by the WRIA 9 Watershed Ecosystem Forum on February 11, 2021



Puget Sound Chinook Recovery Context

Puget Sound Water Resource Inventory Areas (WRIAs) with Seattle nexus

- WRIA 7 Snohomish Basin River Basin
- WRIA 8 Lake Washington Cedar Sammamish Watershed
- WRIA 9 Green-Duwamish





Green-Duwamish Salmon Recovery Background

- 1999 Chinook salmon listed under ESA
- 2001 WRIA 9 interlocal agreement (ILA)
- 2005 WRIA 9 Recovery Plan
- 2007 WRIA 9 ILA renewal (2007-15)
- 2007 Puget Sound Regional Recovery Plan
- 2016 WRIA 9 ILA renewal (2016-2025)
- 2021 WRIA 9 Recovery Plan Update





Green River Chinook Salmon





WRIA 9 - A Watershed Approach



WRIA 9

575 square miles 17 local governments 5 subwatersheds

1 Watershed Ecosystem Forum

CM Herbold current Forum co-chair



WRIA 9 Partnership Accomplishments

\$200M of local, state and federal investment

- 2 miles of levee realignments to reconnect floodplains & restore shoreline
- 4,695 ft of marine shoreline restored
- 500 acres of revegetation
- 5.8 acres of estuary shallow water habitat

Interlocal Agreement (2001-2020)

- \$8.4M Total from ILA Partners
- \$1.9M Seattle

Duwamish River







Duwamish & Nearshore Subwatersheds

Protect, restore & enhance marine shorelines

- Net reduction in shoreline stabilization
- Promote soft armor where feasible

Restore and enhance estuarine habitat

- Excavate shallow water rearing habitat
- National Resource Damage Assessment

Improve sediment and water quality

- Superfund clean-up
- Source control

Revegetate riparian corridors

- Regreen-the Green grant program
- Noxious weed control



Herrings House Park, Seattle

Capital Projects

39 Nearshore habitat projects

• 9 Seattle projects

19 Duwamish River habitat projects

• 4 Seattle/City Light Projects











Local Plan Ratification

- ✓ Collaborative, watershed-based approach to implementation
- ✓ Multi-benefit approach to salmon recovery
- ✓ Recognize the Plan as a source of best available science
- ✓ Use Plan to inform local actions

Salmon Habitat Plan 2021 Update







MAKING OUR WATERSHED FIT FOR A KING



GREEN/DUWAMISH AND CENTRAL PUGET SOUND WATERSHED Water Resource Inventory Area 9 (WRIA 9)

Approved by the WRIA 9 Watershed Ecosystem Forum on February 11, 2021



Questions?

Martha Neuman SPU Senior Policy Advisor

Matt Goehring WRIA 9 Salmon Recovery Manager







Legislation Text

File #: CB 120230, Version: 1

CITY OF SEATTLE

ORDINANCE

COUNCIL BILL

AN ORDINANCE relating to the City Light Department, the Seattle Department of Parks and Recreation, and the Seattle Department of Transportation; declaring certain real property rights to be surplus to the needs of City Light; authorizing the General Manager and Chief Executive Officer of Seattle City Light to execute an easement agreement with King County, allowing the temporary use of a portion of City Light property to resolve the encroachment of an existing structure located on the west side of Boeing Field within the Northeast Quarter of Section 29 Township 24 N Range 4 E and the Southeast Quarter of Section 29 Township 24 N Range 4 E, and increasing the temporary use area authorized by Ordinance 126328 by approximately 207 square feet; and transferring jurisdiction of certain properties located in the Georgetown neighborhood in Section 29 Township 24 N, Range 4 E, from the City Light Department to the Seattle Department of Parks and Recreation and to the Seattle Department of Transportation.

WHEREAS, City Light owns certain property between S. Myrtle St. and East Marginal Way S. in the

Georgetown neighborhood ("Property"), on which City Light previously operated a flume for drainage

of spent cooling water from its Georgetown Steam Plant to Slip 4 on the Duwamish Waterway until the

flume was decommissioned in 2009 by City Light; and

WHEREAS, City Light has no utility use for the Property other than for the continued placement and operation

of two existing utility poles, guy wires to stabilize the utility poles, and associated electrical power

lines; and

WHEREAS, as documented in Clerk File 314451, City Light petitioned for a vacation of a portion of Diagonal Avenue S. to allow more efficient operation of its South Service Center and offered to provide portions of the Property as well as development funding to the Seattle Department of Parks and Recreation ("SPR") and to the Seattle Department of Transportation ("SDOT") for the creation of an off-leash area and bicycle and pedestrian trail segment to satisfy certain public benefit requirements of the street

File #: CB 120230, Version: 1

vacation proposal; and

- WHEREAS, this off-leash area and trail segment will be enduring amenities for the Georgetown neighborhood that have long been sought and supported by the community; and
- WHEREAS, on August 9, 2021, the City Council granted preliminary approval for the street vacation including the public benefit proposal; and
- WHEREAS, a recent survey performed by City Light has indicated that a fence, part of a storage yard, a floodlight, and part of a storage building on adjacent King County ("KC") property encroach onto a small portion of this City Light property and likely have existed in their current location for many years; and
- WHEREAS, City Light and SPR have determined that it is in the interest of the City to resolve these encroachments prior to the jurisdiction for the property being transferred to SPR; and
- WHEREAS, KC has agreed to remove the fence and floodlight from City Light property at KC's expense in consideration for City Light providing KC a temporary easement for a 365 square foot encroachment by the corner of the storage building; and
- WHEREAS, City Light has determined it has no further utility use for the 365 square feet of the surface of this property and desires to grant KC a temporary easement for the building encroachment and access to the building; and
- WHEREAS, the subsequent transfer of jurisdiction of the underlying property from City Light to SPR would then be subject to the terms of this temporary easement; and
- WHEREAS, Ordinance 126328 originally authorized the granting of a temporary easement to KC for use of approximately 158 square feet of City Light's property; and
- WHEREAS, some minor adjustments in the terms of the location and increase in the size of the temporary easement area to approximately 365 square feet have been requested by KC; and

WHEREAS, the City Council approved Ordinance 126306, which executed a partial transfer of jurisdiction

File #: CB 120230, Version: 1

from City Light to Seattle Public Utilities ("SPU") to allow SPU to operate and maintain an existing storm drain on a portion of the Property to be transferred to SPR and to SDOT; and

WHEREAS, the City Council has held a public hearing in accordance with the requirements of RCW 35.94.040; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. After a public hearing and pursuant to the provisions of RCW 35.94.040, the properties described and depicted in Attachments 1, 2, and 3 to this ordinance are declared to be no longer required for electric utility service and are surplus to the needs of City Light except for its ongoing placement and operation of two existing utility poles, guy wires to stabilize the utility poles, and associated electrical power lines within a portion of Tax Parcel Number 700670-0570 as described in Attachment 4 to this ordinance.

Section 2. The General Manager and Chief Executive Officer of Seattle City Light, or designee, is authorized to execute and grant to King County, for and behalf of The City of Seattle, a temporary easement agreement, substantially in the form of Attachment 1 to this ordinance.

Section 3. The property described and depicted in Attachment 2 to this ordinance ("Parcel 1") is transferred from the jurisdiction of City Light to the jurisdiction of Seattle Parks and Recreation ("SPR"), subject to: 1) the terms of the easement to be granted King County as authorized by Section 2 of this ordinance, 2) the terms of Ordinance 126306 granting partial jurisdiction of Parcel 1 to Seattle Public Utilities for operation and maintenance of a public storm drain pipe, and 3) City Light's reserved partial jurisdiction for the operation, maintenance, and repair of its electric power infrastructure components described in Attachment 4 to this ordinance. Parcel 1 is transferred for the purpose of the development of an off-leash area consistent with the terms of the "Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset" executed by City Light, SPR, and the Seattle Department of Transportation ("SDOT"), which is attached to this ordinance as Attachment 5.

Section 4. The property described and depicted in Attachment 3 to this ordinance ("Parcel 2") is

File #: CB 120230, Version: 1

transferred from the jurisdiction of City Light to the jurisdiction of SDOT, subject to the terms of Ordinance 126306, and further subject to City Light's reserved partial jurisdiction for the operation, maintenance, and repair of its electric power infrastructure components described in Attachment 4 to this ordinance. Parcel 2 is transferred for the purpose of the development of a pedestrian and bicycle trail segment consistent with the terms of the "Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset" executed by City Light, SPR, and SDOT, which is attached to this ordinance as Attachment 5.

Section 5. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the	_day of		, 2021, and signed by
me in open session in authentication of its passa	ge this	_day of	, 2021.

President ______ of the City Council

Approved / returned unsigned / vetoed this _____ day of _____, 2021.

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2021.

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:

Attachment 1 - Temporary Easement Agreement

Attachment 2 - Property to be Transferred to Seattle Parks and Recreation (Parcel 1)

Attachment 3 - Property to be Transferred to Seattle Department of Transportation (Parcel 2)

Attachment 4 - City Light Retained Jurisdiction for its Electrical Infrastructure on the Flume Property (Parcel 1 & 2)

Attachment 5 - Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset

Attachment 1 – Temporary Easement Agreement

When recorded, return to: SEATTLE CITY LIGHT Real Estate Services 700 Fifth Avenue, SMT 3338 P.O. Box 34023 Seattle, WA 98124-4023

TEMPORARY EASEMENT FOR BUILDING ENCROACHMENT

Reference #: Grantor: City of Seattle Grantee: King County Short Legal: Additional Legal Description: See Exhibit A Tax Parcel #: 7006700570, 2824049007

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, THE CITY OF SEATTLE, a Washington municipal corporation, acting by and through its CITY LIGHT DEPARTMENT ("Grantor"), hereby grants to King County, a political subdivision of the State of Washington, (Grantee), a temporary easement for an existing building encroachment for the purposes described below ("Easement") on the Grantor's real property described in Exhibit A (the "Property"). This Easement is appurtenant to and shall run with the land that makes up Grantee's property described in Exhibit B.

Except as otherwise set forth herein, Grantee's rights shall be exercised upon that portion of the Grantor's Property occupied by a portion of the Grantee's existing storage building as of the effective date of this Easement, ("the Building") as depicted in Exhibit C attached hereto, and no other portion of the Grantor's Property.

1. **Purpose.** Grantee and their current lessee, the Boeing Company ("Boeing"), shall have the right and privilege to use the Easement Area to accommodate that portion of the Building which encroaches onto the Property (the "Encroachment") as of the Effective Date of this Easement, and to perform maintenance and repair of the Building, but not for replacement, enlargement, extension, or expansion of the Building. Grantee's use of the Easement Area shall be limited to the term of the life of the Encroachment as a storage building within the existing footprint of the Building as of the effective date of the Easement, and such use shall be subject to and in accordance with the terms, conditions, and limitations set forth in this Easement. Grantee shall be responsible for ensuring that Boeing's, its successors' or assigns' use and occupancy of the Easement Area at

all times is limited by and complies in all respects with the terms and conditions of this Easement. The Grantor's intent is to permit the existence and use of the Encroachment for its life as a storage building within its existing footprint as of the effective date of this Easement, but to ultimately and permanently clear the Property of the Encroachment and Easement.

2 Additional Terms and Conditions. Grantee and their successors, agents, and assigns, hereby agree to the following additional terms and conditions:

2.1 This Easement is for the life of the Building only, and if: 1) the Building is damaged beyond fifty percent (50%) of its then-fair market value, 2) if the Building is wholly destroyed or demolished , or 3) if the Encroachment is otherwise partly or wholly removed from the Easement Area, then this Easement shall automatically terminate along with all rights of the Grantee or Boeing to use the Easement Area, and no further building or structure or portion thereof shall be permitted, constructed or erected within the Easement Area.

2.2 The Encroachment shall not be modified or increased in footprint, area or height.

2.3 Grantor shall not be liable for any injury or damage to persons or property arising by reason of the Encroachment being permitted to remain within the Easement Area or by Grantee's or Boeing's use and occupancy of the Building, including but not limited to the Encroachment, or by Grantee's or Boeing's use of the Easement Area.

2.4 There shall be no storage, dumping, burying or transferring any hazardous substances, inoperable vehicles, chemicals, oils, fuels, flammable materials ("Hazardous Substances") or containers for said substances, within the Easement Area; provided that nothing herein shall prohibit the passage of vehicles containing or transporting Hazardous Substances across the Easement Area coincident to the ordinary and safe operation of said vehicles on Grantee's Property. Grantee, its successors, agents, lessees, and assigns shall comply with all environmental laws of the State of Washington or any other governmental subdivision or agency having regulatory authority over Grantor's Property with respect to Grantee's use of the Easement Area.

2.5 Grantee and its successors and assigns assume all risk of loss, damage or injury which may result from its use of the Easement Area, or the use of the Easement Area by its agents, employees, invitees, contractors, subcontractors, lessees, permittees or licensees (each, a "Grantee Party" and collectively, the "Grantee Parties"). Grantee and its successors, and assigns shall indemnify and hold harmless Grantor from all claims, actions, or damages of every kind and description, which may accrue from or be suffered by reason of any Grantee Party's, use of or presence in the Easement Area, the performance of any Grantee Party work in connection with the allowed use, or any Grantee Party's exercise of any rights granted in this Easement; and in case of any such suit or action being brought against Grantor, or damages arising out of or by reason of any of the above causes, Grantee shall, upon notice of commencement of such action, defend Grantor at Grantee's sole cost and expense and will

fully satisfy any judgment after the said suit shall have been finally determined, if adversely, to Grantor, except to the extent of the sole negligence of the Grantor, its agents, or representatives.

2.6 Without limiting Grantee's obligations pursuant to Paragraph 2.5 of this Easement, Grantee shall indemnify and defend Grantor from any claims, damages, or liabilities arising directly or indirectly from Hazardous Substances that are released or discharged by Grantee or any Grantee Party related to their operations, use of or presence in the Easement Area, the performance of any Grantee Party work in connection with use of the Easement Area, or the exercise by any Grantee Party of any right granted by this Easement. The term "Hazardous Substances" includes all substances that are regulated under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Solid Waste Disposal Act (SWDA) as amended by the Resource Conservation and Recovery Act (RCRA), The Toxic Substances Control Act (TSCA), and the Washington State Model Toxics Control Act (MTCA). The term "claims" related to released or discharged Hazardous Substances includes any claim that may be brought and any order that may be issued pursuant to one of the statutes listed above and associated regulations, and claims based upon common law causes of action for trespass, negligence, nuisance or other common law theories, claims for lost property value, claims for business losses, and claims for personal injuries arising from or related to Hazardous Substances.

2.7 Grantee shall at all times exercise its rights under this Easement in accordance with the requirements of all applicable statutes, orders, rules and regulations of any public authority having jurisdiction.

2.8 The Parties acknowledge that maintenance or repair of the exterior of the Building may be needed. In that event, Grantee may request Grantor's permission to enter Grantor's property immediately adjacent to the Easement Area to perform such necessary maintenance or repair to the exterior of the Encroachment portion of the Building. Grantor shall not unreasonably withhold such permission but may place reasonable restrictions on the timing, length, manner, and extent of Grantee's access. Such permission may be in form of a temporary permit or license, to be chosen by Grantor in its sole discretion.

2.9 Subject to the right of either party to use the dispute resolution process in Section 2.10, this Easement and all rights granted herein to Grantee shall automatically terminate in the event that: A) the Encroachment is in any way damaged beyond fifty percent (50%) of its then fair market value, wholly destroyed, or removed from the Easement Area consistent with Section 2.1 of this Easement; or B) Grantee defaults on the obligations or violates any term or condition set forth in this Easement, and such default is not fully cured following thirty (30) days written notice from the Grantor to Grantee.

2.10 Grantor and Grantee agree to use their best efforts to resolve any disputes arising under this Easement using good-faith negotiations. Grantor and Grantee further agree to

communicate regularly to discuss matters arising under this Easement and to prevent disputes from arising. If a dispute cannot be resolved informally, then the Parties shall use the following dispute escalation process.

A. **STEP ONE**. Grantor and Grantee shall each identify a representative and shall confer and attempt to resolve the dispute within ten (10) business days of written notification by either Party.

B. **STEP TWO**. In the event that Grantor and Grantee are unable to resolve the dispute within ten (10) business days as provided in Step One, either Party may refer the dispute to the King County Airport Director and the Director of the City of Seattle Department having jurisdiction of the Property at the time or their designees. They shall confer and attempt to resolve the dispute within five (5) business days of receiving the referral.

C. **STEP THREE**. In the event the King County Airport Director and the Director of the City of Seattle Department having jurisdiction of the Property at the time or their designees are unable to resolve the dispute within five (5) business days as provided in Step Two, either party may refer the dispute to the King County Executive and the Mayor of Seattle or their designees. They shall confer and attempt to resolve the dispute within five (5) business days after receiving the referral.

If the Parties are unable to resolve the dispute utilizing the process set forth in Steps One through Three above, the Parties may, by mutual agreement, choose to submit the matter to a non-binding mediator. The Parties shall share equally in the cost of the mediator. Neither Party shall have the right to seek relief in a court of law until and unless Steps 1-3 above are exhausted. Grantor may not issue a notice of default to Grantee until and unless Steps 1-3 above are exhausted.

2.11 At all times during the course of the conflict or dispute resolution efforts, the Parties shall diligently continue to perform their respective responsibilities under this Easement.

2.12 This Easement and all amendments thereof shall be governed by and construed in accordance with the laws of the State of Washington applicable to contracts made and to be performed therein, without giving effect to its conflicts of law provisions or choice of law rules. In the event of any litigation arising out of or relating to this Easement, the Superior Court of King County, Washington shall have the exclusive jurisdiction and venue. If the Parties litigate any controversy, claim, or dispute arising out of or relating to this Easement, then each Party shall be solely responsible for the payment of its own legal expenses, including but not limited to, attorney's fees and costs.

2.13 This writing (including the Exhibits attached hereto) constitute the entire agreement of the Parties with respect to the subject matter hereof and may not be modified or amended except by a written agreement specifically referring to this Easement and signed by all Parties

hereto. All other agreements between the Parties regarding the subject matter of this Easement are hereby terminated and no longer applicable.

2.14 This Easement and each of its terms and provisions are deemed to have been explicitly negotiated between the Parties, and the language in all parts of this Easement will, in all cases, be construed according to its fair meaning and not strictly for or against either Party. Both Parties acknowledge and represent, as an express term of this Easement, that they have had the opportunity to obtain and utilize legal review of the terms and conditions outlined in this Easement.

3. Effective Date. This Easement shall become effective and binding upon execution by both Parties hereto and recording of this Easement.

IN WITNESS WHEREOF, this instrument has been executed the day and year first above written.

Dated this ______ day of ______, 20_____

GRANTOR:

CITY OF SEATTLE, a Washington municipal corporation CITY LIGHT DEPARTMENT

By: _____

Printed Name: _____

Title: _____

GRANTEE:

By:

Acknowledged and accepted as to all conditions herein

By:	By:
Printed Name:	Printed Name:
Title:	Title:
Date:	Date:

Att 1 – Temporary Easement Agreement V1

STATE OF WASHINGTON)) ss.COUNTY OF KING)

On this ______ day of ______, 20____, before me personally appeared Greg Sancewich, to me known to be the Manager of Real Estate Services of SEATTLE CITY LIGHT, a department of THE CITY OF SEATTLE, the Washington municipal corporation that executed the within and foregoing instrument, and acknowledged that said instrument was the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and is authorized to execute said instrument on behalf of THE CITY OF SEATTLE.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

Signature:
Print name:
Notary Public in and for the State of Washington
Residing at:
My commission expires:

(Notary Seal)

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

On this _____ day of _____, 20___, before me personally appeared ______, to me known to be the ______ of Facilities Management Division of the Department of Executive Services, a department of King County, the Washington municipal corporation that executed the within and foregoing instrument, and acknowledged that said instrument was the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and is authorized to execute said instrument on behalf of King County.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

Signature:
Print name:
Notary Public in and for the State of Washington
Residing at:
My commission expires:

(Notary Seal)

Exhibit "A" Grantor's Property

That portion of land within the Northeast Quarter of Section 29 Township 24 Range 4 and the Southeast Quarter of Section 29 Township 24 Range 4, lying easterly of the following described line:

Beginning at the point of intersection of the Government Meander Line and the southern line of South Myrtle Street; thence, southerly S9°49'16"W a distance of 108.333 feet; thence southerly S1°45'40"E a distance of 201.015 feet; and, thence S9°38'02"E a distance of 122.173 feet to a point that is coincident with the northerly boundary of East Marginal Way South; thence southeasterly S49°00'00"E a distance of 130.00 feet; thence northerly N6°57'48"W a distance of 309.801 feet; and, thence N3°34'03"E a distance of 218.131 feet; and, thence northeasterly N12°14'45"E to the southern line of South Myrtle Street; thence westerly to the point of beginning.

Exhibit "B" Grantee's Property

POR OF SECS 20-24-04 & 28-24-04 & 29-24-04 & 33-24-04 & 34-24-04 & 03-23-04 & 04-23-04 TGW PORS OF DAVIS MEADOW TRACTS & ELIZABETH ADD & VAC FAIRGROUNDS ADD & HORTONS 1ST SUBD OF GEORGETOWN & THE MEADOWS TRACTS & QUEEN ADD & QUEEN ADD SUPL - TGW PORS OF FOLG DONATION LAND CLAIMS - JOHN BUCKELY #42 & LUTHER M COLLINS #46 & TIMOTHY GROW #44 & #48 & SAMUEL A MAPLE #49 & FRANCIS MCNATT #38 & HENRY VAN ASSELT #50 TGW POR OF FILLED BED OF DUWAMISH RIVER OF -- BAAP OF NXN BTWN WLY MGN OF AIRPORT WAY SOUTH & SELY LN OF SD QUEEN ADD SUPL TH IN A GENERALLY SWLY DIRECTION ALG SD SELY LN TO SW COR TRACT A SD OUEEN ADD SUPL & SLY EXTN OF E LN OF W 1/2 SD LUTHER M COLLINS D L C TH S ALG SD SLY EXTN TO SLY LN OF NLY 1/2 OF SD FILLED BED OF DUWAMISH RIVER TH SWLY ALG SD SLY LN TO ELY MGN OF EAST MARGINAL WAY SOUTH TH CONT SELY ALG SD ELY MGN TO NXN WITH A LN PLT AND 825.00 FT S OF N LN OF JOHN BUCKLEY D L C #42 TH S 54-14-57 E TO ELY MGN OF FILLED BED OF DUWAMISH RIVER TH S 35-49-39 E 104.93 FT TO NLY EXTN OF WLY LN OF DAVIS MEADOW TRATS TH SLY ALG SD WLY LN TO N LN OF TRACT 8 OF THE MEADOWS TRACTS TH WLY ALG SD N LN N 89-16-16 W 197.97 FT TH S 29-52-38 E 520.79 FT TH N 89-58-17 W 230.59 FT TH N 29-52-38 W 524.20 FT TH N 89-16-16 W 179.98 FT TO ELY MGN OF EAST MARGINAL WAY SOUTH TH SLY ALG SD ELY MGN TO SLY LN OF TRACT 7 OF SD MEADOWS TRACTS TH ELY ALG SD S LN A DIST OF 474.62 FT TH S 29-52-38 E A DIST OF 2695.00 FT MORE OR LESS TH S 21-20-38 E TO N LN OF NORFOLK ST (CITY OF SEATTLE R/W) TH ELY ALG N MGN OF SD R/W TO EAST LN OF SECTION 04-23-04 TH CONT ELY & NELY ALG SD N MGN TO WLY MGN OF AIRPORT WAY SOUTH EXTN TH NWLY ALG SD WLY MGN TO P O B -- LESS POR OF SECTIONS 28-24-04 & 29-24-04 DAF - BEG AT 1/4 COR COMMON TO SD SECTIONS TH S ALG SEC LN 575.27 FT TO TPOB TH S 28-42-05 E 199.26 FT TH S 61-17-55 W 464.00 FT TH S 40-59-48 W TO NELY MGN OF EAST MARGINAL WAY SOUTH TH NWLY ALG SD MGN 492.927 FT TH N 40-59-48 E 569.836 FT TH N 28-42-05 W 483.276 FT TH N 61-17-55 E 187.06 FT TO NXN WITH E & W C/L OF SD SEC 29 TH CONT N 61-17-55 E 276.94 FT TH S 28-42-05 E 151.09 FT TO NXN WITH SD C/L TH CONT S 28-42-05 E 654.90 FT TO TPOB LESS TRIANGLE STRIP IN TRACT 4 OF DAVIS MEADOWS TRS-BEG AT SW COR TH N 19-03-01 W 4.00 FT TH SELY TAP ON N BDRY OF MCNATT D L C 50.00 FT E OF BEG TH W 50.00 FT TO BEG --- SUBJ TO FORMER TRANS LN R/W - TGW POR BLKS 1 & 2 & 5 & 6 & 9 & 12 OF QUEEN ADD LY SELY OF SOUTH ALBRO PLACE & VAC STS & ALLEYS ADJ LESS STS - TGW POR LOT 5 BLK 6 SD QUEEN ADD LY NWLY OF S ALBRO PL - TGW ENTIRE REPLAT OF QUEEN ADD SUPL & VAC STS ADJ LESS C/M RGTS OVER POR LOT 1 BLK 5 SD OUEEN ADD LY NELY OF A LN FR PT 16.47 FT WEST OF NE COR TO PT 24.32 FT S OF NE COR LESS C/M RGTS OVER LOTS 5-13 BLK 6 OF SD QUEEN ADD - LESS C/M RGTS OVER POR LOT 36 BLK 9 OF SD QUEEN ADD

LY SWLY OF LN RNG FR PT 10.12 FT N OF SW COR SD LOT 36 TAP 6.85 FT E OF SD SW COR - LESS C/M RGTS OVER LOTS 1-13 & OVER LOTS 26-29 & OVER POR OF LOT 25 BLK 10 OF SD OUEEN ADD SUPL LY N OF LN - BEG ON EAST LN OF SD LOT 25 A DIST OF 1.56 FT N OF SE COR TH NWLY TAP ON N LN OF S 10.00 FT OF SD LOT 108.28 FT E OF W LN TH W PLW S LN 108.28 FT TO W LN OF SD LOT 25 - LESS POR TRACTS A B C & D SD QUEEN ADD SUPL & VAC ST ADJ & NLY 1/2 SD FILLED BED OF DUWAMISH RIVER DAF - BAAP ON NWLY LN SD TR B 100.00 FT SWLY FR MOST NLY COR TH S 33-36-10 E TO SLY LN SD NLY 1/2 TH SWLY ALG SD SLY LN TO E LN W 1/2 SD COLLINS D L C TH N ALG SD E LN TO NXN WITH C/L OF VAC SOUTH GREELY STREET TH NELY ALG SD C/L TAP N 33-36-10 W OF BEG TH S 33-36-10 E 30.00 FT TO BEG TGW POR W 1/2 SD COLLINS D L C LY ELY OF ELLIS AVENUE SOUTH (MABLE STREET) SLY OF ELIZABETH ADD & LY NLY OF TRACT DEEDED TO CITY OF SEATTLE BY ORD NO 38426 TGW POR SEC 29-24-04 LY ELY OF SD D L C & LY WLY OF WLY & NLY SHORELINE OF SD FILLED RIVER BED TGW POR SD HORTONS 1ST SOUTH ALBRO PLACE & VAC ST ADJ TGW BLK 1 & LOTS 1-6 & LOTS 11-15 BLK 2 OF SD ELIZABETH ADD & VAC POR SOUTH ELIZABETH ST ADJ

Exhibit "C" Temporary Easement Area

The as built location of Grantee's storage building, as now constructed and generally described and depicted below, within Grantor's property described in Exhibit "A"

A TRACT OF LAND LOCATED IN THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY; THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 81.23 FEET; THENCE S11°48'48"W FOR 44.75 FEET; THENCE S04°46'40"W FOR 218.30 FEET; THENCE S05°42'51"E FOR 93.96 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING S05°42'51"E FOR 64.57 FEET; THENCE N32°45'57"W FOR 24.84 FEET; THENCE N92°45'57"W FOR 24.84 FEET; THENCE N09°11'17"E FOR 43.92 FEET TO THE TRUE POINT OF BEGINNING. SAID TRACT CONTAINS 365 SQUARE FEET, MORE OR LESS.



Page 13 of 13

Property to be Transferred to Seattle Parks and Recreation (Parcel 1)

A TRACT OF LAND LOCATED IN THE NORTHEAST QUARTER AND THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY; THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 20.29 FEET TO THE TRUE POINT OF BEGINNING;

THENCE CONTINUING \$88°49'03"E FOR 60.94 FEET;

THENCE \$11°48'48"W FOR 44.75 FEET;

THENCE S04°46'40"W FOR 218.30 FEET;

THENCE S05°42'51"E TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF EAST MARGINAL WAY SOUTH FOR 309.83 FEET;

THENCE N47°51'58"W ALONG SAID NORTHERLY RIGHT-OF WAY LINE FOR 97.70 FEET;

THENCE N08°24'44"W FOR 145.68 FEET;

THENCE N00°39'37"W FOR 197.68 FEET;

THENCE N10°56'18"E FOR 166.59 FEET TO THE TRUE POINT OF BEGINNING.

SAID TRACT CONTAINS 36,349 SQUARE FEET, MORE OR LESS.



Property to be Transferred to Seattle Department of Transportation (Parcel 2)

A TRACT OF LAND LOCATED IN THE NORTHEAST QUARTER AND THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY, SAID POINT ALSO BEING THE TRUE POINT OF BEGINNING; THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 20.29 FEET; THENCE S10°56'18"W FOR 166.59 FEET; THENCE S10°56'18"W FOR 166.59 FEET; THENCE S00°39'37"E FOR 197.68 FEET; THENCE S08°24'44"E TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF EAST MARGINAL WAY SOUTH FOR 145.68 FEET; THENCE N47°51'58"W ALONG SAID NORTHERLY RIGHT-OF-WAY LINE FOR 31.47 FEET; THENCE N08°24'44"W FOR 122.73 FEET; THENCE N08°24'44"W FOR 201.07 FEET; THENCE N10°56'18"E FOR 165.18 FEET TO THE TRUE POINT OF BEGINNING.

SAID TRACT CONTAINS 9,989 SQUARE FEET, MORE OR LESS.



City Light Retained Jurisdiction for its Electrical Infrastructure on the Flume Property (Parcels 1 & 2)

City Light retains the jurisdiction to operate, maintain and replace the following infrastructure components as well as access thereto:

- 1. Wooden pole located at approximately Lat. 47.538803, Long. -122.319152, or possible future replacement poles within ten feet of said location.
- 2. Wooden pole located at approximately Lat. 47.538441, Long. -122.319079, or possible future replacement poles within ten feet of said location.
- 3. Guy wires as necessary to stabilize said poles.
- 4. Electrical distribution and service lines as necessary to serve customers adjacent to the Flume Property.

Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset

- Whereas, the City Light Department (SCL) owns 46,338 square feet of property located between S Myrtle St and East Marginal Way S, which formerly functioned as part of the Georgetown Steam Plant Flume (Flume Property); and
- Whereas, SCL is seeking a vacation of a segment of Diagonal Way S, which would require the provision of an offsetting public benefit; and
- Whereas, the Georgetown community has been historically underserved in terms of public amenities; and
- Whereas, this community has long expressed an interest in additional open-space amenities, including specifically an off-leash area and a trail connection with the South Park community; and
- Whereas, the Georgetown community has participated in the Seattle Parks and Recreation Department's (SPR) planning for City off-leash areas (OLA), the Seattle Department of Transportation's (SDOT) study of a trail connection between Georgetown and South Park, and SCL's community outreach process for that department's proposed vacation of a segment of Diagonal Ave S and has specifically advocated for both an OLA and a trail segment at the Flume Property; and
- Whereas, SPR finds the Flume Property to be a suitable and preferred location for an OLA and SDOT finds the Flume Property to be a suitable and preferred location for a segment of the Georgetown/South Park Connector trail; and
- Whereas, the Seattle Design Commission has recommended that SCL's street vacation request be granted and approved the creation of an OLA and trail at the Flume Property as the public benefit for the vacation;

The City Light Department, the Seattle Department of Parks and Recreation, and the Seattle Department of Transportation agree to the following:

<u>Overview</u>. SCL has petitioned to vacate a section of Diagonal Ave S. As a public benefit for the vacation, the petition included transferring the jurisdiction of the Flume Property, at no cost, to SPR and SDOT. The jurisdiction of the western twenty feet of the property (see Exhibit A) will be transferred to SDOT for the future development of a bike/pedestrian trail. The jurisdiction of the remainder of the property (see Exhibit B) will be simultaneously transferred to SPR for the development of an OLA. These two transfers and other consideration detailed below would constitute the offsetting public benefit for the granted vacation and would be contingent on the granting of the vacation.

Att 5 – Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset V1

SCL will also transfer partial jurisdiction of a portion of the property (see Exhibit C) to Seattle Public Utilities (SPU) for the operation and maintenance of SPU's existing drainage infrastructure on the property. SCL will also retain partial jurisdiction of the property to allow the continued presence of its utility poles and overhead lines (see Exhibit D.)

If the street vacation is approved and the jurisdiction of the property is transferred by the City Council, then SPR, SCL, and SDOT would develop the property as outlined below.

<u>Development.</u> The property will be developed to support an Off- Leash Area (OLA) on the eastern portion of the site and bicycle/pedestrian trail on the western site of the site, more or less as indicated in Exhibit E. The project would include the following components:

- The top 6 -12" of soil will be removed from the flume property and properly disposed (12" for the OLA and 6-12" of the other portions of the site).
- The underlying soil may be regraded.
- An equivalent thickness of clean gravel will replace the removed soil. The soil removal and gravel replacement will serve two purposes:
 - It will remove any previously undetected residual contamination and leave a clean surface for the OLA and trail users.
 - It will create a surface that is more suitable for the development of the OLA and trail.
- The OLA on the eastern portion of the property will be fenced.
- The OLA will also have hard pavement pedestrian circulation, signage and waste receptacles.
- An on-site stormwater management facility (bioswale) will be constructed on the eastern portion of the property to serve both the OLA and the trail. 20 trees will be included in this part of the site.
- A domestic water service will be constructed to the site.
- The trail will include pedestrian lighting.
- The project will include required street improvements along S. Myrtle and East Marginal Way S.
- Project timeline:
 - City Council approval of vacation and transfer of public benefit property to SPR & SDOT – 4Q 2020 – 1Q 2021
 - OLA and bioswale constructed 3Q 2021 2Q 2022 Dependent on property transfer and permitting.
 - Trail and street improvements constructed 1Q 2022 1Q 2023 or sooner, if SDOT's funds can be made available quickly enough.

Responsibilities.

- SCL will:
 - Provide the property for the project to SPR and SDOT.

- Contribute to SPR and SDOT for the full cost of soil removal, regrading and placement of clean gravel up to \$480,000.
- Contribute to SPR \$185,000 toward the cost of designing and developing the OLA.
- Contribute to SDOT \$1,283,000 toward the cost of designing and constructing the trail.
- Issue a revocable easement to King County, or otherwise resolve to the satisfaction of SPR the existing encroachment on the east side the Flume Property prior to transfer of the OLA portion of the property to SPR (see Exhibit F.)
- Continue to be responsible even after the transfers of jurisdiction of the property - for any testing and/or removal of legacy contamination below the newly placed gravel, that may be required by a regulatory agency.
- These commitments are contingent on the granting of the Diagonal Ave S street vacation to SCL by the City Council.
- SPR and SDOT will:
 - Continue to support SCL in its efforts to receive the street vacation, including participating in meetings with the community, the Seattle Design Commission, SDOT Street Vacation staff and the Seattle City Council.
 - Assume responsibility for any future contamination of the top gravel layer in their respective areas after its installation.
 - Equally share the cost of the design and construction of the stormwater management facility.
 - Be responsible for maintaining their respective properties once the transfers of jurisdiction are effective. (For SDOT this will include the areas of the street improvements in the S. Myrtle St. and East Marginal Way S. ROWs.)
 - Be responsible for any future improvements to their respective properties that they might seek to make beyond those envisioned here.
- SPR will:
 - Be responsible for and fund (to the limit described below) the design and construction of the OLA, the related fencing, the OLA-related pedestrian circulation, the signage and waste receptacles, and the drinking water service.
 - Manage the design and construction of the initial soil removal and gravel placement for the entire site and the design and construction of the stormwater management facility.
 - Commit \$400,000 of identified capital and labor budget toward its share of the above components.
 - Be responsible for and fund the maintenance of the trees in the stormwater management facility.
- SDOT will:
 - Be responsible for and fund (to the limit described below) the design and construction of the trail, the pedestrian lighting, and the curb and sidewalk improvements along S Myrtle and East Marginal Way S.
 - Reimburse SPR for the cost of the installation of the trees in the stormwater management facility.
- Commit \$400,000 of identified capital and labor budget toward its share of the above components.
- \circ Cover the ongoing cost of the electricity for the pedestrian lighting.

Tom Deboer 16, 2020 15:09 PDT)

Tom DeBoer, Chief Environmental Officer Seattle City Light

Andy Sheffer, Planning & Development Division Director Seattle Department of Parks and Recreation

10/16/2020

Date

10/16/2020 Date

10/19/2020

Date

Jim Curtin Jim Curtin (Oct 19, 2020 08:05 PDT)

Jim Curtin, Director of Project Development Seattle Department of Transportation

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Exhibit A: Legal Description of Property to be Transferred from SCL to SDOT

A TRACT OF LAND LOCATED IN THE NORTHEAST QUARTER AND THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY, SAID POINT ALSO BEING THE TRUE POINT OF BEGINNING;

THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 20.29 FEET;

THENCE S10°56'18"W FOR 166.59 FEET;

THENCE S00°39'37"E FOR 197.68 FEET;

THENCE S08°24'44"E TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF EAST MARGINAL WAY SOUTH FOR 145.68 FEET;

THENCE N47°51'58"W ALONG SAID NORTHERLY RIGHT-OF-WAY LINE FOR 31.47 FEET;

THENCE N08°24'44"W FOR 122.73 FEET;

THENCE N00°39'37"W FOR 201.07 FEET;

THENCE N10°56'18"E FOR 165.18 FEET TO THE TRUE POINT OF BEGINNING.

SAID TRACT CONTAINS 9,989 SQUARE FEET, MORE OR LESS.



Exhibit B: Legal Description of Property to be Transferred from SCL to SPR

A TRACT OF LAND LOCATED IN THE NORTHEAST QUARTER AND THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY; THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 20.29 FEET TO THE TRUE POINT OF BEGINNING;

THENCE CONTINUING S88°49'03"E FOR 60.94 FEET;

THENCE S11°48'48"W FOR 44.75FEET;

THENCE S04°46'40"W FOR 218.30 FEET;

THENCE S05°42'51"E TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF EAST MARGINAL WAY SOUTH FOR 309.83 FEET;

THENCE N47°51'58"W ALONG SAID NORTHERLY RIGHT-OF WAY LINE FOR 97.70 FEET;

THENCE N08°24'44"W FOR 145.68 FEET;

THENCE N00°39'37"W FOR 197.68 FEET;

THENCE N10°56'18"E FOR 166.59 FEET TO THE TRUE POINT OF BEGINNING.

SAID TRACT CONTAINS 36,349 SQUARE FEET, MORE OR LESS.

Att 5 – Memorandum of Agreement Developing the Georgetown Steam Plant Flume into a Community Asset $\mathrm{V1}$



Exhibit C: Property Description for Partial Transfer of Jurisdiction to Seattle Public Utilities.

A 20 foot wide strip of land, being a portion of the northerly and westerly half of the filled bed of the Duwamish River in Sections 28 and 29, Township 24 North, Range 4 East, W.M., being 1(feet on each side of the following described centerline:

Commencing at the intersection of the center lines of Ellis Ave S and S Myrtle St; Thence along the center line of said S Myrtle St S 88° 49' 53" E a distance of 317.92 feet; Thence S 01° 10' 07" W a distance of 40.00 feet to the Point of Beginning;

Thence S 10° 39' 38" W a distance of 118.66 feet to a point hereinafter referred to as point "A" Thence continuing S 10° 39' 38" W a distance of 53.68 feet; Thence S 01° 29' 03" E a distance of 174.48 feet; Thence S 17° 32' 54" E a distance of 172.10 feet;

Thence S 47° 51' 41" E a distance of 42.54 feet to the terminus of said 20 foot wide strip of land at the east line of said westerly half of the filled bed of the Duwamish River in Sections 28 and 29, Township 24 North, Range 4 East, W.M., from which the southeasterly corner of said westerly half bears S 05° 53' 30" E a distance of 35.37 feet.

The southerly sidelines of said strip to be extended or shortened to terminate at said easterly line.

Together with a 20.00 foot wide strip of land, being 10 feet on each side of the following described centerline:

Commencing at said point "A", Thence N 79° 20' 22" W a distance of 10.00 feet to the point of beginning; Thence continuing 79° 20' 22" W a distance of 5.00 feet to the terminus of said line

Containing 11,329 square feet or 0.26 acres, more or less.



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Exhibit D: City Light's Reservation of Jurisdiction for its Electrical Infrastructure on the Flume <u>Property</u>

- 1. Wooden pole located at approximately Lat. 47.538803, Long. -122.319152, or possible future replacement poles within ten feet of said location.
- 2. Wooden pole located at approximately Lat. 47.538441, Long. -122.319079, or possible future replacement poles within ten feet of said location.
- 3. Guy wires as necessary to stabilize said poles
- 4. Electrical distribution and service lines as necessary to serve customers adjacent to the Flume Property.

Exhibit E: Project Concept for OLA and Trail



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Exhibit F: Legal Description of Revocable Easement Area

A TRACT OF LAND LOCATED IN THE SOUTHEAST QUARTER OF SECTION 29, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE POINT OF INTERSECTION OF THE GOVERNMENT MEANDER LINE AND THE SOUTHERN LINE OF SOUTH MYRTLE STREET AS SHOWN ON THAT CERTAIN SURVEY AS RECORDED IN BOOK 409 OF SURVEYS, PAGES 44 AND 45, RECORDS OF KING COUNTY; THENCE S88°49'03"E ALONG SAID SOUTHERN LINE FOR 81.23 FEET;

THENCE S11°48'48"WFOR 44.75 FEET;

THENCE S04°46'40"W FOR 218.30 FEET;

THENCE S05°42'51"E FOR 130.64 FEET TO THE TRUE POINT OF BEGINNING;

THENCE CONTINUING S05°42'51"E FOR 27.89 FEET;

THENCE N32°45'57"W FOR 24.84 FEET;

THENCE N57°14'03"E FOR 12.68 FEET TO THE TRUE POINT OF BEGINNING.

SAID TRACT CONTAINS 158 SQUARE FEET, MORE OR LESS.



SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:		
Seattle City Light	Mike Haynes/684-3618	Greg Shiring/206-386-4085		

* Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to the City Light Department, the Seattle Department of Parks and Recreation, and the Seattle Department of Transportation; declaring certain real property rights to be surplus to the needs of City Light; authorizing the General Manager and Chief Executive Officer of Seattle City Light to execute an easement agreement with King County, allowing the temporary use of a portion of City Light property to resolve the encroachment of an existing structure located on the west side of Boeing Field within the Northeast Quarter of Section 29 Township 24 N Range 4 E and the Southeast Quarter of Section 29 Township 24 N Range 4 E, and increasing the temporary use area authorized by Ordinance 126328 by approximately 207 square feet; and transferring jurisdiction of certain properties located in the Georgetown neighborhood in Section 29 Township 24 N, Range 4 E, from the City Light Department to the Seattle Department of Parks and Recreation and to the Seattle Department of Transportation.

Summary and background of the Legislation: City Light is requesting City Council approval for the transfer of the jurisdiction of portions of the Georgetown Steam Plant former flume property to the Seattle Department of Parks and Recreation ("SPR") and to the Seattle Department of Transportation ("SDOT") to create an off-leash area and bicycle and pedestrian trail segment in Georgetown, as part of the public benefit condition for City Light's approved vacation of a portion of Diagonal Ave South. This ordinance also makes a minor adjustment to the terms of a temporary easement to the benefit of King County, which was previously authorized by Ordinance 126328.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ____ Yes __X__ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ____ Yes __X__ No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs? As part of the public benefit condition for City Light's vacation of a section of Diagonal Ave. S., this property transfer will allow City Light to improve its South Service Center yard with existing budget authority.

This property transfer will allow SPR to develop an off-leash area and SDOT to develop a bicycle and pedestrian trail segment (a portion of the Georgetown-South Park Connection) at the site. The costs of these projects will be shared by City Light, SPR, and SDOT, all with existing appropriations. SPR and SDOT will be responsible for ongoing O&M of the property and facilities, except for the electric power infrastructure (poles and wires) on the property for which City Light will reserve ownership.

Is there financial cost or other impacts of *not* implementing the legislation?

If the property transfer is not approved, the off-leash area and trail segment will not be constructed. Also, City Light would not receive permanent title to this section of Diagonal Ave. S., impeding its plan to improve its South Service Center yard.

4. OTHER IMPLICATIONS

- a. Does this legislation affect any departments besides the originating department? SPR and SDOT will be receiving property and incurring obligations to fund their portions of the off-leash area and trail segment.
- **b.** Is a public hearing required for this legislation? Yes. The public hearing required by state law for disposition of surplus municipal utility property is scheduled for the Transportation and Utilities Committee meeting when the legislation will be considered.
- **c.** Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation? No.
- **d. Does this legislation affect a piece of property?** Yes.
- e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?

No expected negative impacts on vulnerable or historically disadvantaged communities. The property transfer will allow the development of the off-leash area and trail segment in Georgetown, a traditionally underserved Duwamish Valley community. Both projects are included in the Duwamish Valley Action Plan. City Light implemented an extensive community outreach plan, approved by Department of Neighborhoods, for its street vacation petition. SPR and SDOT will continue their ongoing community outreach for their off-leash area and trail projects.

f. Climate Change Implications

1. Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?

The legislation will not directly affect carbon emissions, though it will facilitate the development of the off-leash area and trail segment in Georgetown which may help

decrease carbon emissions by creating local recreation opportunities and improving nonmotorized transportation.

2. Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.

Facilitating the development of the Georgetown-South Park Connection may enhance transportation resiliency.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s). Not applicable.

List attachments/exhibits below: Summary Attachment 1 – Diagram of Vicinity



Attachment 1 Diagram of Vicinity

This diagram is intended for illustrative or informational purposes only and is not intended to modify anything in the legislation.

Georgetown Flume Property Transfer Ordinance Presentation to City Council Transportation and Utilities Committee December 1, 2021 f. h.l.



WE POWER SEATTLE

Last Council action in a series of steps to create off-leash area and trail in Georgetown

+ Prior Council steps:

- Approved Ordinance 126306 on April 12, 2021, to formalize Seattle Public Utilities' rights to maintain storm drain under the property
- Approved Ordinance 126328 on May 10, 2021, to authorize temporary easement to King County to resolve a small encroachment on the property
- Granted conditional approval for City Light's street vacation request in Clerk File 314451 on August 9, 2021

What this ordinance accomplishes

+ Declares the property surplus to City Light's utility needs

- + Makes minor correction in King County's temporary easement previously authorized by City Council
- + Transfers jurisdiction of the property to Parks and SDOT
- + Implements one of the major components of the requirements of City Light's previously approved street vacation
- + Allows Parks and SDOT to proceed with creating the off-leash area and trail for the community, on the property

Property location in Georgetown



Parcels to be transferred



General depiction of off leash area & trail segment



THANK YOU





Legislation Text

File #: CB 120233, Version: 1

CITY OF SEATTLE

ORDINANCE

COUNCIL BILL _____

 AN ORDINANCE relating to the City Light Department; directing the transfer of certain funds in the Light Fund into the Rate Stabilization Account in 2021; and amending Section 21.49.086 of the Seattle Municipal Code to simplify the operation of the Rate Stabilization Account.
WHEREAS, the City established the Rate Stabilization Account (RSA) within the Light Fund to buffer the City

Light Department ("City Light") and its customers from deviations of Net Wholesale Revenues (NWR)

from those assumed in budgets; and

WHEREAS, over its past decade in operation, the RSA has proven to be a useful and effective mechanism for

shielding customer rates from financial risks brought on by uncontrollable external factors like

temperatures, rainfall, and wholesale market conditions; and

WHEREAS, the financial risk in NWR is smaller than when the RSA was first introduced due to smaller

surplus volumes, lower average market prices and changes to City Light's contract with the Bonneville

Power Administration; and

- WHEREAS, the current \$10 million band between surcharge thresholds is not well aligned to current revenue uncertainty and contributes to more frequent rate changes than necessary to buffer NWR risk; and
- WHEREAS, in Ordinance 123757 the Council expressed a desire to reduce the likelihood of rate surcharges, as provided for in Seattle Municipal Code (SMC) 21.49.086, should revenue be less than that assumed in budgets; and
- WHEREAS, City Light customers participating in focus groups in 2019 expressed a strong desire for rate stability; and

WHEREAS, City Light anticipates better than 1.85 times 2021 debt service coverage due to increased retail revenues, lower power contract costs, and favorable bond pricing; and

WHEREAS, City Light anticipates 2021 NWR will be significantly lower than the level assumed in the 2021 Adopted Budget, primarily due to the impacts of unforeseen and extreme weather and drought conditions, triggering a surcharge under current rules; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The City Light Department may transfer 2021 cash available in the Light Fund for debt service coverage in excess of 1.85 times debt service for 2021 into the Rate Stabilization Account so long as its balance does not exceed \$100 million.

Section 2. Section 21.49.086 of the Seattle Municipal Code, last amended by Ordinance 126194, is amended as follows:

21.49.086 Rate Stabilization Account

A. The purpose of the Rate Stabilization Account established by Ordinance 121637 is, among other things, to absorb fluctuations in the Department's annual revenue in any given year due to deviations in net wholesale revenue from the amount assumed in the adopted budget for that year. Deposits into and withdrawals from the Rate Stabilization Account also affect the calculation of "Net Revenue" under certain provisions of ordinances authorizing Department bonds, and can therefore serve to absorb other fluctuations in "Net Revenue" as that term is defined in those bond ordinances. Except as otherwise provided by ordinance, funds in the Rate Stabilization Account cannot be used for any purposes other than those specified herein.

B. ((Target size of the Rate Stabilization Account)) The target size of the Rate Stabilization Account shall be no less than \$100 million and no greater than \$125 million.

((C. Initial funding of the Rate Stabilization Account

Initial funding of the Rate Stabilization Account will come from a variety of sources including:

1. The amount remaining in the Department's existing Contingency Reserve Account;

2. Cash from operations in 2010 in excess of that required for operations and debt service;

3. Revenue from the sale of surplus property in 2010 and 2011 not already recognized in the

Department's 2010 Adopted Budget;

4. Allowable savings in 2010, 2011, and 2012 from refunding bonds in 2010; and

5. Other sources of revenue as determined by the City Council.

D. Baseline for the Net Wholesale Revenue forecast:))

<u>C.</u> The Net Wholesale Revenue forecast shall be \$60 million in 2021 and \$40 million in 2022 through 2024. The forecast shall be the amount of Net Wholesale Revenue assumed by the City Council for the purpose of establishing Department rates and budgets. <u>The Department shall allocate the forecast by month and document this assumption in annual revenue requirement and budget proposals.</u>

((The annual forecast for each year will be distributed over the quarters of the year as follows:

1. Thirty-five percent for January 1 to March 31;

2. Twenty percent for April 1 to June 30;

3. Fifteen percent for July 1 to September 30; and

4. Thirty percent for October 1 to December 31.

The amounts determined in this way will be the quarterly Net Wholesale Revenue forecasts for the

purpose of subsection 21.49.086.E and will be reported by the Department in its annual budget proposals.

E. Use of the Rate Stabilization Account Effective January 1, 2011:))

<u>D.</u> Should the actual Net Wholesale Revenue for any ((quarter)) month be less than the forecast for that ((quarter as determined in subsection 21.49.086.D)) month, the Department will transfer the difference (($_{\tau}$ rounded to the nearest million dollars,)) from the Rate Stabilization Account to the Light Fund. Alternatively, should the actual Net Wholesale Revenue for any ((quarter)) month be greater than the forecast for that ((quarter as determined in subsection 21.49.086.D)) month, the Department will transfer the difference (($_{\tau}$ rounded to the nearest million dollars,)) from the Light Fund to the Rate Stabilization Account. In each case the

transfer will occur within 30 days of the end of the ((quarter)) month in question. A true-up may be included if actual net wholesale revenue for any past month is restated or differs from the amount used to calculate a transfer.

No later than ((30)) <u>45</u> days after the end of each quarter, the Department will notify the Mayor and the City Council of the forecast and actual Net Wholesale Revenue ((for that quarter and)) for the year to date, and of the amount remaining in the Rate Stabilization Account. ((after transfers authorized under this subsection 21.49.086.E.))

 $((F_{\cdot}))$ <u>E.</u> Replenishment of the Rate Stabilization Account ((-))

1. Whenever the amount in the Rate Stabilization Account is ((\$90)) <u>\$75</u> million or less <u>on</u> <u>either March 31 or Sept 30</u>, City Light will impose a surcharge equal to ((1.5%)) <u>2.0 percent</u> of base rates. ((at <u>the earliest opportunity.</u>)) The proceeds from the surcharge <u>adjusted for applicable revenue taxes</u> will be deposited into the Rate Stabilization Account. The surcharge will remain in effect until the amount in the Rate Stabilization Account reaches \$100 million. ((and will be removed at the earliest opportunity thereafter.))

2. Whenever the amount in the Rate Stabilization Account is ((\$80)) \$50 million or less on either March 31 or Sept 30, the Department will impose an additional surcharge equal to ((1.5)) 2.0 percent of base rates. ((at the earliest opportunity.)) The proceeds of the additional surcharge <u>adjusted for applicable</u> revenue taxes will be deposited into the Rate Stabilization Account. The additional surcharge will remain in effect until the amount in the Rate Stabilization Account reaches ((\$90)) \$100 million. ((, and will be removed at the earliest opportunity thereafter.))

3. ((Whenever the amount in the Rate Stabilization Account is \$70 million or less, the Department will impose an additional surcharge equal to 1.5 percent of base rates at the earliest opportunity. The proceeds of the additional surcharge will be deposited into the Rate Stabilization Account. The additional surcharge will remain in effect until the amount in the Rate Stabilization Account reaches \$80 million, and will be removed at the earliest opportunity thereafter.)) Surcharges may be initiated twice per year, on either January

<u>1 or June 1. Surcharges should be lifted within 90 days of when the month-end balance has reached the relevant</u> <u>threshold.</u> The Department will notify the Mayor and the Council in writing of ((its intent to impose a surcharge under subsection 21.49.086.F.1, 21.49.086.F.2, or 21.49.086.F.3)) any upcoming surcharge change before it is implemented.

4. ((Effective after the fund has reached its minimum target value of \$100 million: If, in spite of the rate surcharges provided for in subsections 21.49.086.F.1, 21.49.086.F.2, and 21.49.086.F.3,)) If for any reason the amount in the Rate Stabilization Account is ((\$50)) \$25 million or less at the end of a month, the Department will notify the City Council within 30 days and the City Council will initiate a rate review, if the Mayor has not already done so, within ((forty-five)) 45 days that will increase rates, reduce Department spending, or identify additional sources of funding, or a combination of these measures, to bring the amount in the Account up to \$100 million within a period of ((12)) 24 or fewer months.

((Interest earned by the funds in the Rate Stabilization Account will be deposited into that account.))

5. Nothing in this Section 21.49.086 shall limit the authority of the City to deposit other amounts into the Rate Stabilization Account as may be authorized by ordinance.

F. If the amount in the Rate Stabilization Account exceeds \$125 million, the Department will reduce its balance to \$110 million by transferring funds to the Operating Account and notify the Mayor and City Council within 30 days of this transfer.

((G. Disposition of excess funds in the Rate Stabilization Account

Effective January 1, 2016: Whenever the amount in the Rate Stabilization Account exceeds \$125 million, the City Council will initiate a rate review, if the Mayor has not already done so, within 45 days that will decrease rates, allow the Department to cover more of its capital expenditures with cash from operations or defease outstanding debt in order to keep future rates low, increase its expenditures, or a combination of these measures, to bring the amount in the Account down to \$125 million within a period of 12 or fewer months.

H. Consistent with Section 22 of Ordinance 121637, deposits into or withdrawals from the Rate Stabilization Account in respect of any fiscal year may be made up to and including the date 90 days after the end of that fiscal year.))

Section 3. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the	day of	, 2021, and signed by
me in open session in authentication of its p	bassage this day of	, 2021.

President _____ of the City Council

Approved / returned unsigned / vetoed this _____ day of _____, 2021.

Jenny A. Durkan, Mayor

Filed by me this ______ day of ______, 2021.

Monica Martinez Simmons, City Clerk

(Seal)

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:		
Seattle City Light	Chris Ruffini/206-684-4649	Greg Shiring/206-386-4085		

* Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to the City Light Department; directing the transfer of certain funds in the Light Fund into the Rate Stabilization Account in 2021; and amending Section 21.49.086 of the Seattle Municipal Code to simplify the operation of the Rate Stabilization Account.

Summary and background of the Legislation:

City Light's Rate Stabilization Account (RSA) is a reserve fund created in 2010 that helps buffer net wholesale revenues (NWR). The amount of NWR City Light earns in any year depends primarily on hydro conditions at its dams and wholesale market prices and both can vary significantly year to year.

A 3.0% RSA surcharge was removed in April 2021 after the RSA reached its target level of \$100 million. In Ordinance 126302, the surcharge was replaced by a permanent 3.0% base rate increase as part of City Light's 2021-2022 rate strategy, smoothing the customer rate path without increasing customer bills in 2021. In early 2021 the outlook for the RSA was strong and no surcharge was expected to come back on within the next year. However, dry hydro conditions, combined with exceptionally hot weather and high wholesale market prices quickly depleted the RSA balance during Q3. By the end of Q3, the RSA balance was \$82 million, which would trigger an automatic 1.5% rate surcharge per SMC 21.49.086.

In keeping with the spirit of Ordinance 126302 - to keep customer bills stable - this legislation would authorize a one-time discretionary deposit into the RSA. City Light anticipates higher than forecast retail revenue in 2021, primarily due to an earlier than expected recovery for electricity demand, power cost savings, and debt service savings from low bond interest rates. 2021's strong retail demand contributed to the lower realized NWR because power was sold retail that would have otherwise been surplus and sold wholesale. City Light can make a deposit to the RSA and still achieve a debt service coverage ratio that would be viewed as prudent by credit rating agencies.

There is precedent for discretionary RSA deposits, City Light has made year-end cash deposits to augment the RSA when it had ample financial cushion in 2011, 2012 and 2013.

In addition, this legislation also updates the RSA mechanism to simplify the surcharge trigger rules both by lowering the trigger balances and by adjusting the surcharge rate. The table below summarizes the proposed changes. City Light believes this amended mechanism will still provide the utility with financial stability while providing customers with more rate certainty. The current \$10 million increments for surcharges result in frequent rate changes which is not

optimal for customers. When the RSA was created in 2010, the expected annual NWR under typical water conditions was well over \$100 million. The current outlook of NWR is expected to be in the \$40 million to \$50 million range, so the magnitude of the volatility is lower. Therefore, the RSA can operate with wider bands and still adequately buffer net wholesale revenue because the overall NWR risk is lower.

Under the proposed changes, the RSA mechanism will operate with fewer changes to customer rates. For example, under the current model, if the RSA balance dipped to as low as \$70 million, three separate surcharges would have been triggered (1.5% triggered at each increment: \$90 million, \$80 million, and again at \$70 million), and a 4.5% surcharge would be in place. Under the proposed model, when the balance dips to \$70 million, only one 2.0% surcharge would be triggered, and it would stay in place until the balance reaches \$100 million. Although the surcharge may need to remain in place longer to replenish the RSA, rate volatility will be greatly reduced while still protecting the overall RSA balance. Rate predictability has consistently been at or near the top of the list of customer preferences in City Light surveys.

	CURRENT	PROPOSED
RSA target balance	\$100M	\$100M
RSA max balance	\$125M	\$125M
Transfer interval	Quarterly	Monthly
Surcharge initiated	Quarterly	Biannually (Jan/Jun)
First surcharge	@ <\$90M 1.5% surcharge	@ <\$75M 2.0% surcharge
Second surcharge	@ <\$80M 3.0% surcharge	@ <\$50M 4.0% surcharge
Third surcharge	@ <\$70M 4.5% surcharge	NA
Surcharge ends when	RSA balance grows by \$10M	RSA balance reaches \$100M
Council initiates rate	@ <\$50M	@ <\$25M
review to replenish RSA		
Interest earnings	Transfer to RSA	No administrative requirement

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? _____ Yes _x_ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget?

___Yes <u>x</u> No

Does the legislation have other financial impacts to The City of Seattle that are not reflected in the above, including direct or indirect, short-term, or long-term costs? Revenue from an RSA surcharge is subject to a 6% Seattle utility tax. The dollar impact to the General Fund would depend on the duration of the RSA surcharge.

Is there financial cost or other impacts of *not* **implementing the legislation?** There is no direct cost of not implementing the legislation. If not implemented a 1.5% RSA surcharge would be added to customer rates.

3.a. Appropriations

This legislation adds, changes, or deletes appropriations.

3.b. Revenues/Reimbursements

_____ This legislation adds, changes, or deletes revenues or reimbursements.

Revenue/Reimbursement Notes: This legislation does not impact planned/budgeted revenues. If this legislation wasn't approved and a 1.5% RSA surcharge was implemented, it would provide additional retail revenue of approximately \$3.5 million per quarter until it is removed or changed. Surcharge revenues would be deposited into the RSA.

3.c. Positions

This legislation adds, changes, or deletes positions.

4. OTHER IMPLICATIONS

- a. Does this legislation affect any departments besides the originating department? No
- **b.** Is a public hearing required for this legislation? No
- c. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation? No
- **d. Does this legislation affect a piece of property?** No
- e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public? NA
- f. Climate Change Implications
 - 1. Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way? No

- 2. Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects. No
- g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s)? NA

List attachments/exhibits below:

RSA Ordinance

Presentation for Transportation & Utilities Committee

December 1, 2021



WE POWER SEATTLE

Rate Stabilization Account (RSA) Ordinance

+The RSA is cash reserve that buffers uncertain revenues from sales of surplus power on the wholesale market.

+ This ordinance authorizes two changes that affect the RSA:

- 1. Transfer \$10M-\$20M from operating cash to the RSA to avoid an imminent RSA rate surcharge
- 2. Amend RSA rules of operation to simplify and reduce frequency of future RSA rate surcharges

Drought Conditions Have Reduced Wholesale Revenues

- + Revenues from surplus power sales (also called net wholesale revenue or NWR) for 2021 are expected to come in \$35M below budget due to dry conditions and higher retail demand.
- +RSA was full at \$100M through spring.

2021 Current Forecast: \$25M

+ By September, the RSA balance was \$82M, which per RSA rules triggers a 1.5% surcharge.



2021 Budget: \$60M

Overall, 2021 Financial Picture is Excellent

\$M	2021	Plan	Variance	
Retail Revenue	946.0	919.3	26.7	Retail demand is exceeding our (adjusted for COVID) plan/budget
RSA Surcharge Revenue	9.6	7.4	2.2	
Net Wholesale Revenue	25.2	60.0	-34.8	Low wholesale power revenues due to dry conditions and higher retail demand
RSA Transfers (net)	24.3	-8.2	32.5	
Other Revenue (expense)	-31.0	-29.7	-1.3	
Total Revenue	974.1	948.8	25.3	
	222.2	220 5	0.0	
Purchased Power (net)	229.3	238.5	-9.2	Savings in pet nower supply costs
Other O&M	309.4	306.3	3.1	Savings in het power supply costs
Total Expense	538.7	544.9	-6.2	
Amount Available for Debt Service	e 435.4	404.0	31.5	
Debt Service	216.7	224.4	-7.7	Bottom line: 2021 financials are on track to be very strong, and
Debt Service Coverage	2.0	1.8	0.2	there is room to transfer some operating cash to help the RSA
Rate Stabilization Account (RSA) Ordinance

- 1. Transfer of \$10M-\$20M from operating cash to RSA
 - Want to maintain strong debt service coverage of 1.85X-1.90X+
- 2. Amend RSA rules of operation
 - Updates reflect learnings from over the past decade of RSA operation
 - Rules balance dual goals of utility financial resilience and customer rate stability

	CURRENT	PROPOSED	
RSA target balance	\$100M	\$100M	
RSA max balance	\$125M	\$125M	
Transfer interval	Quarterly	Monthly	
Surcharge initiated	Quarterly	Biannually (Jan/Jun)	
First surcharge	@ <\$90M 1.5% surcharge	@ <\$75M 2.0% surcharge	
Second surcharge	@ <\$80M 3.0% surcharge	@ <\$50M 4.0% surcharge	
Third surcharge	@ <\$70M 4.5% surcharge	NA	
Surcharge ends when	RSA balance grows by \$10M	RSA balance reaches \$100M	
Council action required	@ <\$50M	@ <\$25M	
Interest earnings	Transfer to RSA	No administrative requirement	

Seattle City Light



Legislation Text

File #: Res 32030, Version: 1

CITY OF SEATTLE

RESOLUTION

A RESOLUTION relating to the City Light Department; acknowledging and approving the City Light Department's adoption of a biennial energy conservation target for 2022-2023 and ten-year conservation potential.

WHEREAS, Ballot Initiative 937 (I-937), also known as the Energy Independence Act, was passed by

Washington state voters on November 7, 2006, which requires qualifying electric utilities to obtain new

renewable resources and undertake cost-effective energy conservation; and

WHEREAS, I-937 was codified in chapter 19.285 RCW; and

WHEREAS, RCW 19.285.040 calls for each qualifying utility to pursue all available conservation that is costeffective, reliable, and feasible, including requiring of the development of conservation potential and biennial conservation targets; and

WHEREAS, WAC 194-37-070 requires that each qualifying utility must document the methodologies and inputs used in the development of its ten-year potential and biennial target are consistent with the requirements of RCW 19.285.040; and

WHEREAS, City Light undertook a Conservation Potential Assessment study to develop its ten-year potential and biennial target, which was consistent with the methodologies set forth in RCW 19.285.040 and WAC 194-37-070; and

WHEREAS, the Conservation Potential Assessment identifies a ten-year conservation potential of 76.9 annual megawatts (aMW) starting in 2022, and a biennial energy conservation target of 18.7 aMW for City

File #: Res 32030, Version: 1

Light in 2022-2023; and

- WHEREAS, City Light anticipates meeting or exceeding the energy conservation target for 2022 and 2023, and updating its Conservation Potential Assessment by the year 2023; and
- WHEREAS, WAC 194-37-070 requires that each utility must establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for comment; NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. Pursuant to RCW 19.285 et. seq. and corresponding WAC 194-37-070 regulations, and after public hearing, the City Council acknowledges and approves the City Light Department's (City Light) adoption of a biennial energy conservation target of 18.7 aMW for 2022-2023 and a ten-year conservation potential of 76.9 aMW starting in 2022. City Light's biennial energy conservation target and ten-year conservation potential are based upon a Conservation Potential Assessment conducted using methodologies consistent with those used by the Pacific Northwest Electric Power and Conservation Planning Council in order for City Light to pursue all available conservation that is cost-effective, reliable, and feasible.

Section 2. The City Council further acknowledges that City Light anticipates meeting or exceeding the biennial energy conservation target with its adopted 2022 budget.

Adopted by the City Council the _____ day of ______, 2021, and signed by me in open session in authentication of its adoption this _____ day of _____, 2021.

e #: Res 32030, Version: 1		
	President	of the City Council
The Mayor concurred the	day of	, 2021.
	Jenny A. Durkan,	Mayor
Filed by me this day o	f	, 2021.
	Monico Mortinoz	Simmong City Clork

(Seal)

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Seattle City Light	Kali Hollenhorst/4-3645	Greg Shiring/6-4085
	Jennifer Finnigan/6-9153	

* Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.

1. BILL SUMMARY

Legislation Title: A RESOLUTION relating to the City Light Department; acknowledging and approving the City Light Department's adoption of a biennial energy conservation target for 2022-2023 and a ten-year conservation potential.

Summary and background of the Legislation:

To comply with RCW 19.285 (also known as I-937 or the Energy Independence Act), City Light must establish and make publicly available a biennial acquisition target for cost-effective conservation and a ten-year conservation potential. This Resolution establishes an 18.7 average megawatt (aMW) conservation target for 2022-2023 and a ten-year conservation potential of 76.9 aMW.

Initiative 937 was passed by Washington state voters in November 2006 to establish renewable and energy efficiency targets for electric utilities serving more than 25,000 retail customers. In complying with RCW 19.285.040, each qualifying utility shall pursue all available conservation that is cost-effective, reliable, and feasible. RCW 19.285.040.

WAC 194-37-070 Section (5) provides further guidance that the development of the biennial target and the ten-year potential should follow the methodologies used by the Northwest Power and Conservation Council (NWPPC) and this section offers a series of methodical details to ensure consistency with this regional effort. Section (4) also calls for electric utilities to "establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for public comment." The adoption of this resolution by the City Council in an open public meeting will maintain our compliance with state law.

Every two years City Light initiates a Conservation Potential Assessment (CPA) to identify the biennial acquisition target and the ten-year potential for the service territory. City Light hired the consulting firm (Cadmus) to support the CPA consistent with the methodologies outlined in RCW 19.285.040 and WAC 194-37-070 and to be consistent with the Northwest Power and Conservation Council's methodology used for their Seventh Power Plan. This CPA has identified a total of 18.7 aMW being achievable within the City Light service territory for 2022-2023 and a total conservation potential of 76.9 aMW for the ten-year period starting in 2022. City Light anticipates meeting or exceeding the 18.7 aMW biennial target for 2022-2023 and believes the spending plan adopted in the Strategic Plan's rate path is sufficient to meet the biennial acquisition targets.

As a point of reference, this is the seventh Resolution to establish the biennial target and ten-year potential for the utility. The most recent legislation, Resolution #31932 established the 2020-2021 conservation target of 21.27 aMW and ten-year potential of 82.67 aMW. The 2022-2023 target of 18.7 aMW is a decrease from the 2020-2021 conservation target of approximately 12%. Other than the energy savings target and ten-year potential, this Resolution is quite similar to Resolution 31932 in its language and intent.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ____ Yes __X__ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ____ Yes __X__ No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?

There is no direct financial impact of implementing this legislation; the adoption of this Resolution is an administrative requirement of state law. However, failing to meet the biennial conservation targets may result in an administrative penalty outlined in RCW 19.285.060: "(1) Except as provided in subsection (2) of this section, a qualifying utility that fails to comply with the energy conservation or renewable energy targets established in RCW 19.285.040 shall pay an administrative penalty to the state of Washington in the amount of fifty dollars for each megawatt-hour of shortfall. Beginning in 2007, this penalty shall be adjusted annually according to the rate of change of the inflation indicator, gross domestic product-implicit price deflator, as published by the bureau of economic analysis of the United States department of commerce or its successor."

City Light's proposed 2022 budget and the spending plan adopted in the Strategic Plan's rate path provide the resources necessary to meet the target and it is anticipated that adequate resources will be available to meet the biennial acquisition targets for 2022-2023. City Light does not expect to propose any significant increase in budget levels to implement this legislation.

Is there financial cost or other impacts of *not* implementing the legislation?

There is no direct financial cost of not implementing this legislation. However, City Light is required by state law to set the conservation targets as outlined in RCW 19.285.040. City Light anticipates meeting the conservation targets with the funding levels proposed in the 2022-2026 Strategic Plan.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department? No

Kali Hollenhorst/Jennifer Finnigan SCL 2022-2023 RCW 19.285 Conservation Target SUM D1

b. Is a public hearing required for this legislation?

Yes. Consistent with WAC 194-37-070 section (4), the utility must establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for comment.

- c. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation? No
- **d. Does this legislation affect a piece of property?** No
- e. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public? No, this resolution sets an overall savings target for City Light, but does not alter the way the organization offers services to vulnerable or historically disadvantaged communities.

f. Climate Change Implications

1. Emissions: Is this legislation likely to increase or decrease carbon emissions in a material way?

This resolution supports a decrease in carbon emissions by establishing a two- and ten-year energy conservation target. Energy efficiency helps to reduce City Light's carbon emissions by saving energy and helping to reduce overall load, ultimately helping City Light's hydroelectric resources meet most of our demand.

2. Resiliency: Will the action(s) proposed by this legislation increase or decrease Seattle's resiliency (or ability to adapt) to climate change in a material way? If so, explain. If it is likely to decrease resiliency in a material way, describe what will or could be done to mitigate the effects.

This resolution supports Seattle's resiliency to climate change by establishing two- and tenyear energy conservation targets. Energy efficiency helps to reduce carbon emissions, as stated in f2.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).

This is not a new initiative or major programmatic expansion; this effort is consistent with City Light's longstanding commitment to energy efficiency.

List attachments/exhibits below:

Summary Att A - 2022 Conservation Potential Assessment-Volume I

Summary Att A - 2022 Conservation Potential Assessment—Volume I V1



2022 Conservation Potential Assessment—Volume I

August 3, 2021 Project Lead: Kali Hollenhorst, Seattle City Light Prepared by: Aquila Velonis, Sophia Spencer, Cadmus

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Definition of Terms

aMW	Average Megawatt
AC	Air Conditioning
ACS	American Community Survey
BPA	Bonneville Power Administration
CBECS	Commercial Buildings Energy Consumption Survey
CBSA	Commercial Building Stock Assessment
CETA	Clean Energy Transformation Act
CEE	Consortium for Energy Efficiency
CFL	Compact Fluorescent Lamp
CEAP	Clean Energy Action Plan
CEIP	Clean Energy Implementation Plan
Council	Northwest Power and Conservation Council
СРА	Conservation Potential Assessment
CRI	Color Rendering Index
DHW	Domestic hot water
DHP	Ductless heat pump
DSR	Demand-side response
ECM	Energy Conservation Measure
ECM	Electronically Commutated Motor
EISA	Energy Independence and Security Act of 2007
EUI	Energy Use Intensity
EUL	Effective Useful Life
GPM	Gallons Per Minute
HVAC	Heating Ventilation and Air Conditioning
I-937	Initiative 937
IRP	Integrated Resource Plan
kW	Kilowatt
kWh	Kilowatt-hour

LED	Light-emitting diode		
MW	Megawatt		
MWh	Megawatt-hour		
NEEA	Northwest Energy Efficiency Alliance		
0&M	Operations and Maintenance		
РАСТ	Program administrator cost test		
RBSA	Residential Building Stock Assessment		
RCW	Revised Code of Washington		
REC	Renewable Energy Credit		
RTF	Regional Technical Forum		
RUL	Remaining Useful Life		
SEER	Seasonal Energy Efficiency Ratio		
T&D	Transmission and Distribution		
TRC	Total Resource Cost		
TSPR	Total System Performance Ratio		
UCT	Utility Cost Test		
UEC	Unit Energy Consumption		
UES	Unit Energy Savings		
WAC	Washington Administrative Code		

Summary Att A - 2022 Conservation Potential Assessment—Volume I V1

Acknowledgements

The authors would like to thank the Seattle City Light staff who provided invaluable guidance and support, especially Kali Hollenhorst, Jennifer Finnigan, Emma Johnson, Joe Fernandi, John Rudolph, Aliza Seelig, Villamor Gamponia, Paul Nissley, and Saul Villareal. The study required a compilation of a large amount of data from many sources, including several departments at City Light.

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1. Executive Summary

1.1. Overview

Seattle City Light (City Light) engaged Cadmus to complete a Conservation Potential Assessment (CPA) to produce rigorous estimates of the magnitude, timing, and costs of conservation resources in its service territory over the next 20 years, beginning in 2022. This study, as part of City Light's Integrated Resource Planning (IRP) process, is intended to identify cost-effective potential from the perspectives of energy efficiency and demand response within City Light's major customer sectors: residential, commercial, and industrial.¹ The results of this assessment will also help inform City Light's future programs. The study period aligns with the timeline for City Light's 2022 IRP and provides direct inputs into its IRP.

This study accomplishes the following objectives:

- Fulfills statutory requirements of Chapter 194-37 of the Washington Administrative Code (WAC), Energy Independence Act. The WAC requires that City Light identify all achievable, cost-effective, conservation potential for the upcoming ten years.² City Light's public biennial conservation target should be no less than the *pro rata* share of conservation potential over the first ten years. The study estimates will inform City Light's targets for the 2022-2023 biennium.
- Supports City Light's compliance of Washington State's Clean Energy Transformation Act (CETA), passed as Senate Bill 5116 in April 2019, to inform City Light's energy efficiency and demand response short- and long-term targets.³ In addition, this study will inform City Light's near-term interim targets for its Clean Energy Implementation Plan (CEIP) as required by CETA. CETA sets additional requirements for City Light, such as including the social cost of carbon in avoided energy costs. This study, more broadly, supports City Light's Clean Energy Action Plan (CEAP), a ten-year action plan described in the 2020 IRP Progress Report to meet CETA requirements.
- Develops up-to-date estimates of energy conservation measure (ECM) datasets for the residential, commercial, and industrial market sectors using measures consistent with the Northwest Power and Conservation Council's (Council) draft 2021 Power Plan, the Regional Technical Forum (RTF), and other data sources.
- Provides inputs into City Light's IRP. Completed every two years, City Light's IRP determines the mixture of supply-side and demand-side resources required over the next 20 years to meet customer demand and looks ahead to how City Light plans to meet the 2045 100 percent

- ² Washington State Legislature. *Energy Independence Act.* Washington Administrative Code Chapter 194-37.
- ³ CETA requires proposing interim targets for meeting the standard under RCW 19.405.040(1) during the years prior to 2030 and between 2030 and 2045. This study estimates potential over 20 years (2022-2041) and does not directly estimate potential through 2045. Through the IRP process, City Light's projects their long-term targets out to 2045.

¹ This study did not estimate street lighting potential as all streetlights have been converted to LED.

non-emitting standard of CETA. The IRP requires a thorough analysis of conservation potential to properly assess the reliability, cost, risk, and environmental impact of different resource portfolios for power generation as well as other demand-side resources that are not part of the CPA.

This study relies on City Light-specific data, compiled from City Light's oversample of the 2017 Northwest Energy Efficiency Alliance (NEEA) Residential Building Stock Assessment (RBSA),⁴ the 2019 Commercial Building Stock Assessment (CBSA),⁵ and other regional data sources. This study uses a methodology consistent with the Council's draft 2021 Power Plan supply curve workbooks, as of December 2020.⁶ It incorporates savings and costs for all ECMs in the Council's draft 2021 Power Plan workbooks and the active unit energy savings (UES) workbooks from the RTF.⁷ The *Detailed Methodology* section of this report describes the sources and data used in greater detail.

This study also estimates demand response potential to align with the Council's demand response methodology and to provide City Light the data it needs to meet Washington State's CETA requirements. The demand response potential can be found in Appendix E.

1.2. Scope of Analysis

This study analyzed three sectors—residential, commercial, and industrial—and, where applicable, Cadmus considered multiple market segments, construction vintages (new and existing), and end-uses:

- Residential: Eight segments including standard-income single-family and multifamily homes (including low-rise, mid-rise, and high-rise) and low-income single-family and multifamily homes (including low-rise, mid-rise, and high-rise)⁸
- Commercial: 20 major commercial segments (including offices, retail, and other segments)
- Industrial: Energy-intensive manufacturing and primarily process-driven customers

- ⁷ RCW 19.285.040 requires CPAs to use methodologies consistent with those used by the Council's most recent regional power plan.
- ⁸ Cadmus disaggregated residential households into low-income and standard-income segments based on income qualification in the City Light Utility Discount Program. Thus, only customers with a household income of less than 70 percent of the state median income, by household size, were considered low-income.

⁴ Northwest Energy Efficiency Alliance. 2017 Residential Building Stock Assessment.

⁵ Northwest Energy Efficiency Alliance. 2019 Commercial Building Stock Assessment.

⁶ In early 2022, the Council is expected to finalize the region's eighth Power Plan (the 2021 Power Plan). This is a regional plan that provides guidance on which resources can help ensure a reliable and economical regional power system from 2022 to 2041. The Council develops supply curves covering a variety of supply- and demand-side resources, considers how to best meet the region's power needs across a range of future scenarios, balancing cost and risk, and develops a draft plan and gathers public input before releasing the final version.

For each sector, Cadmus developed a baseline end-use load forecast that assumed no new future programmatic conservation. The baseline forecast largely captured savings from building energy codes, equipment standards, and other naturally occurring market forces Cadmus calculated energy efficiency potential estimates by assessing the impact of each ECM on this baseline forecast. Therefore, conservation potential estimates presented in this report represent savings beyond codes and standards and naturally occurring savings.

Consistent with the WAC requirements, this study considers two types of energy efficiency potential, as shown in Figure 1.1. City Light determined a third potential—achievable economic—through the IRP's optimization modeling.





The three types of potential are described as follows:

- **Technical potential** assumes that all technically feasible resource opportunities may be captured, regardless of their costs or other market barriers. It represents the total energy efficiency potential in City Light's service territory, after accounting for purely technical constraints.
- Achievable technical potential is the portion of technical potential assumed to be achievable during the study's forecast, regardless of the acquisition mechanism. For example, savings may be acquired through utility programs, improved codes and standards, and market transformation.
- Achievable economic potential is the portion of achievable technical portion determined to be cost-effective by the IRP's optimization modeling, in which either bundles or individual energy efficiency measures are selected based on cost and savings. The cumulative potential for these selected bundles constitutes achievable economic potential.

This is a divergence from prior CPAs where Cadmus provided the estimates for achievable economic potential based on screening individual measures for cost-effectiveness under a total resource cost (TRC)

test.⁹ For the 2022 CPA, City Light used their IRP optimization model to select measures based on the levelized cost.

To be consistent with WAC requirements of relying on cost-effective energy efficiency for this 2022 CPA, Cadmus bundled the resulting forecasts of achievable technical potential by levelized costs bin for City Light's IRP modeling team. The IRP modeling team then determined the amount of cost-effective energy efficiency that could be considered as a resource within the IRP. Details of the IRP process and the final selection of measures considered as part of the IRP optimization model can be found in the *Development of Conservation IRP Inputs* section of this report and in Appendix D (Measure Details).

1.3. Summary of Results

The study found 125 average megawatts (aMW) of achievable technical potential in the first ten years (cumulative in 2031) in City Light's service territory.¹⁰ To inform CEIP energy efficiency targets, Cadmus calculated two-year and four-year cumulative achievable technical potential. In the first two years, cumulative achievable technical potential equals 28 aMW, and in the first four year cumulative achievable technical potential is 53 aMW.

Furthermore, City Light used its IRP optimization model to select measures based on the levelized TRC. Overall, the cumulative 20-year achievable economic potential is 106 aMW, with 77 aMW acquired in the first ten years. The *pro rata* share (20 percent of 10-year achievable economic potential), which represents City Light's minimum biennial target, equals 15 aMW. All estimates of potential in this report are presented at the generator, meaning they include line losses.¹¹

1.3.1. Technical Potential

Table 1.1 shows the cumulative technical potential for each sector in 2041. Overall, the study identified 233 aMW of technically feasible conservation potential by 2041—the equivalent of 19 percent of forecasted baseline sales. Study results are presented as a percentage of forecasted baseline sales, which provides a useful benchmark for comparison against City Light's previous CPAs and the Council's draft 2021 Power Plan. The commercial, residential, and industrial sectors account for 56 percent, 39 percent, and 5 percent of the 20-year technical potential, respectively.

⁹ Cadmus conducted both the 2020 CPA and the 2022 CPA.

¹⁰ An average megawatt (aMW) refers to a unit of measure that represent one million watts (MW) delivered continuously 24 hours a day for each day of the year (e.g., 8,760 hours). A detailed description of MW and aMW can be found on the Council's website: <u>https://www.nwcouncil.org/reports/columbia-river-history/megawatt</u>

¹¹ For illustrative purposes, City Light estimates line losses to be 5.5 percent, so the minimum biennial target at the customer site is 14 aMW.

Sector	Baseline Sales– 20-Year (aMW)	Technical Potential– 20-Year (aMW)	Technical Potential as % of Baseline Sales
Residential	461	90	20%
Commercial	667	131	20%
Industrial	91	12	13%
Total	1,219	233	19%

Table 1.1. Cumulative Technical Potential by Sector (2022-2041)

1.3.2. Achievable Technical Potential

Table 1.2 shows the cumulative achievable technical potential for each sector in 2041. Overall, the study identified 196 aMW of technically feasible achievable potential by 2041—the equivalent of 16 percent of forecasted baseline sales. The commercial, residential, and industrial sectors account for 59 percent, 36 percent, and 5 percent of the cumulative achievable technical potential, respectively.

Sector	Baseline Sales– 20-Year (aMW)	Achievable Technical Potential– 20-Year (aMW)	Achievable Technical Potential as % of Baseline Sales
Residential	461	70	15%
Commercial	667	116	17%
Industrial	91	10	11%
Total	1,219	196	16%

 Table 1.2. Cumulative Achievable Technical Potential by Sector (2022-2041)

Table 1.3 provides two-year, four-year, and ten-year cumulative achievable technical potential by sector. The commercial sector provides the majority of the cumulative achievable technical potential. This is due in part to the commercial sector's higher baseline sales compared to the residential and industrial sectors as well as the reduction in potential for residential screw-base lighting compared to prior assessments, thereby shifting the potential to the commercial sector.

Table 1.3. Cumu	Iative Achievable	Technical Potential b	by Sector and Time Perio	d

	Achievable Technical Potential – aMW					
Sector	2-Year (2022-2023)	4-Year (2022-2025)	10-Year (2022-2031)	20-Year (2022-2041)	20% of 10-Year Potential	
Residential	6	12	32	70	6	
Commercial	20	37	85	116	17	
Industrial	2	4	9	10	2	
Total	28	53	125	196	25	

Table 1.4 provides the winter and summer technical and achievable technical capacity savings from energy efficiency by sector in 2041 in megawatts (MW). Capacity savings represent the maximum demand for each season. The commercial sector accounts for the majority of the total cumulative winter and summer capacity achievable technical potential. The residential sector accounts for nearly 46 percent of the winter capacity achievable technical potential but only 25 percent of the summer capacity achievable technical potential, which reflects the relatively higher saturation of residential electric space heating loads compared with residential cooling loads.

	Technical I	Potential	Achievable Technical Potential	
Sector	Winter MW	Summer MW	Winter MW	Summer MW
Residential	158	81	124	63
Commercial	154	199	135	175
Industrial	13	13	11	11
Total	325	294	270	249

Table 1.5 provides the two-,four-,and ten-year summer and winter capacity savings by sector. In the first ten years of the study period, the cumulative winter achievable technical capacity savings are 167 MW, 62 percent of the 20-year cumulative winter achievable technical capacity savings. The cumulative summer achievable technical capacity savings are 165 MW, 66 percent of the 20-year cumulative summer achievable technical capacity savings.

Sector	Cumulative Winter Achievable Technical Potential (MW)			Cumulative Summer Achievable Technical Potential (MW)		
	2-Year (2022- 2023)	4-Year (2022- 2025)	10-Year (2022- 2031)	2-Year (2022- 2023)	4-Year (2022- 2025)	10-Year (2022- 2031)
Residential	10	22	59	5	10	26
Commercial	23	43	98	31	57	129
Industrial	2	4	9	2	4	10
Total	35	69	167	38	71	165

Table 1.5. Cumulative Winter and Summer Capacity (MW) Savings by Sector and Time Period

1.3.3. Technical and Achievable Technical Comparison to the 2020 CPA

The 2022 CPA identified 233 aMW of cumulative, 20-year technical potential, compared to 282 aMW in the 2020 CPA, as shown in Table 1.6. The 17 percent decrease in cumulative, final year technical potential is due to the following major drivers:

• Cadmus made updates to the residential baseline forecast that assume a shift in heating and cooling equipment to more efficient heat pumps over time based on City Light's assumptions about market adoption. For example, Cadmus increased new construction, single-family heat

pump saturations from 15 percent in the base year to 30 percent in the final year to align with City Light's load forecasting assumptions.

- The study accounted for an increase in LED lighting saturation and state standards in Washington (HB 1444). The state standards require general service lamps to meet or exceed a lamp efficacy of 45 lumens per watt, similar to the federal Energy Independence and Security Act of 2007 (EISA) backstop provision. Additional details can be found in *Additional Codes and Standards Considerations* section of this report.
- Cadmus assumed a higher saturation of more efficient lighting for standard-income residential customers compared to the 2020 CPA. As a result, less lighting savings can be achieved (e.g., more homes already have efficient LED lighting),.
- Commercial lighting measure potential decreased by 50 percent compared to the Seventh Power Plan, in part, due to the higher saturation of existing LED lamp and fixture applications in the commercial sector.
- Cadmus included additional industrial measures from the draft 2021 Power Plan, requested by City Light.

		2022 CPA		2020 CPA			
Sector	Baseline Sales— 20 Year (aMW)	Technical Potential— 20 Year (aMW)	Technical Potential as % of Baseline Sales	Baseline Sales— 21 Year (aMW)	Baseline Technical Sales— Potential— 21 Year 21 Year (aMW) (aMW)		
Residential	461	90	20%	440	100	23%	
Commercial	667	131	20%	693	173	25%	
Industrial	91	12	13%	88	9	10%	
Total	1,219	233	19%	1,221	282	23%	

Table 1.6. Cumulative Technical Potential Comparison by Sector

This report's *Comparison to 2020 CPA* section discusses each factor in detail. Figure 1.2 illustrates that the 2020 CPA realized a higher proportion of total achievable technical potential in the initial years of the study.



Figure 1.2. Cumulative Achievable Technical Potential as a Percentage of Total Achievable Technical Potential

Cadmus used the draft 2021 Power Plan ramp rates in the 2022 CPA rather than the Seventh Power Plan ramp rates (released in February 2016) that were used in the 2020 CPA. The change in sources for ramp rate data leads to a decrease in potential in the initial years of the study relative to the final year. Because the Seventh Power Plan ramp rates ranged from 2016 to 2035, for the 2020 CPA, Cadmus took the ramp rate beginning in 2020 and extrapolated maximum saturation to extend from 2035 to the final year of the study (2040). This methodology is described in more detail in the *Achievable Technical Potential and Ramping* section of this report.

The 2022 CPA used the ramp rates from the draft 2021 Power Plan supply curve workbooks (as of December 2020), which have ramp rates for the 2022 to 2041 period. Therefore, the first year of the study aligns with the first year of the CPA—no extrapolation was needed. This leads to less realized potential in the initial years of the study. It is worth noting, as part of this study, Cadmus worked with City Light to determine the appropriate Council ramp rates so that City Light's program measures align better with historical program acquisition as well as with local and state policies promoting energy efficiency.

Even with these adjustments, the annual rate of adoption is lower in the early years of this study compared to the prior CPA. However, this study still "frontloads" the savings with the earlier part of the study with the ten-year estimate representing over 60 percent of the total 20-year achievable technical potential. Ramp rates are explained in more detail in the *About Measure Ramp Rates* section of this report.

The industrial sector in the 2022 CPA included new measures based on the draft 2021 Power Plan, such as HVAC measures, forklift battery chargers, and new savings methodology for compressors, fans, pumps, and other motor-driven systems. City Light also requested the inclusion of measures such as industrial generator block heaters, retro-commissioning, and welder system upgrades. These additions and changes

in methodology increased the potential in the industrial sector compared to the prior CPA. Additional detail of this comparison can be found in the *Industrial Sector Changes*

The industrial sector in the 2022 CPA included new measures based on the draft 2021 Power Plan, such as HVAC measures, forklift battery chargers, and new methodology for compressors, fans, pumps, and other motor-driven systems. City Light also requested the addition of measures such as industrial generator block heaters, retro-commissioning, and welder system upgrades. These additions and changes in methodology increased the potential in the industrial sector compared to the prior CPA.

Achievable Technical Potential and Ramping

Further differences in the achievable technical and technical potential between the 2020 CPA and the 2022 CPA are tied to the change in source of the underlying data, from using the Seventh Power Plan to using the draft 2021 Power Plan. Both studies are consistent with Council as the primary resource for residential, commercial, and industrial measures impacts. The 2022 CPA transitioned from the Council's Seventh Power Plan (February 2016) to the draft 2021 Power Plan. These updates impacted measure consumption or savings values for individual measures. As demonstrated in Figure 1.3, the potential in the first six years and the 20-year achievable technical potential from the draft 2021 Power Plan are 21 percent and 26 percent less than the corresponding Seventh Power Plan values, respectively.





Note: Draft 2021 Power Plan data was last updated on June 16, 2020, and may not represent final planning values.

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1.3.4. Incorporating Conservation into City Light's IRP

Cadmus summarized the achievable technical potential for energy efficiency, described above, by the levelized cost groups (bins) of conserved energy by customer class for inclusion in City Light's IRP framework. These costs have been calculated over a 20-year program life—the *Development of Conservation IRP Inputs* section provides additional detail on the levelized cost methodology. Figure 1.4 shows that 67 aMW, or 34 percent, of the cumulative, 2041 achievable technical potential has a levelized cost of less than or equal to \$30 per MWh. Additionally, the figure shows that 24 percent of the total achievable technical potential has a levelized cost of greater than \$160 per MWh.



Figure 1.4. Electric Supply Curve – Cumulative 20-Year Achievable Technical Potential (Levelized Cost Bins)

There is less energy efficiency potential available in the lower levelized cost bins compared to the prior CPA. This directly corresponds with the Council's draft 2021 Power Plan data, where the measure acquisition costs are higher compared to the Seventh Power Plan.

1.3.5. Achievable Economic Potential

After incorporating the achievable technical levelized cost of conserved energy bins, City Light's IRP model identified an optimal amount of annual conservation. Bundling resources into a number of distinct cost groups allowed the portfolio optimization model to select the combination of conservation cost bundles by sector that provided City Light with the least-cost portfolio alongside renewable resources while also achieving resource adequacy targets, I-937 requirements, City Light's greenhouse gas neutrality goals, and the requirements of the Clean Energy Transformation Act of Washington. By integrating conservation choices alongside renewable supply options into the portfolio optimization model, City Light can capture the different value streams from all resources within the same analytical framework.

The resulting IRP analysis selected 106 aMW of achievable economic potential at an optimal levelized cost for each sector, as shown in Table 1.7. Cumulative, 20-year achievable economic potential accounted for

9 percent of the total baseline sales in 2041. The commercial sector had the greatest achievable economic potential relative to baseline sales, accounting for 12 percent of the baseline sales for the commercial sector in 2041. This was followed by the industrial sector cumulative achievable economic potential, which accounted for 11 percent of the industrial 2041 baseline sales. Finally, the residential sector cumulative achievable economic potential made up 4 percent of the 2041 residential baseline sales.

The IRP portfolio optimization model differentiated the levelized TRC by sector so the model can select the specific energy efficiency cost bins for each sector that best fit City Light's portfolio and minimize the overall costs. This also recognizes that the conservation supply curves for each sector have different shapes, limits, and elasticities. As shown in Table 1.7, the achievable economic potential represents the levelized TRC of \$40 or less per MWh for residential, \$70 or less per MWh for commercial, and all levelized cost bins for industrial.

Sector	Levelized TRC (\$/MWh)	Baseline Sales— 20 Year (aMW)	20-Year Achievable Economic Potential (aMW)	Achievable Economic Potential as % of Baseline Sales
Residential	≤\$40	461	18	4%
Commercial	≤\$70	667	77	12%
Industrial	All Bins	91	10	11%
Total		1,219	106	9%

Table 1.7. Cumulative Achievable Economic Potential by Sector (2022-2041)

Table 1.8 provides the two-, four-, ten-, and 20-year cumulative achievable economic potential estimates by sector. Eighteen percent of the total 20-year achievable economic is achieved in the first two years, and 73 percent is achieved in the first ten years.

		Achievable Economic Potential – aMW						
Sector	2-Year (2022-2023)	4-Year (2022-2025)	10-Year (2022-2031)	20-Year (2022-2041)	20% of 10-Year Potential			
Residential	2.90	5.22	11.16	17.91	2.23			
Commercial	13.85	25.98	57.08	77.48	11.42			
Industrial	1.99	4.03	8.65	10.44	1.73			
Total	18.74	35.23	76.89	105.83	15.38			

Table 1.8. Cumulative Achievable Economic Potential by Sector and Time Period

Table 1.9 provides achievable economic potential estimates of the two-, four-, and ten-year summer and winter capacity savings by sector.

Sector	Cumulati Technic	ve Winter Ac cal Potential	hievable (MW)	Cumulative Summer Achievable Technical Potential (MW)		
	2-Year (2022- 2023)	4-Year (2022- 2025)	10-Year (2022- 2031)	2-Year (2022- 2023)	4-Year (2022- 2025)	10-Year (2022- 2031)
Residential	4	8	16	3	5	12
Commercial	16	31	68	20	37	80
Industrial	2	4	9	2	4	10
Total	23	43	93	25	47	102

Table 1.9. Cumulative Achievable Economic Winter and Summer Capacity (MW) Savings by Sector and Time Period

1.4. Organization of this Report

This report presents the study's findings in two volumes. Volume I—this document—presents the methodologies and findings. Volume II contains the appendices and provides detailed study results, supplemental materials, and summaries of demand response potential.

Volume I includes the following sections:

- *Methodology Overview* provides an overview of the methodology Cadmus and City Light used to estimate technical, achievable technical, and achievable economic potential.
- Baseline Forecast provides detailed sector-level results for Cadmus' baseline end-use forecasts.
- *Energy Efficiency Potential* provides detailed sector, segment and end-use specific estimates of conservation potential as well as discussion of top-saving measures in each sector.
- *Comparison to 2020 CPA* shows how this study's results (the 2022 CPA) compare to City Light's prior CPA.
- *Detailed Methodology* describes Cadmus' combined top-down/bottom-up modeling approach.
- *Developing Baseline Forecasts* provides an overview of Cadmus' approach to produce baseline end-use forecasts for each sector.
- *Measure Characterization* describes Cadmus' approach for developing a database of ECMs, deriving from this estimates of conservation potential. This section discusses how Cadmus adapted measure data from the draft 2021 Power Plan, the RTF, RBSA, CBSA, and other sources for this study.
- *Estimating Conservation Potential* discusses assumptions and underlying equations used to calculate technical and achievable technical potential.
- *Development of Conservation IRP Inputs* details the 2022 CPA methodology of determining costeffective conservation supply curves as an input for City Light's IRP optimization model to identify the achievable economic potential.

• *City Light's IRP Portfolio Framework* provides an overview of the methodology from the City Light economic screening process to determine the cost-effective conservation potential for the Energy Independence Act and the CEIP.

Volume II includes the following sections:

- Appendix A. Washington Initiative 937 (I-937) Compliance Documentation
- Appendix B. Baseline Data
- Appendix C. Detailed Assumptions and Energy Efficiency Potential
- Appendix D. Measure Details¹²
- Appendix E. Demand Response

Volume III includes detailed inputs, assumptions, and scenarios of City Light's IRP optimization modeling.

¹² Appendix D includes sector, end-use group, and measure level results by technical, achievable technical, and IRP selected potential (achievable economic potential).

2. Methodology Overview

Estimating conservation potential draws upon a sequential analysis of various energy conservation measures (ECMs) in terms of technical feasibility (technical potential), expected market acceptance, and the normal barriers that could impede measure implementation (achievable technical potential).

Cadmus' assessment took the following primary steps:

- Development of the baseline forecast involved determining the 20-year future energy consumption by sector, market segment, and end-use. This study calibrated the base year (2022) to City Light's sector level, corporate load forecast produced in 2020. Baseline forecasts in this report include estimated impacts of market-driven efficiency, codes and standards, and City Light's estimates of the impacts of COVID-19 on commercial and residential energy usage. Cadmus worked with the City Light load forecast team to determine the impacts of market-driven efficiency and codes and standards.
- Estimates of technical potential are based on incremental difference between the baseline load forecast and an alternative forecast reflecting the technical impacts of specific energy efficiency measures.
- Estimates of achievable technical potential are calculated by applying ramp rates and achievability percentages to technical potential, described in greater detail in this section.

This approach offered two advantages:

- Savings estimates were driven by a baseline forecast that is consistent with the assumptions used in City Light's adopted 2020 corporate load forecast.
- The approach maintained consistency among all assumptions underlying the baseline and alternative forecasts—technical and achievable technical potential. The alternative forecasts changed relevant inputs at the end-use level to reflect ECM impacts. Because estimated savings represented the difference between baseline and alternative forecasts, they could be directly attributed to specific changes made to analysis inputs.

Cadmus' general methodology can be best described as a combined top-down/bottom-up approach. As shown in Figure 2.1, the top-down component began with the most current load forecast, adjusting for building codes, equipment efficiency standards, and market trends. Cadmus then disaggregated this load forecast into its constituent customer sectors, customer segments, and end-use components.

The bottom-up component estimates electric consumptions for each major building end-use and applies potential technical impacts of various ECMs to each end-use. This bottom-up analysis includes assumption on end-use equipment saturations, fuel shares, ECM technical feasibility, ECM cost, and engineering estimates of ECM unit energy consumption and savings. A detailed description of the methodology can be found in the *Detailed Methodology* section.



Figure 2.1. General Methodology for Assessment of Conservation Potential

In the final step, Cadmus developed energy efficiency supply curves so City Light's IRP portfolio optimization model could identify the amount of cost-effectiveness for energy efficiency. The portfolio optimization model required hourly forecasts of electric energy efficiency potential. To produce these hourly forecasts, Cadmus applied hourly end-use load profiles to annual estimates of achievable technical potential for each measure. These profiles are similar to the shapes the Council used in its draft 2021 Power Plan supply curves and as the RTF used in its UES measure workbooks.

2.1. Considerations and Limitations

This study provides insights into which measures City Light could offer in future programs and is intended to inform program targets. The following are other considerations about the design of this potential study that may cause future program plans to differ from study results:

- The baseline demand forecasts is based on the 2020 adopted City Light's Corporate Forecast. It
 includes assumptions about the impacts of COVID-19 on commercial and residential energy
 usage that, by default, impact the related energy efficiency potential. Due to the lack of data and
 knowledge about the future impacts of the pandemic, it is possible that the near-term demand
 and potential available has more uncertainty than in normal times.
- This potential study uses broad assumptions about the adoption of energy efficiency measures.
 Program design, however, requires a more detailed examination of historic participation and incentive levels on a measure-by-measure basis. The study can inform planning for measures City

Light has not historically offered, or can focus program design on areas with remaining amounts of potential identified in this study.

- This potential study does not consider program implementation barriers. Though it includes a robust, comprehensive set of efficiency measures, it does not examine if these measures can be delivered through incentive programs or what incentive rate is appropriate. Many programs require strong trade ally networks or must overcome market barriers to succeed.
- This potential study cannot predict market changes over time. Though it accounts for changes in codes and standards as they are enacted today, the study cannot predict future changes in policies, pending codes and standards, and which new technologies may become commercially available. For example, past potential studies may not have accurately predicted the speed and magnitude of recent adoption of LED technology. City Light programs are not static and have the flexibility to address changes in the marketplace, whereas the potential study estimates potential using information collected at a single point in time.
- Due to timing constraints, City Light did not fully evaluate climate change impacts in its baseline load forecast that was used for the 2022 CPA. City Light's current forecast does not include the same level of climate change-induced impacts as does the Council. As a result, this study does not directly reflect possible changes in consumption patterns resulting from climate change. However, City Light's 2022 IRP portfolio optimization model did assess alterative scenarios that incorporate climate change impacts.
- This potential study does not attempt to forecast or otherwise predict future changes in energy efficiency measure costs. The study includes Council and RTF incremental energy efficiency measure costs, including equipment, labor, and operations and maintenance, but it does not attempt to forecast changes to these costs during the course of the study (except where Council makes adjustments). For example, changes in incremental costs may impact some emerging technologies, which may then impact both the speed of adoption and the levelized cost of that measure (impacting the IRP levelized cost bundles).
- Commercial end-use consumption relies on NEEA's CBSA data supplemented by U.S. Energy Information Administration's Commercial Buildings Energy Consumption Survey (CBECS). However, these data may not reflect the type of commercial facilities in City Light's territory and may have an inherent level of uncertainty. On May 28, 2021, the Council's Conservation Resources Advisory Committee reiterated that additional research for the region is needed to develop more reliable energy use intensity data for commercial buildings. In addition, Seattle contains a number of large multifamily buildings with insufficient primary data (such as baseline stock characteristics). For example, this potential study assessed the impacts of the 2018 Seattle Energy Code and incorporated the code as best as possible. Data were limited on the natural gas fuel shares of equipment in multifamily construction and, therefore, it was difficult to correctly estimate the impact of this 2018 code. As a result, this potential study has limited insight to inform the remaining potential in this segment and requires further research.

• This study uses City Light's nonresidential database to identify sales and the number of customers for each commercial market segment. City Light last updated this database in 2016. Though still realitively recent, this database does not incorperate changes in customer building use or any new construction activity within the past five years. An update to these data will be the basis for segmentation of the commercial sector and will improve future CPA potential characterization analysis.

Though these considerations and limitations impact the CPA, it is worth noting that Chapter 194-37 of the WAC requires City Light to complete and update a CPA every two years. City Light can then address some of these considerations over time and mitigate short- and mid-term uncertainties by continually revising CPA assumptions to reflect charges in the market.

3. Baseline Forecast

3.1. Scope of Analysis

Assessing conservation potential starts with development of baseline end-use load forecasts over a 20-year (2022 to 2041) planning horizon. These forecasts are calibrated to City Light's corporate load forecast in the base year (2022). They are not adjusted for future programmatic conservation, but they do account for enacted equipment standards and building energy codes. This potential study separately considers residential, commercial, and industrial sectors in the baseline forecast.

In each sector-level assessment, the study further distinguishes building segments, facility types, and their respective, applicable end-uses. The analysis addressed the following:

- Sixteen residential segments of existing and new construction:
 - Single-family, single-family low-income
 - Multifamily low-rise, multifamily low-rise low-income, multifamily mid-rise, multifamily mid-rise low-income, multifamily high-rise, multifamily high-rise low-income¹³
- Forty commercial segments, which include new and existing construction for 20 standard commercial segments
- Eight industrial segments (existing construction only)

Cadmus and City Light's load forecast team worked together to develop a baseline forecast that aligned with City Light's 2020 adopted corporate load forecast. To achieve this, Cadmus modified the residential baseline forecast to include assumptions about electrification and market-driven equipment adoption (e.g., changing heat pump and cooling equipment saturations over time). These changes are detailed in the following section as well as in the *Detailed Methodology* section.

Figure 3.1 shows the distribution of projected sales by sector in 2041. The commercial sector will account for roughly 55 percent of projected sales, while the residential and industrial sectors will account for 38 percent and 7 percent, respectively.

¹³ Multifamily low-rise is defined as multifamily buildings with one to three floors; mid-rise is defined as buildings with four to six floors; and high-rise is defined as buildings with more than six floors. Multifamily common area is treated within the commercial sector.



Figure 3.1. Annual Baseline Sales by Sector (2022-2041)

3.2. Residential

Cadmus considered eight residential segments with 34 end-uses. Table 3.1 lists the residential segment and end-uses considered as well as the broad end-use groups used in this study. Overall, the residential sector accounted for approximately 38 percent of total baseline sales.

City Light produces separate forecasts of single-family, multifamily low-rise, multifamily mid-rise, and multifamily high-rise households. Cadmus used City Light's residential household forecast in the baseline forecast. Cadmus disaggregated these households into low-income and standard-income segments based on income qualification in the City Light Utility Discount Program.¹⁴ Thus, only customers with a household income of less than 70 percent of the state median income, by household size, were considered low-income.

Cadmus relied on five-year American Community Survey (ACS) household income reports to determine the proportion of customers considered low-income for each residential building type. Cadmus combined residential household forecasts, estimates of end-use saturations, fuel shares, efficiency shares, and end-use consumption to produce a sales forecast through 2041. This approach is described in the *Developing Baseline Forecasts* section below.

¹⁴ City of Seattle, Seattle Public Utilities. "Utility Discount Program." Accessed June 2021. <u>https://www.seattle.gov/utilities/your-services/discounts-and-incentives/utility-discount-program</u>

Segments	End-Use Group	End-Use		
	Appliances	Cooking Oven	Freezer	
	Appliances	Dryer	Refrigerator	
	Electric Vehicles	Electric Vehicles		
Single-Family Multifamily – High-Rise	Cooling Electronics	Cool Central Cool Room Computer – Desktop Computer – Laptop DVD Player	Microwave Monitor Multifunction Device Plug Load Other	
		Home Audio System	Printer Set Top Box Television	
Multifamily Low Pice	Exterior Lighting	Lighting Exterior Standard		
Single-Family Low-Income Multifamily – High-Rise Low-Income Multifamily – Mid-Rise Low-Income Multifamily – Low-Rise Low-Income	Heating	Circulation – Domestic Hot Water (DHW) Circulation – Hydronic Heating Heat Central	Heat Pump Heat Room Ventilation - Air	
	Interior Lighting	Lighting Interior Linear Fluorescent Lighting Interior Specialty		
	Miscellaneous	Air Purifier Other	Waste Water Pool Pump	
	Water Heating	Water Heat GT 55 Gal Water Heat LE 55 Gal		

Table 3.1. Residential Segment and End-Uses

Figure 3.2 shows residential sales by segment for each year of the study. City Light projects more than 80,000 new housing units will be built by 2041. New multifamily units account for about 80 percent of new residential construction, so multifamily sector baseline sales are expected to increase at a faster rate than single-family, as shown in Table 3.2.



Figure 3.2. Annual Residential Baseline Sales by Segment (2022-2041)

Table	3.2	Residential	Baseline	Sales and	Housing	Units by	/ Seament
IUNIC	J.L.	I Coluction	Duschine	Suics und	inousing		Juginene

Contra 1	Sales (aMW)	Housing Units		
Sector	2022	2041	2022	2041	
Single-Family	167	194	164,352	177,532	
Single-Family Low-Income	37	42	35,836	38,710	
Multifamily – Low-Rise	49	67	60,983	79,711	
Multifamily – Low-Rise Low-Income	24	32	29,155	38,109	
Multifamily – Mid-Rise	27	37	37,320	48,782	
Multifamily – Mid-Rise Low-Income	16	23	22,772	29,765	
Multifamily – High-Rise	32	44	43,783	57,229	
Multifamily – High-Rise Low-Income	15	21	20,601	26,928	
Total	366	461	414,803	496,765	

In the base year (2022), Cadmus calibrated baseline forecasts to City Light's load forecast, ensuring that the study's starting point aligned with the starting point of City Light's forecasts. Cadmus then produced a residential forecast.

Figure 3.3 shows the residential baseline forecast by end-use. Overall, City Light's residential forecast increases by approximately 26 percent over the 20-year horizon. This is primarily due to an increased customer forecast, the addition of new load from electric vehicles, and assumptions for the greater saturation of electric heat pumps as a result of electrification. The figure also shows that heating and appliances are the top two consuming end-use groups, accounting for a combined 57 percent of
residential consumption. The next three highest forecasted end-use groups were electronics (13.8 percent), water heating (13.6 percent), and electric vehicles (8 percent).



Figure 3.3. Annual Residential Baseline Forecast by End-Use Group (2022-2041)

Table 3.3 shows the assumed average electric consumption per household for each residential segment in 2041. Differences in average consumption for each segment drive either differences in end-use consumption, saturations, fuel shares,¹⁵ or any combination of differences. Appendix B includes detailed baseline data for the residential sector.

¹⁵ Fuel shares refers to the percentage of end-use equipment that is electric for end-uses where customers have at least the option of electricity or another fuel. Residential end-uses where multiple fuels are an option include central furnace space heat, water heating, cooking, and dryers. For example, single-family has a higher share of natural gas space heating compared to multifamily. Therefore, multifamily electric space heating end-use baseline sales show a higher per-home value.

End Use	Single-Family	Multifamily – Low-Rise	Multifamily – Mid-Rise	Multifamily – High-Rise
Miscellaneous	200	119	98	98
Heating	2,862	3,347	3,157	3,222
Electronics	1,550	824	773	773
Appliances	2,080	1,050	1,285	1,285
Cooling	89	173	147	147
Electric Vehicles	757	618	618	618
Exterior Lighting	59	1	1	1
Interior Lighting	403	145	138	137
Water Heating	1,561	1,117	487	487
Total	9,562	7,394	6,704	6,769

Table 3.3. Per Household Baseline Sales (kWh/Home) by Sector and End-Use Group – 2041

Note: Low-income kwh/home values are equivalent to the standard-income.

Table 3.4 shows the electric end-use group distributions of the baseline consumption in 2041 by building type. For each of the building types, heating makes up greater than 25 percent of the building type consumption in 2041 and is the end-use group with the largest consumption.

Table 3.4. Residentia	l Consumption End	-Use Group Disti	ributions by Seg	gment – 2041
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End-Use Group	Single-Family	Multifamily – Low-Rise	Multifamily – Mid-Rise	Multifamily – High-Rise	
Miscellaneous	2%	2%	1%	1%	
Heating	30%	45%	47%	48%	
Electronics	16%	11%	12%	11%	
Appliances	22%	14%	19%	19%	
Cooling	1%	2%	2%	2%	
Electric Vehicles	8%	8%	9%	9%	
Exterior Lighting	1%	0.01%	0.01%	0.01%	
Interior Lighting	4%	2%	2%	2%	
Water Heating	16%	15%	7%	7%	

Note: Low-income percentage distribution values are equivalent to the standard-income.

Figure 3.4 shows forecasted residential sales by construction vintage over the study horizon. Study results indicate approximately 16 percent of sales will derive from homes constructed after 2021 (new construction). Use per customer for existing homes will decrease over the 20-year study timeframe, partly due to more efficient equipment standards and other naturally occurring efficiency.



Figure 3.4. Annual Residential Baseline Sales by Construction Vintage (2022-2041)

3.3. Commercial

Cadmus considered 20 commercial building segments and 18 end-uses. Table 3.5 shows the commercial segments and end-uses considered in this study as well as the corresponding segment and end-use groups presented in this report. Cadmus chose commercial segments for consistency with the draft 2021 Power Plan with one exception. The multifamily common area was not a stand-alone segment in the draft 2021 Power Plan. Overall, the commercial sector accounts for 667 aMW, or 55 percent of total baseline sales in 2041.

Segment Group	Segment	End-Use Group	End-Use	
Assembly	Assembly	Cooking	Cooking	
Data Center	Data Center	C l'a a	Cool Chillers	
Hospital	Hospital	Cooling	Cooling DX	
Large Grocery	Supermarket	Data Center	Data Center	
	Large Office		Servers	
Large Office	Medium Office	Heat Pump	Heat Pump (Air	
Lodging	Lodging			
Multifamily Common	Multifamily Common	Heating	Space Heat	
Area	Area	Lighting	Exterior Lighting	
Miscellaneous	Other		Interior Lighting	
Other Health	Residential Care		Computer – Desktop	
Restaurant	Restaurant		Computer – Laptop	
		Miscellaneous	Other ¹	
			Plug Load Other	
Retail	Medium Retail		Waste Water	
	Small Retail	Refrigeration	Refrigeration	
School	School K-12	Ventilation and	Ventilation and	
Small Grocony	Mini Mart	Circulation	Circulation	
		Water Heat	Water Heat GT 55 Gal	
Small Office	Small Office		Water Heat LE 55 Gal	
University	University	¹ Other end uses include	es all undefined loads such	
Warehouse	Warehouse	as elevators, automatic doors, and process load		

Table 3.5. Commercial Segments and End-Uses

Cadmus used City Light's nonresidential database to identify sales and the number of customers for each commercial market segment. The database combined City Light's billing data with King County Assessor data, as well as other secondary data sources, to identify the customer segment and consumption for each nonresidential customer. These data served as the basis for Cadmus' segmentation of the commercial sector.

Cadmus also classified customers as commercial or industrial based on City Light's premise-level nonresidential customer database. Commercial customers are mapped to segments listed in Table 3.5. (Industrial customers are mapped to segments listed in Table 3.6, shown in the Industrial section below.)

To align with the City Light load forecast team's commercial building square footage, Cadmus adjusted the commercial building counts per segment, based on average square footage per building type from the 2020 CPA.

Figure 3.5 shows the distribution of baseline commercial energy consumption by segment for each year of the study. Large offices accounted for 24 percent of commercial baseline sales. Data center, multifamily common area, and university accounted for ten percent, 11 percent, and ten percent, respectively, of baseline sales. Together, these segments represent 55 percent of all commercial sector sales.





Cadmus developed the whole-building energy intensities (total kWh per building square feet) based on NEEA's CBSA IV. To develop the end-use intensities, Cadmus used CBSA, Energy Information Administration's Commercial Buildings Energy Consumption Survey (CBECS), and other Cadmus research. Further details is described in the *Derivation of End-Use Consumption* section below. Figure 3.6 shows energy intensities for each building type and end-use group.



Figure 3.6. Commercial End-Use Group Intensities by Building Type – 2041

Note: The data center segment EUI of 181.5 kWh/sq ft is not included due to scaling. Additionally, all of the consumption for the data center segment appears in the data centers end-use group.

Figure 3.7 shows the commercial baseline forecast by end-use group. The forecast shows moderate load growth of commercial sales by roughly 0.7 percent on average per year over the study's horizon. The highest consuming end-use group was lighting, accounting for 32 percent of projected commercial consumption in 2041 (approximately the same percentage of overall end use as in 2022). Miscellaneous, data center, and ventilation end-use groups also account for a large share of consumption, at 16 percent, 15 percent, and 13 percent of projected commercial sales, respectively. Appendix B includes detailed baseline data for the commercial sector.



Figure 3.7. Annual Commercial Forecast by End-Use Group (2022-2041)

Note: The "miscellaneous" end-use group includes laptops (1.88 aMW of 2041 sales), desktops (28 aMW of 2041 sales), all other plug load (69.59 aMW of 2041 sales), and waste water (9.79 aMW of 2041 sales).

New commercial floorspace is a significant contributor to load growth in the commercial sector. By 2041, 12 percent of the forecasted load will come from buildings constructed after 2019. Figure 3.8 shows the commercial baseline forecast by construction vintage based on floor space.



Figure 3.8. Annual Commercial Forecast by Construction Vintage (2022-2041)

3.4. Industrial

Cadmus disaggregated City Light's forecasted industrial sales into eight facility types/segments and 11 end-uses, as shown in Table 3.6. Overall, the industrial sector accounted for 91 aMW, or seven percent of City Light's overall forecasted baseline sales in 2041. The sector included about ten of City Light's

largest customers with known industrial processes in addition to customers that contribute wastewater and water treatment loads.

Segments	End-Uses
Foundries	Process Air Compressor
Frozen Food	Lighting
Miscellaneous Manufacturing	Fans
Other Food	Pumps
Stone and Glass	Motors Other
Transportation, Equipment	Process Other
Wastewater	Process Heat
Water	HVAC
	Other
	Process Electro Chemical
	Process Refrigeration

Table 3.6. Industrial Segments and End-Uses

Like the commercial sector, Cadmus relied on City Light's nonresidential customer database to determine the distribution of baseline sales by segment. Figure 3.9 shows the distribution of industrial sales by segment in 2041. Foundries accounts for 40 percent of industrial baseline sales; the next largest segments are miscellaneous manufacturing (32 percent) and transportation equipment (22 percent).





Cadmus relied on end-use distributions provided in the draft 2021 Power Plan's industrial tool to disaggregate segment-specific consumption into end-uses. Figure 3.10 shows industrial baseline sales forecast by end-use.



Figure 3.10. Annual Industrial Baseline Sales by End-Use (2022-2041)

4. Energy Efficiency Potential

4.1. Overview

4.1.1. Scope of the Analysis

This potential study included a comprehensive set of conservation measures, including those assessed by the Council in the draft 2021 Power Plan and by the RTF. Cadmus began its analysis by assessing the technical potential of hundreds of unique conservation measures applicable to each sector, segment, and construction vintage (discussed in the *Baseline Forecast* section).

Cadmus considered over 7,111 permutations of conservation measures representing a wide range of technologies and applications. Permutations are defined as unique measure, sector, segment, end-use, construction vintage, and baseline combinations that have technical potential (i.e., no below-standard measures are included). For example, an ENERGY STAR air purifier for residential single-family new construction with a federal standard baseline is a different permutation than an ENERGY STAR purifier for residential single-family *existing* construction with a federal standard baseline. Table 4.1 lists the number conservation measures and permutations by sector considered in this study.

Sector	Measures	Permutations
Residential	228	1,454
Commercial	1,137	5,471
Industrial	34	186
Total	1,399	7,111

Table 4.1. Measures and Permutations

4.1.2. Summary of Results

Table 4.2 shows baseline sales and cumulative technical and achievable technical potential by sector. Study results indicate 233 aMW of technically feasible conservation potential—19 percent of baseline sales—will be available by 2041, and 84 percent (196 aMW) is considered achievable in 2041. The achievable technical potential corresponds to 16 percent of baseline sales. Technical and achievable technical potential are inclusive of future City Light-funded conservation. That is, the baseline consumption forecasts account for historical achieved and planned City Light-funded conservation prior to 2022. However, the estimated potential identified is inclusive of—not in addition to—forecasted program savings. In other words, the baseline forecast excludes future, planned energy efficiency program efforts but the savings estimates include energy efficiency program savings.

These results in this report account for line losses and represent cumulative energy savings at generator (unless specified).

Peceline		Technical	Potential	Achievable Technical Potential		
Sector	Sales	aMW	Percent of Baseline	aMW	Percent of Baseline	
Residential	461	90	20%	70	15%	
Commercial	667	131	20%	116	17%	
Industrial	91	12	13%	10	11%	
Total	1,219	233	19%	196	16%	

Table 4.2.	Cumulative [•]	Technical a	and Achievable 7	Fechnical Potentia	l bv Sector	(2022-2041)
					· · · / · · · · · · ·	(

The commercial sector, representing 55 percent of baseline energy use, accounts for approximately 59 percent of cumulative achievable technical potential in 2041, as shown in Figure 4.1. The residential and industrial sectors account for 36 percent and 5 percent, respectively.



Figure 4.1. Cumulative Achievable Technical Potential by Sector (2022-2041)

Table 4.3 shows cumulative two-year, four-year, ten-year, and 20-year achievable technical potential by sector, as well as 20 percent of the ten-year achievable technical potential.

Table 4.3. Cumulative Achievable Technical Potential by Sector and Time Period

	Achievable Technical Potential – aMW						
Sector	2-Year (2022-2023)	4-Year (2022-2025)	10-Year (2022-2031)	20-Year (2022-2041)	20% of 10-Year Potential		
Residential	6	12	32	70	6		
Commercial	20	37	85	116	17		
Industrial	2	4	9	10	2		
Total	28	53	125	196	25		

Figure 4.2 presents the cumulative achievable technical potential across the study horizon.



Figure 4.2. Cumulative Achievable Technical Potential by Sector (2022-2041)

Approximately 27 percent of cumulative 20-year achievable potential is acquired in the first four years, and 64 percent of cumulative 20-year achievable potential is acquired in the first ten years. This acquisition rate is based on the acquisition rate from the draft 2021 Power Plan along with acceleration adoption for measures that City Light has historically offered through programs to better align with local and state policies promoting energy efficiency. The *About Measure Ramp Rates* section of this report provides more information on how Cadmus performed this calculation.

Cadmus determined incremental achievable technical potential in each year of the study horizon, using the rate at which equipment naturally turns over and measure-specific ramp rates. Figure 4.3 shows incremental achievable potential. The increase in savings in 2037 is the result of the ramp rates applied and the 15-year measure life for many heating measures. For example, in 2037, residential zonal heating systems, initially installed in 2022, need to be replaced since the technology has a 15-year measure life. A proportion, based on the ramp rate in the year of replacement (2037), is replaced by ductless heat pumps. Since ductless heat pumps are such a high-saving measure, there is a large increase in residential incremental achievable potential in 2037.

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The conservation supply curve in Figure 4.4 shows cumulative achievable potential in \$10/MWh levelized cost increments. The study found that 60 percent (117 aMW) of the cumulative 2041 achievable technical potential can be acquired at less than or equal to \$60/MWh.¹⁶ The amount of available achievable technical potential levels off at less than or equal to \$60/MWh, excluding high-cost measures (costing more than \$160/MWh). The 2041 achievable technical potential with a levelized cost of greater than \$160/MWh makes up 24 percent of cumulative achievable technical potential. Many of the costlier measures are for emerging equipment, heat pump conversion (e.g., electric resistance heating to heat pump), and weatherization in the residential and commercial sectors.

¹⁶ The levelized cost bundle of less than or equal to \$60/MWh represents an example value, and it has been identified as in between City Light's IRP optimization model selection for the residential (\$40/MWh) and commercial (\$70/MWh) sectors.



Figure 4.4. All Sectors Supply Curve — Cumulative Achievable Technical Potential in 2041 by Levelized Cost

Appendix D shows detailed measure-level results, including levelized costs and technical and achievable technical conservation potential for each measure. The remainder of this section provides detailed results by sector.

City Light's IRP selected an achievable economic potential of 106 aMW. Table 4.4 shows cumulative, 20-year achievable economic potential by sector and the maximum levelized cost for measure permutations in each sector. For example, all residential achievable economic potential can be obtained at a levelized cost of less than or equal to \$40/MWh. Details of achievable economic potential methodology can be found in the *Achievable Economic Potential* section.

Fable 4.4. Cumulative Achievable	Economic Potential b	y Sector	(2022-2041)
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Sector	Levelized TRC (\$/MWh)	20-Year Achievable Economic Potential (aMW)
Residential	≤\$40	18
Commercial	≤\$70	77
Industrial	All Bins	10
Total		106

4.2. Residential

Residential customers in City Light's service territory account for 38 percent of 2041 total baseline sales. This sector, made up of low- and standard-income single-family and multifamily customers, has a variety of sources for potential savings, including equipment efficiency upgrades (e.g., water heaters and appliances) and improvements to building shells (e.g., windows, insulation, and air sealing).

Based on resources in this assessment, Cadmus estimated residential, cumulative, achievable technical potential of 70 aMW over 20 years, which corresponds to 15 percent of the forecast residential load in 2041. Table 4.5 shows cumulative 20-year residential conservation potential by segment.

		Cumulative 2041 – aMW				
Segment	Baseline Sales	Technical Potential (TP)	TP % of Baseline	Achievable Technical Potential (AP)	AP % of TP	
Single-Family	194	41	21%	31	77%	
Single-Family Low-Income	42	9	21%	7	77%	
Multifamily – Low-Rise	67	12	18%	10	80%	
Multifamily – Low-Rise Low-Income	32	6	18%	5	80%	
Multifamily – Mid-Rise	37	7	18%	5	78%	
Multifamily – Mid-Rise Low-Income	23	4	18%	3	78%	
Multifamily – High-Rise	44	8	18%	6	78%	
Multifamily – High-Rise Low-Income	21	4	18%	3	78%	
Total	461	90	20%	70	78%	

Table 4.5. Cumulative Residential Potential by Segment (2022-2041)

As shown in Table 4.5 and Figure 4.5, single-family homes account for 55 percent (38 aMW) of total achievable technical potential, followed by multifamily low-rise (15 aMW), multifamily high-rise (9 aMW), and multifamily mid-rise (8 aMW). Total achievable technical potential for income-qualified customers is 18 aMW, or 25 percent. Each home type's proportion of baseline sales drives this distribution, but segment-specific end-use saturations and fuel shares have a role as well. Appendix B includes detailed data on saturations and fuel shares for each segment.¹⁷ Appendix C includes detailed summary of achievable technical potential by segment and end use for each segment.

¹⁷ The scope of this study does not distinguish differences in end-use saturations and fuel shares among income classifications. Potential by income classification is defined by customer segmentation. (Potential results by segment, including income classification and end-use, can be found in Appendix C).



Figure 4.5. Residential Cumulative Achievable Technical Potential by Segment (2022-2041)

Figure 4.6 presents the cumulative achievable technical potential by construction type for the residential sector. Existing construction represents the majority of achievable technical potential, particularly in the early years of the study, accounting for 96 percent of the potential in the first two years (2022-2023). However, by the final year of the study period (2041), new construction accounts for 18 percent of the total cumulative residential achievable technical potential. This is because of the increase in new construction, from roughly 4,000 buildings in 2022 to over 86,000 buildings constructed between 2022 and 2041.



Figure 4.6. Residential Cumulative Achievable Technical Potential by Construction Type (2022-2041)

Table 4.6 shows the residential baseline sales, technical, and achievable technical potential by end-use group. Heating savings make up the greatest proportion of cumulative achievable technical potential at 37 percent. Water heating measures contribute 29 percent of the total achievable technical potential, followed by appliance measures at 25 percent. Overall, 78 percent of the technical potential is considered achievable based on adoption patterns from the draft 2021 Power Plan and adjusted for City Light's historical program success.

		Cumulative 2041 - aMW						
End Use	Baseline Sales	Technical Potential (TP)	TP % of Baseline	Achievable Technical Potential (AP)	AP % of TP			
Miscellaneous	8	1	7%	1	87%			
Heating	175	32	18%	26	80%			
Electronics	64	4	7%	4	94%			
Appliances	89	26	29%	18	69%			
Cooling	7	1	11%	1	81%			
Electric Vehicles	38	0.2	1%	0.2	94%			
Exterior Lighting	1	<0.01	2%	< 0.01	85%			
Interior Lighting	14	1	9%	1	86%			
Water Heating	63	25	39%	20	82%			
Total	461	90	20%	70	78%			

Table 4.6. Cumulative Residential Potential by End-Use Group (2022-2041)

Incremental and cumulative potential over the 20-year study horizon varies by end-use group due to the application of ramp rates. These ramp rates were assigned to each measure based on factors such as availability, existing program activity, and market trends. Cadmus used the same ramp rates for each measure, as assigned by the Council in the draft 2021 Power Plan, with some adjustments as discussed in the *Achievable Technical Potential and Ramping* section. Figure 4.7 shows cumulative residential achievable potential.



Figure 4.7. Residential Cumulative Achievable Technical Potential (2022-2041)

Note: In 2041, exterior lighting and electric vehicles makes up 0.03 percent and 0.27 percent of residential cumulative achievable technical potential, respectively.

Figure 4.8 shows incremental residential achievable potential. Measure ramp rates and effective useful lives (only for equipment replacement measures) determine the timing of these savings. The increase in heating savings in 2037 is the result of the replacement of a high proportion of zonal heating measures with ductless heat pumps after their 15-year measure life expires.



Figure 4.8. Residential Incremental Achievable Technical Potential (2022-2041)

Table 4.7 lists the 15 highest-saving residential measures, which make up 77 percent of the total residential achievable technical potential. The table also includes the weighted average levelized costs for these measures,¹⁸ which represent the economic equipment and administrative costs while still accounting for energy and non-energy benefits. The measure with the highest cumulative achievable technical potential—multifamily ductless heat pumps—also has a levelized cost of \$297 per MWh. Other measures identified with high savings are heat pump dryers, efficient (hybrid) heat pump water heaters, and refrigerators and freezers CEE (Consortium for Energy Efficiency) Tier 3. Of the highest-savings measures, the least costly are ENERGY STAR printers, wall insulation, and CEE Tier 3 refrigerators and freezers.

Note: On average, exterior lighting and electric vehicles makes up 0.03 percent and 0.27 percent of annual residential incremental achievable technical potential, respectively.

¹⁸ The levelized cost value represents a weighted average across all iterations, including segment and end-use. As a result, permutations of a measure may have a low levelized cost while other permutations may have a high levelized cost.

Table 4.7. Top-Saving Residential Measures

	Cumul	ative Ach	ievable T Potentia	Percent	Weighted Average	
Measure Name	2-Year	4-Year	10- Year	20- Year	of lotal (20-Year)	Levelized TRC (\$/MWh)
Multifamily Ductless Heat Pump Upgrade	0.50	1.43	4.98	11.40	16%	\$297.08
Heat Pump Dryer	0.02	0.09	1.00	10.61	15%	\$56.43
Heat Pump Water Heater – Tier 4	0.30	0.82	2.79	7.70	11%	\$367.54
Refrigerator and Refrigerator- Freezer – CEE Tier 3	0.28	0.73	2.34	6.04	9%	\$39.64
Heat Pump Water Heater – Tier 3	0.14	0.38	1.18	3.13	4%	\$60.09
Office Printer – ENERGY STAR	0.30	0.62	1.55	1.94	3%	-\$4.90
Single Family Weatherization – Insulate Wall – R0 to R11 – Heating Zone 1	0.41	0.82	1.64	1.87	3%	\$133.46
Front Load Washer CEE Tier 2 and Electric DHW Electric Dryer	0.60	0.92	1.48	1.86	3%	\$119.28
Solar Hot Water - Solar Zone 1	0.00	0.02	0.23	1.78	3%	\$1,034.36
HVAC Upgrade – Heat Pump Upgrade to 12 HSPF/18 Seasonal Energy Efficiency Ratio (SEER) - Heating and Cooling Zone 1	0.01	0.06	0.40	1.54	2%	\$1,810.16
Wall Insulation - R0 to R11 - Heating Zone 1	0.33	0.66	1.33	1.51	2%	\$28.86
Top Load Washer CEE Tier 1 and Electric DHW Electric Dryer	0.42	0.64	1.03	1.29	2%	\$90.31
Zonal to Ductless Heat Pump	0.09	0.23	0.41	1.19	2%	\$215.74
Single Family Showerhead Aerator 1.50 Gallons Per Minute (GPM)	0.40	0.60	0.93	1.09	2%	\$40.64
Residential Thermostatic Shower Restriction Valve	0.01	0.05	0.51	1.00	1%	\$185.71

Overall, 16 percent of residential conservation potential is achievable within the first four years, and 45 percent is achievable in the first ten years. Figure 4.9 shows 20-year cumulative residential potential by levelized cost (in \$10/MWh increments).



Figure 4.9. Residential Supply Curve — Cumulative Achievable Technical Potential in 2041 by Levelized Cost

Forty-three percent of the residential achievable technical potential is from measures with a levelized cost of over \$160/MWh. This is partly because the highest savings measure—multifamily ductless heat pump upgrades (MF DHP Upgrades)—has a levelized cost greater than \$160/MWh.

City Light's IRP selected an economic achievable potential of 18 aMW for the residential sector. Figure 4.9 shows the cumulative, 20-year achievable economic potential for the residential sector by end-use group. The two end-use groups that have the greatest achievable economic potential are appliances and water heating. Collectively, appliance and water heating achievable economic potential is 68 percent of the total residential 20-year, cumulative achievable economic potential.





Table 4.8 lists the 15 highest saving IRP selected residential measures. The measure permutations included in the table all have a levelized cost of less than or equal to \$40/MWh and make up 21 percent of the cumulative, 20-year achievable technical potential for the residential sector.

	Cu	Percent of Cumulative 20-Year			
Measure Name	2-Year	4-Year	10-Year	20-Year	Achievable Technical Potential
Refrigerator and Refrigerator-Freezer – CEE Tier 3	0.28	0.73	2.34	6.04	9%
Office Printer – ENERGY STAR	0.30	0.62	1.55	1.94	2%
Front Load CEE Tier 2 Washer with Electric DHW Electric Dryer	0.56	0.86	1.38	1.73	2%
Wall Insulation - R0 to R11 - Heating Zone 1	0.32	0.64	1.29	1.46	2%
Top Load Washer CEE Tier 1 with Electric DHW Electric Dryer	0.39	0.59	0.96	1.20	1%
Single Family Showerhead Aerator 1.50 GPM	0.37	0.55	0.87	1.01	1%
Linear Fluorescent Lamp – TLED	0.09	0.20	0.56	1.00	1%
Heat Pump Water Heater – Tier 3	0.04	0.10	0.30	0.81	1%
Multifamily Showerhead Aerator 1.50 GPM	0.18	0.28	0.45	0.57	1%
Home Audio System – ENERGY STAR	0.01	0.02	0.19	0.38	0.4%
Single Family Bathroom Aerator	0.09	0.13	0.21	0.24	0.3%
Ultra-High Definition TV – ENERGY STAR	0.00	0.01	0.11	0.22	0.2%
Electric Vehicle Supply Equipment Level 2 Networked Charger	0.00	0.00	0.04	0.19	0.2%
Single Family Kitchen Aerator	0.06	0.09	0.13	0.16	0.2%
Floor Insulation - R0 to R19 - Heating Zone 1	0.03	0.07	0.13	0.15	0.2%

Table 4.8. Top-Saving Residential Measures Selected by IRP

4.3. Commercial

City Light's commercial sector accounts for 55 percent of its baseline sales in 2041 and 59 percent of total achievable technical potential. Cadmus estimated potential for the 20 commercial segments listed above in Table 3.5 (grouped into 16 segments for this report). Table 4.9 summarizes 20-year cumulative technical and achievable technical potential by commercial segment.

		Cumulative 2041 – aMW						
Segment	Baseline Sales	Technical Potential (TP)	TP % of Baseline	Achievable Technical Potential (AP)	AP % of TP			
Assembly	28	6	23%	6	88%			
Data Center	67	0.3	0.5%	0.3	85%			
Hospital	38	8	20%	7	85%			
Large Grocery	16	9	56%	8	89%			
Large Office	160	41	25%	36	89%			
Lodging	21	4	17%	3	89%			
Multifamily Common Area	71	0	0%	0	0%			
Miscellaneous	33	7	22%	7	91%			
Other Health	11	2	18%	2	90%			
Restaurant	21	4	16%	3	87%			
Retail	47	13	26%	11	90%			
School	14	4	28%	3	85%			
Small Grocery	7	2	23%	1	89%			
Small Office	42	15	35%	13	89%			
University	65	12	19%	10	83%			
Warehouse	25	5	22%	5	88%			
Total	667	131	20%	116	88%			

Table 4.9. Cumulative Commercial Potential by Segment (2022-2041)

Approximately 31 percent of 20-year commercial achievable technical potential is from the large office segment, as shown in Figure 4.10. Together, large and small offices account for 43 percent of commercial achievable technical potential. The large grocery segment has the highest technical potential savings relative to baseline sales due to the high potential associated with refrigeration equipment.



Figure 4.11. Cumulative Commercial Achievable Technical Potential by Segment (2022-2041)

Note: Other segment includes data centers, multifamily common area, miscellaneous, and other health.

Figure 4.11 presents the cumulative achievable technical potential by construction vintage for the commercial sector. Existing construction represents the majority of achievable technical potential, particularly in the early years of the study, accounting for 98.9 percent of the potential in the first two years (2022-2023).



Figure 4.12. Cumulative Commercial Achievable Technical Potential by Construction Type (2022-2041)

Across each of these segments, lighting accounts for 33 percent of total achievable technical potential. Table 4.10 shows 20-year cumulative commercial potential by end use.

	Peceline	Cumulative 2041 – aMW						
End Use	Sales	Technical Potential (TP)	TP % of Baseline	Achievable Potential (AP)	AP % of TP			
Cooking	7	1	9%	1	85%			
Cooling	57	23	40%	19	82%			
Data Center	101	5	5%	4	89%			
Heat Pump	12	4	36%	4	84%			
Heating	25	8	30%	6	85%			
Lighting	211	42	20%	38	91%			
Miscellaneous	109	5	4%	4	88%			
Refrigeration	56	18	32%	16	89%			
Ventilation	85	25	30%	23	91%			
Water Heating	5	2	32%	1	74%			
Total	667	131	20%	116	88%			

Table 4.10. Cumulative Commercial Potential by End-Use Group (2022-2041)

Note: The heat pump end-use group includes air source heat pumps and related retrofit measures. This differs from heat pump water heaters, which are included in the water heating end-use group. Heating end-use group refers to non-heat pump electric space heating equipment (e.g., electric resistance heating). Cooling end-use group refers to cooling direct expansion, chiller equipment, and related retrofit measures.

One-third of commercial achievable potential comes from interior lighting equipment upgrades, exterior lighting equipment upgrades, and controls. Lighting's 20-year technical potential is equivalent to an 18 percent reduction in baseline lighting consumption. Overall, 91 percent of lighting technical potential is considered achievable based on the maximum achievable potential assumed in the draft 2021 Power Plan.

Compared to the residential sector, a larger proportion of the achievable technical potential is realized in the first ten years of the study, with 73 percent of the 20-year cumulative achievable technical potential in the first ten years and 32 percent in the first four years. Figure 4.12 and Figure 4.13 show cumulative and incremental achievable potential for the commercial sector, respectively. There is a slight bump in incremental achievable technical potential in 2037, due to the replacement of high-savings measures that have a measure life of 15 years.







Figure 4.14. Commercial Incremental Achievable Technical Potential (2022-2041)

Table 4.11 shows the top 15 commercial measures and their average levelized costs, ¹⁹ sorted by 20-year achievable technical potential. Together, these measures represent 34 percent of the commercial cumulative 2041 achievable technical potential. The highest-saving measure is HVAC retro-commissioning with over 5 aMW, or four percent, of achievable technical potential. Depending on the application, this measure can also be costly and may not be considered economic with a weighted average levelized TRC of \$160 per MWh.

¹⁹ The levelized cost value represents a weighted average across all iterations, including segment and end-use. As a result, permutations of a measure may have a low levelized cost while other permutations may have a high levelized cost.

Table 4.11. Top-Saving Commercial Measurers

	Cumulative	Achievable To	Percent of	Weighted Average		
Measure Name	2-Year	4-Year	10-Year	20-Year	Total (20-Year)	Levelized TRC (\$/MWh)
HVAC Retro-commissioning	1.95	2.94	4.54	5.16	4%	\$159.97
Building Automation System Upgrades	1.81	2.74	4.29	4.96	4%	\$11.87
Strategic Energy Management (SEM)	0.06	0.26	2.50	4.59	4%	\$189.09
Large Office Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.23	0.58	1.81	3.31	3%	\$23.70
New Refrigerated Case	0.71	1.41	2.84	3.22	3%	\$25.94
Fans (Retrofit) Commercial System Upgrade	0.51	1.01	2.03	2.31	2%	\$44.47
Thin Triple Windows Large Office	0.03	0.12	1.13	2.03	2%	\$116.81
Server – Virtualization	0.44	0.87	1.75	1.99	2%	\$15.36
Medium Office Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.13	0.32	0.99	1.81	2%	\$23.51
Circulation Pumps Space Heating Commercial Electronically Commutated Motor (ECM) + Advanced Speed Controls	0.68	1.02	1.58	1.80	2%	\$93.84
Server - ENERGY STAR	0.42	0.79	1.69	1.78	2%	\$1.39
Packaged AC (Air-Cooled) >= 240,000 Btu/h and < 760,000 Btu/h - Above Code	0.05	0.18	0.69	1.74	2%	\$12.56
Packaged AC (Air-Cooled) >= 135,000 Btu/h and < 240,000 Btu/h - Above Code	0.05	0.18	0.68	1.73	1%	\$214.33
Circulation Pumps Water Heating Commercial ECM + Advanced Run Hour Controls	0.65	0.97	1.50	1.71	1%	\$74.74
Large Commercial Refrigerators	0.16	0.39	1.38	1.65	1%	\$355.41

Note: The average levelized TRC value represents a weighted average across all iterations, including segment and end-use. As a result, permutations of a measure may have a low levelized cost while other permutations may have high levelized cost.

Approximately 73 percent of 20-year commercial achievable technical potential falls within the first ten years of the study horizon. Much of the commercial retrofit potential for existing buildings becomes exhausted within the first ten years.

Figure 4.14 shows that the commercial levelized cost distributions for the achievable technical potential are similar to the residential sector. However, 14 percent of the realized achievable technical savings has costs greater than \$160/MWh. This is primarily because HVAC retro-commissioning and weatherization measures such as thin triple window replacements are costly but offer large savings opportunities.

Figure 4.15. Commercial Supply Curve — Cumulative Achievable Technical Potential in 2041 by Levelized Cost



Note: The cooking end use has 0.12 aMW at \leq \$10/MWh, 0.21 aMW at \leq \$20/MWh, 0.38 aMW at \leq \$30/MWh, 0.40 aMW at \leq \$90/MWh, 0.43 aMW at \leq \$100/MWh, 0.53 aMW at \leq \$150/MWh.

City Light's IRP selected an achievable economic potential for the commercial sector of 77 aMW. Figure 4.15 shows the cumulative, 20-year achievable economic potential for the commercial sector by end-use

group. Lighting achievable economic potential makes up 46 percent of the commercial achievable economic potential, followed by refrigeration (15 percent) and ventilation (12 percent).



Figure 4.16. Commercial Cumulative Achievable Economic Potential in 2041 by End-Use Group

Table 4.12 lists the 15 highest saving IRP selected commercial measures. The commercial achievable economic measure permutations selected all have a levelized cost of less than or equal to \$70/MWh, and their associated cumulative achievable economic potential makes up 26 percent of the commercial, cumulative 2041 achievable technical potential.

Measure Name	Cum	ulative Ad	Percent of Cumulative 20- Year Achievable			
	2-Year	4-Year	10-Year	20-Year	Technical Potential	
Building Automation System Upgrades	1.65	2.49	3.91	4.53	4%	
Large Office Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.23	0.58	1.81	3.31	3%	
New Refrigerated Case	0.71	1.41	2.84	3.22	3%	
HVAC Retro-commissioning	1.02	1.54	2.38	2.70	2%	
Fans (Retrofit) Commercial System Upgrade	0.51	1.01	2.03	2.31	2%	
Server – Virtualization	0.44	0.87	1.75	1.99	2%	
Medium Office Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.13	0.32	0.99	1.81	2%	
Server - ENERGY STAR	0.42	0.79	1.69	1.78	2%	
Packaged AC (Air-Cooled) >= 240,000 Btu/h and < 760,000 Btu/h - Above Code	0.05	0.18	0.69	1.74	2%	
Strategic Energy Management	0.02	0.10	0.93	1.66	1%	
Small Office Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.07	0.18	0.57	1.22	1%	
Retrofit Add Refrigerated Case Door	0.23	0.47	0.94	1.07	1%	
Exterior Lighting - Parking Lot to LED from High Pressure Sodium 250W	0.13	0.28	0.76	1.06	1%	
Economizer - Outside Air	0.39	0.59	0.91	1.03	1%	
Other Building Type Linear Fixture from Linear Fluorescent Tube to LED Panel Control	0.08	0.21	0.64	1.03	1%	

Table 4.12. Top-Saving Commercial Measures Selected by IRP

4.4. Industrial

Cadmus estimated conservation potential for the industrial sector using the Council's draft 2021 Power Plan analysis tool. The conservation potential addressed eight industrial segments in City Light's service territory, based on allocations developed from City Light's nonresidential database. The assessment identified approximately 10 aMW of achievable technical potential by 2041.

Table 4.13 shows cumulative industrial potential by segment in 2041.

	Deceline	Cumulative 2041 – aMW						
Segment	Sales	Technical Potential (TP)	TP % of Baseline	Achievable Potential (AP)	AP % of TP			
Foundries	36	5	15%	5	86%			
Frozen Food	2	0.3	17%	0.2	85%			
Miscellaneous. Manufacturing	29	1	5%	1	86%			
Other Food	0	<0.1	17%	<0.1	86%			
Transportation Equipment	20	4	21%	4	85%			
Wastewater	2	0.2	10%	0.1	85%			
Water	3	1	27%	1	85%			
Total	91	12	13%	10	86%			

Table 4.13. Cumulative Industrial Potential by Segment (2022-2041)

Note: Miscellaneous Manufacturing represents all undefined industrial segments with City Light's customer database. Other Food represents all non-frozen food manufacturing that may include specialty food manufacturing, fruit and vegetable preserving, bakeries and tortilla manufacturing, animal food manufacturing, etc.

Figure 4.15 shows industrial cumulative achievable technical potential by segment and year. The distribution of industrial achievable technical potential by segment follows a similar distribution to the baseline sales. Foundries account for 5 aMW, the largest percentage of 20-year industrial achievable technical potential, followed by transportation equipment, which makes up 4 aMW of total achievable technical potential.



Figure 4.17. Cumulative Industrial Achievable Technical Potential by Segment (2022-2041)

Table 4.14 shows 20-year potential by industrial end use. The four highest end-uses of industrial achievable technical potential are for lighting (32 percent), fans (15 percent), pumps (15 percent), and process air compressor (12 percent).

	Pacalina	Cumulative 2041 – aMW						
End Use	Sales	Technical Potential (TP)	TP % of Baseline	Achievable Potential (AP)	AP % of TP			
Fans	7	2	27%	2	85%			
HVAC	12	1	10%	1	85%			
Lighting	9	4	42%	3	85%			
Motors Other	13	1	5%	1	85%			
Other	9	1	10%	1	85%			
Process Air Compressor	6	1	21%	1	92%			
Process Electro Chemical	6	0.4	6%	0.3	85%			
Process Heat	14	0	0%	0	0%			
Process Other	0.5	0	0%	0	0%			
Process Refrigeration	3	0.1	5%	0.1	85%			
Pumps	12	2	16%	2	85%			
Total	91	12	13%	10	86%			

Table 4.14. Cumulative Industrial Potential by End-Use (2022-2041)

Figure 4.16 and Figure 4.17 show cumulative and incremental, achievable technical potential over the 20-year study horizon, respectively.








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Table 4.15 shows the top-saving industrial measures and their weighted average levelized costs; collectively, these represent 79 percent of industrial 20-year cumulative, achievable technical potential.

Moodure Nome	C	Cumulative chnical Pot	Percent of Total	Weighted Average		
	2-Year	4-Year	10-Year	20-Year	(20-Year)	Levelized TRC (\$/MWh)
Lighting Controls	0.19	0.37	0.74	0.84	8%	\$39.81
HVAC	0.18	0.36	0.73	0.83	8%	\$15.35
Pump Optimization	0.07	0.14	0.35	0.70	7%	\$2.14
Energy Management (SEM)	0.07	0.16	0.58	0.69	7%	\$21.68
Fan Equipment Upgrade	0.15	0.30	0.59	0.67	6%	\$0.00
High Bay Lighting 2 Shift	0.14	0.27	0.55	0.62	6%	\$34.01
Wastewater	0.13	0.25	0.51	0.58	6%	\$55.85
Air Compressor Equipment	0.13	0.25	0.51	0.58	6%	\$62.71
High Bay Lighting 1 Shift	0.12	0.24	0.48	0.55	5%	\$39.43
Efficient Lighting 2 Shift	0.11	0.21	0.43	0.49	5%	\$10.34
Efficient Lighting 1 Shift	0.09	0.18	0.36	0.41	4%	\$12.61
Fan Optimization	0.08	0.17	0.34	0.38	4%	\$36.90
Energy Management 2 (SEM)	0.03	0.07	0.17	0.33	3%	\$44.67
Air Compressor Variable Speed	0.06	0.13	0.25	0.29	3%	\$56.67
Advanced Motors - Material Processing	0.03	0.06	0.23	0.28	3%	\$9.02

Table 4.15. Top-Saving Industrial Measures

Note: The average levelized TRC value represents a weighted average across all iterations, including segment and enduse. As a result, permutations of a measure may have a low levelized cost while other permutations may have high levelized cost.

Note: The Council separated the Energy Management (SEM) measures into two tiers level 1 and level 2. Energy Management (SEM) 2 represents 50 percent more savings but assumes double the cost.

Note: The Fan Equipment Upgrade net expenses (costs and benefits) were less than zero. The resulting levelized TRC was shown as \$0.00 (\$/MWh) and can be considered cost effective,

Consistent with the Council's approach to the industrial sector, Cadmus modeled all industrial measures as retrofits and did not distinguish between new and existing construction. After applying ramp rates, approximately 83 percent of 20-year achievable technical potential is realized within the first ten years.

Industrial measures are generally low cost, so the industrial achievable technical potential by levelized cost distribution does not suffer from the same peak at greater than \$160/MWh as the residential and commercial sectors do. In fact, all 10 aMW of industrial potential can be achieved at a levelized cost of less than or equal to \$100/MWh. Figure 4.18 shows cumulative achievable economic potential in 2041 for different levelized cost thresholds.



Figure 4.20. Industrial Supply Curve — Cumulative Achievable Technical Potential in 2041 by Levelized Cost

City Light's IRP selected all industrial measures for inclusion in the achievable economic potential portfolio. Therefore, the 20-year, cumulative achievable economic potential for the industrial sector is 10 aMW at a levelized cost of less than or equal to \$160/MWh. For this sector, the achievable economic potential is equivalent to the achievable technical potential, because all of the achievable technical potential is considered economically feasible at the levelized cost threshold. Therefore, the achievable economic potential by end-use can be found in Table 4.14 and the 15 highest savings measures is equal to the achievable technical potential in Table 4.15, above.

5. Comparison to 2020 CPA

5.1. Overview

Overall, the 2022 CPA identified lower final year cumulative technical potential and achievable technical potential than the 2020 CPA. This section compares results from the two assessments and explains the reasons for the change.

The 2022 study focused on final year cumulative estimates of technical potential and incremental estimates of achievable technical potential. Cadmus defines the final year cumulative technical potential as the total aMW of savings that are considered technically feasible to achieve over the study horizon. For the 2022 CPA, that horizon is 2022-2041, and for the 2020 CPA, that horizon is 2020-2040.

5.2. Technical Potential

The 2022 CPA identified 233 aMW of technical potential, compared to 282 aMW in the 2020 CPA. The 17 percent decrease in cumulative, final year technical potential is heavily influenced by the transition from the Seventh Power Plan to the draft 2021 Power Plan, which is the primary resource for residential and commercial measures. Table 5.1 compares cumulative technical potential, by sector, from the 2020 and 2022 CPAs.

		2022 CPA					
Sector	Baseline Sales – 20-Year (aMW)	BaselineTechnicalTechnicalSales -PotentialPotential20-Year- 20-YearBaseline(aMW)(aMW)Sales		Baseline Technical Sales – Potential 21-Year – 21-Year (aMW) (aMW)		Technical Potential as % of Baseline Sales	Percent Change in Technical Potential
Residential	461	90	20%	440	100	23%	-10%
Commercial	667	131	20%	693	173	25%	-24%
Industrial	91	12	13%	88	9	10%	43%
Total	1,219	233	19%	1,221	282	23%	-17%

Table 5.1. Technical Cumulative Potential Comparison

The following sections detail the changes between 2022 CPA and the 2020 CPA .

5.2.1. Residential Sector Changes

The residential sector potential decreased 100 aMW of technical potential in the final year from the 2020 CPA to 90 aMW in the 2022 CPA. This is a 10 percent decrease that can be attributed to two major facts: first, the assumption that lighting, heating, and cooling market equipment is more efficient than in 2020 study; and second, the update in unit energy consumptions (UEC) and savings that align with the draft 2021 Power Plan.

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Cadmus assumed a more efficient lighting baseline for standard-income residential customers compared to the 2020 CPA lighting baseline.²⁰ By increasing the efficiency of the lighting baseline, less lighting savings are achieved, because the incremental difference in consumption between the baseline and measure has decreased relative to the last CPA.

For example, more homes have LEDs in the 2022 CPA, resulting in less available lighting potential to install LEDs. In the 2022 CPA, all standard-income residential specialty and screw-base lighting measures are assumed to have an LED baseline. Thus, the market average baseline is more efficient than if the study had assumed an incandescent or halogen baseline (as was done in the 2020 CPA).

In addition to the lighting updates, Cadmus assumed an increase in efficient heating and cooling equipment over time based on City Light's assumptions about market adoption of efficient equipment. For example, Cadmus increased new construction, single-family heat pump saturations from 15 percent in the base year to 30 percent of homes in the final year to align with City Light's load forecasting assumptions (such as electrification conversion assumptions of non-electric heating equipment to electric heating equipment). Smaller impacts also contribute to the differences between CPAs. One smaller impact, but notable difference, relates to the increased adoption of electric vehicles in the 2022 CPA.

Table 5.2 provides a comparison of baseline sales and technical potential and the reasoning for the change.

Component	2022 CPA 20-Year (aMW)	2020 CPA 21-Year (aMW)	Percent Change	Reason for Change
Baseline Sales (aMW)	461	440	5%	Updated sales forecast from City Light with adjustments from HVAC equipment adoption
Technical Potential (aMW)	90	100	-13%	Transition to LED lighting baseline for standard-income customers;
Technical Potential as % of Baseline	20%	23%	N/A	more efficient baseline, UEC updates in draft 2021 Power Plan

 Table 5.2. Residential Cumulative Technical Potential Comparison

Figure 5.1 compares the residential technical potential at the end-use group level. The blue bars indicate all end-use groups that saw a decrease in technical potential from the 2020 study to the 2022 study. As described above, the most significant decrease, of 8.4 aMW, comes from the transition to LEDs as the baseline throughout the study for standard-income residential customers. Other notable dips in potential are for heating and water heating due to differences in end-use group consumptions and savings estimates in the draft 2021 Power Plan compared to the Seventh Power Plan. Finally, the potential for appliances increases as the result of higher savings estimates in the draft 2021 Power Plan compared to the Seventh Power Plan compared t

²⁰ Cadmus assumed income-qualified customers have remaining lighting potential that can be obtained through direct replacement of halogen baseline equipment.



Figure 5.1. Change in Cumulative Residential Technical Potential by End-Use Group

These residential changes from the prior 2020 CPA correlate to the changes from Seventh Power Plan to draft 2021 Power Plan. Though the draft 2021 Power Plan added 11 new measures, the overall achievable technical 20-year potential deceased by 20 percent, as shown in Figure 5.2. The short-term achievable technical potential is more pronounced and decreases by 32 percent compared to the Seventh Power Plan, in part due to differences in ramp rates. The largest driver is the decrease in residential lighting potential compared to the Seventh Power Plan, with a decrease of more than 80 percent of the regional lighting achievable technical potential.



Figure 5.2. Draft 2021 Power Plan and Seventh Power Plan Cumulative Residential Achievable Technical Potential (aMW)

Note: Draft 2021 Power Plan data last updated on 6/16/2020 and may not represent final planning values.

5.2.2. Commercial Sector Changes

The 2022 CPA identified lower final-year cumulative technical potential than the 2020 CPA. One notable change relates to a decrease in the baseline sales as a result from latest CBSA data (2019 dataset version IV) that informed building energy end-use group intensities compared to prior CBSA data (2014 dataset version III). This new CBSA data showed a much higher saturation of efficient lighting compared to the estimates within the 2020 CPA. The 2022 study incorporated the latest CBSA data that included new lighting saturation data. CBSA IV data showed a large shift towards LED lamps and fixtures compared to the prior CBSA III. Table 5.3 compares technical potential in the commercial sector for the two CPAs.

Component	2022 CPA 2020 CPA Percent Change		Reason for Change	
Baseline Sales	667	693	-4%	Updated sales forecast with adjustments from CBSA IV
Technical Potential	131	173	-24%	More efficient lighting
Technical Potential as % of Baseline	20%	25%	N/A	baseline; transition to draft 2021 Power Plan

Table 5.3. Commercial Cumulative Technical Potential Comparison

Figure 5.3 illustrates the change in commercial technical potential between the 2020 and 2022 CPAs by end-use group. End-use groups exhibiting decreased technical potential include lighting, data center,

miscellaneous (laptops, showerhead, compressors, and washing machines), heating, and heat pump. The decrease in lighting potential alone makes up the difference between the 2020 and 2022 CPA technical potential.



Figure 5.3. Change in Commercial Cumulative Technical Potential by End-Use Group

Changes from Seventh Power Plan to draft 2021 Power Plan contribute to the notable differences in potential. Figure 5.4 shows the overall achievable technical 20-year potential deceased by 37 percent. Though the draft 2021 Power Plan added 12 new commercial measures, commercial lighting potential decreased by 50 percent compared to the Seventh Power Plan base. As noted above, this is due in part to the high saturation of existing LED lamp and fixture applications in the commercial sector CBSA data. In addition, the draft 2021 Power Plan looked at fewer data center measures. Working with City Light, Cadmus added several specific data center measures back into the CPA to help minimize the gap in potential as well as to align with City Light's historical program participation with data center upgrades.



Figure 5.4. Draft 2021 Power Plan and Seventh Power Plan Cumulative Commercial Achievable Technical Potential (aMW)

Note: Draft 2021 Power Plan data last updated on 6/16/2020 and may not represent final planning values.

5.2.3. Industrial Sector Changes

The industrial sector in the 2022 CPA included new measures based on the draft 2021 Power Plan, such as HVAC measures, forklift battery chargers, and new methodology for compressors, fans, pumps, and other motor-driven systems. City Light also requested the addition of measures such as industrial generator block heaters, retro-commissioning, and welder system upgrades. These additions and changes in methodology increased the potential in the industrial sector compared to the prior CPA.

5.3. Achievable Technical Potential and Ramping

As with assessments of technical potential, Cadmus identified lower, cumulative, achievable technical potential. Because 20-year cumulative achievable technical potential is a subset of technical potential, factors contributing to lower cumulative achievable technical potential are the same as those previously discussed for technical potential.

Figure 5.5 shows incremental achievable technical potential from the 2022 CPA, and Figure 5.6 shows incremental achievable technical potential from the 2020 CPA. Incremental achievable technical potential in the first two years of the 2022 CPA is about 34 percent lower than the first two years of the 2020 CPA.



Figure 5.5. Incremental Achievable Technical Potential—2022 CPA





Figure 5.6 shows that the 2020 CPA determines that a higher proportion of total available potential will be realized in the study's early years than in the 2022 CPA. The two-year achievable potential in the 2020 CPA is equal to approximately 18 percent of the total 21-year achievable technical potential, whereas the two-year achievable potential in the 2022 CPA is equal to approximately 14 percent of the total 20-year achievable technical potential. This change is the result of two key factors—changes in ramp rate assumptions and the decrease in technical potential from the 2020 CPA to the 2022 CPA.

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For the 2022 CPA, Cadmus used the draft 2021 Power Plan ramp rates rather than the Seventh Power Plan ramp rates (released in February 2016) used in the 2020 CPA. The change in the source of ramp rate data leads to a decrease in potential in the initial years of the study relative to the final year.

The Seventh Power Plan ramp rates ranged from 2016 to 2035. For the 2020 CPA, Cadmus took the ramp rate beginning in 2020 and extrapolated maximum saturation to extend from 2035 to the final year of the study (2040). For example, Figure 5.7 shows the ramp rate for multifamily ductless heat pumps used in the 2020 CPA and the 2022 CPA. The ramp rate is the LO12Med ramp rate, which indicates it is a lost opportunity ramp rate that reaches full saturation after 12 years and has a medium ramp-up speed. Using the Seventh Power Plan ramp rate, Cadmus started farther up on the curve, assuming an adoption rate of 44 percent in the first year and increasing until 100 percent adoption in 2031.

For the 2022 CPA, Cadmus used the ramp rates released from the draft 2021 Power Plan in 2020. The first year adoption is 11 percent and increases to 100 percent adoption in 2037. Therefore, though the adoption rate is the same in the final years of 2040 and 2041, the incremental adoption in the initial years of the study is drastically different. This leads to the differences in incremental potential in the initial years of the study between the 2020 and 2022 CPA.





5.4. IRP Achievable Economic Potential Comparison

The 2020 CPA achievable (economic) potential and the 2022 CPA IRP selected economic potential cannot be directly compared without acknowledging that the two studies use very different methodologies in determining what is consider "economic." The 2020 CPA followed an economic cost-effectiveness criteria, based on City Light's avoided supply costs for delivering electricity, whereas the 2022 CPA used the IRP optimization modeling to determine how much energy efficiency, as a resource, is cost-effective compared to other competing resources over the study horizon. Table 5.4 shows a comparison of the achievable (economic) potential between the two studies.

		2022 CPA		•				
Sector	Baseline Sales – 20-Year (aMW)	Achievable Economic Potential – 20-Year (aMW) Achievable Economic Potential as % of Baseline Sales		Baseline Sales – 21-Year (aMW)	Baseline Achievable Sales – Potential – 21-Year (aMW) (aMW)		Percent Change in Potential	
Residential	461	18	4%	440	12	3%	53%	
Commercial	667	77	12%	693	96	14%	-19%	
Industrial	91	10	11%	88	4	5%	158%	
Total	1,219	105	9%	1,221	111	9%	-5%	

Table 5.4. Achievable	Economic C	umulative Po	otential Com	parison
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The 2022 CPA residential sector achievable economic potential increased by 53 percent, compared to the 2020 CPA. The 2022 CPA IRP selected appliance measures, such as refrigerators and freezers, whereas the 2020 CPA did not find these appliance measures cost-effective. In addition, the 2022 CPA IRP analysis selected more weatherization measures (impacting heating and cooling end-uses) compared to the 2020 CPA. These differences represent the majority of the change in achievable economic potential in the residential sector between the two studies.

The 2022 CPA commercial sector achievable economic potential decreased slightly, by 19 percent, compared to the 2020 CPA. Though there were increases in achievable economic potential in the refrigeration and ventilation end uses, the majority of change reflects the decrease in available lighting potential. The lighting end-use comparison between studies is described in the *Commercial Sector Changes* section above.

As described in the *Industrial Sector Changes* section, the industrial sector in the 2022 CPA included new measures that increased the achievable economic potential. In addition, 2022 CPA IRP portfolio optimization modeling selected all of the available industrial achievable technical potential. Slightly less than half of the technical potential in the 2020 CPA was determined to be cost-effective as achievable economic potential. These two factors represent the majority of the differences between the two studies.

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6. Detailed Methodology

Cadmus' general methodology can be best described as a combined top-down/bottom-up approach. The top-down component began with the most current load forecast, adjusting for building codes, equipment efficiency standards, and market trends that are not accounted for through the forecast. Cadmus then disaggregated this load forecast into its constituent customer sectors, customer segments, and end-use components and projected out 20 years. The study calibrated the base year (2022) to City Light's sector-load forecasts produced in 2020.

The bottom-up component considered potential technical impacts of various ECMs and practices on each end use. Impacts could then be estimated, based on engineering calculations, and accounting for fuel shares, current market saturations, technical feasibility, and costs. The technical potential presents an alternative forecasts that reflects the technical impacts of specific energy efficiency measures. The achievable technical potential is then determined by applying ramp rates and achievability percentages to technical potential. The following section describes the CPA methodology in detail.

6.1. Developing Baseline Forecasts

City Light's sector-level sales and customer forecasts provided the basis for assessing energy efficiency potential. Prior to estimating potential, Cadmus disaggregated sector-level load forecasts by customer segment (business, dwelling, or facility types), building vintage (existing structures and new construction), and end-uses (all applicable end-uses in each customer sector and segment).

The first step in developing baseline forecasts was to determine the appropriate customer segments in each sector. Designations drew upon categories available in the study's key data sources—primarily City Light's nonresidential customer database (for the commercial and industrial sectors), and the U.S. Census Bureau's American Community Survey (for the residential sector)—then mapping the appropriate end-uses to relevant customer segments.

Upon determining appropriate customer segments and end-uses for each sector, Cadmus produced the baseline end-use forecasts, based on integration of current and forecasted customer counts with key market and equipment usage data.

For the commercial and residential sectors, calculating total baseline annual consumption for each end use in each customer segment used the following equation:

$$EUSE_{ij} = \Sigma_e ACCTS_i * UPA_i * SAT_{ij} * FSH_{ij} * ESH_{ije} * EUI_{ije}$$

Where:

EUSE_{ij} = total energy consumption for end use j in customer segment i

ACCTS_i = the number of accounts/customers in customer segment i

UPA _i	=	units per account in customer segment i (UPAi generally equals the average square feet per customer in commercial segments, and 1.0 in residential dwellings, assessed at the whole-home level)
SAT _{ij}	=	the share of customers in customer segment i with end use j
FSH_{ij}	=	the share of end use j of customer segment i served by electricity
ESH_{ije}	=	the market share of efficiency level in equipment for customer segment and end use ij
EUI _{ije}	=	end-use intensity: energy consumption per unit (per square foot for commercial) for the electric equipment configuration ije

For each sector, total annual consumption could be determined as the sum of *EUSE_{ij}* across the end-uses and customer segments.

Consistent with other conservation potential studies, and commensurate with industrial end-use consumption data (which varied widely in quality), allocating the industrial sector's loads to end-uses in various segments and drawing upon data available from the Energy Information Administration.²¹

6.1.1. Derivation of End-Use Consumption

End-use energy consumption estimates by segment, end-use, and efficiency level (*EUl*_{ije}) provided one of the most important components in developing a baseline forecast. In the residential sector, the study used estimates on unit energy consumption (UEC), representing annual energy consumption associated with an end use and represented by a specific type of equipment (e.g., a central air conditioner or heat pump). The basis for the UEC values were derived from savings in the Council's draft 2021 Power Plan workbooks and savings analysis to calculate accurate consumption wherever possible for all efficiency levels of end-use technology. When Council workbooks did not exist for certain end-uses, Cadmus used results from NEEA's 2017 RBSA City Light oversample or conducted other research.

For the commercial sector, the study treated consumption estimates as end-use intensities that represented annual energy consumption per square foot served. To develop the end-use intensities, Cadmus developed electric energy intensities (total kWh per building square feet) based on NEEA's CBSA IV. Cadmus then benchmarked these electric energy intensities against various other data sources including CBSA III, historical forecasted and potential study data from City Light, and historical end-use intensities developed by the Council and NEEA.

To distribute the energy intensities Cadmus developed from the CBSA IV to end-use intensities for this potential study, Cadmus used assumptions specific to each building segment and each end-use:

• **Lighting.** The methodology for lighting end-use consisted of analyzing CBSA IV's lighting power density (lighting wattage per square foot) multiplied by the Council's interior lighting hours of use

²¹ U.S. Department of Energy, Energy Information Administration. 2010. *Manufacturing Energy Consumption Survey*.

by building type. Once lighting end-use intensity was calculated, Cadmus subtracted this portion of load from the total CBSA electric energy intensities (e.g., to estimate non-lighting intensities).

- Non-lighting. To distribute the remaining non-lighting CBSA electric energy intensities into enduses, Cadmus used CBECS 2012 microdata to calculate percentages of end-use intensities across various end-use groups by building types as defined by the Council. Cadmus used the CBSA fuel shares and end-use saturations to adjust the distributions of CBECS end-use intensities to better represent City Light's commercial service territory. These finalized CBECS end-use intensities adjusted with CBSA values where possible—were the basis for most of the end-use intensities in the commercial sector.
- **Computers and servers.** Cadmus developed energy intensities by building type for two enduses—computers (desktops and laptops) and servers—using the CBECS number of units per square foot multiplied by unit consumption.
- University. The CBSA IV data lacked information on university building type, and the schools building type represented only K-12, as designated by the Council. Cadmus developed a more accurate electric energy intensity specific to university by calculating a ratio of the CBECS's university and school K-12 building types. Cadmus then used the CBSA school K-12 lighting power density and applied the Council's university lighting hours of use. Cadmus determined that the result was reasonable by benchmarking the university lighting end-use intensity developed for City Light against the ratio of CBECS University and School K-12 lighting loads.
- **Retail.** Low CBSA respondent counts and matching varying definitions of building type in Council and CBECS data caused concern, especially for the large and extra large retail building types, so Cadmus combined large and extra large retail building types for the CBSA electric energy intensities and lighting power density. Cadmus combined small and medium retail building types because it found counts and definitions were sufficient.

For the industrial sector, end-use energy consumption represented total annual industry consumption by end use, as allocated by the secondary data described above.

6.1.2. City Light Forecast Adjustments

Cadmus worked with the City Light load forecast team to adjust the baseline forecast to account for the impacts of COVID-19, increased market adoption of efficient, electric heating and cooling equipment, and to align this study's commercial and residential baseline forecasts with the City Light load forecasts.

Cadmus made the following adjustments to the heating and cooling residential forecasts using the 2018 Seattle City Code and City Light's electrification assumptions to account for changes in adoption patterns over time:

 Increased saturations of heat pumps in single-family and multifamily from the base year to 2041. City Light expects significant conversion to heat pumps for single-family homes traditionally heated by electric furnaces as well as the conversion of single-family homes traditionally heated by fuel oil.

- Decreased saturations for single-family and multifamily homes heated by electric furnaces and baseboard to account for increased heat pump conversion.
- Increase of UEC for all residential cooling measures to align more closely with City Light estimates.

The first two adjustments created a more efficient baseline, which means less potential for heating equipment than would have occurred if the baseline accounted only for changes in the federal standard. In this study, these adjustments are naturally occurring rather than having energy efficiency potential.

City Light's current forecast do not include the same level of climate change inducted impacts as does the Council. As described above, City Light projects different cooling loads instead of the Council's modelling of future weather. Accordingly, for measures where the Council adjusted unit savings based on future climate change impacts, Cadmus removed these future climate change impacts by using RTF workbooks assumptions instead, where feasible.

6.2. Measure Characterization

Because technical potential draws upon an alternative forecast, reflecting installations of all technically feasible measures, Cadmus chose the most robust set of appropriate ECMs. Cadmus measures by developing a comprehensive database of technical and market data for ECMs that applied to all end-uses in various market segments.

The database included the following measures:

- All measures in the Council's draft 2021 Power Plan conservation supply curve workbooks
- Active unit energy savings (UES) measures in the RTF
- Particular commercial technologies of interest to City Light, as identified and included for the study:
 - Airflow Management (Data Center)
 - Building Automation System Upgrades
 - Computer Room Air Conditioner
 - Cooling Towers
 - Economizer Outside Air
 - Economizer Water side

- Freezer Lab Grade
- Heat Pump Water Source
- Heat Recovery Improvements
- HVAC Retro-commissioning
- LED Sign Lighting
- Server Virtualization
- Water Heater Controls

Cadmus included only the Council and RTF measures applicable to sectors and market segments in City Light's service territory. For example, this study does not characterize measures for the agriculture sector or the residential manufactured home segment as these sectors are a small fraction of City Light's customer mix. Cadmus added measures if the RTF workbooks were not included in the Council's draft 2021 Power Plan or the RTF workbooks have been updated since the Council's draft 2021 Power Plan workbooks. For the residential sector, these included the following:

- Freezer Decommissioning
- New Construction Home
- Pool Pumps
- Refrigerator Decommissioning

In the commercial sector, additional RTF measures included the following:

- Demand Control Kitchen Ventilation
- Fan VSD
- Pool Pumps

- Thermostat Communicating Line Voltage
- Thermostat Electronic Line Voltage
- Vehicle Engine Block Heater Control
- Pump VSD
- Walk-in Evaporator Fan ECM Motor
- Weatherization School

Cadmus classified the electric energy efficiency measures applicable to City Light's service territories into two categories:

- **High-efficiency equipment (lost opportunity) measures** directly affecting end-use equipment (e.g., high-efficiency domestic water heaters), which follow normal replacement patterns based on expected lifetimes.
- Non-equipment (retrofit) measures affecting end-use consumption without replacing end-use equipment (e.g., insulation). Such measures do not include timing constraints from equipment turnover—except for new construction—and should be considered discretionary, given that savings can be acquired at any point over the planning horizon.

Each measure type's relevant inputs include the following:

- Equipment and non-equipment measures:
 - Energy savings: average annual savings attributable to installing the measure, in absolute and/or percentage terms
 - Equipment cost: full or incremental, depending on the nature of the measure and the application
 - Labor cost: the expense of installing the measure, accounting for differences in labor rates by region and other variables
 - Technical feasibility: the percentage of buildings where customers can install this measure, accounting for physical constraints
 - Measure life: the expected life of the measure equipment
- Non-equipment measures only:
 - Percentage incomplete: the percentage of buildings where customers have not installed the measure, but where its installation is technically feasible. This equals 1.0 minus the measure's current saturation
 - Measure competition: for mutually exclusive measures, accounting for the percentage of each measure likely installed to avoid double-counting savings

 Measure interaction: accounting for end-use interactions (e.g., a decrease in lighting power density causing heating loads to increase)

Cadmus derived these inputs from various sources, though primarily through the following:

- Northwest Energy Efficiency Alliance (NEEA) Commercial Building Stock Assessment (CBSA) IV, including Puget Sound Energy's oversample, where applicable²²
- NEEA Residential Building Stock Assessment (RBSA) II with City Light's oversample
- The Northwest Power and Conservation Council's draft 2021 Power Plan conservation supply curve workbooks
- The Regional Technical Forum (RTF) unit energy savings (UES) measure workbooks

For many equipment and non-equipment inputs, Cadmus reviewed a variety of sources. To determine which source to use for this study, Cadmus developed the following hierarchy for costs and savings (and shown in Table 6.1):

- 1. The Council's draft 2021 Power Plan conservation supply curve workbooks, except in cases where a more recent version of RTF UES measure workbooks were submitted and not used in the Council's draft 2021 Power Plan
- 2. RTF UES measure workbooks
- 3. Secondary sources, such as American Council for an Energy-Efficient Economy work papers, Simple Energy and Enthalpy Model building simulations, or various technical reference manuals

Cadmus also developed a hierarchy to determine the source for various applicability factors, such as the technical feasibility and the percentage incomplete. This hierarchy differed slightly for residential and commercial measure lists.

RBSA Methodology

For residential estimates, Cadmus relied on City Light's oversample in NEEA's 2016 RBSA. If City Light's subset did not have a sufficient sample to achieve 90 percent confidence with a ±10 percent precision for a given estimate, estimates were derived from the sample of Puget Sound-area customers (e.g., City Light, Puget Sound Energy, Snohomish County Public Utility District, Tacoma Power) or for the broader Northwest, as found in the RBSA. If Cadmus could not calculate applicability factors from NEEA's RBSA, the study used applicability factors from the Council's draft 2021 Power Plan conservation supply curve workbooks. The resulting estimates reflected averages for the Northwest region and were not necessarily specific to City Light's service territory.

²² City Light did not have an oversample conducted as part of CBSA IV. To better represent the Seattle area (compared to regional values), Cadmus incorporated Puget Sound Energy's CBSA oversample data.

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CBSA Methodology

For the commercial sector, Cadmus first used the subset of City Light's customers, including Puget Sound Energy's oversample, in NEEA's 2019 CBSA IV.

The original CBSA IV weights were constructed to represent the Council's regional building counts. To represent City Light's building counts, Cadmus reanalyzed the CBSA weights based on City Light's totals of building square footage for specific building type buckets. Cadmus included only the CBSA data and the Puget Sound Energy's oversample in the Council's defined climate heating zone 1. While reviewing whether to include urban sites only in these analyses, Cadmus found that, for the heating zone 1 subset, 92 percent of the buildings were urban and 95 percent of building square footage was urban. Due to the limited impact of rural for all sites in the heating zone 1 subset, Cadmus did not make any further adjustments in the overall analysis.

Once Cadmus finalized City Light's CBSA weights to match City Light's total building square footage by building type bucket, these weights were used for all CBSA analysis in this study. Where respondent counts were sufficient for specific CBSA analyses, Cadmus used building type names as defined by the Council to produce more granular results.

If NEEA's CBSA did not have sufficient data to estimate a particular value (for example, applicability factors) for a given measure, Cadmus relied on factors from the Council's draft 2021 Power Plan conservation supply curve workbooks.

Measure Data Sources

By data input, Table 6.1 lists the primary sources referenced in the study.

Data	Residential Source	Commercial Source	Industrial Source
Energy Savings	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research
Equipment and Labor Costs	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research
Measure Life	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research
Technical Feasibility	NEEA RBSA; Cadmus research	NEEA CBSA; Cadmus research	Cadmus research; Industrial Council data
Percentage Incomplete	NEEA RBSA; City Lights program accomplishments; Cadmus research	NEEA CBSA; City Lights program accomplishments; Cadmus research	Cadmus research; Industrial Council data
Measure Interaction	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Draft 2021 Power Plan supply curve workbooks; RTF; Cadmus research	Cadmus research

Table 6.1. Key Measure Data Sources

6.2.1. Incorporating Federal Standards, State and Local Codes and Policies

Cadmus' assessment accounted for changes in codes, standards, and policies over the planning horizon. These changes not only affected customers' energy-consumption patterns and behaviors, they also determined which energy efficiency measures would continue to produce savings over minimum requirements. Cadmus captured current efficiency requirements, including those enacted but not yet in effect.

Cadmus reviewed all local codes, state codes, federal standards, and local and state policy initiatives that could impact this potential study. For the residential and commercial sectors, the potential study considered the local energy code (2018 Seattle Energy Code, 2018 Washington State Energy Code, and 2018 Revised Code of Washington) as well as current and pending federal standards. Cadmus also assessed if, how, and when Washington state and Seattle City legislation impact the potential study. This legislation included the Seattle's Energy Benchmarking Program (SMC 22.920), Clean Buildings' bill (E3SHB 1257), and the Clean Energy Transformation Act (194-40-330).

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Cadmus reviewed the following codes, standards, and policy initiatives:

Federal standards. All technology standards for heating and cooling equipment, lighting, water heating, motors, and other appliances not covered in or superseded by state and local codes.²³

2018 Seattle Energy Code. The code prohibits new commercial and multifamily buildings from using electric resistance or fossil fuels for space heating effective June 1, 2021, and electric resistance or fossil fuels for water heating effective January 1, 2022. All other code provisions take effect March 15, 2021.²⁴

2018 Washington State Energy Code. The code provides requirements for residential and commercial new construction buildings, except in cases where the 2018 Seattle Energy Code supersedes Washington code. The effective date is February 1, 2021.²⁵

Seattle's Energy Benchmarking Program (SMC 22.920). This program requires owners of commercial and multifamily buildings (20,000 square feet or larger) to track energy performance and annually report to the City of Seattle. Though in effect since 2016, full enforcement of the program began on January 1, 2021.²⁶

2018 Revised Code of Washington (RCW 19.260.040). These codes set minimum efficiency standards to specific types of products including computers, monitors, showerheads, faucets, residential ventilation fans, general service lamps, air compressors, uninterruptible power supplies, water coolers, portable air conditioners, high color rendering index (CRI) fluorescent lamps, commercial dishwashers, steam cookers, hot food holding cabinets, and fryers. The effective dates vary by product with the 2018 RCW signed on July 28, 2019.²⁷

Clean Buildings Bill (E3SHB 1257). The law requires the Washington State Department of Commerce to develop and implement an energy performance standard for the state's existing buildings, especially large

²³ Office of Energy Efficiency & Renewable Energy. "Standards and Test Procedures." Accessed June 2021. <u>https://www.energy.gov/eere/buildings/standards-and-test-procedures</u>

 ²⁴ City of Seattle, Office of the City Clerk. February 1, 2021. "Council Bill No: CB 119993. An ordinance relating to Seattle's construction codes."
 <u>http://seattle.legistar.com/LegislationDetail.aspx?ID=4763161&GUID=A4B94487-56DE-4EBD-9BBA-C332F6E0EE5D</u>

²⁵ Washington State Building Code Council. Accessed June 2021. <u>https://sbcc.wa.gov/</u>

²⁶ City of Seattle, Office of Sustainability and Environment. "Energy Benchmarking." Accessed June 2021. <u>https://www.seattle.gov/environment/climate-change/buildings-and-energy/energy-benchmarking#:~:text=Seattle's%20Energy%20Benchmarking%20Program%20(SMC,to%20the%20Cit y%20of%20Seattle.&text=Compare%20your%20building's%20energy%20performance,started%20saving%20energy%20and%20money.</u>

²⁷ Washington State Legislature. Revised Code of Washington. December 7, 2020. "RCW 19.260.050 Limit on sale or installation of products required to meet or exceed standards in RCW 19.260.040." <u>https://app.leg.wa.gov/rcw/default.aspx?cite=19.260.050</u>

commercial buildings (based on building square feet) and provide incentives to encourage efficiency improvements. Effective date is July 28, 2019, with the building compliance schedule set to begin on June 1, 2026. Early adopter incentive applications begin in July of 2021.²⁸

Clean Energy Transformation Act (CETA) (194-40-330). This act applies to all electric utilities serving retail customers in Washington and sets specific milestones to reach the required 100 percent clean electricity supply. The first milestone is in 2022, when each utility must prepare and publish a clean energy implementation plan with its own targets for energy efficiency and renewable energy.²⁹

6.2.1.1 Applying Federal Standards

Cadmus explicitly accounted for several other pending federal codes and standards. For the residential sector, these included appliance, HVAC, and water-heating standards. For the commercial sector, these included appliance, HVAC, lighting, motor, and water-heating standards. Figure 6.1 provides a comprehensive list of equipment standards considered in the study. Bars indicate the year in which a new equipment standard will be enacted. Some products will be subject to multiple standards over the planning horizon. However, Cadmus did not attempt to predict how energy standards might change in the future.

²⁸ Washington State Department of Commerce. "Clean Buildings." Accessed June 2021. <u>https://www.commerce.wa.gov/growing-the-economy/energy/buildings/</u>

²⁹ Washington State Department of Commerce. "Clean Energy Transformation Act (CETA)." Accessed June 2021. <u>https://www.commerce.wa.gov/growing-the-economy/energy/ceta/</u>

All External Power Supplies Fluorescent Lamp Ballats General Service Incandescent Reflector Lamps Incandescent Reflector	Sector	Product Regulated	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
All External Power Supplies Fluorescent Lamp Ballasts General Service Fluorescent Lamps General Service Incandescent Lamps Incandescent Reflector Lamps Ceiling Fan Light Kit Central Air Conditioners and Heat Pumps Clothes Dryers Clothes Dryers Clothes Vashers Furnace Fans Microwave Ovens Pool Pumps Residential Automatic Lee Makers Packaget AC and Heat Pumps Pre-Rinse Spray Valves Pre-Rinse Spray Valves Refrigerated Beverage Vending Machines Refrigerated Service Incal AC and Heat Pumps Vater Heaters Walk-in Coolers and Freezers Water Heaters Walk-in Coolers and Freezers Water Heaters Water Heaters Walk-in Coolers and Freezers Water Heaters		Battery Charger System										
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Water and evaporatively Cooled CAC and HP Water Heaters		Walk-in Coolers and Freezers										
Water Heaters		Water and evaporatively Cooled CAC and HP										
		Water Heaters										
Water Source Heat Pumps		Water Source Heat Pumps										
Pumps		Pumps										
Commercial/Industrial Small Electric Motors	Commercial/Industrial	Small Electric Motors										
Electric Motors		Electric Motors										

Figure 6.1. Equipment Standards Considered

6.2.1.2 Treatment of State and Local Codes and Initiatives

Cadmus identified each type of code (local or state) and/or initiative (local and state) that would impact the measures in the CPA. Cadmus sorted each impact into four main categories.

- Measure applicability or savings adjustment. Cadmus adjusted measure characterization inputs to account for local and state energy codes (2018 Washington State Energy Code and 2018 Revised Code of Washington). Where appropriate, Cadmus revised measure applicability, savings, and/or costs to reflect the impact of the code. For example, measures were removed entirely or over time (applicability set to zero) if code baselines were more efficient than the baseline data found in the RTF or Council workbooks (such as showerheads, fryers, steam cookers, and new construction homes).
- Equipment saturation adjustment. Cadmus adjusted equipment saturations by year to account for the 2018 Seattle Energy Code. In addition, Cadmus adjusted new construction commercial and large multifamily buildings space heating equipment saturations to align with this code (such as ductless heat pump and air source heat pumps). These adjustments were also accounted for in the baseline forecast, as described in the *City Light Forecast Adjustments* section.
- Adoption ramp rate adjustment. Cadmus accounted for initiatives and legislation that promote energy efficiency through customer incentives or penalties (Seattle's Energy Benchmarking Program and Clean Buildings bill). This also includes CETA in setting state-wide goals that require

City Light to set performance targets. These initiatives do not mandate an energy code or baseline for specific measures, rather they inherently speed up the rate of the adoption of energy efficiency through energy reduction requirements. City Light can also claim energy impacts through these initiatives; therefore, removing measures or adjusting baselines may not be appropriate within the context of the CPA. Cadmus reviewed and adjusted the prescribed ramp rates in the Council's draft 2021 Power Plan, where necessary, to address groups of measures that will be impacted. Changing the ramp rates (in most cases) will not impact the cumulative potential; rather it changes the timing of when the potential occurs. Cadmus adjusted ramp rates to measures currently in City Light's programs by increasing the allocated Council ramp rates up to the next tier (e.g., slow speed ramp moved to medium speed ramp).

No adjustment (already accounted for in the existing data). Measures impacted by federal standards and in some cases by 2018 Revised Code of Washington, the Council's draft 2021 Power Plan workbooks, and Cadmus' equipment characterization are already accounted for as part of the initial development of the measure data.

6.2.1.3 Additional Codes and Standards Considerations

Cadmus identified two considerations that impact the characterization of this potential study. Starting with residential lighting, Cadmus reviewed the codes and standards as well as assessed the current situation related to LED lighting.

The Council's draft 2021 Power Plan and RTF residential lighting workbooks account for the Washington state code requirement (HB 1444) of the EISA backstop provision. Originally adopted from the federal standard, the EISA backstop provision requires higher-efficiency technologies (i.e., 45 lumens per watt or better). There are still pending legal challenges and, with the change in presidential administrations, uncertainty remains regarding if and how this standard will be reintroduced. For example, the Biden-Harris Administration, through the Department of Energy, has introduced a semiannual Unified Agenda of Federal Regulatory and Deregulatory Actions that includes possible amendments to EISA. Washington state did, however, adopt the EISA backstop provision. The savings in the draft 2021 Power Plan and RTF workbooks state a 45 lumens per watt baseline (for Washington only).

As a result, Cadmus developed a special case for residential lighting. After reviewing the Council and RTF workbooks, Cadmus concluded that the 45 lumens per watt baseline should be changed to an LED baseline for the CPA. Currently, there are no lighting technologies on the market that meet the 45 lumens per watt requirement other than CFLs or LEDs. Furthermore, major manufacturers have phased out production of CFLs. The market is rapidly adopting LEDs (according to the RBSA saturations and Council and RTF projections) and becoming the de facto baseline. Considering that LEDs are the only viable technology that meets Washington code, Cadmus used LEDs as the baseline for all standard-income applications but assessed potential for low-income homes. This adjustment to the lighting loads is effectively accounted for in City Light's baseline forecast and the CPA. The lighting impact by end-use can be found in Table 3.3 and Table 4.6, above.

Secondly, the 2018 Washington state energy code includes both residential and commercial new construction prescriptive and performance path requirement options. The CPA characterizes efficiency

improvements on a measure basis that aligns with the prescriptive path. The performance path includes the HVAC total system performance ratio (HVAC TSPR) requirement. HVAC TSPR is defined as the ratio of the sum of a building's annual heating and cooling load compared to the sum of the annual carbon emissions from the energy consumption of the building's HVAC systems. The variability in the HVAC TSPR from building to building cannot be easily captured in the CPA. For this study, Cadmus followed the prescriptive requirements in the 2018 Washington state energy code.

6.2.2. Adapting Measures from the RTF and Draft 2021 Power Plan

To ensure consistency with methodologies employed by the Council and to fulfill requirements of WAC 194-37-070, Cadmus relied on ECM workbooks developed by the RTF and the Council to estimate measure savings, costs, and interactions. In adapting these ECMs for this study, Cadmus adhered to the following principles:

- **Deemed ECM savings in RTF or Council workbooks must be preserved:** City Light relies on deemed savings estimates provided by the Bonneville Power Administration (BPA) that largely remain consistent with savings in RTF workbooks in demonstrating compliance with I-937 targets. Therefore, Cadmus sought to preserve these deemed savings in the potential study to avoid possible inconsistencies among estimates of potential, targets, and reported savings.
- Use inputs specific to City Light's service territory: Some Council and RTF workbooks relied on regional estimates of saturations, equipment characteristics, and building characteristics derived from the RBSA and CBSA. Cadmus updated regional inputs with estimates, calculated either from City Light's oversample of CBSA and RBSA or from estimates affecting the broader Puget Sound area. This approach preserved consistency with Council methodologies while incorporating Seattle-specific data.

Cadmus' approach for adapting Council's and RTF's workbooks varied by sector, as described in the following sections.

6.2.2.1 Residential and Commercial

Cadmus reviewed each residential Council workbook and extracted savings, costs, and measure lives for inclusion in this study. Applicability factors (such as the current saturation of an ECM) largely derived from City Light's oversample of RBSA, adjusted for City Light's program accomplishments. If Cadmus could not develop a City Light-specific applicability factor from the RBSA, it used the Council's regional value.

In addition to extracting key measure characteristics, Cadmus identified each measure as an equipment replacement measure or a retrofit measure. Key distinctions between these two types of measures included the following:

 Savings for equipment replacement measures were calculated as the difference between measure consumption and baseline consumption. For instance, for the heat pump water heater measure, Cadmus estimated the baseline consumption of an average market water heater and used the Council's deemed savings to calculate the consumption for a heat pump water heater. This approach preserved the deemed savings in Council workbooks. Savings for retrofit measures were calculated in percentage terms relative to the baseline end-use consumption but reflected the Council's and RTF's deemed values. For instance, if the Council's deemed savings were 1,000 kilowatt-hour (kWh) per home for a given retrofit measure and Cadmus estimated the baseline consumption for the end use to which this measure was applicable as 10,000 kWh, relative savings for the measure were ten percent. Cadmus did not apply relative savings from the Council's workbooks to baseline end-use consumption because doing so would lead to per-unit estimates that differed from Council and RTF values.

Cadmus also accounted for interactive effects presented in Council and RTF workbooks. For instance, the Council estimated water heating, heating, and cooling savings for residential heat pump water heaters— with the heating and cooling savings as the interactive savings. Because installation of a heat pump water heater represents a single installation, Cadmus employed a stock accounting model, which combined interactive and primary end-use effects into one savings estimate. Though Cadmus recognizes this approach could lead to overstating or understating savings in an end use, in aggregate—across end-uses—savings matched the Council's deemed values.

Cadmus generally followed the same approach with the commercial sector; however, because of the mixture of lighting measures considered in the Council's draft 2021 Power Plan, Cadmus chose to model all commercial lighting measures as retrofits and none as equipment replacements. Savings and costs for these measures reflected this decision.

6.2.2.2 Industrial

Cadmus adapted measures from the Council's Industrial_Tool_2021P_v08 and IND_AllMeasures_2021P_V8 workbooks for inclusion in this study for the following key industrial measure inputs:

- Measure savings (expressed as end-use percentage savings)
- Measure costs (expressed in dollar per kWh saved)
- Measure lifetimes (expressed in years)
- Measure applicability (percentage)

Cadmus mapped each Council industry type to industries found in City Light's service territory. These included foundries, miscellaneous manufacturing, stone and glass, transportation equipment manufacturing, other food, frozen food, water, and wastewater. Cadmus identified applicable end-uses using the Council's assumed distribution of end-use consumption in each industry. Table 6.2 shows the distribution of end-use consumption and the list of industries considered in this study.

Cadmus Segment	Process Air Compressor	Lighting	Fans	Pumps	Motors Other	Process Other	Process Heat	ниас	Other	Process Electro-Chemical	Process Refrigeration
Foundries	7%	9%	10%	18%	15%	0%	21%	9%	5%	6%	0%
Frozen Food	4%	8%	4%	4%	12%	0%	4%	7%	1%	3%	53%
Misc. Manufacturing	7%	11%	7%	10%	16%	0%	11%	17%	9%	6%	6%
Other Food	12%	4%	2%	8%	11%	0%	0%	9%	8%	2%	44%
Transportation Equip	6%	20%	6%	8%	11%	0%	0%	28%	7%	14%	0%
Wastewater	0%	5%	30%	44%	15%	0%	0%	0%	6%	0%	0%
Water	12%	4%	0%	71%	0%	0%	0%	7%	6%	0%	0%
Stone and Glass	8%	5%	7%	13%	20%	2%	25%	6%	3%	2%	7%

Table 6.2. Distribution of End Use Consumption by Segment

To incorporate broader secondary data, Cadmus aggregated some Council end-uses into broader end-uses. Table 6.3 shows the mapping of Council end-uses to Cadmus end-uses.

Council End-Use	Cadmus End-Use
Pumps	Pumps
Fans and Blowers	Fans
Compressed Air	Process Air Compressor
Material Handling	Process Electro Chemical
Material Processing	Motors Other
Low Temp Refer	Process Refrigeration
Pollution Control	Other
Other Motors	Motors Other
Drying and Curing	Process Heat
Heat Treating	Process Heat
Heating	Process Heat
Melting and Casting	Process Heat
HVAC	HVAC
Lighting	Lighting
Other	Other

Table 6.3. Council and Cadmus End-Uses

6.3. Estimating Conservation Potential

As discussed, Cadmus estimated two types of conservation potential, and City Light determined a third potential—achievable economic—through the IRP's optimization modeling, as shown in Figure 6.2.





- **Technical potential** assumes that all technically feasible resource opportunities may be captured, regardless of their costs or other market barriers. It represents the total energy efficiency potential in City Light's service territory, after accounting for purely technical constraints.
- Achievable technical potential is the portion of technical potential assumed to be achievable during the study's forecast, regardless of the acquisition mechanism. For example, savings may be acquired through utility programs, improved codes and standards, and market transformation.
- Achievable economic potential is the portion of achievable technical portion determined to be cost-effective by the IRP's optimization modeling, in which either bundles or individual energy efficiency measures are selected based on cost and savings. The cumulative potential for these selected bundles constitutes achievable economic potential.

The following sections describe Cadmus' approach to estimating each type of potential.

6.3.1. Technical Potential

Technical potential includes all technically feasible ECMs, regardless of costs or market barriers. Technical potential divides into two classes: discretionary (retrofit) and lost opportunity (new construction and replacement of equipment on burnout).

Another important aspect in assessing technical potential is, wherever possible, to assume installations of the highest-efficiency equipment that are commercially available. For example, this study examined CFL and LED general-service lighting in residential applications. In assessing technical potential, Cadmus assumed that, as equipment fails or new homes are built, customers will install LED lighting wherever technically feasible, regardless of cost. Where applicable, CFLs would be assumed as installed in sockets ineligible for LEDs. This study treated competing non-equipment measures in the same way, assuming installation of the highest-saving measures where technically feasible.

In estimating technical potential, it is inappropriate to merely sum up savings from individual measure installations. Significant interactive effects can result from installations of complementary measures. For example, upgrading a heat pump in a home where insulation measures have already been installed can produce fewer savings than upgrades in an uninsulated home. Analysis of technical potential accounts for two types of interactions:

- Interactions between equipment and non-equipment measures: As equipment burns out, technical potential assumes it will be replaced with higher-efficiency equipment, reducing average consumption across all customers. Reduced consumption causes non-equipment measures to save less than they would if the equipment had remained at a constant average efficiency. Similarly, savings realized by replacing equipment decrease upon installation of non-equipment measures.
- Interactions between non-equipment measures: Two non-equipment measures applying to the same end use may not affect each other's savings. For example, installing a low-flow shower head does not affect savings realized from installing a faucet aerator. Insulating hot water pipes, however, causes water heaters to operate more efficiently, thus reducing savings from either measure. This study accounted for such interactions by stacking interactive measures, iteratively reducing baseline consumption as measures were installed, thus lowering savings from subsequent measures.

Although, theoretically, all retrofit opportunities in existing construction—often called discretionary resources—could be acquired in the study's first year, this would skew the potential for equipment measures and provide an inaccurate picture of measure-level potential. Therefore, the study assumed these opportunities would be realized in equal, annual amounts, over the 20-year planning horizon. By applying this assumption, natural equipment turnover rates, and other adjustments described above, annual incremental and cumulative potential could be estimated by sector, segment, construction vintage, end use, and measure.

This study's technical potential estimates drew upon best-practice research methods and standard utility industry analytic techniques. Such techniques remained consistent with the conceptual approaches and methodologies used by other planning entities (such as the Council in developing regional energy-efficiency potential) and remained consistent with methods used in City Light's previous CPAs.

6.3.2. Achievable Technical Potential

The achievable technical potential summarized in this report is a subset of the technical potential that accounts for market barriers. To subset the technical potential, Cadmus follows the approach of the Council and employs two factors:

- **Maximum achievability factors** represent the maximum proportion of technical potential that can be acquired over the study horizon.
- **Ramp rates** are annual percentages values representing the proportion of cumulative 20-year technical potential that can be acquired in a given year (discretionary measures) or the

proportion of technical annual potential that can be acquired in a given year (lost opportunity measures).

Achievable technical potential is the product of technical potential and both the maximum achievability factor and the ramp rate percentage. Cadmus assigned maximum achievability factors to measures based on the Council's draft 2021 Power Plan supply curves. Ramp rates are measure-specific and were based on the ramp rates developed for the Council's draft 2021 Power Plan supply curves but were accelerated based on the program accomplishments of City Light. The following sections provide additional detail about ramp rates.

6.3.2.1 About Measure Ramp Rates

The study applied measure ramp rates to lost opportunity and discretionary resources, although interpretation and application of these rates differed for each class, as described below. Measure ramp rates were based on the Council's draft 2021 Power Plan. As described above in *Treatment of State and Local Codes and Initiatives* section, Cadmus accounted for initiatives and legislation that promote energy efficiency through customer incentives or penalties (Seattle's Energy Benchmarking Program and Clean Buildings bill) by accelerating ramp rates for measures that are offered by City Light programs. These initiatives and legislation (including CETA) are viewed as mechanisms to speed up the rate of the adoption for energy efficiency.

For measures not specified in the draft 2021 Power Plan, the study assigned a ramp rate considered appropriate for that technology— i.e., the same ramp rate as a similar measure in draft 2021 Power Plan or Seventh Power Plan.

Lost Opportunity Resources

Quantifying achievable technical potential for lost opportunity resources in each year required determining amounts technically available through new construction and natural equipment turnover. New construction rates drew directly from City Light's customer forecast. The study developed equipment turnover rates by dividing units into each year by the measure life. For example, if 100 units initially had a 10-year life, one-tenth of units (10) would be replaced. The following year, 90 units would remain, and one-tenth of these (9) would be replaced and so on over the study's course.

As the mix of existing equipment stock ages, the remaining useful life (RUL) would equal—on average—one-half of the effective useful life (EUL). The fraction of equipment turning over each year would be a function of this RUL; thus, technical potential for lost opportunity measures would have an annual shape before applying ramp rates, as shown in Figure 6.3. The same concept applied to new construction, where resource acquisition opportunities became available only during home or building construction. In addition to showing an annual shape, Figure 6.3 demonstrates that amounts of equipment turning over during the study period were a function of the RUL: the shorter the RUL, the higher the percentage of equipment assumed to turn over.



Figure 6.3. Existing Equipment Turnover for Varying Remaining Useful Life (RUL)

In addition to natural timing constraints of equipment turnover and new construction rates, Cadmus applied measure ramp rates to reflect other resource acquisition limitations (such as market availability over the study's horizon). These measure ramp rates had a maximum ranging from 60 percent to 100 percent, reflecting the Council's measure-specific assumptions about the percentage of technical potential could be achieved over a 20-year planning horizon.

Figure 6.4 shows a measure with a maximum achievable percentage of 85 percent that ramps up over ten years. This measures would reach full market maturity—85 percent of annual technical potential—by the end of that period, while another measure might take 20 years to reach full maturity. Measures that were ramped over 20 years in this CPA included some newer technologies, such as heat pump dryers, whereas measures that were ramped over a shorter time period included more mature and accepted technologies, such as various LED lighting technologies.

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To calculate annual achievable technical potential for each lost opportunity measure, Cadmus multiplied technical resource availability and measure ramping effects together, consistent with the Council's methodology. In the early years of the study horizon, a gap occurs between assumed acquisition and the maximum achievability. These lost resources can be considered unavailable until the measure's EUL elapses. Therefore, depending on EUL and measure ramp rate assumptions, some potential may be pushed beyond the twentieth year, and the total lost opportunity, achievable economic potential may be less than the maximum achievable percentage of the technical potential.

Figure 6.5 shows a case for a measure with a five-year RUL/10-year EUL. The spike in achievable technical potential, starting in Year 11—after the measure's EUL—results from acquisition of opportunities missed at the beginning of the study period.



Figure 6.5. Example of Combined Effects of Resource Availability and Measure Ramping Based on 10-Year EUL

Table 6.4 illustrates this method, based on the same five-year RUL/10-year EUL measures on a 10-year ramp rate (the light blue line in Figure 6.5), assuming 1,000 inefficient units would be in place by Year 1. In the first ten years, lost opportunities would accumulate as the measure ramp-up rate caps the availability of high-efficiency equipment. Starting in the eleventh year, the opportunities lost during the previous ten years become available again. Table 6.4 also shows that this EUL and measure ramp rate combination results in 85 percent of technical potential achieved by the close of the study period.

As described, amounts of achievable potential are a function of the EUL and measure ramp rate. The same 10-year EUL measure, on a slower 20-year ramp rate, would achieve less of its 20-year technical potential—also shown in Table 6.4. Across all lost opportunity measures in this study, approximately 77 percent of technical potential appears achievable over the 20-year study period.

Year	Incremental Stock Equipment Turnover (Units)	Cumulative Stock Equipment Turnover (Units)	Measure Ramp Rate	Installed High- Efficiency Units	Missed Opportunities for Acquisition in Later Years (Units)	Missed Opportunities Acquired (Units)	Cumulative Units Installed	Cumulative Percent of Technical Achieved
1	200	200	9%	17	180	0	17	9%
2	160	360	16%	26	130	0	43	12%
3	128	488	24%	30	92	0	73	15%
4	102	590	31%	32	65	0	106	18%
5	82	672	39%	32	44	0	138	20%
6	66	738	47%	31	29	0	168	23%
7	52	790	54%	29	19	0	197	25%
8	42	832	62%	26	11	0	223	27%
9	34	866	70%	23	6	0	246	28%
10	27	893	77%	21	2	0	267	30%
11	21	914	85%	18	0	153	438	48%
12	17	931	85%	15	0	110	563	60%
13	14	945	85%	12	0	78	653	69%
14	11	956	85%	9	0	55	717	75%
15	9	965	85%	7	0	38	762	79%
16	7	972	85%	6	0	25	793	82%
17	6	977	85%	5	0	16	814	83%
18	5	982	85%	4	0	10	828	84%
19	4	986	85%	3	0	5	836	85%
20	3	988	85%	2	0	2	840	85%

Table 6.4. Example of Lost Opportunity Treatment: 10-Year EUL Measure on a 10-Year Ramp

Discretionary Resources

Discretionary resources differ from lost opportunity resources due to their acquisition availability at any point within the study horizon. From a theoretical perspective, this suggests that all achievable technical potential for discretionary resources could be acquired in the study's first year. From a practical

perspective, however, this outcome is realistically impossible due to infrastructure and budgetary constraints and customer considerations.

Furthermore, due to interactive effects between discretionary and lost opportunity resources, immediate acquisition distorts the potential for lost opportunity resources. For example, if one assumes that all homes would be weatherized in the program's first year, potentially available high-efficiency HVAC equipment would decrease significantly (i.e., a high-efficiency heat pump would save less energy in a fully weatherized home).

Consequently, the study addressed discretionary resources in two steps:

- Developing a 20-year estimate of discretionary resource technical potential, assuming technically feasible measure installations would occur equally (at 5 percent of the total available) for each year of the study, avoiding the distortion of interactions between discretionary and lost opportunity resources previously described.
- 2. Overlaying a measure ramp rate to specify the timing of achievable discretionary resource potential, thus transforming a 20-year cumulative technical value into annual, incremental, achievable technical values.

The discretionary measure ramp rates specify only the timing of resource acquisition and do not affect the portion of the 20-year technical potential achievable over the study period.

Figure 6.6 shows incremental (bars) and cumulative (lines) acquisitions for two different discretionary ramp rates. A measure with an 85 percent maximum achievability on the 10-year discretionary ramp rate reaches full maturity in ten years, with market penetration increasing in equal increments each year. A measure with an 85 percent maximum achievability on the emerging technology discretionary ramp rate would take longer to reach full maturity, though also gaining 85 percent of the total technical potential. Ultimately, it would arrive at the same cumulative savings as the measure on the ten-year ramp rate.


Figure 6.6. Examples of Discretionary Measure Ramp Rates

6.3.3. Development of Conservation IRP Inputs

Cadmus worked with City Light to determine the format of inputs into the IRP model. Cadmus compiled energy efficiency potential into the levelized costs bundles shown in Table 6.5. Cadmus spread the annual savings estimates over 8760-hour load shapes to produce hourly bundles. The number and delineating values of the electric levelized cost bundles remain unchanged from the 2020 CPA.

Bundle	\$/MWh
1	(\$9,999,999) to \$10
2	\$10 to \$20
3	\$20 to \$30
4	\$30 to \$40
5	\$40 to \$50
6	\$50 to \$60
7	\$60 to \$70
8	\$70 to \$80
9	\$80 to \$90

T	able	6.5.	Electric	Levelized	Cost	Bundle

\$/MWh	Bundle
\$90 to \$100	10
\$100 to \$110	11
\$110 to \$120	12
\$120 to \$130	13
\$130 to \$140	14
\$140 to \$150	15
\$150 to \$160	16
\$160 to \$9,999,999	17

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Cadmus derived the levelized cost for each measure using the following formula.

$$LCOE = \frac{\sum_{t=0}^{n} \frac{Expenses_{t}}{(1+i)^{t}}}{\sum_{t=0}^{n} \frac{E_{t}}{(1+i)^{t}}}$$

Where:

LCOE	=	The levelized cost of conserved energy for a measure
Expenses _t	=	All net expenses in the year t for a measure using the costs and benefits outlined in Table 6.6
i	=	The discount rate
n	=	The lifetime of the analysis (20-years)
Et	=	The energy conserved in year t

Cadmus grouped the achievable technical potential by levelized cost over the 20-year study horizon, allowing City Light's IRP model to select the optimal amount of energy efficiency potential, given various assumptions regarding future resource requirements and costs. The 20-year total resource levelized cost calculation incorporates numerous factors, which are consistent with the expense components shown in Table 6.6.

Туре	Component
Costs	Incremental Measure Equipment and Labor Cost
	Incremental Operations and Maintenance (O&M) Cost
	Administrative Adder
	Present Value of Non-Energy Benefits
Devestite	Present Value of Transmission and Distribution (T&D) Deferrals
Benefits	Secondary Energy Benefits
	10% Conservation Credit

Table 6.6. Levelized Cost Components

The levelized cost calculation incorporates several factors:

• **Incremental measure cost:** This study considered costs required to sustain savings over a 20-year horizon, including reinstallation costs for measures with useful lives less than 20 years. If a measure's useful life extended beyond the end of the 20-year study, Cadmus incorporated an end

effect that treated the measure's cost over its EUL,³⁰ considered an annual reinstallation cost for the remainder of the 20-year period.³¹

- Incremental operations and maintenance (O&M) costs or benefits: As with incremental measure costs, O&M costs were considered annually over the 20-year horizon. Cadmus used the present value to adjust the levelized cost upward for measures with costs above baseline technologies and downward for measures that decreased O&M costs.
- Administrative adder: Cadmus assumed program administrative costs of 16 percent of incremental measure costs in the residential sector and 22 percent of incremental measure costs in the commercial and industrial sectors.
- Non-energy benefits: A reduction in levelized costs for measures that saved resources (such as water or detergent). For example, the value of reduced water consumption from installing a lowflow shower head would reduce that measure's levelized cost. Council and RTF workbooks provide measure level non-energy benefit assumptions.
- **10 percent conservation credit and transmission and distribution (T&D) deferrals:** Each are treated as reductions in levelized cost for electric measures. The addition of this credit, per the Northwest Power Act, was consistent with the Council methodology and effectively served as an adder to account for unquantified external benefits from conservation when compared to other resources.³²
- Secondary energy benefits: A reduction in levelized costs for measures saving energy on secondary fuels. This treatment was necessitated by Cadmus' end-use approach to estimating technical potential. An example is R-60 ceiling insulation costs for a home with a gas furnace and an electric cooling system. For the gas furnace end use, Cadmus classified energy savings that R-60 insulation produced for electric cooling systems, conditioned on the presence of a gas furnace, as a secondary benefit that reduced the measure's levelized cost. This adjustment affected only the measure's levelized costs; the R-60's magnitude of energy savings on the gas supply curve was not affected by considering secondary energy benefits.

The approach adopted in calculating a measure's levelized cost of conserved energy aligned with that of the Council, considering the costs required to sustain savings over a 20-year study horizon (including reinstallation costs for measures with useful lives less than 20 years). If a measure's useful life extended beyond the end of the 20-year study, Cadmus incorporated an end effect, treating the measure's levelized cost over its useful life as an annual reinstallation cost for the remainder of the 20-year period.

³⁰ This refers to levelizing over the measure's useful life, equivalent to spreading incremental measure costs in equal payments, assuming a discount rate of City Light's weighted average cost of capital.

³¹ This method is applied to measures with a useful life of greater than 20 years and those with a useful life extending beyond the 20th year at the time of reinstallation.

³² Northwest Power and Conservation Council. January 1, 2010. *Northwest Power Act.* <u>https://www.nwcouncil.org/reports/northwest-power-act</u>

For example, Figure 6.7 shows the timing of initial and reinstallation costs for a measure with an eightyear lifetime, in context with the 20-year study. As a measure's lifetime in this study ends after the study horizon, the final five years (Year 17 through Year 20) were treated differently, leveling measure costs over the measure's eight-year life and treating these as annual reinstallation costs.

		Year																		
Component	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Initial Capital Cost																				
Reinstallation Cost																				

Figure 6.7. Illustration of Capital and Reinstallation Cost Treatment

As with incremental measure costs, Cadmus considered O&M costs annually over the 20-year horizon. The present value was used to adjust the levelized cost upward for measures with costs above baseline technologies and downward for measures that decreased O&M costs.

6.3.4. Achievable Economic Potential

According to WAC 194-37-070, City Light must consider conservation potential estimates using avoided costs equal to a forecast of regional market prices. Regional market price forecasts, however, do not reflect all costs for City Light to meet future resource need. Therefore, in the 2022 CPA, to assess the value of conservation and develop the economic potential, City Light used its IRP framework. The 2020 IRP Progress Report provided the foundation for the analysis to evaluate the achievable economic potential on its conservation programs.³³ In past conservation potential assessments, City Light used a conservation screening methodology that was based on a high-level avoided cost from the most recent IRP. This new integrated methodology evaluates conservation potential alongside power supply and other demand-side resource choices to more discretely target the conservation attributes that meet City Light's resource needs. This methodology creates a more equivalent way of looking at supply and demand-side resources.

This new framework also supports development of cost-effective targets for meeting CETA and preparation of a CEIP every four years. With the current regulatory timeline for the CPA and CEIP and with the City Light's 2022 IRP process in progress, City Light also included eight different scenarios [see section Portfolio Optimization Modeling] to test the robustness of the conservation targets and considered feedback from its IRP Technical Advisory Group in setting the targets.

6.3.4.1 City Light's IRP Portfolio Framework

The IRP framework is a decision support system that develops an optimal resource strategy, given the current forecasts of supply-side and demand-side resource costs and future load and market conditions. By using this framework for the CPA, the benefit of the conservation path is determined by establishing an

³³ City Light. 2020 Integrated Resources Plan Progress Report. https://www.seattle.gov/Documents/Departments/CityLight/2020IRPProgessReport.pdf

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optimal portfolio with conservation alongside resources that minimize the net present value (NPV) of City Light's total incremental portfolio cost. For the CPA, resources of all types are set up for analysis on an equivalent basis between 2022 to 2041. The model also uses end effects to capture CETA's requirements beyond the 20-year analysis and to make every portfolio equivalent. Each portfolio meets City Light's resource needs and compliance obligations. Figure 6.8 is a high-level overview of City Light's IRP framework.





The IRP framework captures several factors in selecting a resource strategy by methodically evaluating interactions between different options and policies. These interactions include the following:

- **City Light's Monthly Energy Resource Adequacy.** Resource adequacy is having sufficient generation, energy efficiency, storage, and demand-side resources to serve loads across a wide range of conditions.
- Washington Energy Independence Act (I-937) compliance.³⁴ In 2006, Washington voters approved Initiative 937 (I-937), which requires that major utilities invest in all cost-effective energy efficiency measures and sets targets for adding Northwest renewable energy as a percentage of load. Eligible renewable resources include water, wind, solar energy, geothermal energy, landfill gas, wave, ocean or tidal power, gas for sewage treatment plants, bio-diesel fuel, and biomass

³⁴ Washington State Legislature. RCW 19.285. Energy Independence Act. <u>https://apps.leg.wa.gov/rcw/default.aspx?cite=19.285</u>

energy. In 2020, the renewable energy target increased to 15 percent of load, and this target does not increase beyond the current level. The law also includes provisions to keep costs affordable for utilities. Today, City Light can comply under the "no load growth" option.

- Clean Energy Transformation Act (CETA) clean electricity compliance.³⁵ Approved by the Washington Legislature in 2019, CETA provides electric utilities in Washington a clear mandate to phase out greenhouse gas emissions. CETA requires that utilities eliminate the use of coal-fired resources after December 31, 2025. Additionally, all electricity sold to customers must be greenhouse gas neutral starting January 1, 2030, and greenhouse gas free by 2045. To be greenhouse gas neutral, a utility must supply at least 80 percent of its load with a combination of renewable and non-emitting resources. Utilities may use alternative compliance options during the greenhouse gas neutral period for no more than 20 percent of load.
- **Greenhouse gases.** City Light applies the Social Cost of Greenhouse Gases when evaluating conservation programs, developing IRPs, and evaluating mid- to long-term resource options during resource acquisition.
 - City Light's greenhouse gas neutrality policy. Since 2005, City Light has accounted for the greenhouse gas emissions used to serve retail load and purchased offsets for those emissions to be greenhouse gas neutral.³⁶
 - Clean Energy Transformation Act's social cost of greenhouse gases requirement. CETA establishes that a utility must incorporate a social cost of greenhouse gases in making resource decisions. CETA also sets a minimum cost that a utility must use from a technical study published in August 2016 by the Interagency Working Group on Social Cost of Greenhouse Gases. CETA also stipulates that a utility may use a higher cost if it can establish a reasonable basis for doing so.
- Bonneville Power Administration (BPA) contract impacts. Load and energy efficiency programs impact City Light's BPA power contract deliveries. As load declines, City Light receives less BPA power. The ability to add energy efficiency creates a choice for City Light and gives the utility some control over how much BPA power City Light receives. When a conservation path reduces City Light's BPA power deliveries, BPA's power costs are reduced and the change in BPA's contribution to resource adequacy is taken into account.
- Hourly energy sales and energy purchases. Conservation's impact on hourly demand and City Light's ability to reshape its existing hydro power resources to this change in load shape is taken into account in the IRP models. The models account for the hours when conservation makes City

³⁵ Washington State Legislature. RCW 19.405. Washington Clean Energy Transformation Act. <u>https://app.leg.wa.gov/RCW/default.aspx?cite=19.405</u>

³⁶ Climate Registry summary of City Light's utility-specific emission factors: <u>https://www.theclimateregistry.org/our-members/cris-public-reports/</u>

Light more surplus and sells more power, and it also accounts for when conservation reduces City Light's market purchases.

Third-party system transmission costs. For City Light, new supply resources will interconnect with another utility's transmission system. In the IRP framework, these transmission costs include the cost of moving power across other utility's transmission systems. Current limitations on moving power from specific locations of the transmission system is also taken into account. Table 6.7 provides a high-level comparison of the 2020 CPA methodology to the 2022 CPA methodology and important factors driving the updated targets.

	2020 CPA Approach	2022 CPA Approach					
Screening Method	Compare levelized avoided cost to measure levelized cost	Compare NPV of benefits to NPV of measure/resource cost					
Calculation of Net Benefits (Value Components)							
Bonneville Power Administration Net Market Position GHG	Application of Market Revenue, GHG costs, and BPA power costs without adjustment for change in hourly and monthly shapes and net energy position	Accounts for hourly changes in City Light energy position, reductions in GHG emissions consistent with CETA, and monthly changes to BPA power deliveries					
I-937 Need	Low cost renewable energy credit (REC) to meet I-937 requirements	Recognizes, by conservation measure groupings, the benefit in reducing I-937 (with multiple compliance options) and winter and					
Resource Adequacy Need	None	summer resource adequacy when competitive with other resource options					
Third-Party Transmission Costs	Flat annual BPA transmission rate	Conservation measures that are competitive with resources help reduce third-party transmission costs					

Table 6.7. Achievable (Economic) Potential Methodology Comparison

The 2022 CPA approach is better able to recognize the identified resource needs from City Light's new load forecast and more up-to-date alternative resource costs. The result is a CPA target based on the evaluation of conservation's monthly and hourly shapes to more closely match City Light's resource needs. The new analysis also takes into account CETA compliance and BPA contract high water impacts.

Overall, this new approach provides a better way for City Light to weigh the tradeoffs of different levels of investment in conservation. The combination of these factors led to selection of conservation at different levelized costs levels in the 2022 CPA than used in the 2020 CPA.

6.3.4.2 Conservation Resource Inputs into the IRP Framework

A main input into the IRP framework is the levelized costs bundles shown in Table 6.5. City Light created these bundles to minimize modeling run time. To evaluate all possible combinations of 17 levelized cost bundles for each of the three customer classes would have required optimization of the portfolio for approximately 5,000 combinations of conservation bundles. City Light further reduced the number of

combinations to evaluate by combining cost bundles where the achievements did not significantly increase, even at higher levelized cost bundles.

Figure 6.9 illustrates where City Light combined cost bundles. For example, residential levelized cost bundles \$10/MWh and \$20/MWh were combined because the additional achievement with the higher cost bundle was negligible. This led to eight residential, seven industrial, and eleven commercial cost bundles for a total of 616 bundles that included the no-conservation savings option for each customer class. This led to shorter run times without sacrificing precision.

The figure also shows the elasticity of the conservation supply curves by customer class. The industrial supply curve becomes inelastic at \$60/MWh, while the residential supply curve becomes inelastic above \$70/MWh. The commercial supply curve shows the highest elasticity but reaches high inelasticity above \$130/MWh. The inelasticity of conservation places a limit to the amount of conservation potential that can be relied upon to contribute to the portfolio.



Figure 6.9. Conservation Supply Curves – 2041 Cumulative Savings

The adjusted cost bundles and energy savings are the starting point for input into the IRP framework. The hourly conservation inputs allow City Light to reflect the seasonal and hourly economic benefits of

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conservation to the hydro system and to the overall generation portfolio. For each conservation sector (residential, commercial, and industrial) being evaluated, City Light's IRP framework develops an energy resource adequacy contribution for meeting City Light's resource adequacy needs.³⁷ Once this contribution is established, City Light conducts its portfolio optimization modeling. Refer to Volume 3 of this report for more information on the IRP framework.

Figure 6.10 and Figure 6.11 show that City Light has winter and summer energy resource adequacy needs that must be met.³⁸





³⁷ City Light's Hydro Risk and Reliability Analyzer (HydRRA) is the tool that calculates energy resources adequacy needs and contributions.

³⁸ Resource adequacy needs are established using simulations of loads and resources in HydRRA, assuming no new supply and conservation resources, a market reliance of 200 aMW, and an achievement of an adequacy target of loss of load events (LOLEV) no greater than two every ten years.





In the 2020 CPA, City Light did not identify any resource adequacy needs. New to the 2022 CPA are City Light's resources adequacy needs, which were found using the new IRP Framework, as shown in Figure 6.10 and Figure 6.11. The load forecast used in the 2022 CPA, which includes additional electrification from new codes and faster EV growth, leads to winter resource adequacy needs.

Summer resource adequacy needs are also identified in the 2022 CPA, as shown in Figure 6.11. This is due to changing regional power supply and demand, which has reduced and altered the reliability of surplus energy available from the wholesale market when City Light's hydro supply is low and demand is high.³⁹

Once these needs are identified, seasonal resource adequacy contributions of conservation by sector are developed for every year of the study.⁴⁰ Figure 6.12 and Figure 6.13 show the December and August resource adequacy contribution multipliers for conservation, respectively.

These multipliers indicate the energy contribution to resource adequacy relative to the monthly energy savings of each conservation bundle. For example, as shown in Figure 6.12 and Figure 6.13, approximately 1.0 aMW of commercial savings improves resource adequacy by 0.5 aMW in August 2030, while 1.0 aMW

³⁹ City Light. 2020 Integrated Resources Plan Progress Report. <u>https://www.seattle.gov/Documents/Departments/CityLight/2020IRPProgessReport.pdf</u>

⁴⁰ HydRRA is used to develop the seasonal and annual resource adequacy contributions of conservation by sector.

of commercial savings reduces the resource adequacy need for December 2030 by 0.5 aMW.⁴¹ Conservation can reduce BPA power deliveries more in the winter than in the summer largely because of how the power deliveries are defined in the BPA contract.⁴²



Figure 6.12. December Energy Resource Adequacy Contribution

⁴¹ The resource adequacy contribution is applied across all conservation measures within a particular bundle and sector.

⁴² As an example, the resource adequacy contribution of conservation in the winter before 2035 is negative for two primary reasons. First, City Light's BPA annual energy entitlement is below the maximum annual contractual energy entitlement ("high water mark"). Second, because existing power deliveries are shaped more toward the winter, a load reduction means a bigger power delivery reduction in the winter compared to the summer. Once loads begin to increase in 2035, the difference between the annual entitlement and the maximum annual contractual energy entitlement becomes smaller, this leads to an increase in the resource adequacy contribution of conservation.





6.3.4.3 Portfolio Optimization Modeling

The targets for 2022 CPA achievable economic conservation result from a systematic evaluation of the choices in supply-side and demand-side resources and are based on City Light's most recent estimates of load, resource costs, conservation savings, and future power market conditions. Technology and regulations are constantly evolving and the region's energy supply changes, so City Light obtained and included more up-to-date information about new resource costs and market conditions since its 2020 IRP Progress Report.

Nevertheless, because the future is unknown, City Light relied on more than one analysis. City Light reviewed a range of potential futures, or scenarios, to evaluate the factors that could change the targets for achievable economic potential.⁴³ Detailed information about the IRP's updated inputs, assumptions, and scenarios can be found in Volume III.

The IRP framework found that across all scenarios reviewed, five different conservation combinations rose to the top. Across the scenarios, the optimal result included all measures with a net levelized cost of \$40/MWh and below for the residential sector, \$70/MWh and below for the commercial sector, and \$160/MWh and below for the industrial sector. Table 6.8 shows the scenarios that were evaluated and in which scenario the five conservation bundles listed were optimal.

⁴³ In addition to good utility practice, WAC 194-070 requires City Light to test multiple scenarios.

	Ontinual Concomution	Achievable Economic Potential – aMW						
Scenarios	Bundle By Levelized Cost and Sector	2-Year (2022- 2023)	4-Year (2022- 2025)	10-Year (2022- 2031)	20-Year (2022- 2041)			
1. Baseline								
2. Resource Adequacy need delayed to 2030	Residential ≤ \$40/MWh Commercial ≤ \$70/MWh	19	35	77	106			
3. Forced selection of low cost demand response options	Industrial : All Bins							
4. Use short-term REC purchases to meet I-9375. No I-937 renewable energy requirement	Residential ≤ \$20/MWh Commercial ≤ \$50/MWh Industrial ≤ \$60/MWh	15	28	63	85			
6. No future winter Resource Adequacy needs	Residential ≤ \$40/MWh Commercial ≤ \$100/MWh Industrial ≤ \$60/MWh	21	39	84	114			
7. High Load 2030 to 2041	Residential ≤ \$70/MWh Commercial ≤ \$130/MWh Industrial : All Bins	22	41	93	136			
8. High Load 2030 to 2041 and no RPS	Residential ≤ \$70/MWh Commercial ≤ \$100/MWh Industrial : All Bins	21	40	88	129			

Table 6.8. Scenarios – Cumulative Achievable Economic Potential Results by Sector and Time Period

The analysis shows two-year targets that range from 30 percent lower to 4 percent higher than the 2020 CPA's two-year target of 21.3 aMW.

The eight scenarios show that City Light's conservation target can be sensitive to existing future conditions. Under some conditions, City Light's conservation targets are sensitive to I-937 compliance opportunities. For example, if City Light's current long-term load forecast is unchanged going forward and assuming I-937 can be met with renewable energy credits (RECs) that cost less than conservation, then the lower end of the range would be more desirable. Compared to the 2020 CPA, investments at the low end of the range still emphasize investment in higher-cost commercial and industrial measures but lower-cost residential measures. In other words, only residential measures with levelized costs of \$20 and below should be considered part of the conservation portfolio when lower-cost RECs are assumed to be available in the future and are part of the compliance option.

Conversely, if load is 5 percent higher compared to the current forecast in 2030 and 11 percent higher in 2041, then City Light would benefit by investing in conservation near the top end of the range. This higher load growth has little impact on the conservation target relative to the baseline scenario because the achievable economic target for the baseline scenario is currently at the inelastic portion of the achievable economic conservation potential. The analysis also shows that, in the future, greater conservation

investment and more demand response programs can be complementary. Demand response potential is outlined in Appendix E.

In summary, the optimal decision for economic conservation is an achievable economic target that recognizes the long-run benefit of conservation investments in supporting portfolio diversification.

With policies and new regulations aimed at mitigating the impacts of climate change, conservation continues to play a significant role in supporting a clean energy future and environmental equity.

Finally, though not the highest possible conservation level, the CPA target represents a robust strategy in the sense that it is chosen most frequently across various scenarios and performs well even in scenarios where it was not optimal.

Results from the 2022 CPA analysis are also being used to establish renewable energy, conservation, and demand response targets for City Light's 2022 Clean Energy Implementation Plan. Table 6.9 shows the optimal portfolio decisions for the 2022 CPA and the Clean Energy Implementation Plan. The portfolio is considered the most robust at this time; it represents the lowest reasonable cost and risk and was selected based on how it performed across the most scenarios. The table shows the projected new supply-side resources, changes in BPA power deliveries from the contractual high water mark, and the cumulative conservation savings. To keep the table simple, BPA and conservation savings are shown only for three representative years. City Light will continue to refine the long-term resource strategy in the 2022 IRP and through its work helping customers choose the resources that best meet their power needs.

Portfolio Resource Change	Year	Capacity
Spot RECs	2024	5
Spot RECs	2025	24
OR Solar Addition	2026	100
Gorge Wind Addition	2026	25
SE WA Solar Addition	2026	300
Gorge Wind Addition	2027	50
SE WA Solar Addition	2030	25
SE WA Solar Addition	2032	25
BPA aMW below Max	2026, 2030	-75
BPA aMW below Max	2041	-31
Cumulative Conservation Savings aMW (2-Year)	2023	19
Cumulative Conservation Savings aMW (4-Year)	2025	35
Cumulative Conservation Savings aMW (20-Year)	2041	106

Table 6.9. Optimal Portfolio Decisions

7. Glossary of Terms

These definitions draw heavily from the NAPEE Guide for Conducting Energy Efficiency Potential Studies and the State and Local Energy Efficiency Action Network.⁴⁴

Achievable potential: The amount of energy use that efficiency can realistically be expected to displace.

Benefit-cost ratio: The ratio (as determined by the Total Resource Cost [TRC] test) of discounted total benefits of the program to discounted total costs over some specified time period.

Conservation potential assessment: A quantitative analysis of the amount of energy savings that exists, proves cost-effective, or could potentially be realized through implementation of energy-efficient programs and policies.

Cost-effectiveness: A measure of relevant economic effects resulting from implementation of an energy efficiency measure. If the benefits of this selection outweigh its costs, the measure is considered cost-effective.

Economic potential: Refers to the subset of technical potential that is economically cost-effective compared to conventional supply-side energy resources.

End use: A category of equipment or service that consumes energy (e.g., lighting, refrigeration, heating, process heat).

End use consumption: Used for the residential sector, this represents per-UEC consumption for a given end use, expressed in annual kWh per unit. (Also called unit energy consumption [UEC]).

End-use intensities: Used in the commercial and institution sectors, energy consumption per square foot for a given end use, expressed in annual kWh per square foot per unit.

Energy efficiency: The use of less energy to provide the same or an improved service level to an energy consumer in an economically efficient way.

Effective useful life: An estimate of the duration of savings from a measure. EUL is estimated through various means, including the median number of years that energy efficiency measures installed under a program remain in place and operable. EUL also is sometimes defined as the date at which 50 percent of installed units remain in place and operational.

Levelized cost: The result of a computational approach used to compare the cost of different projects or technologies. The stream of each project's net costs is discounted to a single year using a discount rate (creating a net present value) and divided by the project's expected lifetime output (MWhs).

⁴⁴ SEEAction. 2012. Energy Efficiency Program Impact Evaluation Guide. NAPEE Guide for Conducting Energy Efficiency Potential Studies and the State and Local Energy Efficiency Action Network. Prepared by Steven R. Schiller, Schiller Consulting, Inc. <u>www.seeaction.energy.gov</u>

Lost opportunity: Refers to an efficiency measure or efficiency program seeking to encourage selection of higher-efficiency equipment or building practices than that typically chosen at the time of a purchase or design decision.

Measure: Installation of equipment, subsystems, or systems, or modifications of equipment, subsystems, systems, or operations on the customer side of the meter, designed to improve energy efficiency.

Portfolio: Either (a) a collection of similar programs addressing the same market, technology, or mechanisms; or (b) the set of all programs conducted by one organization.

Program: A group of projects with similar characteristics and installed in similar applications.

Retrofit: An efficiency measure or efficiency program intended to encourage replacement of functional equipment before the end of its operating life with higher-efficiency units (also called "early-retirement"), or the installation of additional controls, equipment, or materials in existing facilities for reducing energy consumption (e.g., increased insulation, lighting occupancy controls, economizer ventilation systems).

Resource Adequacy: having sufficient resources, generation, energy efficiency, storage, and demand-side resources to serve loads across a wide range of conditions.

Technical potential: The theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints (such as cost-effectiveness or the willingness of end-users to adopt the efficiency measures).

Total resource cost (TRC) test: A cost-effectiveness test that assesses the impacts of a portfolio of energy efficiency initiatives on the economy at large. The test compares the present value of efficiency costs for all members of society (including costs to participants and program administrators) compared to the present value of benefits, including avoided energy supply and demand costs.

Utility cost test (UCT): A cost-effectiveness test that evaluates impacts of efficiency initiatives on an administrator or an energy system. It compares administrator costs (e.g., incentives paid, staff labor, marketing, printing, data tracking, reporting) to accrued benefits, including avoided energy and demand supply costs. Also called the program administrator cost test (PACT).

2022-2023 Conservation Target Presentation to the Transportation and Utilities Committee Kali Hollenhorst and Jennifer Finnigan J. December 1, 2021

Barth A. A. Hadal



WE POWER SEATTLE

Why we are here

+Approve the recommended targets

+10-year target = 76.9 aMW (~94,000 homes)

+I-937 requires governing bodies to approve utilities' conservation targets every 2 years

Presentation overview

- 1. Introduction to conservation
- 2. Conservation target for 2022-2023
- **3.** What this target means for City Light

Conservation at City Light

- One of the longest continually operated energy conservation programs in country
- A top resource choice
 - Low cost
 - Low risk
 - Low environmental impact



Why we do potential assessments



Targets (by sector)

	2 2022	-Yr -2023	^{10-Yr} 2022-2031			
	aMW	Percent of Total	aMW	Percent of Total		
Residential	2.9	15%	11	14%		
Commercial	13.9	74%	57	74%		
Industrial	2.0	11%	9	12%		
Total	18.7		76.9			
	~23,000 homes		~94,000 home	25		

How the two-year target compares (by sector)

	2 2020	-Yr -2021	2-Yr 2022-2023		
	aMW	Percent of Total	aMW	Percent of Total	Change
Residential	2.8	13%	2.9	15%	4%
Commercial	16.1	76%	13.9	74%	-14%
Industrial	2.4	11%	2.0	11%	-17%
Total	21.3		18.7		-12%

Most of the conservation potential is in the commercial sector.

What changed?



Less potential overall, particularly less lighting potential



Fewer low-cost measures



New methodology that better reflects conservation's value to City Light

What this target means for City Light

Our commitment to conservation remains strong

+Continue to deliver innovative programs

- Target **seasonally** and **geographically**
- **Bundle** with demand response and electrification
- + Develop customer tools to manage energy use
- +Listen to customer and community voices



THANK YOU

