Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

Final Feasibility Study

Lower Duwamish Waterway

Seattle, Washington

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List of Acronyms

2D	two dimensional
3D	three dimensional
AEOLOS	Atmospheric Exchange Over Lakes and Oceans Study
AET	apparent effects threshold
AOC	Administrative Order on Consent
AOPC	area of potential concern
API	Asian and Pacific Islander
ARAR	applicable or relevant and appropriate requirement
As	arsenic
B(a)P	benzo(a)pyrene
B100	99.9% biodiesel
B2	2% biodiesel and 98% diesel fuel
B20	20% biodiesel
BAZ	biologically active zone
BBP	butylbenzyl phthalate
BCA	bias corrected accelerated
BCM	bed composition model
BDC	Boeing Developmental Center
BEHP	bis(2-ethylhexyl)phthalate
Bg	natural background
bgs	below ground surface
BHC	benzene hexachloride
BMP	best management practices
BOD	biological oxygen demand
BPJ	best professional judgment
C	Celsius
C	combined-technology alternative

CAD	contained aquatic disposal
CAP	Cleanup Action Plan
CDD	chlorinated dibenzodioxin
CDF	confined disposal facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFU	colony forming units
CLU-IN	EPA Hazardous Waste Clean-up Information
cm	centimeter
cm^3	cubic centimeter
CO	carbon monoxide
CO_2	carbon dioxide
COC	contaminant of concern
COPC	contaminant of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	cleanup screening level
CSM	conceptual site model
CSO	combined sewer overflow
CSTAG	Contaminated Sediment Technical Advisory Group
CT	central tendency
CTM	Candidate Technologies Memorandum
Cu	copper
CV-RMSE	cross-validation root mean square error
CWA	Clean Water Act
cy	cubic yards
D_{50}	median grain size
DAIS	Dredged Analysis Information System
DC	developmental center

DCA	disproportionate cost analysis
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyl-trichloroethane
DEA	David Evans and Associates
dm	dry matter
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DMMU	Dredged Material Management Unit
DNS	Determination of Non-Significance
DPD	City of Seattle Department of Planning and Development
DRCC	Duwamish River Cleanup Coalition
dw	dry weight
EAA	early action area
EBAP	Elliott Bay Action Program
EE/CA	engineering evaluation/cost analysis
EB/DRP	Elliott Bay/Duwamish Restoration Program
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
EM	edible meat
EMS	Environmental Management System
ENR	enhanced natural recovery
EOF	emergency overflow
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessment
ES&T	Journal of Engineering, Science and Technology
ESA	Endangered Species Act
ESG	Environmental Solutions Group

ESTCP	Environmental Security Technology Certification Program
EW	East Waterway
FDA	Food and Drug Administration
f_{oc}	fraction of organic carbon
FOS	factor of safety
ft	feet
ft^3	cubic foot
FEMA	Federal Emergency Management Act
FRTR	Federal Remediation Technologies Roundtable
FS	feasibility study
FSWP	feasibility study work plan
FWM	food web model
FY	fiscal year
g	gram
GAC	granular activated carbon
gal	gallon
GHG	greenhouse gas
GIS	geographic information system
GRA	general response action
GSA	General Services Administration
Hg	mercury
HHRA	human health risk assessment
HI	hazard index
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
HQ	hazard quotient
HTTD	high-temperature thermal desorption
IC	institutional control
IDW	inverse distance weighting
IR	ingestion rate
ISIS	Integrated Site Information System

JARPA	Joint Aquatic Resources Permit Application
KCDOT	King County Department of Transportation
KCWQA	King County Water Quality Assessment
kg	kilogram
Koc	organic carbon coefficient
L	liter
lb	pound
LDC	laboratory data consulting
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LN	natural log
LOAEL	lowest-observed-adverse-effect level
LOEC	lowest-observed-effect concentration
LPAH	low molecular weight polycyclic aromatic hydrocarbon
LTTD	low-temperature thermal desorption
µg	microgram
µm	micrometer or micron
M	moment magnitude
m	meter
m^2	square meter
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCUL	minimum cleanup level
MeHg	methylmercury
Metro	Municipality of Metropolitan Seattle
mg	milligram
MJ	megajoule
ML	maximum level
mL	milliliter

mm	millimeter
MHHW	mean higher high water
ML	maximum level
MLLW	mean lower low water
MOU	Memorandum of Understanding
MNR	monitored natural recovery
MT	metric ton
MTCA	Model Toxics Control Act
MUP	master use permit
n/a	not applicable
NAD83	North American Datum of 1983
NBB	National Biodiesel Board
nc	no value calculated
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
ng	nanogram
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effect level
NOEC	no-observed-effect concentration
NOS	National Ocean Service
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NSR	net sedimentation rate
NST	National Status and Trends
NTU	nephelometric turbidity units
O&M	operation and maintenance

oc	organic carbon (carbon normalized)
ODEQ	Oregon Department of Environmental Quality
OM&M	operation, maintenance, and monitoring
ORCA	Office of Ocean Resources Conservation and Assessment
OSV	ocean survey vessel
OU	operational unit
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCT	polychlorinated terphenyl
PEF	potency equivalency factor
pg	picograms
PGA	peak ground acceleration
PM_{10}	particulate matter less than 10 microns in diameter
POPs	persistent organic pollutants
ppt	parts per thousand
PQL	practical quantitation limit
PRG	preliminary remediation goal
PSA	preliminary screening of alternatives
PSAMP	Puget Sound Assessment and Monitoring Program (formerly known as the Puget Sound Ambient Monitoring Program)
PSAPCA	Puget Sound Air Pollution Control Agency
PSDDA	Puget Sound Dredged Disposal Analysis Program
PSEP	Puget Sound Estuary Program
PSNS	Puget Sound Naval Shipyard Complex
PSR	Pacific Sound Resources
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan

QC	quality control
R	removal-emphasis alternative
RAL	remedial action level
RAO	remedial action objective
RBC	risk-based concentration
RBTC	risk-based threshold concentration
RCRA	Resource Conservation and Recovery Act
RCM	reactive core mat
RCW	Revised Code of Washington
RD/RA	remedial design/remedial action
REL	remediation level
RFI	RCRA facility investigation
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RL	reporting limit
RM	river mile
RME	reasonable maximum exposure
RMSE	root mean square error
RNA	restricted navigation areas
RP/PEIS	Restoration Plan and Programmatic Environmental Impact Statement
ROD	Record of Decision
R-T	removal-emphasis alternative with treatment (soil washing)
RTDF	Remediation Technologies Development Forum
RTK-DGPS	real-time kinematic differential global positioning systems
RV	replacement value
SARA	Superfund Amendments and Reauthorization Act
SCA	source control area
SCAP	Source Control Action Plan
SCWG	Source Control Work Group

SD	storm drain
SDOT	Seattle Department of Transportation
SEPA	State Environmental Policy Act
SI	site investigation
SIM	selected ion monitoring
SITE	Superfund Innovative Technology Evaluation
SL	screening level
SMS	Sediment Management Standards
SO_x	sulfur oxides
SPI	sediment profile imaging
SPME	solid phase microextraction
SPU	Seattle Public Utilities
SQS	sediment quality standards
STAR	Sediment Transport Analysis Report
STFATE	Sediment Transport and FATE model
STM	sediment transport model
STP	sewage treatment plant
SVOC	semivolatile organic compound
SWAC	spatially-weighted average concentration
TBD	to be determined
TBT	tributyltin
TCDD	tetrachlorodibenzo-p-dioxin
TCDD	2,3,7,8-tetrachlorodibenzodioxin
TCLP	toxicity characteristic leaching procedure
TEF	toxic equivalency factor
TEQ	toxic equivalent
TI	technical impracticability
TIN	triangulated irregular network
TOC	total organic carbon

TPH	total petroleum hydrocarbons
TPPS	Toxicant Pretreatment Planning Study
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TSP	Tacoma Smelter Plume
TSS	total suspended solid
U&A	usual and accustomed
UCL	upper confidence limit
UCL95	95% upper confidence limit on the mean
UECA	Uniform Environmental Covenants Act
UL	upper limit
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USDOL	U.S. Department of Labor
USGS	U.S. Geological Survey
VOC	volatile organic compound
VM	verification monitoring
WAC	Washington Administrative Code
WB	whole body
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WDOH	Washington State Department of Health
WQC	water quality criteria
WQS	water quality standards
WSDOT	Washington State Department of Transportation
WSOU	Waterway Sediment Operable Unit
ww	wet weight
WWTP	wastewater treatment plant