



Engineering Evaluation/Cost Analysis Technical Briefing – Gasco Sediments Site

Presented by
NW Natural and Anchor QEA

October 19, 2011

Do Not Quote or Cite - Preliminary Discussion Draft
May Contain Errors - Restricted Distribution

Technical Briefing Agenda

- Introduction and Purpose
- Design Framework and Feasibility Study (FS) Integration
- Data Gaps Sampling/Results
- Summary of Lines of Evidence (LOEs) Evaluations
- Depth of Impact Analysis
- Development of Management Areas (Sub Sediment Management Areas - SubSMAs)
- Summary Description of Draft Engineering Evaluation/Cost Analysis (EE/CA) Alternatives

Introduction and Purpose

- NW Natural and Siltronic Corporation under AOC with EPA for design and implementation of final sediment remedy - concurrent with FS development
- AOC requires submittal of an EE/CA that includes identification and evaluation of cleanup alternatives
- Prior to EE/CA development, AOC requires technical briefing to present proposed EE/CA alternatives
- EPA to review and comment on proposed EE/CA alternatives followed by NW Natural response to comments
- Initiate EE/CA following resolution of comments

Summary of Design Framework and FS Integration

- Goal: Final sediment remedy to be implemented expeditiously following Record of Decision (ROD)
- Remedy includes “preference for removal” of substantial product
- Design will rely on the harbor-wide risk and FS information as it becomes available (iterative)
- Gasco design will be consistent/fully integrated with harbor-wide FS remedy and included in Proposed Plan

Summary of Data Gaps Sampling/Results

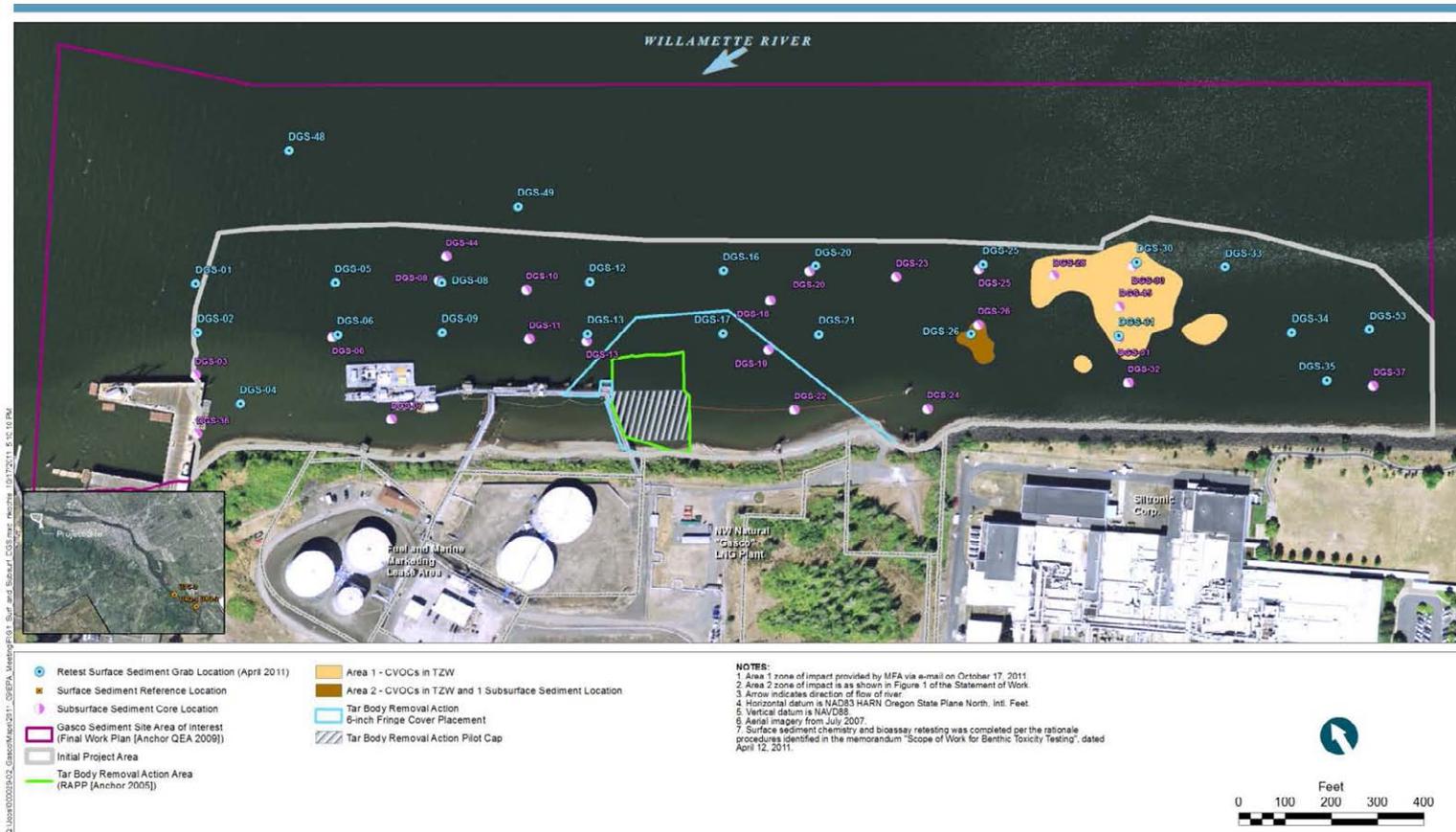
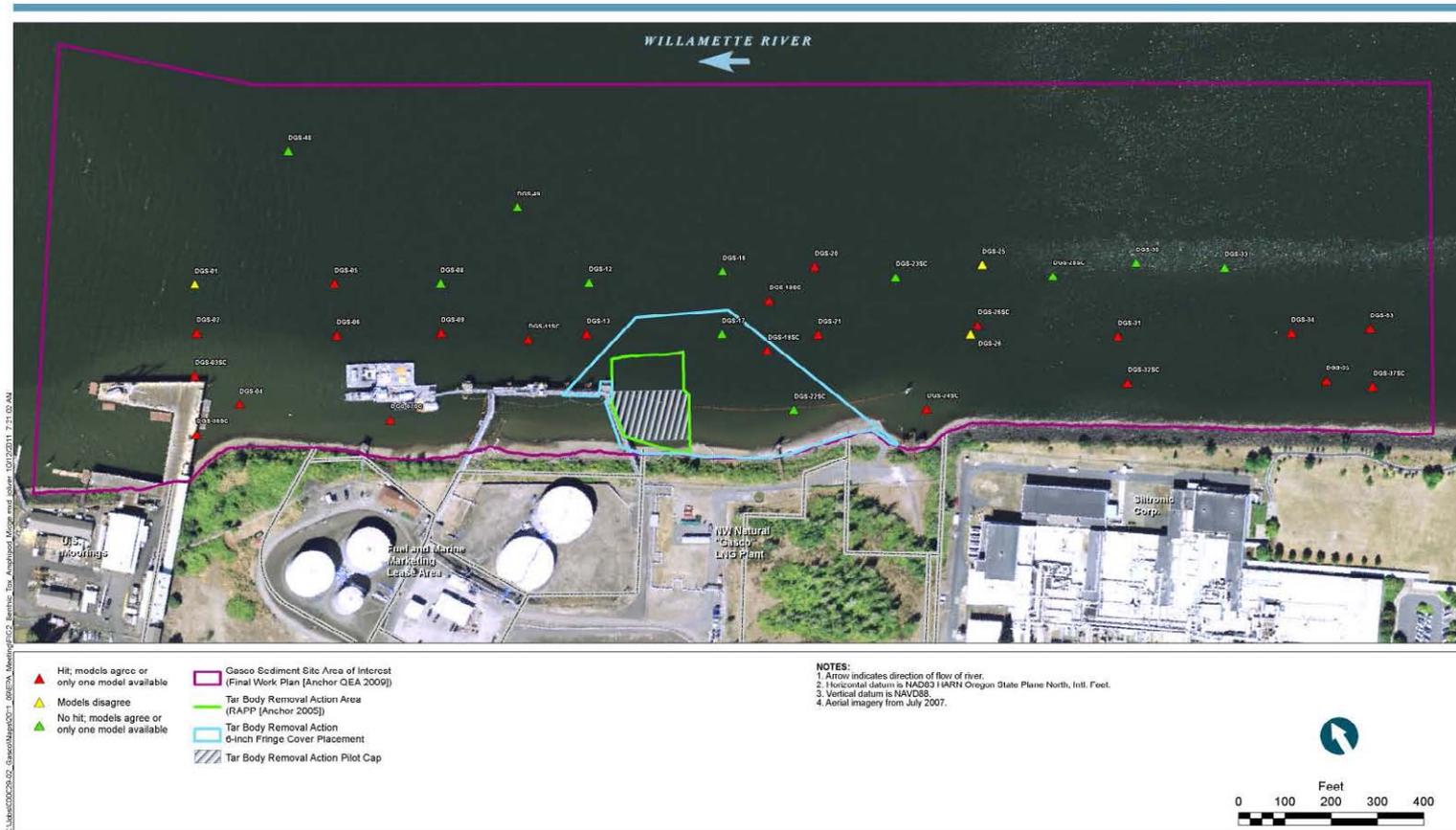


Figure 1
 Data Gaps Surface and Subsurface Sample Locations
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action

Summary of Data Gaps Sampling/Results

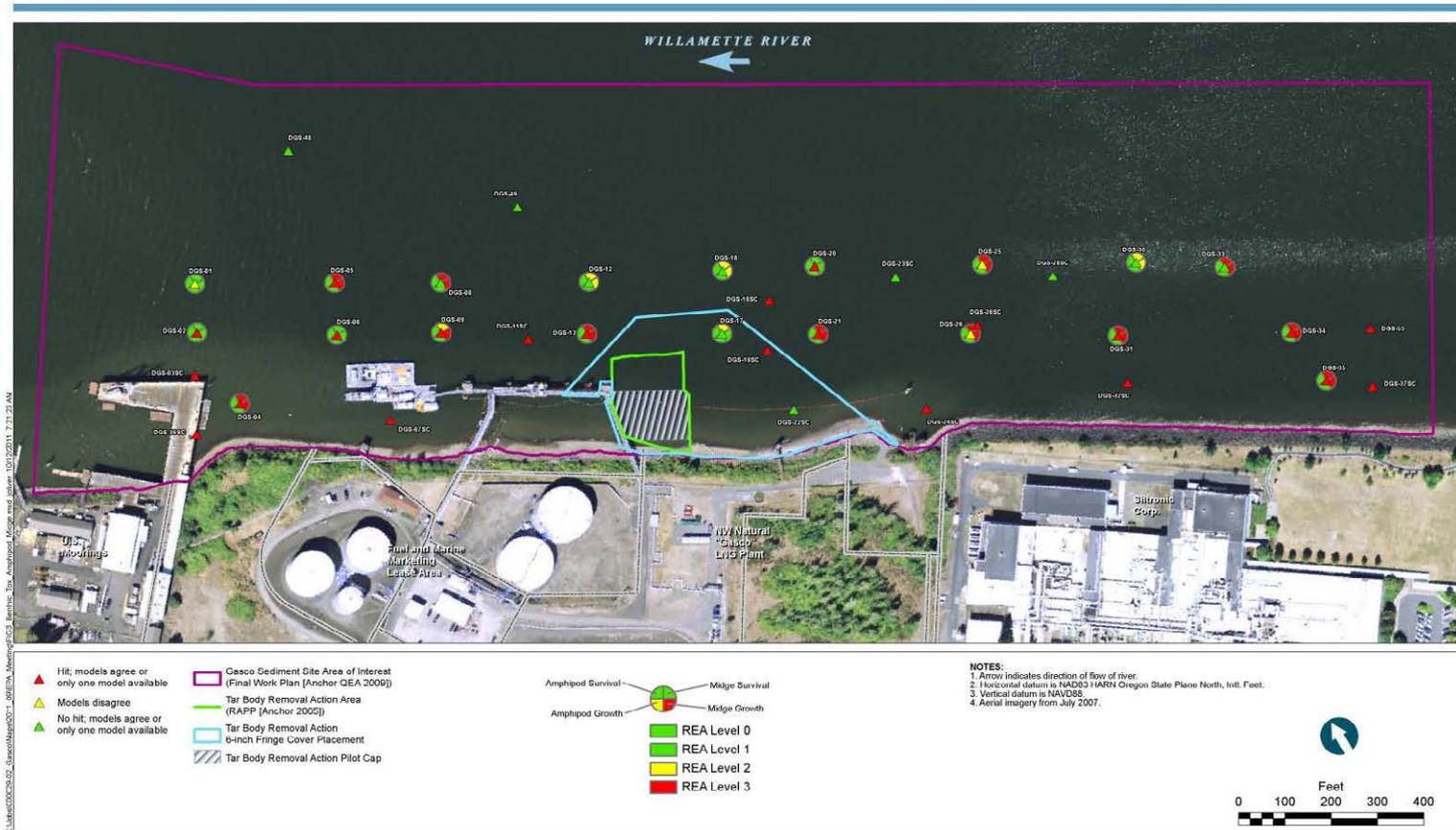


DRAFT – PRELIMINARY AND SUBJECT TO CHANGE

Figure 2
 Gasco Data Gaps Sampling Predictive Toxicity LOE Results
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Summary of Data Gaps Sampling/Results

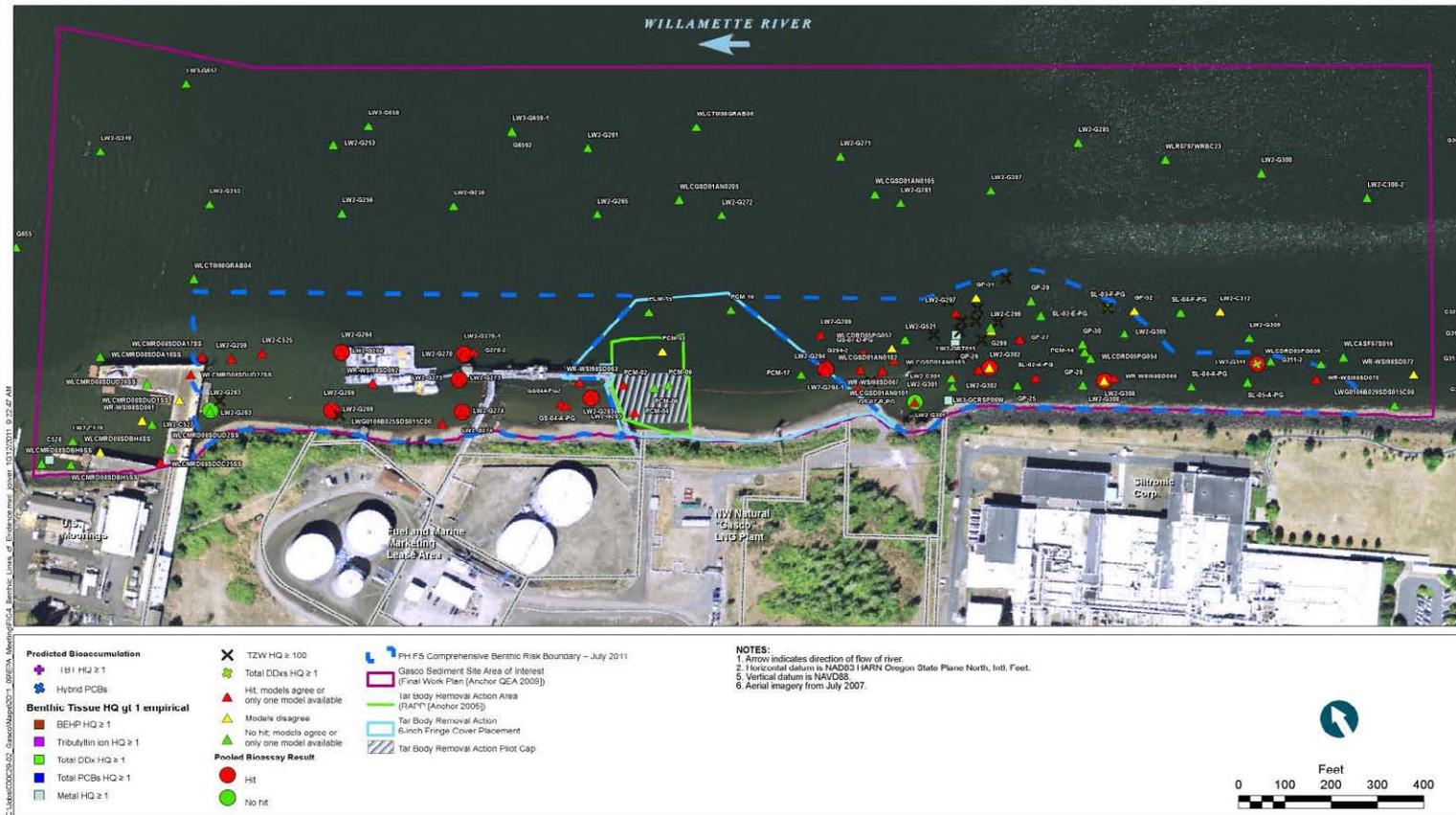


DRAFT – PRELIMINARY AND SUBJECT TO CHANGE

Figure 3
 Gasco Data Gaps Sampling Benthic Toxicity Results – Amphipod and Midge Performance
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Summary of Benthic Lines of Evidence



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE

Figure 4
 Benthic LOE's Used in PH FS - July 2011
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Summary of Benthic Lines of Evidence

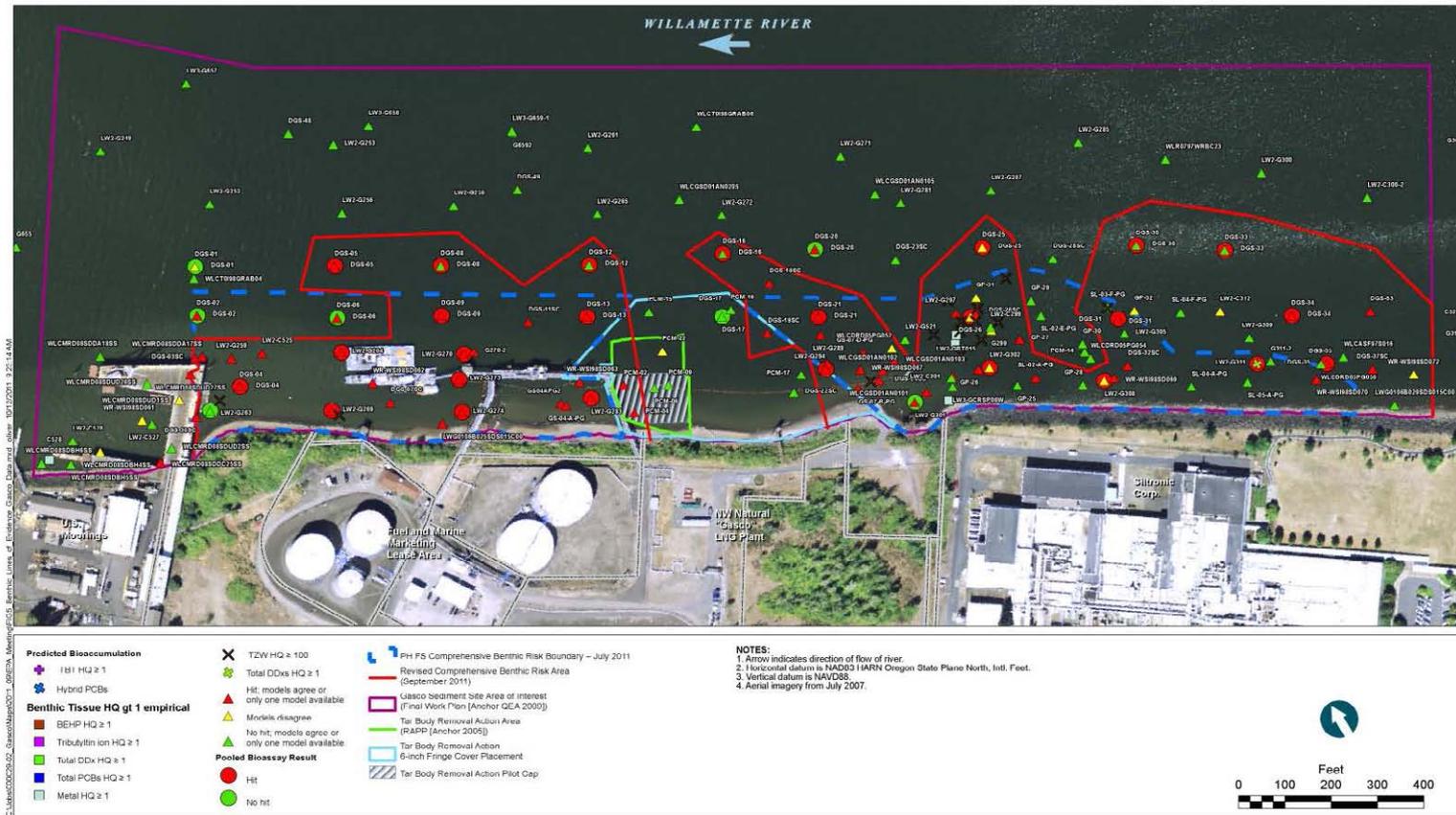


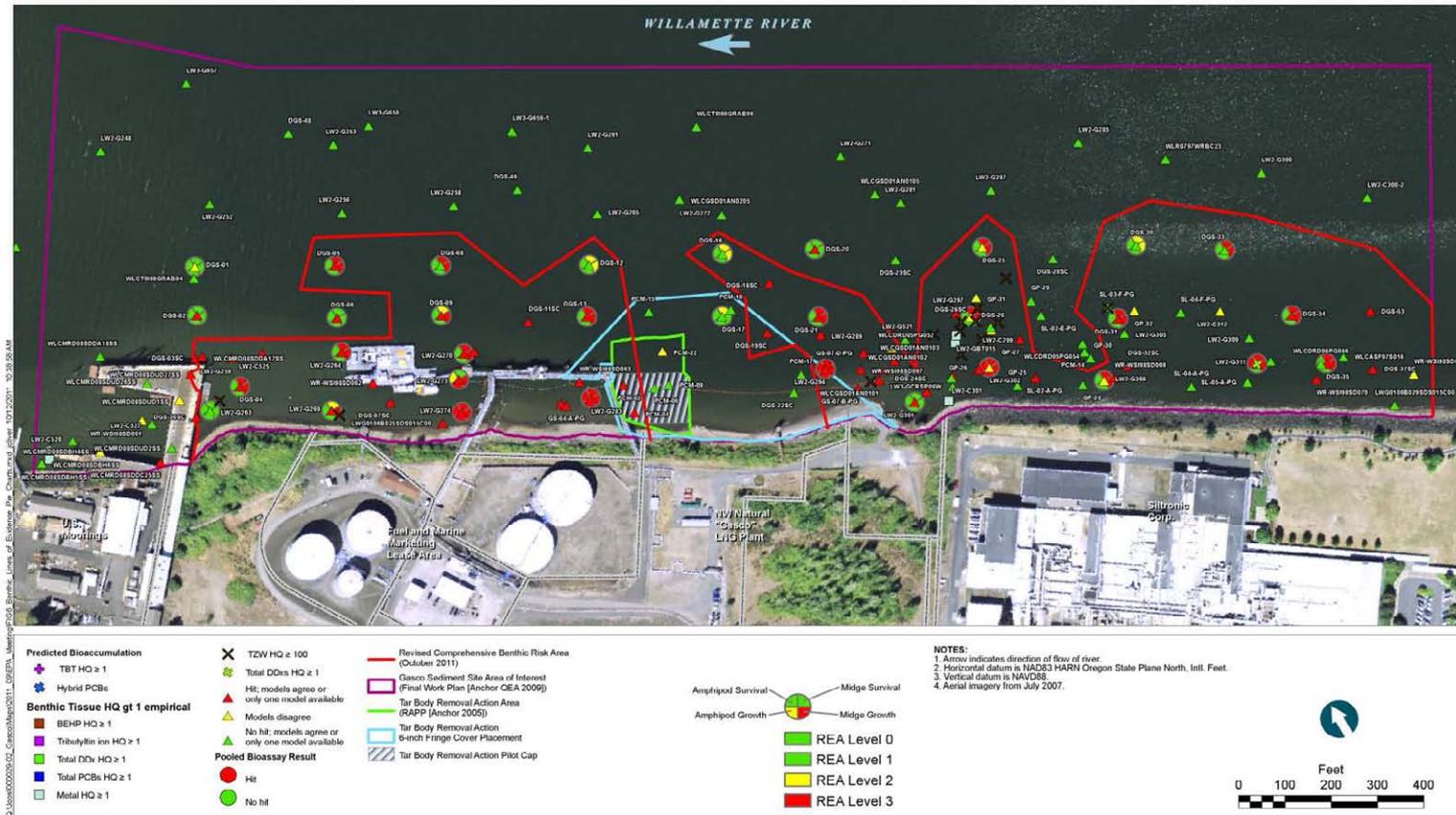
Figure 5
 Comparison of PH FS and Gasco Data Gaps Benthic LOEs
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE



Summary of Benthic Lines of Evidence



DRAFT – PRELIMINARY AND SUBJECT TO CHANGE

Figure 6
 Gasco Data Gaps Benthic LOEs Relative to Bioassay Performance
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Summary of FS RALs and Alternatives

- Portland Harbor FS currently includes remedial action levels (RALs) for six chemicals of concern (COCs) at variable concentrations across six alternatives (Alternatives B-G)
- RALs are applied on different spatial scales based on risk receptor and exposure pathway (e.g., BapEq RAL only applies shoreward of navigation channel)
- BapEq is a site-related COC and RAL concentrations range from 600 to 20,000 parts per billion (ppb) across alternatives
- Draft EE/CA will evaluate risk across a range of RALs identified in FS alternatives
- This presentation uses a BapEq RAL of 1,500 ppb, which conservatively results in the largest risk footprint of any alternative likely to be carried through the detailed evaluation of FS alternatives.

Summary of Benthic LOEs and FS RALs

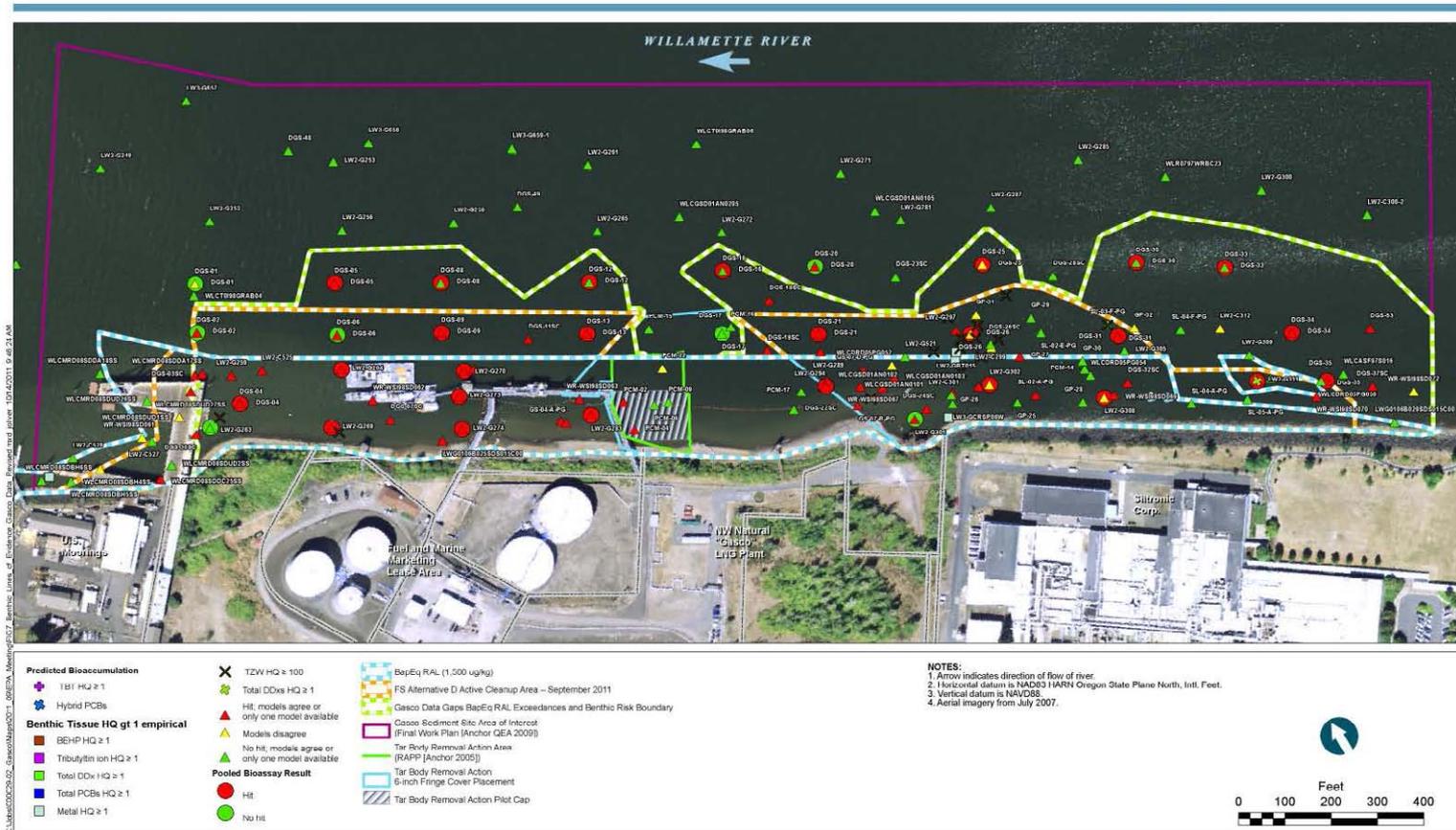


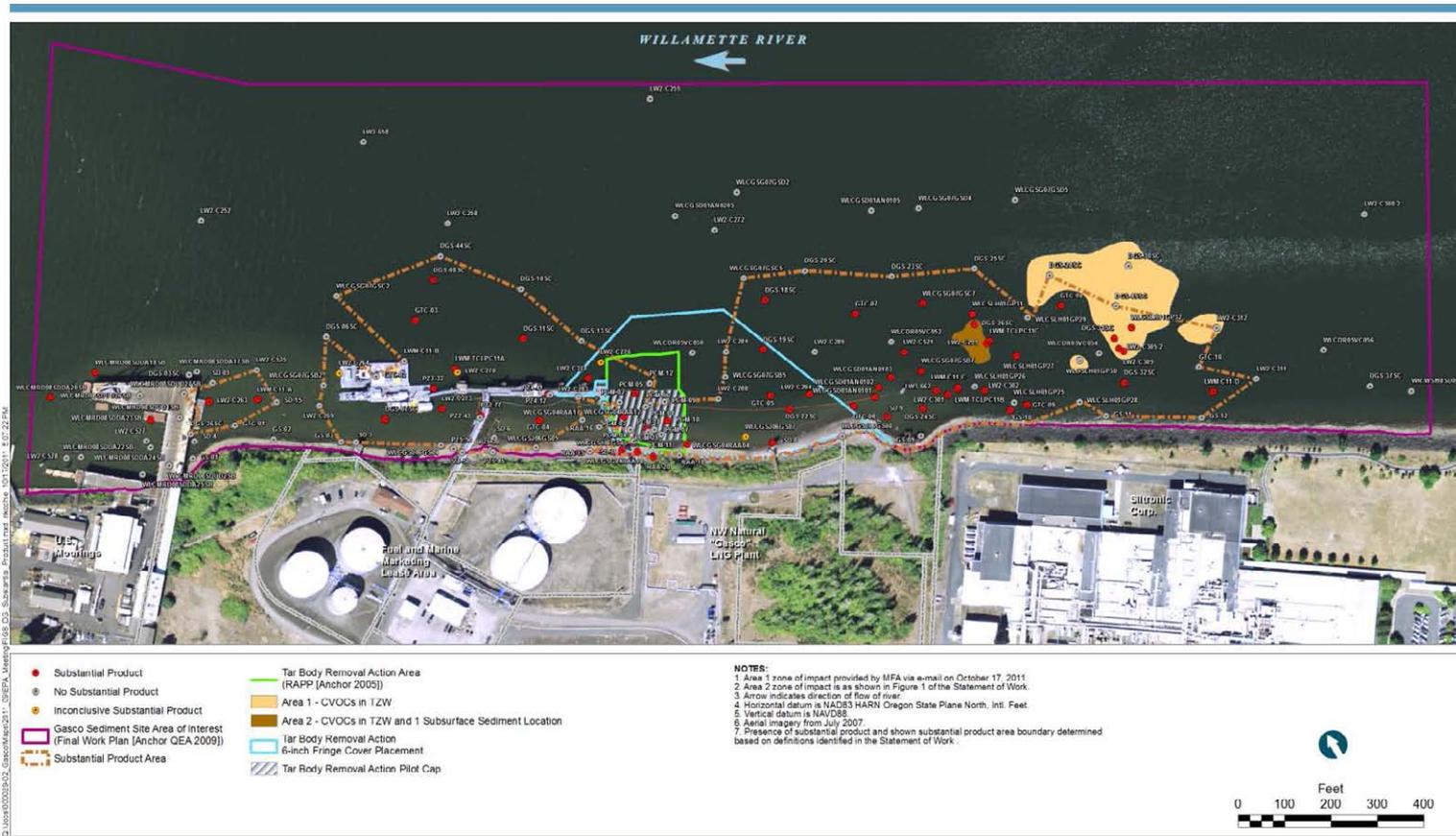
Figure 7
 Comparison of Gasco Data Gaps and PH FS Cleanup Boundaries –
 BapEq RALs and Benthic LOEs
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE



Summary of Substantial Product LOE



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE

Figure 8
 Summary of Presence of Substantial Product
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Development of Reduced EE/CA Remedial Footprint

Do Not Quote or Cite
Preliminary Discussion Draft
May Contain Errors
Restricted Distribution

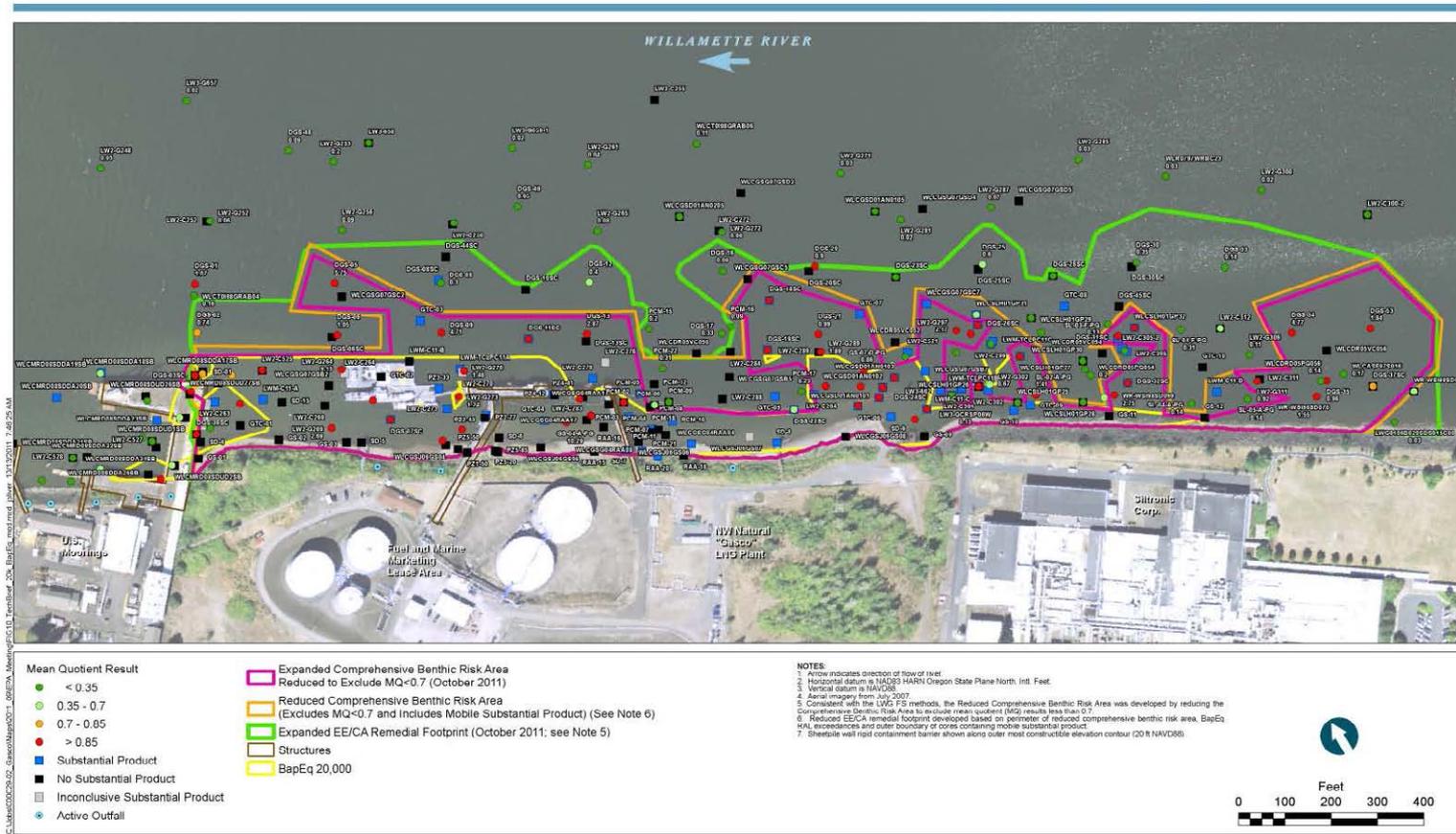


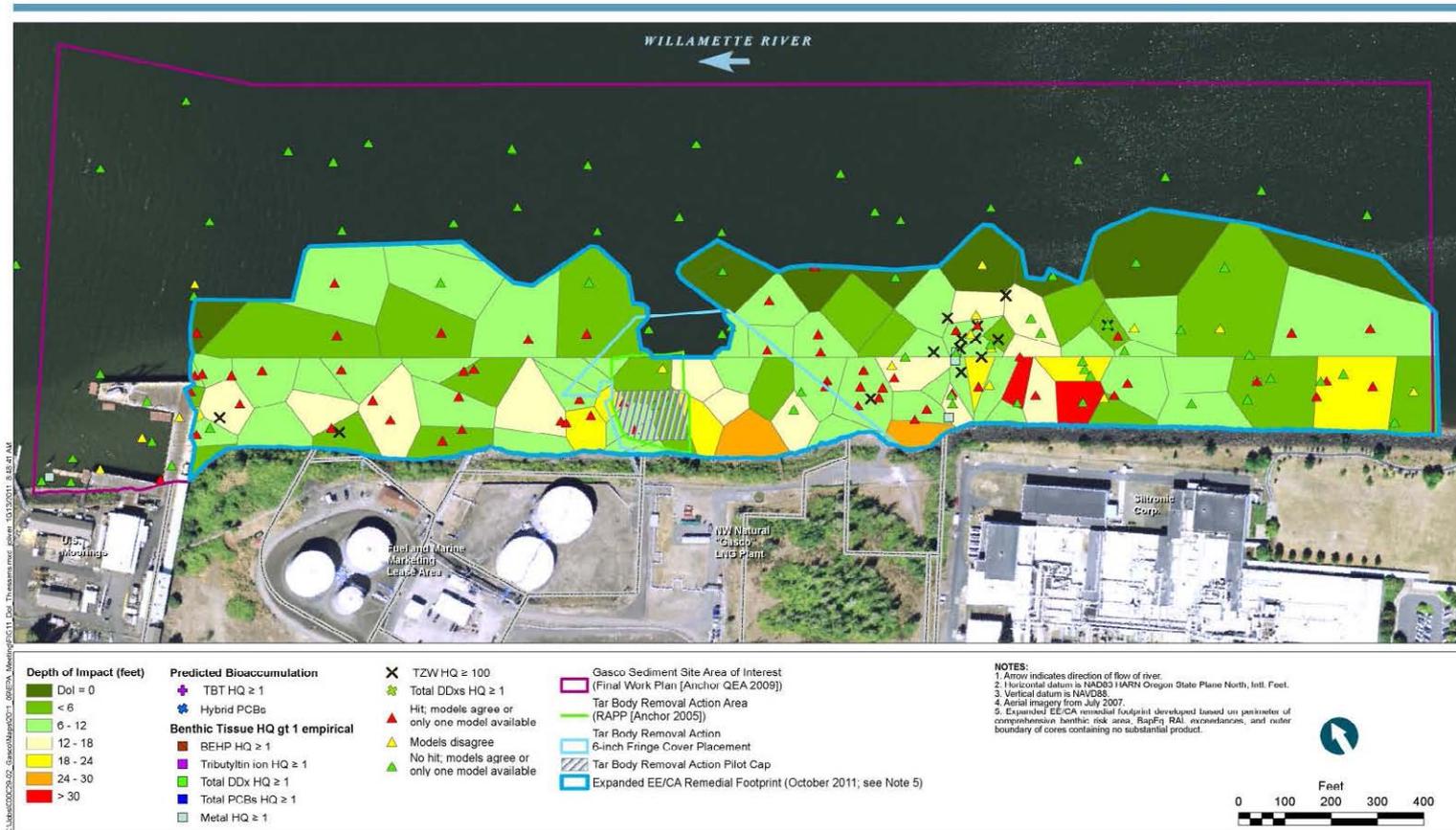
Figure 10
Summary of LOEs Used for EE/CA Alternatives Development – Reduced Remedial Footprint
Gasco EE/CA Technical Briefing – October 19, 2011
Gasco Sediments Cleanup Action



DRAFT – PRELIMINARY AND SUBJECT TO CHANGE



Depth of Impact Results – RAL DOIs



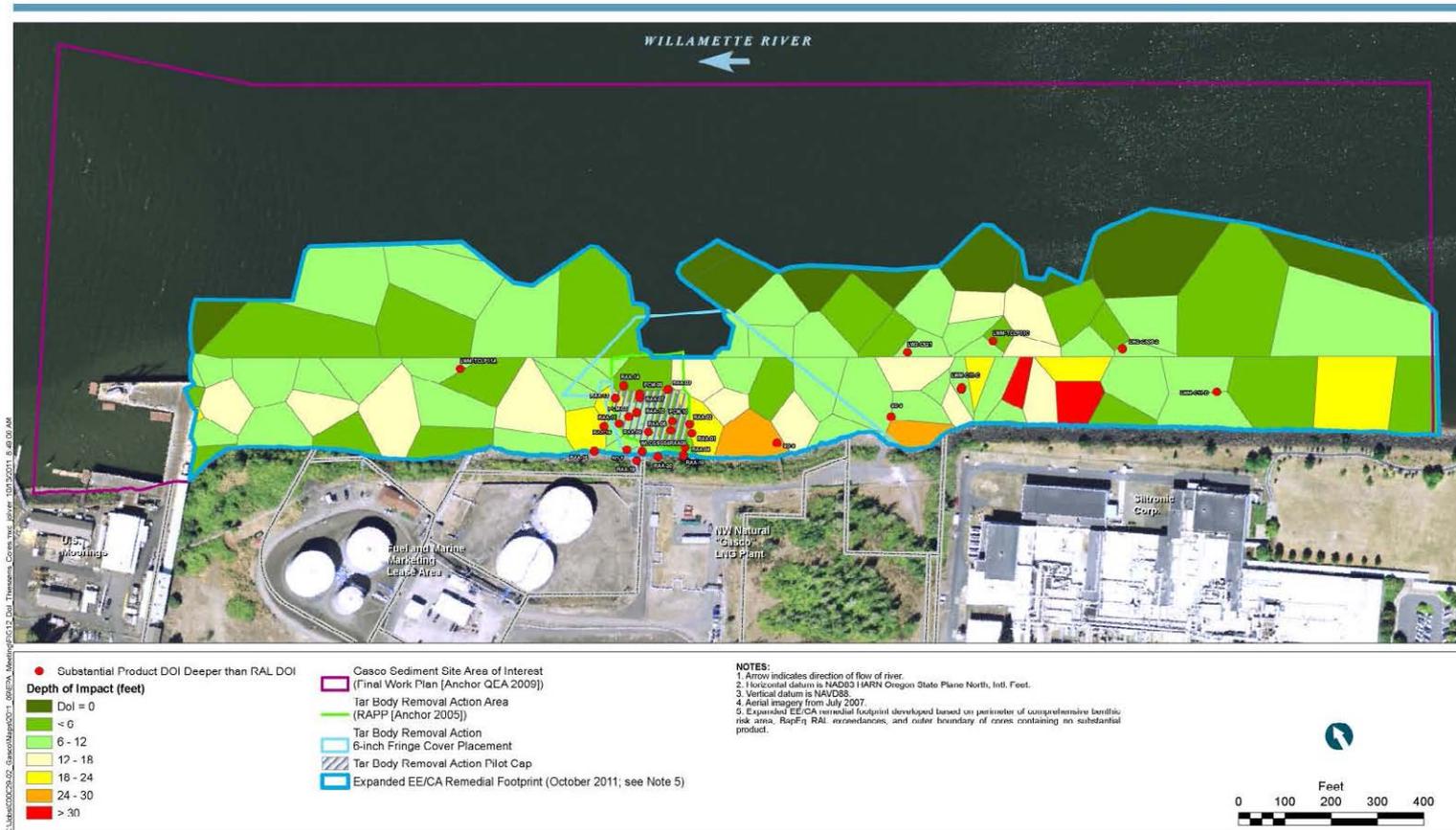
DRAFT – PRELIMINARY AND SUBJECT TO CHANGE

Figure 11
 PH RAL Depth of Impact Exceedances
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Depth of Impact Results – Substantial Product

Do Not Quote or Cite
Preliminary Discussion Draft
May Contain Errors
Restricted Distribution



DRAFT – PRELIMINARY AND SUBJECT TO CHANGE

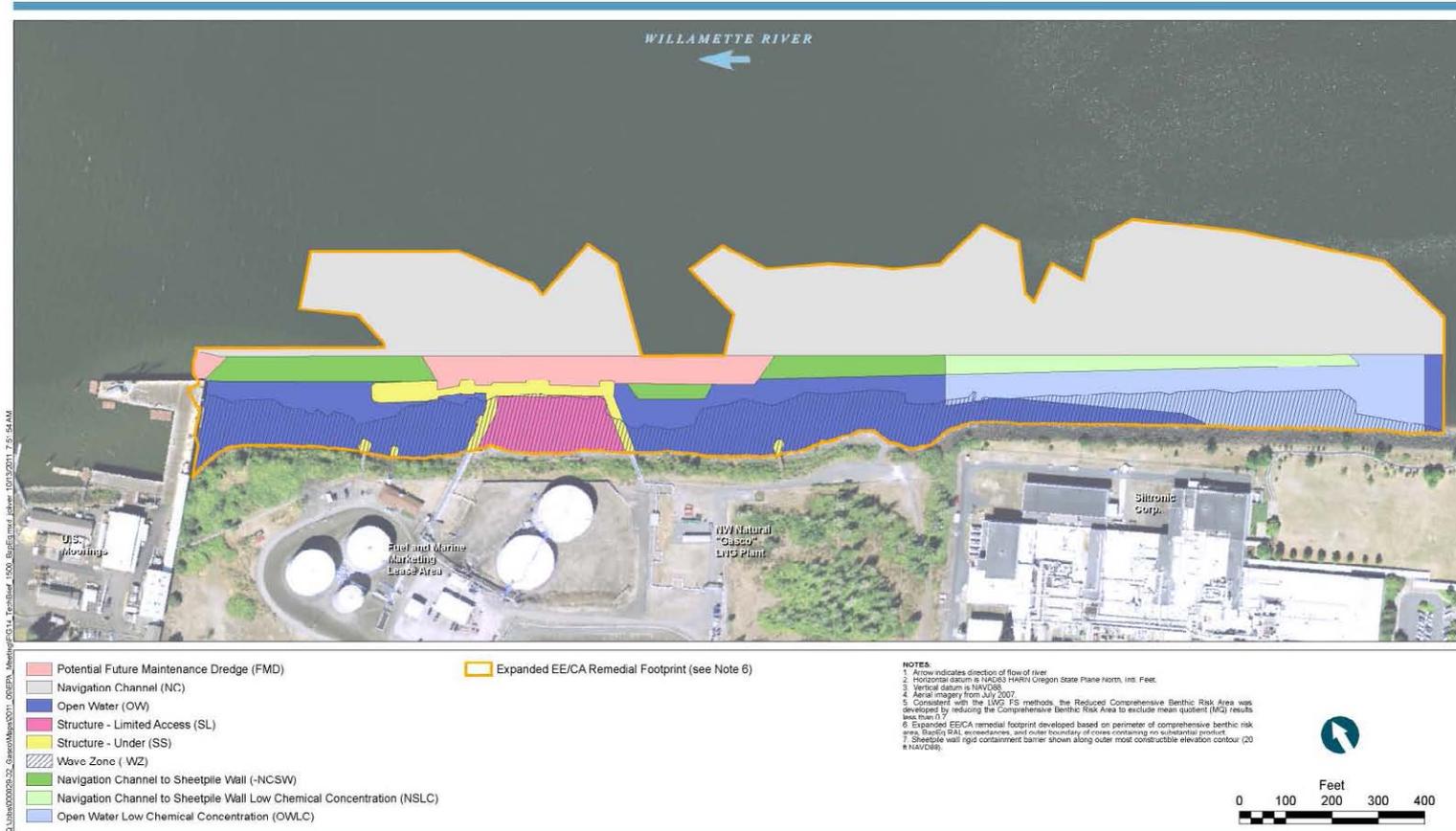
Figure 12
Comparison of PH RAL and Substantial Product Depth of Impact Exceedances
Gasco EE/CA Technical Briefing - October 19, 2011
Gasco Sediments Cleanup Action



Summary of SubSMA Development

- Consistent with Portland Harbor FS, application of remedial technologies within remedial footprint (SMA) based on considerations of site use, erosive forces, physical constraints, and chemical concentrations
- These considerations led to identification of distinct subareas, termed SubSMAs
- Draft EE/CA uses SubSMAs developed in FS, as well as three site-specific SubSMAs

Expanded Footprint SubSMA Designations



Q:\Jobs\00002032_Gasco\MapDocs\001_001EPA_Memo\EECA_L1_TechBrief_1000_Brief\SubSMA_Designs_10112011_7:35:44AM



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE

Figure 14
 Expanded EE/CA Remedial Footprint SubSMA Designations
 Gasco EE/CA Technical Briefing - October 19, 2011
 Gasco Sediments Cleanup Action



Reduced Footprint SubSMA Designations



DRAFT - PRELIMINARY AND SUBJECT TO CHANGE



SubSMA Development and Preliminary Technology Screening

Label	Feature	Description	MNR ¹	EMNR	In-Situ Treatment	Engineered and Active Capping	Full Removal
NC	Navigation Channel	Areas within the current federally authorized navigation channel.	SOME ²	SOME ²	SOME ²	No	YES
FMD	Potential Future Maintenance Dredge Area	Approach areas located between the NC areas and docks where shipping access is needed now or in the future.	No	No	POTENTIALLY ³	POTENTIALLY ³	YES
SS	Structure - Under	Areas located beneath structures including a 5 foot offset from the structure face. ⁴	No	No	YES	YES	No
SL	Structure – Limited Access	Areas where larger open water equipment is not accessible due to structures. Smaller water-based equipment would have to be used.	No	No	YES	YES	YES ⁵
OWLC	Open Water in Low Chemical Concentration Areas	Open water area in upstream nearshore area that contains lower surface sediment chemical concentrations.	No	YES	YES	YES	YES
NCSW	Between Navigation Channel and Sheetpile Wall	Open water area between the navigation channel and sheetpile wall rigid containment barrier located at maximum constructable offshore location on -20 ft NAVD88 contour. ⁵	No	No	YES	YES	YES
NSLC	Between Navigation Channel and Sheetpile Wall with Low Chemical Concentrations	Open water area between the navigation channel and sheetpile wall rigid containment barrier located at maximum constructable offshore location on -20 ft NAVD88 contour that contains lower surface sediment chemical concentrations. ⁵	NO	YES	YES	YES	YES
OW	Open Water	Areas not impacted by structures (SS, SL) or within navigation channels (NC) or potential future maintenance dredge (FMD) areas.	No	No	YES	YES	YES
OTHER CONSIDERATIONS							
-WZ	Wave Zone	Area above 0 NAVD88 subject to wake and wind generated waves.	No	No	No	YES	YES

Notes:

All screening results in this table are for Draft EE/CA purposes only, and all technologies discussed here may be subject to change as determined during EE/CA development.

1 - MNR is considered implementable in select areas of the navigation channel within the Gasco Sediments Site.

2 - Enhanced monitored natural recovery (EMNR), in-situ treatment, and engineered/active capping screened in for one portion of navigation channel in Project Area with low surface sediment chemical concentrations and no RAL exceedances (for all FS alternative RAL levels) in subsurface sediments. Screened out for all other areas in navigation channel due to depth of impact results relative to future potential navigation channel maintenance dredge elevations.

3 - In-situ treatment and engineered/active capping screened in for potential future maintenance dredge area associated with dock (currently permitted for -30 ft CRD) due to ongoing evaluations of future development plans and dock use. These evaluations will be completed during the EE/CA process to determine if these technologies are applicable to this SubSMA.

4 - The SS designation includes some "light" structures that can be removed and relocated to allow dredging underneath. These light structures will be identified in the Draft EE/CA.

Otherwise, removal (and therefore the potential for ex-situ treatment) was screened out as not implementable in SS areas.

5 - Removal in areas adjacent to structures would require appropriate offset from structures to avoid damage.

6 - Site use, locations of structures, and water depths significantly limit implementability of sheetpile wall rigid containment barrier for water quality controls during dredging. Preliminary evaluations indicate deepest possible depth allowable for sheetpile wall is at approximately -20 ft NAVD88 elevation contour.

Summary Description of Alternatives for Gasco Sediments Site

Do Not Quote or Cite
Preliminary Discussion Draft
May Contain Errors
Restricted Distribution

No.	Name - Area Remediated	BaPEq RAL (ppb)*	Benthic Toxicity	Substantial Product	Technology Options
A	No further action	None	None	None	None
B-r1	REMOVAL Focused 1 - Active remediation consistent with Portland Harbor <u>reduced</u> SMAs	20,000	Comp. Benthic Risk Areas achieved at Year 10 (estimated)	All accessible substantial product removed except three stations with substantial depth of clean overburden.	Full removal in most cases (e.g., provide stable slopes), dock removal/replacement, sheetpile wall isolation where feasible (e.g., water depth). In place technologies where necessary (e.g., shoreline slopes). MNR in CBRAs achieved at Year 10.
B-r2	REMOVAL Focused 2 - Active remediation consistent with Portland Harbor <u>reduced</u> SMAs	20,000	Comp. Benthic Risk Areas achieved at Year 10 (estimated)	All accessible substantial product removed except three stations with substantial depth of clean overburden.	Full removal in most cases (e.g., allow offsets with structures), no dock removal, no sheet pile wall. In place technologies where necessary (e.g., slopes and structures). MNR in CBRAs achieved at Year 10.
B-rP	PARTIAL REMOVAL Focused - Active remediation consistent with Portland Harbor <u>reduced</u> SMAs.	20,000	Comp. Benthic Risk Areas achieved at Year 10 (estimated)	All substantial product actively remediated except three stations with substantial depth of clean overburden.	Partial removal and cap back in most cases (e.g., removal only in areas of shallow contamination). No dock removal or sheet pile walls. In place technologies in some areas (e.g., slopes, structures, lower contamination levels). MNR in CBRAs achieved at Year 10.
B-i	IN PLACE** Focused - Active remediation consistent with Portland Harbor <u>reduced</u> SMAs	20,000	Comp. Benthic Risk Areas achieved at Year 10 (estimated)	All substantial product actively remediated except three stations with substantial depth of clean overburden.	In place technologies in most cases (e.g., removal in navigation areas). MNR in CBRAs achieved at Year 10.
C-r1	REMOVAL Focused 1 - Active remediation consistent with Portland Harbor <u>expanded</u> SMAs	1,500	Comp. Benthic Risk Areas achieved at Year 0	All accessible substantial product removed.	Full removal in most cases (e.g., provide stable slopes), dock removal/replacement, sheetpile wall isolation where feasible (e.g., water depth). In place technologies where necessary (e.g., shoreline slopes).
C-r2	REMOVAL Focused 2 - Active remediation consistent with Portland Harbor <u>expanded</u> SMAs	1,500	Comp. Benthic Risk Areas achieved at Year 0	All accessible substantial product removed.	Full removal in most cases (e.g., allow offsets with structures), no dock removal, no sheet pile wall. In place technologies where necessary (e.g., slopes and structures).
C-rP	PARTIAL REMOVAL Focused - Active remediation consistent with Portland Harbor <u>expanded</u> SMAs.	1,500	Comp. Benthic Risk Areas achieved at Year 0	All accessible substantial product actively remediated.	Partial removal and cap back in most cases (e.g., removal only in areas of shallow contamination). No dock removal or sheet pile walls. In place technologies in some areas (e.g., slopes, structures, lower contamination levels).
C-i1	IN PLACE Focused 1 - Active remediation consistent with Portland Harbor <u>expanded</u> SMAs	1,500	Comp. Benthic Risk Areas achieved at Year 0	All accessible substantial product actively remediated.	In place technologies in most cases (e.g., removal in navigation areas).
C-i2	IN PLACE Focused 2 - Active remediation consistent with Portland Harbor <u>expanded</u> SMAs	1,500	Comp. Benthic Risk Areas achieved at Year 0	All accessible substantial product actively remediated.	In place technologies in most cases (e.g., removal in navigation areas) with greater emphasis on EMNR and in-situ treatment. MNR in some outlying areas with low toxicity/concentrations and no substantial product.

Notes:

*Consistent with Portland Harbor FS, prospective RAL point of compliance is the maximum layer-weighted-average up to 30 cm below mudline.

** In Place remedial technologies include a range of process options with similar effectiveness, implementability, and cost, including armored caps, sand caps, EMNR, or in-situ treatment (e.g., activated carbon placement), depending on subSMA-specific characteristics.

CBRA - Comprehensive benthic risk areas as defined in Portland Harbor process.

EMNR - Enhanced Monitored Natural Recovery

MNR - Monitored Natural Recovery

RAL - Remedial Action Level

SMA - Sediment Management Area