SMS Rule Revisions
Implementing the Framework

Washington State Department of Ecology

DEPARTMENT OF
ECOLOGY
State of Washington

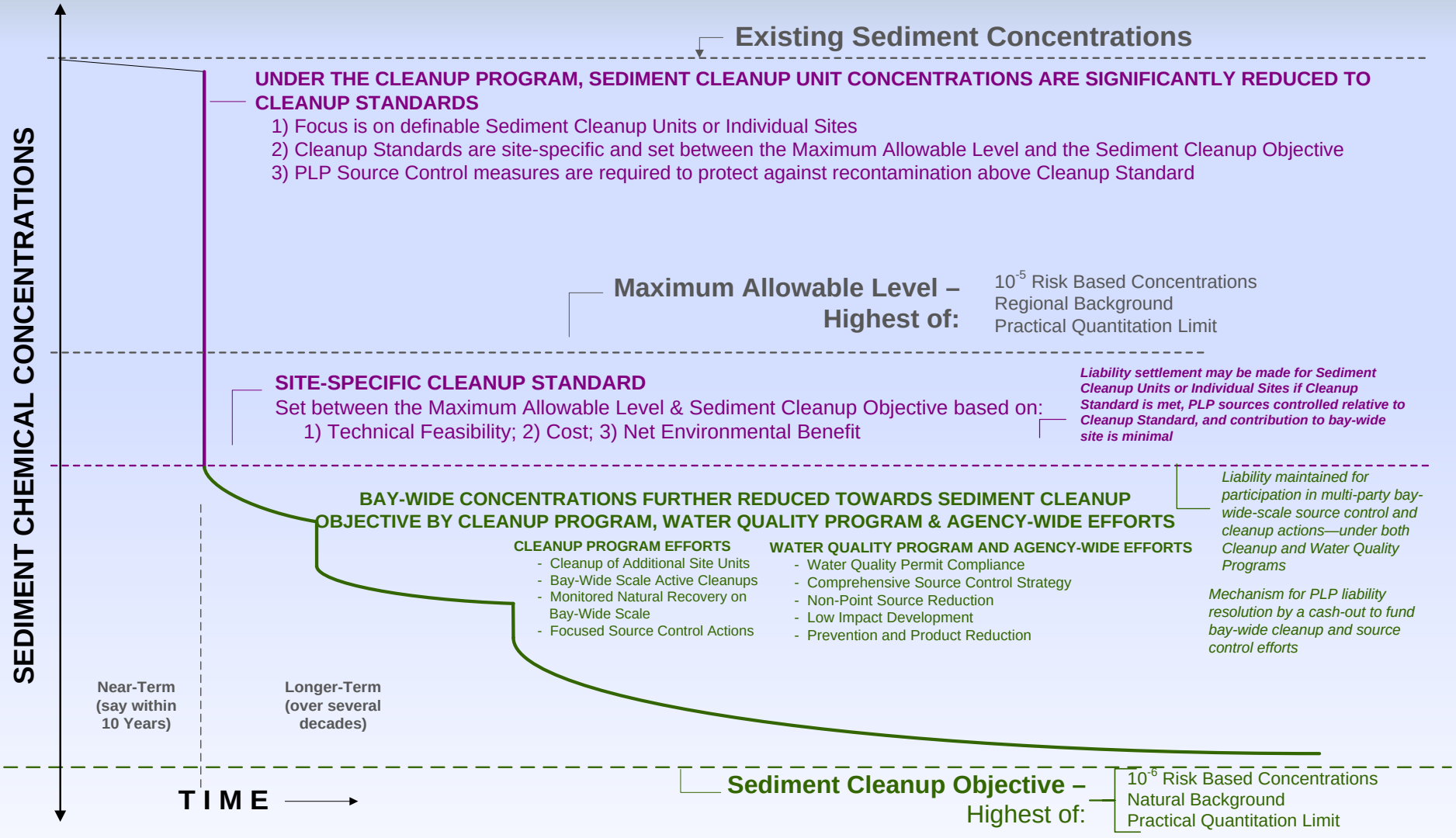
Objectives for Today

- Hear from advisory group:
  - Are the rule revisions an implementable, protective, and legally defensible solution?
  - Does the rule language capture the necessary specificity and clarity?
  - How would this framework work at your sites?
  - Are there problem areas in the framework and rule revisions?
  - Suggestions on how to resolve rule language and identified issues.

Objectives for Today

- Use case studies to illustrate the rule language intent to:
  - Identify site units or individual sites within a larger site.
  - Conduct site investigations to characterize:
    - Nature and extent of contamination
    - Boundaries of site or site unit
    - PLP sources
    - Background concentrations
  - Establish cleanup standards
  - Select remedial actions
  - Resolve liability for the cleanup unit
- Hypothetical scenarios based on real sites and data

Ecology Cleanup Program Proposal



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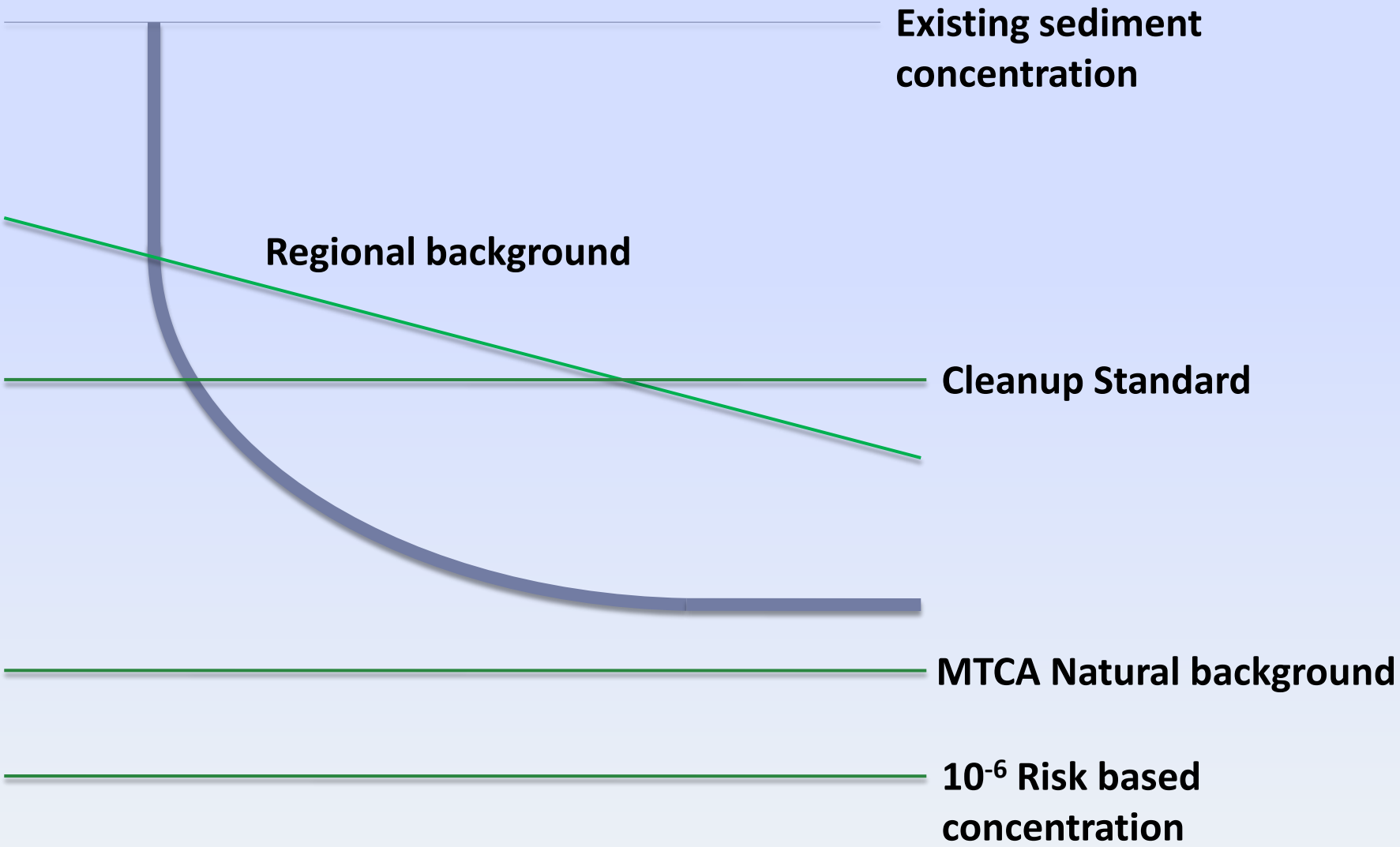

SMS Decision Steps

Identify Bay-Wide Sites, Sediment Cleanup Units, and Individual Sites
(Sections 500, 510, 530)

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Site Investigation/Alternatives Evaluation
(Section 560, 580)

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Sediment Cleanup Standards
(Section 570)

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Selection and Approval of Sediment Cleanup Actions
(Section 580, 585)

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Source Control
(Section 410; not under revision)

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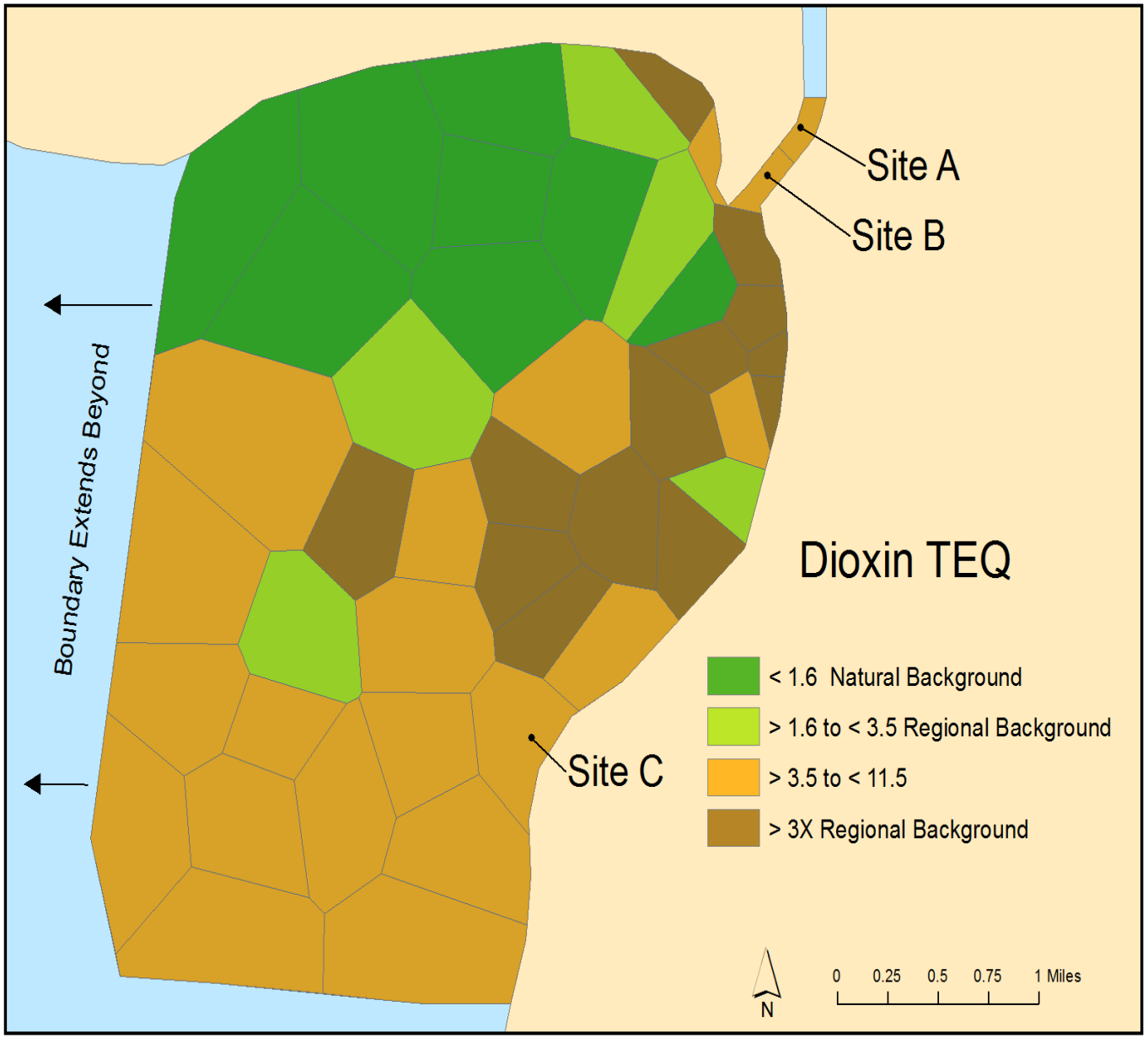
Post-Cleanup—Resolving PLP Liability
(Section 500)

SMS Section -500
Bay or Watershed-Wide Sites
Defining Individual Sites and Cleanup Units

- The rule recognizes sites can be as large or larger than an embayment or watershed based on chemical concentrations above risk levels or background.
- The rule allows distinct units or sites within larger sites to be defined for cleanup based on a number of factors including:
  - Chemical signature
  - Habitat features
  - Development related cleanups
  - Physical features (piers, pilings)
- Recognition of need to cleanup highly contaminated areas in an expeditious manner.
- Recognition of need for long restoration time frames for bioaccumulatives.

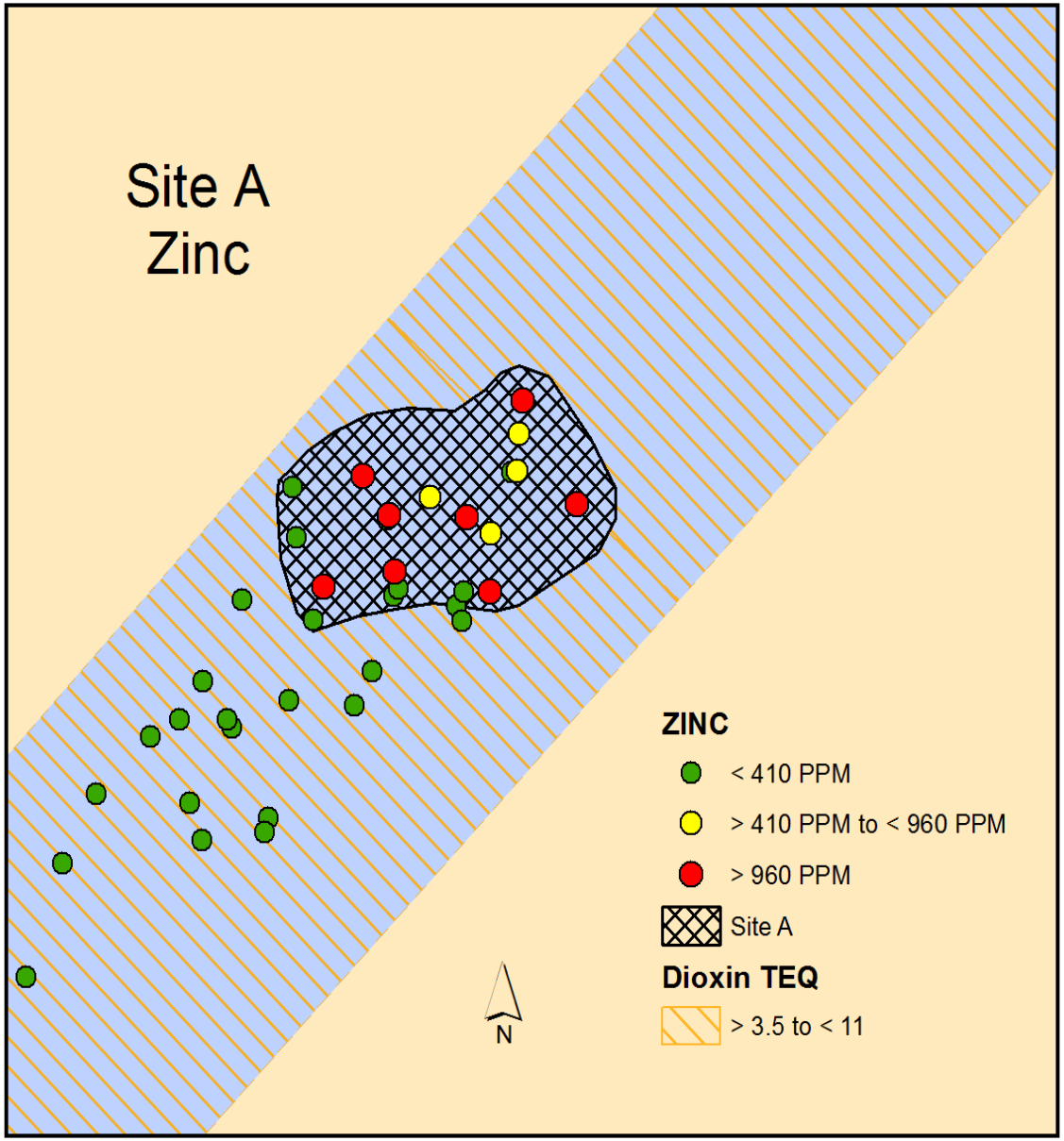
Embayment Scenario

- Baywide site defined by dioxin concentrations
- Regional background calculated at 3.5 TEQ
- Natural background calculated at 1.6 TEQ
- Background: 95th UCL on the mean
- Size of site defined by regional background ~2500 acres
- Size of site defined by MTCA natural background ~5500 acres
- Three areas defined within larger site



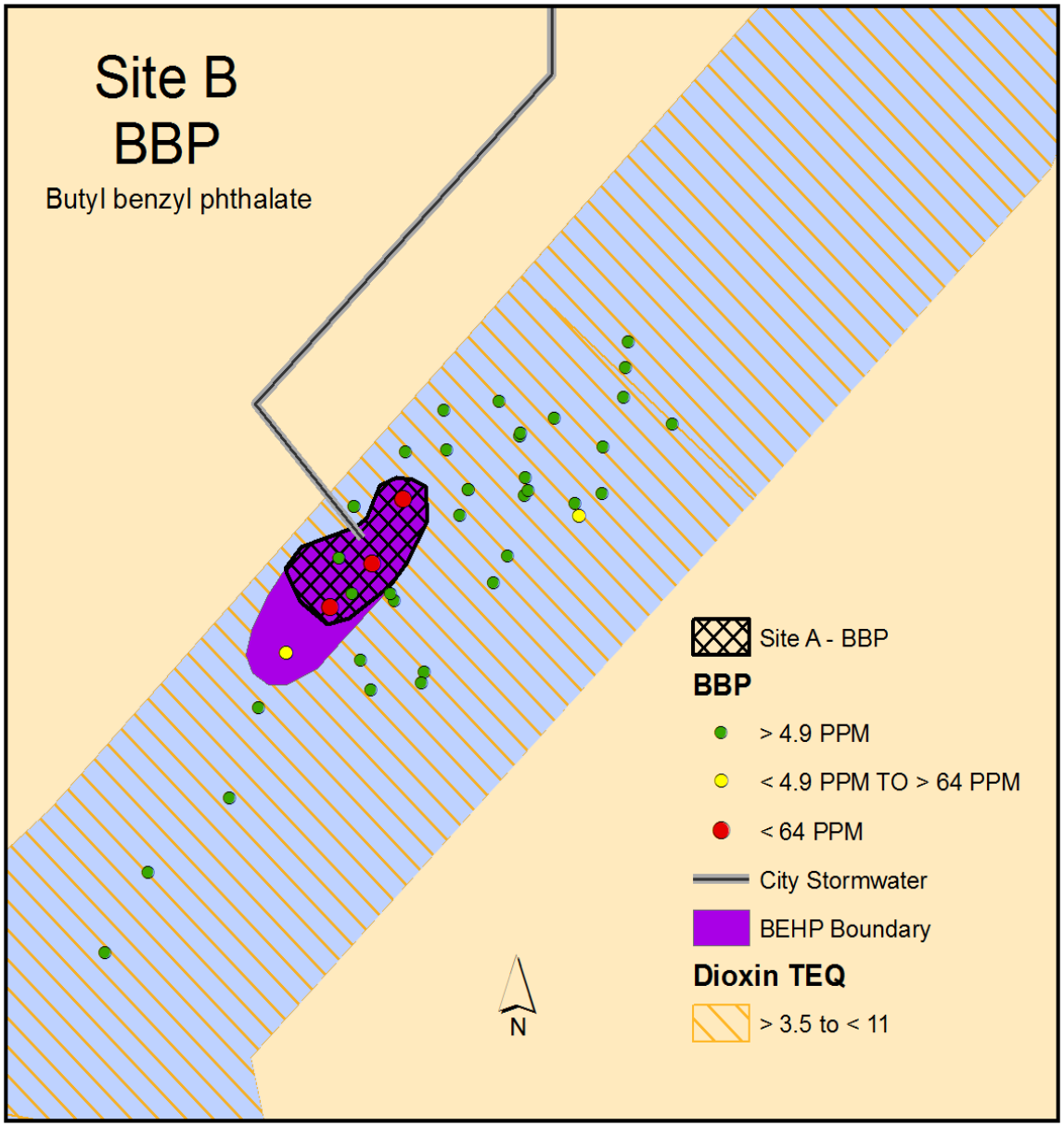
Site Units: Individual site within a larger site

- PLP responsible for unit specific chemical (zinc) but not from baywide specific chemical (dioxin).
- Source of PLP specific metal: Smelter
- Source of baywide dioxin: Other PLP site specific activities, stormwater, atmospheric deposition.
- Site identified by specific chemical from PLP activity.
- Site boundary delineated by concentration above SQS.
- Size of unit: ~15 acres
- Size of site at RB ~2500 acres
- Size of site at NB ~5500 acres



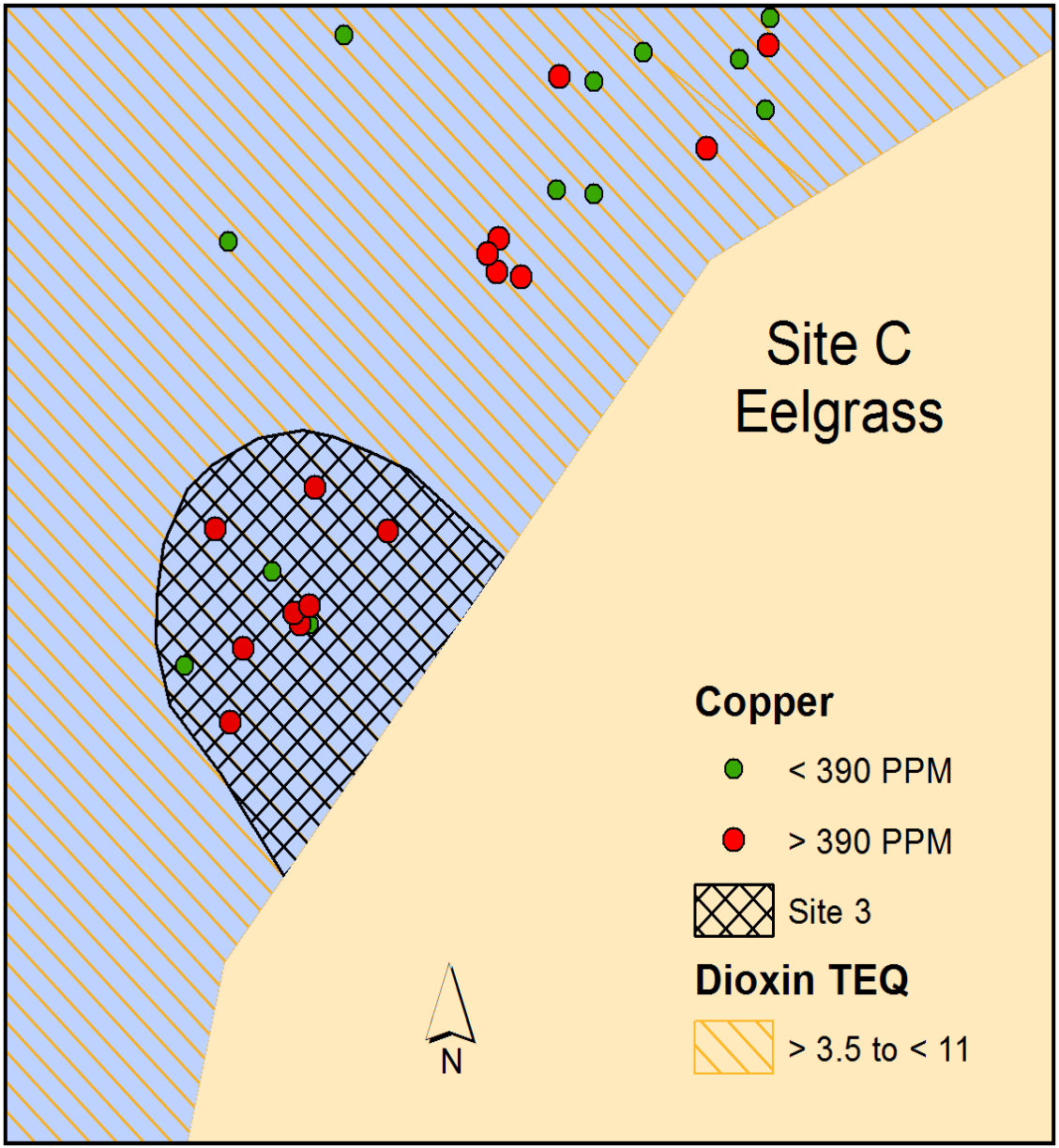
Site Units: Cleanup unit within a larger site

- PLP responsible for unit specific chemical (butyl benzyl phthalate) and partially for baywide specific chemical (dioxin).
- Source of unit specific BBP: Fire at facility.
- Source of PLP dioxin: Fire at facility.
- Unit identified by specific BBP chemical from PLP activity.
- Unit boundaries delineated by BBP concentration above SQS.
- Size of unit: ~10 acres
- Size of site at RB: ~2500 acres
- Size of site at NB: ~5500 acres



Site Units: Cleanup unit within a larger site

- PLP responsible for unit specific chemical (copper) and baywide specific chemical (dioxin).
- Source of copper: process water
- Source of baywide dioxin: PLP hog fuel burner.
- Unit(s) identified by:
  - Eelgrass bed – critical habitat.
  - PLP specific chemical
- Unit(s) boundaries delineated by:
  - Boundaries of eelgrass bed.
  - Followed by copper concentration above SQS.
- Size of unit: ~15 acres
- Size of site at RB: ~2500 acres
- Size of site at NB: ~5500 acres



Sections -570 through -574
Sediment Cleanup Standards

- Cleanup standards are established with an upper and lower range of chemical concentrations or biological effects.
- The upper and lower tier determined by the highest of risk based concentration, background, or practical quantitation limit.
- Cost, technical feasibility, and net environmental effects are considered when establishing the cleanup standard.
- Risk based concentration is the lowest of risk of:
  - Human health from bioaccumulatives (section -571)
  - Benthic community toxicity (sections -572 and -573)
  - Ecological health from bioaccumulatives (section -574)

Sediment Cleanup Standards – Upper and Lower Tiers

- Upper tier:
  - Calculate a 10^{-5} total site risk/HQ=1 based on paired sediment and tissue data, default or site specific fish consumption rate, other default parameters to be decided.
  - Assume 100% of total tissue burden is from sediment.
  - Sediment is the point of compliance based on exposure potential.
  - Calculate regional background.
- Lower tier:
  - Calculate a 10^{-6}/HQ=1 risk based concentration as above
  - Assume 100% of total body burden is from sediment.
  - Sediment is the point of compliance based on exposure potential.
  - Calculate natural background.
- The upper and lower tier determined by the highest of risk based concentration, background, and practical quantitation limit.
- Cleanup standard is the within the lower and upper tier range.

Sediment Cleanup Standards - Background

- A number of options are being considered by Ecology to determine both MTCA natural background and regional background.
- Natural background:
  - Use of BOLD study - Puget Sound wide stations, local subset sampling stations, or reference stations.
  - Location specific natural background.
  - Ecology supplementing a data set.
- Regional background:
  - Region specific value.
  - Intended to include influence from diffuse, nonpoint stormwater sources.
  - Ecology supplementing a data set.
- Screening chemicals of concern:
  - Distribution analysis – population to population data comparison.
  - Use of a background bright line threshold with tolerance limit (CL on a %tile) – any station that exceeds the threshold is a chemical of concern.
  - Kaplan Meier approach for non detects.

Sediment Cleanup Standards - Background

- Determining cleanup standards based on background:
  - Use of a bright line threshold in the background data set based on upper tolerance limit:
    - 90th Confidence limit on the 90th percentile
    - 90th Confidence limit on the 80th percentile
    - 95th UCL on the mean
- Determining compliance at a site based on background:
  - Point by point site data comparison to a bright line threshold of background data set
  - Area weighted average of site data compared to a bright line threshold of the background data set
  - Modified MTCA three part rule

Cleanup Standards for case studies:

	SQS	CSL	Natural Bkgd	Regional Bkgd	Sediment RBC* at 10^{-6} risk level	Sediment RBC* at 10^{-5} risk level	Sediment RBC * at 10^{-4} risk level
Zinc	410	960					
Copper	390	390					
BBP	4.9	64					
Dioxin	N/A	N/A	1.6 TEQ	3.5 TEQ	0.00395 TEQ	0.0395 TEQ	0.395 TEQ

* [(Risk x Body Weight x Averaging Time x Conversion Factor) /

(Slope Factor x FCR x Fish Diet Fraction x Exposure Frequency x Exposure Duration x BSAF x Lipid Fraction) x Organic Carbon]

Fish consumption rate (shellfish): 175 grams per day (site specific)

Exposure duration: 70 years Body weight: 70 kg Fish Diet Fraction: 100%

Exposure frequency: 365 days per year Averaging Time: 70 years

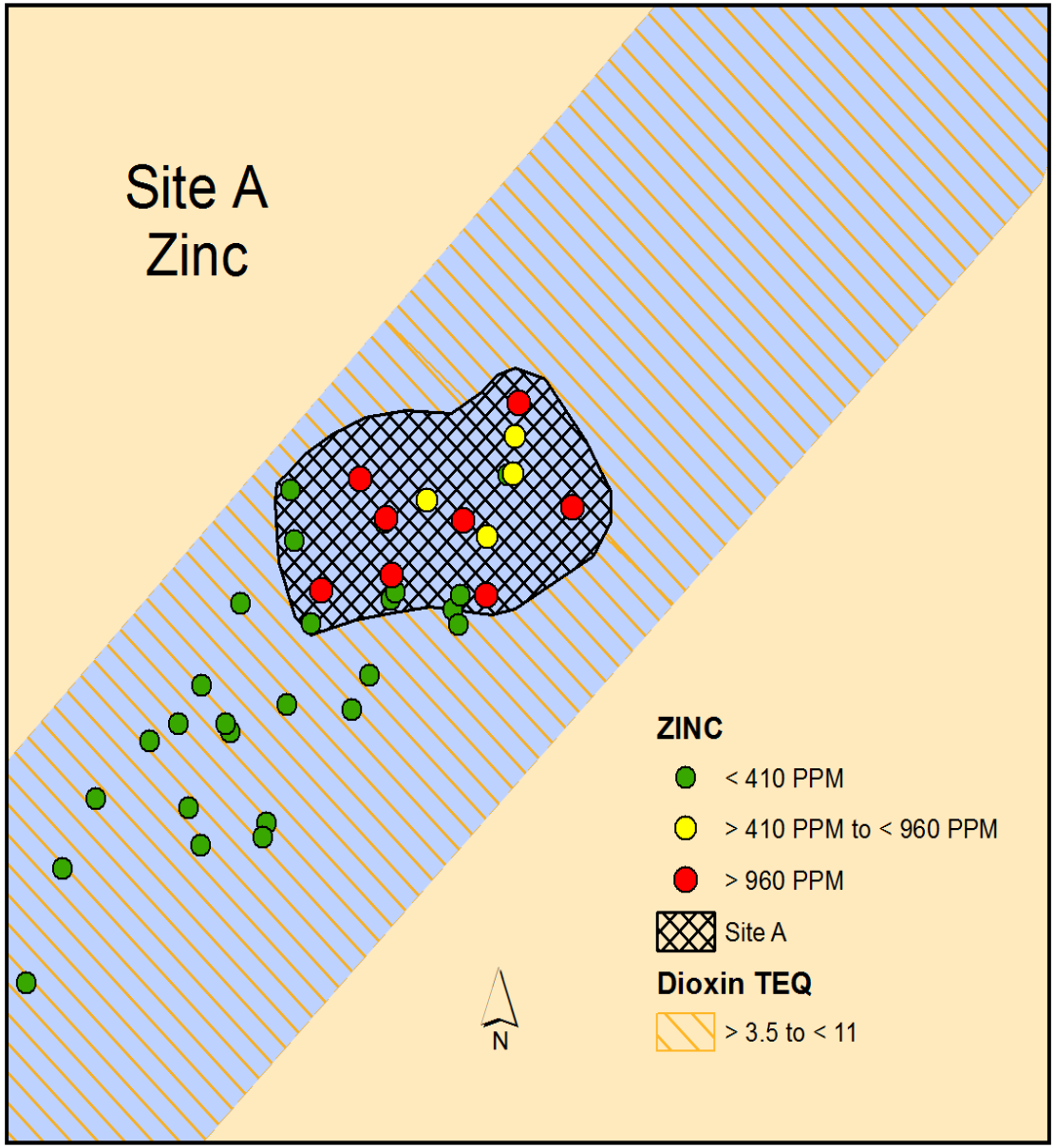
Body burden assumed to be 100% from sediment

Section -560 Remedial Investigation/Feasibility Study:

- Sufficient data must be gathered to complete an RI/FS to select cleanup standards and evaluation remedial alternatives.
- Site boundary: Characterize vertical and horizontal nature and extent of contamination.
- Potential sources: Erosion potential, contaminated soil and groundwater, discharges.
- Natural resources and habitat.
- Conceptual site model.
- Identify remedial alternatives.
- Establish potential cleanup units or individual sites.

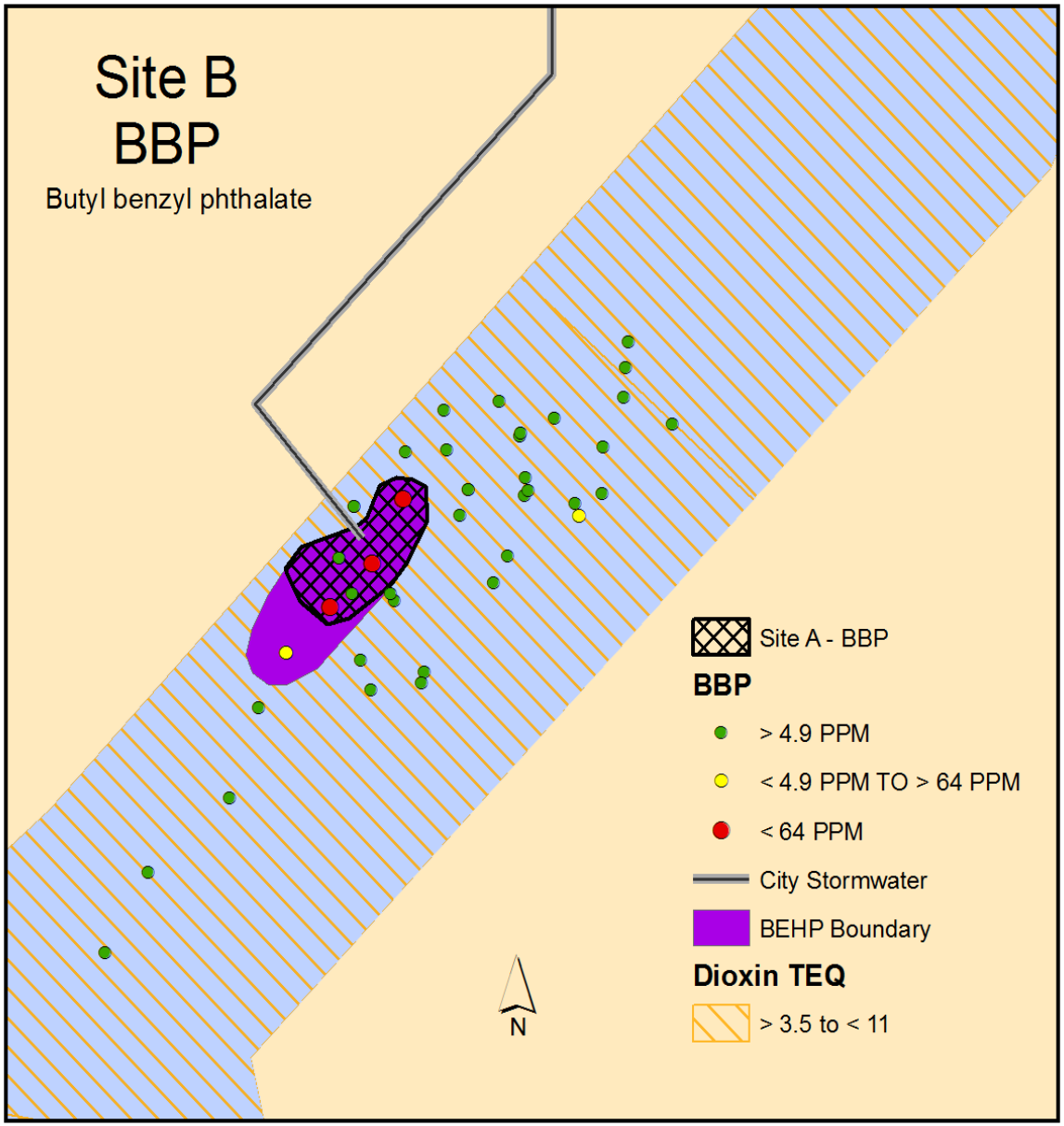
R/I site Investigation: Individual site within larger site

- Characterize vertical and horizontal nature and extent of contamination within and outside unit.
- Utilize existing data to determine if more data required beyond unit boundaries.
- Unit boundary defined at SQS.
- Analyze suite of 47 SMS chemicals to verify zinc as COC.
- PLP sources to water must be characterized to determine potential to recontaminate including: discharge pipes, upland soil or ground water contamination, overland flow.



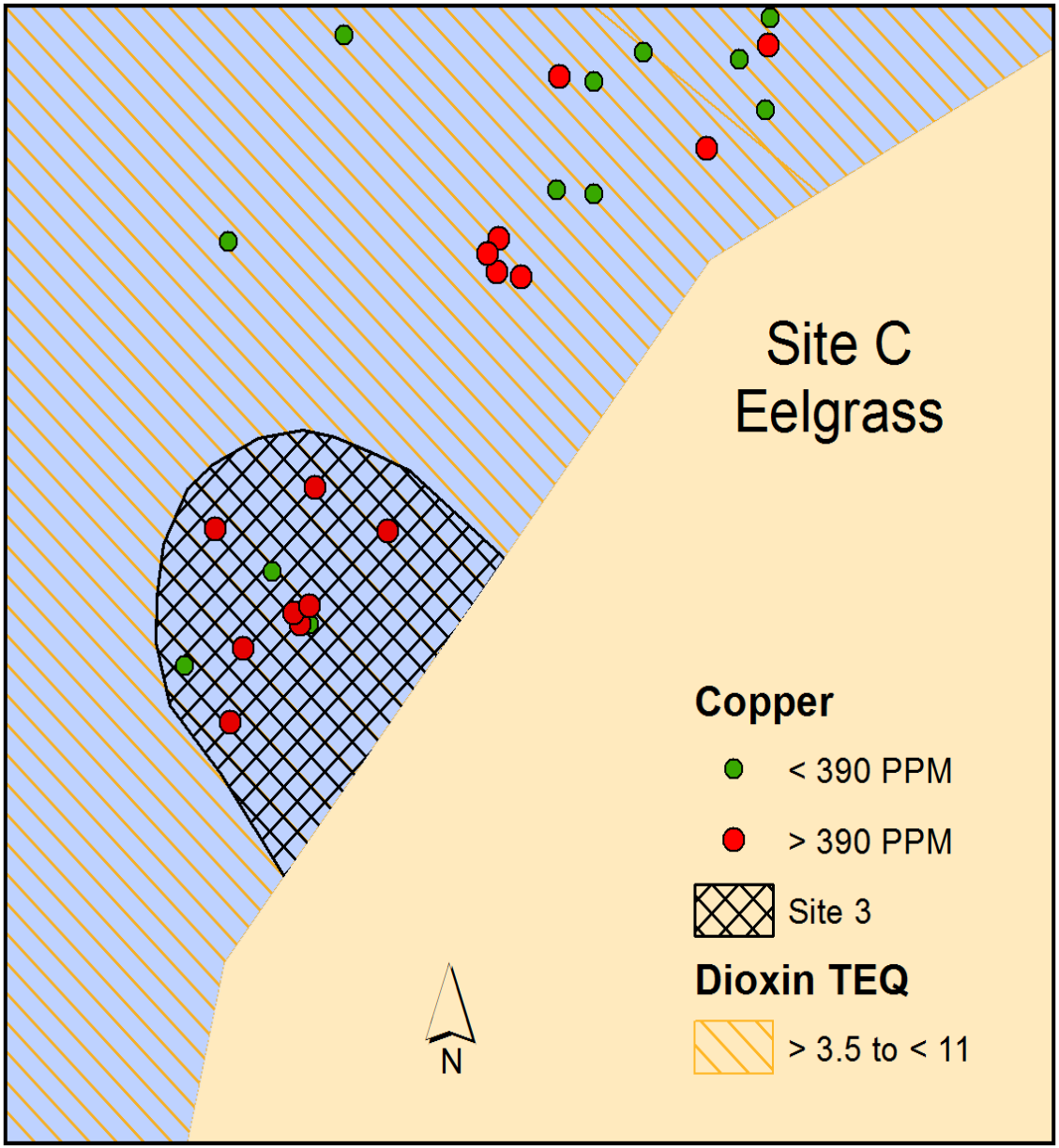
R/I site Investigation: Unit within larger site

- Characterize vertical and horizontal nature and extent of contamination within and outside unit.
- Utilize existing data to determine if more data required beyond unit boundaries.
- Unit boundary defined at SQS.
- Analyze suite of 47 SMS chemicals to verify BBP and dioxin are the COCs.
- PLP sources to water must be characterized to determine potential to recontaminate including: discharge pipes, upland soil or ground water contamination, overland flow.



R/I site Investigation: Unit within larger site

- Sufficient data must be gathered to complete an RI/FS to select a preferred remedy.
- Characterize vertical and horizontal nature and extent of contamination within and outside unit.
- Utilize existing data to determine if more data required beyond unit boundaries.
- Unit(s) boundaries delineated by:
  - Boundaries of eelgrass bed.
  - Followed by copper concentration above SQS.
- Analyze suite of 47 SMS chemicals to verify copper and dioxin are the COCs.
- PLP sources to water must be characterized to determine potential to recontaminate including: discharge pipes, upland soil or ground water contamination, overland flow.



Discussion

- Are the rule revisions an implementable, protective, and legally defensible solution?
- Does the rule language capture the necessary specificity and clarity?
- How would this framework work at your sites?
- Are there problem areas in the framework and rule revisions?
- Suggestions on how to resolve rule language and identified issues.

Sections -560, -580, -590 Source Control

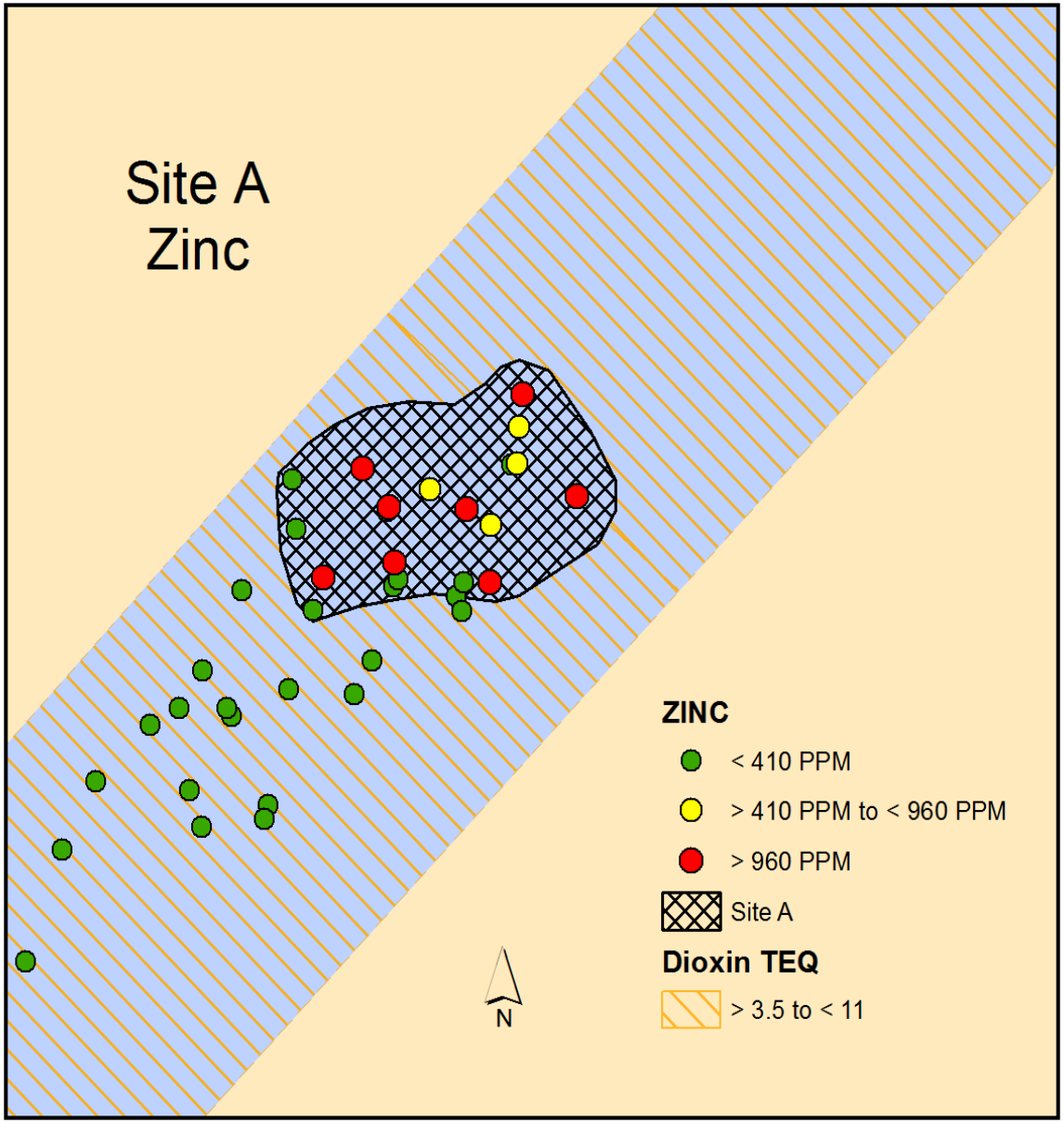
- Section -560 RI/FS:
  - Determine recontamination potential which can affect remedy implementation.
  - Identify current and potential sources to the site.
  - Identify contaminant migration routes to and from the site.
  - Compliance time frame for discharges.
- Section -580 Remedy Selection:
  - Evaluate source control measures to prevent recontamination for long term effectiveness and evaluation of alternatives.
- Section -590 Sediment Recovery Zone:
  - Discharges within zone must meet AKART.
  - Best management practices used for diffuse, nonpoint discharges.

Source Control

- PLP responsible for all discharges under their authority:
  - NPDES permitted wastewater and/or stormwater discharges.
  - Upland overland flow discharge.
  - Upland contaminated site – groundwater or soil runoff.
  - Upland activities that may contaminate sediment.
- Determine all stormwater pipes draining through and from the PLP property boundary to the water.
- Sample effluent and catch basins for all pipes under authority of PLP that drain to water.
- Options for PLP source control:
  - Re-route stormwater to municipal wastewater system.
  - Treat stormwater to cleanup standard
  - Implement state of the art best management practices to meet cleanup standard
- Options for PLP stormwater compliance:
  - Catch basin solids must meet cleanup standard.
  - Use of appropriate models (WASP, CORMIX, Equilibrium Partitioning) to determine potential to recontamination above cleanup standard.
- If necessary, upland investigation to determine if soil and groundwater is contaminated and a potential source to sediment.

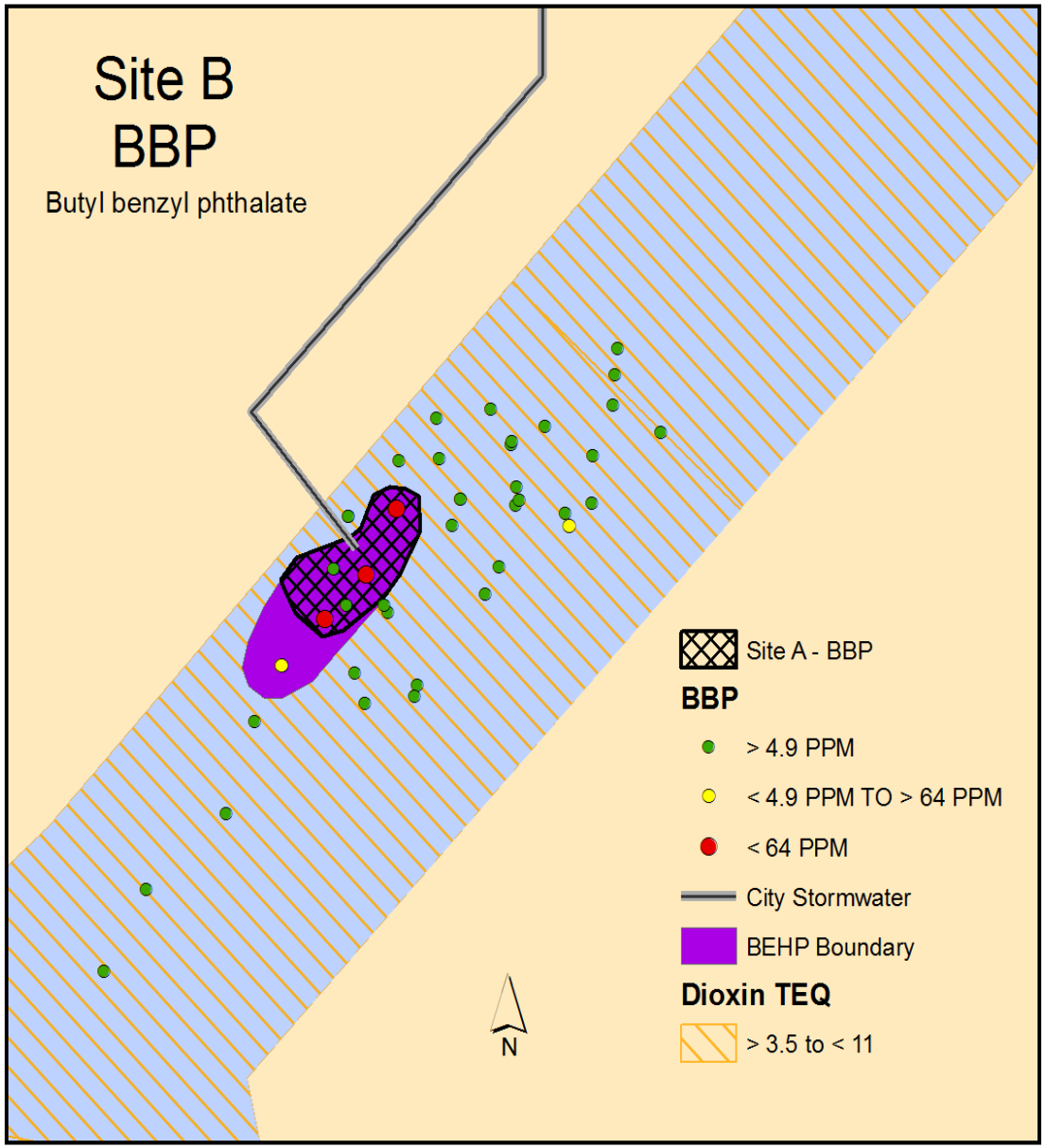
S/C Investigation: Individual site within larger site

- Determine all stormwater pipes draining through and from the PLP property boundary to the water.
- Sample effluent, in-line traps and/or catch basins for all pipes under authority of PLP that drain to water.
- Options for stormwater compliance:
  - Catch basin solids must meet cleanup standard for zinc.
  - Use of appropriate models (WASP, CORMIX, Equilibrium Partitioning) to determine potential to recontaminate above cleanup standard.
- If necessary, conduct upland investigation to determine if soil and groundwater is contaminated and a potential source to sediment.



S/C Investigation: Cleanup unit within larger site

- Determine all stormwater pipes draining through and from the PLP property boundary to the water.
- Sample effluent, in-line traps and/or for all pipes under authority of PLP that drain to water.
- Sample a city pipe for phthalates.
- Results show BEHP above CSL from city pipe. Likely recontamination.
- Options for PLP stormwater compliance:
  - Catch basin solids must meet BBP cleanup standard.
  - Use of appropriate models (WASP, CORMIX, Equilibrium Partitioning) to determine potential to recontaminate above cleanup standard.
- If necessary, conduct upland investigation to determine if soil and groundwater is contaminated and a potential source to sediment.



Settlement

- Unit(s):
  - Post cleanup monitoring must show remedy is effective.
  - Cleanup standard must be met after active cleanup.
  - Source control requirements must be met and maintained for all PLP sources.
  - PLP not responsible for other PLP/permittee recontamination.
  - Settlement of unit for dioxin/other COC but not baywide site for dioxin.
- Individual site within larger site:
  - Post cleanup monitoring must show remedy is effective.
  - Cleanup standard must be met within timeframe.
  - Source control requirements must be met and maintained.
  - Settlement for site for COC. PLP not responsible for dioxin.

Remedy Selection

<u>Basic approach</u>

- Reviewed selection process used to date at sites
- Reviewed MTCA & SMS rules for commonalities and differences
- Integrated two rules to the extent feasible, incorporating elements of both
- Changes integrated into SMS sections
  - 580 (Remedy Selection)
  - 585 (Cleanup Action Decisions)
  - 590 (Sediment Recovery Zones)

Remedy Selection - Commonalities Between MTCA and SMS

- Protection of human health & environment
- Compliance with cleanup standards
- Compliance with ARARs
- Consideration of public concerns
- Post cleanup compliance monitoring
- Short-term effectiveness
- Long-term effectiveness
- Ability to implement

Remedy Selection - Differences Between MTCA and SMS

MTCA Regulation	SMS Regulation
Cost not considered in selecting cleanup standards	Net environmental effects, cost-effectiveness, technical effectiveness considered when setting cleanup standards
Disproportionate-cost analysis	Cost-effectiveness
No limit on restoration time frame	10 year restoration time frame
Prevent or minimize present & future releases	Source control
Natural attenuation	Natural recovery
Institutional controls commonly used	Questionable effectiveness of institutional controls
Overall effectiveness	Net environmental effects