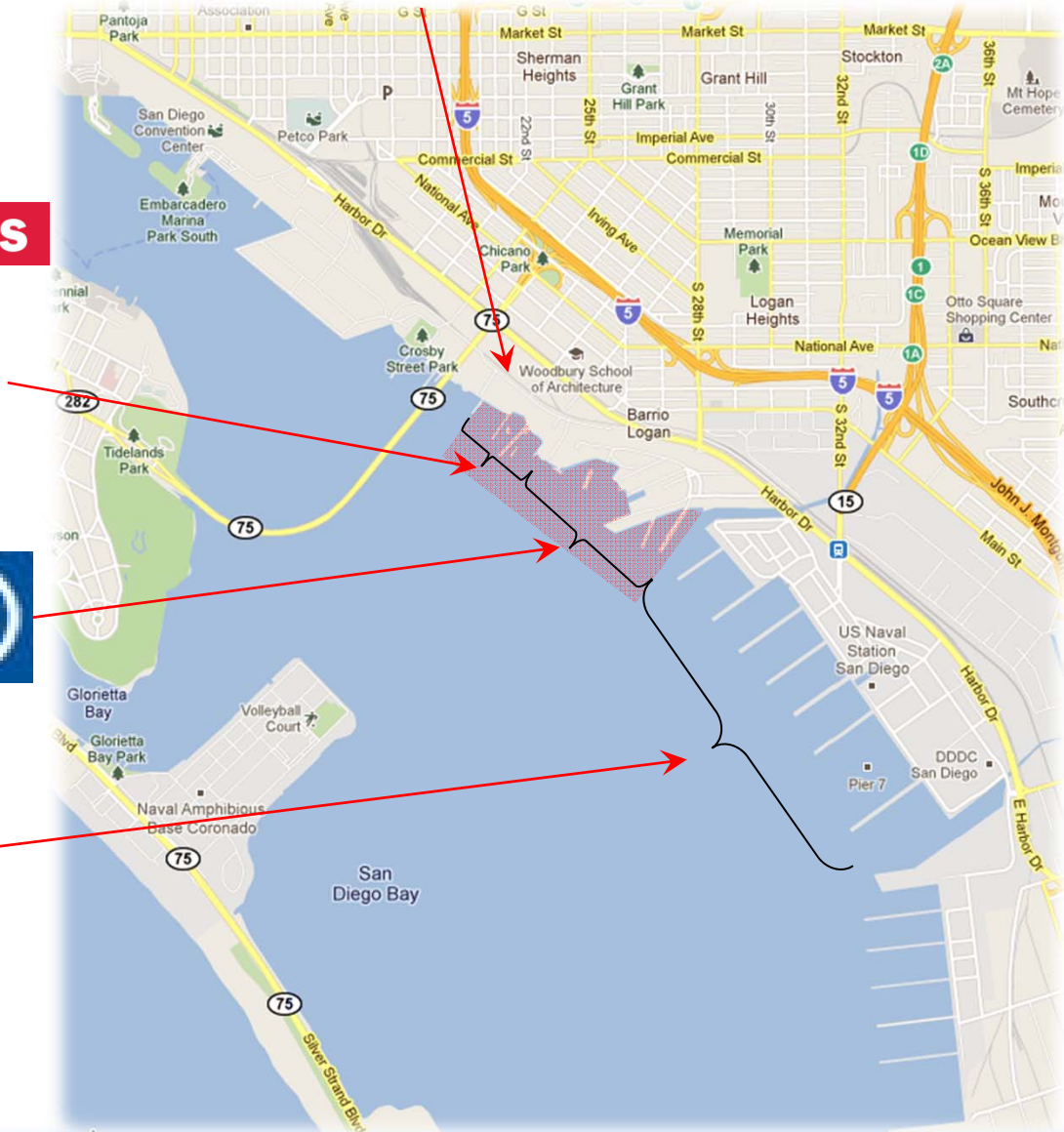


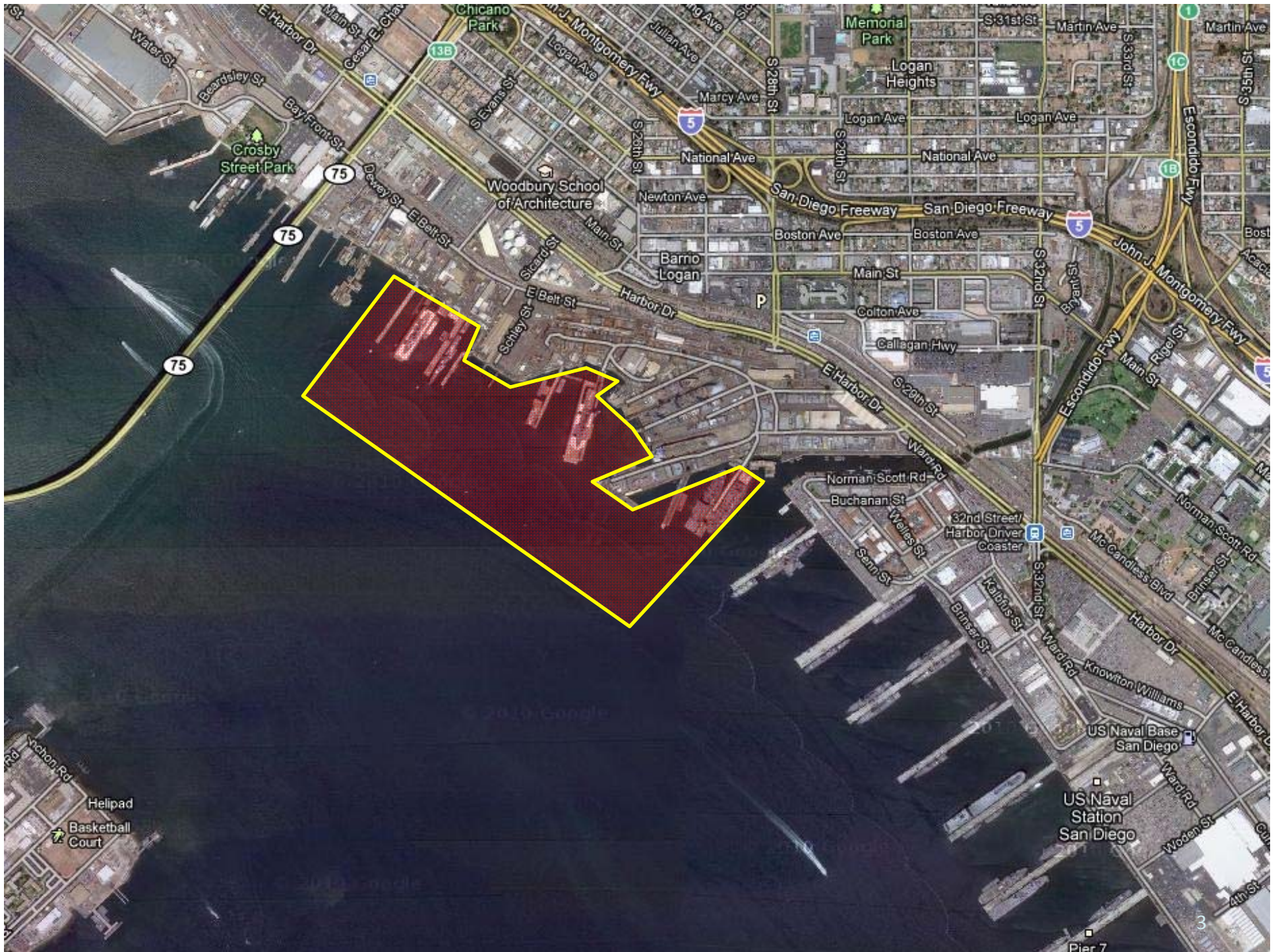




BAE SYSTEMS

**STAR &
CRESCENT
CAMPBELL
INDUSTRIES**



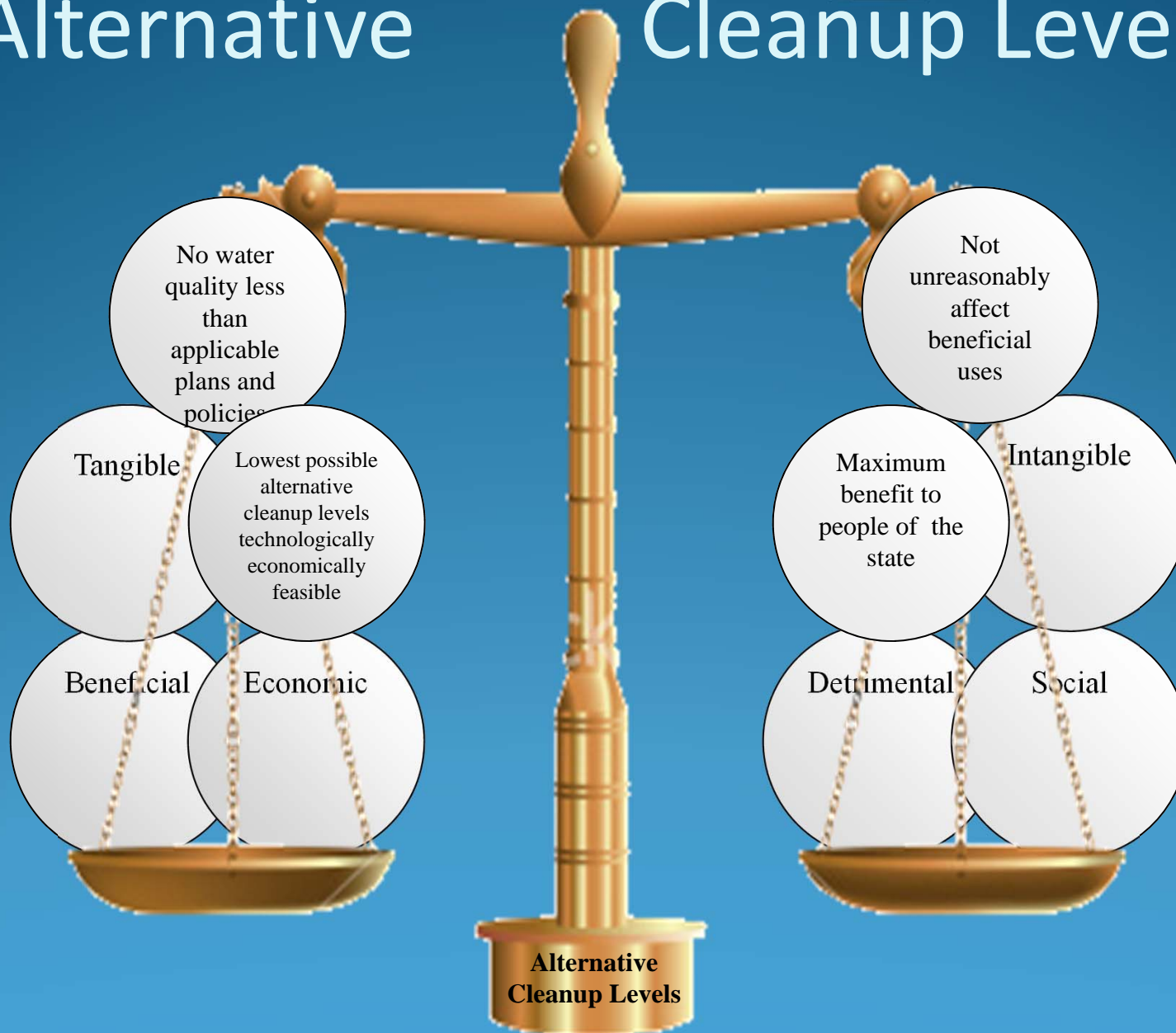


State Water Board Resolution 92-49

Alternative cleanup levels must achieve:

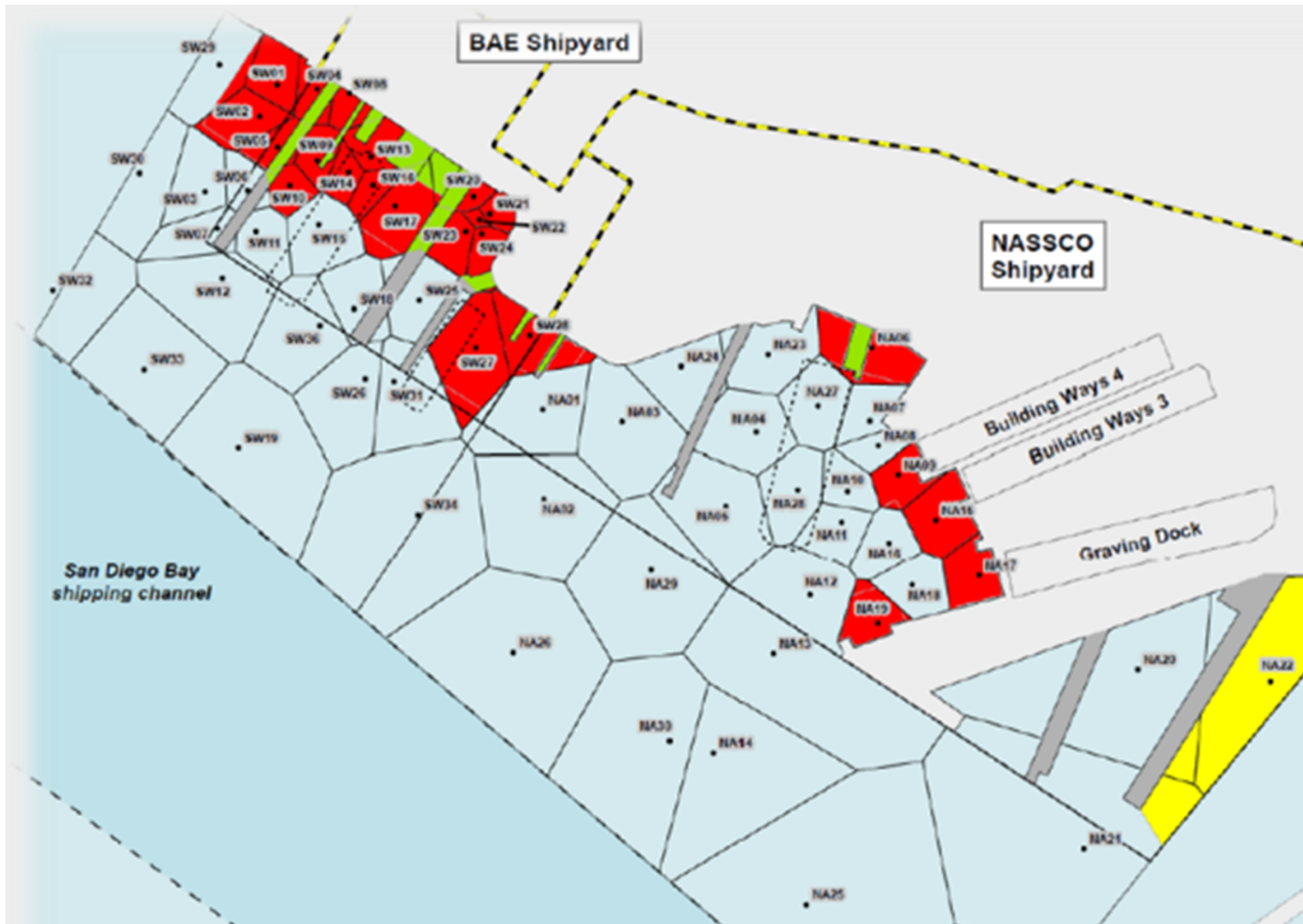
“The best water quality which is reasonable... considering all demands made and to be made on these waters and the total values involved...”

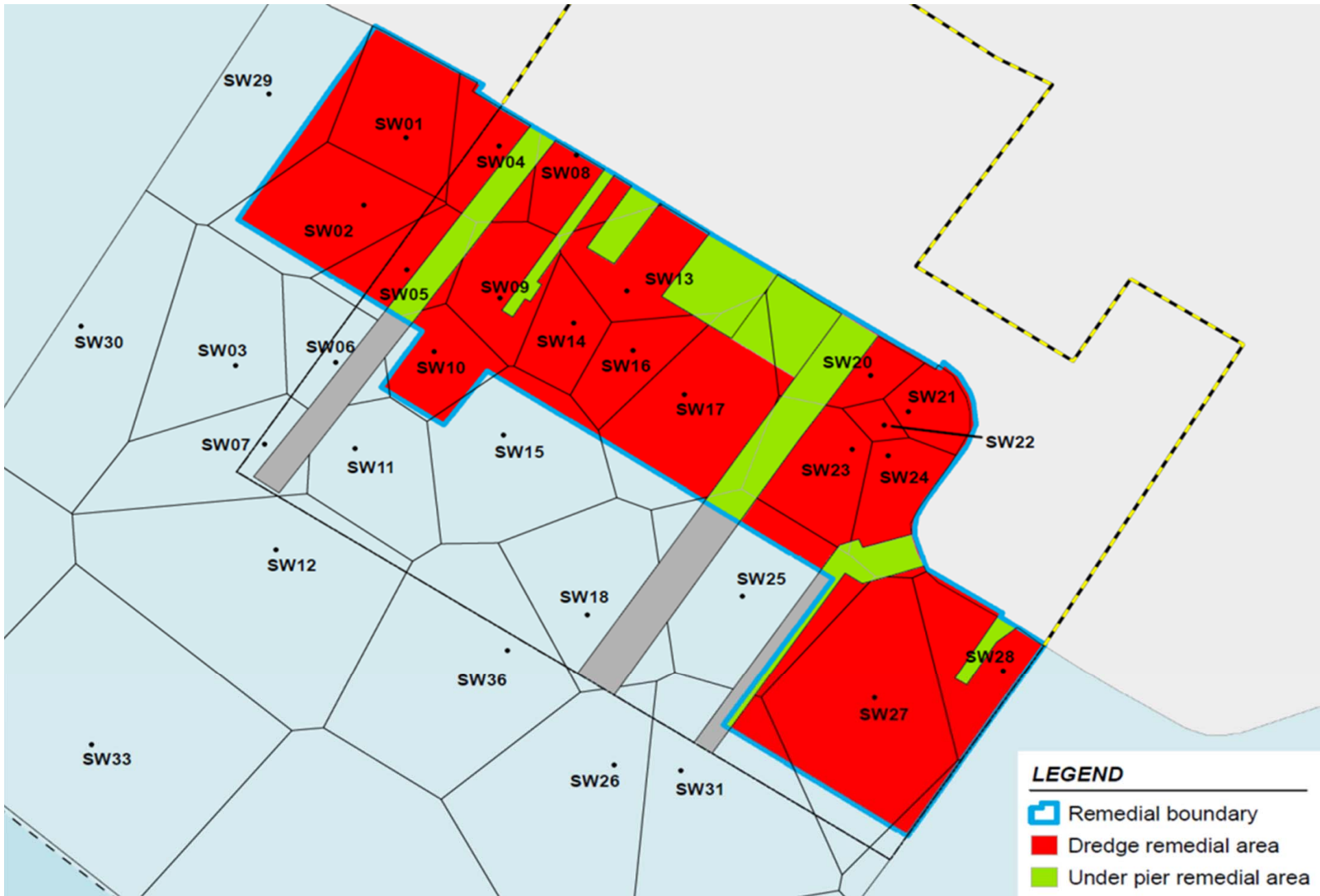
92-49 Total Values Approach to Alternative Cleanup Levels

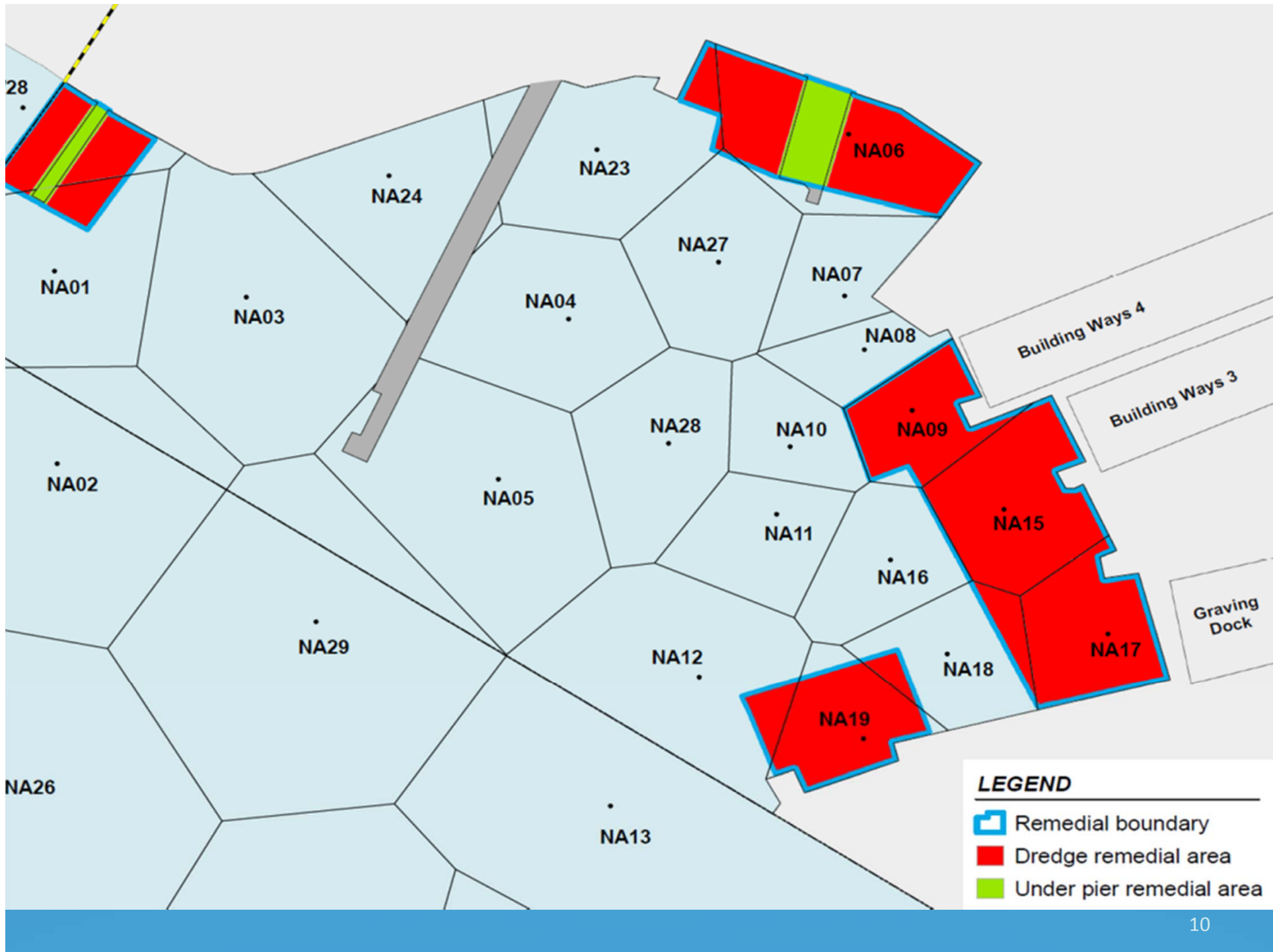


**What will adopting this
Order accomplish?**

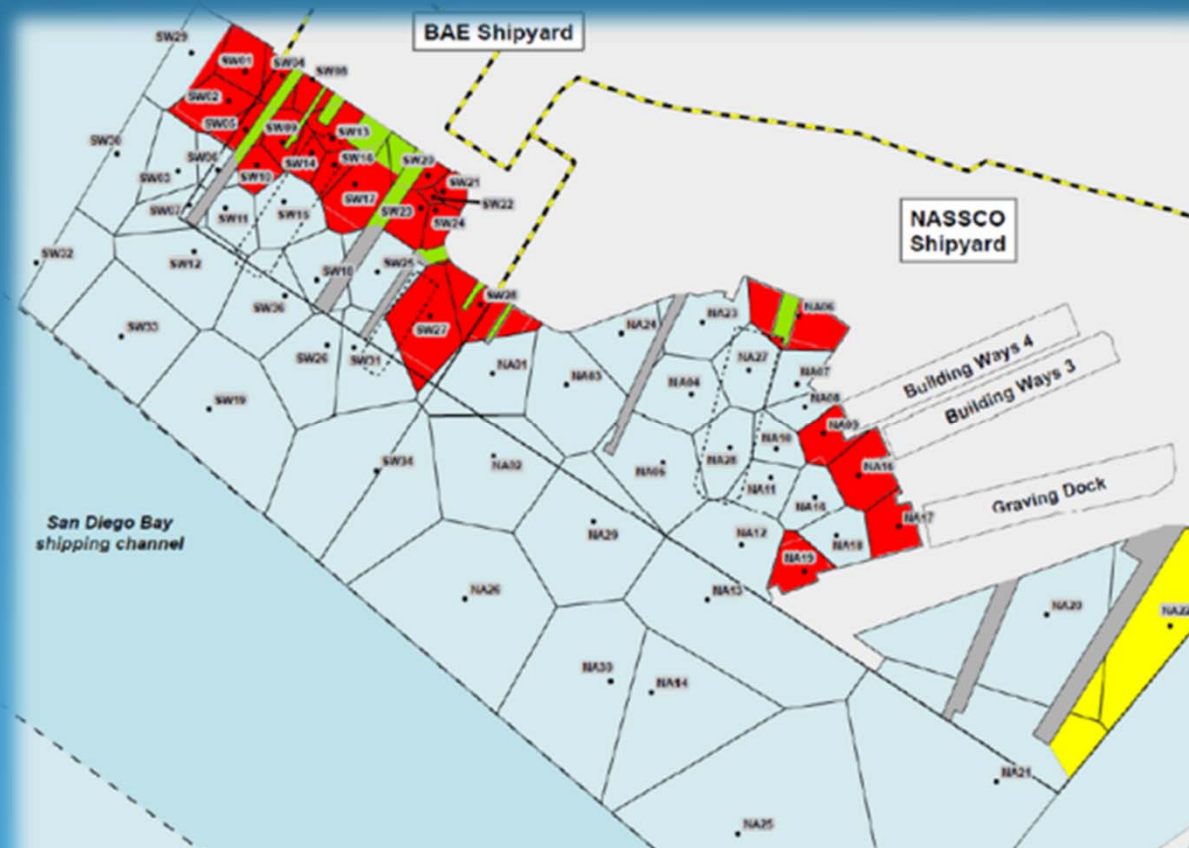








Remove 143,000 cubic yards 15 acres dredge footprint



Estimated Mass Removed

COC	Pounds
Copper	114,400
Mercury	500
HPAHs	2,860
PCBs	420
Tributyltin	210
Arsenic	4,800
Cadmium	370
Lead	33,000
Zinc	134,200

Environmental Impact Report

Identified potential impacts

Proposed mitigation measures

Unavoidable air quality impacts

Overriding considerations



01/05/2011







Primary COCs	Pre-Remedy Maximum	Post Remedy Maximum	Percent Reduction
Cu (mg/kg)	1,500	320	79%
Hg (mg/kg)	4.5	2.1	53%
HPAH (µg/kg)	52,000	15,850	70%
PCB (µg/kg)	5,450	495	91%
TBT (µg/kg)	3,250	410	87%

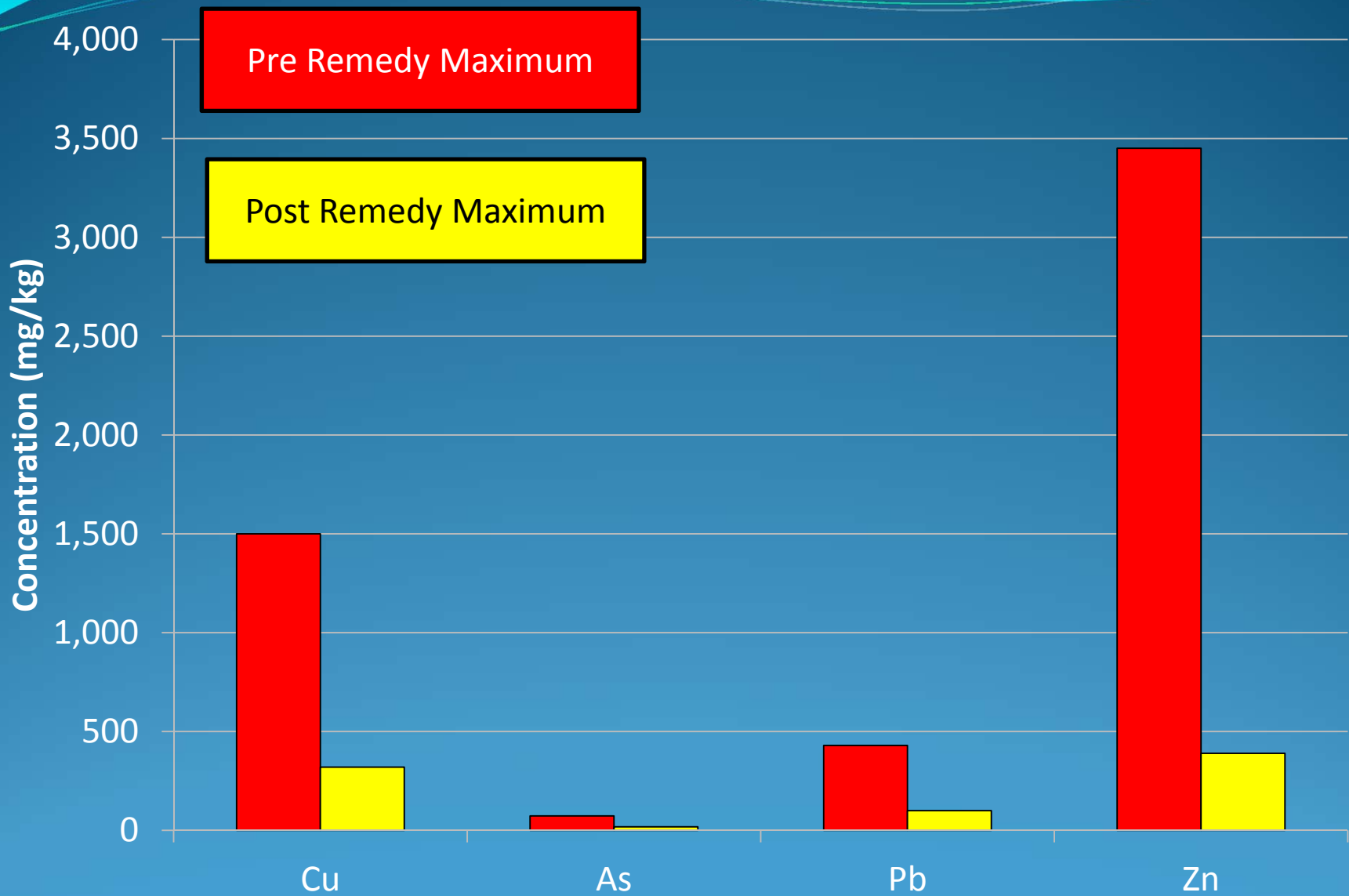
Secondary COCs	Pre-Remedy Maximum	Post Remedy Maximum	Percent Reduction
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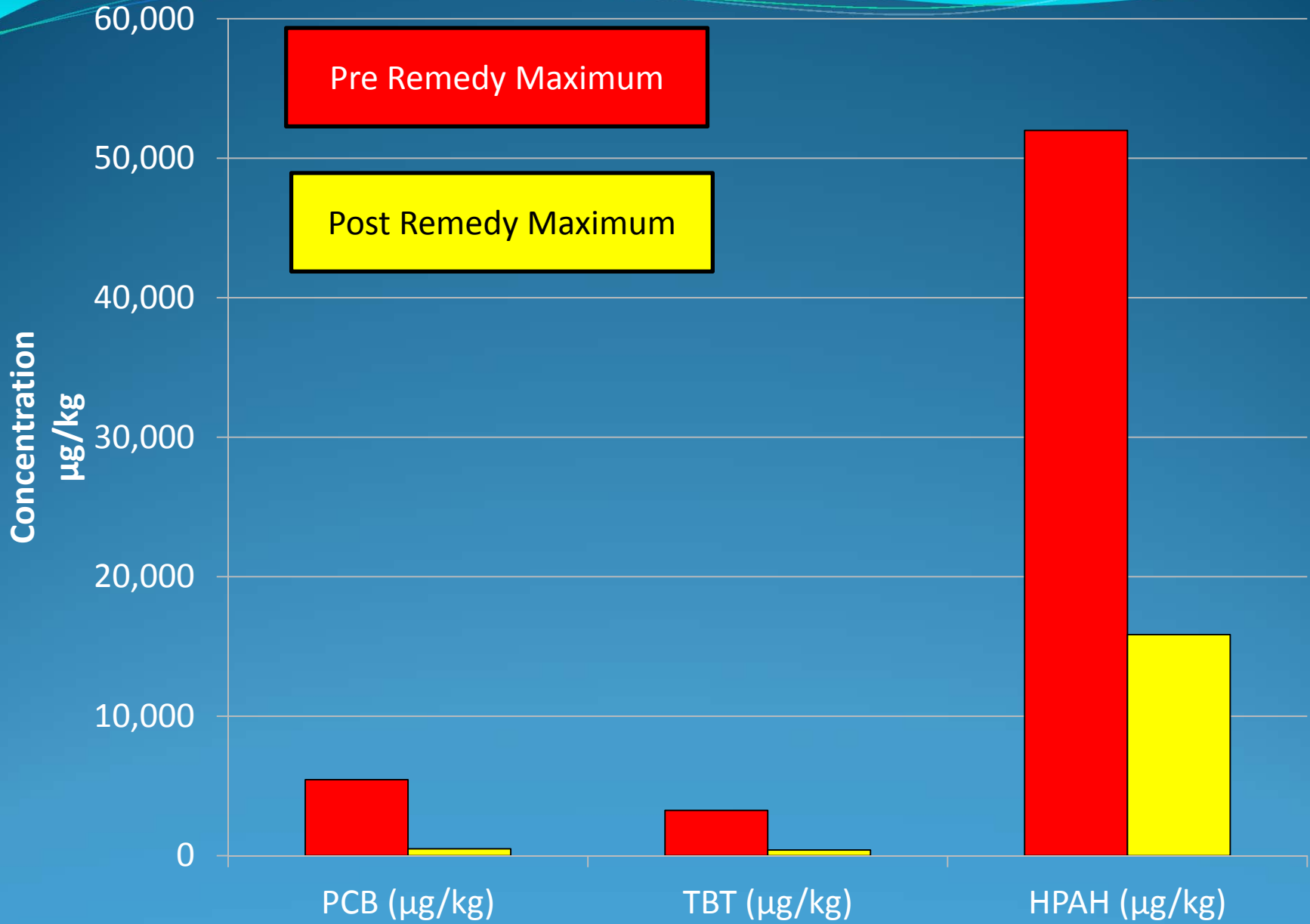
As (mg/kg)	73	18	75%
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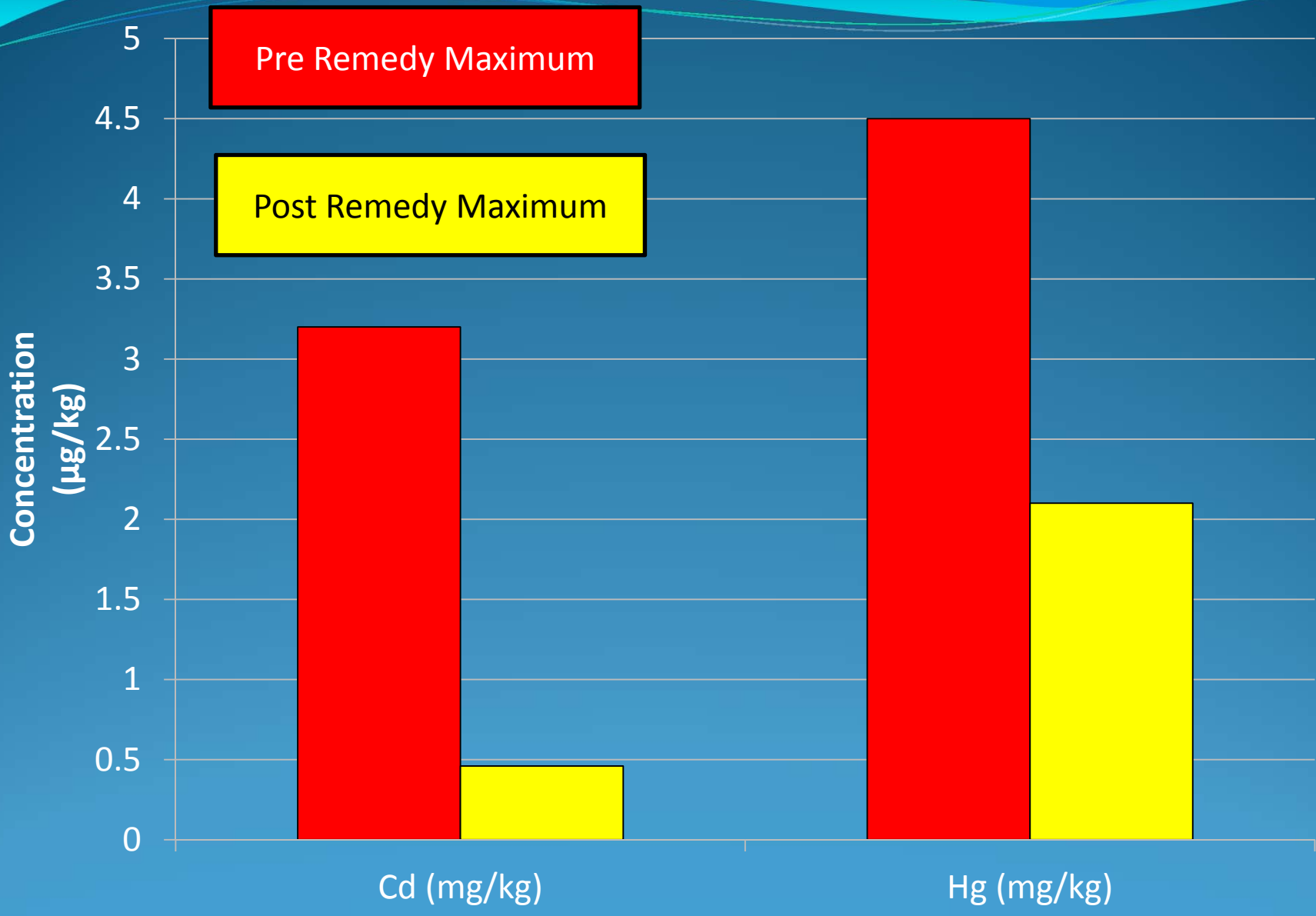
Cd (mg/kg)	3.2	0.46	86%
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Pb (mg/kg)	430	100	77%
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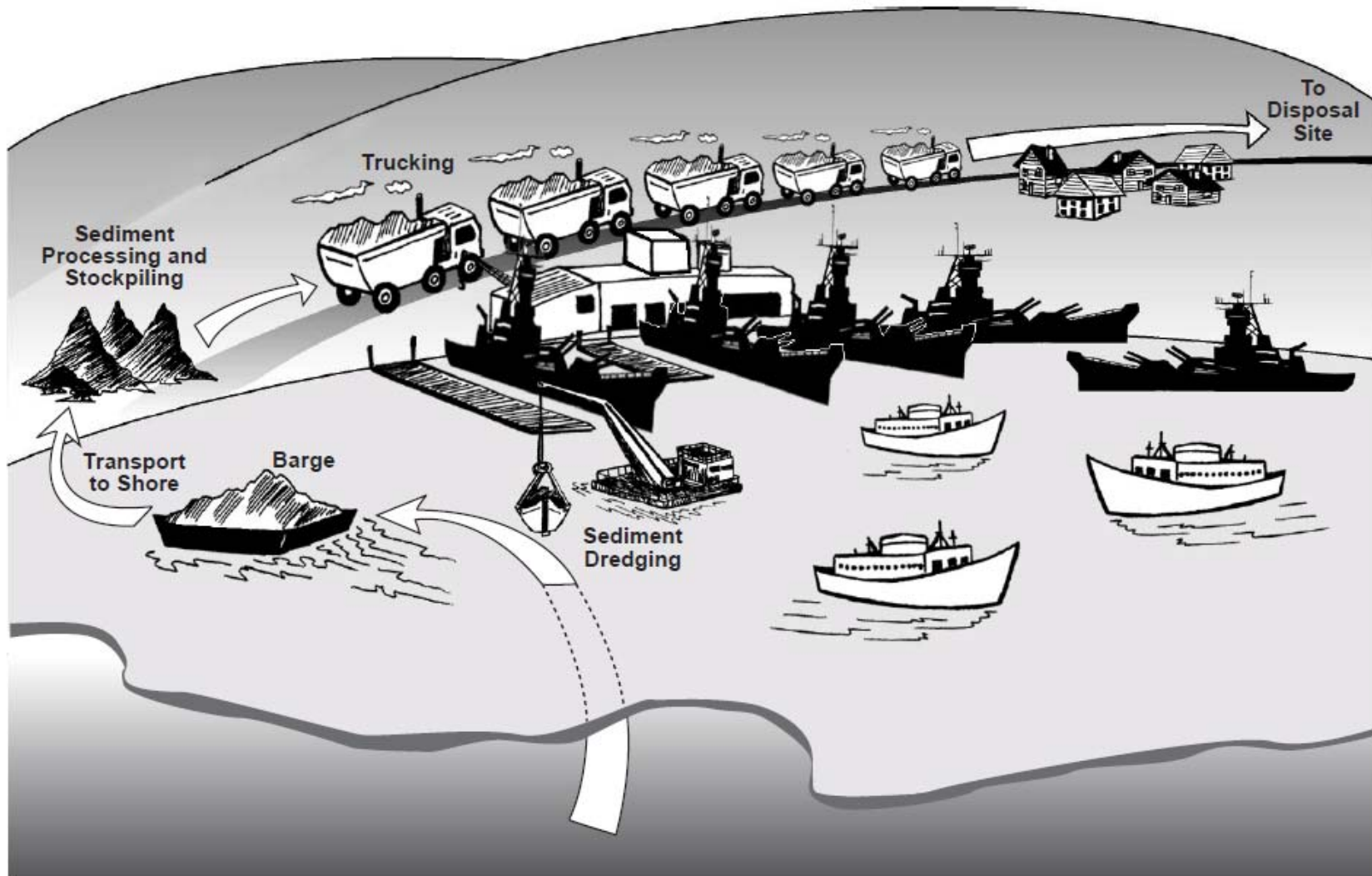
Zn (mg/kg)	3,450	390	89%
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**How do we verify the
cleanup has been achieved
and maintained?**



Remedial Monitoring

1. Water Quality Monitoring
2. Disposal Monitoring
3. Sediment Monitoring



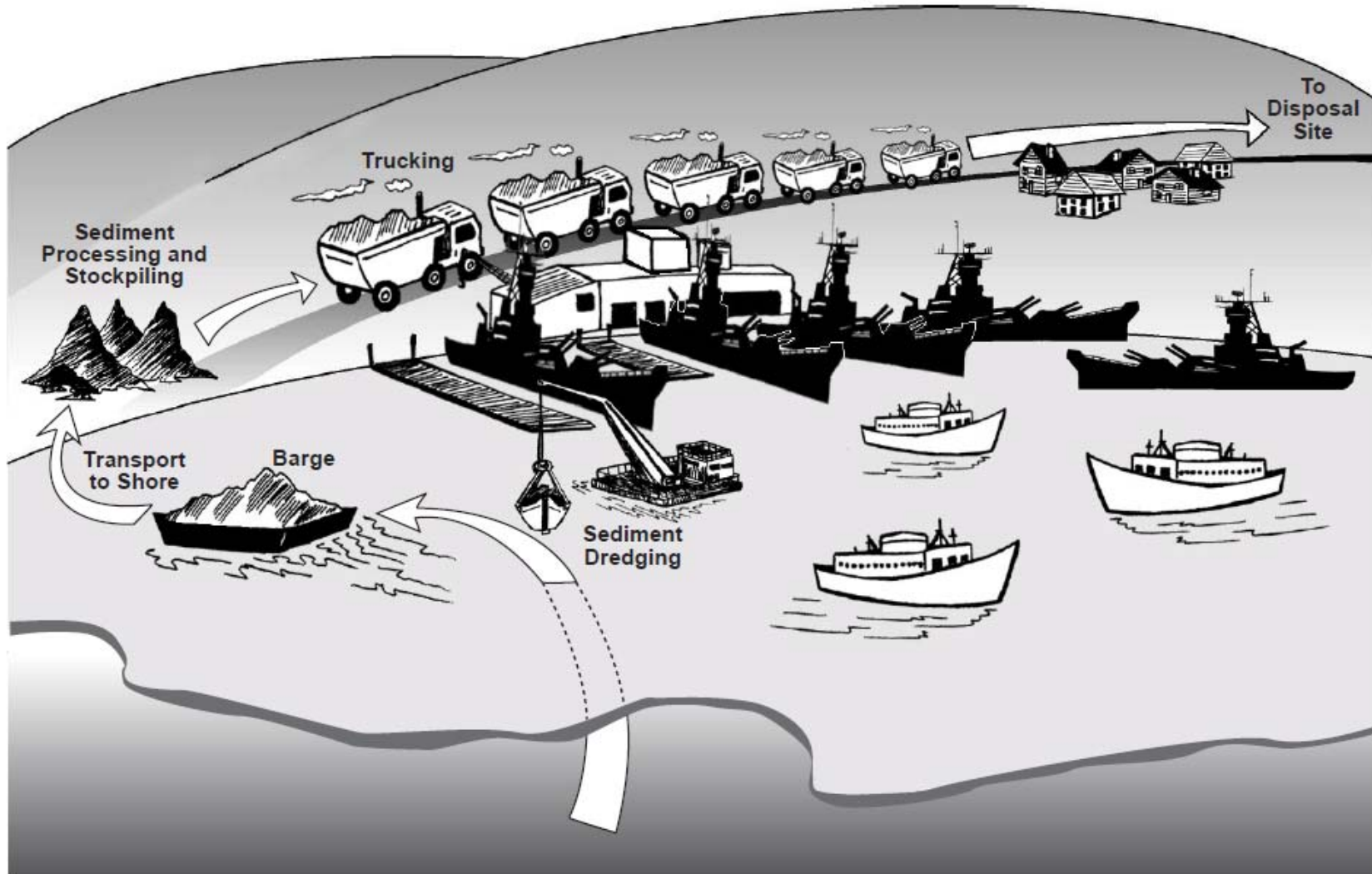
Water quality monitoring



Outer Silt Curtain

Inner Silt Curtain

Remedial Monitoring



Sediment monitoring



Dredging Decision Rules

- Above 120%, re-dredge area and sample
- Below 120%, dredging can stop for that area
- If no sample due to hard substrate, dredging can stop for that area

120 % Decision Rule does not determine Alternative Cleanup Level compliance

- Not a loophole
- Merely field guidance
- Successfully applied

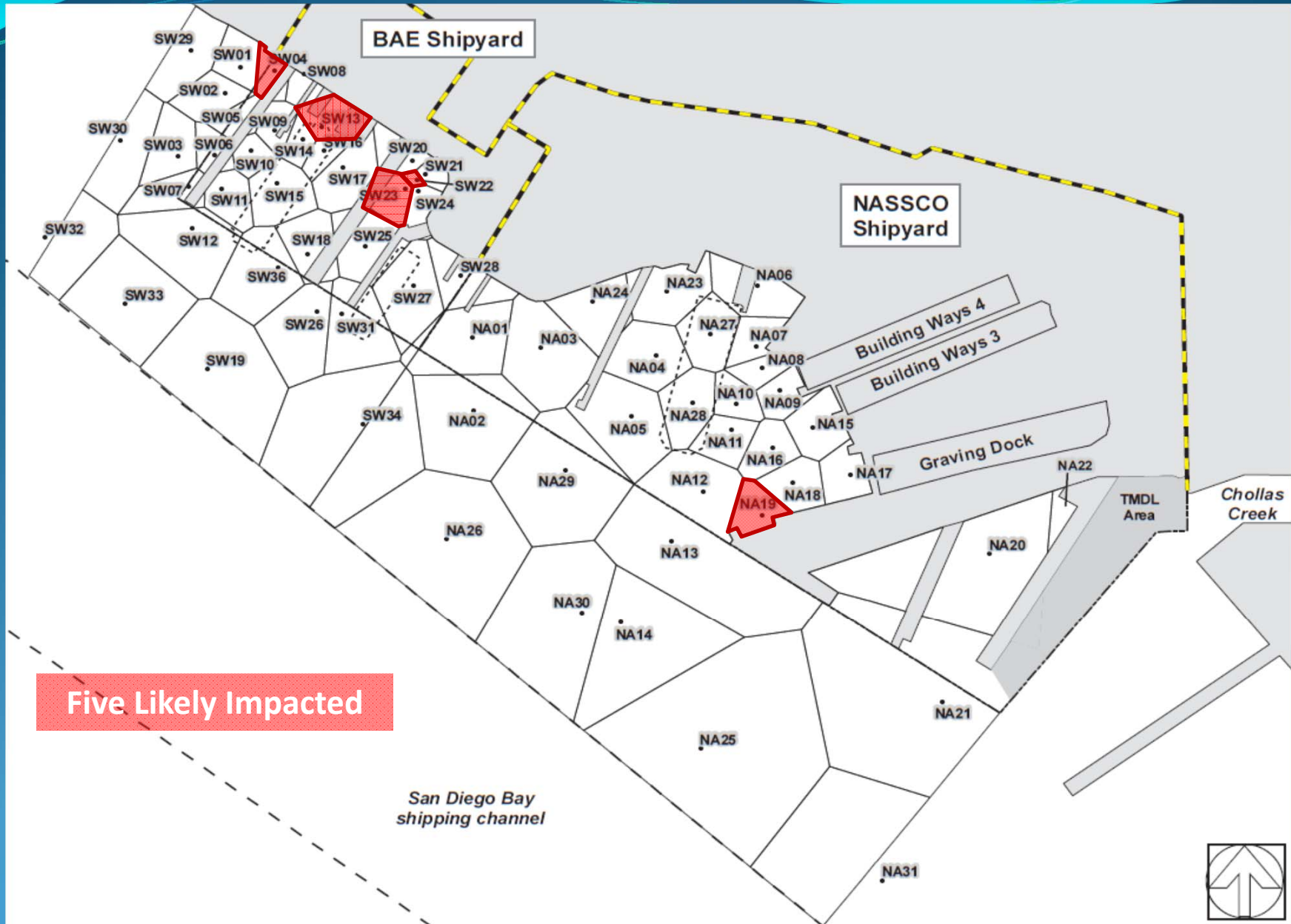
Post Remedial Verification Monitoring “Heart and Soul of the CAO”

- 2 years
- 5 years
- 10 years if needed

Remediation Goals

- Sediment chemistry below SS-MEQ and 60%LAET thresholds

Post Remedial Verification Monitoring



Remediation Goals – Aquatic Life

- Toxicity not significantly different from conditions at the reference stations

Remediation Goals – Wildlife and Human Health

- Bioaccumulation levels below the pre-remedial levels

Remediation Goals – Wildlife and Human Health

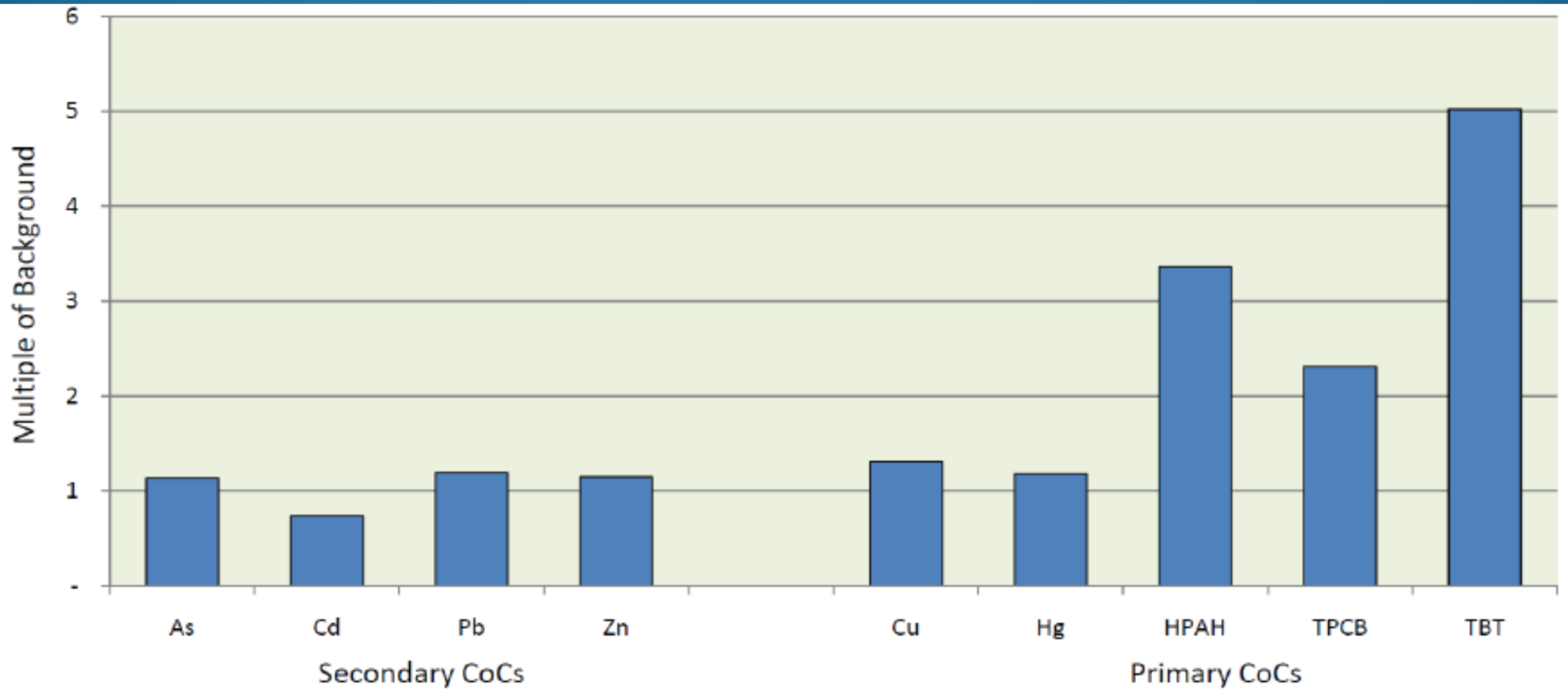
- Site-wide SWACs are below trigger concentrations
- Trigger concentrations equal the 95% Upper Confidence Level of the predicted post-remedial SWACs

SWAC Trigger Concentrations

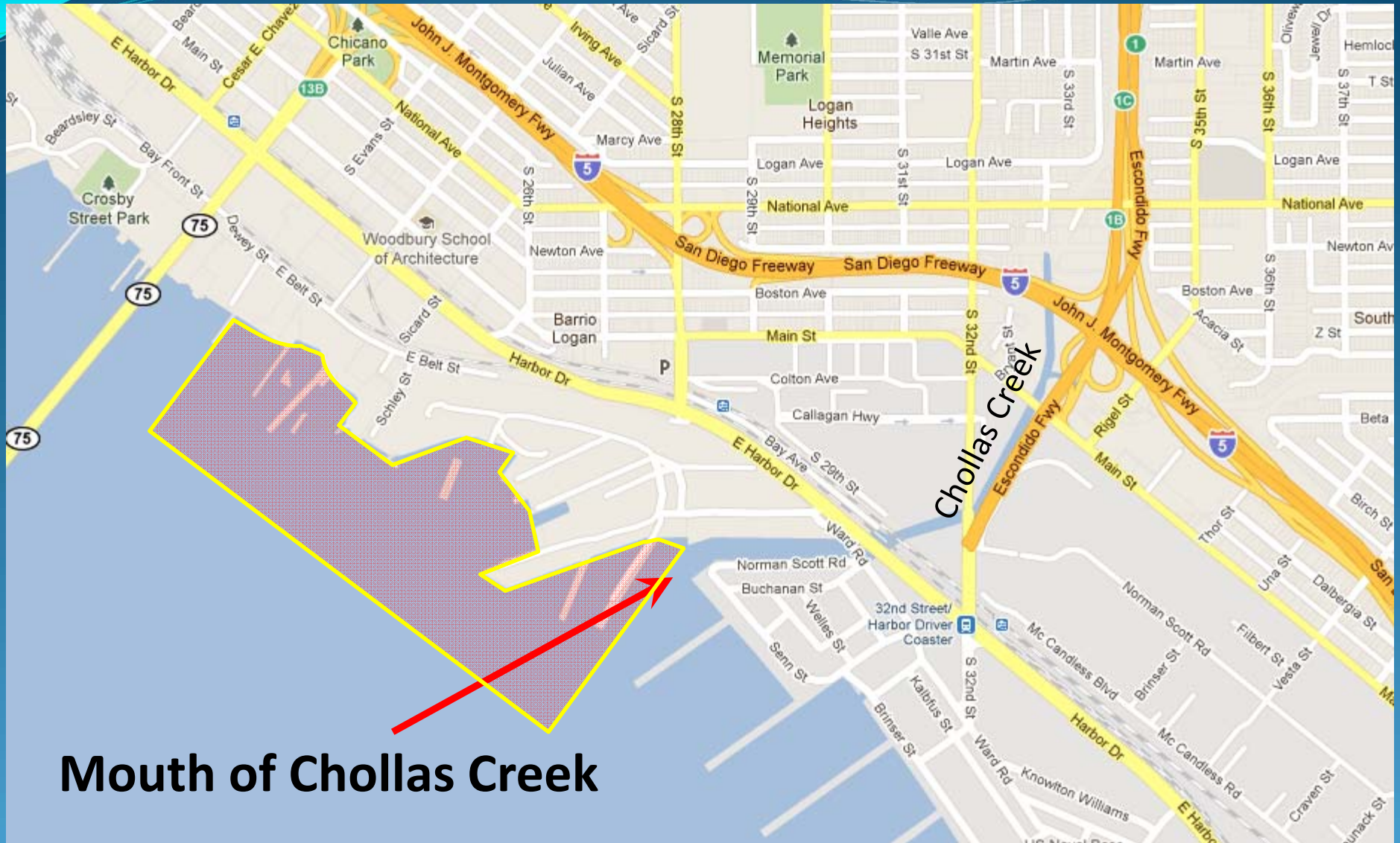
Primary COC	Post-Remedial SWACs	95% UCL Trigger
Copper mg/kg	159	185
Mercury mg/kg	0.68	0.78
HPAHs µg/kg	2,451	3,208
PCBs µg/kg	194	253
TBT µg/kg	110	156

DTR Figure 33-3

Comparison of Post-Remedial SWACs to Background Sediment Chemistry Levels



Post Remedial Verification Monitoring



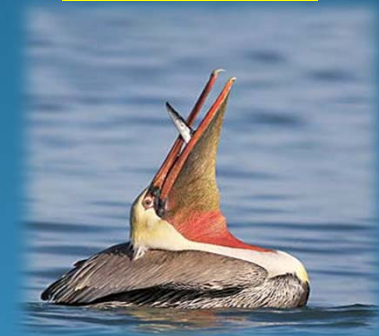
Mouth of Chollas Creek

**Will the cleanup result in
the best water quality
that is reasonable?
(Resolution 92-49)**

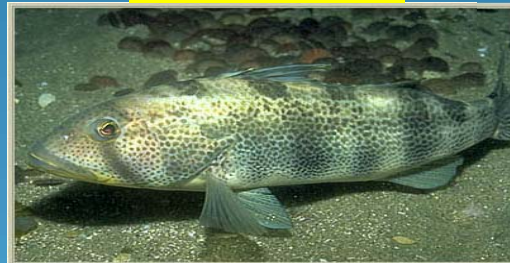
BENEFICIAL USE IMPAIRMENT

- Aquatic Life
- Aquatic-Dependent Wildlife
- Human Health

Birds



Fish



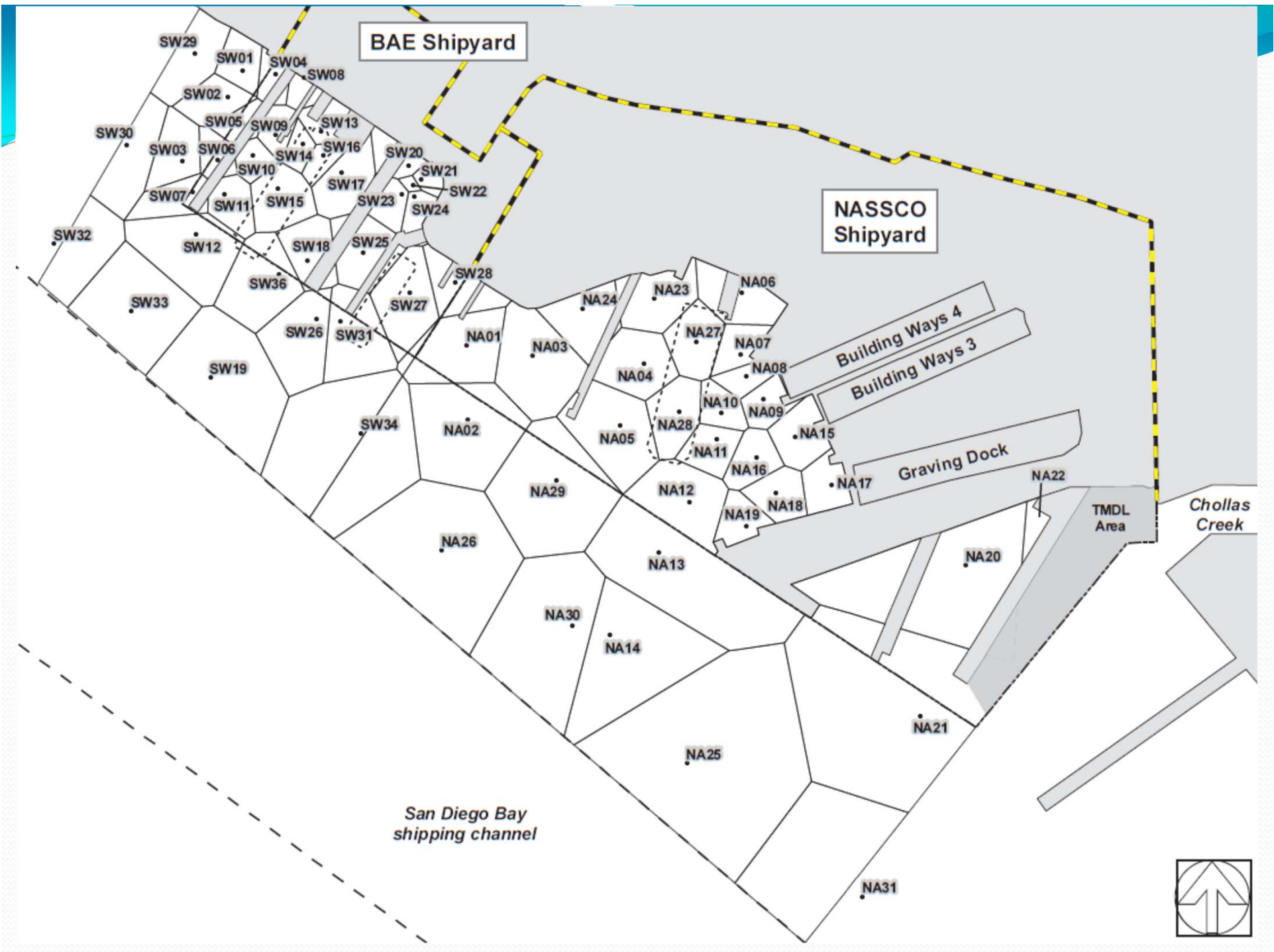
Anglers



Benthic Community



Aquatic Life Beneficial Uses	Wildlife Beneficial Uses	Human Health Beneficial Uses
Estuarine Habitat (EST)	Wildlife Habitat (WILD)	Contact Water Recreation (REC-1)
Marine Habitat (MAR)	Preservation of Biological Habitats of Special Significance (BIOL)	Non-Contact Water Recreation (REC-2)
Migration of Aquatic Organisms (MIGR)	Rare, Threatened or Endangered Species (RARE)	Shellfish Harvesting (SHELL)
		Commercial and Sport Fishing (COMM)



BAE Shipyard

NASSCO Shipyard

Building Ways 4
Building Ways 3

Graving Dock

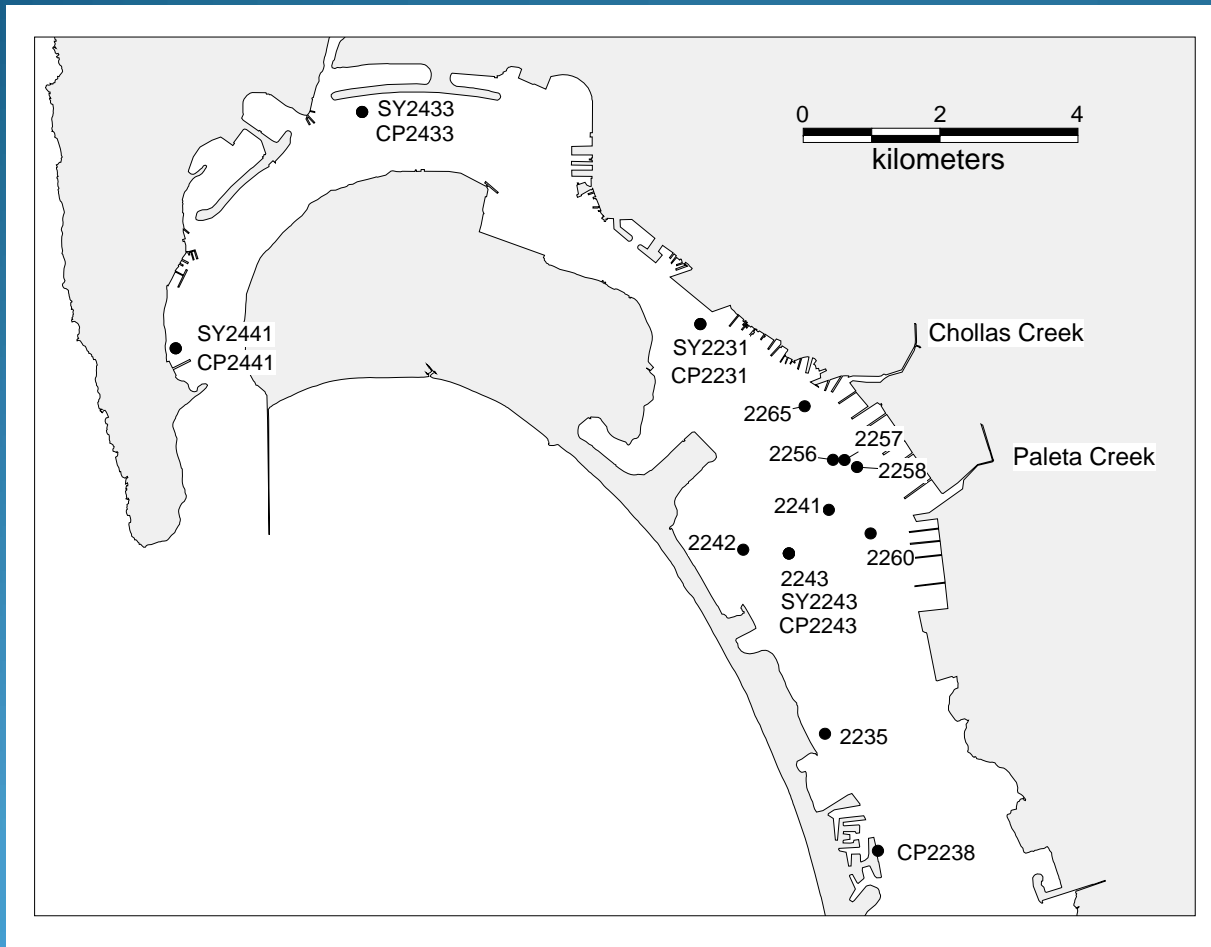
TMDL Area

Chollas Creek

San Diego Bay
shipping channel



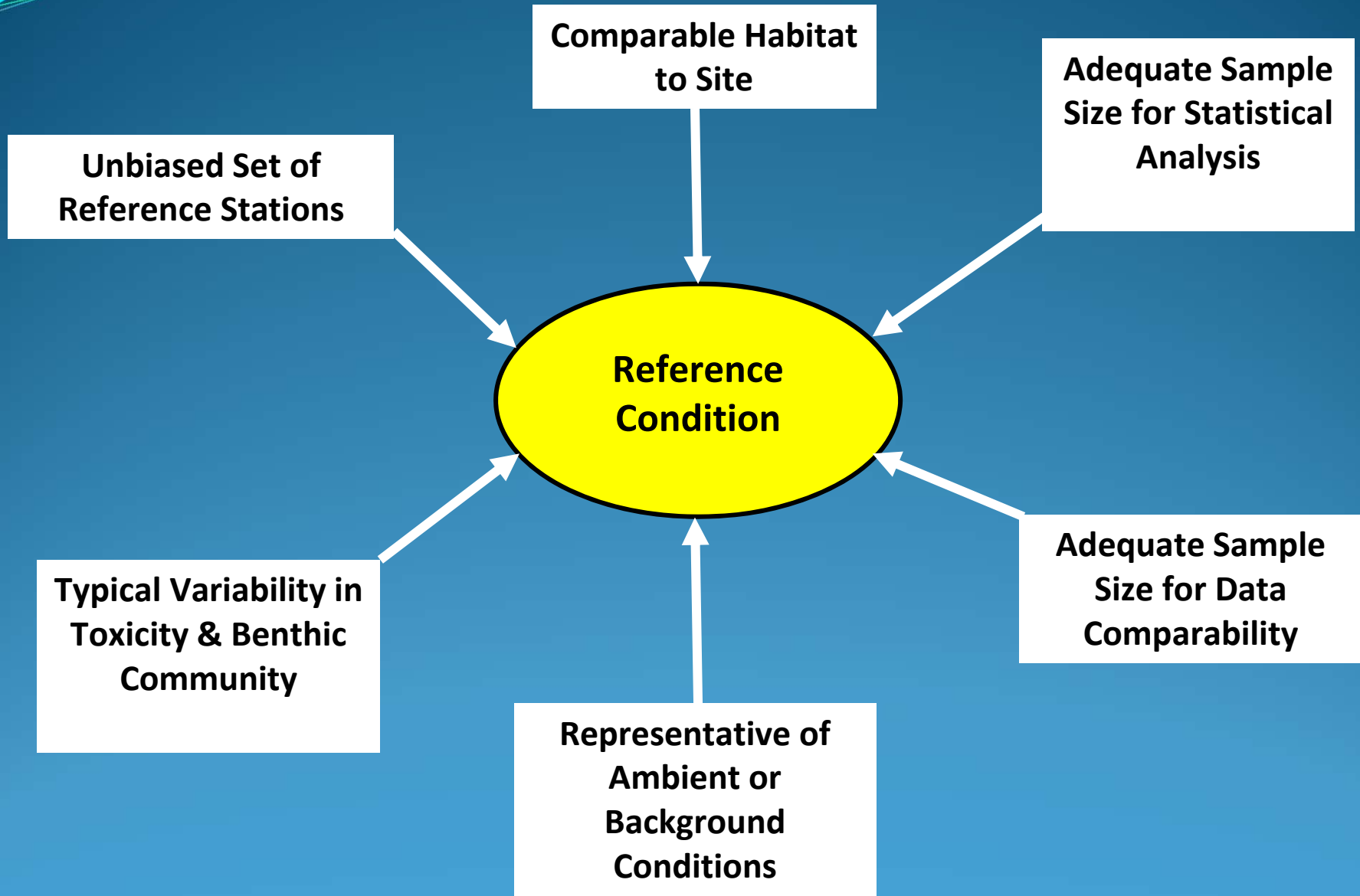
REFERENCE CONDITION



**2001 Shipyard
Study**

**2001
Chollas/Paleta
TMDL Study**

**1998 Bight'98
Study**



**Aquatic Life
Beneficial Uses**

**Estuarine Habitat
(EST)**

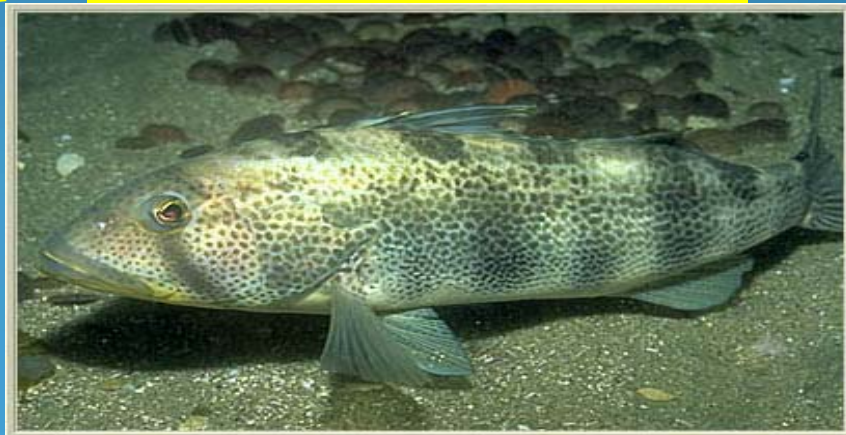
**Marine Habitat
(MAR)**

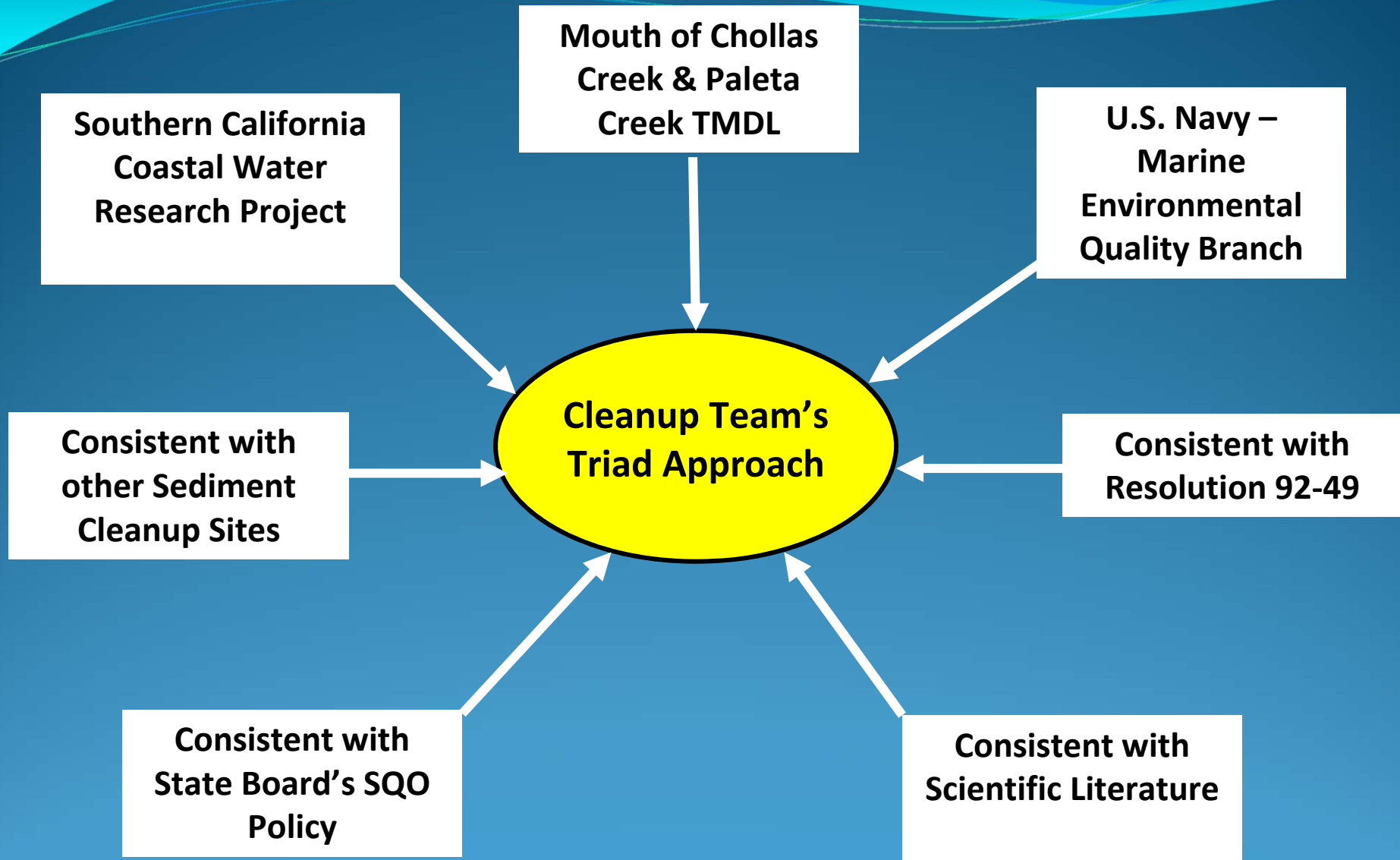
**Migration of
Aquatic
Organisms
(MIGR)**

Benthic Community



Fish





Cleanup Team's Triad Approach

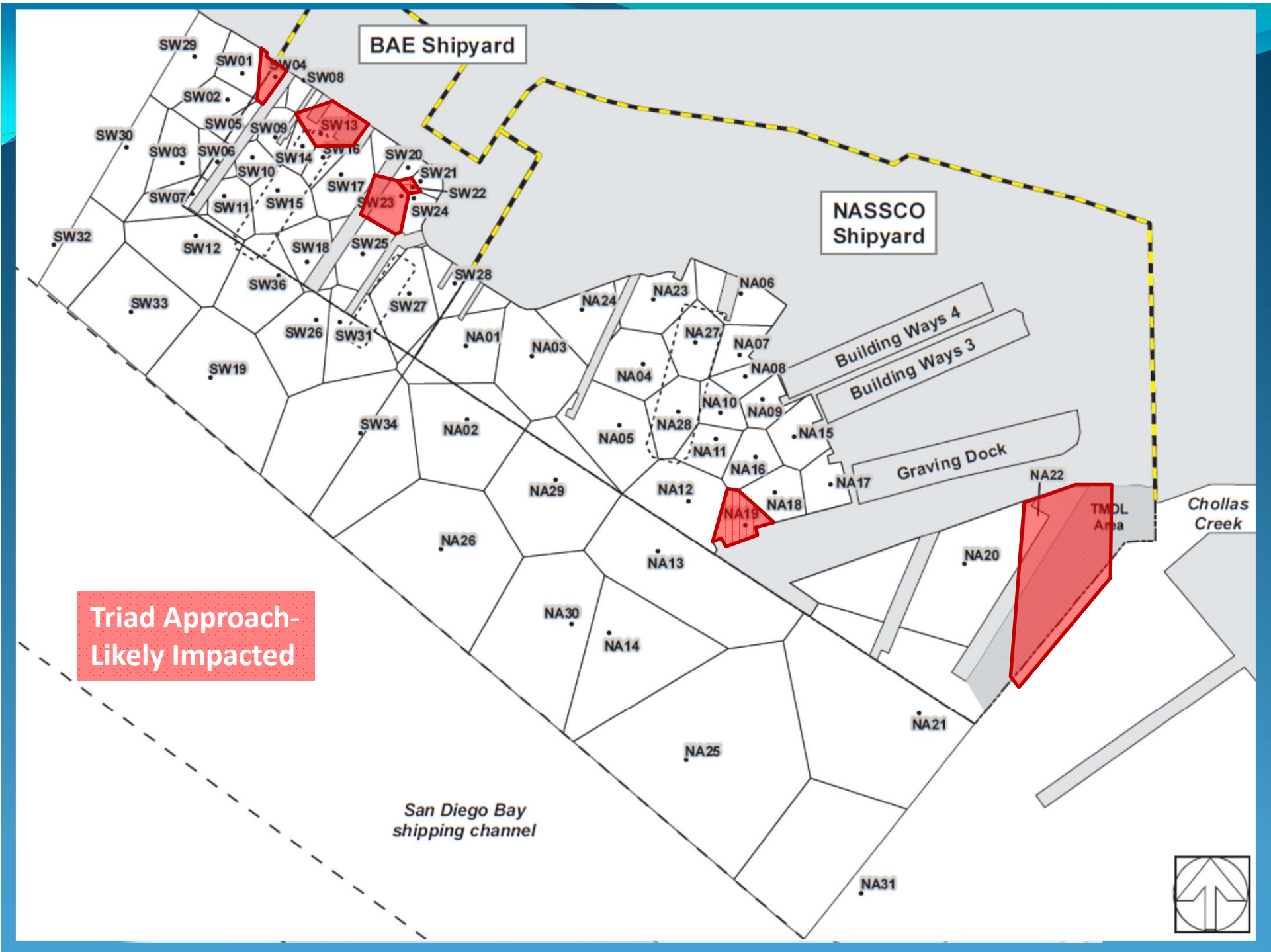
Sediment Chemistry

Toxicity

Benthic Community

Triad Decision Matrix
(unlikely, possibly, likely)

Aquatic Life Beneficial Use Impaired?



Triad Approach-
Likely Impacted

BAE Shipyard

NASSCO
Shipyard

Building Ways 4
Building Ways 3

Graving Dock

Chollas
Creek

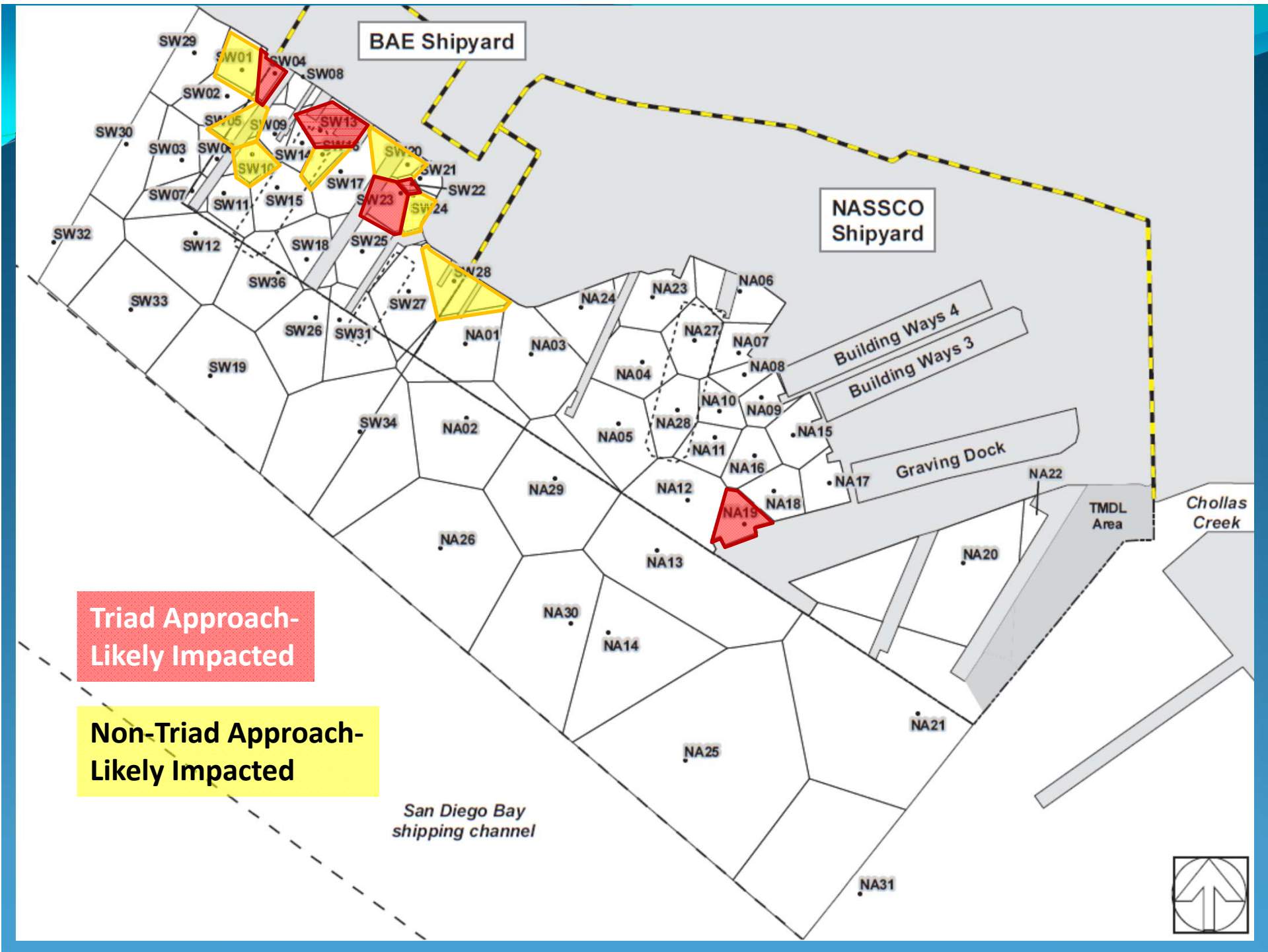
TMDL
Area

San Diego Bay
shipping channel



NON-TRIAD DATA APPROACH

- Only sediment chemistry data
- 60% Lowest Apparent Effects Thresholds (LAETs)
- Site-specific Median Effects Quotient (SS-MEQ)



Triad Approach-
Likely Impacted

Non-Triad Approach-
Likely Impacted

BAE Shipyard

NASSCO
Shipyard

Building Ways 4
Building Ways 3

Graving Dock

TMDL
Area

Chollas
Creek

San Diego Bay
shipping channel



Cleanup Team's Triad assumptions protect beneficial uses

- Weighting on chemistry leg
- Bivalve larvae test
- Bioavailability

Possibly Impaired Stations

Sediment Chemistry	Toxicity	Benthic Community	Relative Likelihood of Benthic Community Impairment
Moderate	Moderate	Low	Possible
Moderate	Low	Moderate	
High	Low	Low	

Cleanup Team's Triad assumptions protect beneficial uses

- Weighting on chemistry leg
- Bivalve larvae test
- Bioavailability

**Wildlife Beneficial
Uses**

**Wildlife Habitat
(WILD)**

**Preservation of
Biological
Habitats of Special
Significance
(BIOL)**

**Rare, Threatened
or Endangered
Species
(RARE)**

Birds



Mammals



Reptiles





Surf Scoter

Pacific Green Turtle



CA Least Tern

Western Grebe



CA Sea Lion



CA Brown Pelican



Aquatic-Dependent Wildlife Risk Assessment



WILDLIFE TIER II RISK RESULTS

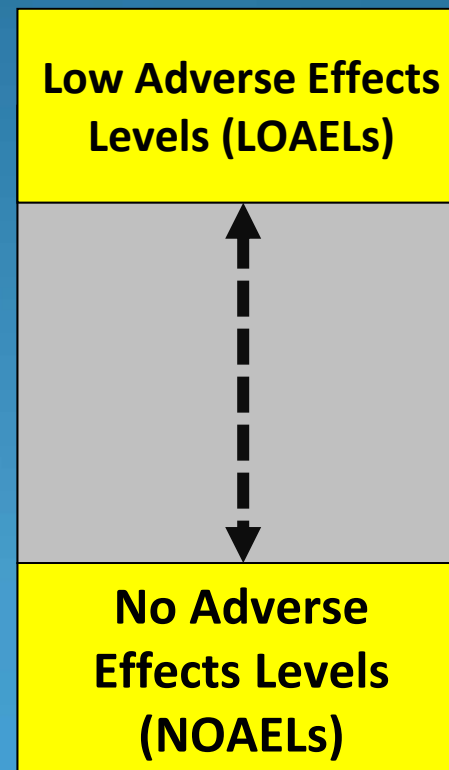
- **Aquatic-dependent wildlife beneficial uses are impaired:**

“... ingestion of prey items caught within all four assessment units at the Shipyard Sediment Site poses an increased risk above reference to wildlife receptors other than the sea lion.”

Cleanup Team's foraging area assumptions protect beneficial uses

RECEPTOR	CLEANUP TEAM'S AREA USE FACTOR	NASSCO/BAE AREA USE FACTOR
CA Brown Pelican	100%	0.2-1%
CA Least Tern		
Western Grebe		
Surf Scoter		
CA Sea Lion		
East Pacific Green Turtle		

Cleanup Team's effects threshold protects beneficial uses



Anglers



**Human Health
Beneficial Uses**

**Contact Water
Recreation
(REC-1)**

**Non-Contact
Water Recreation
(REC-2)**

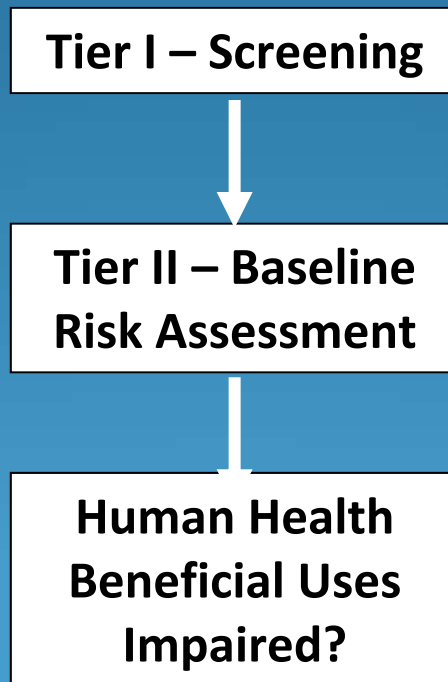
**Shellfish
Harvesting
(SHELL)**

**Commercial and
Sport Fishing
(COMM)**

RECEPTORS

- **Recreational Anglers**
 - Eat the fish and/or shellfish they catch recreationally
- **Subsistence Anglers**
 - Fish for food for economic and/or cultural reasons
 - Fish and/or shellfish is major source of protein intake

Human Health Risk Assessment



HUMAN HEALTH TIER II RISK RESULTS

- **Human health beneficial uses are impaired:**

“... ingestion of fish and shellfish caught within all four assessment units at the Shipyard Sediment Site poses a theoretical increased cancer and non-cancer risk greater than that in reference areas to recreational and subsistence anglers.”

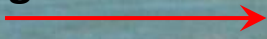
Cleanup Team's fishing area assumption protects beneficial uses

RECEPTOR	CLEANUP TEAM'S FRACTIONAL INTAKE	NASSCO/BAE FRACTIONAL INTAKE
Recreational Angler	100%	0.2 - 3.4%
Subsistence Angler	100%	0.2 - 3.4%

Cleanup Team's risk assumptions protect beneficial uses

- Subsistence anglers consume entire fish and shellfish
- Maximum tissue chemical concentration used to estimate risk

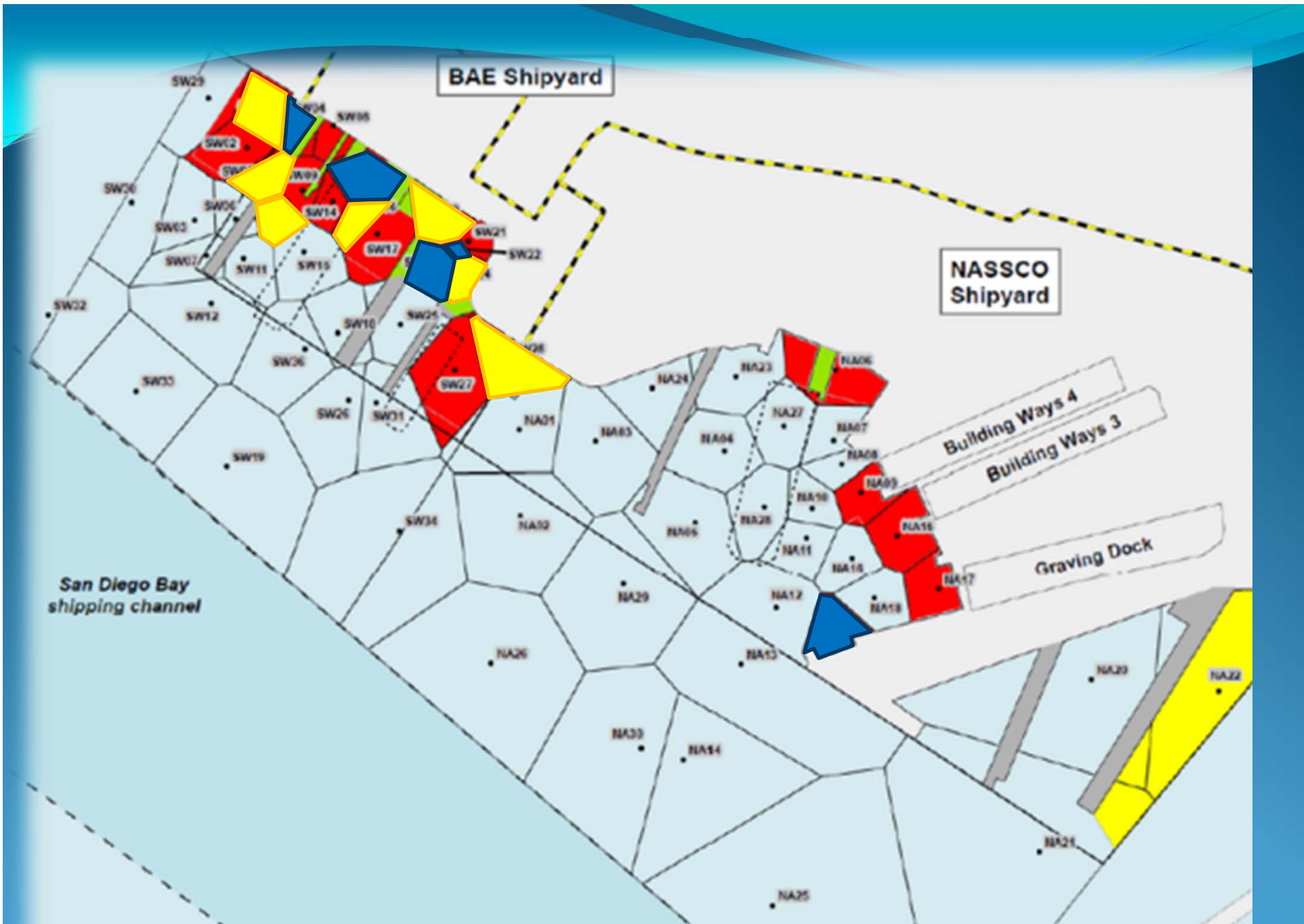
Dredge Bucket

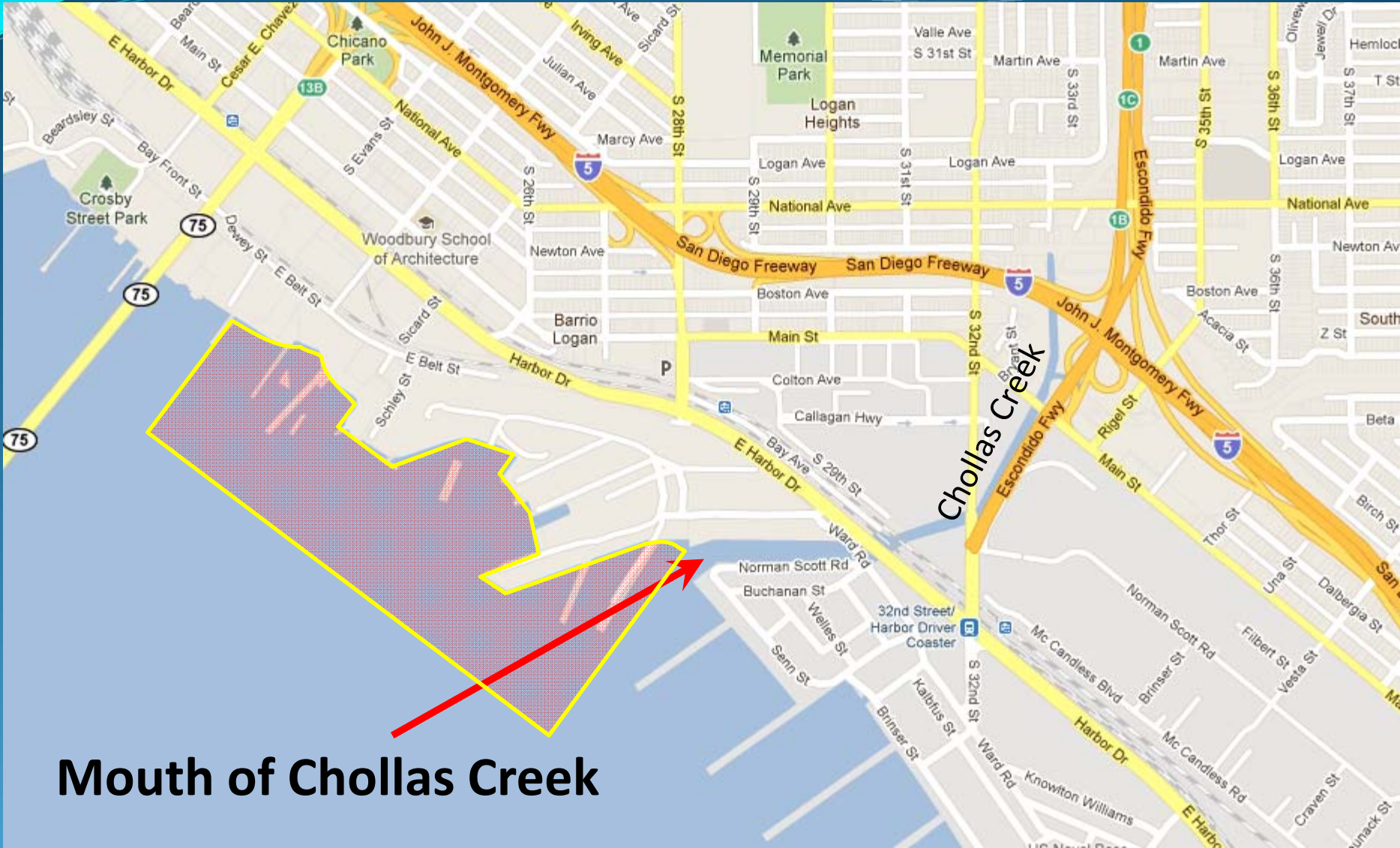


01/05/2011

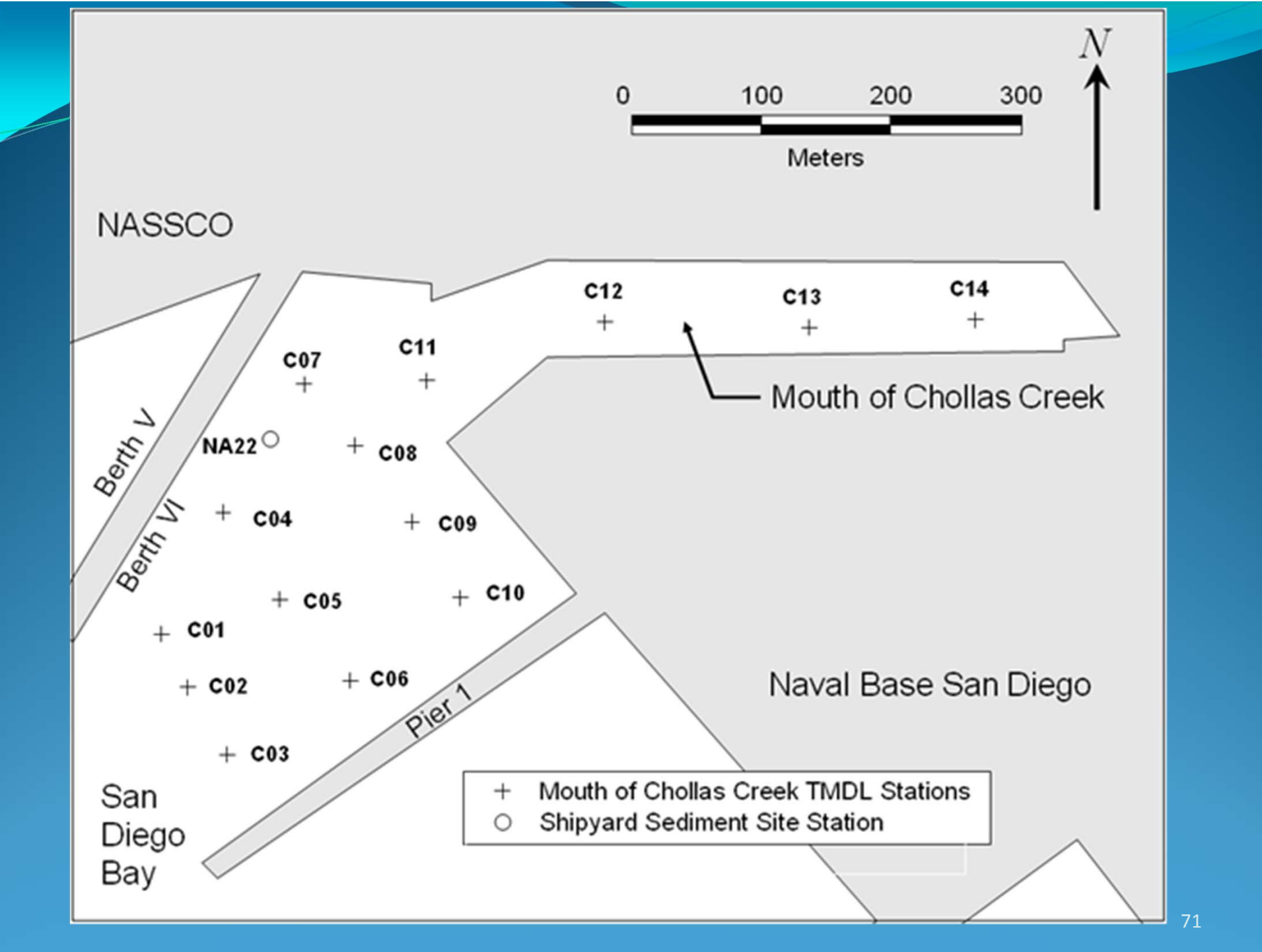
MNA is not appropriate as the only remedy

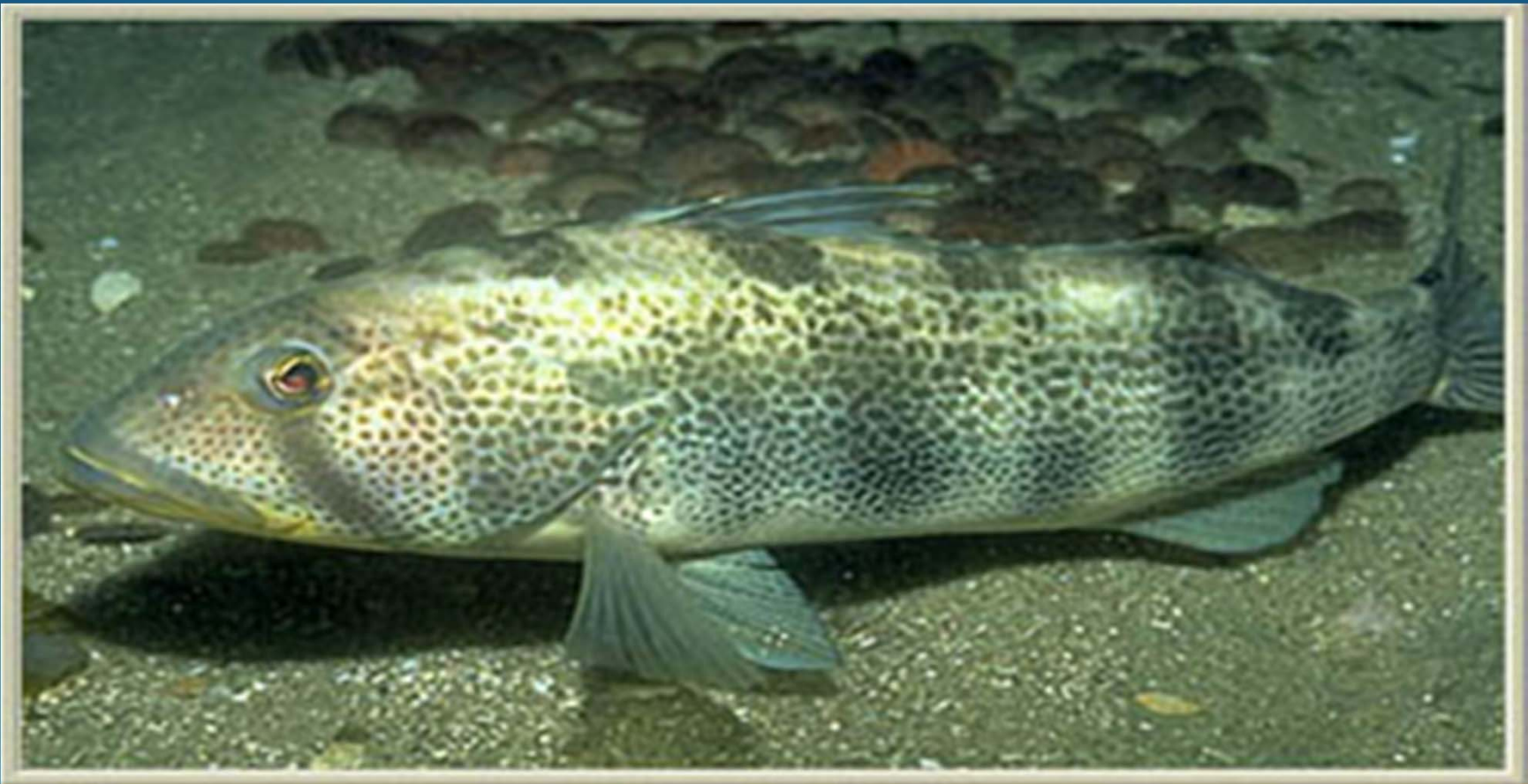
- 1. Requires longer time frame**
 - 2. Constituents and site activities not favorable**
 - 3. No substantial evidence**
- MNA will work**

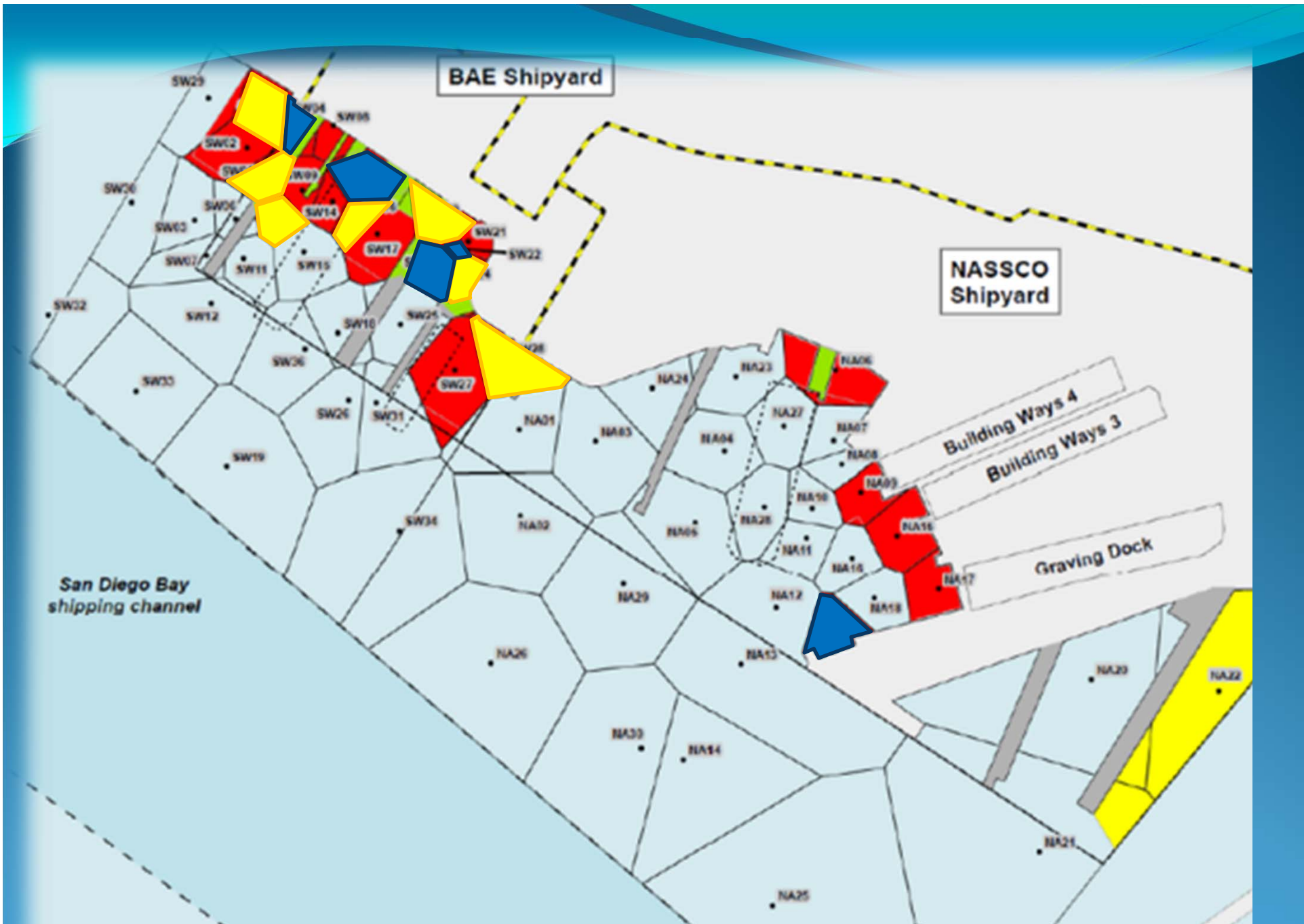




Mouth of Chollas Creek







Post-Remedial Hazard Quotient

Receptor	Cu	Hg	HPAHs	PCBs	TBT	Pb	Zn
Brown Pelican	0.059	0.496	--	0.327	--	--	--

Post-Remedial Hazard Quotient

Receptor	Cu	Hg	HPAHs	PCBs	TBT	Pb	Zn
Least Tern	0.100	0.138	--	0.415	--	--	0.309

Post-Remedial Hazard Quotient

Receptor	Cu	Hg	HPAHs	PCBs	TBT	Pb	Zn
Western Grebe	0.066	0.073	--	0.183	--	--	--

Post-Remedial Hazard Quotient

Receptor	Cu	Hg	HPAHs	PCBs	TBT	Pb	Zn
Surf Scoter	0.272	0.084	0.265	0.059	--	--	--

Post-Remedial Hazard Quotient

Receptor	Cu	Hg	HPAHs	PCBs	TBT	Pb	Zn
Green Turtle	--	--	--	--	--	0.245	--



92-49 Total Values Approach to Alternative Cleanup Levels

