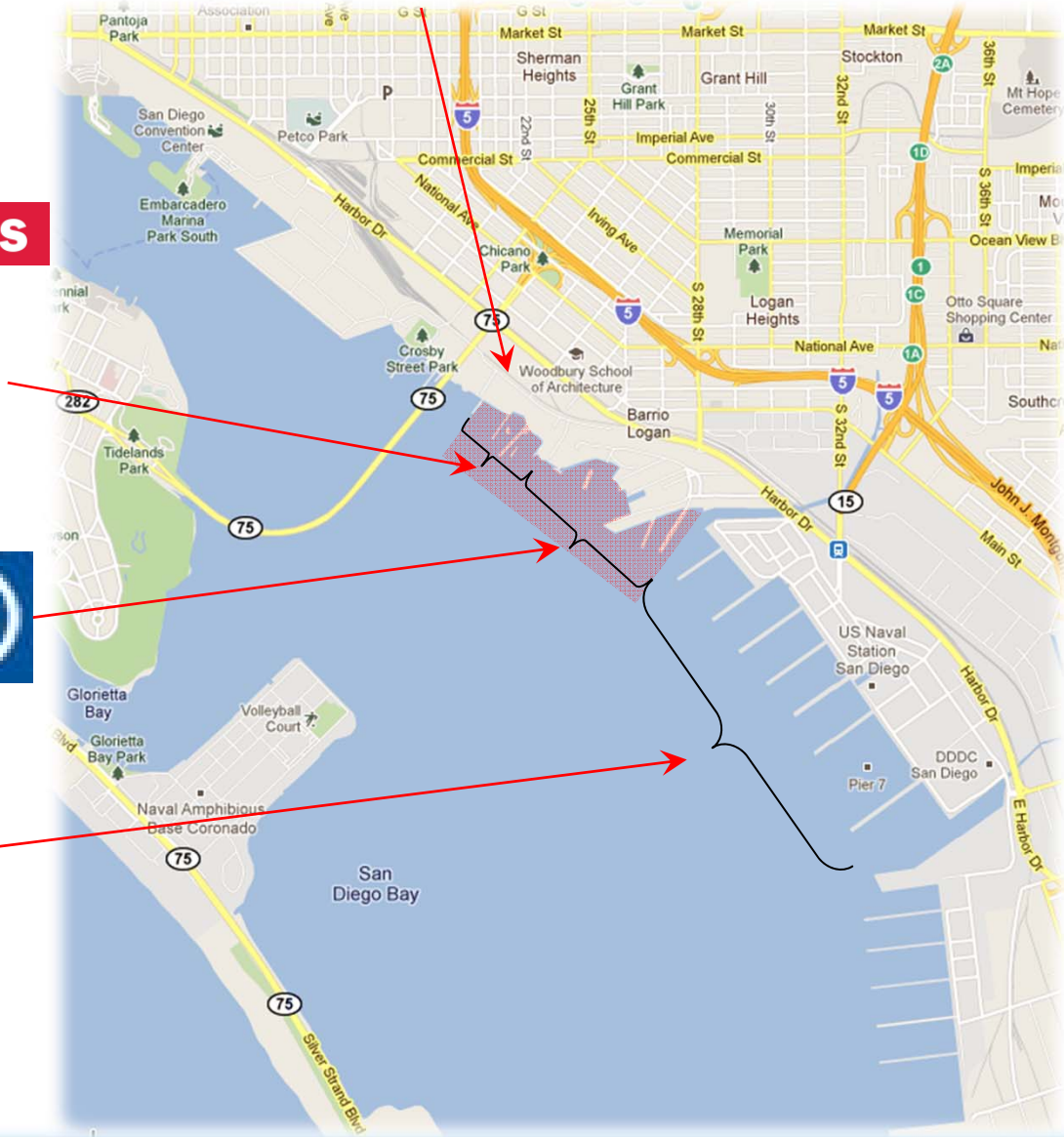


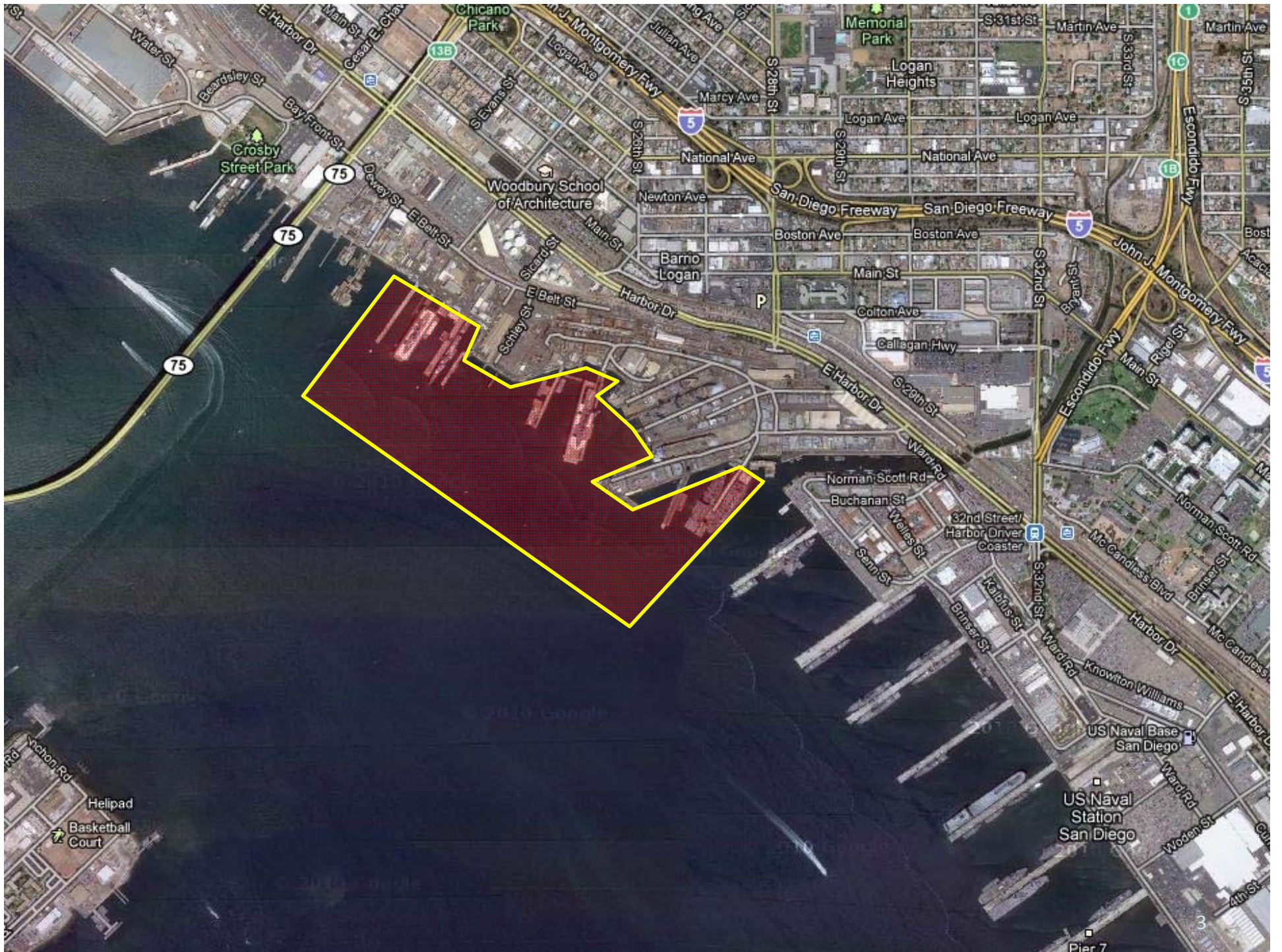




BAE SYSTEMS

**STAR &
CRESCENT
CAMPBELL
INDUSTRIES**



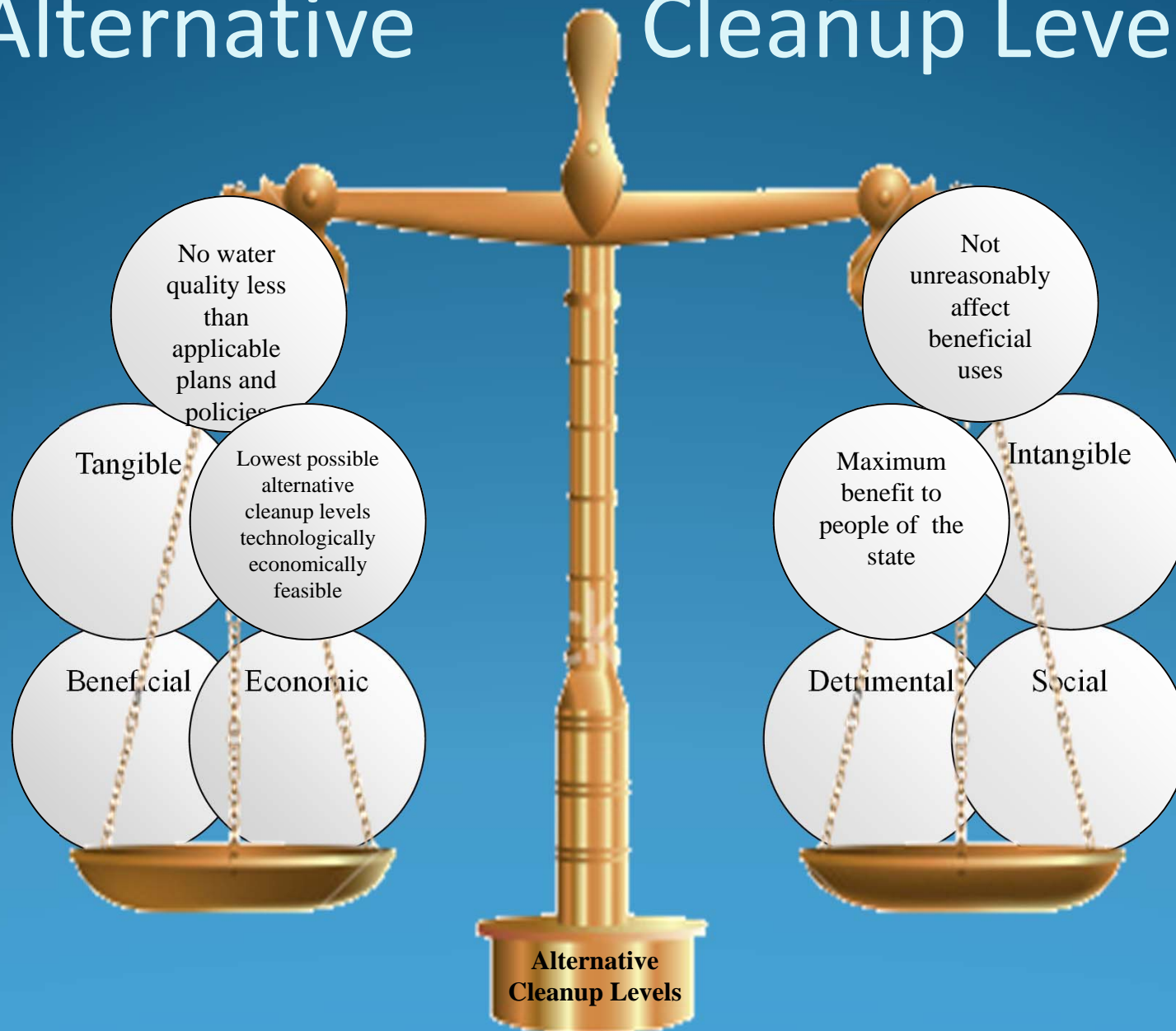


State Water Board Resolution 92-49

Alternative cleanup levels must achieve:

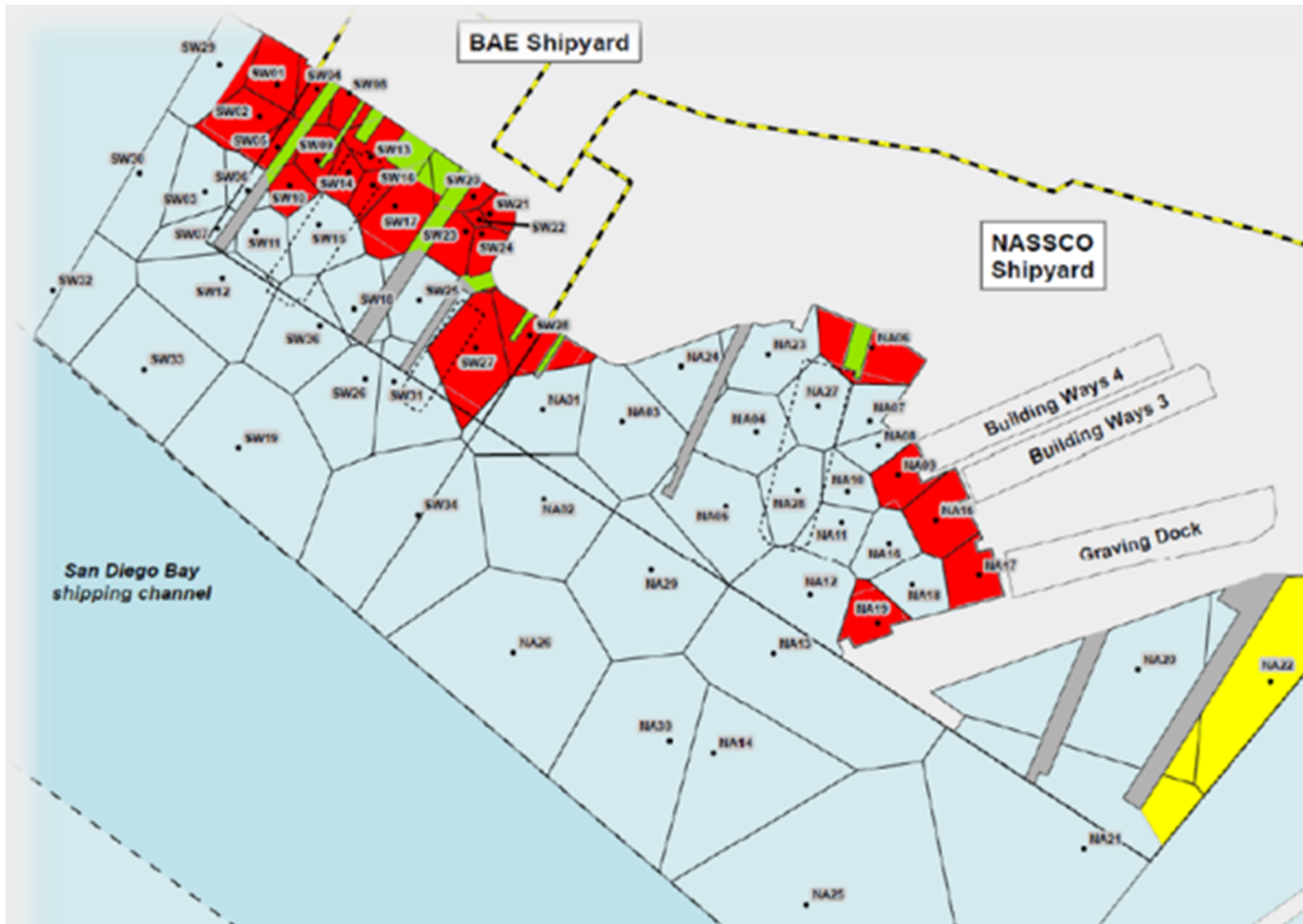
“The best water quality which is reasonable... considering all demands made and to be made on these waters and the total values involved...”

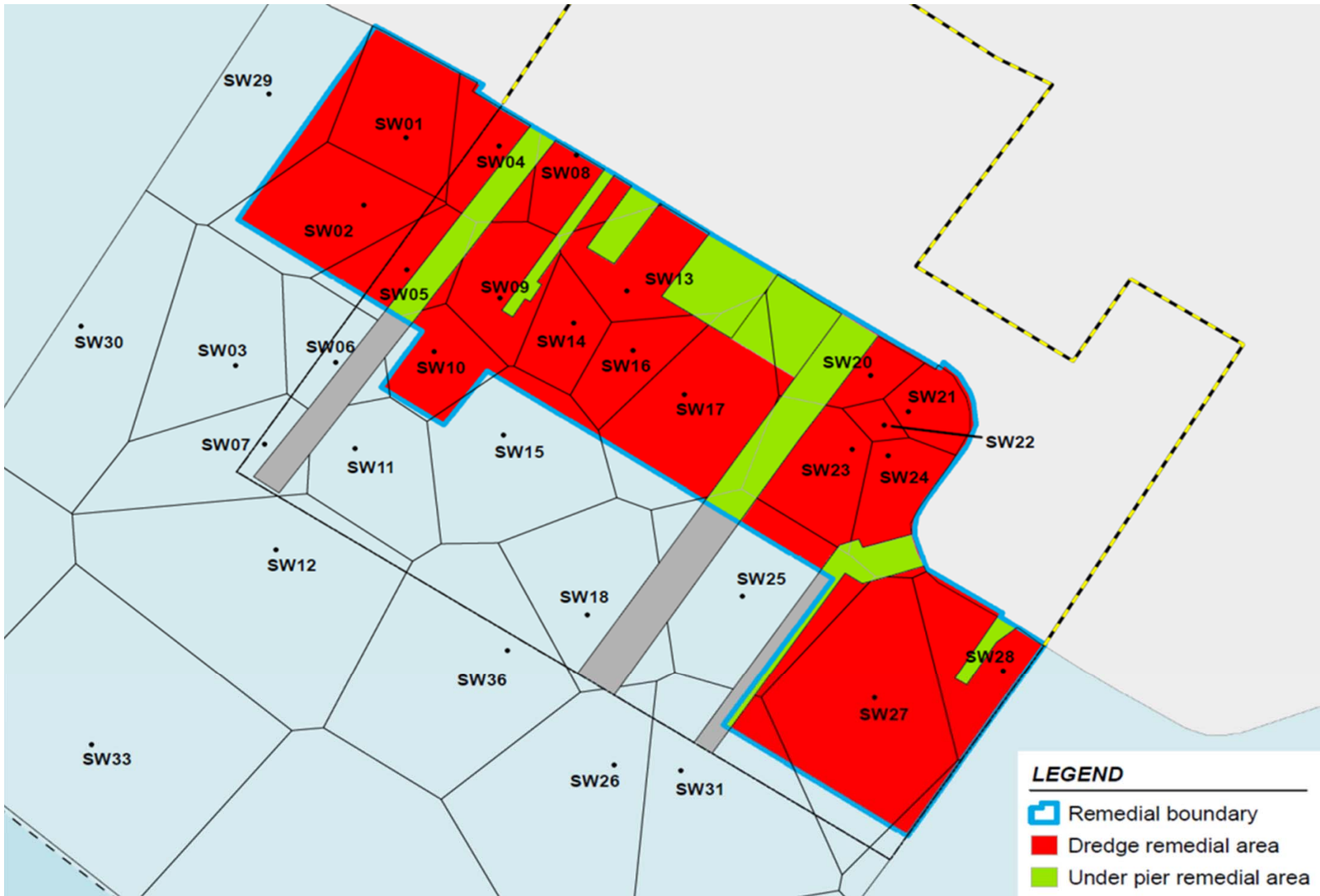
92-49 Total Values Approach to Alternative Cleanup Levels

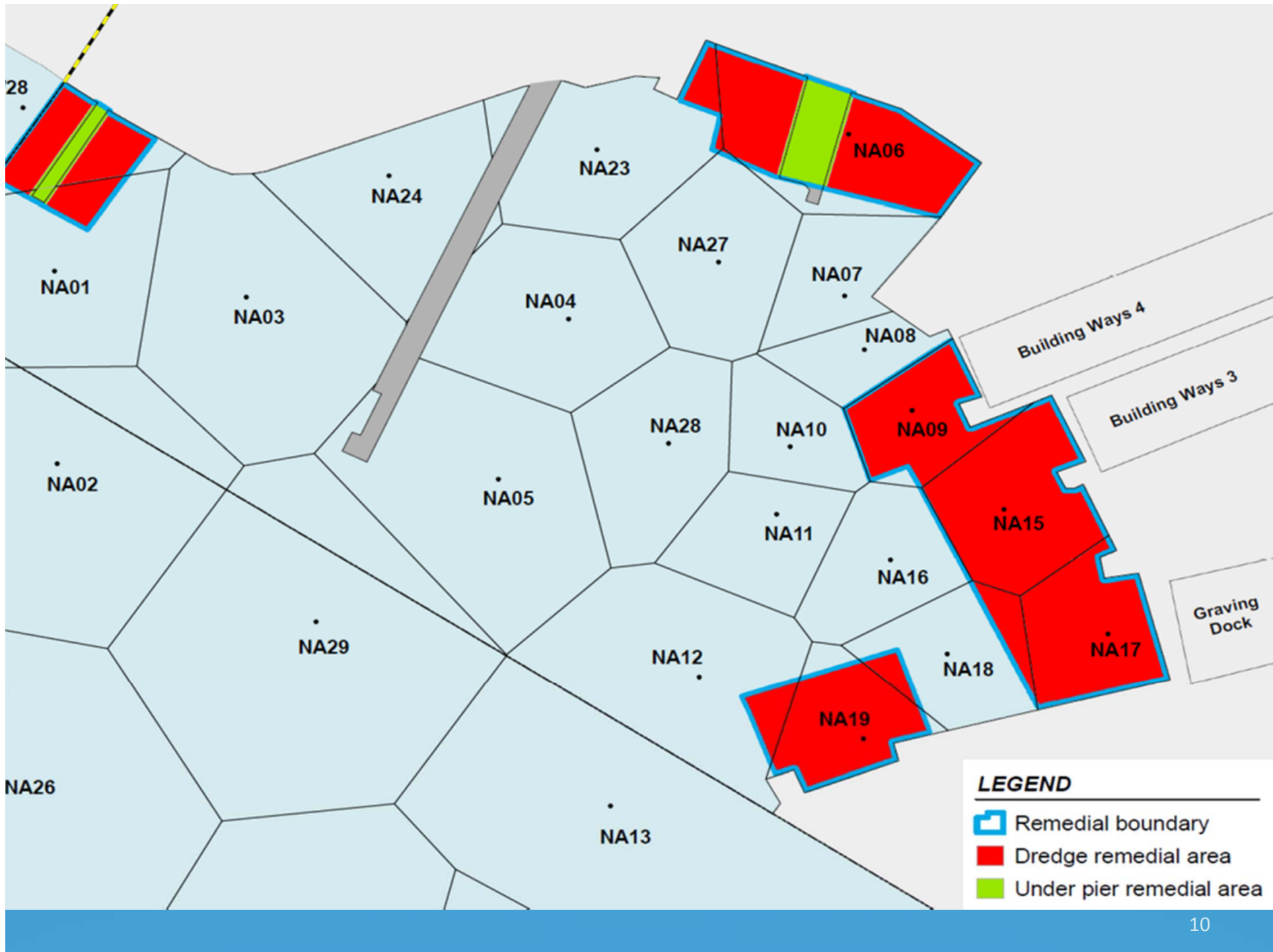


**What will adopting this
Order accomplish?**

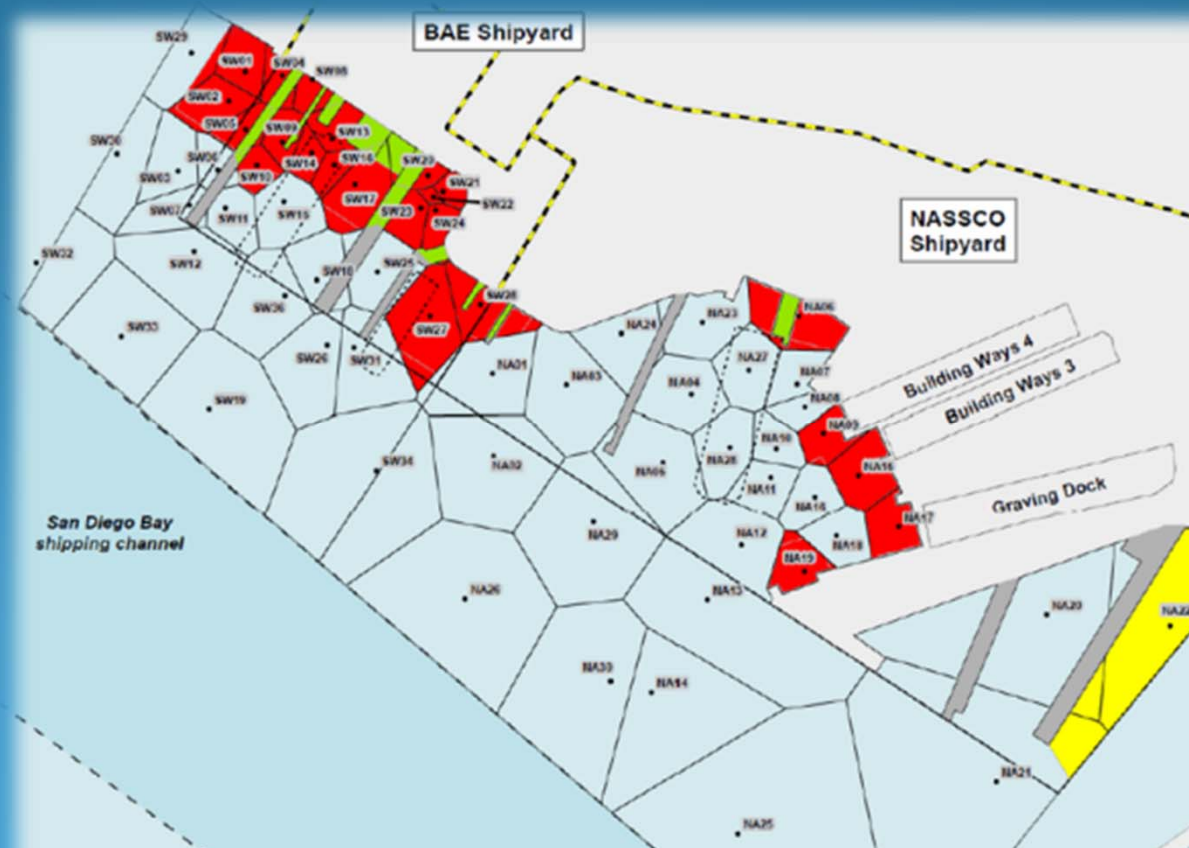








Remove 143,000 cubic yards 15 acres dredge footprint



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% |

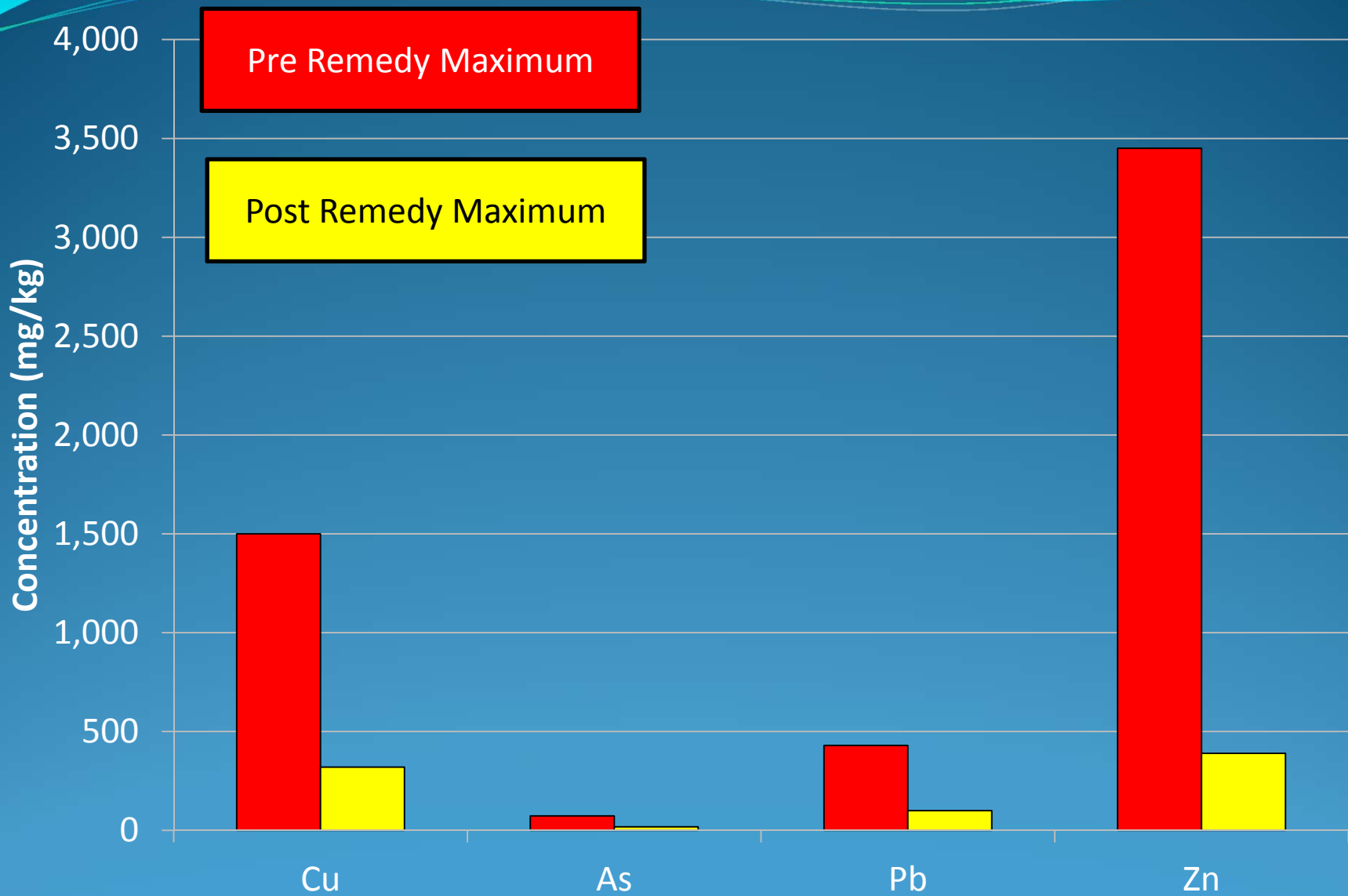
| Secondary COCs | Pre-Remedy Maximum | Post Remedy Maximum | Percent Reduction |
|----------------|--------------------|---------------------|-------------------|
|----------------|--------------------|---------------------|-------------------|

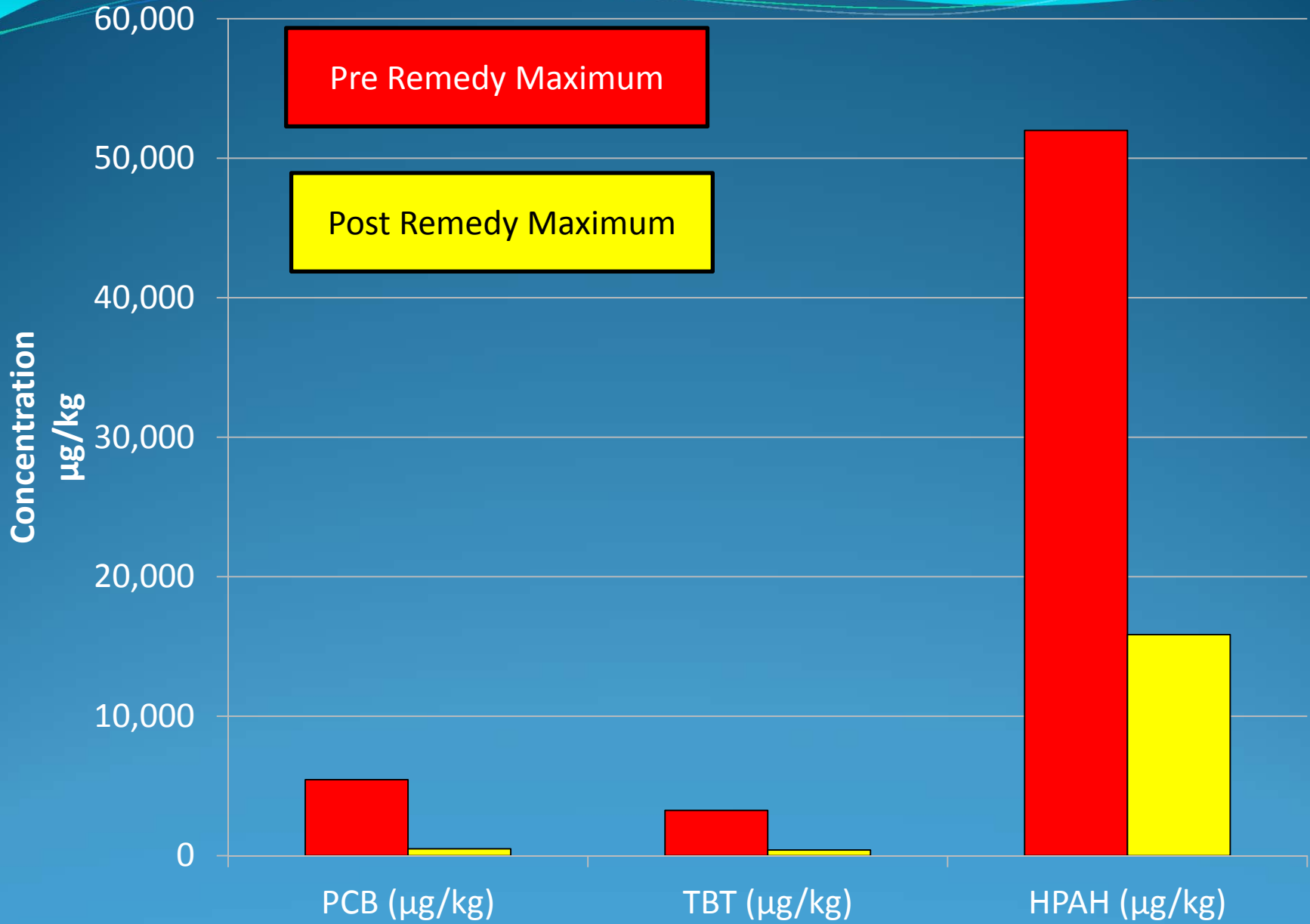
| | | | |
|---------------|----|----|-----|
| As (mg/kg) | 73 | 18 | 75% |
|---------------|----|----|-----|

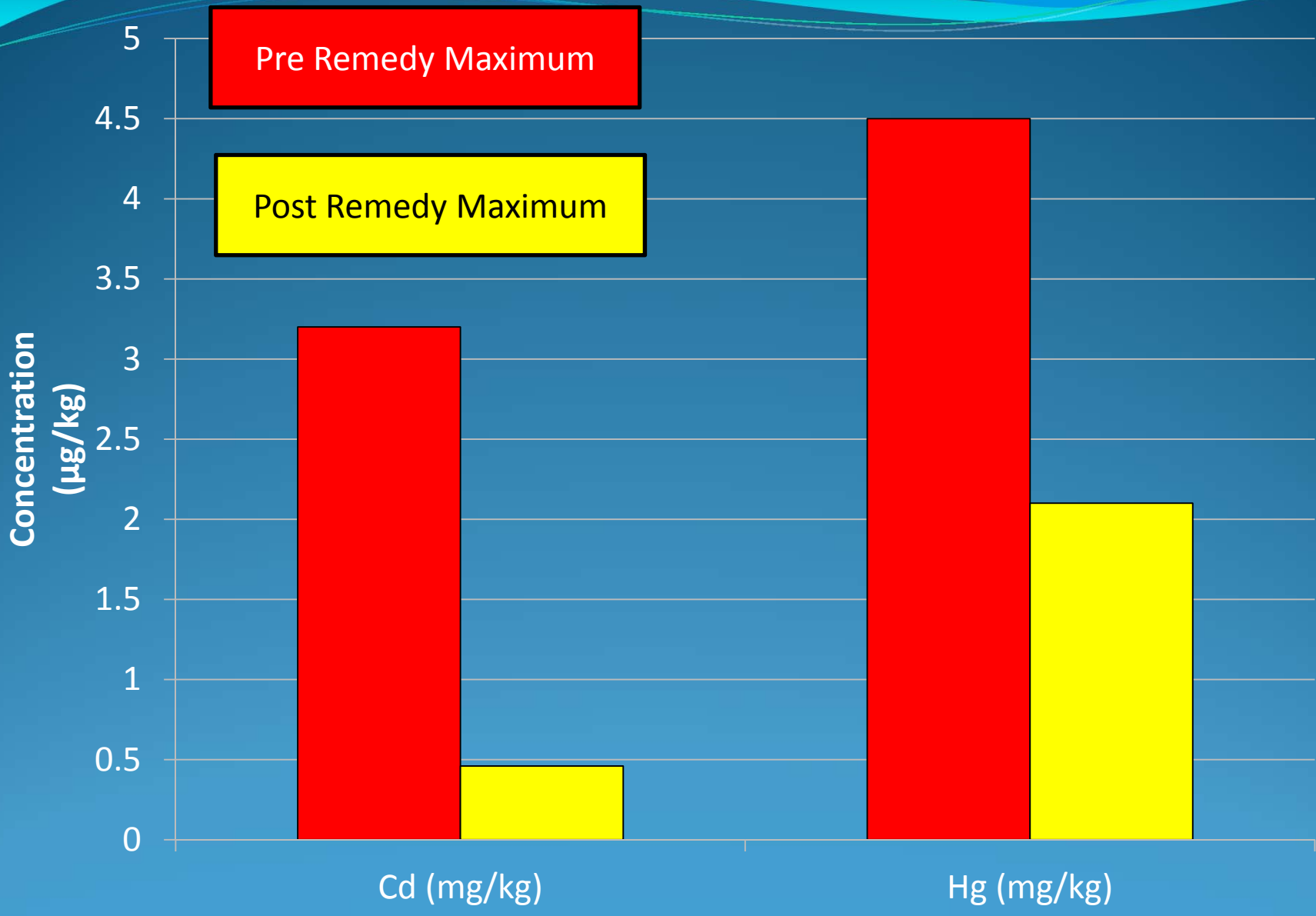
| | | | |
|---------------|-----|------|-----|
| Cd (mg/kg) | 3.2 | 0.46 | 86% |
|---------------|-----|------|-----|

| | | | |
|---------------|-----|-----|-----|
| Pb (mg/kg) | 430 | 100 | 77% |
|---------------|-----|-----|-----|

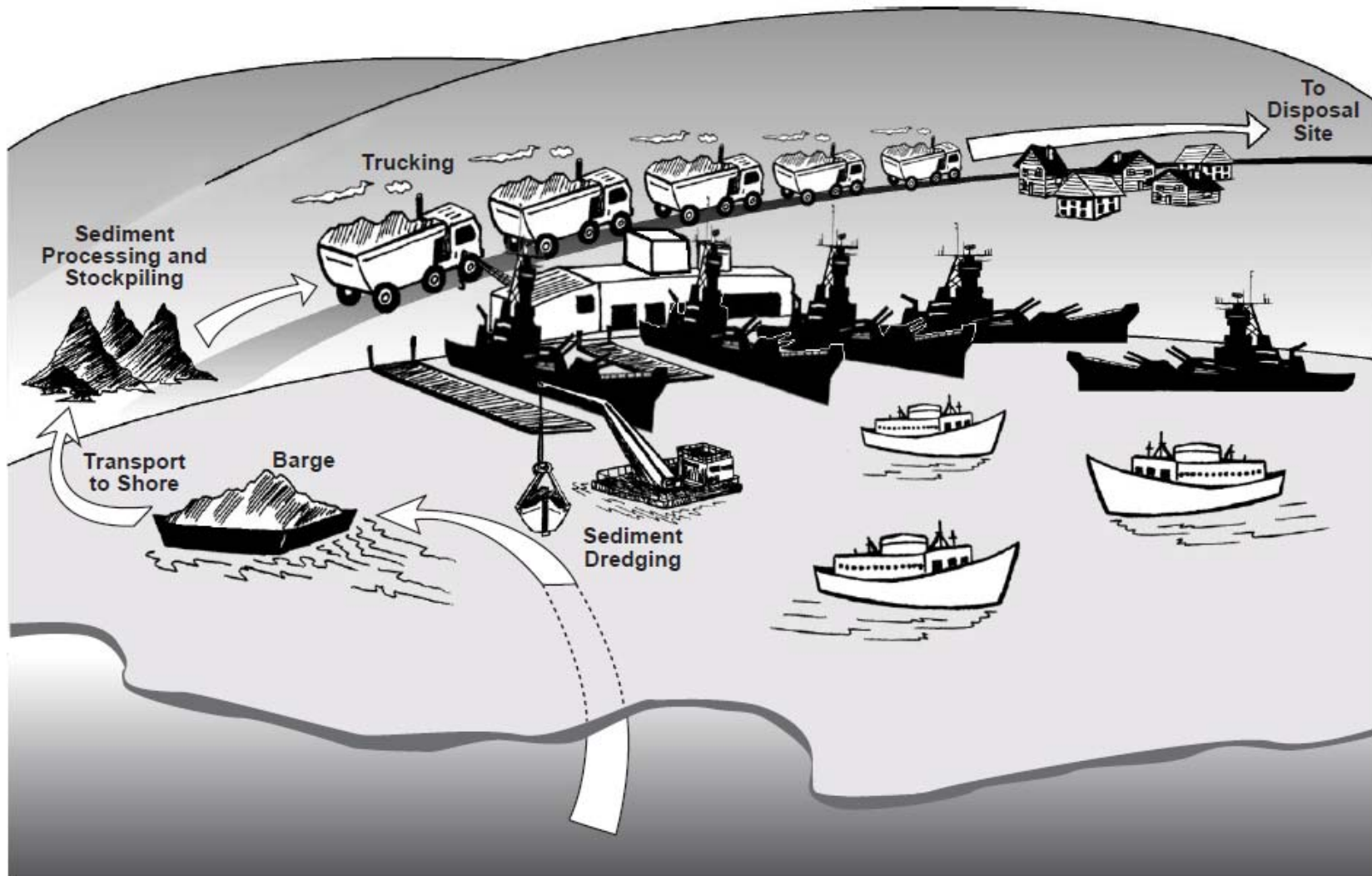
| | | | |
|---------------|-------|-----|-----|
| Zn (mg/kg) | 3,450 | 390 | 89% |
|---------------|-------|-----|-----|







**How do we verify the
cleanup has been achieved
and maintained?**



Remedial Monitoring

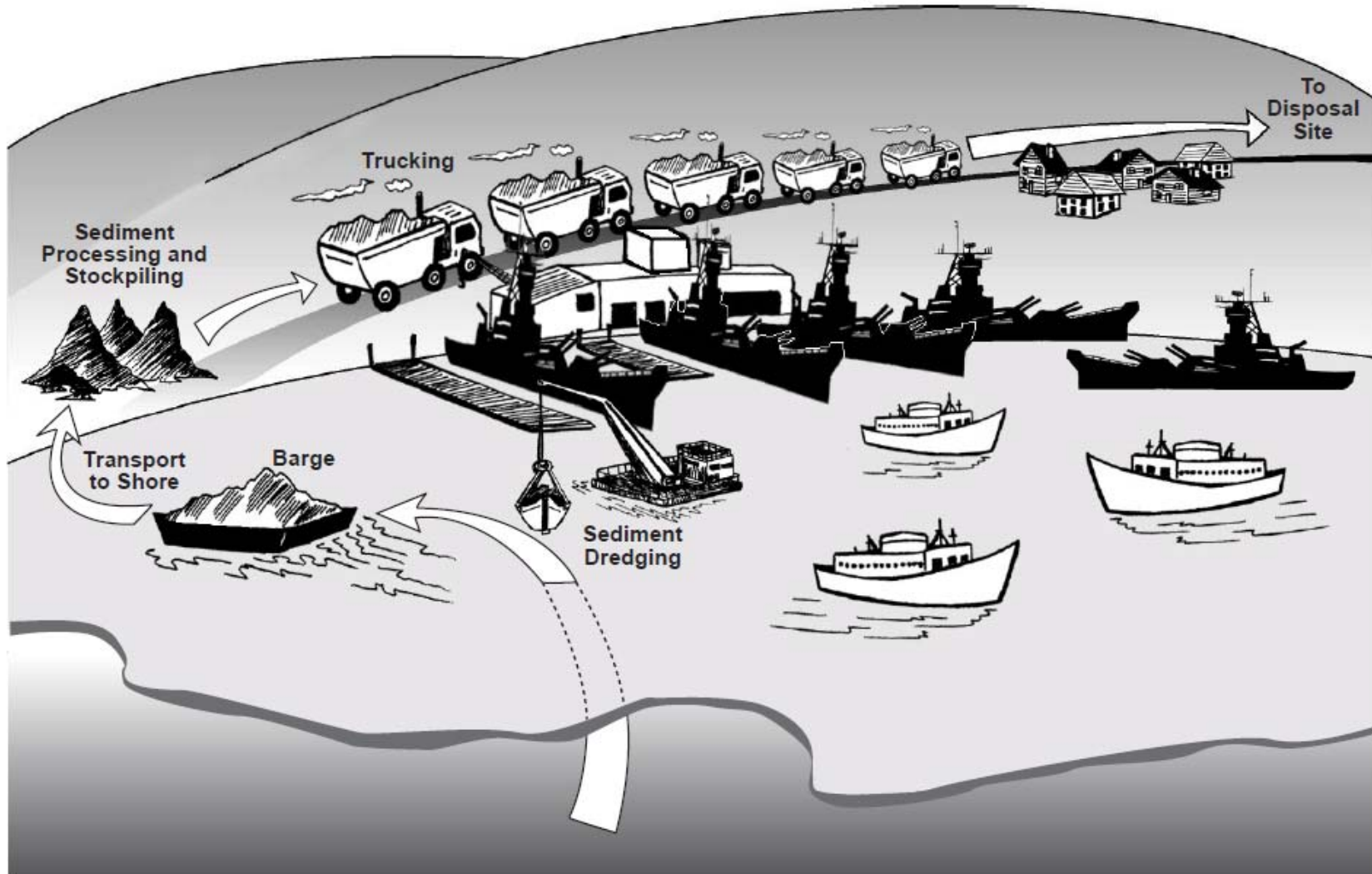
1. Water Quality Monitoring
2. Disposal Monitoring
3. Sediment Monitoring



Water quality monitoring



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

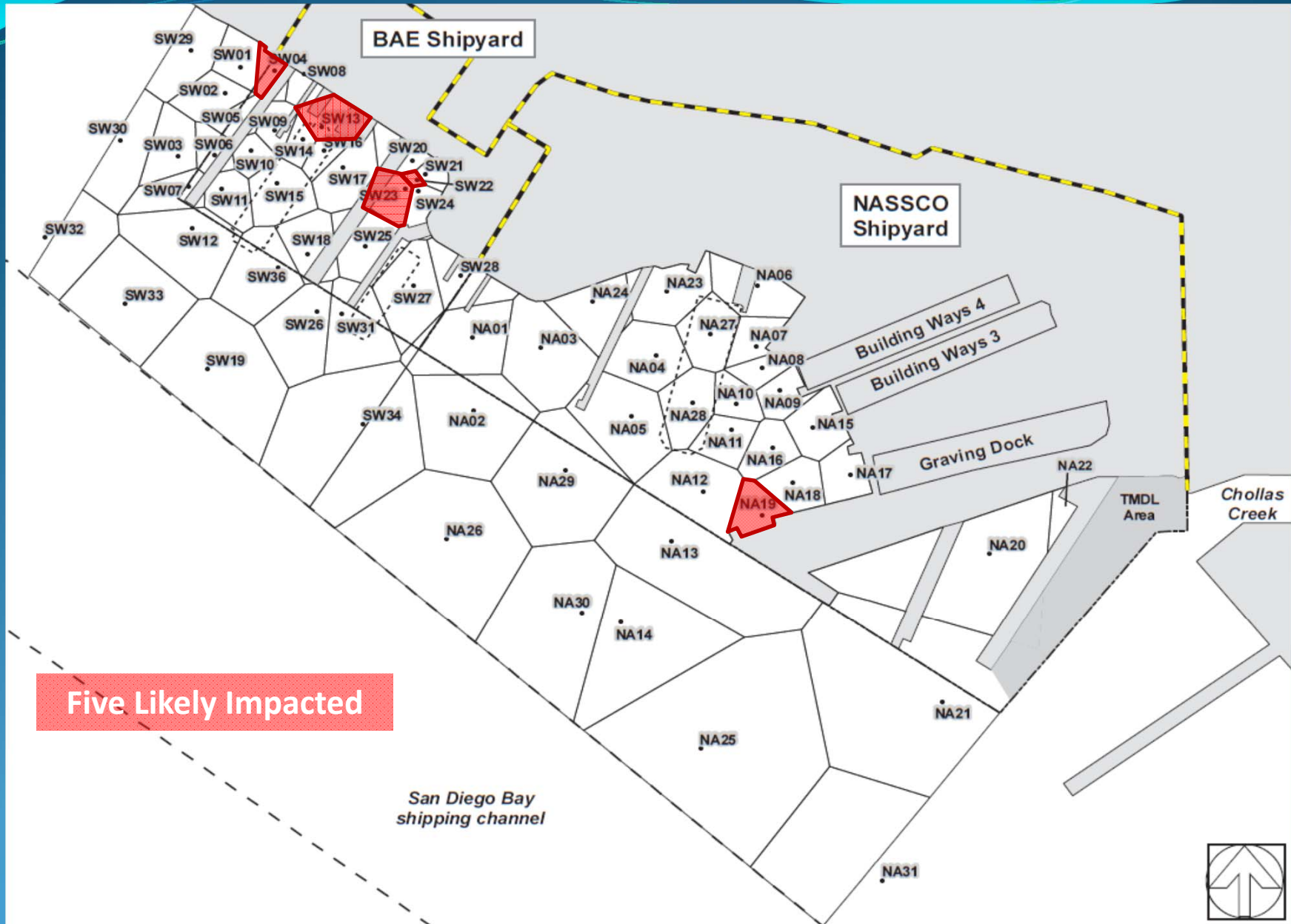
Post Remedial Verification Monitoring “Heart and Soul of the CAO”

- 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

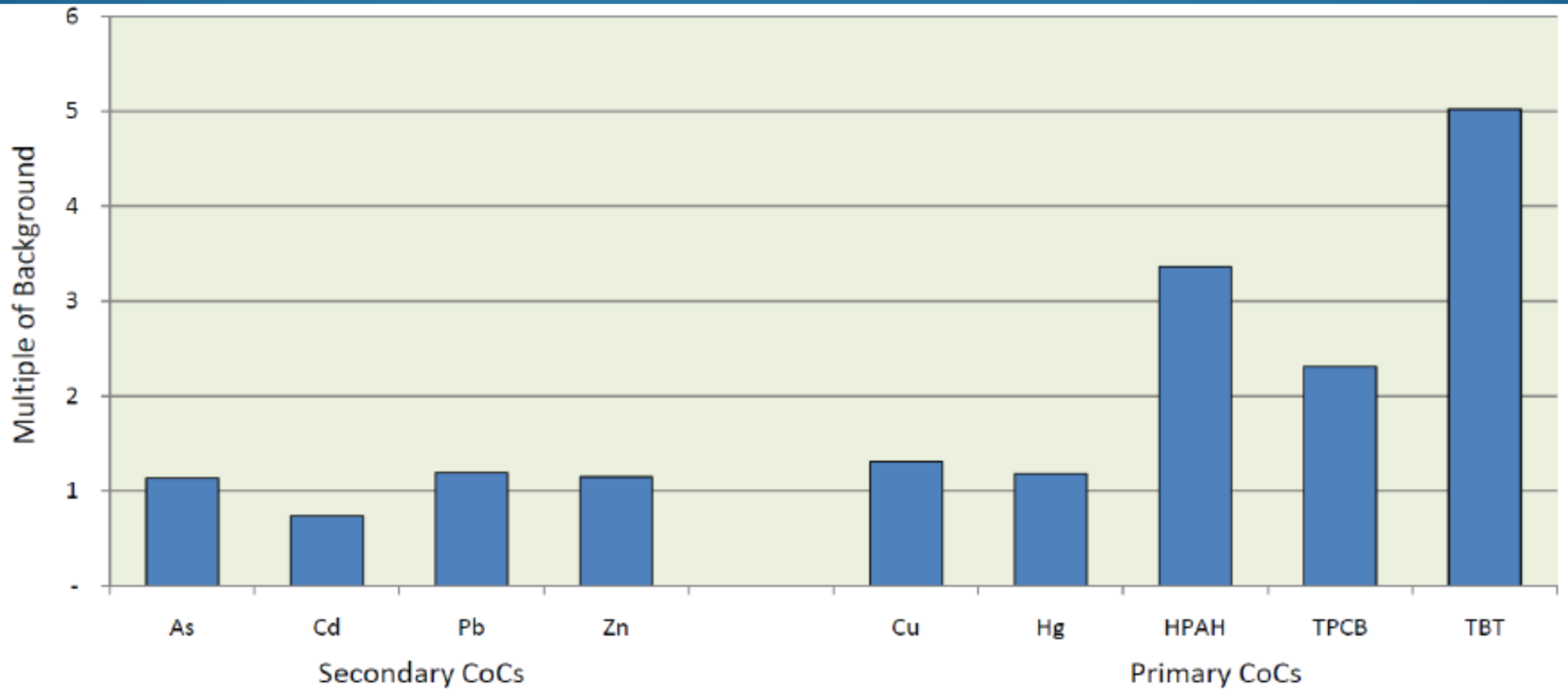
- Site-wide SWACs are below trigger concentrations
- Trigger concentrations equal the 95% Upper Confidence Level of the predicted post-remedial SWACs

SWAC Trigger Concentrations

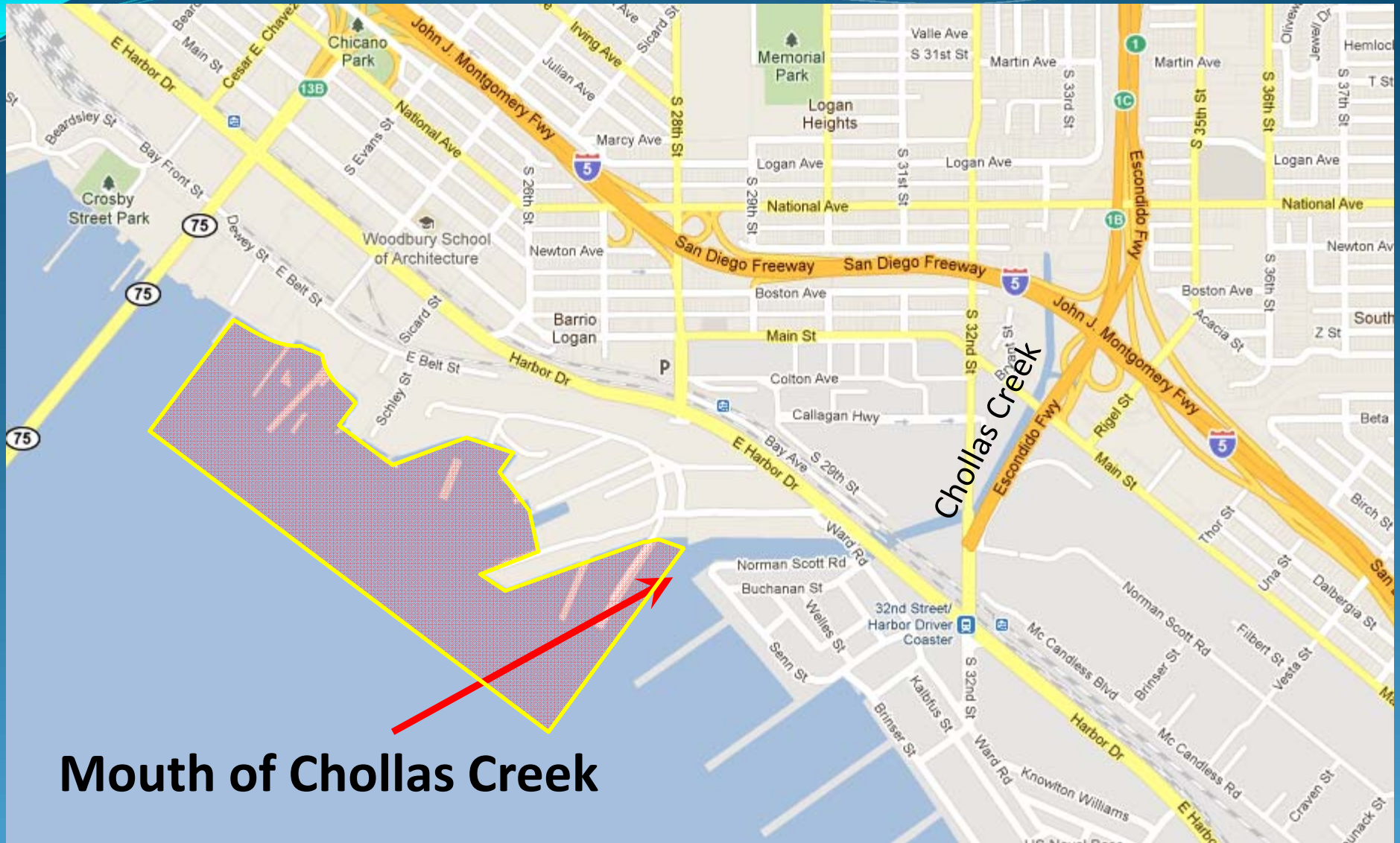
| Primary COC | Post-Remedial SWACs | 95% UCL Trigger |
|------------------|---------------------|-----------------|
| Copper mg/kg | 159 | 185 |
| Mercury mg/kg | 0.68 | 0.78 |
| HPAHs µg/kg | 2,451 | 3,208 |
| PCBs µg/kg | 194 | 253 |
| TBT µg/kg | 110 | 156 |

DTR Figure 33-3

Comparison of Post-Remedial SWACs to Background Sediment Chemistry Levels



Post Remedial Verification Monitoring



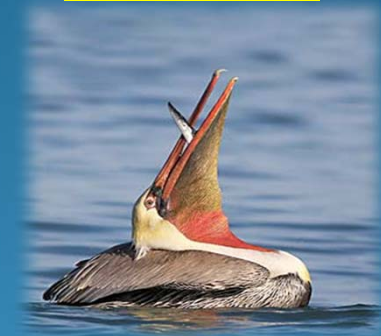
Mouth of Chollas Creek

**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



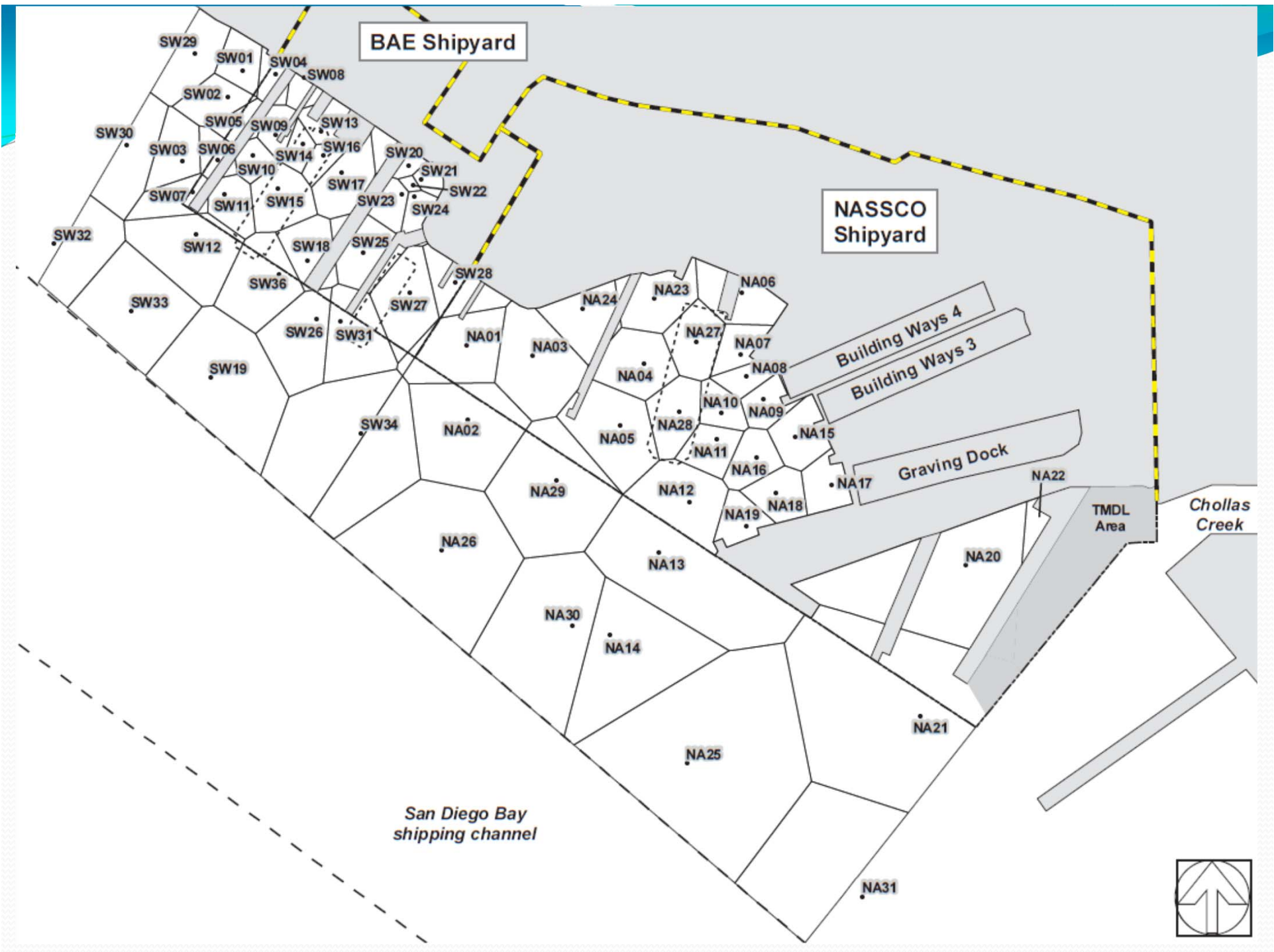
Anglers



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

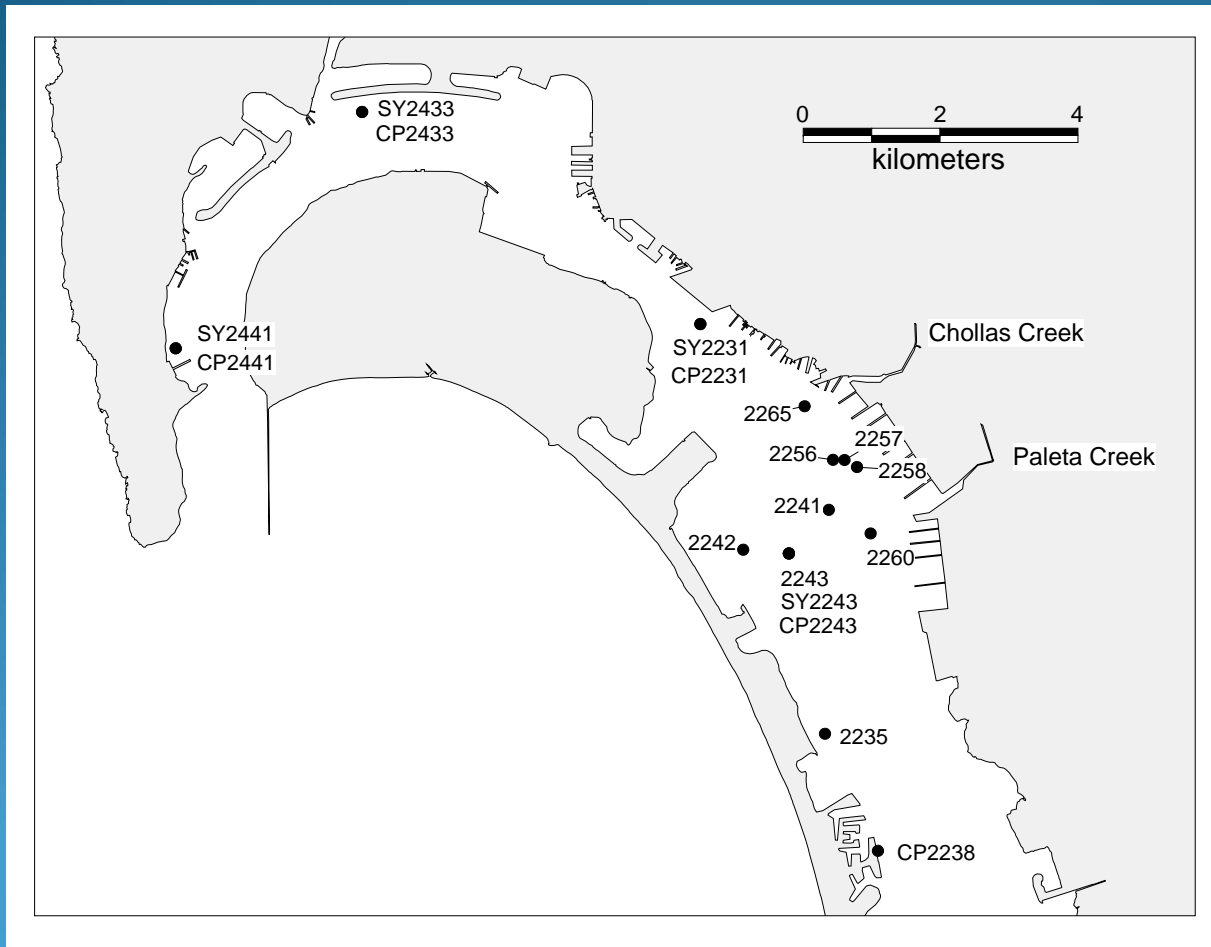
TMDL Area

Chollas Creek

San Diego Bay
shipping channel



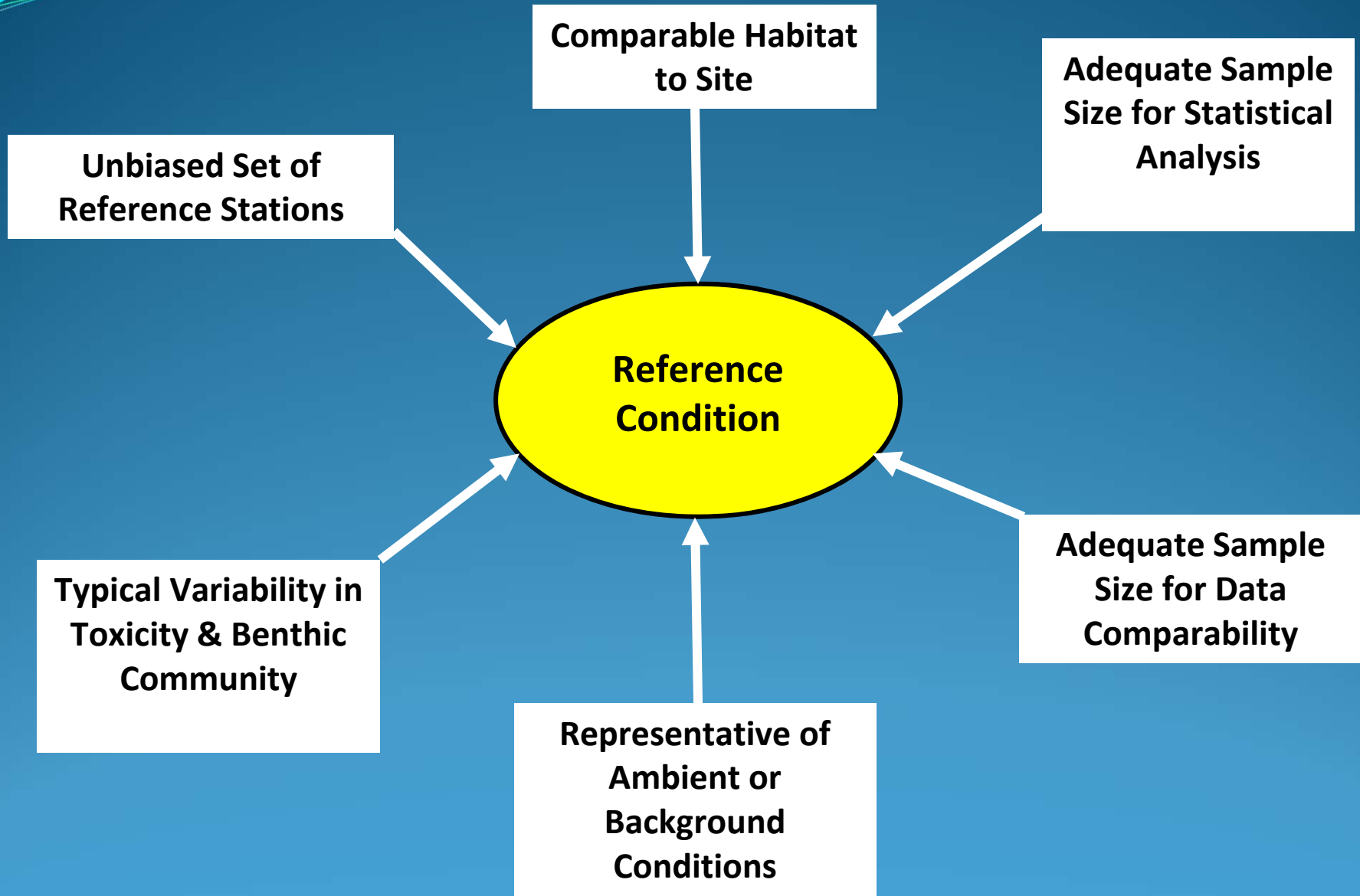
REFERENCE CONDITION



**2001 Shipyard
Study**

**2001
Chollas/Paleta
TMDL Study**

**1998 Bight'98
Study**



**Aquatic Life
Beneficial Uses**

**Estuarine Habitat
(EST)**

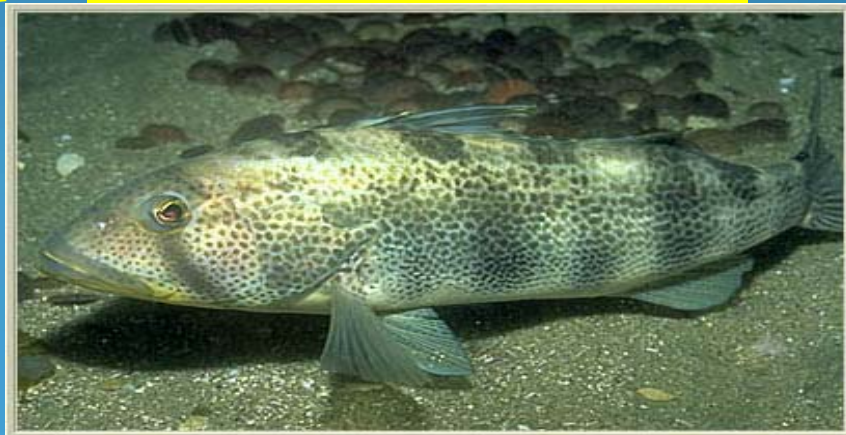
**Marine Habitat
(MAR)**

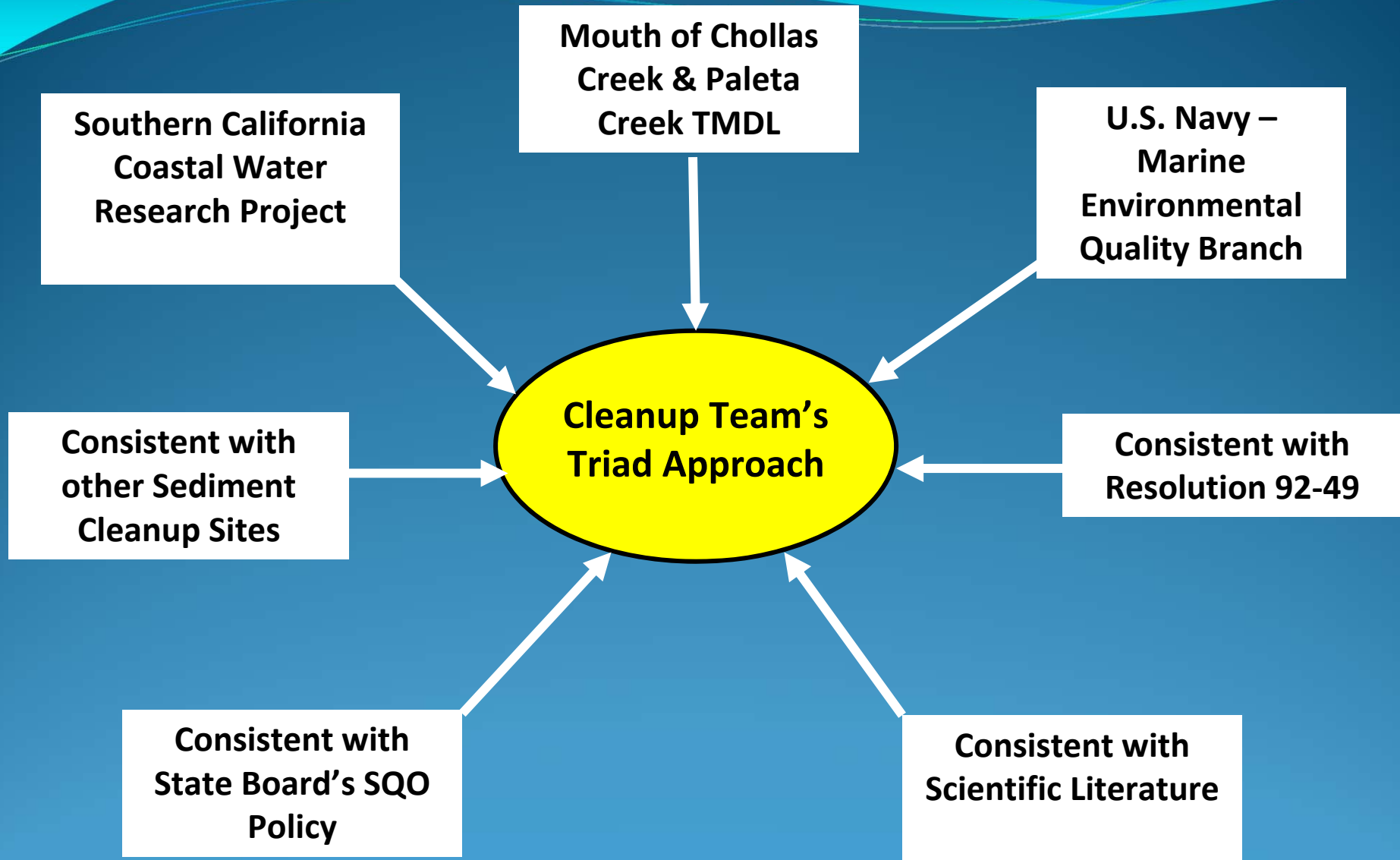
**Migration of
Aquatic
Organisms
(MIGR)**

Benthic Community



Fish





Cleanup Team's Triad Approach

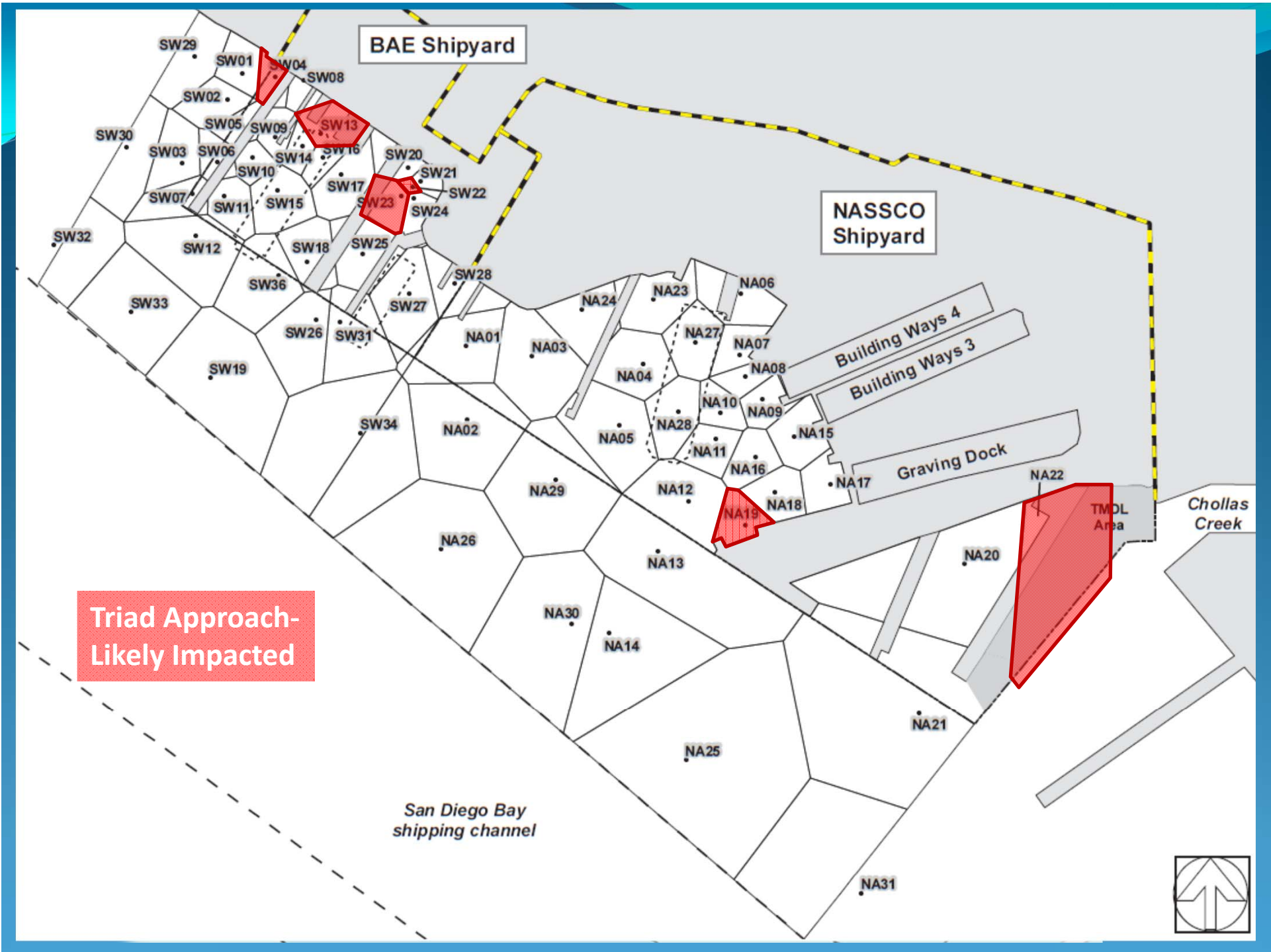
Sediment Chemistry

Toxicity

Benthic Community

Triad Decision Matrix
(unlikely, possibly, likely)

Aquatic Life Beneficial Use Impaired?



BAE Shipyard

NASSCO Shipyard

Triad Approach- Likely Impacted

TMDL Area

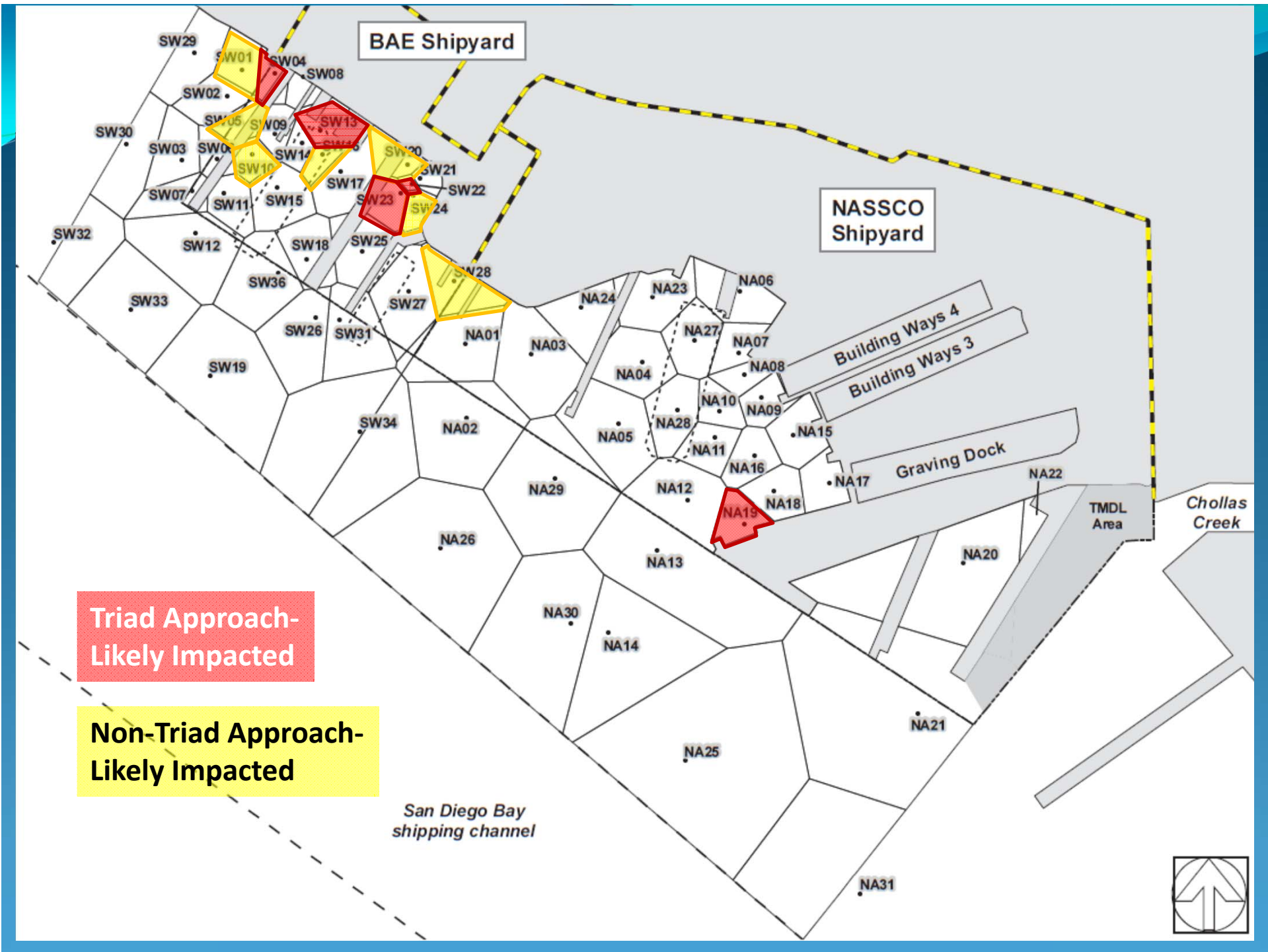
Chollas Creek

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





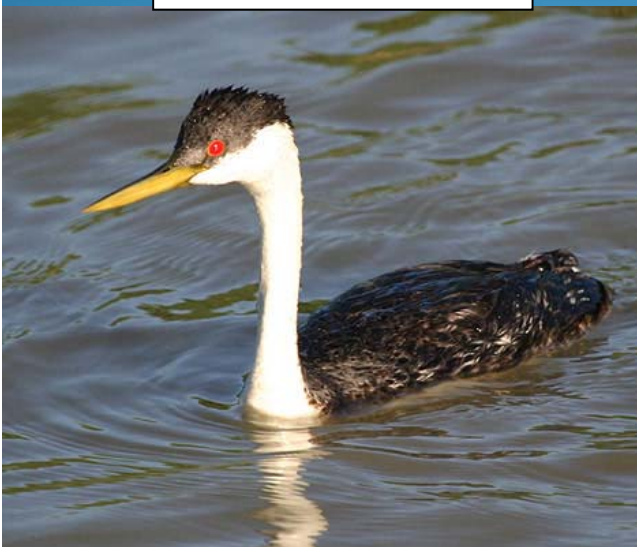
Surf Scoter

Pacific Green Turtle



CA Least Tern

Western Grebe



CA Sea Lion



CA Brown Pelican



Aquatic-Dependent Wildlife Risk Assessment



WILDLIFE TIER II RISK RESULTS

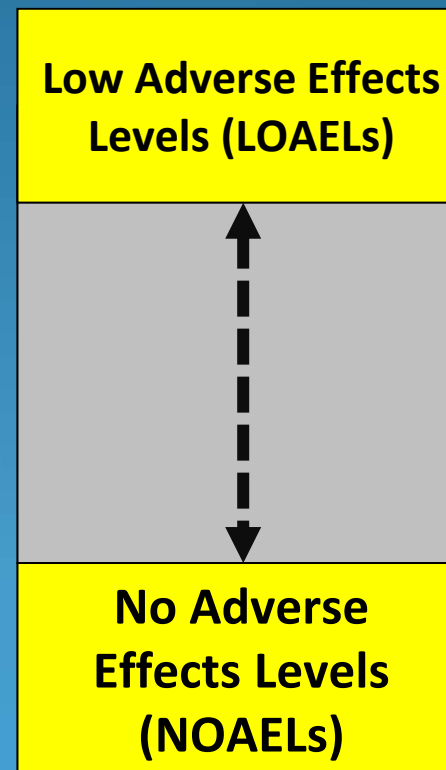
- **Aquatic-dependent wildlife beneficial uses are impaired:**

“... 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)**

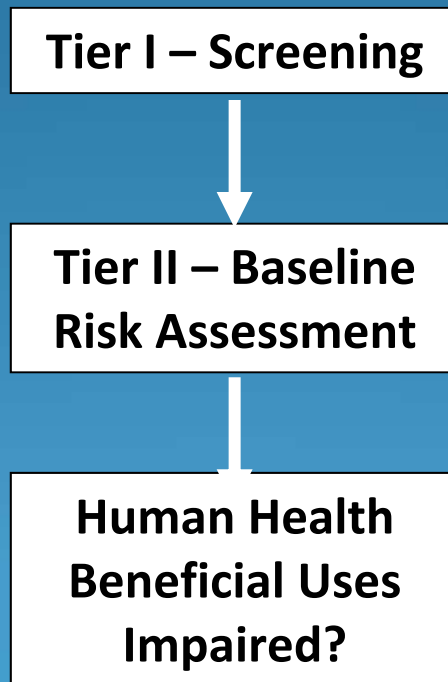
**Shellfish
Harvesting
(SHELL)**

**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.”

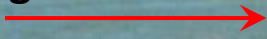
Cleanup Team's fishing area assumption protects beneficial uses

| 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

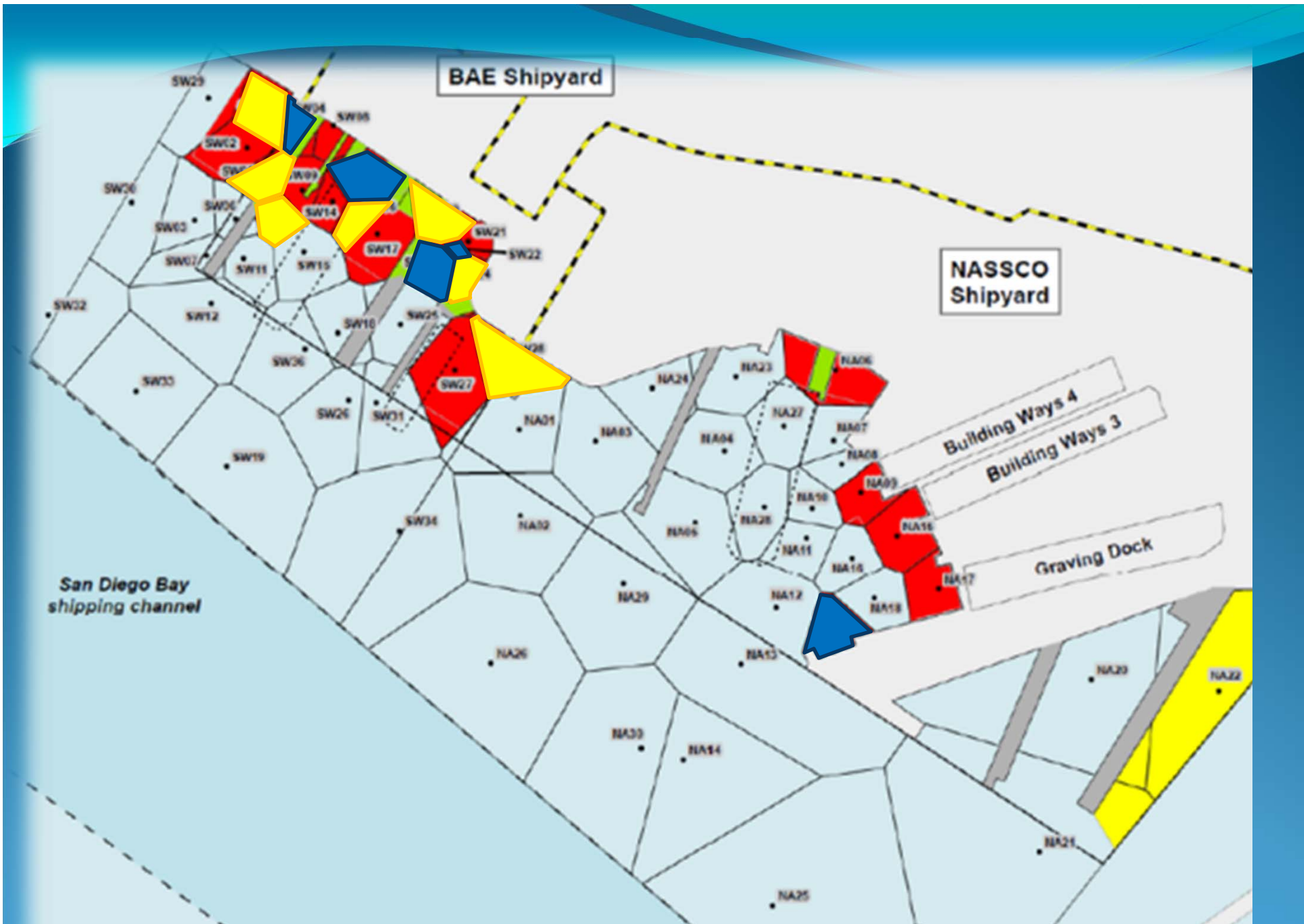
Dredge Bucket

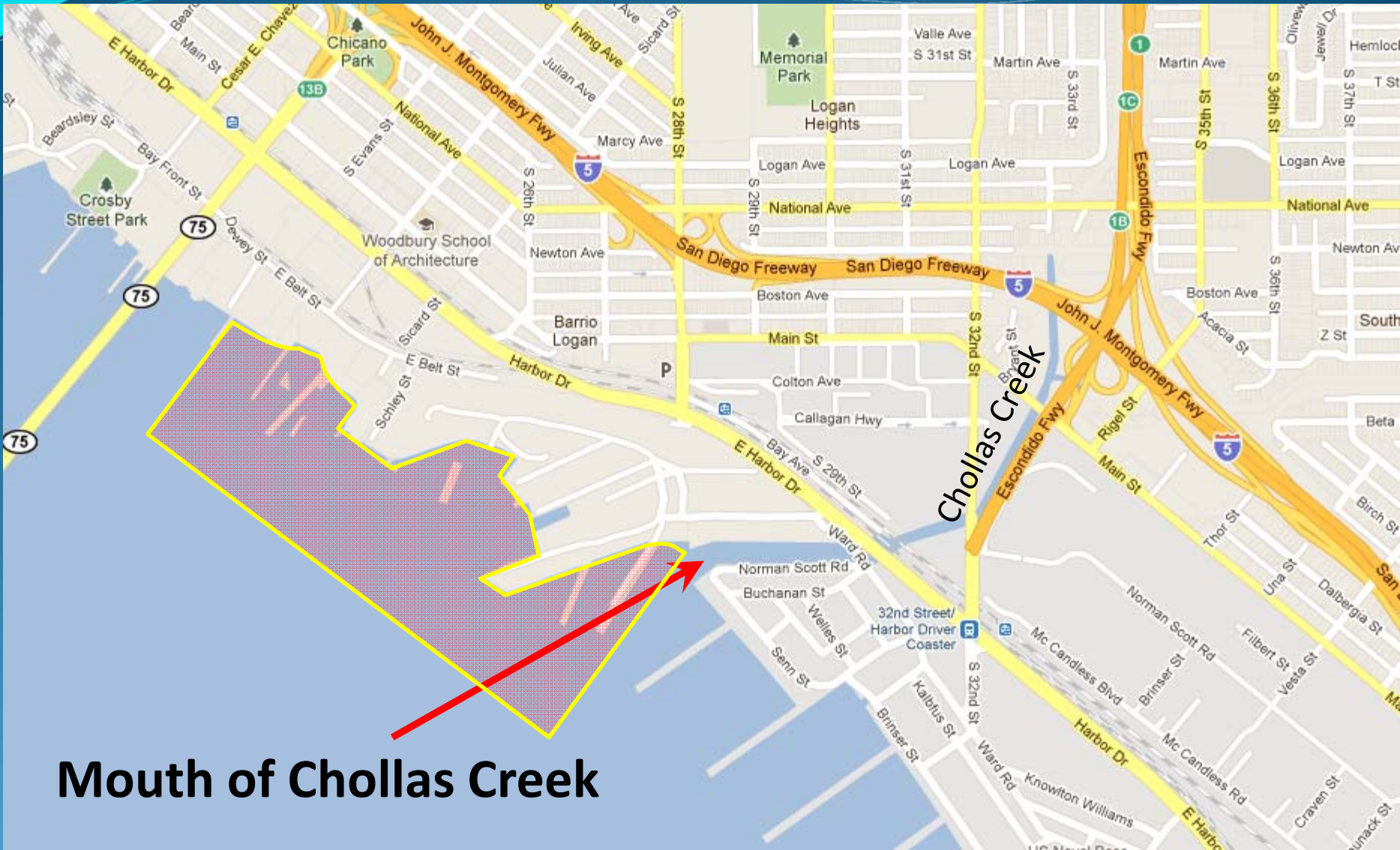


01/05/2011

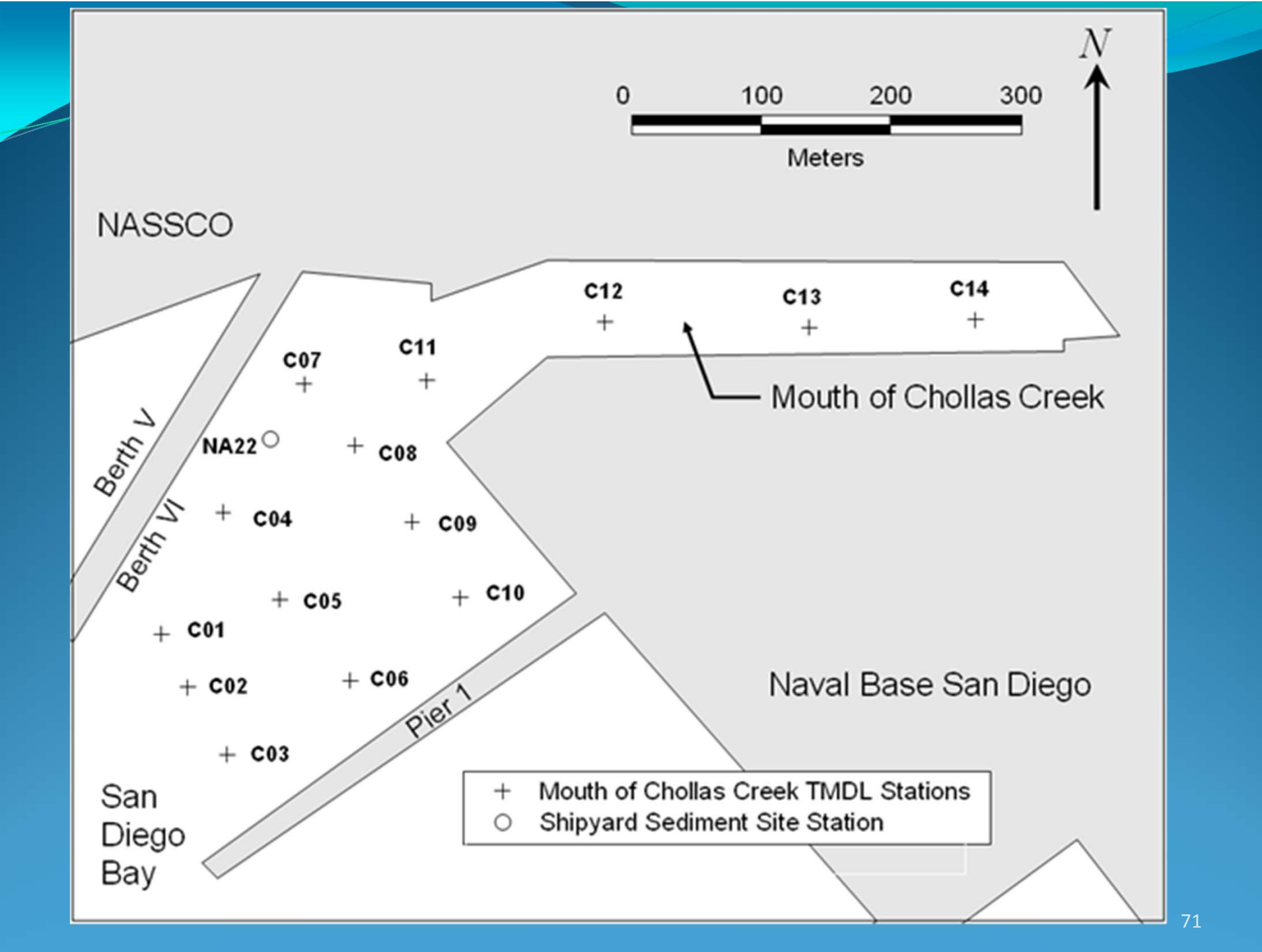
MNA is not appropriate as the only remedy

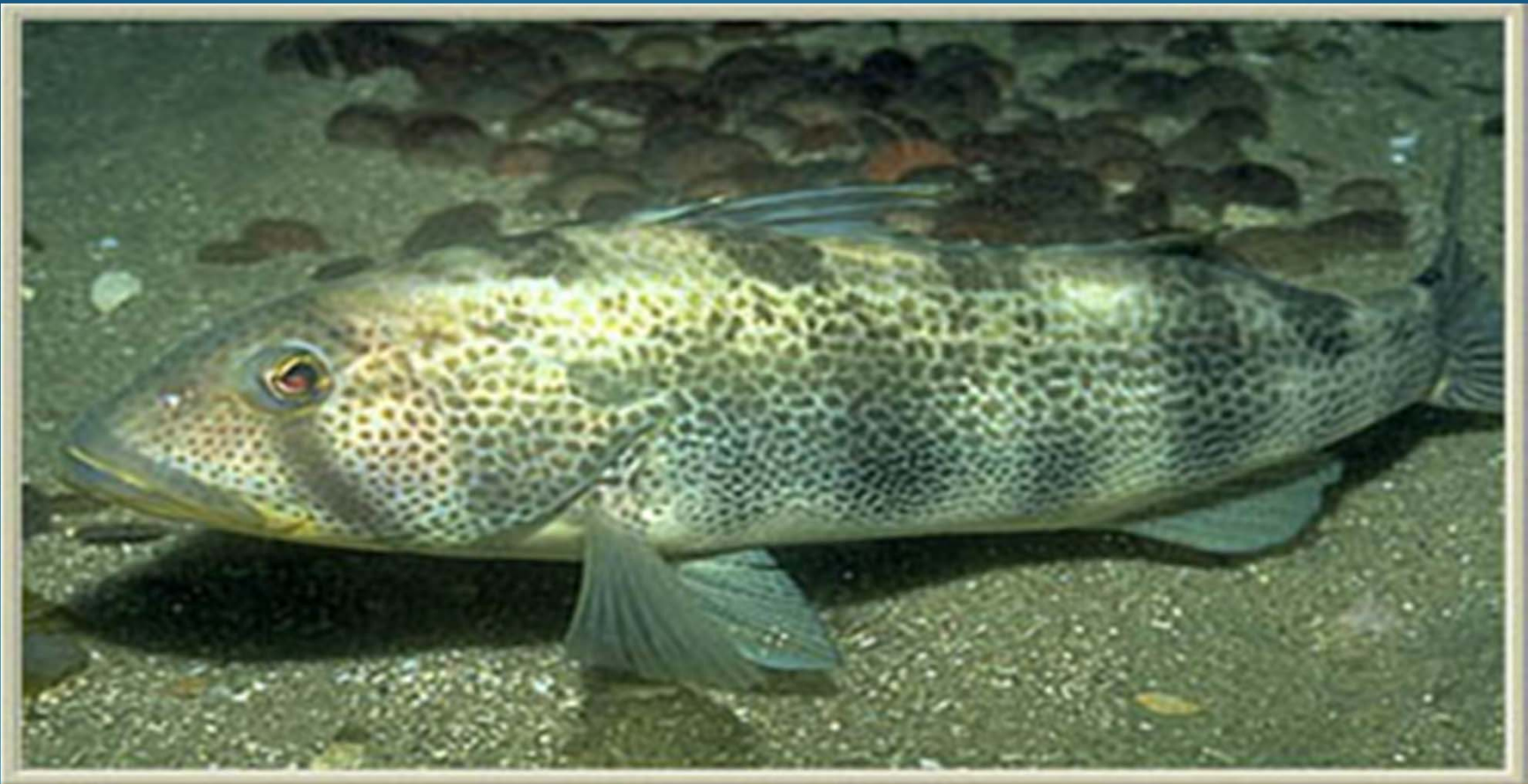
- 1. Requires longer time frame**
 - 2. Constituents and site activities not favorable**
 - 3. No substantial evidence**
- MNA will work**

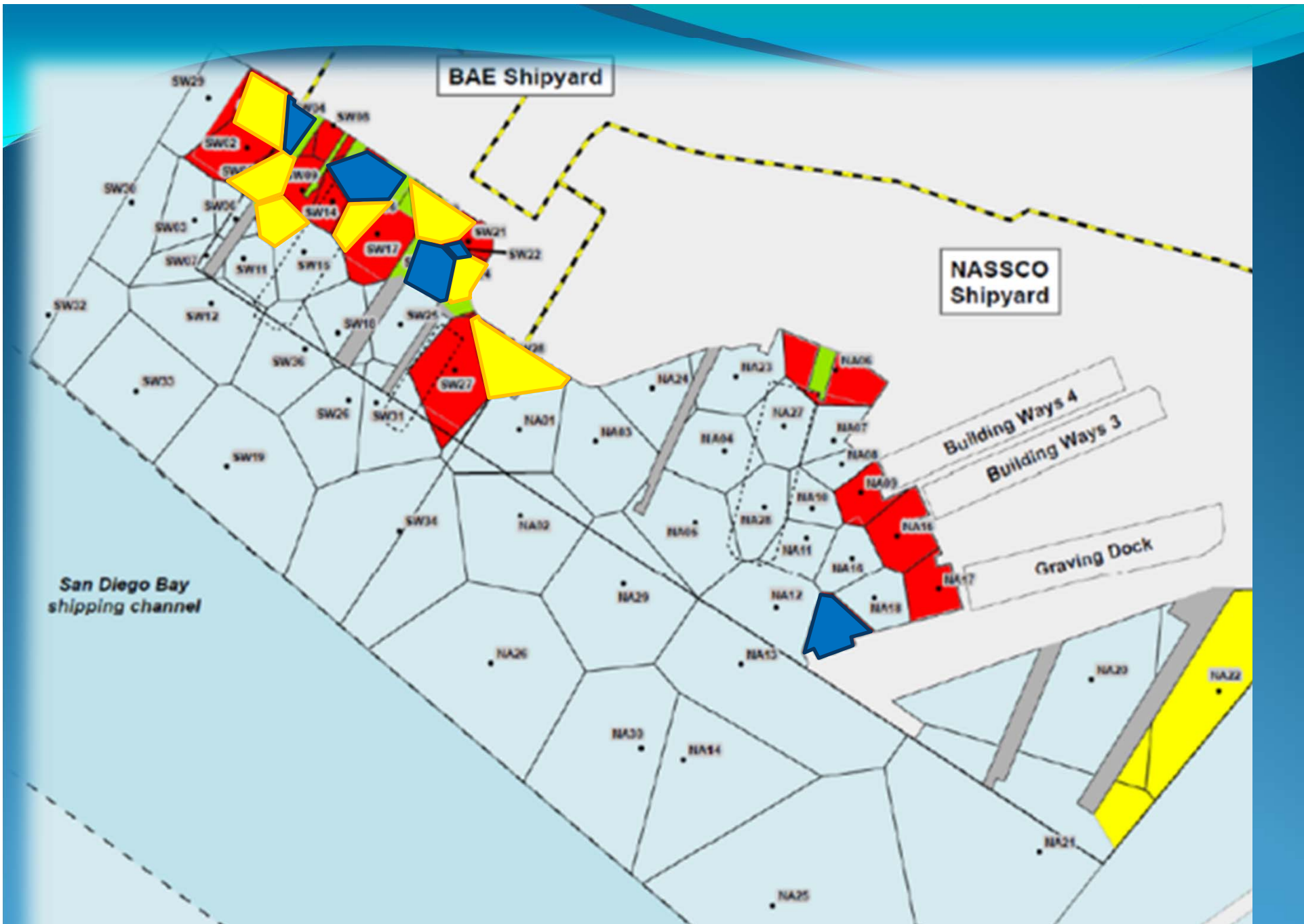




Mouth of Chollas Creek







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

