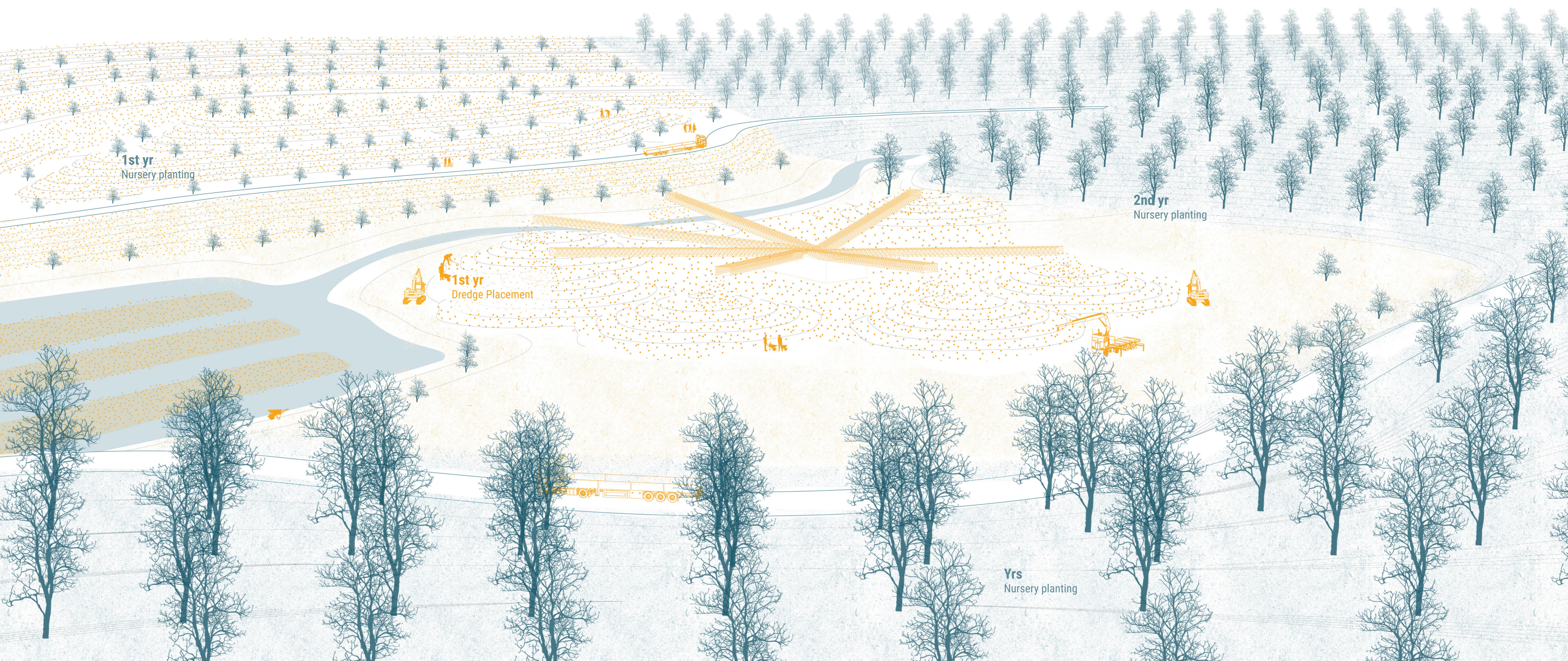


DREDGE ENGINE



EXSITING DREDGE DISPOSAL TERRITORY

Dredge type

Navigational dredging

Cape cod canal and surrounding channels

Maintenance dredging

Cape cod canal and surrounding channels

PCB dredging

Superfund sites around Buzzards Bay

Disposal type

Open Water Disposal Sites

Cape Cod Canal Disposal Site

(with longest history)

Cleveland Ledge Disposal Site

(proximity to the canal west)

Near shore Placement

Springhill Beach

Beach Placement

Town Neck Beach

Upland Placement

None identified for site

▼ Maintenance dredge site
15,000 cy/y

● Superfund dredge site
75,000 cy/y

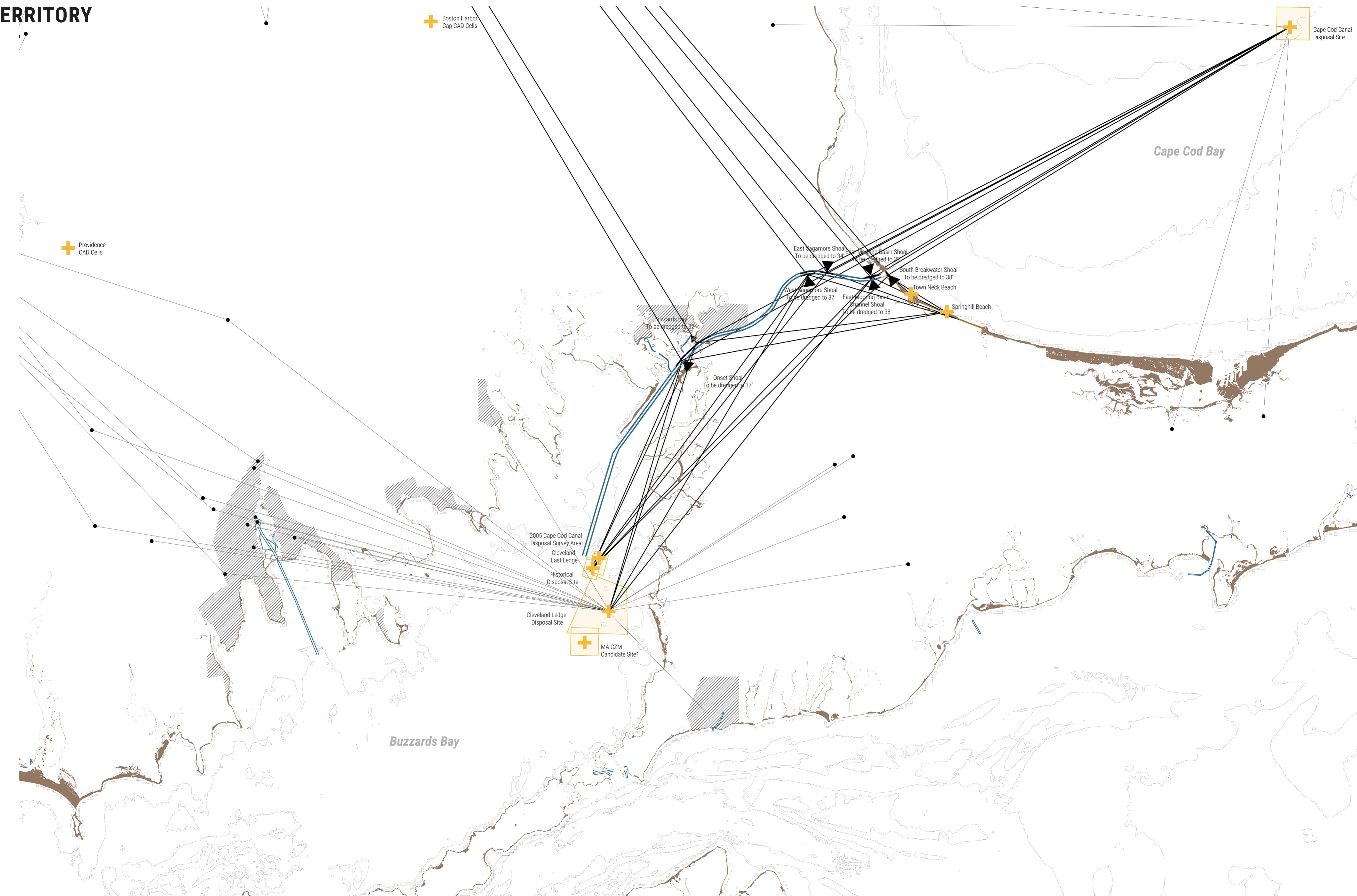
▨ Superfund Area

+ Disposal site

▬ Disposal Area

■ Salt sandy beach

▬ Channel



RISKS FACING CLIMATE CHANGES

HISTORICAL HURRICANE TRACK

- Category 1
- Category 2
- Category 3
- Category 4
- Tropical storm
- Tropical depression / disturbance
- Extratropical / subtropical

HURRICANE INUNDATION ZONE

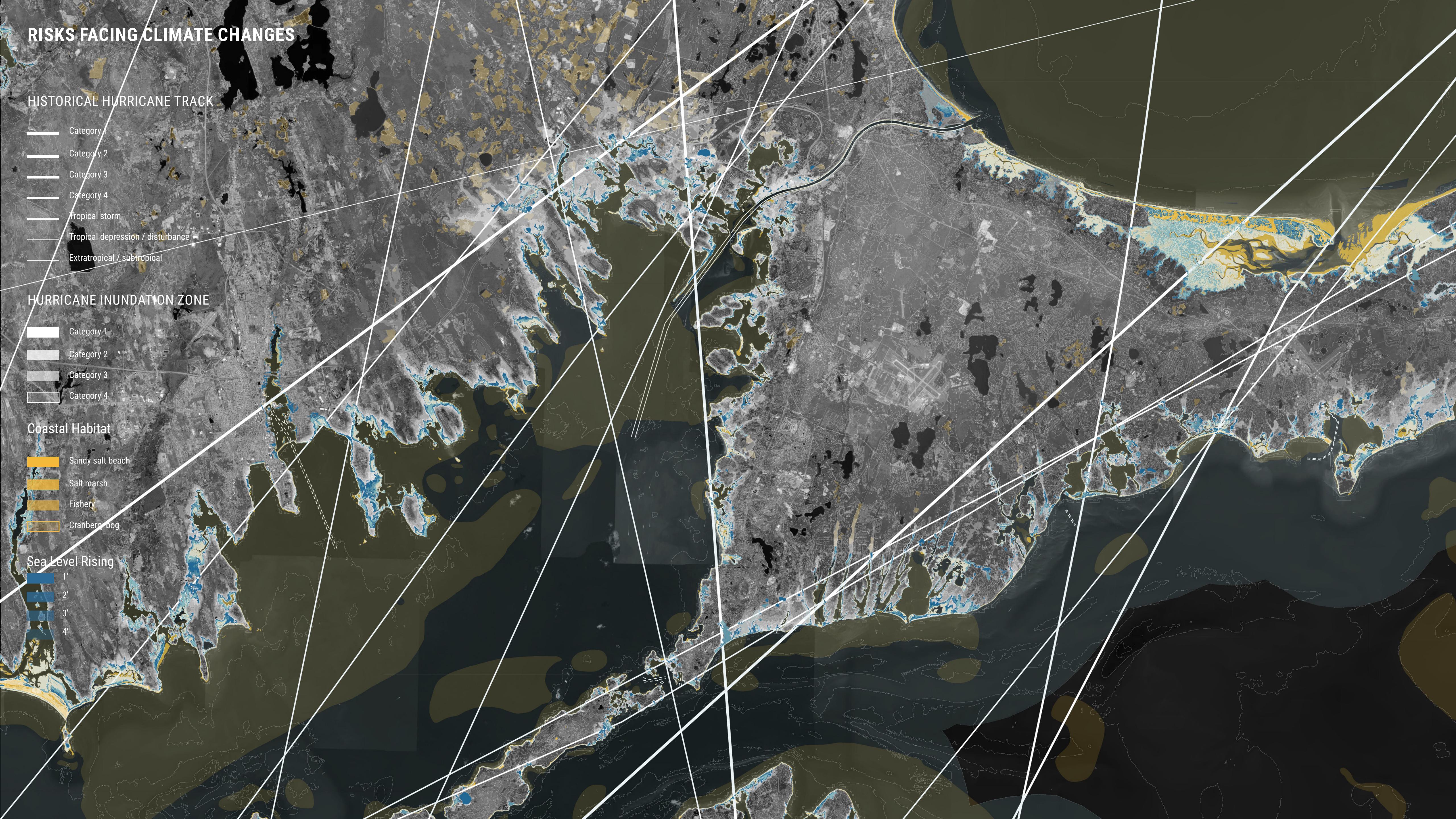
- Category 1
- Category 2
- Category 3
- Category 4

Coastal Habitat

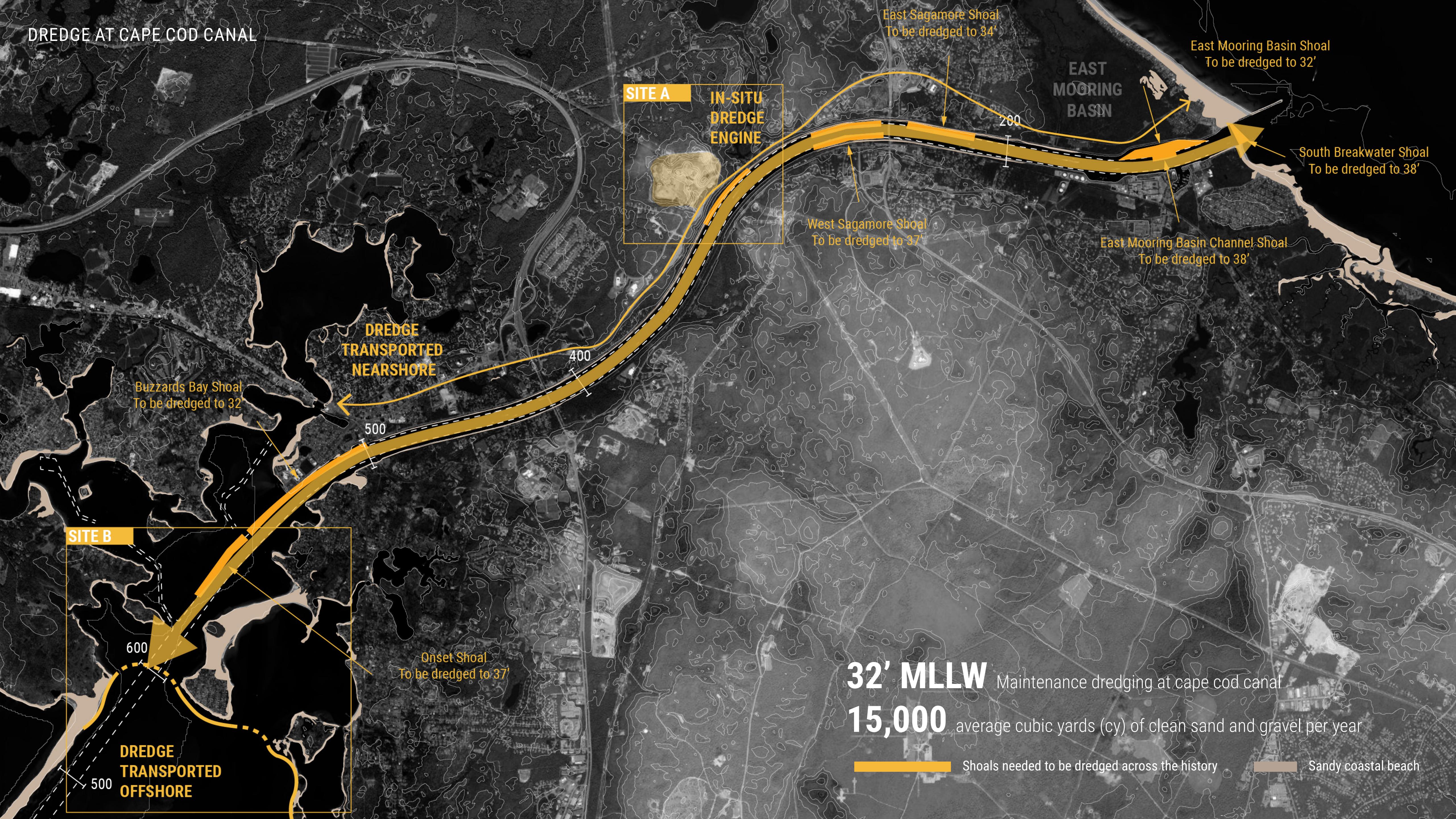
- Sandy salt beach
- Salt marsh
- Fishery
- Cranberry bog

Sea Level Rising

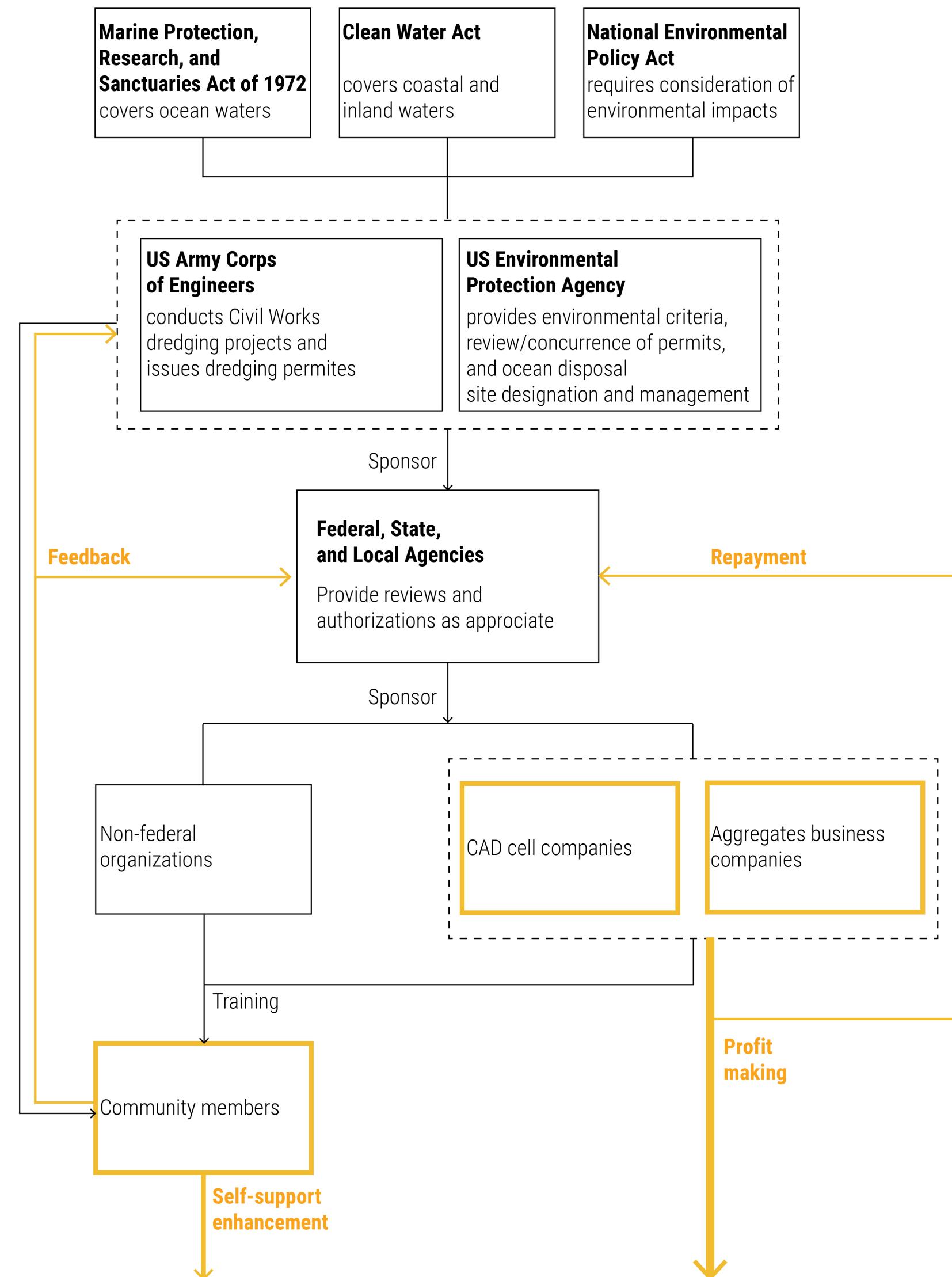
- 1'
- 2'
- 3'
- 4'



DREDGE AT CAPE COD CANAL



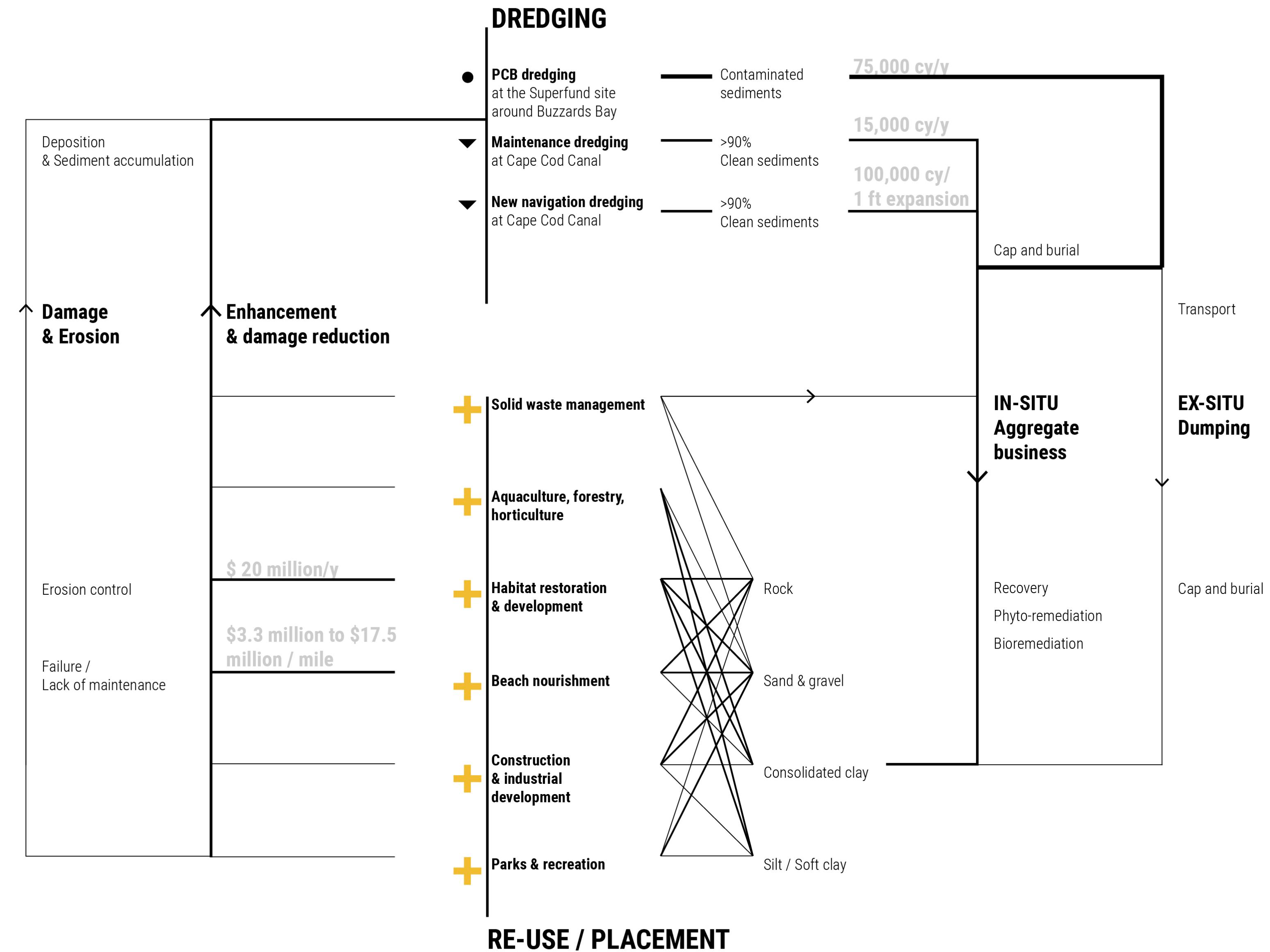
IN-SITU DREDGE CYCLE

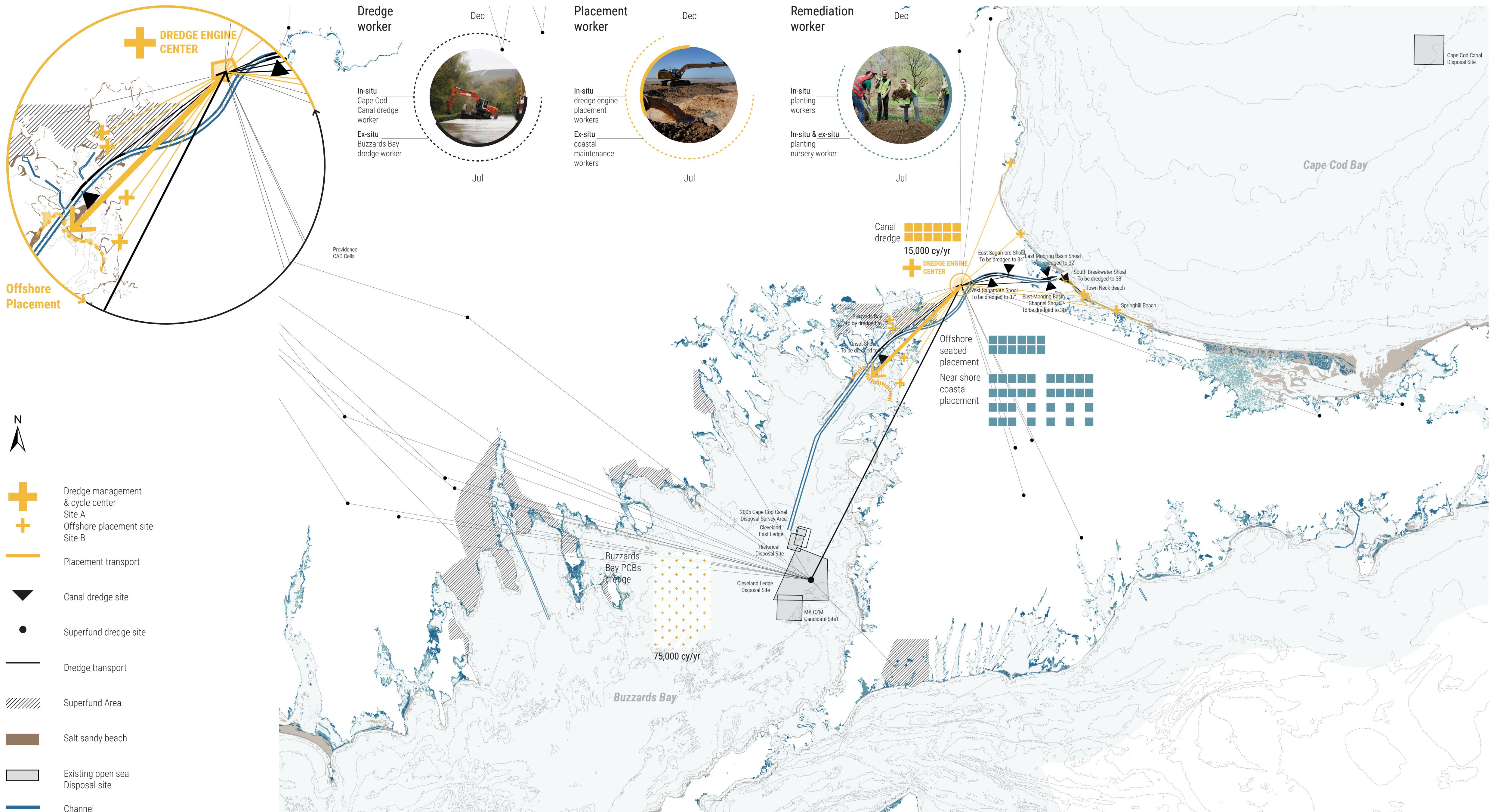


70% → 35%
Federal

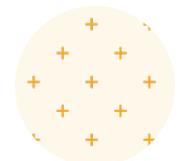
30% → 65%
Non-federal

a localized labor, a diversified aggregates business, a quickened geology





SITE A | CYCLIC PLAN OF DREDGE ENGINE



Dredge input



Sediment



DREDGE CAPPING
Class B
1st year



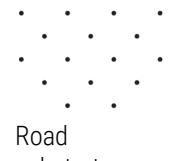
Under remediation
Class B



Under remediation
Class B



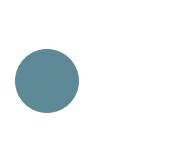
Pebbles



Road
substrate



Pioneer trees



Secondary trees
(Saltbush,
Mulberry,
legumes)



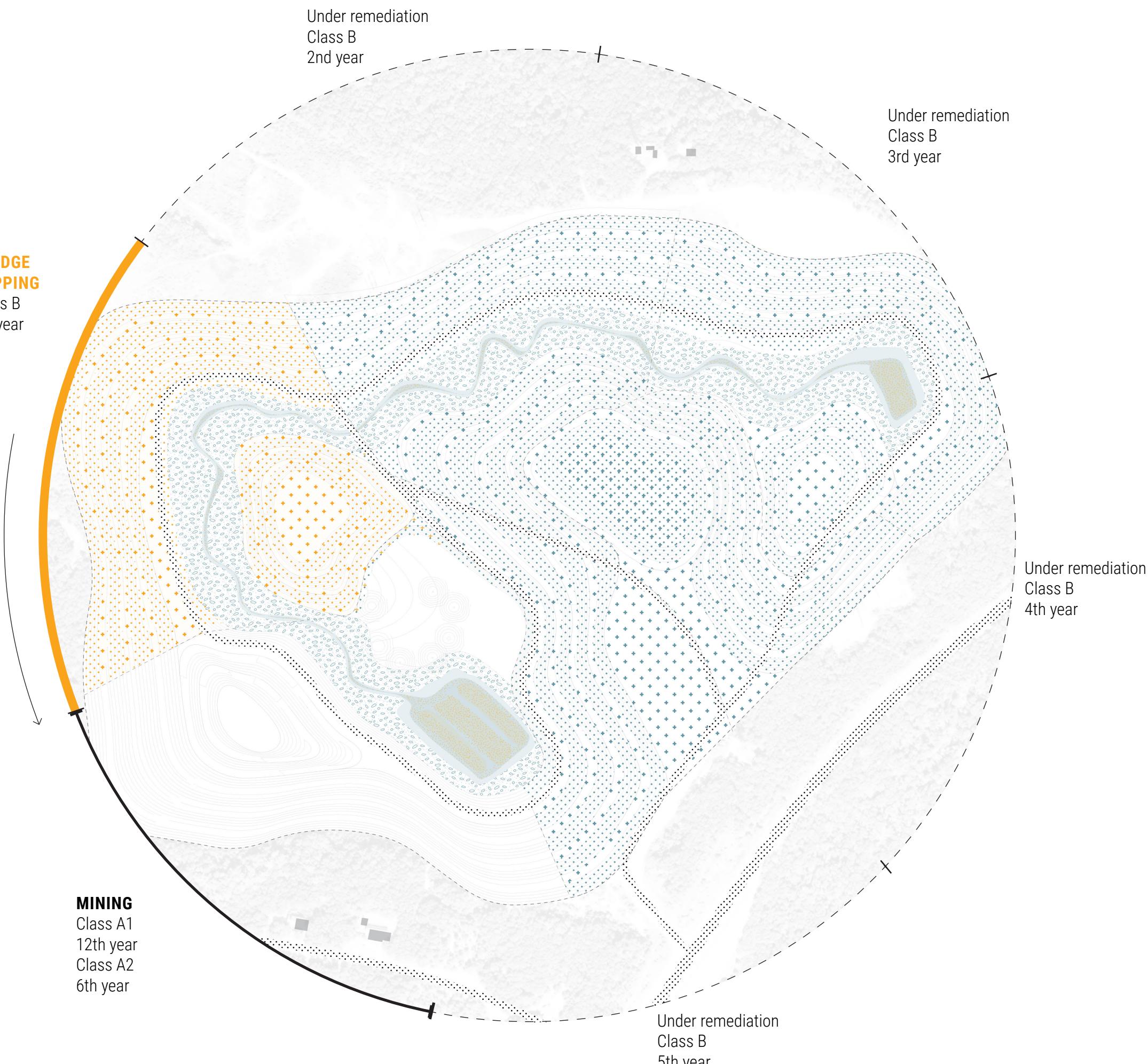
Dredge
Class A1



Dredge
Class A2

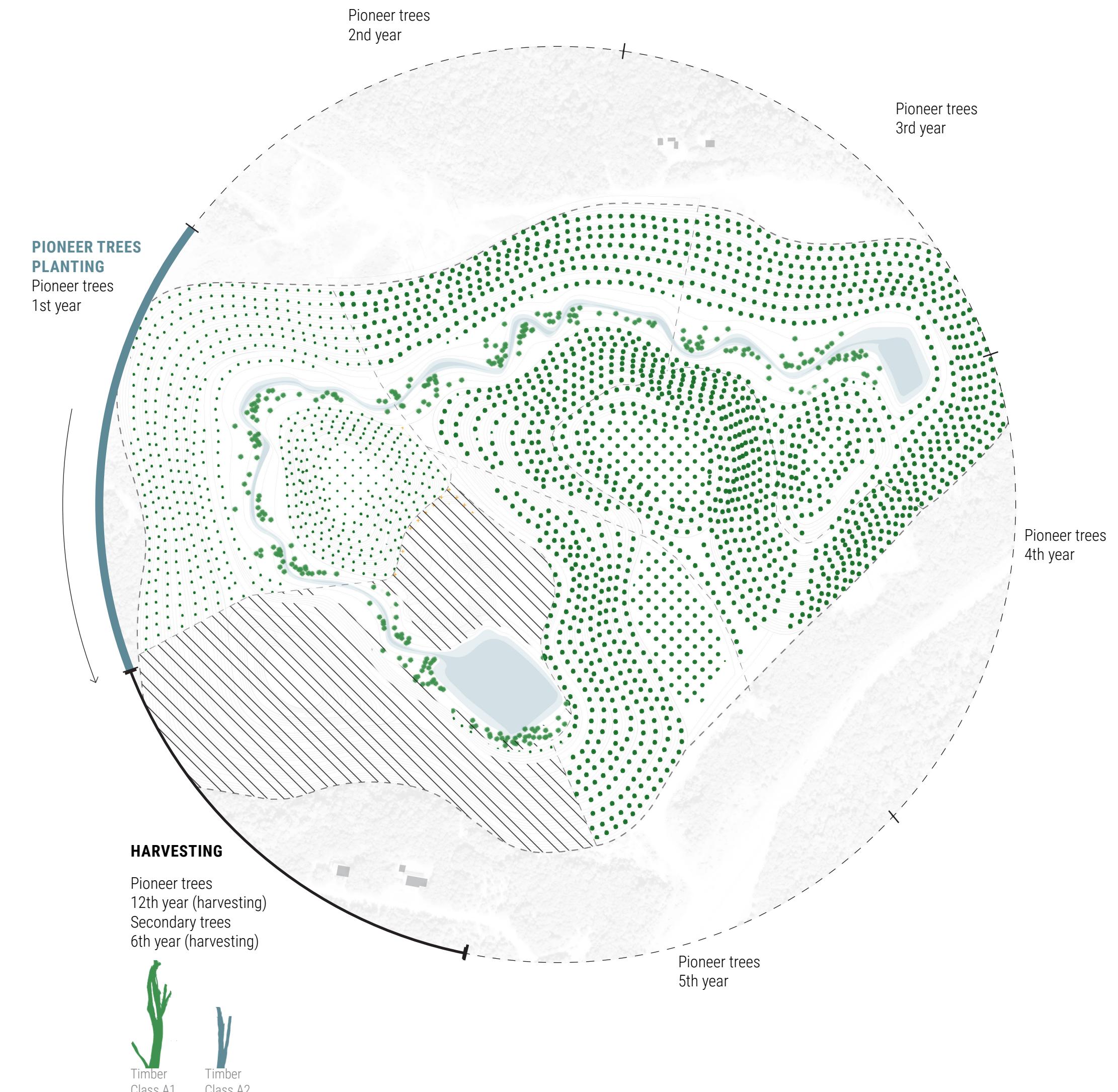
Material Plan

5th year / 12yrs cycle

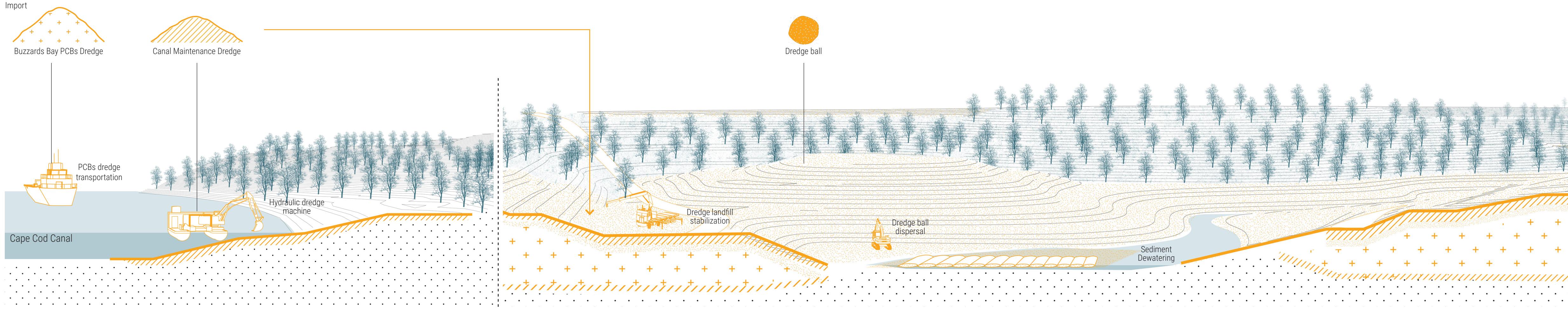


Tree plan

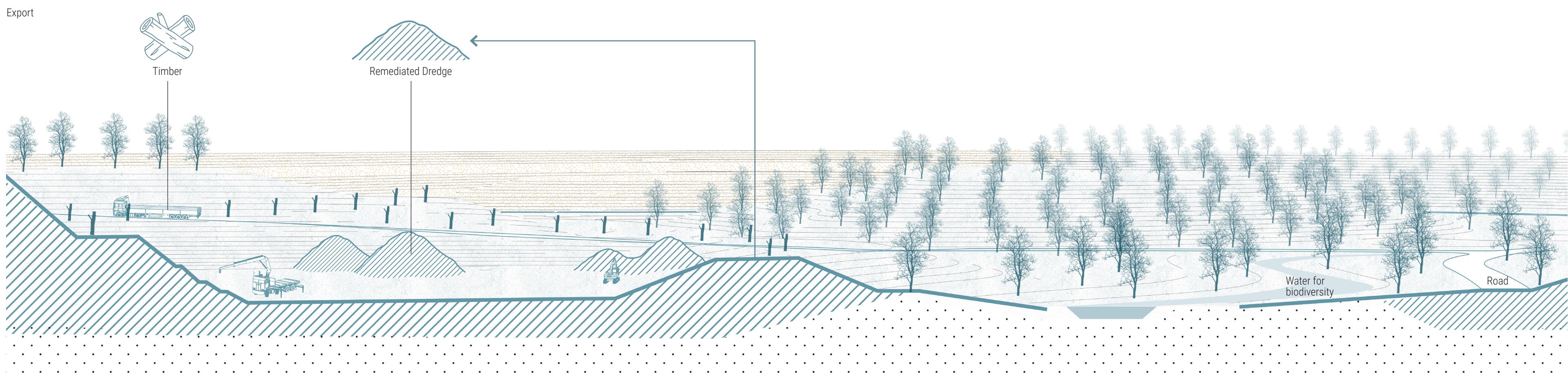
5th year / 12yrs cycle



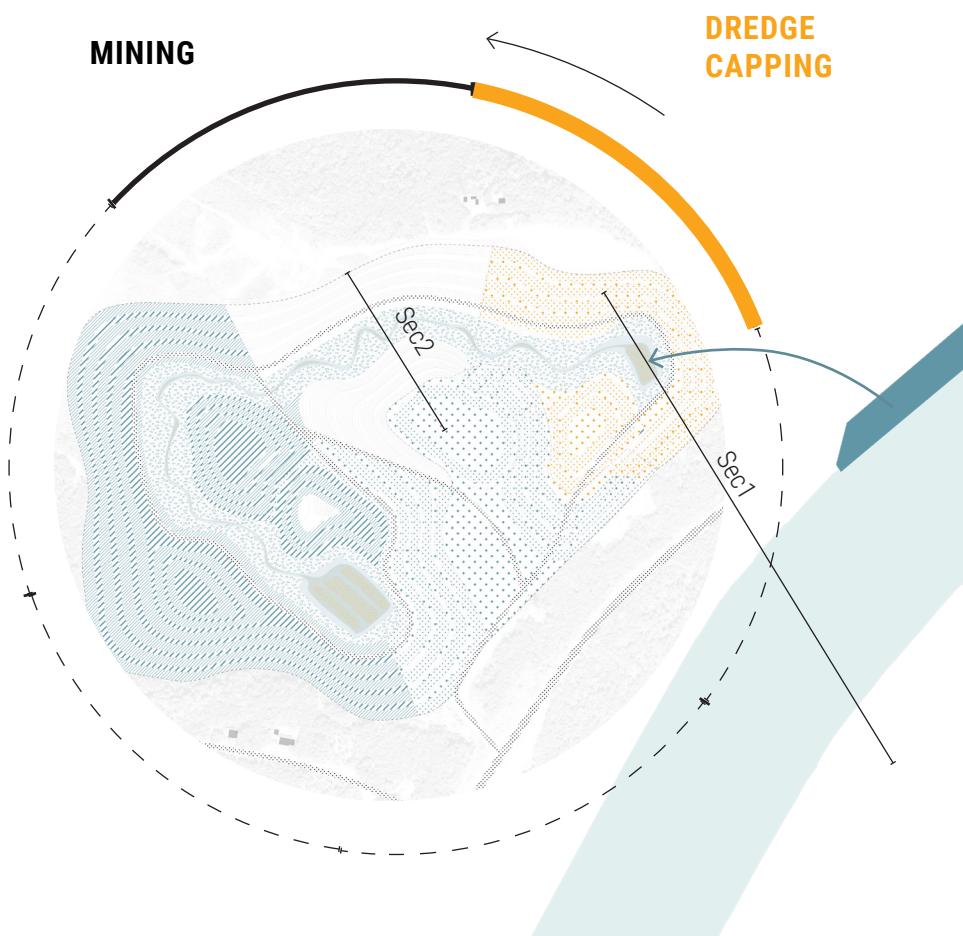
SITE A | CYCLIC ZONING



Dredge capped under remediation



Dredge mined as product

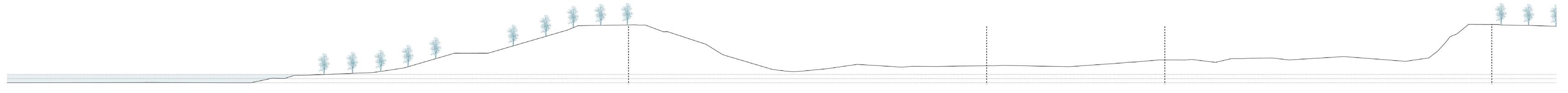


Capping region
 Under re-mining
 Under mining

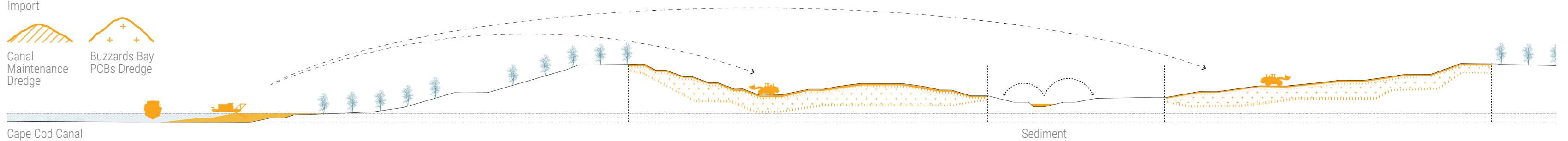
SITE A | ZONE PHASING

12 year cycle of dredge & remediation planting

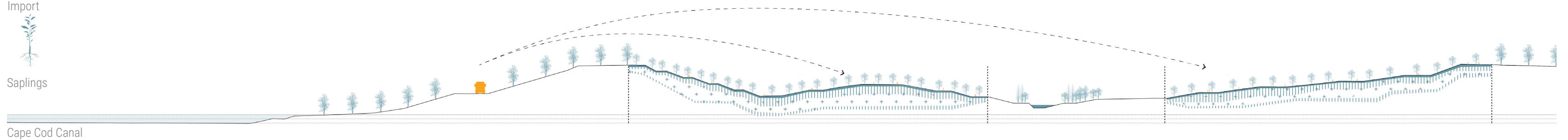
0 yr Existing condition



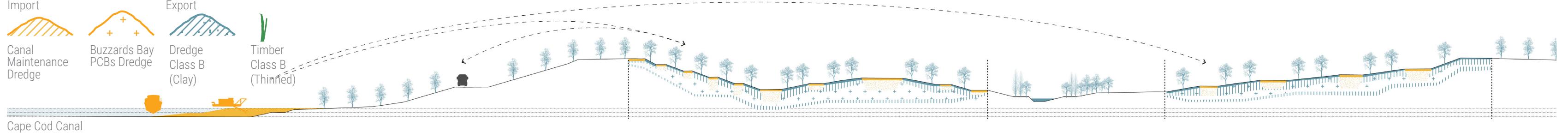
0-1 yrs Dredge capped Import



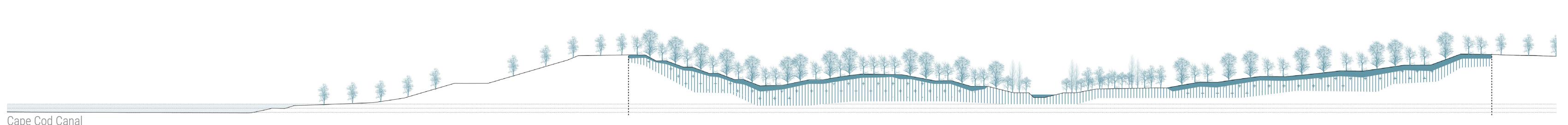
1-2 yrs Pioneer trees planting Import



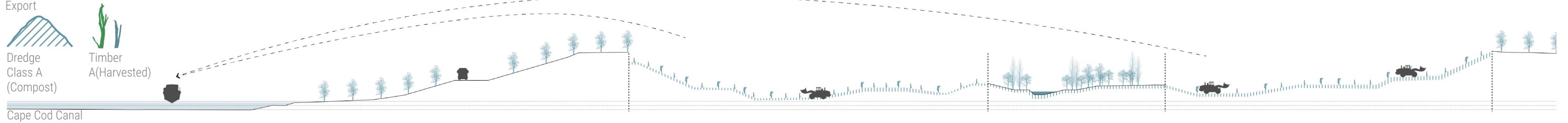
5-6 yrs Dredge changing, trees young stand thinning Import Export



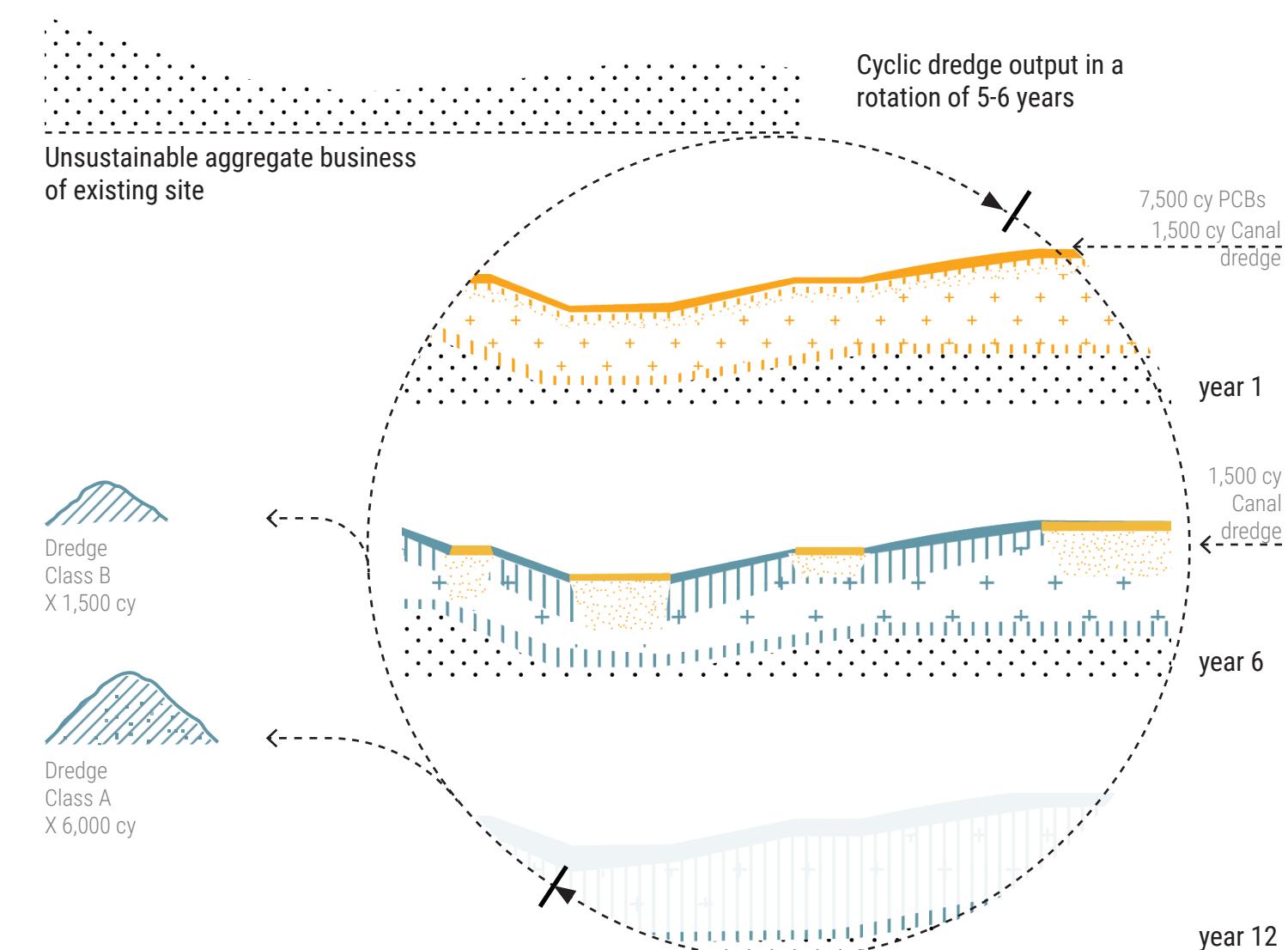
12-13 yrs Trees harvesting



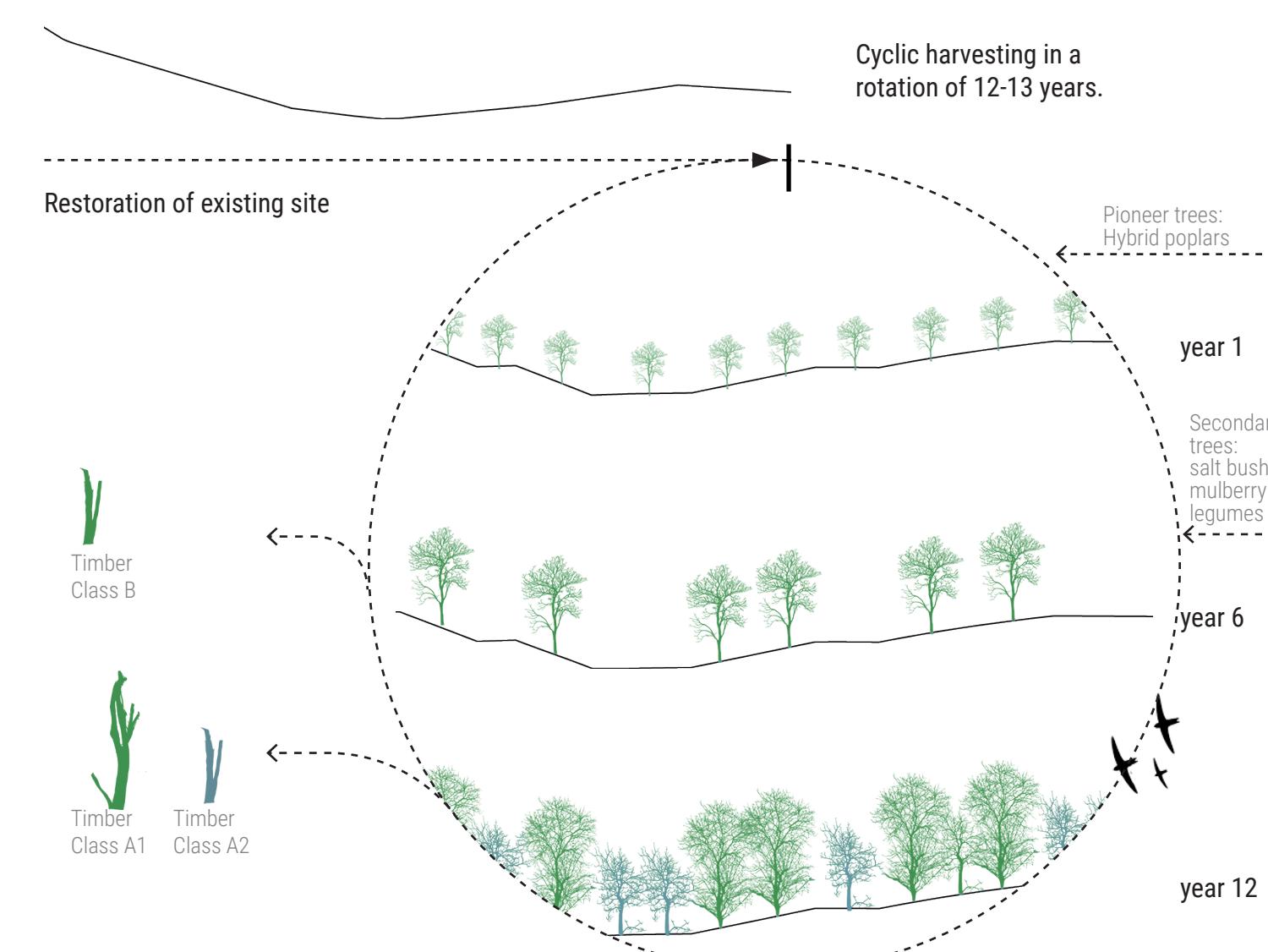
13yr Mining, dredge output Export



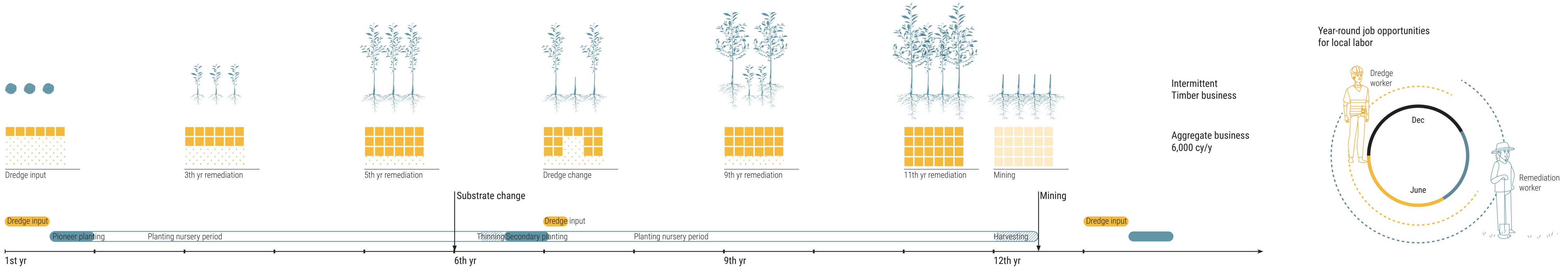
Phasing of material placement



Phasing of remediation



SITE A | DREDGE MANAGEMENT CYCLE



SITE A | CYCLIC TRANSFORMATION

MATERIAL CYCLE

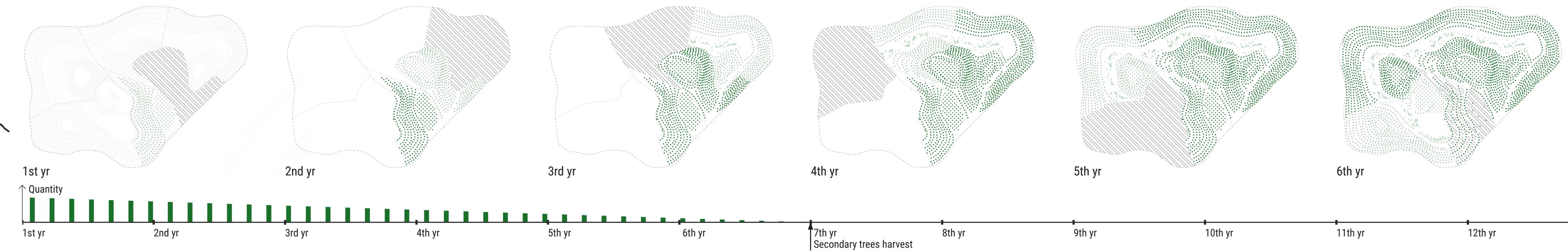
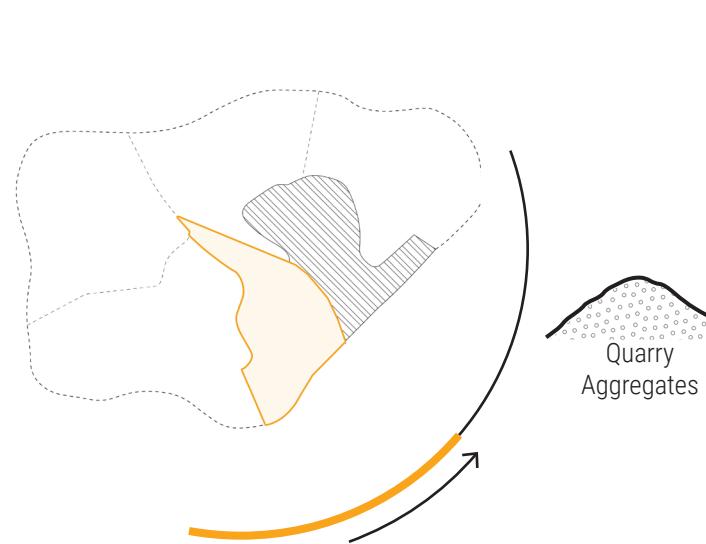
DREDGE & AGGREGATE BUSINESS

From Aggregates business

BIODIVERSITY CYCLE

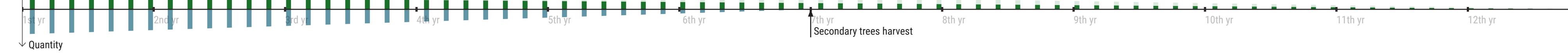
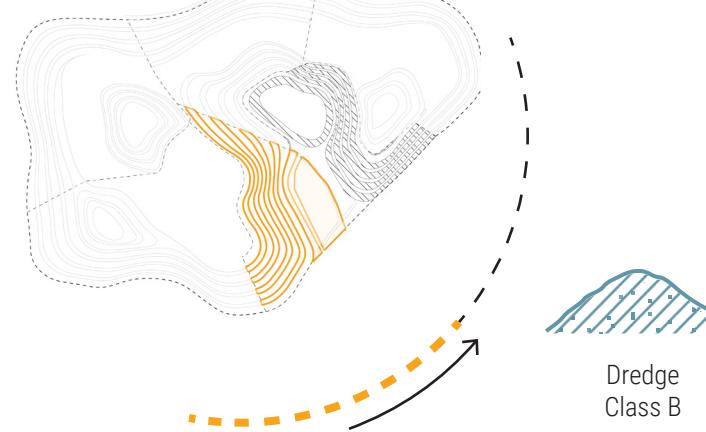
REMEDIATION & HARVESTING

Pioneer trees planting

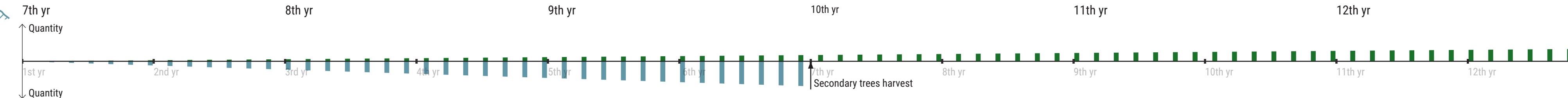
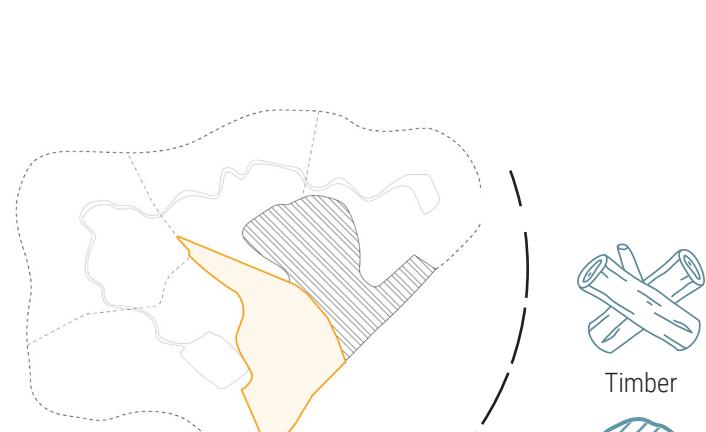


To Dredge Business

Young stand thinning



Tree harvesting



Pioneer trees (thinned)

Secondary trees (thinned)

Secondary trees

SITE B | STORM DAMAGE REDUCTION BELT

Context mapping



Sea Level Rising



Dredge fill region



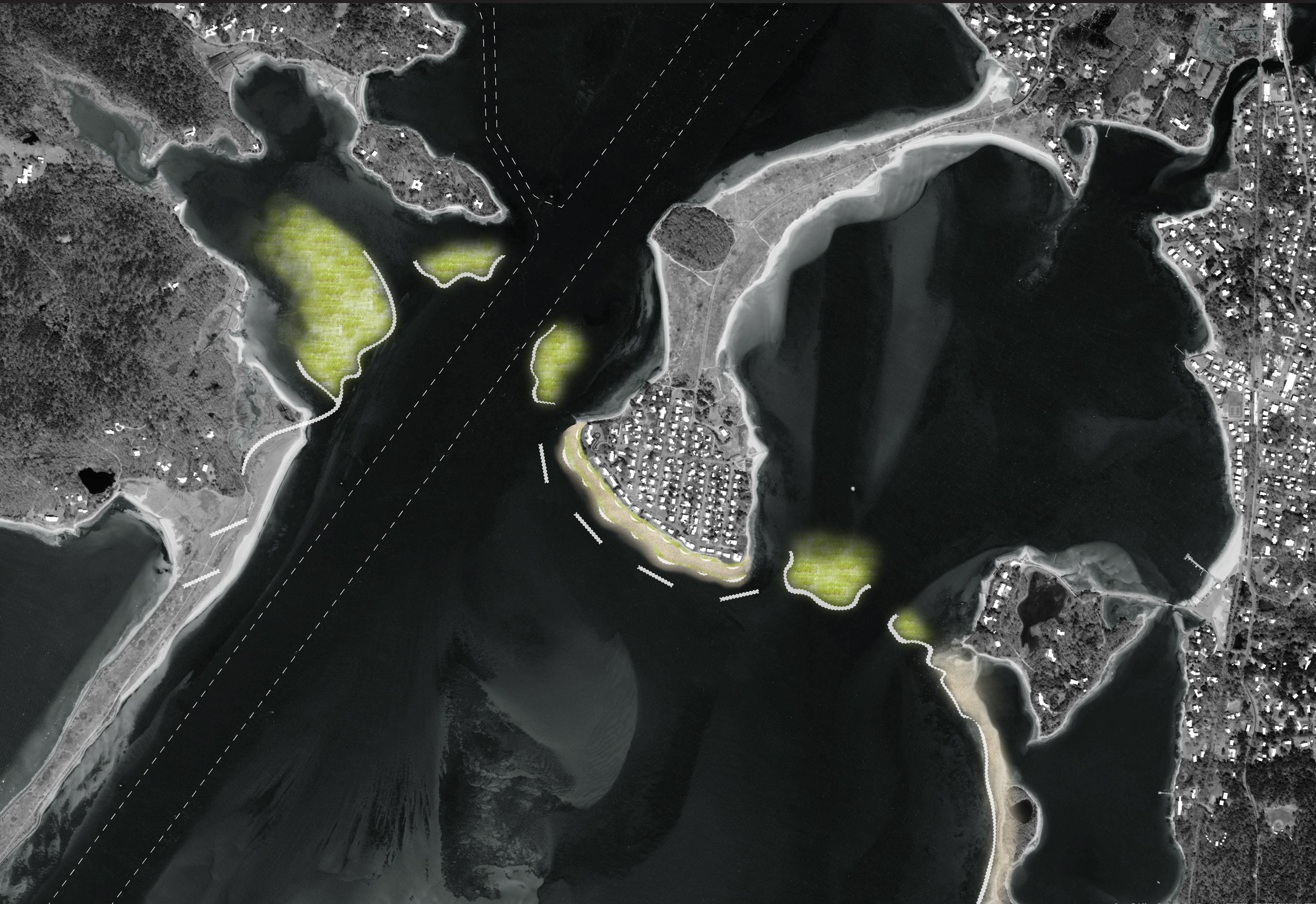
Dredge construction



Marsh area



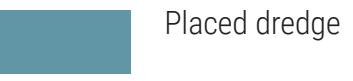
Master plan



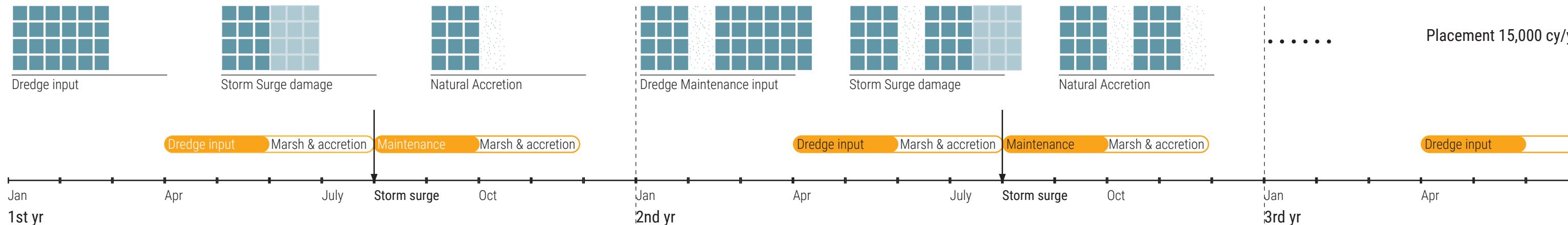
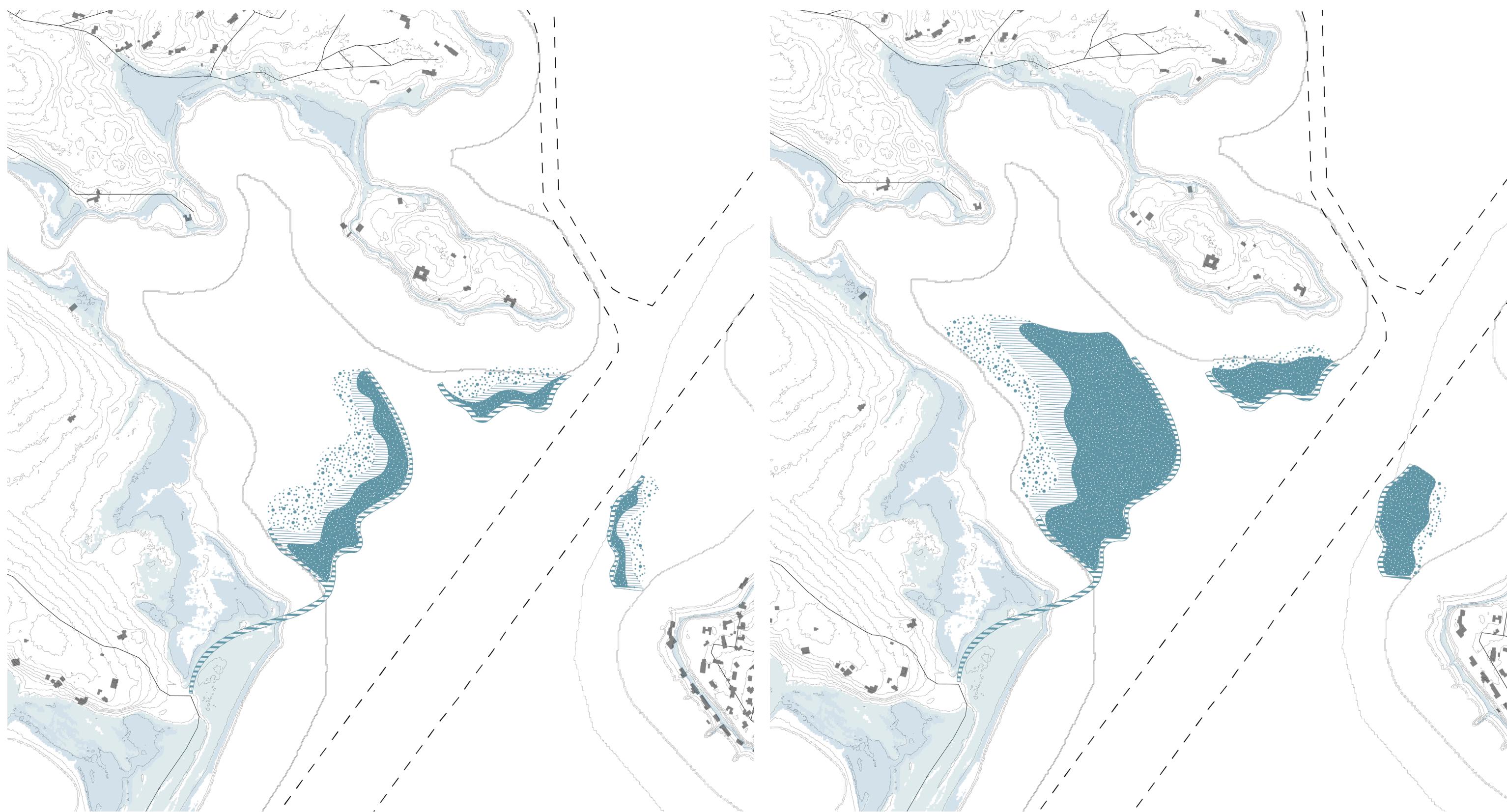
Source: Esri, Microsoft, GeoEye, i-cubed, USDA, USGS, AerialPhoto, MapInfo, Intermap, Earthstar Geographics, CNES/Airbus DS, USDA, USFWS, USGS, AeroGRID,

SITE B | DREDGE FOR MARSH WETLAND CONSTRUCTION

+ + + Naturally accredited sediment



Seabed Serial Plans



Dredge as marsh wetland engine

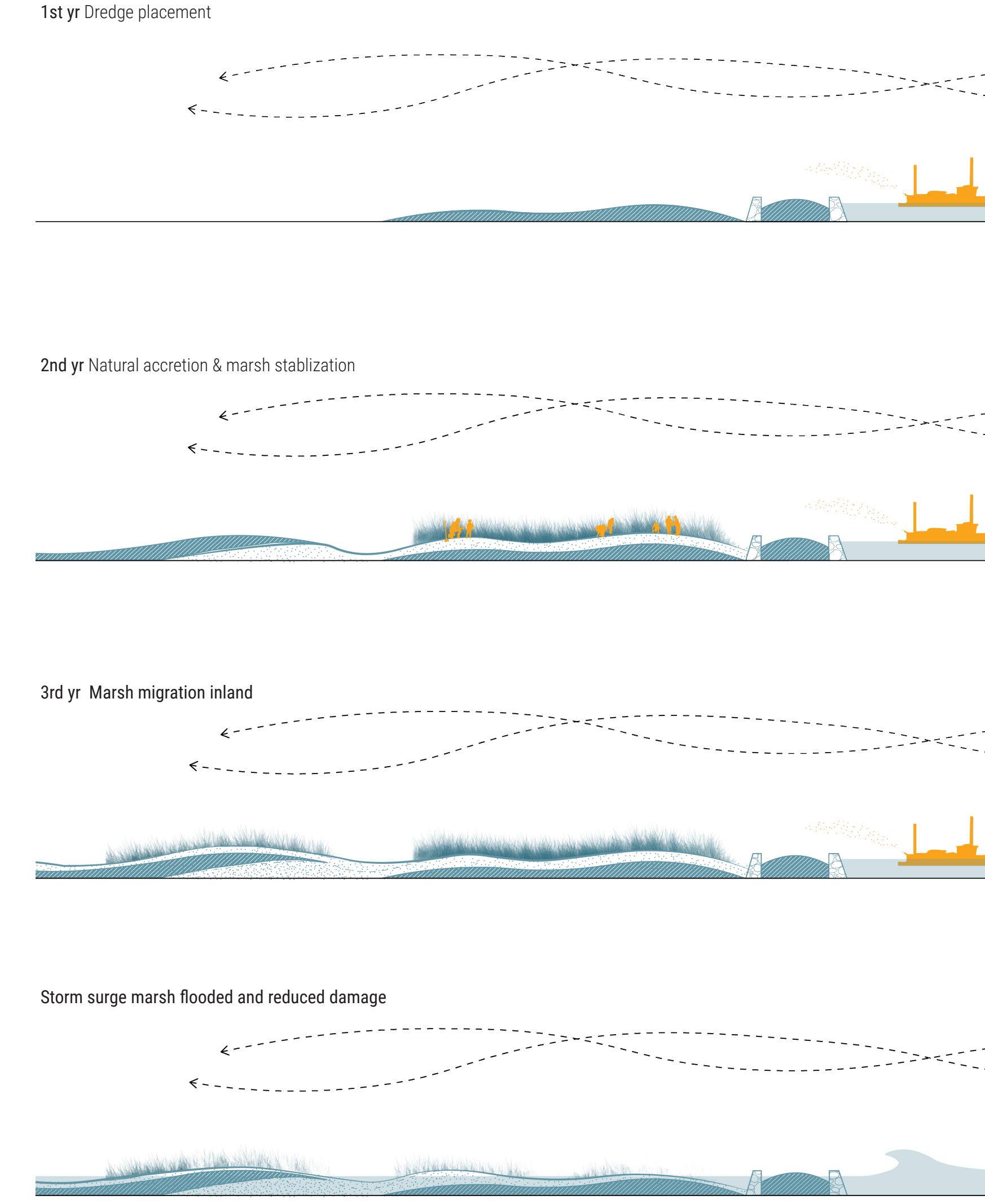
1st yr Dredge placement

2nd yr Natural accretion & marsh stabilization

3rd yr Marsh migration inland

Storm surge marsh flooded and reduced damage

Placement needs

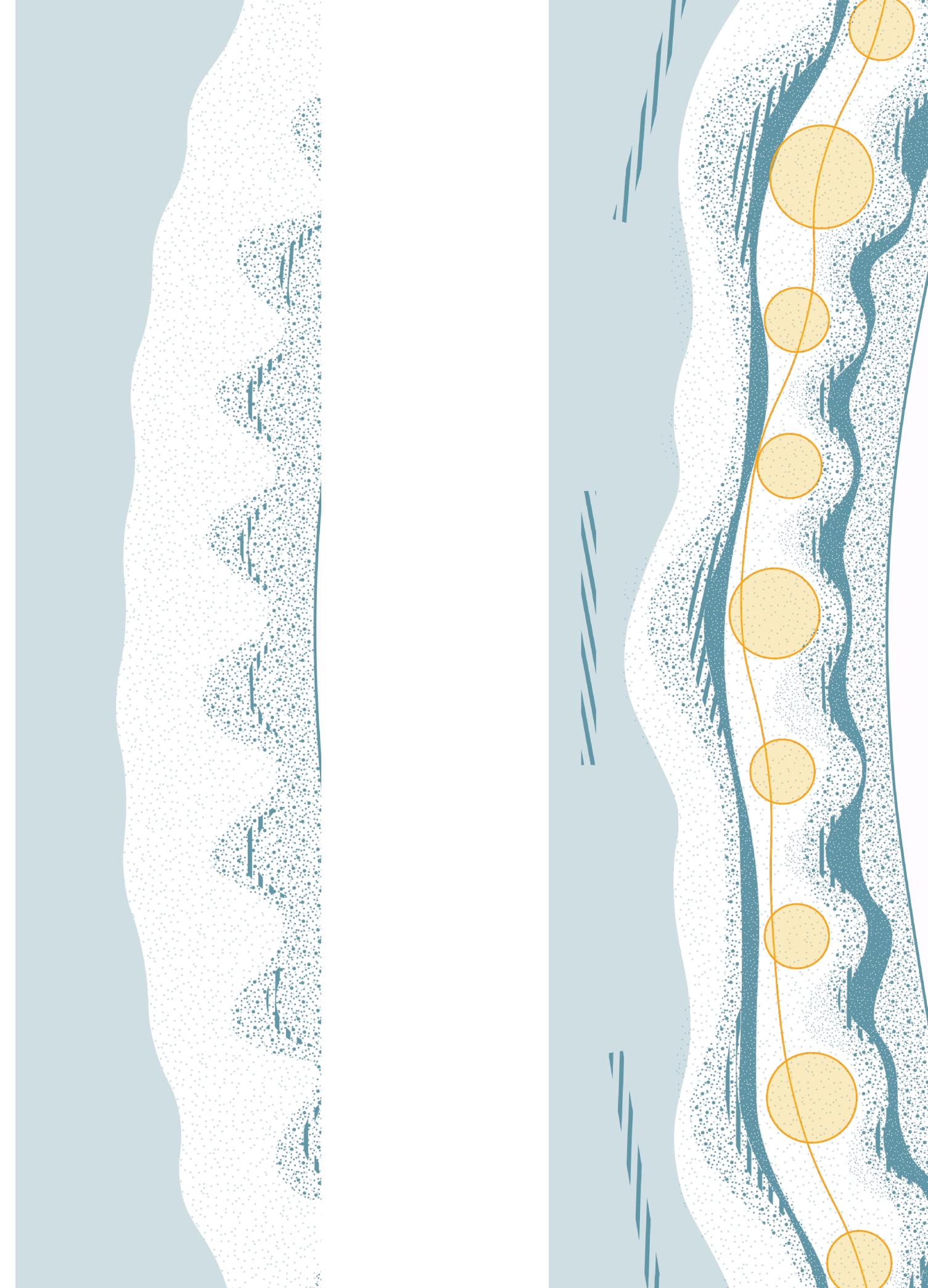


SITE B | MARSH BUFFER AT THE COASTAL NECK

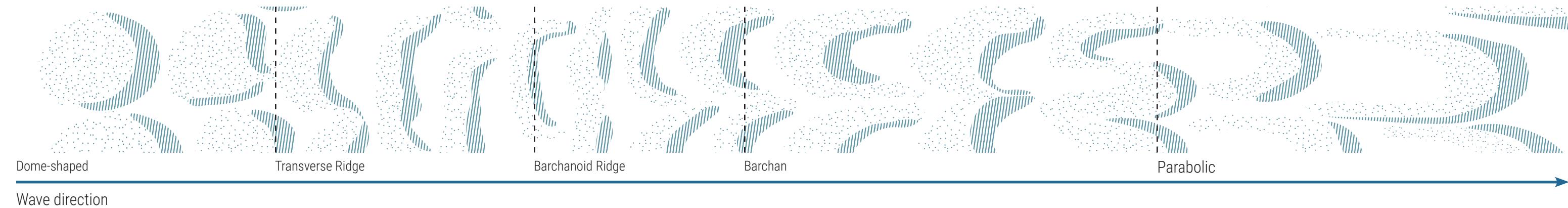


SITE B | DREDGE FOR DUNE CONSTRUCTION

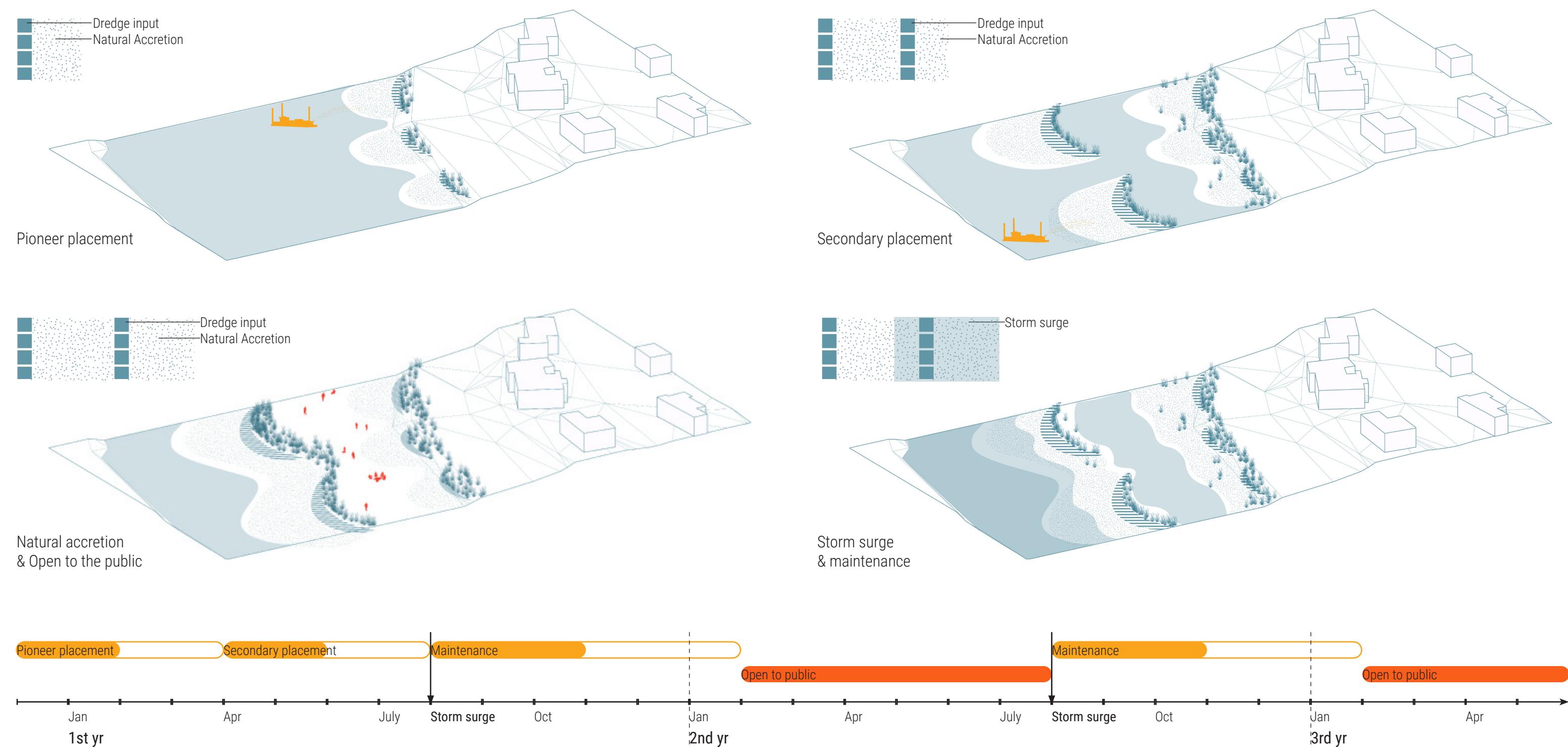
Coastal beach serial plans



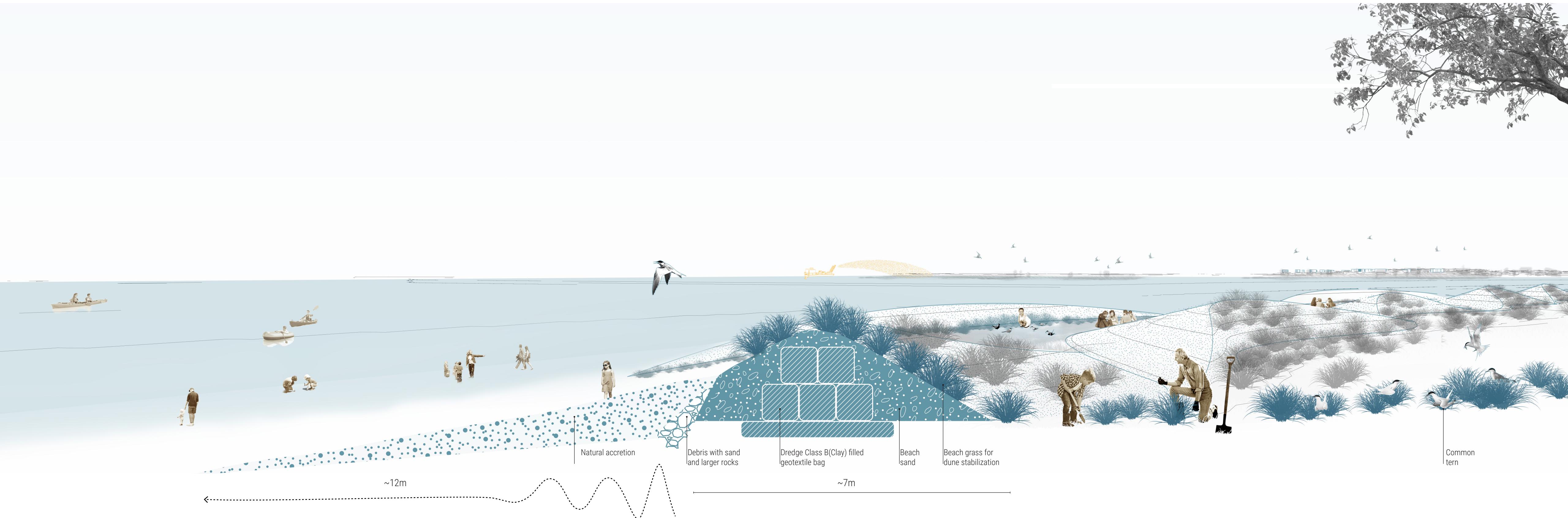
Dune Typology



Dredge as coastal sand engine

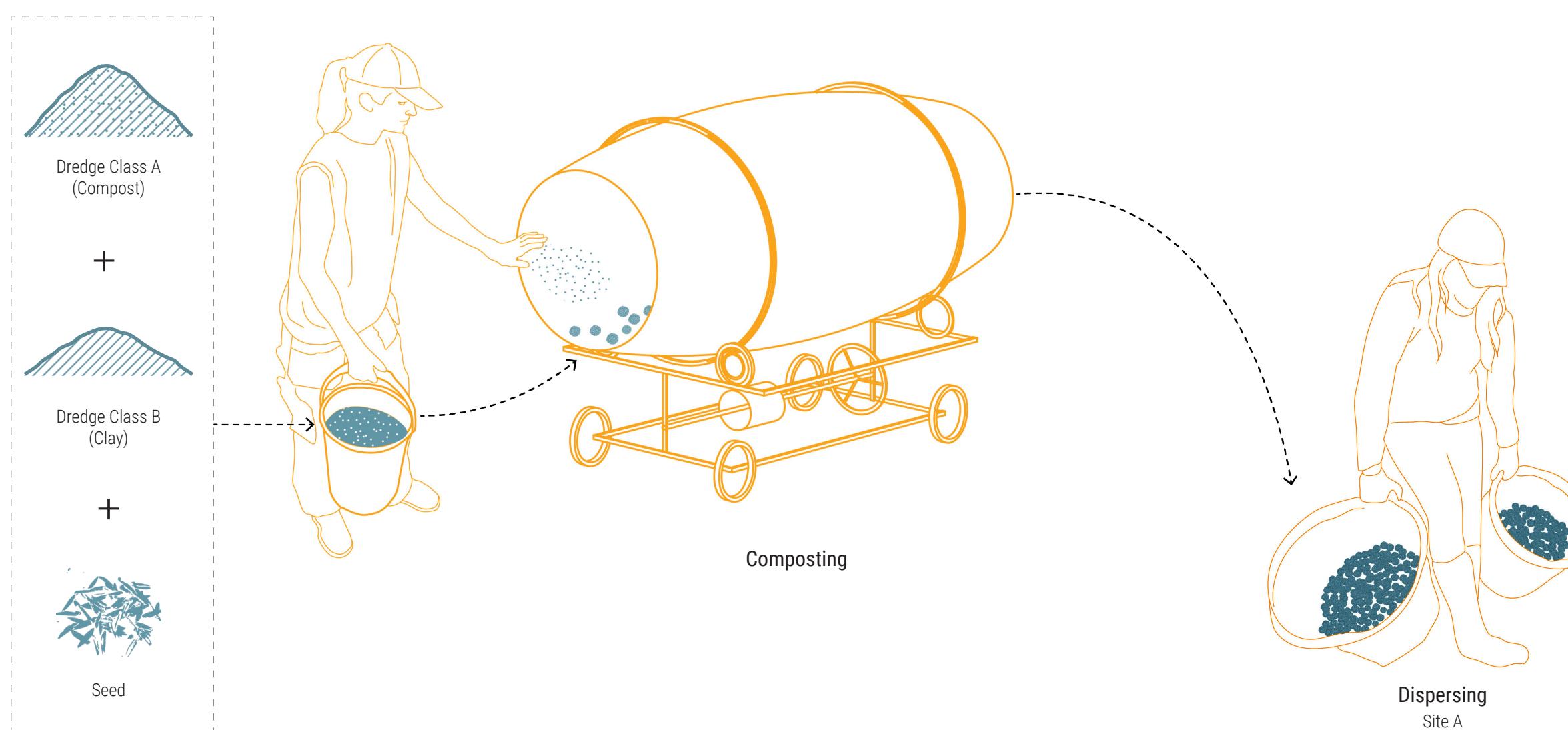
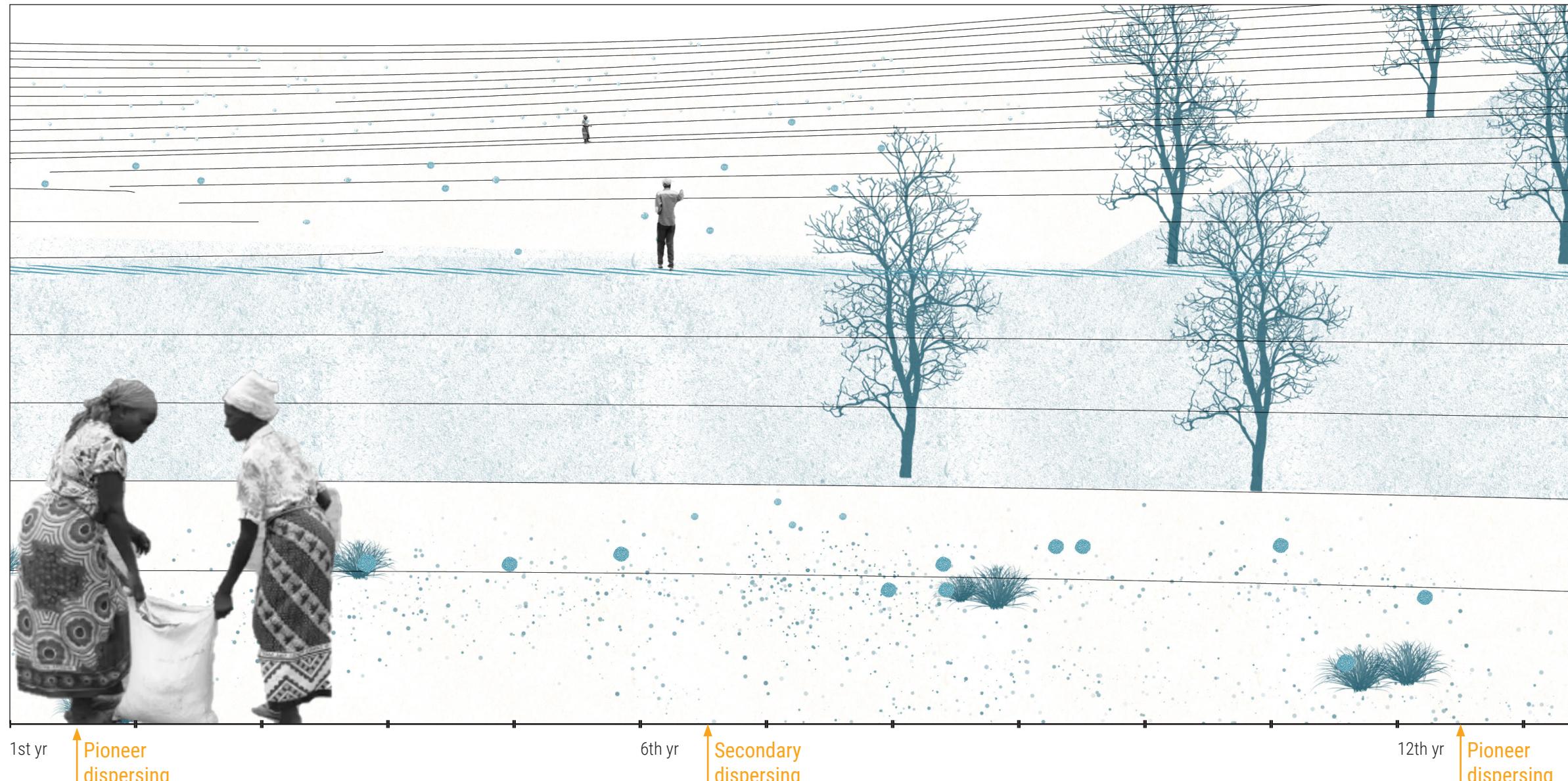


SITE B | DUNE BUFFER AT COASTAL BEACH



FUTURE KIT | DREDGE BALL COMPOSTER

Site A - During remediation - Labor-Dispersing dredge ball



Site B - After storm - Community - Involvement

