HOMER GREEN STORMWATER MANAGEMENT SYSTEM

CITY OF HOMER PUBLIC WORKS DEPARTMENT

JANUARY 2022

WATER, WATER EVERYWHERE

- History of drainage research

- What's missing?

- Drainage problems

- Concepts for Green Infrastructure Projects

- Next Steps

EARLY RESEARCH

- 1979 Drainage Management Plan

- 1981- 82 Revised Drainage Management Plan

- Focused on traditional drainage management

- Did not address groundwater, erosion, water quality, etc.

"MODERN" RESEARCH

- 2003 – Wetland Functional Assessment Guidebook; ADEC

- 2004 – Soil Survey of Western Kenai Pen. USDA, NRCS…

- 2007 – Homer Stormwater and Meltwater Management and Mitigation Handbook; Allegra Bukojemsky & David Scheer

- 2004-2009 – Privately-funded work – Coble, McCarthy

MORE RESEARCH "RECENT" TIMES

- 2014 Beluga Area Planning Reference – Homer SWCD

- 2020 Low Impact Dev. Planning – Kinney Engineering

- 2020 - Coastal Bluff Stability; AK DGGS

WHAT'S BEEN MISSING?

- Connection between the research findings

- Implementation of the recommendations

- Consistent link with land development regulations

- Focus on water quality

WE STILL HAVE DRAINAGE PROBLEMS

- Drainage is damaging private property.

- Near-surface ground water is triggering bluff erosion.

- Drainage is threatening slope stability.

- Silt-laden storm water is flowing into streams.

FLOODING

Geoff Coble

FLOODING

Chad W. Smith
USGS

EROSION

USACE

EROSION

Public Domain

BAYCREST SUBDIVSION

- Storm water erodes channels into the bluff

- Degree of bluff erosion evident by amount of sediment and stone deposited on the beach

KACHEMAK DRIVE

- Sediment-laden storm water discharges directly to Kachemak Bay

- This runoff doesn't benefit from filtration by wetland processes

KACHEMAK DRIVE

- Homeowners create private solutions

SHORT TERM SOLUTIONS = LONG TERM PROBLEMS

- Private developments don't always look downstream.

- Inspection efforts don't address all development activity.

- Maintenance focuses on efficiency, not sustainability.

- Water quality not always a priority.

- Windows of opportunity to use natural systems are closing.

STORM WATER FLOWS
FOOTHILL SUBDIVISION
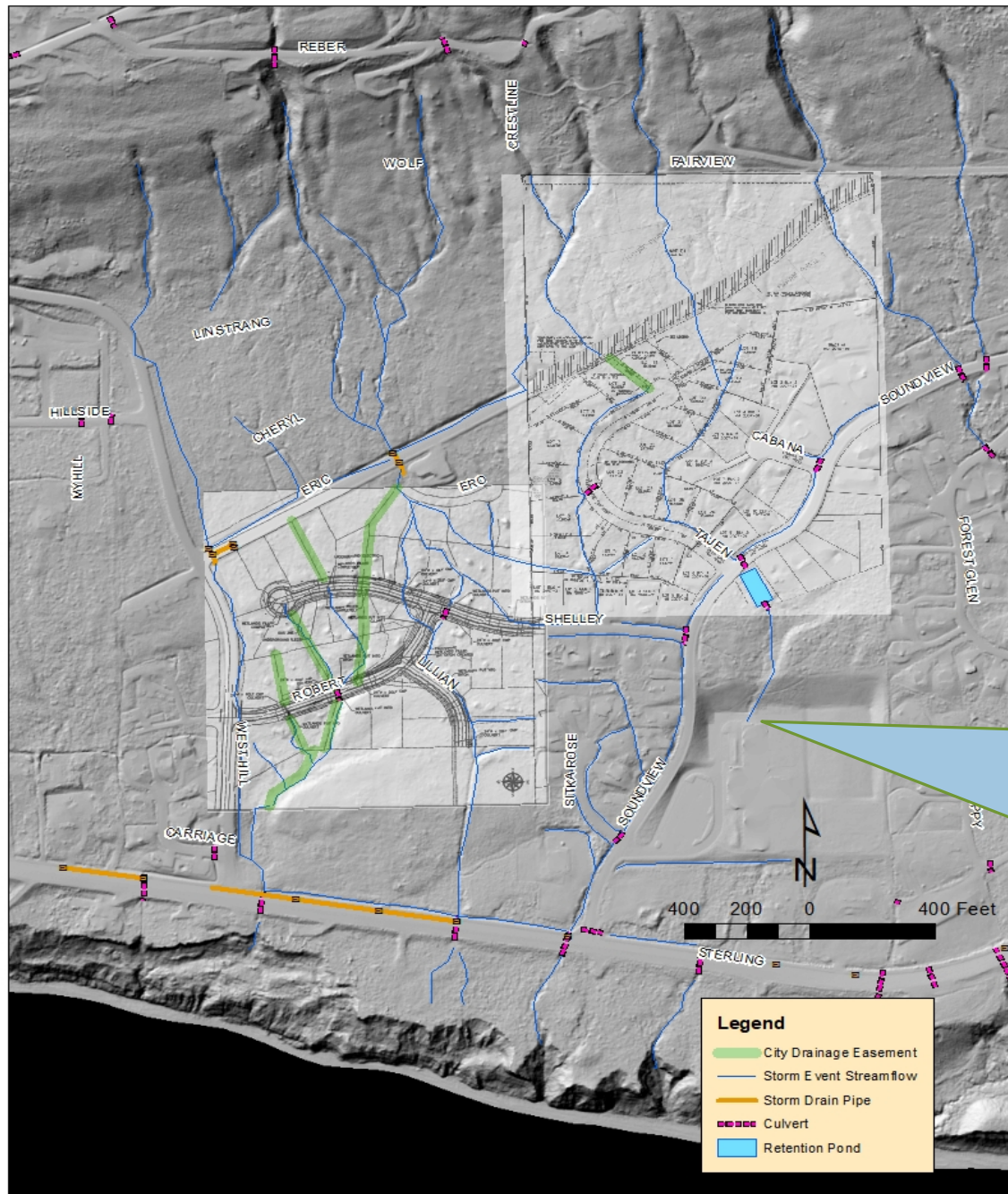
WHAT'S THE ANSWER?

- Nature always wins.

- Work with nature, not against it.

- Plan for the long term.

GREEN STORMWATER MANAGEMENT SYSTEM

- Includes four Green Infrastructure sub-systems

- Uses natural resources to diffuse water quantity and protect water quality

- Manages water flow to mitigate bluff erosion

NATURAL RESOURCES AROUND US

Peatland
Pool

NATURAL RESOURCES AROUND US

Riparian

NATURAL RESOURCES AROUND US

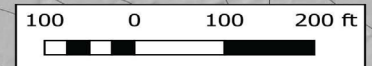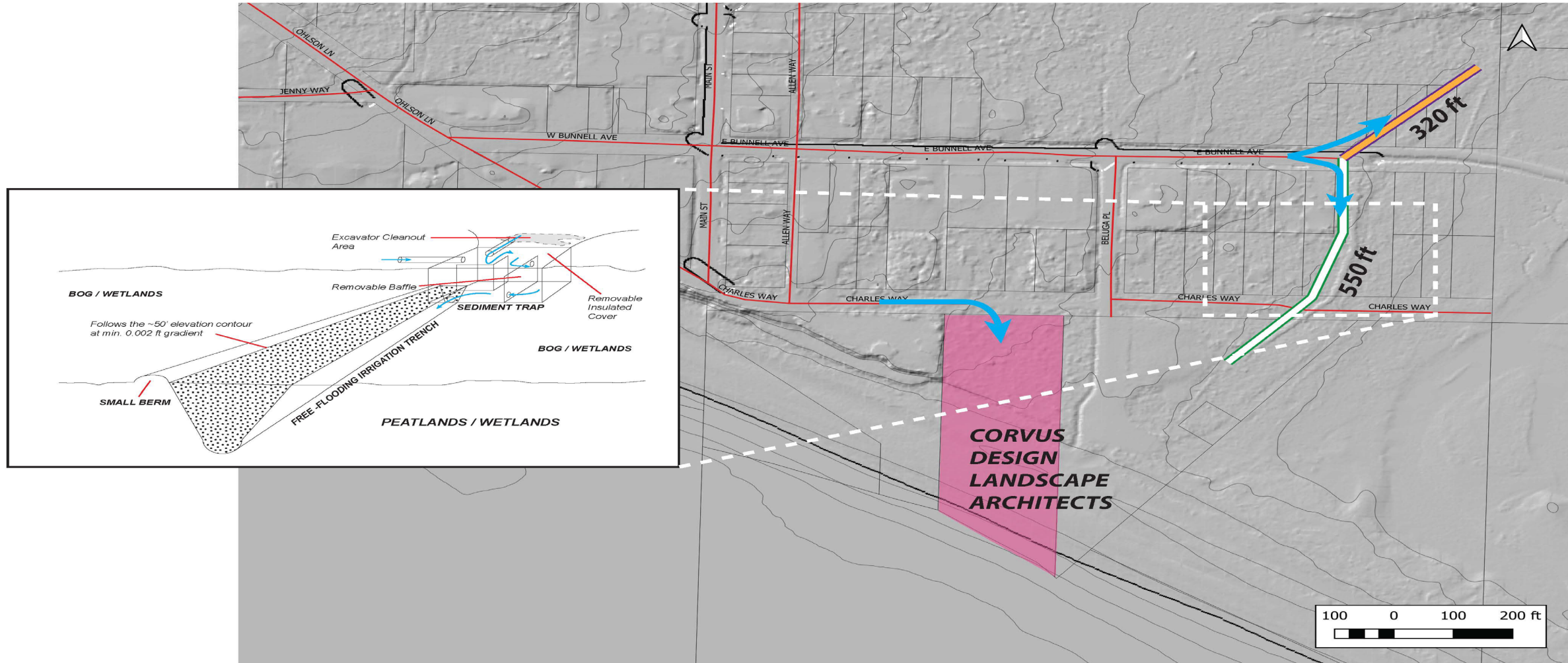Relict Glacial Lakebed

NATURAL RESOURCES AROUND US

Headwater Fen

GREEN INFRASTRUCTURE ELEMENT #1 –
BISHOP'S BEACH STORMWATER TREATMENT SYSTEM

- Uses existing wetlands to store/treat storm water from Main Street and Old Town storm drains

- Protects water quality of Beluga Slough & Kachemak Bay

- Ties into Bishop's Beach Park

Bishops Beach

Inset diagram labels:
- Excavator Cleanout Area
- Removable Baffle
- Removable Insulated Cover
- SEDIMENT TRAP
- BOG / WETLANDS
- BOG / WETLANDS
- Follows the ~50' elevation contour at min. 0.002 ft gradient
- FREE-FLOODING IRRIGATION TRENCH
- SMALL BERM
- PEATLANDS / WETLANDS

Map labels:
- OHLSON LN
- JENNY WAY
- OHLSON LN
- W BUNNELL AVE
- MAIN ST
- ALLEN WAY
- E BUNNELL AVE
- E BUNNELL AVE
- E BUNNELL AVE
- MAIN ST
- ALLEN WAY
- BELUGA PL
- CHARLES WAY
- CHARLES WAY
- CHARLES WAY
- CHARLES WAY
- CORVUS DESIGN LANDSCAPE ARCHITECTS
- 320 ft
- 550 ft

Scale bar: 100 0 100 200 ft

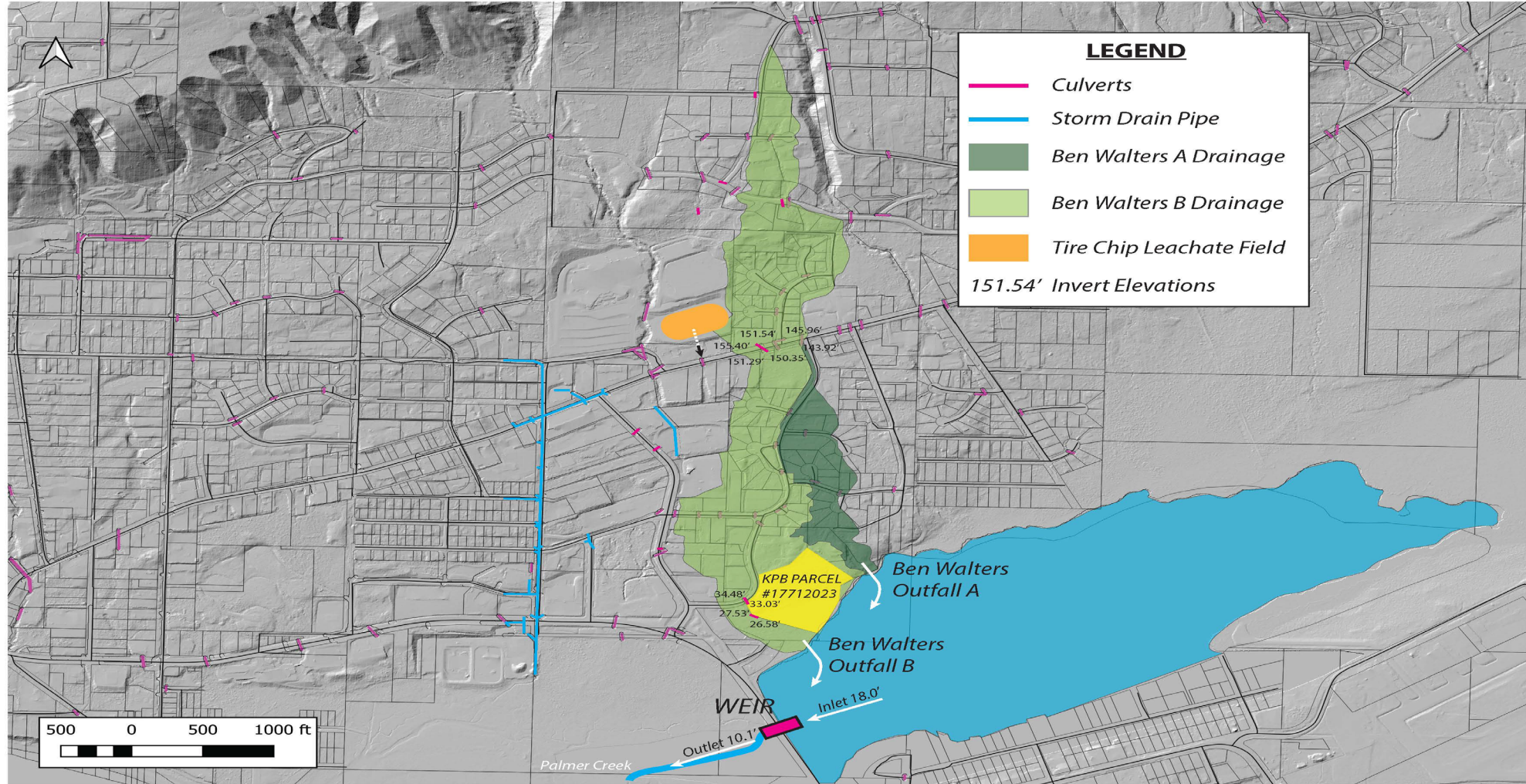| CLIENT	PROJECT	DRAWN BY	DESCRIPTION
City of Homer Homer Public Works Dept 3575 Heath St Homer, AK 99603	Bishops Beach Area Stormwater Treatment Project	CGS	Section C

FIGURE 7

GREEN INFRASTRUCTURE ELEMENT #2 – BEN WALTERS STORMWATER TREATMENT SYSTEM

- Uses existing wetlands to store and treat storm water from Ben Walter's Way and upstream watershed

- Diffuses water volumes flowing into Beluga Lake

- Protects water quality of Beluga Lake, Beluga Slough and Kachemak Bay

- Ties into Ben Walters Park

Ben Walters

LEGEND

- Culverts
- Storm Drain Pipe
- Ben Walters A Drainage
- Ben Walters B Drainage
- Tire Chip Leachate Field
- 151.54' Invert Elevations

151.54' 145.96'
155.40' 143.92'
151.29' 150.35'

KPB PARCEL
#17712023
34.48' 33.03'
27.53' 26.58'

Ben Walters Outfall A

Ben Walters Outfall B

WEIR Inlet 18.0'

Outlet 10.1'

Palmer Creek

500   0   500   1000 ft

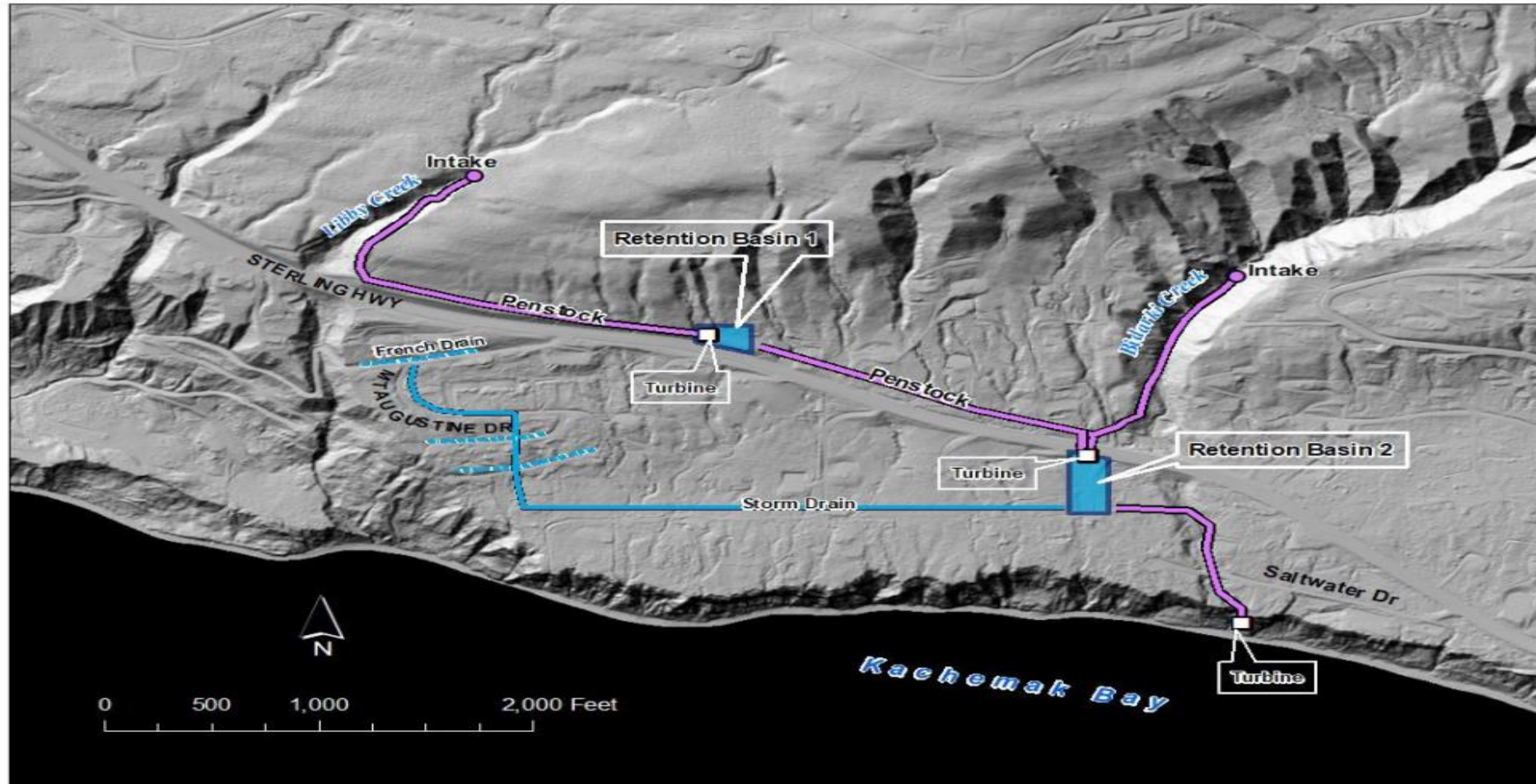| CLIENT	PROJECT	DRAWN BY	DESCRIPTION	
City of Homer Homer Public Works Dept 3575 Heath St Homer, AK 99603	Ben Walters Area Stormwater Treatment Project	CGS	Ben Walters Outfalls	FIGURE **3**

GREEN INFRASTRUCTURE ELEMENT #3 – BAYCREST AREA STORM DRAIN

- Carries drainage from Baycrest Hill area to Bidarki Creek

- Reduces potential for bluff erosion and slope instability

- Protects water quality of Kachemak Bay

- Provides opportunity for mini-hydro facility

Baycrest Storm Drain Plan

Intake

Libby Creek

STERLING HWY

Penstock

Retention Basin 1

Turbine

French Drain

MT AUGUSTINE DR

Penstock

Bidarki Creek

Intake

Retention Basin 2

Turbine

Storm Drain

Saltwater Dr

N

Kachemak Bay

Turbine

| 0 | 500 | 1,000 | | 2,000 Feet |

COBLE GEOPHYSICAL SERVICES

CGS

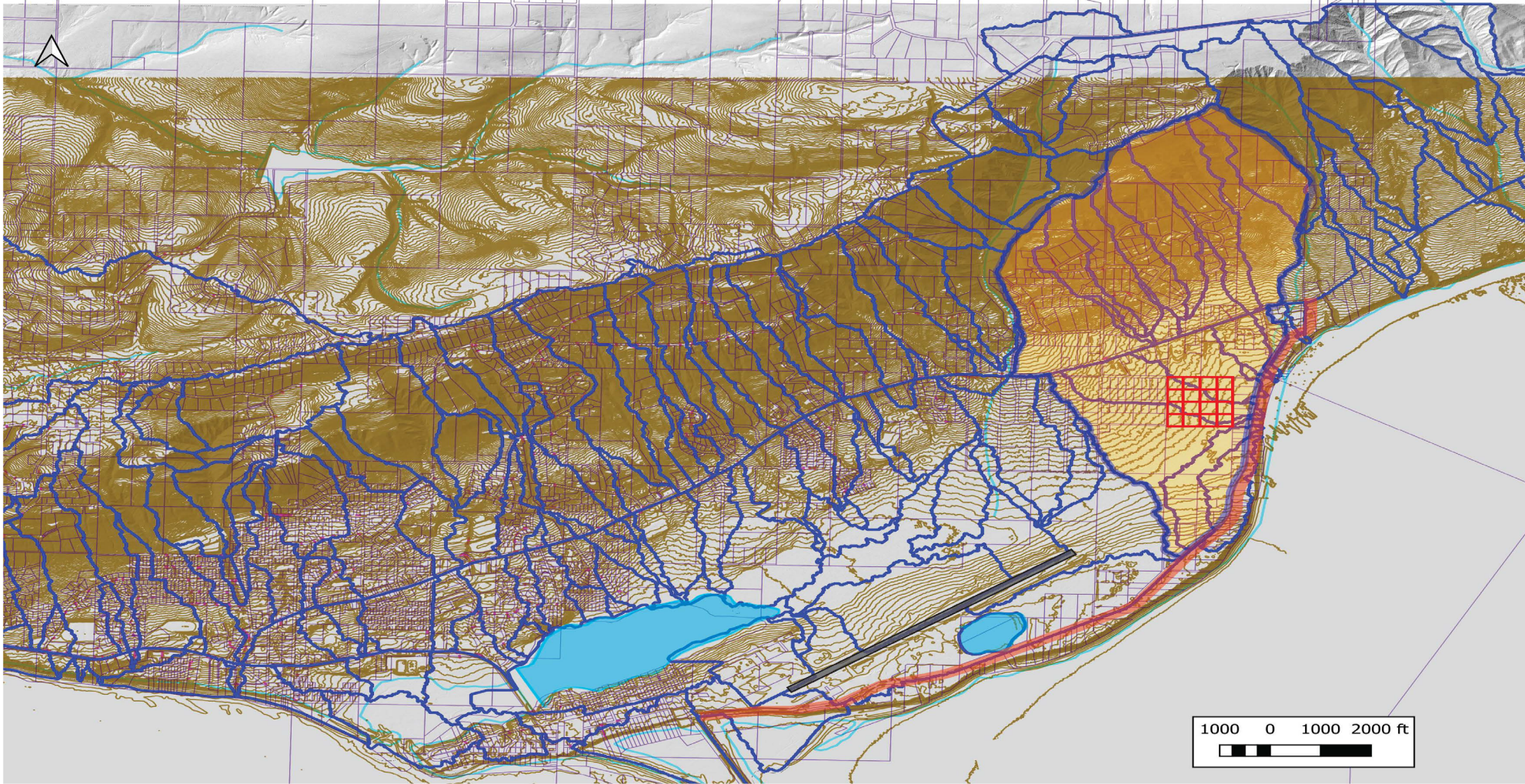| CLIENT	PROJECT	DRAWN BY	DESCRIPTION	
City of Homer Homer Public Works Dept. 3575 Heath St Homer, AK 99603	Baycrest Stormwater Drainage Plan	CGS	Master Plan for Baycrest Area to Mitigate Sources of Bluff Erosion Via Storm Drainage Utilizing Water Retention and Power Generation	**FIGURE** **9**

GREEN INFRASTRUCTURE ELEMENT #4 – CHECKERBOARD SPONGE

- Uses existing wetlands to store/treat drainage from industrial/commercial land and upstream watersheds, including those in Kachemak City

- Reduces potential for bluff erosion on Kachemak Drive East

- Protects water quality of Kachemak Bay

- Provides opportunity for mini-hydro facility

Kachemak Dr.

1000   0   1000 2000 ft

CLIENT	PROJECT	DRAWN BY	DESCRIPTION	
City of Homer Homer Public Works Dept 3575 Heath St Homer, AK 99603	Kachemak Drive Stormwater Treatment and Control	CGS	Storm Drainage, Basin Storage, Runoff and Coastal Erosion Mechanics, East Kachemak Drive	FIGURE **2**

STORM WATER RETENTION AREA

A detail of the area needed for storm water retention

Credit: Coble Geophysical

NEXT STEPS

- Refine the concepts

- Secure the funding

- Acquire the real estate

- Design/build the projects

- Review/adjust regulations