



White Rock Lake Trail Erosion: Preliminary Engineering Report

April 2024

Prepared for:

City of Dallas Parks and Recreation

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1.0 INTRODUCTION

Freese and Nichols, Inc. (FNI) was contracted by the City of Dallas Park and Recreation Department to conduct a shoreline erosion assessment on approximately 2,300 linear feet (LF) of shoreline on the southern shore of White Rock Lake. This assessment was then used to guide the development of three conceptual level alternatives to address erosion related concerns along the lakeshore, including impacts to the trail and nearby infrastructure.

The objective of the assessment was to document the existing conditions of the lakeshore within the project area and identify the present and potential impacts to infrastructure and adjacent land due to erosion and hydraulic processes.

This assessment included desktop and field components which included:

- Review of Site History and Hydrology
- Review of Site Physiography, Soils, and Geology
- Review of Historic Aerials and LiDAR Data
- Geotechnical Investigation (performed by HVJ Associates)
- Site Investigation & Condition Assessment
- Shoreline Erosion Risk Index
- Photo Documentation with GPS-Tagged Photos and Unmanned Aerial Vehicle (UAV)

The results of this assessment allowed the development of conceptual-level alternatives to address erosion related risks that account for shoreline processes and existing conditions in the design. This report describes three alternatives, offers an opinion of probable construction cost (OPCC), and includes preliminary 404 permitting considerations provided by Integrated Environmental Solutions, LLC.

2.0 BACKGROUND

2.1 White Rock Lake History and Hydrology

Originally a fertile river valley, White Rock Lake completed construction in 1911 to meet the growing water demand of Dallas’s expanding population. As rapid population growth continued in Dallas, additional water sources became necessary, resulting in the construction of what is now known as Lake Lewisville (formerly Lake Dallas), completed in 1930. No longer needed as Dallas’s primary water supply, White Rock Lake was transformed into a park shortly afterward. Although the lake remains an emergency water supply for the city of Dallas, its primary function is now recreation.

The White Rock Creek Watershed has undergone a massive shift in land use in the past 60 years, transitioning from primarily rural in the 1960’s to 95% urban by 2002. The construction of Dallas suburbs including Richardson, Plano, and Frisco largely caused this change. This has resulted in an over 60% reduction in infiltration capacity, increased storm flow peak discharge, and increased frequency of flood events (Groening & Williams, 2006).

Since the completion of its construction in 1911, White Rock Lake has been dredged four times (1937, 1955, 1974, and 1998). During the 1974 dredging, the 850 acre-feet of sediment removed was used to create Mockingbird Point on the northwest side of the lake, now White Rock Lake Dog Park. Its reservoir capacity has decreased over time from the original design estimate of 18,160 acre-feet to a 2015 capacity of 10,230 acre-feet as it fills in with sediment. A volumetric and sedimentation survey of the lake was conducted in 2015 by the Texas Water Development Board (TWDB), indicating 3,550 acre feet of sediment below conservation pool elevation, with the greatest sediment accumulation found in a narrowed section northwest of the Dallas Arboretum (TWDB, 2016).

Lastly, other available information includes a Spillway Capacity Study (FNI, 2021) in which the peak water surface elevation was calculated during flood events, as shown in **Table 1**. A wave-runup analysis indicates that significant wave heights are up to 3.3 feet, which reaches an elevation of 461.3 feet when applied to the normal pool elevation of 458.0 feet.

Table 1. Peak Water Surface Elevation during Flood Events

Frequency Event	Peak WSE (ft)
Normal Pool Elevation	458.0
2-year	462.4
5-year	463.3
10-year	464.1
25-year	465.2
50-year	466.0
100-year	466.8
200-year	467.6
500-year	468.7

2.2 Physiography, Soils, and Geology

White Rock Lake is in the Northern Blackland Prairie ecoregion of the Great Plains physiographic province. The primary soil type at the project site is Lewisville northern clay loam (Hydrologic Soil Group B). Ranging from grayish brown to very dark grayish-brown, this well-draining soil is found in stream terraces and derived from loamy and clayey calcareous alluvium (NRCS, 2023). Surrounding soil types include Ferris clays and Frio silty clays. The geologic units that underly these soils include Holocene Alluvium and Terrace deposits, which consist of clays, silts, sands, and gravels (USGS, 1992). Upstream of the lake, White Rock Creek flows through Austin Chalk, resulting in characteristic tan-white outcroppings that gave the creek its name. Along the study shoreline alluvial terrace deposits are exposed at the surface at locations where erosion has occurred.

Geotechnical investigations were also performed by HVJ Associates. The results of the geotechnical investigation are attached in **Appendix A**. The findings in the geotechnical investigation also correlate with site observations, USGS geologic, and USDS soils data.

2.3 Lake Erosion Processes

Lake shoreline erosion is a natural consequence of impoundment of a waterway. The magnitude of erosion is dependent on two factors, erosional forces applied to the shoreline and the vulnerability of the shoreline to erosive forces. The interaction between all the variables within these two factors contribute to the likelihood of shoreline erosion.

Erosional forces that induce erosion are derived from by both natural and man-made forces by wave action generated by wind from wind blowing across the surface of the water and boats (Holmes and Stalling, 1987) as well as the rise and fall of the water level (i.e. rapid drawdown). Wave action is a function of the fetch, or the uninterrupted distance wind can blow before reaching the shoreline, prevailing wind direction, windspeed and lake bottom geometry. Generally, the greater the fetch distance in the direction of the prevailing winds, the greater the wave action. The rise and fall of the water level is a function of precipitation and how water is released from a lake/reservoir. This factor influences both the elevation of wave action and potential erosion from rapid drawdown.

The factors that relate to shoreline erosion vulnerability include, but are not limited to, shoreline geometry (e.g. bluff height, steepness, shoreline shape, bathymetry), aquatic and bank vegetation, surface protection, and nearby structures.

3.0 SHORELINE EROSION ASSESSMENT

This section provides descriptions of the observed site conditions at White Rock Lake during a site visit on January 17, 2024, a description and results of an Erosion Risk Index created to evaluate shoreline retreat and threats to the trail and infrastructure, and the results of a LiDAR elevation change analysis between 2009 and 2019. Shoreline stationing was created to communicate the location of features within the study area (**Exhibit 1**). Stationing begins at 0+00 at the northeast corner of the study area and ends at Station 22+50 at the spillway to the southwest. Note that no survey was conducted, and the stationing only serves to describe general areas and extents.

The field observations, erosion risk index, and LiDAR comparison analysis are generally in agreement about the locations and severity of erosion. The greatest erosion threats to the trail and infrastructure are in the middle of the study area between Stations 5+50 and 16+00, where the bank slopes are taller and steeper banks. **Table 2** provides a station-by-station tabulation of the erosion risk index (defined in section 3.2) and estimated bank retreat. These estimates were made using the location of rock riprap and concrete rubble found on the banks or submerged in front of the banks along shoreline. It is unknown when these protection measures were initially placed, but it is assumed to be the historic toe of the shoreline banks.

The primary mechanism for erosion appears to be slumping (slope failure). This slumping is likely the result of two processes: (1) internal erosion/piping during rapid drawdown of the lake surface following storm events and (2) wave action winnowing away the finer sediments that make up the shoreline. With the removal of fine sediments, the soil matrix is unable to support the bank, resulting in slope failure. This is evidenced by rock riprap protection being present, but ineffective to prevent slumping. These processes are most severe along taller and steeper shorelines. If more detailed information is desired regarding the erodibility of the shoreline, additional geotechnical slope stability analyses and/ or rapid drawdown tests could be performed.

Table 2. Estimated Bank Retreat and Erosion Risk Category

Station Extents	Estimated Bank Retreat (ft)*	Erosion Risk Category**
0+00 – 2+00	Minimal	Minimal
2+00 – 3+50	0 – 5	Minimal
3+50 – 5+50	2 – 10	Low
5+50 – 6+00	10- 20	High
6+00 – 7+30	15 -30	Imminent
7+30 – 7+90	5 – 10	High
7+90 – 8+30	10 – 20	Imminent
8+30 – 10+90	2 – 10	High
10+90 – 11+10	15 – 30	Imminent
11+10 – 11+40	2 – 10	High
11+40 – 12+30	15 – 30	Imminent
12+30 – 13+00	10 – 20	High
13+00 – 14+50	2 – 10	Moderate
14+50 – 15+50	2 – 10	High
15+50 – 16+00	2 – 10	Imminent
16+00 – 16+50	2 – 10	Moderate
16+50 – 19+50	2 – 10	Low
19+50 – 22+50	Minimal	Minimal

*Estimated bank retreat is based on the distance of the current shoreline from observed past protection measures submerged within the lake

**Erosion Risk Categories are described in Section 3.2

3.1 OBSERVED SITE CONDITIONS

While shoreline erosion was observed throughout the project area five discrete sections were identified that share similar shoreline morphology and conditions. This section describes the conditions found within each of these five areas.

Station 0+00 to Station 5+50

Between Station 0+00 and 5+50 shoreline bluff heights are relatively low (between 2 – 5 feet). The slope of the bluff varies between shallow (30-degrees) and near vertical. Toe scour derived from wave action was observed, becoming more frequent progressing toward station 5+50. Aquatic vegetation and infrequent cypress trees are present which help protect the shoreline. However, remaining vegetation consists of turf grasses, which provides limited surface protection. Rock riprap can also be found along the toe and in the water where shoreline retreat has progressed up to 10-feet behind the protective measures, which show the location of the historic shoreline. While shoreline retreat will continue slowly, there are minimal threats to infrastructure, except at a 12-inch reinforced concrete pipe stormwater outfall and headwall at Station 4+00. This outfall has been undermined by shoreline retreat. Photo 1 and Photo 2 show the representative conditions of these stations.



Photo 1 – View looking east toward Station 2+00 to 5+00



Photo 2 – View looking northeast from Station 4+00

Station 5+50 to Station 13+00

Between Station 5+50 and Station 13+00 the shoreline and trail are vulnerable to continued erosion. The shoreline bluff heights increase to approximately 10-feet and have a slope between 45-degrees and vertical. Numerous mass failures were observed and up to 30-feet of shoreline retreat has occurred. These mass failures expose the underlying alluvial terrace deposits and foundation of the trail. Rock riprap bank protection composed of old road base is present on the slope and toe of the shoreline, but shoreline retreat has persisted behind these protection measures in many locations. Woody vegetation (trees) and vines are present on segments of shoreline that have not been eroded. This segment of shoreline may be most susceptible to erosion because of its tall bluff heights and because it is the most exposed part of the study area along the lake (i.e., this segment of shoreline has a longer fetch distance for wind generated waves). Photo 3 and Photo 4 show the representative conditions of these stations.

Erosion is an immediate threat to the trail system and Garland Road. A 2-foot x 3-foot rectangular concrete stormwater outfall and headwall at Station 8+00 is also threatened by ongoing shoreline processes. Erosion is likely caused by a combination of wave action and a loss of global stability from rapid drawdown after storm events. This is evidenced by rock riprap toe protection and woody vegetation not providing protection against slumps. Furthermore, the observed bank material below the trail may be disturbed soil, which is more susceptible to internal erosion processes.



Photo 3 – View looking east toward Stations 9+00 to 12+00



Photo 4 – View of looking northeast at Station 10+00

Station 13+00 to Station 16+50

Between Station 13+00 and Station 16+50 the shoreline bluff height is approximately 6-feet tall with a slope between 30-degrees and 45-degrees. The shoreline within this section mainly consists of historic slumps that have since become revegetated with woody vegetation; however, turf grasses are also present at the top of the slope. Concrete rubble and rock riprap has also been placed along the toe of the slope, with mixed effectiveness against shoreline retreat. Photos 5 and 6 show the representative conditions of the shoreline between these stations.

Active erosion is most notable at Station 15+60, where the trail foundation has been exposed. Shoreline retreat will likely continue in isolated locations through time, but because the typical conditions (low bluff heights and trail proximity to lake) make erosion a lower threat to infrastructure compared to other sections of shoreline.



Photo 5 – View of looking northeast at Station 15+00 to Station 13+00



Photo 6 – View looking northeast at Station 15+50

Station 16+50 to Station 19+50

Between Station 16+50 and Station 13+00 the shorelines have a bluff height between 4 and 6 feet and are gently sloping at between 20- and 40-degrees. The shoreline has surface protection composed of both rock riprap along the toe and trees. Infrequent slumps are present, that have since revegetated. Photo 7 and Photo 8 show representative conditions of the shoreline within this section of shoreline.

Shoreline retreat may occur slowly in the future, but nearby infrastructure is not at risk of being impacted. Erosion is less prevalent within this section of shoreline because the vegetated shallow sloping banks and presence of toe armoring protect against wave action derived erosion and inhibit slope failures and slumping.



Photo 7 – View of shoreline at Station 18+00



Photo 8 – View looking northeast at Station 19+00

Station 19+50 to Station 23+00

Between Station 19+50 and Station 23+00 the shoreline is composed of shallow sloping gabion mattress and rock riprap toe, and/or vertical concrete retaining wall. While trees are starting to grow within the gabion mattress, both protection measures are in good condition and appear to adequately prevent shoreline erosion impacts to adjacent infrastructure. Photos 9 and 10 show representative conditions between these stations.



Photo 9 – View of Shoreline at Station 20+50



Photo 10 – View looking southwest from Shoreline at Station 20+00

3.2 Erosion Risk Index

An Erosion Risk Index was created for this project by FNI on to evaluate the shoreline of White Rock Lake within the study area, taking relevant concepts from other rapid field erosion assessments, such as the Bank Erosion Hazard Index (BEHI, Rosgen, 1996) and the Wisconsin Erosion Intensity Score Sheet (Ei, DNR, 2008). This index has five categories based on the *Potential for Erosion* and the *Consequence of Erosion*. *Potential for Erosion* is based on the conditions observed during the site visit, the factors that make a shoreline vulnerable to erosion (e.g., shoreline bluff height and angle, surface protection from vegetation or armoring, evidence of past erosion, etc.), and professional judgement. *The Consequence of Erosion* was evaluated as whether potential erosion would impact nearby infrastructure such as the trail, stormwater outfalls, Garland Road, etc. The following are descriptions of each category:

- 1) Minimal Risk – Insignificant Potential for Erosion
- 2) Low Risk – Some Potential for Erosion and Insignificant Consequence of Erosion
- 3) Moderate Risk – Some Potential for Erosion and Significant Consequence of Erosion
- 4) High Risk – Significant Potential for Erosion and Significant Consequence of Erosion
- 5) Imminent Risk – Active Erosion Impacts

Exhibits 2 - 4 show the shoreline risk index within the project area. In general, areas of High and Imminent Risk of erosion impacts are present from Station 5+50 to 13+00 and 14+50 to 16+00. Between Station 13+00 and Station 14+50 there is Moderate Risk due to slightly taller streambanks and observed past slumping that has since revegetated at a shallower slope.

3.3 HISTORICAL AERIAL PHOTO AND LIDAR COMPARISON ANALYSIS

Historical aerial photos were investigated to evaluate past shoreline erosion. Historical aerials from 1957, 1972, 1989, 1995, 2005, 2015, and 2022 were visually evaluated to identify the extent of shoreline erosion. However, due to the resolution of these aerial images and presence of bank vegetation, no erosion patterns or quantifiable shoreline retreat can be calculated from these data.

A comparison between available 1 meter (3.28 foot) resolution LiDAR data from 2009 and 2019 were also compared to evaluate elevation change between these two time periods (**Exhibits 2 - 4**). This analysis shows between 2.5-feet and 5-feet of elevation loss (erosion) has occurred in many locations within the project area. These locations correlate with location slumps observed during the site and the Erosion Risk Index.

4.0 ALTERNATIVES

Three conceptual alternatives were developed to address erosion concerns on White Rock Lake. These alternatives follow the White Rock Lake Park Guidelines (City of Dallas, 1994), which dictate what type of lake edge erosion control measures are appropriate along various areas of shoreline. This document labels the project area as Type 2 shoreline. Prescribed erosion protection measures for shorelines within the study area can consist of gabions or rip-rap protection measures, including concrete rubble. It should be noted that concrete rubble is not a recommended protection measure due to gradation irregularities, insufficient density, aesthetics, and permitting. In all instances where rock riprap is proposed, the rock riprap should be composed of a well-mixed rock matrix with a wide range of rock sizes. This allows the rocks to be free of voids and the rock to interlock and become imbricated. This imbrication is critical for protection measures to function properly. The proposed protection measures work within these constraints and take into consideration the observed site conditions and shoreline erosion processes.

The conceptual alternatives provided show the extent of protection measures between Station 5+00 and 16+00. While FNI recommends protecting this full extent, it is recognized that these extents may not align with the City’s priorities and as such the opinion of probably construction cost (OPCC) for each alternative was done using a per linear foot approach. A description of each alternative is provided below and exhibits depicting Alternative 1, Alternative 2, and Alternative 3 with attached OPCCs showing are shown in **Exhibits 5 -7**, respectively. **Table 3** summarizes the OPCC for each alternative.

Table 3. Alternative Opinion of Probably Construction Cost’s

Alternative Name	OPCC
Alternative 1 – Gabion Mattress Bank Protection	\$2,516,000
Alternative 2 – Rock Riprap Bank Protection	\$2,378,000
Alternative 3 – Living Shoreline	\$2,225,000

Potential permitting requirements, such as regulated activities within waters of the U.S. (WOTUS) under Section 404 of the Clean Water Act, for each of these alternatives were provided by Integrated Environmental Solutions, LLC (IES) and can be found in **Appendix B**. In the proposed alternatives will need to be permitted using the Nationwide Permit (NWP) program. IES expects that all alternatives could be permitted under *NWP 13 – Bank Stabilization*, but that Alternative 3 could also be permitted under *NWP 54 – Living Shoreline*. Each alternative would be required to meet the conditions of the chosen permit and would also require notifying the U.S. Army Corps of Engineers (USACE) prior to construction using a preconstruction notification (PCN) due to their lengths exceeding 500 feet.

4.1 ALTERNATIVE 1 – GABION MATTRESS BANK PROTECTION

Alternative 1 provides the most traditional approach to shoreline protection. Under this alternative the existing shoreline will be cleared of trees and debris. The existing shoreline will be excavated back to native material. The bank will then be reconstructed with layers of geogrid and an approximately 2:1 slope angle similar to its historic condition. Gabion mattress surface protection with a geotextile fabric liner will be placed over the reconstructed shoreline, keyed in below the lakebed at the bottom of the slope and at the edge of the trail at the top of the slope. Rock riprap toe protection will also be placed on the toe to armor against scour and undermining. This alternative is depicted on **Exhibit 5**. The OPCC for this alternative is \$2,516,000.

4.2 ALTERNATIVE 2 – ROCK RIPRAP BANK PROTECTION

In Alternative 2, excavation of the shoreline is proposed. The excavated shorelines will be reconstructed at a 3:1 slope with geotextile layers up to a minimum elevation of 466.0 feet (equivalent to the 50-year storm peak water surface elevation). Rock riprap armoring will also be placed on the shoreline to a minimum bank elevation of 466.0 feet. Rock riprap will also be placed in front of and along the toe of the slope. Above elevation 466.0 feet, the upper banks of the shoreline will be reconstructed with coir-fiber soil layer lifts. The upper shorelines will also be revegetated with native trees and vegetation. This alternative is depicted on **Exhibit 6**. The OPCC for this alternative is \$2,378,000.

4.3 ALTERNATIVE 3 - LIVING SHORELINE

Alternative 3 takes the most restorative approach to providing erosion protection. In this alternative the shoreline will be excavated and reconstructed at a 3:1 slope. Rock riprap armoring will be placed along the toe of the shoreline and banks up to an elevation of 462.4 feet (above the significant wave height and at the 2-year storm peak water surface elevation). Rock riprap will also be placed 8 feet laterally into the lake in front of the shoreline. This riprap will be configured to form shallow water immediately in front of the toe and a breakwater that protrudes out of the water at the furthest extent of the riprap. Native wetland vegetation will be planted within the shallow water in front of toe, forming a vegetated buffer that dissipates wave energy in front of the shoreline. At elevations above 462.4 feet, the slope will be reconstructed using coir-fiber soil layer lifts and vegetated with native trees. The shoreline will become more resistant to erosion as the vegetation establishes deep roots in the bank. The shallower bank slopes will also limit the potential for slope failures to impact the trail system. This alternative is depicted on **Exhibit 7**. The OPCC for this alternative is \$2,255,000.

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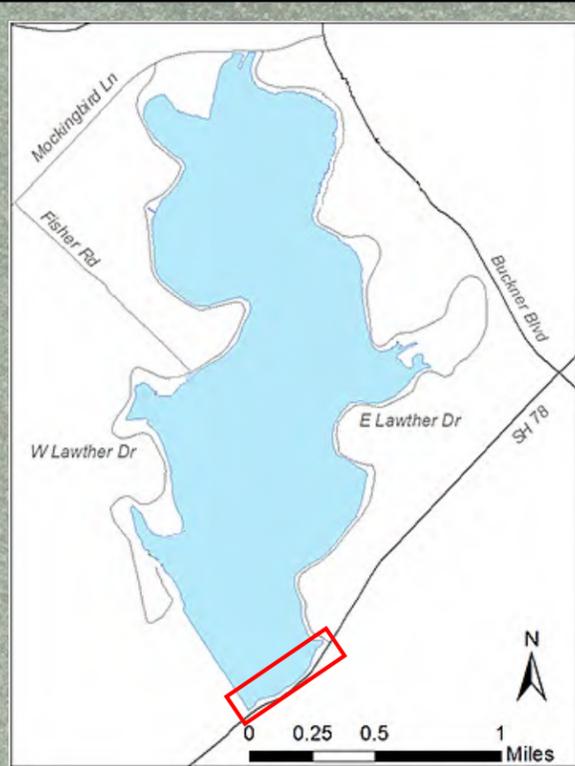


EXHIBIT
1

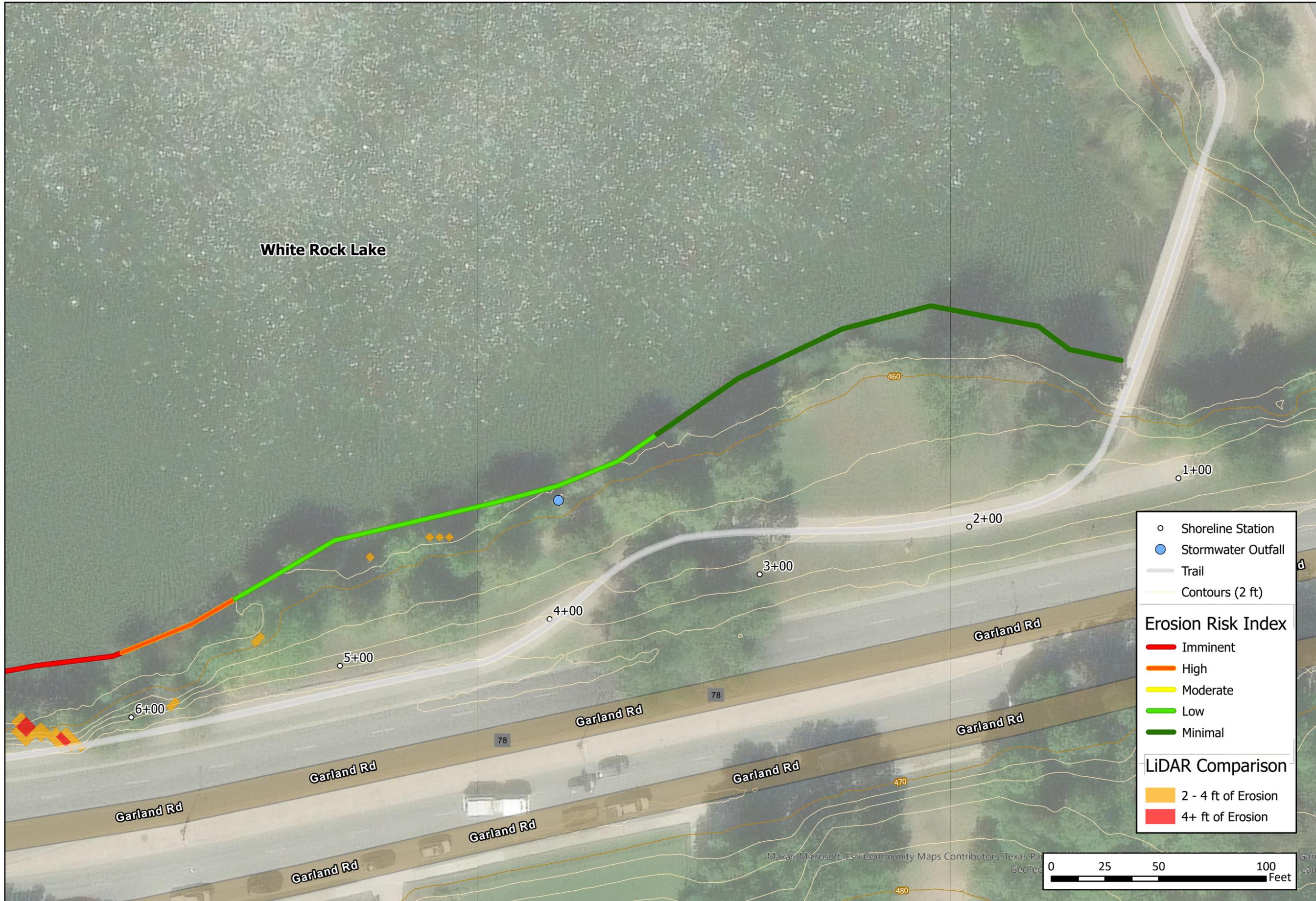
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White Rock Lake Bank Erosion Assessment

Study Area



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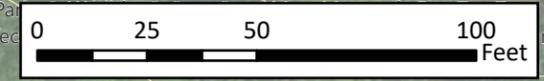
White Rock Lake Bank Erosion Assessment

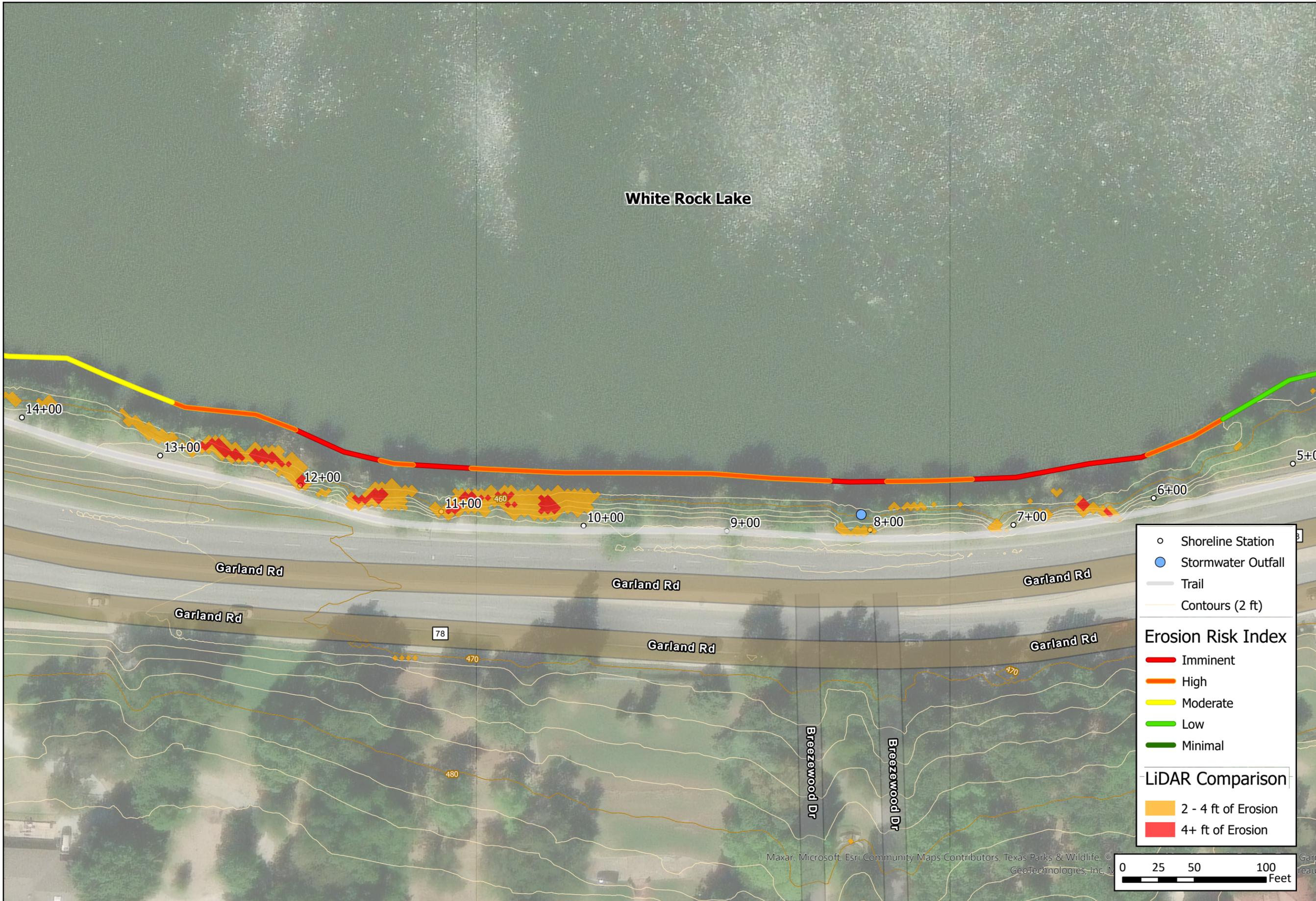
Erosion Risk Index & LiDAR Comparison (2009 - 2019)
Station 0+00 - 5+50

○	Shoreline Station
●	Stormwater Outfall
—	Trail
—	Contours (2 ft)
Erosion Risk Index	
■	Imminent
■	High
■	Moderate
■	Low
■	Minimal
LiDAR Comparison	
■	2 - 4 ft of Erosion
■	4+ ft of Erosion



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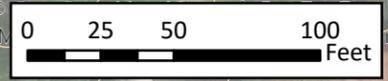


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White Rock Lake Bank Erosion Assessment

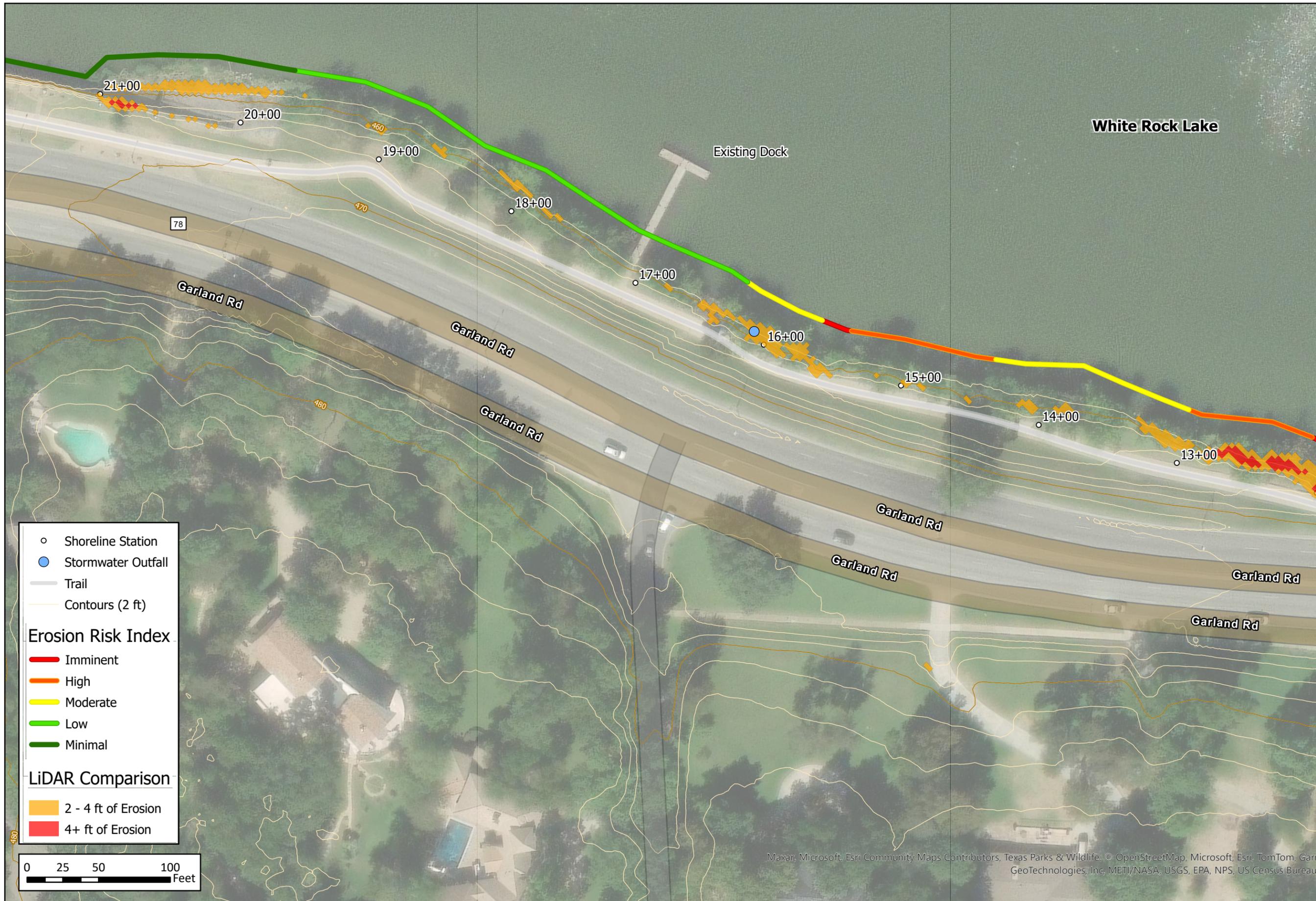
Erosion Risk Index & LiDAR Comparison (2009 - 2019)
Station 5+50 - 13+00

○	Shoreline Station
●	Stormwater Outfall
—	Trail
—	Contours (2 ft)
Erosion Risk Index	
—	Imminent
—	High
—	Moderate
—	Low
—	Minimal
LiDAR Comparison	
■	2 - 4 ft of Erosion
■	4+ ft of Erosion



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- Shoreline Station
 - Stormwater Outfall
 - Trail
 - Contours (2 ft)
- Erosion Risk Index**
- Imminent
 - High
 - Moderate
 - Low
 - Minimal
- LiDAR Comparison**
- 2 - 4 ft of Erosion
 - 4+ ft of Erosion



EXHIBIT				
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White Rock Lake Bank Erosion Assessment

Erosion Risk Index & LiDAR Comparison (2009 - 2019)

Station 13+00 - 21+50



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White Rock Lake Bank Erosion Assessment

Alternative 1 - Gabion Mattress Bank Protection



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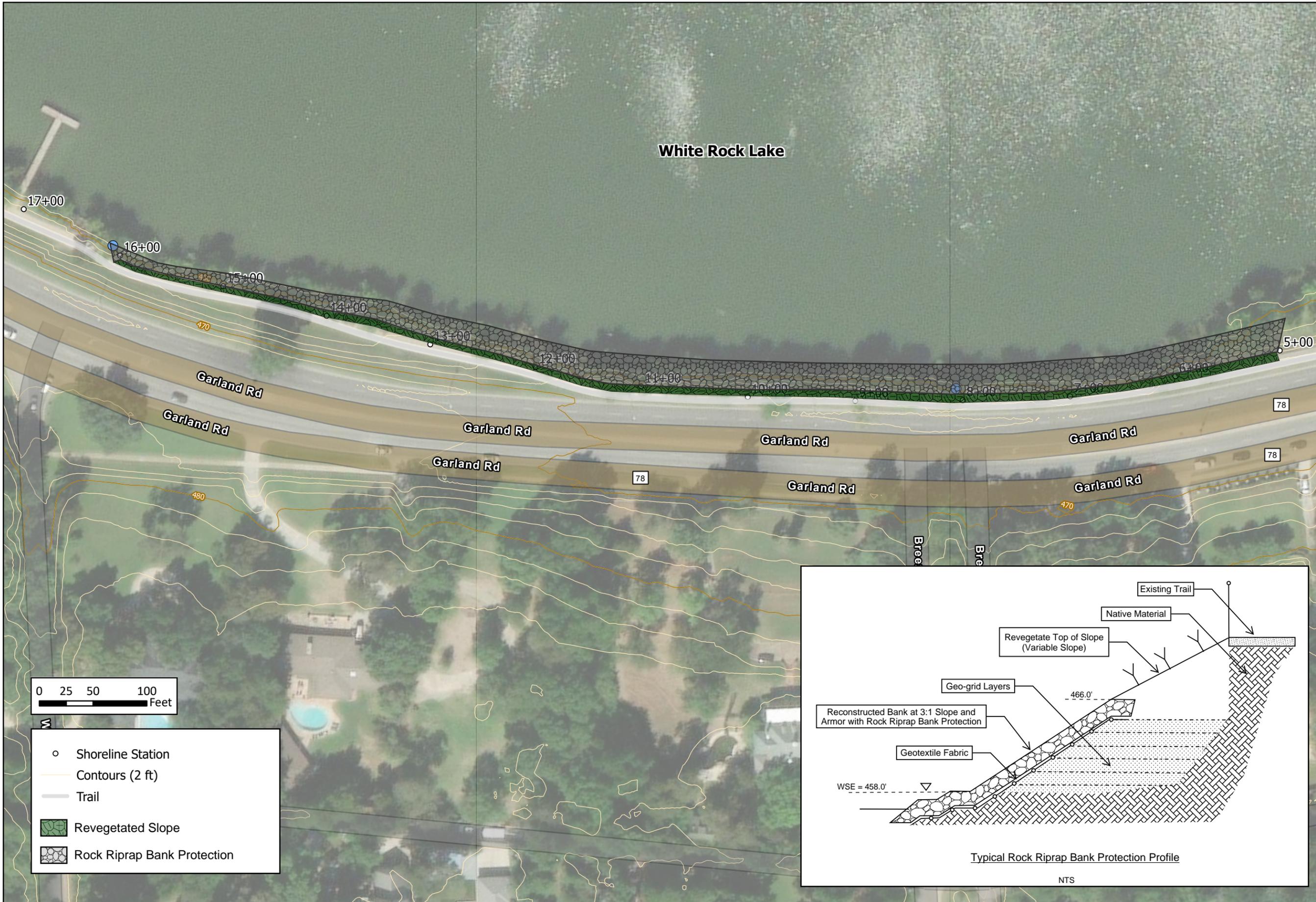
Option 1 - Gabion Matress
Opinion of Probable Construction Cost
 City of Dallas

ACCOUNT NO.	ESTIMATOR	CHECKED BY	DATE		
DPR23224	SGN	KWB	April 22, 2024		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
	MOBILIZATION (10%)	1	LS	\$ 152,448	\$ 152,448
	TRAFFIC CONTROL	1	LS	\$ 45,000	\$ 45,000
	CARE OF WATER	1	LS	\$ 100,000	\$ 100,000
	SITE PREPARATION	1	LS	\$ 100,000	\$ 100,000
	EXCAVATION	3770	CY	\$ 20	\$ 75,400
	BACKFILL	5210	CY	\$ 45	\$ 234,450
	GEOGRID	10600	SY	\$ 15	\$ 159,000
	GABION MATTRESS	1550	CY	\$ 350	\$ 542,500
	ROCK RIPRAP TOE PROTECTION	825	CY	\$ 325	\$ 268,125
SUBTOTAL:					\$ 1,676,923
				DESIGN FEE:	20% \$ 335,385
				CONTINGENCY PERCENTAGE:	30% \$ 503,077
CONSTRUCTION SUBTOTAL:					\$ 2,515,385
PROJECT TOTAL:					\$ 2,516,000

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Notes:

1. This estimate does not include cost for relocating franchise utilities.
2. This estimate does not include cost for water and sewer utilities.
3. Assumes Trail to Remain.
4. Site Preparation includes tree removal, SWPPP and Demolition.
5. Assumes 18" thickness of gabion mattress.



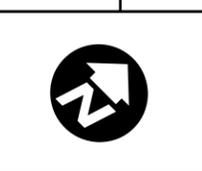
- Shoreline Station
- Contours (2 ft)
- Trail
- Revegetated Slope
- Rock Riprap Bank Protection

EXHIBIT
6

FN JOB NO	DPR23224
FILE	SGN_Working
DATE	4/18/2024
SCALE	1:1,000
DRAFTED	02530

White Rock Lake Bank Erosion Assessment

Alternative 2 - Rock Riprap Bank Protection



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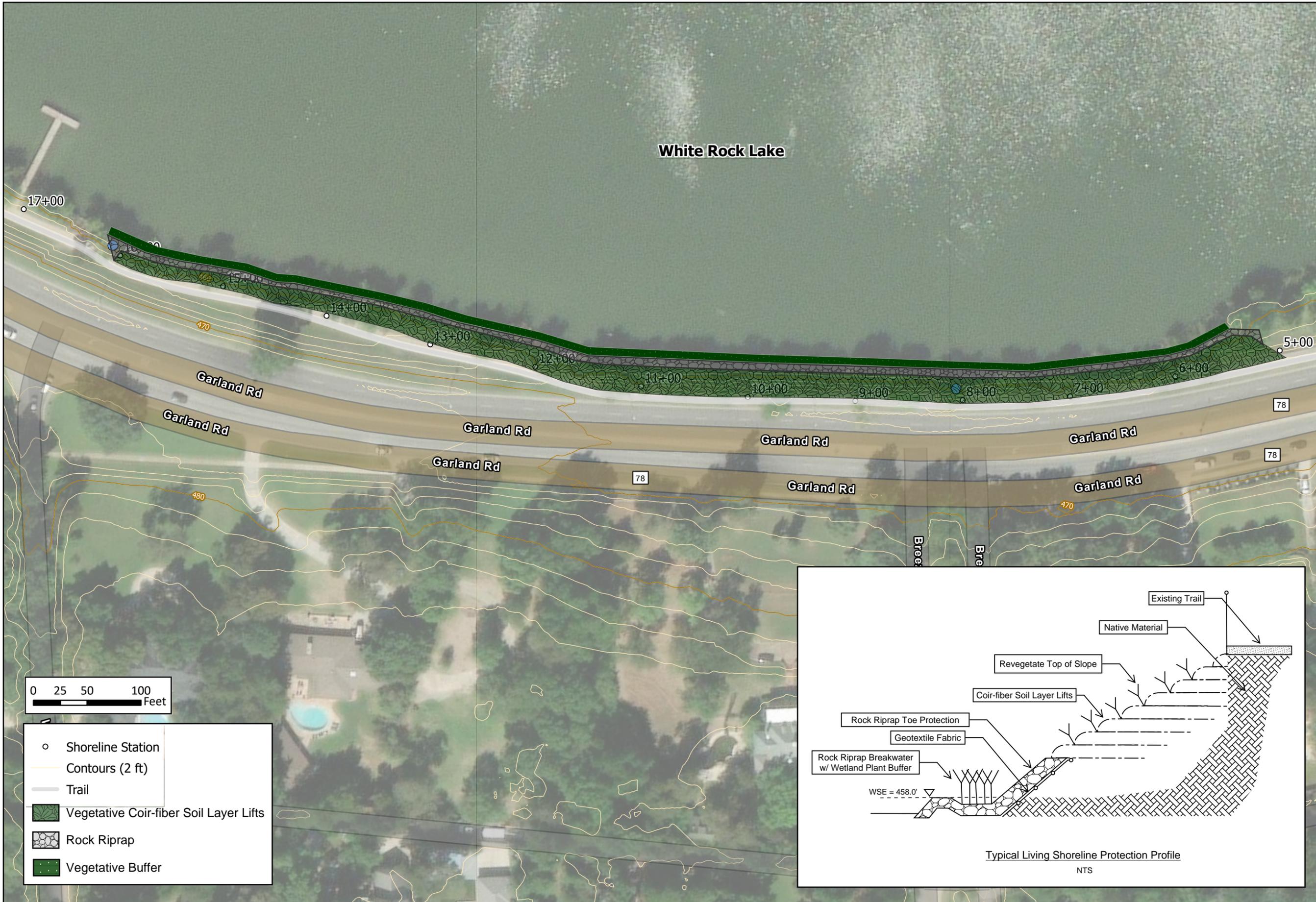
Option 2 - Rock Riprap
Opinion of Probable Construction Cost
 City of Dallas

ACCOUNT NO.	ESTIMATOR	CHECKED BY	DATE		
DPR23224	SGN	KWB	April 22, 2024		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
	MOBILIZATION (10%)	1	LS	\$ 144,085	\$ 144,085
	TRAFFIC CONTROL	1	LS	\$ 45,000	\$ 45,000
	CARE OF WATER	1	LS	\$ 100,000	\$ 100,000
	SITE PREPARATION	1	LS	\$ 100,000	\$ 100,000
	EXCAVATION	3770	CY	\$ 20	\$ 75,400.00
	BACKFILL	4810	CY	\$ 45	\$ 216,450
	GEOGRID	9800	SY	\$ 15	\$ 147,000
	ROCK RIPRAP	2180	CY	\$ 325	\$ 708,500.00
	VEGETATION	970	SY	\$ 50	\$ 48,500
SUBTOTAL:					\$ 1,584,935
DESIGN FEE					20% \$ 316,987
CONTINGENCY PERCENTAGE:					30% \$ 475,481
CONSTRUCTION SUBTOTAL:					\$ 2,377,403
PROJECT TOTAL:					\$ 2,378,000

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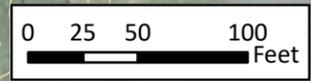
Notes:

1. This estimate does not include cost for relocating franchise utilities.
2. This estimate does not include cost for water and sewer utilities.
- 3 Assumes Trail to Remain
4. Site Preparation includes tree removal, SWPPP and Demolition
5. Assumes 3' depth of riprap.



White Rock Lake

Garland Rd



- Shoreline Station
- Contours (2 ft)
- Trail
- Vegetative Coir-fiber Soil Layer Lifts
- Rock Riprap
- Vegetative Buffer

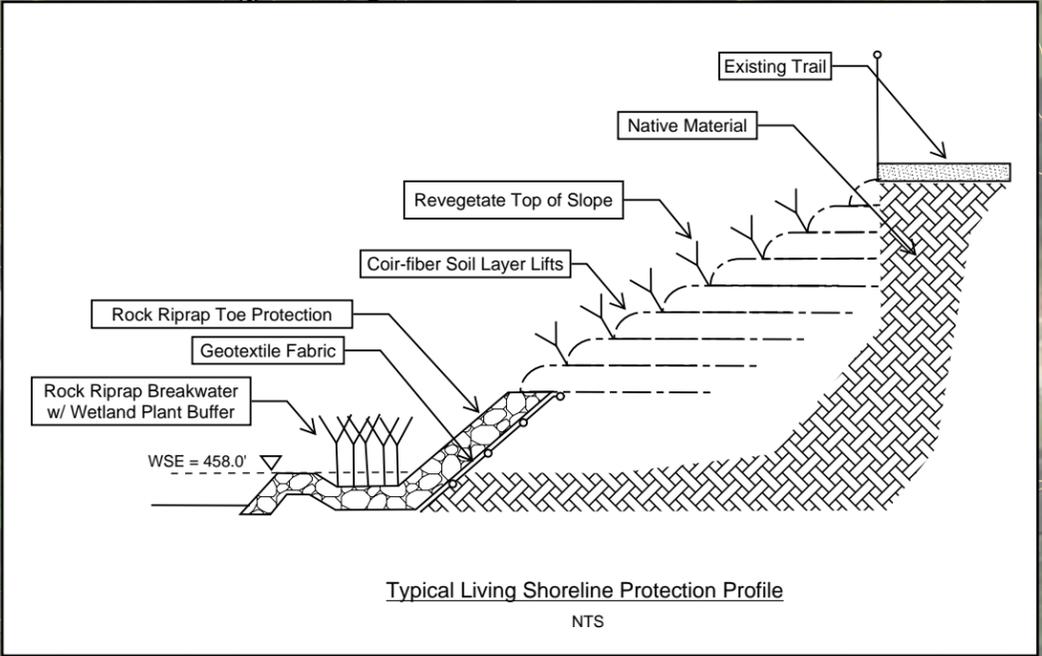


EXHIBIT
7

FN JOB NO	DPR23224
FILE	SGN_Working
DATE	4/18/2024
SCALE	1:1,000
DRAFTED	02530

White Rock Lake Bank Erosion Assessment

Alternative 3 - Living Shoreline Bank Protection



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Option 3 - Living Shoreline
Opinion of Probable Construction Cost
 City of Dallas

ACCOUNT NO.	ESTIMATOR	CHECKED BY	DATE		
DPR23224	SGN	KWB	April 22, 2024		
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
	MOBILIZATION (10%)	1	LS	\$ 155,525	\$ 155,525
	TRAFFIC CONTROL	1	LS	\$ 45,000	\$ 45,000
	CARE OF WATER	1	LS	\$ 100,000	\$ 100,000
	SITE PREPARATION	1	LS	\$ 100,000	\$ 100,000
	EXCAVATION	3770	CY	\$ 20	\$ 75,400
	BACKFILL	4810	CY	\$ 35	\$ 168,350
	COIR-FIBER SOIL LAYER LIFTS	6800	LF	\$ 45	\$ 306,000
	ROCK RIPRAP TOE PROTECTION	825	CY	\$ 325	\$ 268,125
	ROCK RIPRAP BREAKWATER	1025	CY	\$ 375	\$ 384,375
	AQUATIC VEGETATION	330	SY	\$ 100	\$ 33,000
	SLOPE VEGETATION	1500	SY	\$ 50	\$ 75,000
SUBTOTAL:					\$ 1,710,775
				DESIGN FEE:	20% \$ 342,155
				CONTINGENCY PERCENTAGE:	30% \$ 513,233
CONSTRUCTION SUBTOTAL:					\$ 2,224,008
PROJECT TOTAL:					\$ 2,225,000

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2. This estimate does not include cost for water and sewer utilities.
1. This estimate does not include cost for relocating franchise utilities.
2. This estimate does not include cost for water and sewer utilities.
- 3 Assumes Trail to Remain
4. Site Preperation includes tree removal, SWPPP and Demolition
5. Assumes 3' depth of riprap.