

FIVE YEAR PLAN

Reclamation District 799

Hotchkiss tract



August 2020



HOTCHKISS TRACT

925-684-2398

Reclamation District 799

Table of Contents

Section One – Executive Summary..... 1

Section Two - Background..... 3

Section Three - Plan for Flood Protection 9

Section Four - Plan for Permits and Habitat 23

Table of Required Tabulated Information

Required Information	Value/Units	Discussion
Total acreage protected by Local Agency levees	3,100 acres	This is a combination of agricultural and developed land.
Total levee miles maintained by Local Agency	8.9 miles	All the 8.9 miles are non-project located in the perimeter of Hotchkiss Tract.
Levee miles in the Local Agency service area that are not maintained through the Delta Levees Program (e.g. Dry levees, cross levees)	Summer Lake South subdivision has constructed 3 miles of levee system which is maintained by District.	The funding to maintain this levee system comes from a combined regular and special assessments under agreement with District.
Percentage of Local Agency's levee system at or above HMP Levee Standard	100%	The levees meet or exceed the HMP standards.
Miles of Local Agency's levee system raised to meet the minimum HMP Standard through the Delta Levees Special Projects Program	About 0.75 miles of existing levee system totaling about 4,000 linear feet	District completed HMP work under the PFA HO-12-1.0
Percentage of Local Agency's levee system at or above Bulletin 192-82 Levee Standard	None	
Miles of Local Agency's levee system raised to meet the Bulletin 192-82 Levee Standard through the Delta Levees Special Projects Program	None	
Number of levee rehabilitation projects funded through the Delta Levees Special Projects Program	1 project since 2015	HM levee rehabilitation from Sta 50+00 to 92+00.
Total State funds expended for levee rehabilitation projects on the Local Agency's Island/Tract through the Delta Levees Special Projects Program	About \$350,000	HMP costs about \$350,000.
List of local and non-local assets and critical infrastructure protected by the Local Agency's levee system	District assets total about \$104 million.	

I. Section One - Executive Summary

The District Board of Directors has a clear and concise understanding of the challenges facing the Delta and has retained the services of an engineering firm with years of knowledge of the Delta issues and experience in flood control and levee works and dealing with regulatory agencies obtaining permits and preparing environmental and CEQA documents. We also understand that only through a strong partnership with DWR and DFW can we successfully increase the level of flood protection on Hotchkiss Tract.

District goal is to increase flood protection for its residents, developed lands and other assets depending on District levee system. In recent years, minimizing flood risks on Hotchkiss Tract has been mostly through improving the levees to HMP on the north and northeastern portion of the tract (from Station 0+00 to 92+00), which is predominantly undeveloped.

District's future projects would involve work in both the agricultural and residential areas, including areas where levee improvement may not be possible because of the existing encroachments. Measures to improve flood protection in these areas may include installing sheet pile and/or construction of flood wall to improve levee stability, provide adequate drainage, reducing seepage and therefore probability of flooding. It also involves working on the waterside by installing rip rap to protect the levee from wind generated waves and erosion. These measures are very costly and, in some cases, may be cost prohibitive. District interim plan in the next five years is summarized in the table below.

Work Type	Approximate Levee Reach	Approximate Length	Estimated Costs (\$)	Comments
Maintenance	Around the Tract	8.9 miles	One million	The maintenance work will be performed on the entire 8.9 miles levee on a continuous basis.
Levee Rehabilitation and other flood control Opportunities	The entire 8.9 miles of levee around the Tract is in need of improvements.	About 8.9 mile	15 million	This work is subject to further study. Existing encroachments are impediment to levee rehabilitation work. Cost calculation assumes improvements to bulletin 192-82 criteria.
Seepage Control	The entire 8.9 miles of levee around the Tract as needed.	2.7 miles	2.7 million	Further analysis will provide a better understanding of specific locations needing seepage control. The cost calculation assumes 30% of district levees need seepage reduction.
Erosion Control	The entire 8.9 miles of levee around the Tract as needed.	4.5 miles	4.5 million	Further analysis will provide a better understanding of specific locations needing erosion control. The cost calculation assumes 50% of district levees need erosion control with the coverage of about 4 feet, from MLW to MHHW.
TOTAL COST IN THE NEXT FIVE YEARS			23.2 million	

II. Section Two - Background

A. Assessment of the Status of existing Levee System and Future Goals

Hotchkiss Tract has multiple uses of residential homes and agricultural lands. There is a gas station, several local businesses, and a marina located on Reclamation District 799 (RD 799 or District) jurisdictional land. Several electrical transmission lines go through the District, including California Oregon Transmission Project operated by the Western Area Power Administration (WAPA), the Pacific Gas and Electric Company (PG&E) Table Mountain Tesla line, PG&E Vaca-Dixon-Tesla line, and natural gas lines. In total, the value of the assets on District land is estimated to be approximately \$104 million. Attachment A contains general information. Attachment B includes emergency response measure.

Table 1 has been prepared based on the information gathered in 2007 by the Department of Water Resources (DWR) LiDAR data, to show levee standard conditions.

Table 1: DWR LiDAR Information

Meet Delta Specific Public Law 84-99 Standard (PL 84-99)	Approximately 4 miles	45 percent of total 8.9 miles ⁽¹⁾
Meet Hazard Mitigation Program (HMP) Standard	Approximately 2.25 miles	25 percent of total 8.9 miles ⁽¹⁾
Below Delta Specific Public Law 84-99 Standard (PL 84-99)	Approximately 2.65 miles	30 percent of total 8.9 miles
Below Hazard Mitigation Program (HMP) Standard	Approximately ½ mile	5 percent of total 8.9 miles ⁽²⁾

(1) Note that about 95 percent of the District levee system is at or above the HMP elevation criteria.

(2) Levee below HMP is included in the 30 percent that is below PL 84-99.

District has since completed a levee rehabilitation work between stations 50+00 to 92+00; the work was mainly focused on repairing the waterside sloughing and bringing this levee segment to Hazard Mitigation Program (HMP) Standard. The district levees currently are at or above HMP Standard.

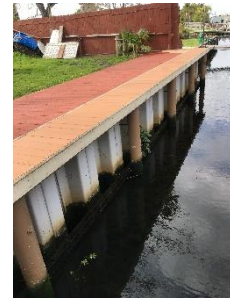
According to the 2007 LiDAR information produced by the DWR about 55 percent of district levees do not meet the Delta Specific PL 84-99 criteria, which includes a minimum 16-foot levee crown, 2H:1V waterside and as much as 3H:1V landside slopes, and 1.5 feet of freeboard above the 100-year floodplain. The levees protecting Hotchkiss Tract need to be at about elevation 8.4 feet to meet the Delta Specific PL 84-99 elevation criterion. DWR allows an additional 6-inch to count for settlement raising the finished Delta Specific PL 84-99 levee elevation to about 8.9 feet. District desire is to pursue raising its levee system to Bulletin 192-82 level, which is referenced to a 300-year floodplain. However, segments of the district levee system are heavily encroached making the levee work very expensive if not impossible. Following are brief description of existing levees and the challenges for improvement.

Dutch Slough Levee

- From Jersey Island Road to about Station 15+00 is encroached, but somewhat manageable. The District may consider improving this reach to Bulletin 192-82 height. The open area on the landside allows achieving the height as well as the allowable landside slope to conform to Bulletin 192-82 criteria. This is conditioned on the District obtaining access and be allowed to use the landside space.
- From Station 15+00 to the Bethel Island Bridge is also encroached; however, the District can consider combination of flood wall and levee improvement to Bulletin 192-82. The landside gets more congested as it gets closer to the Bethel Island Bridge; consequently, achieving the height and the landside slope to conform to Bulletin 192-82 criteria presents significant challenges. The District may be considering to install flood wall along segments of this levee reach to increase flood protection.
- From the Bethel Island Bridge to about Sandmound Blvd is encroached with condominiums and apartment buildings on the landside; however, the encroachments are set back from the landside levee hinge which makes it manageable for improvement to Bulletin 192-82. Additionally, a segment of the levee (from about Station 60+00 to Hennis Marina) has a wide crown and doesn't require much improvement work.

Sandmound Slough Levee

- From Sandmound Blvd to about Station 170+00 is heavily encroached with structures along the landside very close to the levee. The crown for the most part is about 16 feet in width and the landside slope varies. Most part of the water side slope is protected with wooden bulkhead; there are few newly built bulkheads constructed with vinyl sheet piles. The District may consider combination of flood wall on the landside and sheet piles bulkheads on the waterside if there is adequate funding available.
- There may be some opportunities for the District to consider improving from about Station 170+00 to the end of the Sandmound levee, which is about Station 180+00, to Bulletin 192-82. This reach is not heavily encroached; therefore, more manageable.



Contra Costa Canal Levee

The levees on the Contra Costa Canal are intended to convey water supply and not to protect the district from flooding. This levee segment is part of the federal water supply system and is owned and operated by the U.S. Bureau of Reclamation (USBR). The Contra Costa Water District (CCWD) has an agreement with the USBR to conduct maintenance work as needed. RD 799 has an agreement with the CCWD for limited maintenance work. The CCWD is planning to replace the existing canal with buried pipes in 5 to 10 years.

The new East Cypress Preserve development is planning to construct a levee outside of the USBR right-of-way within the next two years. This levee will be considered a dry levee and will be built to at least the Federal Emergency Management Agency (FEMA) 100-year flood protection. The ownership and operation and maintenance of the new levee is being negotiated with the developer and City of Oakley. Any cost associated with operation and maintenance of this levee will be covered through a separate assessment.

In general, there are not enough space in the developed areas for the District to improve its levees, District is exploring possibility of installing permanent flood walls along the segments with limited space. A flood wall is a vertical barrier designed to temporary contain the flow when the stage is high enough to cause flooding during an extreme or seasonal event. Flood walls are mainly installed in locations that space is limited, such as the perimeter of Hotchkiss Tract which is heavily encroached. This proposed structure is an element which coupled with some levee work and other features on Hotchkiss Tract, i.e. pumps and ditches, should work as a system to manage flood water and minimize flood damage to homes and businesses in the area. The type of flood wall considered along these levees could be a gravity I-wall, which can be sheet pile or poured concrete with little or no reinforcement bars.

There is some existing rip rap protection, mostly along Dutch Slough, that lacks the required coverage of the waterside slope to protect the levee from wind generated waves; therefore, makes the levee most susceptible to failure due to flooding resulting from erosion. The limited amount of rip rap below the high tide level exposes the unprotected levee embankment material to wind generated erosion damage. High winds originating from the north during periods of high tide and/or high storm runoff will seriously erode the unprotected levee slope. District plans to replenish the existing rip rap when the funding is available.

RD 799 is planning to apply for funding under the upcoming Project Solicitation Package for some of the work to the extent that is financially feasible for the district. District will consider factors such as population concentration, vulnerability of the levee segment, technical feasibility and financial capability to prioritize the work. The projects in the next 5 years include improving the levee to Bulletin 192-82. These segments include the following.

- Dutch Slough from Jersey Island Road to about Station 15+00
- Reaches of Dutch Slough between Station 15+00 and Sandmound Blvd as feasible.
- Reaches of Sandmound Slough between the Sandmound Blvd. and Station 170+00.
- Sandmound Slough from Station 170+00 to Station 180+00.

Although flooding is a well-known hazard in the Delta, there is no records of flooding on the Hotchkiss Tract and within the Reclamation District 799 jurisdictional land. According to the 1992 U. S. Army Corps of Engineers hydrology study the 100-year flood elevation in the area is about 6.9 feet National Geodetic Vertical Datum (NGVD), the 300-year elevation is about 7.4 feet. The elevation of district levee system, based on the 2005 survey, fluctuates between 9 and 12 feet NGVD. The levee cross sections shows that all of the District levee system, except a portion along the Contra Costa Canal, is at or above the Hazard Mitigation Program (HMP) elevation of 7.9 feet NGVD '29 (see Attachment C).

There is an additional 3.1 miles of interior levee surrounding the Summer Lake South development. This levee system currently exceeds FEMA standards for the 1-percent chance of equaling or exceeding the base flood.

The District levee system is considered local non-project; the District is responsible for maintenance, repair, and improvement of these levees. In addition to the levee maintenance, District maintains and operates four pumping stations and series of canals and ditches. The District's long-range plans for the levees on Hotchkiss Tract are to be maintained and improved to reduce the flood risks to homes and developed lands.

The flood map produced by FEMA indicates the Hotchkiss Tract is in the 100-year floodplain and noted as flood Zone AE with base flood elevation of 9 feet. The District levees are most vulnerable to failure caused by flooding or earthquake damage. Failure from flooding could be caused by overtopping, erosion, slope instability, and burrowing animals. The Hotchkiss Tract levees are susceptible to earthquake-induced breaching from dynamic slope failure, inertially-



Figure 1: Vicinity Map

driven cracking, levee liquefaction, and bearing capacity failure in liquefied native soils. Soils susceptible to liquefaction are present both beneath and within many levees.

The District jurisdictional land is protected by a system of leveed channels. The upstream flows are governed by a flood control system comprising of reservoirs, gates, bypasses, ...etc. Even with the realization of major physical improvements to the flood management system, the risk of flooding can never be eliminated. This remaining flood threat, called “residual risk”, can be managed and further reduced by implementing series of ongoing actions. These non-levee measures to reduce flood risk can be accomplished by a well-planned and focused emergency response, enhanced operations and maintenance (O&M) and floodplain management actions. The actions involving levee work will be discussed later under the “Strategy to Meet Desired Level of Protection” section.

As discussed earlier all RD 799 levees are at or above HMP elevations. The most recent survey information shows not much change in levee elevation compared to the 2007 LiDAR date (see Table 2). The levees protecting Hotchkiss Tract will need to be brought up to the Bulletin 192-82 criteria.

Table 2: Current Levee Status

At or above HMP Standard	100 percent
Meet PL 84-99 Elevation	45 percent
At or above Bulletin 192-82 Elevation	20 percent

1) Standard includes elevation, landside and waterside criteria

2) Previous Five-Year-Plan Progress Report

RD 799 prepared and submitted a 5-year Plan to DWR in May 2012. The plan discussed some potential studies and levee projects to be completed in a 5-year period. Here is a summary of RD 799 progress.

- A) Studies: number of studies and investigations are included in the plan, some of those are no longer needed and not being considered by the RD 799. The district still would like to complete geodetic survey, update geotechnical investigation, and conduct a complete encroachment study. RD 799 has already prepared an Emergency Action Plan through the Contra Costa County.
- B) Projects: RD 799 received funds from the Delta Levees Special Flood Control Projects and was able to improve a portion of its levee system to HMP criteria. District has been using the funds from the Delta Levees Maintenance Subventions Program to implement some of the minor repair projects including maintenance of all-weather road on levee crown, replenish existing rip raps, and repair of side slopes. The more costly repair and improvement works will need to be addressed once funding becomes available.

3) History with the Delta Levees Program

RD 799 has been actively pursuing DWR support in levee rehabilitation as well as levee maintenance work. District has a very limited funding source and is not able to maintain and/or increase flood protection for its existing population and businesses. State grants have been assisting the district to accomplish its responsibilities as outlined in the water code. RD 799 plans to address levee deficiencies subject to availability of government funds. District has been in good standing with DWR and Department of Fish and Wildlife’ Delta Levee Programs.

III. Section Three - Plan for Flood Protection

1) Desired level of protection and strategy to meet this goal

The District Board of Directors has a clear and concise understanding of the challenges facing the Delta and has retained the services of an engineering firm with years of knowledge of the Delta issues and experience in flood control and levee works and dealing with regulatory agencies obtaining permits and preparing environmental and CEQA documents. We also understand that only through a strong partnership with DWR and DFW can we successfully increase the level of flood protection on Hotchkiss Tract. Our team is knowledgeable in food emergency and values the assistance from the California Office of Emergency Services. We are planning to improve levee water side to minimize erosion and reduce the under and through levee seepage; RD 799 goal is to improve its levees to a level providing maximum protection to the Island's assets, and residents. District desire is to widen the existing levee system to provide for a continuous all-weather levee access road, where possible, and better facilitate emergency operations during high water events. We are also considering other measures to increase flood protection in the areas where levee improvement may not be possible because of the existing encroachments; these measures may include installing sheet pile and/or construction of flood wall to improve levee stability, provide adequate drainage, and reduce frequency of flooding.

According to the available survey information produced by DWR and other survey information available to District about 30 percent of district levees do not meet the Delta Specific PL 84-99 criteria, which includes a minimum 16-foot levee crown, 2H:1V waterside and as much as 5H:1V landside slopes, and 1.5 feet of freeboard above the 100-year floodplain. The levees protecting Hotchkiss Tract need to be at about elevation 8.4 feet to meet the Delta Specific PL 84-99 elevation criterion. DWR allows an additional 6-inch to count for settlement raising the finished Delta Specific PL 84-99 levee elevation to about 8.9 feet. District desire is to pursue raising its levee system to Bulletin 192-82 level, which is referenced to a 300-year floodplain. However, segments of the district levee system are heavily encroached making the levee work very expensive if not impossible.

District future projects are focused on improving the levees where feasible and increasing flood protection using other measures in the developed areas. Here is the summary of potential work.

- Improve the levees to Bulletin 192-82 – improving the levees to Bulletin 192-82 will add freeboard, protect waterside slope, increase slope stability against static loading, minimize seepage, and in many cases will improve levee integrity against dynamic loading and seismic activity. District plans to make improvements to undeveloped portions of its levee system along the Dutch Slough, Little Dutch Slough, Rock Slough and Sandmound Slough if the funding is available. Improving levees in the developed areas is cost prohibitive if not impossible. The undeveloped areas of the district are predominantly agricultural land which provide space to expand the levee footprint and setback the landside toe. District has completed levee rehabilitation in the past and will use its experience to implement levee improvement meeting the Bulletin 192-82 criteria providing State is able to cost share at a rate affordable to the District.
- Construction of structural barrier within the levee – the levees protecting the developed areas are in need of improvements; however, a traditional levee work will not be feasible. Construction of structural barrier within the existing levee, i.e., sheetpile and/or flood wall, is being considered as a possibility. These structures will work against both earth and water pressures if there is a slope failure. A structural barrier can be extended above the levee crown elevation or embedded into concrete parapet wall to obtain additional freeboard. The developed portion of the levee however is encroached with homes, garages, retaining walls, decks, and underground

utilities constructed on or near the levee crest and toe. The existing development severely limits options for upgrading the levees. Much of the existing development encroaches into the levee. The levee includes many locations where buried pipes cross the levee crown to provide utility service to waterside docks and improvements. Homeowners have constructed retaining walls on the landside and into the levee prism. These structures prevent effective inspection and obscure viewing the path of seepage, additionally they force seepage flow to go below or around them. Some of these structures lack adequate drain system to collect seepage flow, which could lead to internal erosion within the levee. The buried pipes could also contribute to and facilitate seepage along or through them. As a general rule, trees, brush and heavy vegetation located within the levee prism is undesirable. Not only they could contribute to seepage problems, they also present challenges in levee inspection, repair and rehabilitation.

District is considering constructing structural barriers within the levee in the developed areas. Structural barrier within the levee would be designed to contain the flow when the stage is high enough to cause flooding during an extreme or seasonal event. Installation of flood wall and/or sheetpile coupled with some levee work increase flood protection. District also considers other measure to minimize flood risk, improving pumps and ditches, these measures collectively work as a system to manage flood water and minimize flood damage to homes and businesses in the area. These structures can also alleviate or minimize seepage flow and improve levee seismic performance. Steel panels are traditional sheetpile wall, vinyl sheet piles also provide improvement for seepage but not as effective in resisting liquefaction-induced deformation. Several homeowners have built bulkheads on the waterside. Bulkheads may work well for erosion control; they don't offer any habitat opportunities at the cost of about \$3 million per mile. The waterside in the developed areas is also heavily encroached with boat docks, gangways and other improvements. Riprap could be placed on the slope, but more significant waterside alterations would require removal of docks and gangways. The seepage resistance would not be improved significantly through widening or improving the waterside slopes. Placing limited riprap for erosion protection is about all District can do in these areas.

District contracted with Roger Foott and Associate to conduct a study to better understand the geotechnical engineering of the levees and also examine potential levee upgrades. This study is called "Levee Upgrading Study – Hotchkiss Tract, Contra Costa County" dated February 1993, and is summarized below.

- I) Study included portions of the Little Dutch Slough, Dutch Slough, Rock Slough, and Contra Costa Canal. The levees adjacent to developed portions of the Tract contain a variety of alterations to the original geometry. The impact of the alterations was evaluated first by comparing the stability with unaltered sections. It concluded that alterations will not significantly alter the basic assessment of the levees or the scope of required remediations.
- II) The study also concluded that:
 - a) The levees adjacent to Contra Costa Canal satisfy FEMA static stability requirements. The landside slopes adjacent to Little Dutch Slough, Rock Slough, and undeveloped portions of Dutch Slough have factors of safety exceeding unity but well below the FEMA requirement of 1.4 for the 100-year flood stage condition.
 - b) The waterside stability of the Little Dutch Slough levees is inadequate, largely due to oversteepening of the upper portion of the waterside slopes.
 - c) The landside slope of an altered levee section adjacent to the developed area of Dutch Slough exceeds a factor of unity but fall well below the FEMA requirement of 1.4 for the 100-year flood stage condition.

- III) Issues of seepage stability and freeboard must be addressed; measures for increasing freeboard and/or seepage control should be integrated with stability and seismic upgrade measures.
- IV) Improvement of the levees to provide additional freeboard and to improve stability, by either flattening the slopes or installing stability berms, appear to be the most suitable means of upgrading the levees adjacent to undeveloped portions of the Tract.
- V) Upgrading the levees along the developed area will require extensive enlargement and upgrade and may be cost prohibitive. Encroachments preclude enlargement of the levees in either the waterside or landside directions. Consequently, installation of a barrier within the levees having sufficient structural strength to withstand earth and water pressures in the event of a levee slope failure appears to be the only feasible remediation alternative. The wall can be extended above the existing crown elevation or embedded into a concrete parapet wall to obtain additional freeboard. Construction costs for the wall are estimated to be between \$4-5 million per mile. Total length of the levees adjacent to developed areas is about 3 miles.

Benefits and Challenges of sheet piling

Two studies were conducted evaluating the sheet piling feasibility on Hotchkiss Tract levees.

They are:

- Geotechnical Feasibility Evaluation – Hotchkiss Tract Levee Sheet Pile Wall, Contra Costa County by Lowney Associates (August 2004)
- Reclamation District No. 799 Hotchkiss Tract – Sheet Pile Feasibility Study by KSN/Burns/Lowney (September 2004)

These studies show that steel sheet pile may be the best method to increase flood protection in the developed area.

Sheet piles offer the following benefits.

- Reduce potential seepage resulting from existing developments and encroachment within the levees, i.e. retaining walls, decks, utilities, etc. The existing encroachments created higher risk for levee failure due to piping.
- The existing district levees consists of uncompacted sands subject to liquefaction; sheet pile provides better support for the levee if slumping and movement occur due to soil liquefaction.
- The levees crown currently does not have adequate height to effectively protect the developed area. Sheet pile allows the height to be adjusted and minimizes the risk of overtopping.

Concerns about constructability of sheet piles include:

Vibration and Noise

Vibration has historically been a sensitive issue to homeowners. The level of vibration that can be perceived by homeowners may be well below the level that actually causes structural damage; the vibration is just a nuisance. Other methods with low or no vibrations during driving the steel sheet piles into the levee should be employed, these may include the impact or diesel hammer, the vibratory hammer and the sheet press.

Slope Stability

Slope stability concerns along most the district levees are associated with the steep waterside and/or landside slopes and the existing retaining walls. The concerns is whether the crown of the levee can support the type of heavy construction equipment required to drive in the sheet piles. To mitigate this issue, it is recommended to use techniques such as “positioning the pile

driver behind the sheets being driven, driving extra sheets in a temporary parallel wall on the landside of the pile driver as it proceeds, and shoring of existing retaining walls with steel H piles, sheets, or anchors”.

Construction Access

Access for the pile driving equipment along with the support equipment to deliver materials and supplies is extremely limited. Traffic on the levee crown is limited to one lane with limited ramps to access area from below. The ABI machine with the vibratory hammer proposed by the Lowney Report (August 2004) requires a minimum of 12 feet horizontal clearance between the inside faces of the wall on a flat surface and will require a temporary parallel sheet pile wall in many areas to support the machine as it proceeds. There are many locations along the project where trees, fences, walkways, railings, power lines, etc, would have to be removed. In all cases, the grass and asphalt on the levee crown would be disturbed if not completely removed.

Trees and Overgrown Vegetation

There are large trees along the levee that would either need trimming for vertical clearance or need cutting of their roots to allow the sheets to be driven. Trees that would be trimmed to the extent that they were weakened or unbalanced would have to be removed because of the liability of falling. Trees that were removed would require mitigation. A tree survey needs to be made prior to the construction.

Utility Relocation

The cost of the relocation of existing utility pipes through the sheet pile is very difficult to estimate because of the buried unknowns. Every urban lot and marina have at least one or more pipes for water, electricity, sprinklers, and telephone, and many have sewer lines. Most pipes abandoned by property owners have never been removed. The proper abandonment of a pipe must include the removal of the pipe across the levee crown and on the waterside slope and the capping of the pipe ten feet beyond the landside toe so that pressurization of the pipe in the future does not accidentally scour a hole in the levee. This is tedious work and must start with trenching continuously at least six feet deep along the levee crown. Utility relocation work would need to be closely coordinated with the affected landowners. The pipes with active utilities must be rerouted to penetrate the sheet pile wall through a water proof fitting above the flood plain.

Public Perception

District has to plan a public outreach program such as newsletters, community meetings, one-on-one conversations with landowners and residents, etc. Negative public perception can hurt the relationship between the district and its constituencies. The public outreach should be focused on schedule of the construction, disruption to the Community, access, landscaping, operational vibration, and loss of parking on levee among others.

Construction Costs

The reports estimate the cost of installing sheet pile in the urban area at about \$10 million per mile or about \$40 - \$60 million for the existing urban area.

Prioritizing the Work

District will need to make improvements in phases in order to afford its cost share. The work will be planned to start with the most feasible and cost-effective projects that can be implemented in relatively short period of time. Here is the general plan in the next five years.

Continued Levee Maintenance

District will continue its routine maintenance of the levee system and conduct repairs as needed. RD 799 has been taking advantage of the Delta Levees Subventions Program in the past several years and plans to continue working with DWR on levee maintenance. District is responsible to follow the DWR program guidelines and meet all regulatory requirements including, California Water Code, California Environmental Quality Act, competitive bidding,

prevailing wage, contract administration, and all other applicable labor laws. RD 799 reimbursement under the Delta Levees Subventions Program is limited to up to 75 percent of costs incurred in excess of \$1,000 per levee mile. The balance comes out of the District general fund.

Levee Rehabilitation and Other Flood Control Opportunities

As discussed earlier, performing levee work in the developed area is very challenging; however, District will continue looking for opportunities to improve the levees where it is possible. RD 799 will examine the possibility of some other measure to increase flood protection on Hotchkiss Tract including construction of flood walls and/or installation of sheet piles.

Seepage Control

District levees experience seepage in several areas. Controlling seepage is essential for RD 799 since the through and under seepage is levee safety concern. Levees can fail due to significant seepage and piping. Mitigating for seepage at the toe of levee and landside areas are still the focus of immediate work by District. Measure to control and/or minimize seepage may include a combination of following.

- Construction of new open ditches or widen existing ditches to facilitate conveyance of seepage water to the drainage pumping station.
- Installation of new subsurface drainage systems or enhancement of existing systems at selected locations and where needed to facilitate redirection of seepage flows to the District drainage system.
- Placement of additional culverts crossing the roads to increase capacity to convey seepage flows.
- Installation of monitoring wells, where needed, to monitor groundwater level and measure the seepage rate through and under the levee.

Erosion Control

Deficiencies in riprap on the waterside slope need to be addressed; District plan to repair existing and install new rip raps along the perimeter of the Hotchkiss Tract when implementing levee improvement measures. The existing rip rap protection lacks the required coverage of the waterside slope to protect the levee from wind generated waves. Levee erosion can cause flooding and therefore making levees susceptible to failure. District plans to replenish the existing rip rap where it can. Table 3 provides a summary of the work planned for the next five years providing State funds are available. The costs are based on the previous projects and the engineers experience in levee rehabilitation.

District plans to propose projects to include a combination of each work type in accordance to its priorities. There shouldn't be any obstacle in terms of putting a plan together and moving forward as long as there are funding opportunities and RD 799 is able to use State grants through the Delta Levees Program, both the Delta Levees Special Projects and Delta Levees Maintenance Subventions Programs. It is fully understood that working on the waterside will require federal permits, including U. S. Army Corps of Engineers, U. S. Fish and Wildlife Services, and National Marine Fisheries services. District is capable to prepare all project requirements and comply with CEQA requirements when it gets awarded grant funds.

2) Identification of need for improvements to reduce existing hazards Project Benefits

RD 799 is concerned about flood hazard threatening its residents, the existing assets and critical facilities and infrastructure on the island. Flood mapping (see Attachment D) was performed assuming hypothetical breaches on various locations along the Hotchkiss Tract

perimeter levee system demonstrates the extent of inundation, timing and flood water depth. District man-made levees designed and constructed to contain flow of water in order to protect Hotchkiss Tract from flooding; Hotchkiss Tract is sitting several feet below the sea level and is vulnerable to flooding. RD 799 non-project levees are originally intended to protect agricultural land; they are currently protecting people and developed properties. District incorporates modern science and techniques to bring these levees up to current industry standards to accommodate for subsidence and sea level rise. Below is a summary of benefits of investing in levees protecting Hotchkiss Tract from flooding. Accommodate for subsidence and sea level rise. Below is a summary of benefits of investing in levees protecting Hotchkiss Tract from flooding.

Table 3: Summary of the Work Planned in the next Five Years ⁽¹⁾

Work Type	Approximate Levee Reach	Approximate Length	Estimated Costs (\$)	Comments
Maintenance	Around the Tract	8.9 miles	One million	The maintenance work will be performed on the entire 8.9 miles levee on a continuous basis.
Levee Rehabilitation and other flood control Opportunities	The entire 8.9 miles of levee around the Tract is in need of improvements.	About 8.9 mile	15 million	This work is subject to further study. Existing encroachments are impediment to levee rehabilitation work. Cost calculation assumes improvements to bulletin 192-82 criteria.
Seepage Control	The entire 8.9 miles of levee around the Tract as needed.	2.7 miles	2.7 million	Further analysis will provide a better understanding of specific locations needing seepage control. The cost calculation assumes 30% of district levees need seepage reduction.
Erosion Control	The entire 8.9 miles of levee around the Tract as needed.	4.5 miles	4.5 million	Further analysis will provide a better understanding of specific locations needing erosion control. The cost calculation assumes 50% of district levees need erosion control with the coverage of about 4 feet, from MLW to MHHW.
TOTAL COST IN THE NEXT FIVE YEARS			23.2 million	

(1) Details costs are provided in Attachment E.

Water Supply - Hotchkiss Tract is one of eight western islands of the delta that are considered an important barrier to saltwater intrusion within the remainder of the Delta. Maintaining sufficient freshwater flows through the network of rivers and sloughs also helps prevent saltwater from adversely affecting water quality for water exports at the state and federal pumping stations in the south delta. A catastrophic levee breach on Hotchkiss Tract would pose a significant threat to the water supply and economy of California. Increased flood protection is an important part of maintaining freshwater in the Delta.

Habitat – District takes advantage of opportunities to restore and enhance habitats in the Delta benefitting fish and wildlife. The current levee system provides little habitat value for Delta fisheries and other special-status species known to occupy the region. District seeks opportunities for creating shaded riverine aquatic habitat, freshwater marsh, and riparian forest and scrub shrubs to provide multiple benefits to Delta fish and wildlife. Scrub shrubs, marshes and riparian are anticipated to provide a net functional gain in habitat value.

Levee Stability – District’s improvement projects intend to provide increased flood protection and address current known deficiencies to bring additional stability to the structure and minimize risk of flooding. RD 799 levee improvement and levee strengthening projects, as discussed earlier, will increase the static as well as the seismic stability therefore increase flood protection to residents and developed properties on the island.

3) Identification of the risks for current land use based on the existing assets

As evident in Attachment D, the island elevation is as low as 7 feet below sea level on the northwestern portion of Hotchkiss Tract. The flood inundation maps show the depth of flood water can be as much as 17 feet and inundation can happen very quickly. Therefore, the consequences of flooding on Hotchkiss Tract is huge. More than 1,000 people and nearly \$104 million of public and private assets would be in jeopardy if flooding occurs.

Consequences of levee failure or breach protecting Hotchkiss Tract for local and non-local assets are significant. Here are some specific examples beyond protection of life and properties.

- Major electric transmission lines crossing the island may be jeopardized; the lines work mainly to interconnect California loads and generation in the Pacific Northwest. These lines through the Delta are operated as a coordinated grouping, with maximum imports or exports limited to provide some joint redundancy to help ensure reliability.
- Similarly, all active or idle natural gas and oil fields would be interrupted if there is a levee breach resulting in flooding the island.
- Hotchkiss Tract is one of the eight western islands and the District levees are critical to water quality and controlling salinity intrusion to the interior Delta. A levee breach would allow the saline bay water to move further upstream, jeopardizing the fresh water supply taken from the Delta. The quality of Delta water depends on the path the water takes through the Delta to the export facilities.

4) Identification of opportunities for multi-benefit projects

RD 799 always tries to integrate flood control projects with other features to get the most benefits where and when feasible. Features such as ecosystem restoration and habitat enhancement, subsidence reversal, facilitating emergency response, and climate change are in the forefront of District projects.

District also considers improving water quality and water supply reliability when designing a project. We understand the intent of the Governor Brown’s California Water Action Plan and Governor Newsom’s water policy and will plan project features to meet these. RD 799 continuously look for the opportunities and examines significant constraints when planning a project.

Ecosystem Restoration and Habitat Enhancement:

The current levee system provides little habitat value for Delta fisheries and other special-status species known to occupy the region. District goals include creating habitat types suitable in the

Delta, i.e. shaded riverine aquatic habitat, freshwater marsh, and riparian forest and scrub shrub. This complex of new habitat types is expected to provide multiple benefits to Delta fish and wildlife. District and its engineers, learning from other levee improvement projects, is very capable to create waterside habitat where feasible. Similarly, District is willing and capable of creating landside habitat; however, planting on private properties requires written permit and/or agreement from the landowner(s). District has a very cordial relationship with local landowners and is willing to enter into negotiations with them hoping to obtain an authorization to plant on their property. Should be noted that District currently does not own any property on Hotchkiss Tract to dedicate for habitat enhancement. However, RD 799 is willing to work with DWR and DFW in utilizing commercial vendors to install habitat if and when the program covers the project cost; this is an alternative site if negotiations with the local landowners fail.

Subsidence Reversal:

RD 799 understands that subsidence in the Delta increases flood risk by lowering the elevation of lands protected by levees and threatening the stability of levee system. Many Delta islands have subsided to more than 10 feet below sea level and some more than 15 feet below sea level, compared to less than 5 feet at the time the levees were built in the 19th century. District recognizes, due to this subsidence, levees must withstand greater hydraulic pressure as the supporting soil on the landside of the levee sinks.

Scientists believe farming practices has lot to do with subsidence, for example, early flooding of lands or blending in mineral soils with the peat soil can mitigate subsidence. District, to the extent feasible, designs its projects with the goal of contributing to subsidence reversal process. Typical levee projects on Hotchkiss Tract shifts the landside toe; shifting the landside levee toe will take some acreage out of production therefore contributing to subsidence reversal. A typical levee rehabilitation work on the average shifts the levee landside toe 20 feet landward therefore removing approximately 2.5 acres of farmland out of production per levee mile. RD 799 includes measures in its projects in compliance with the CWC section 12316(g).

Emergency Response:

District future levee improvement projects will include levee crest between 18 and 22 feet to facilitate more efficient flood fight during an emergency. The existing levee crown is uneven and for the most part does not have all-weather road installed on the top. Currently, the emergency vehicles cannot rely on the most Delta levees to perform their job efficiently. District will continue incorporating project components to facilitate emergency response.

Climate Change:

District intent is to provide improvements to the existing levee consistent with acceptable standards when addressing levee deficiencies. Designing the levees to these standards, particularly the Bulletin 192-82 criteria, allows for anticipated sea level rise associated with climate change while still providing greater than 100-year flood protection into the future.

IV. Section Four – Plan for Permits and Habitat

Habitat Mitigation and Enhancement

The Delta is part of the largest estuarine system on the west coast and is adjacent to the largest wetland in California, the Suisun Marsh. The historic conditions of the Delta, dominated by dynamic floodplains and tidal marshlands, are very different from the present Delta landscape. Today the only habitat types that have maintained or increased in acreage are open water and grasslands. The current levee system provides little habitat value for Delta fisheries and other special-status species known to occupy the region.

The Delta Plan states that more than 55 fish species and more than 750 plant and wildlife species are currently part of the Delta ecosystem. Delta levees, adjacent farmland, and small non-leveed tule islands provide habitat for these species, but of these current species, approximately 13 fish, 100 wildlife, and 140 plant species are categorized as special-status, threatened, or endangered. Today's delta is a transformation of once a tidal wetland into a land reclaimed and channelized for agriculture and urbanizing land uses, resulting in significant habitat loss for native species. Additionally, a significant portion of Delta inflow is now diverted for agricultural and urban uses. Climate change also influences the ecology of the Delta.

With that in mind, District has and will continue restoring and enhancing habitat when it is feasible. District recognizes the need to integrate projects and will take advantage of opportunities to do that. District also recognizes that monitoring of the restored and enhanced habitat as well as the mitigation areas are essential and will continue to work with its partners (DFW & DWR) to deliver the best results. We will establish a clear and concise monitoring and reporting expectations for consideration by DFW, DWR, and any other appropriate agencies to document progress.

Additionally, District will ensure every impact resulting from implementation of levee projects will be avoided or mitigated. Because of importance of project mitigation, District consciously avoids filing for categorical exemptions unless the work is part of routine maintenance effort. All mitigation measures are coordinated with DWR and DFW prior to implementation.

District currently does not own a specific parcel on Hotchkiss Tract that can be dedicated to habitat enhancement and/or mitigation. We are utilizing existing mitigation banks and taking advantage of the credits available to program participants.

Finally, District and its professional staff and contractors are knowledgeable about the requirements of the California Water Code Sections 12314, DWR and DFW policies, the Delta Levees Program and its guidelines.

Compliance with CEQA, and obtaining all required permits, etc.

District will prepare environmental documentations in compliance with California Environmental Quality Act (CEQA - California Public Resources Code, Section 21000 et seq.) and the State CEQA Guidelines (Title 14, Section 15000 et seq. of the CCR). For a typical levee project, we intend to prepare an IS/MND in compliance with CEQA. Additionally, District will make certain that all permits required by various regulatory agencies are obtained prior to commencement of the work. Lastly, RD 799 will reach out to the Delta Stewardship Council staff to meet the intent of the Delta Plan.

IS/MND would address the potentially significant environmental impacts. CEQA requires that all State and local government agencies consider the potentially significant and significant environmental impacts of projects they propose to carry out or over which they have discretionary authority, before implementing or approving those projects. District will act as the

lead agency under CEQA when, as the public agency, has the principal responsibility for carrying out or approving a project (State CEQA Guidelines, California Code of Regulations (CCR), Section 15367). The Initial Study (1) determines whether project implementation would result in potentially significant or significant impacts on the physical environment; and (2) identify feasible mitigation measures that could be incorporated into the proposed project design, where necessary, to reduce the project's potentially significant or significant impacts to a less-than-significant level. A Mitigated Negative Declaration, adopted by District Board of Directors (1) discusses revisions in the project plans to mitigate the impacts to a point where clearly no significant impacts would occur; and (2) there is no substantial evidence, in light of the whole record before the agency, that its project as planned may have a potentially significant or significant impact on the physical environment.

RD 799 is planning to obtain all required permits for its projects, typical permits may include the following:

- U.S. Army Corps of Engineers – Clean Water Act Section 404 Individual Permit or Nationwide Permit
- U.S. Fish and Wildlife Service – Section 7 Consultation
- U.S. National Marine Fisheries Service – Section 7 Consultation
- Central Valley Regional Water Quality Control Board – 401 Water Quality Certification
- California Department of Fish and Wildlife – 1602 Streambed Alteration Agreement
- Delta Stewardship Council Consistency certification
- Local City and/or County permits

ATTACHMENTS

ATTACHMENT A – GENERAL INFORMATION

Reclamation District 799 (District) Reclamation District 799 was formed on July 23, 1909, under Sections 50000 et seq. of Division 15 of the California State Water Code to provide drainage, irrigation, and complete reclamation of lands within District boundaries. It is governed by a five-member Board of Trustees, each elected by the landowners to a four-year term.

Hotchkiss Tract is one of eight western Delta islands considered essential in preventing water quality degradation caused by the transportation of tidal salt water into the Sacramento/San Joaquin Delta. Hotchkiss Tract's location relative to the eight western islands places it adjacent to a major Delta Channel where fresh and salt water intermix. The island is near the cities of Oakley and Antioch in Contra Costa County. Recently, portion of the district's jurisdictional land has been annexed to the City of Oakley.

Reclamation District 799 is located in the heart of the Sacramento – San Joaquin Delta (Delta) about two miles northeast of Oakley. Waterways around the District include Dutch Slough to the north, Sandmound Slough to the east, Rock Slough and the Contra Costa Canal to the south and west, and Little Dutch Slough to the northwest (see Figure 1).

- Dutch Slough runs along the north boundary of the District. A large portion of this reach of the levee has some public access with many residences on the landward side as well as private docks on the water side. The remaining portion is adjacent to agricultural and grazing lands.
- Sand Mound Slough runs along the east boundary of the District. A large portion of this reach of levee has some public access with many residences on the landward side as well as private docks on the water side. The RD 799 Maintenance Yard is located at roughly Station 135+00, on the west side of Sand Mound Boulevard, off the levee landside toe.
- Rock Slough runs along the southern boundary of the levee district. This reach of levee is not open to the public. It is mainly used as an access road for local ranchers to access grazing land adjacent to the levee.
- Contra Costa Canal runs along the southwest boundary of the District. This reach is not open to the public. It is mainly used as an access road for local ranchers to access grazing land adjacent to the levee.
- Little Dutch Slough runs along the western boundary of the District. This reach of levee is not open to the public. It is mainly used as an access road for local ranchers to access grazing land adjacent to the levee.

Hotchkiss Tract has multiple uses of residential homes and agricultural lands. There is a gas station, several local businesses, and a marina located on District land. Several electrical transmission lines go through the District, including California Oregon Transmission Project operated by the Western Area Power Administration (WAPA), the Pacific Gas and Electric Company (PG&E) Table Mountain Tesla line, PG&E Vaca-Dixon-Tesla line, and natural gas lines. In total, the value of the assets on District land is estimated to be approximately \$127 million.

The Summer Lake South residential subdivision located in the southeast corner of the RD 799 is protected by about 3 miles of levee, which is an internal ring levee constructed by Shea Homes. District is the owner and maintaining agency for this levee system. The Summer Lake South levee maintenance funding is from a special assessment collected by the RD 799.

Hotchkiss Tract is unique in comparison with the other seven western islands because the island supports both agricultural activities together with a large on-island residential population and commercial/recreational businesses. The District is responsible for repair, maintenance,

and improvement of the 8.9 miles of non-project levees protecting the 3,100 acres of lands and approximately 1,000 people within the district jurisdiction, as briefly described below:

The bulk of residential developments on Hotchkiss Tract are located and concentrated along the perimeter of the Tract, principally on the western, northern, and eastern sides of the Tract.

New Development - East Cypress Corridor Specific Plan

RD 799 has been approached by several landowners pursuing development on Hotchkiss Tract. There is currently the existing Summer Lake South subdivision built in early 2000's as the first phase of multi-phase development on Hotchkiss Tract. This subdivision is protected by a 3.1 mile "Interior Levee" which is owned and maintained by the District; the cost associated with maintenance of this levee is collected through assessments. District also collects special assessments from the residents of this subdivision to mitigate impacts of potential flooding resulting by this development. District is currently working with the developers to address some ongoing issues prior to finalizing and/or agreeing to any final plans. These issues include increase in storm water and flood flow volume, decrease in evacuation time during an emergency, evaluation of existing capacity of drainage ditches and facilities and impacts on District pumping facilities, change in drainage pattern, possible increase in localized flooding, and groundwater management.

The new development, once fully constructed, will add about 10,000 new permanent residents to the existing residents of Hotchkiss Tract. The new development will mainly consist of single-family residences, condos and perhaps some commercial and recreational facilities. This project adds operation and maintenance responsibility over new facilities to the District; including about 13 miles of levee and lagoons. All costs associated with maintenance responsibilities for this project are funded through assessments.

This project, once fully built out, will increase the ration of urbanized area to agricultural land; therefore, increasing the District deductible share per levee mile under the Delta Levees Subventions Program from current \$1,000 per mile to \$2,500 permile.



Figure 1: Vicinity Map

ATTACHMENT B – EMERGENCY RESPONSE

Here are some ongoing activities to increase flood protection on Hotchkiss Tract.

Emergency Response

The primary purpose of emergency response is to prepare for floods, effectively respond to flood events, and quickly recover when flooding occurs thus minimizing the impacts.

Emergency response includes providing flood hazard information, real-time flood data, more frequent and timely flood forecasts, and state-of-the-art flood emergency information dissemination. Fortunately, both federal and State entities have invested time and efforts in providing the state-of-the-art information such as reservoir releases and river conditions to local agencies for use during a flood emergency.

Additionally, the Contra Costa County, through an agreement with DWR, prepared a Local Flood Safety Plan (LFSP) for the District. The purpose of the plan is to ensure that District staff are prepared to effectively respond to a flood emergency. The overall objective of the plan is to reduce loss of human life or injury and minimize property damage. District, as an independent jurisdiction, has responsibility for the maintenance of the levee and drainage systems within its jurisdictional boundaries; therefore, the plan contains procedures to assist staff in fulfilling their emergency responsibilities. The plan covers several areas including preparedness, patrol and flood fight procedures; it also discusses options to remove flood water from the island as part of recovery. District also entered into agreement with DWR and received funding for training and exercises and to purchase flood fight materials.

RD 799 also involves in coordination meetings with local jurisdictions, holds tabletop and functional exercises and annual pre-season flood fight training, and supports formulation of Mutual Aid Agreements regarding storage and sharing of flood fight materials

District may also take advantage of federal and state programs for risk mitigation actions, such as flood proofing and elevating residential and nonresidential structures.

Communication Support

District will work with federal, State, and local emergency responders to better understand their capabilities and seek opportunities to utilize their resources. These resources may include:

- California Governor's Office of Emergency Services (Cal OES) maintains several communications support capabilities available for use by local governments during major emergencies. Requests for Cal OES support will be directed to the County Operational Area for processing.
- Cal OES maintains and operates several mobile satellite communications units that can be driven, transported by trailer, or airlifted to any location in the state to provide dedicated voice and data satellite transmission capability. These mobile units are positioned throughout the state and may be sent into local jurisdictions to support emergency communication needs. The mobile satellite communications units are part of the statewide Operational Area Satellite Information System (OASIS) network.
- Cal OES maintains two mobile command facilities available for use during major emergencies. These mobile command complexes consist of integrated communications and command vans and appropriate support vehicles and equipment. Each of the complexes is equipped for operations on each of the major state radio systems, the OASIS, Mutual Aid radio systems, and amateur radio (RACES) frequencies. Radio operators must be provided by the responsible agency.

- Cal OES maintains caches of portable radios capable of operating on selected statewide law enforcement and fire and rescue Mutual Aid frequencies. These radios are available to local governments upon request.

Effective Levee Patrol

The purpose of levee patrols is to have qualified personnel visually evaluate the performance of the District levees. The intent is to determine the condition of the levee and to identify potential and existing problems such as instabilities, seepage conditions, erosion points, and adequate freeboard. District employs the following.

- All staff will complete the necessary trainings to become qualified for levee patrol. These may include basic levee design, recognizing potential problem characteristics, understanding notification and warning system, and DWR recommended flood fight methods.
- District will ensure to have adequate stockpile of materials and equipment staged in an approved location and is in serviceable condition.
- District will ensure complete coverage and, wherever possible, overlapping coverage. All members will receive a safety briefing prior to commencing patrols and will use all provided safety gear.
- District will conduct high water staking and reference the locations with surveying or GPS locations.



Installation of additional stream gage stations

Stream gages provide streamflow information for variety of uses including prediction of floods, management and allocation of water resources, design and operation of engineering structures, scientific research, operation of locks and dams, and for recreational safety. Nearly 90 percent of stream gages record and transmit streamflow information electronically. Such information is available on the World Wide Web in real time as part of information dissemination to the public and all government and non-governmental agencies. Some stream gages can transmit information via satellite, others may rely on radio telemetry technology. District currently relies on stream gages near Hotchkiss Tract; however, there is only one gage (a staff gage at the Bethel island bridge) that District can realistically rely on. District is seeking funds to add more gages to monitor flows in the channels.

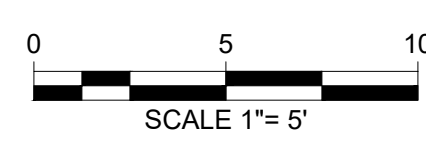
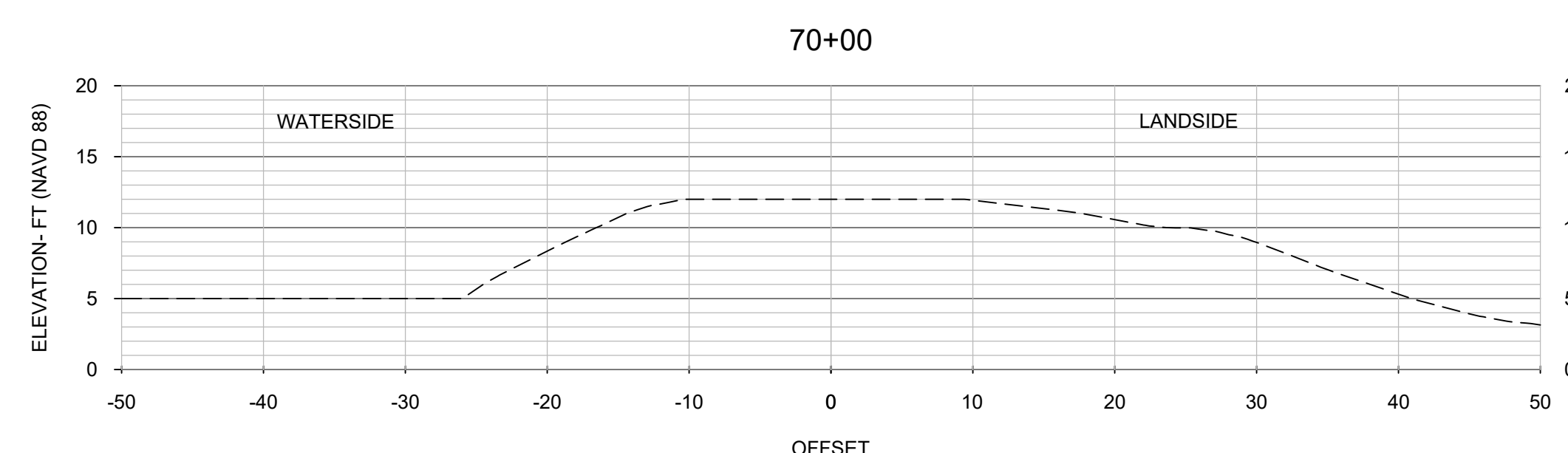
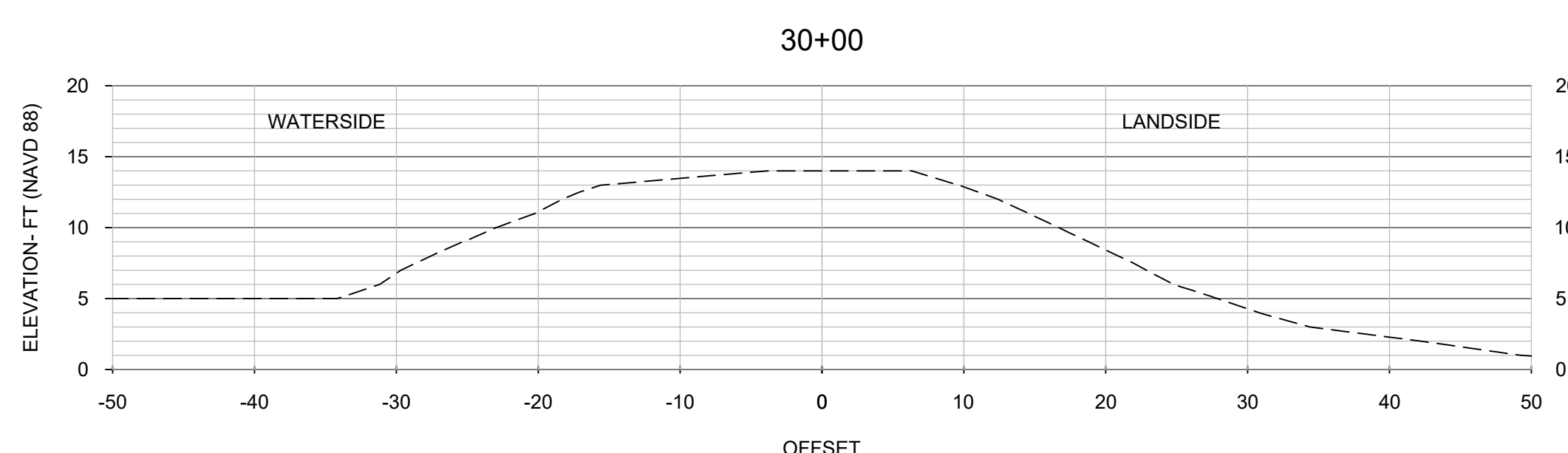
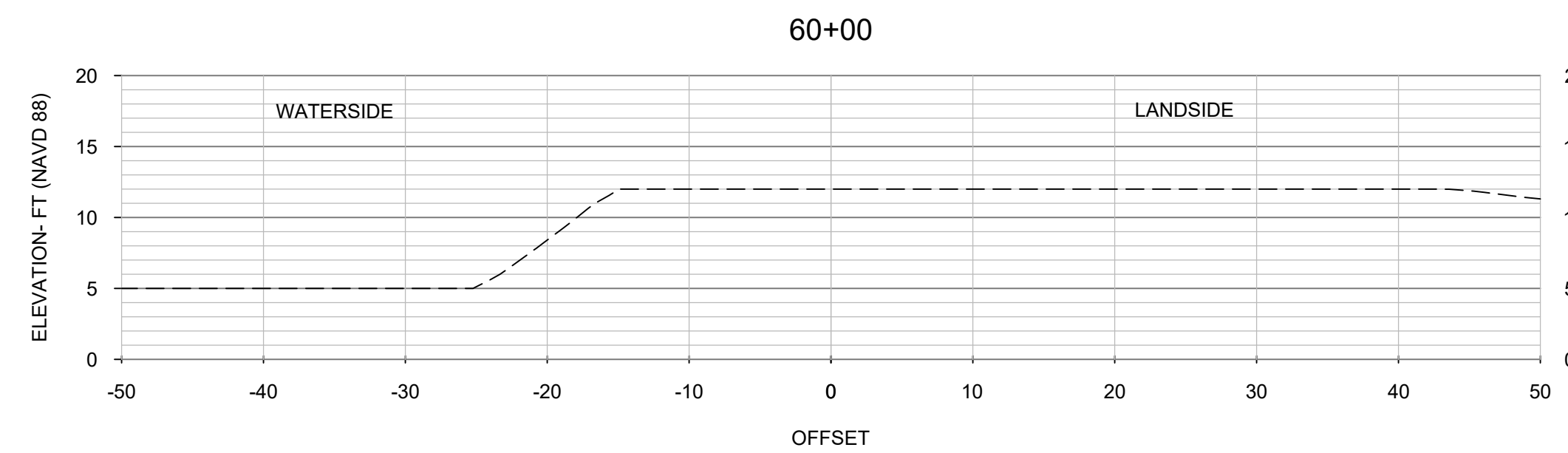
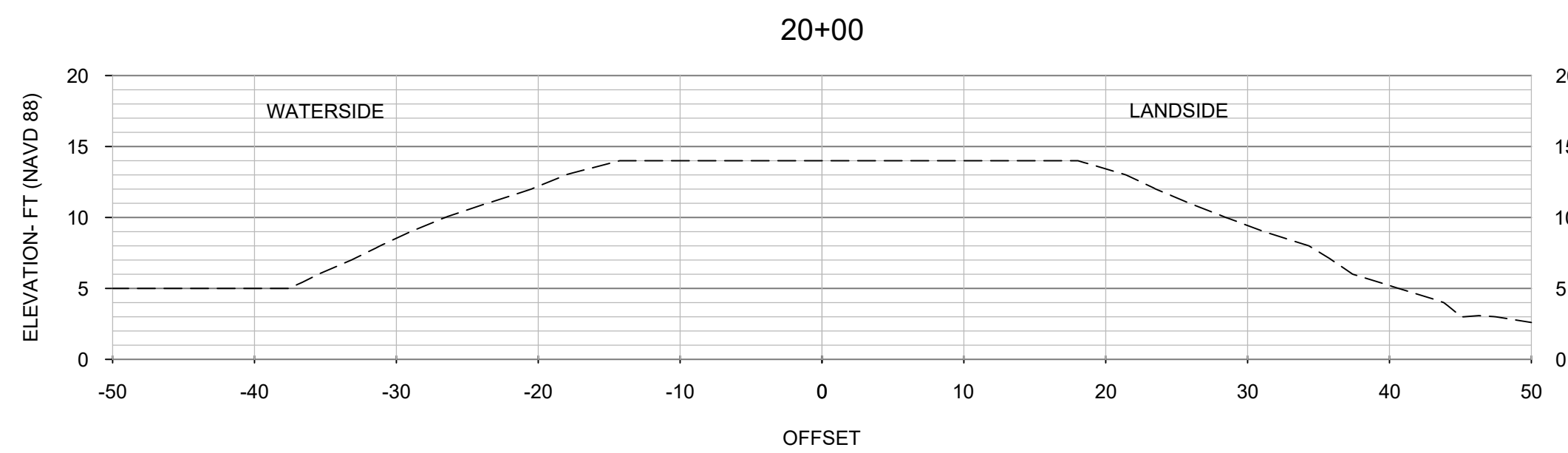
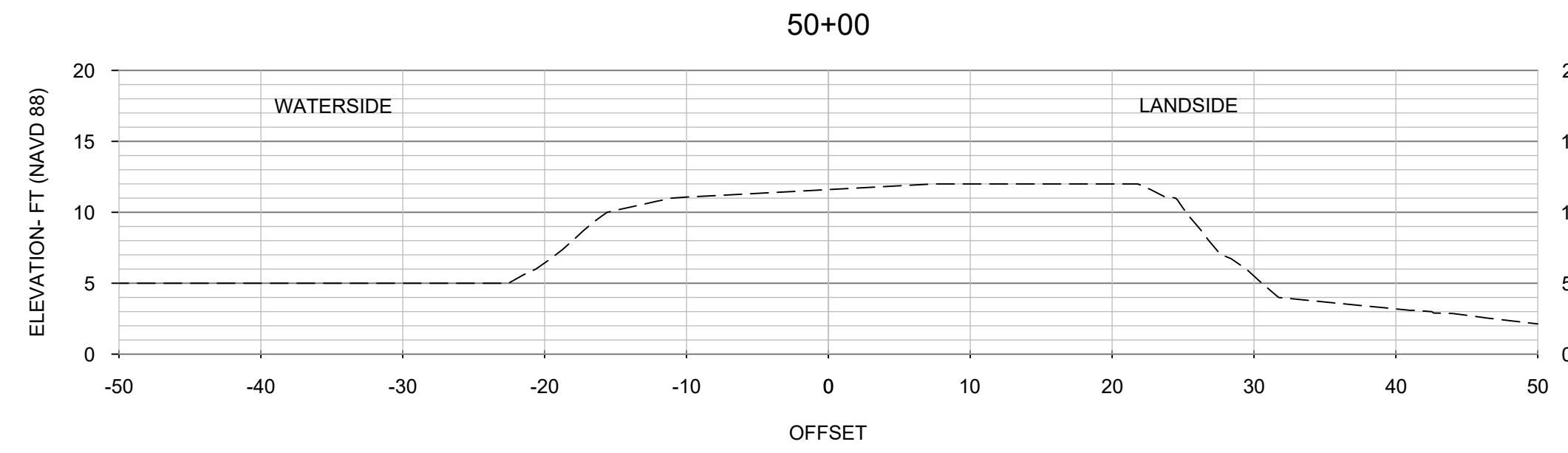
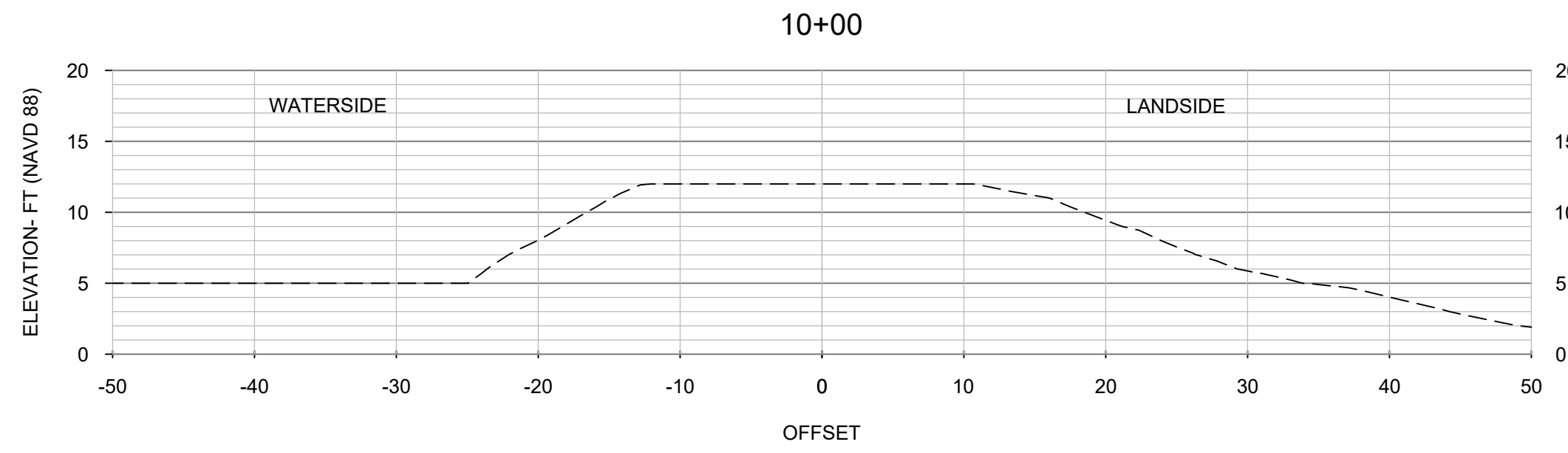
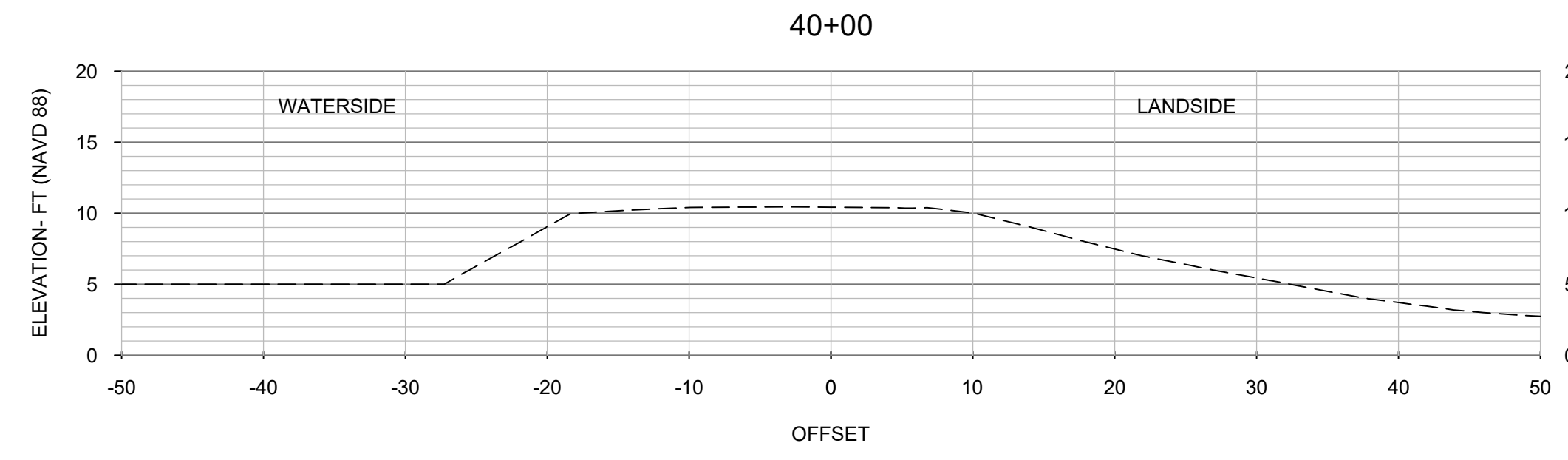
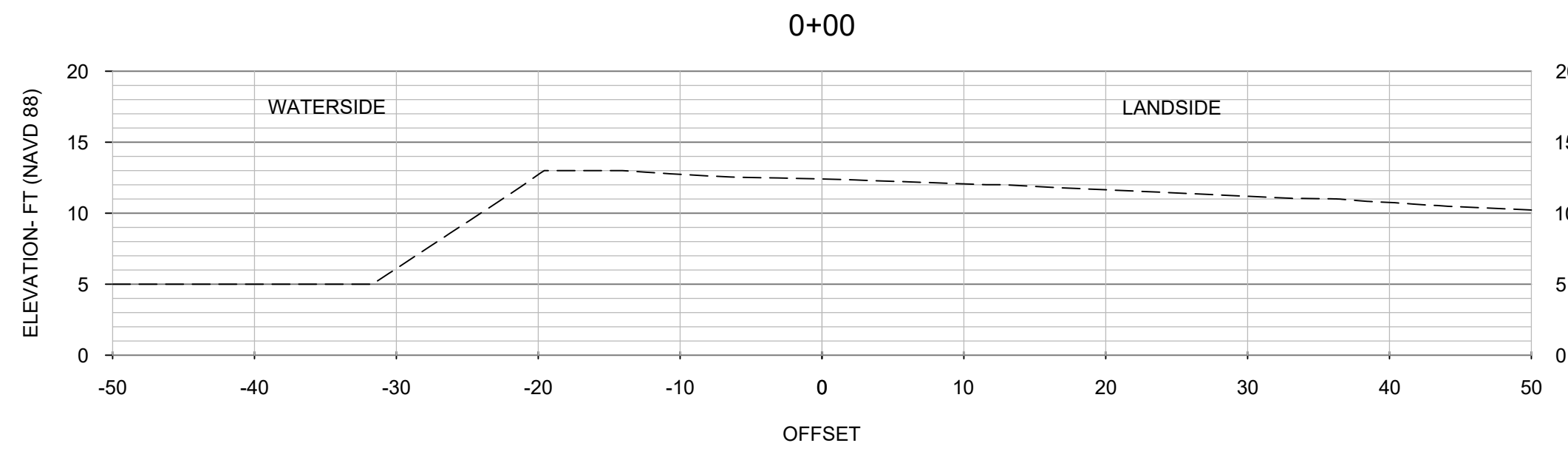
Review the encroachment permitting procedures

The District has established encroachment permit criteria. All improvements near the District’s levees require the property owner to get prior approval from the District by applying for, and receiving approval of, a “Levee Encroachment Permit.” Projects require permits if a landowner plan to conduct it within the levee prism crown. District will review and evaluate the existing encroachment permitting criteria and procedure to discourage any further encroachments along its levee system.



Reclamation District 799 goal is to provide maximum flood protection to the district residents. There are currently about 1000 people living on Hotchkiss Tract; however, a large portion of the land within the district jurisdiction has been annexed to the City of Oakley and is planned for additional single-family residents. The new developments will be protected with an interior dry levee to be built by the developers.

ATTACHMENT C – LEVEE CROSS SECTIONS



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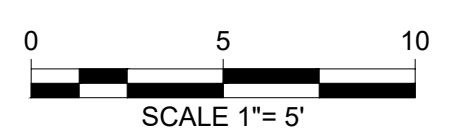
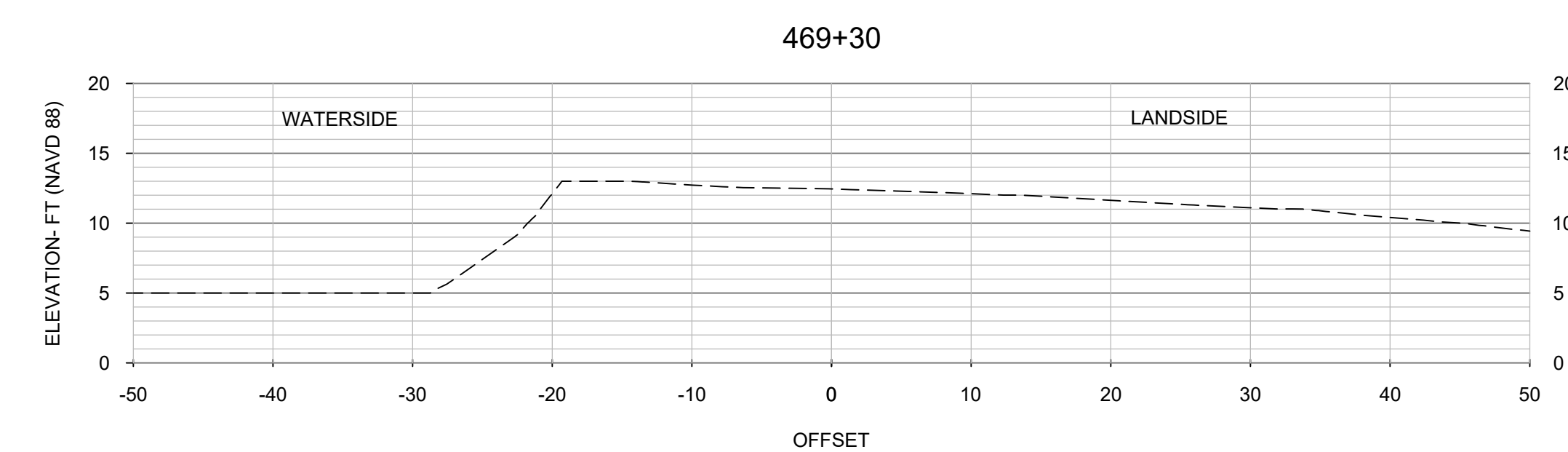
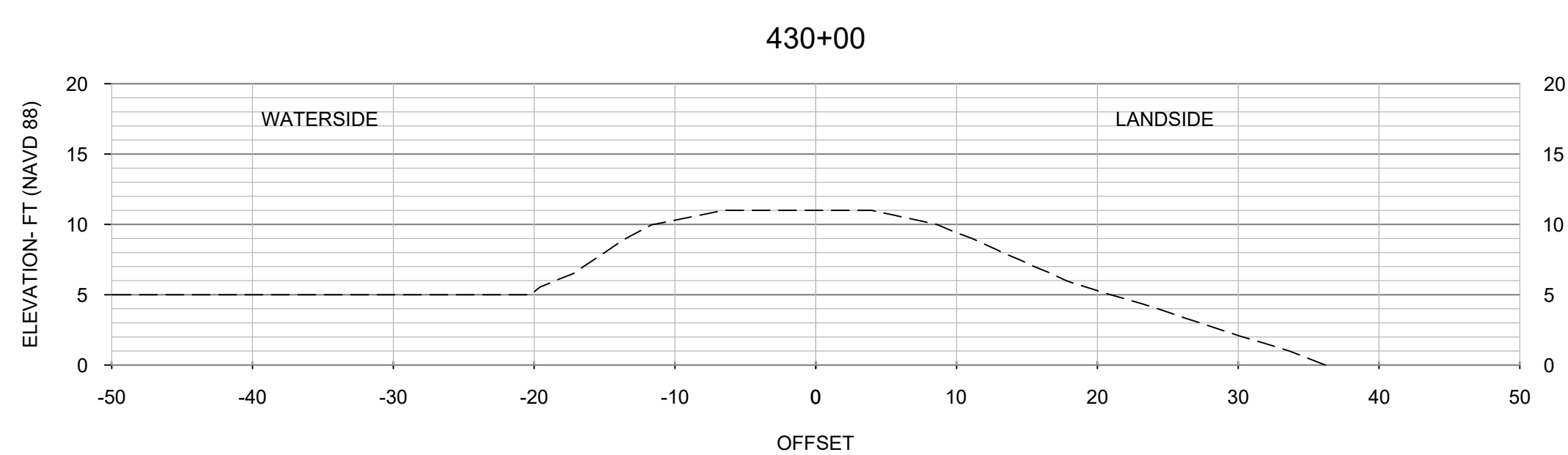
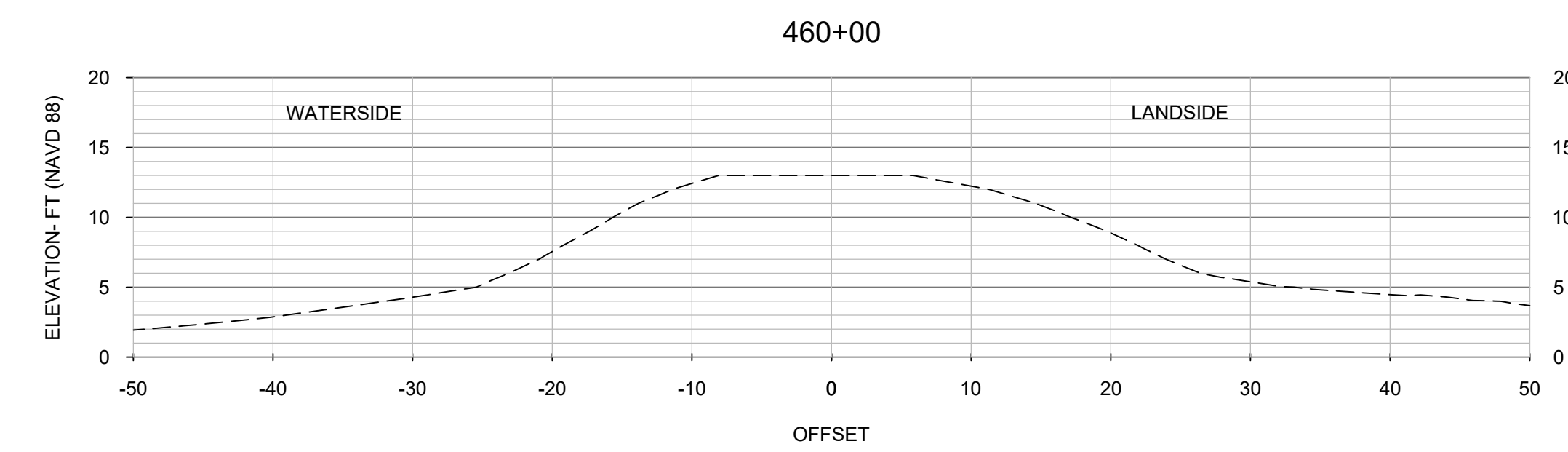
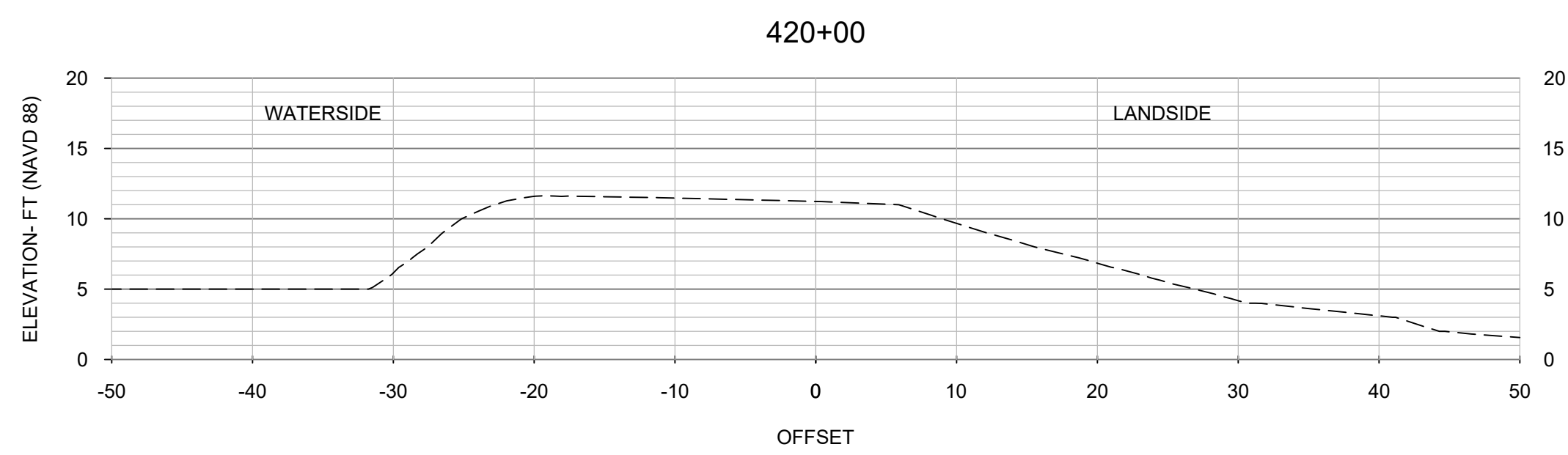
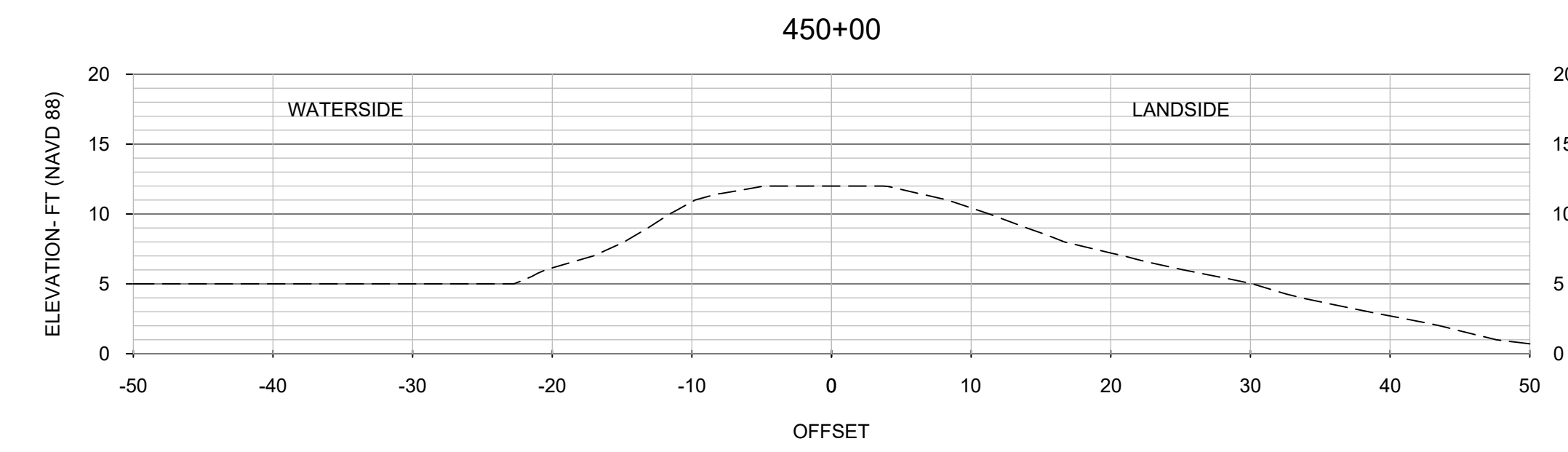
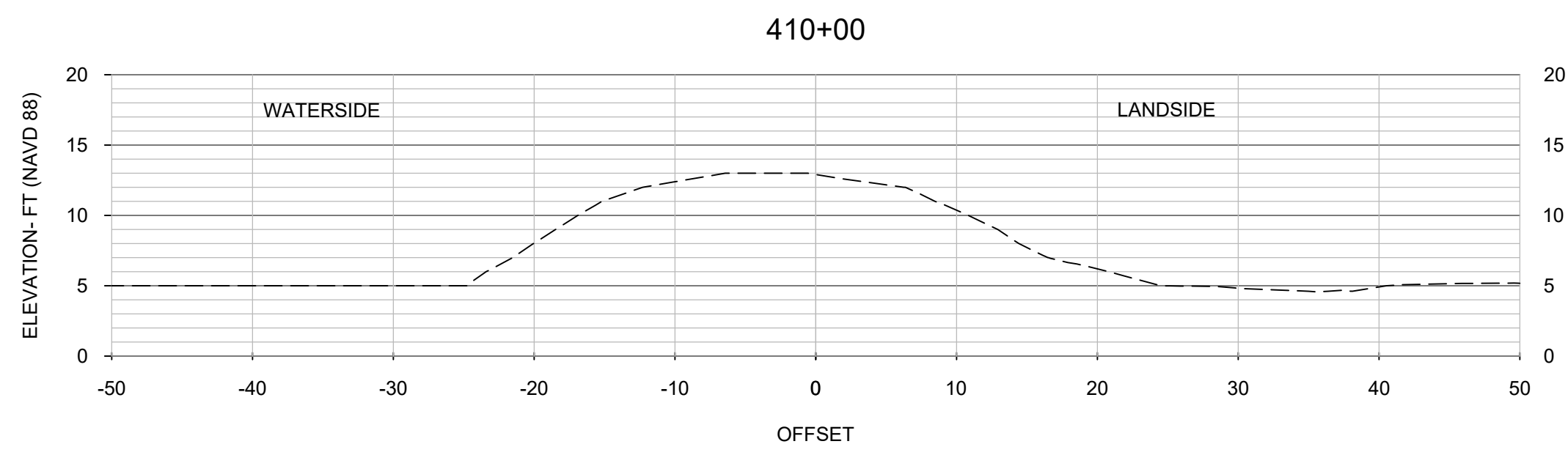
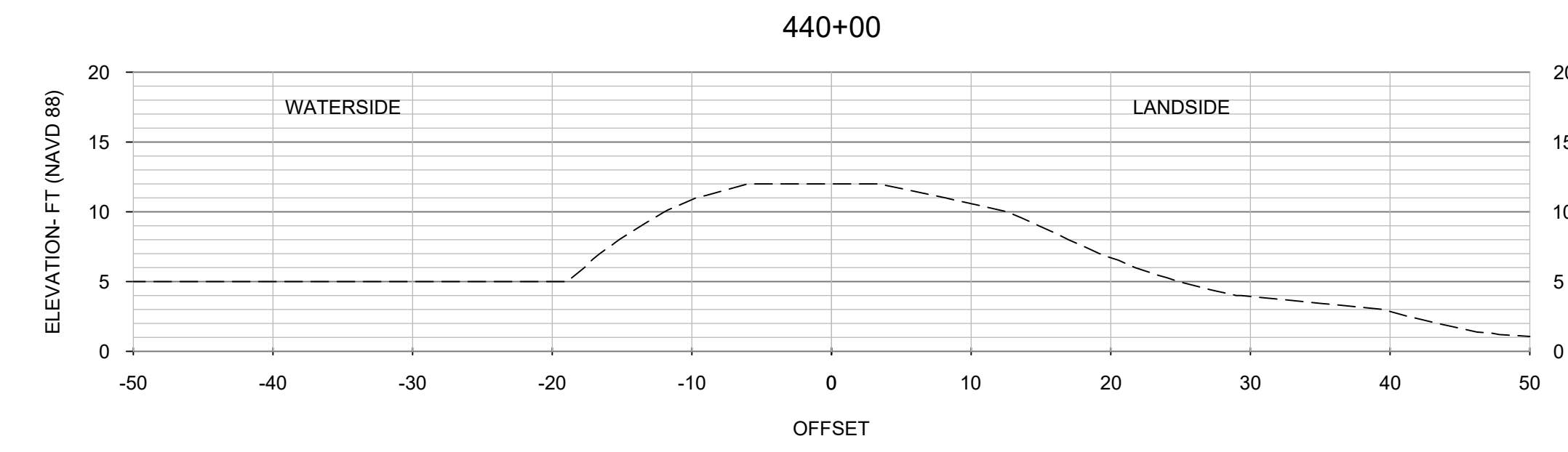
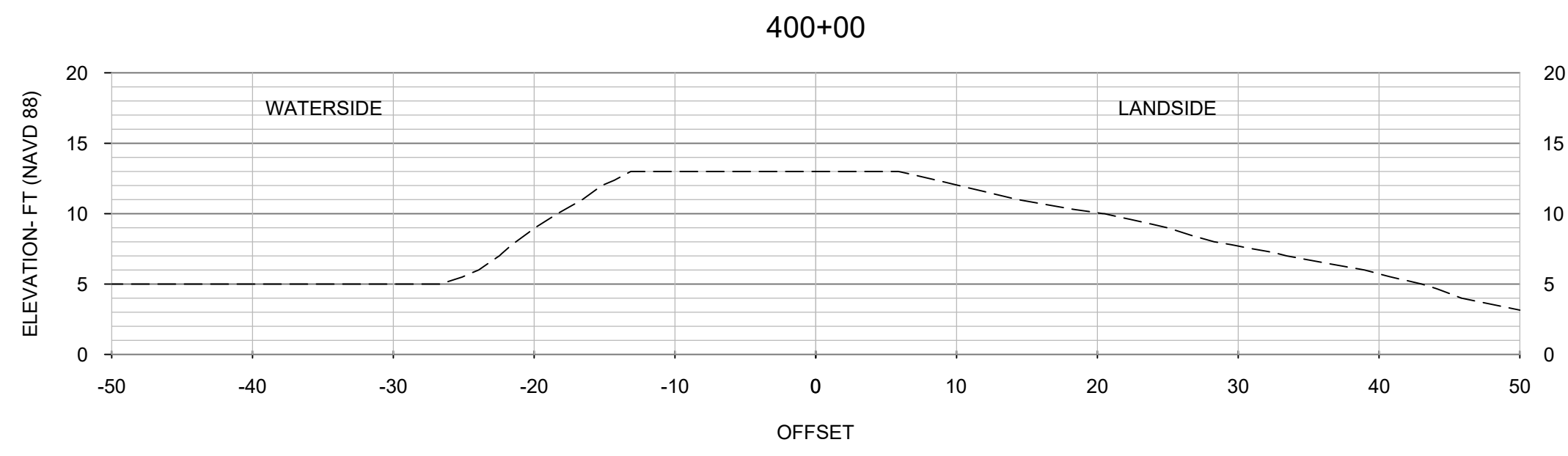


Designed: K. Sharma
 Checked:
 Drawn: K. Sharma
 Approved By: --

Reclamation District 799
 (Hotchkiss Tract)
 PO Box 353,
 Bethel Island, CA 94511
 GEI Project 1802371

Reclamation District 799 (Hotchkiss Tract)
 Contra Costa County, California
 LEVEE CROSS SECTIONS
 STA 0+00 TO STA 70+00

DRAFT
 DWG. NO.
C-01
 SHEET NO.



Attention:

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SCALE 1"= 5'

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP



Designed: K. Sharma

Checked:

Drawn: K. Sharma

Approved By: --

Reclamation District 799
(Hotchkiss Tract)
PO Box 353,
Bethel Island, CA 94511

GEI Project 1802371

Reclamation District 799 (Hotchkiss Tract)
Contra Costa County, California

LEVEE CROSS SECTIONS
STA 400+00 TO STA 469+30

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ATTACHMENT D – Hypothetical Levee Breach

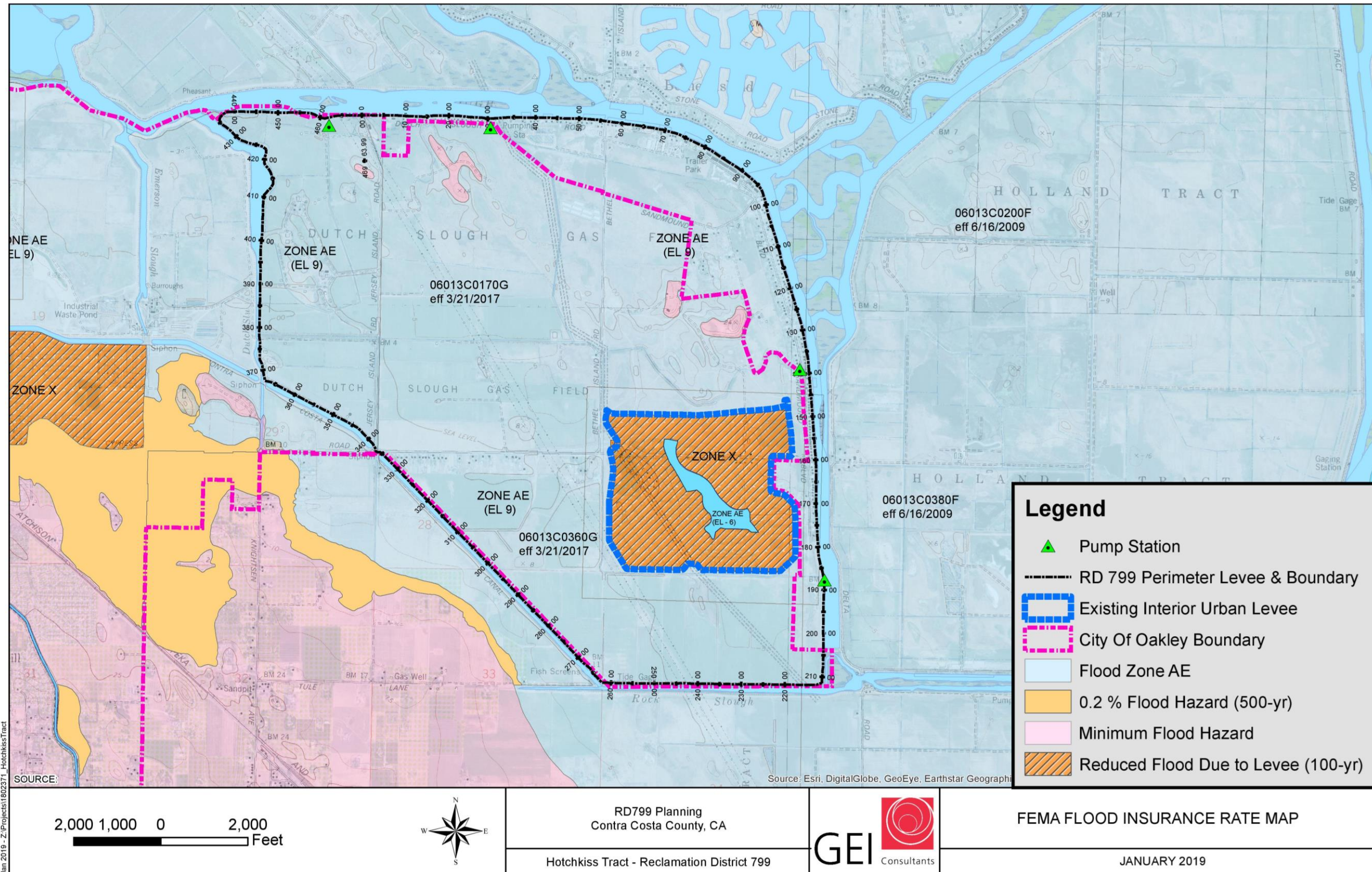


Figure 2: FEMA Flood Zone

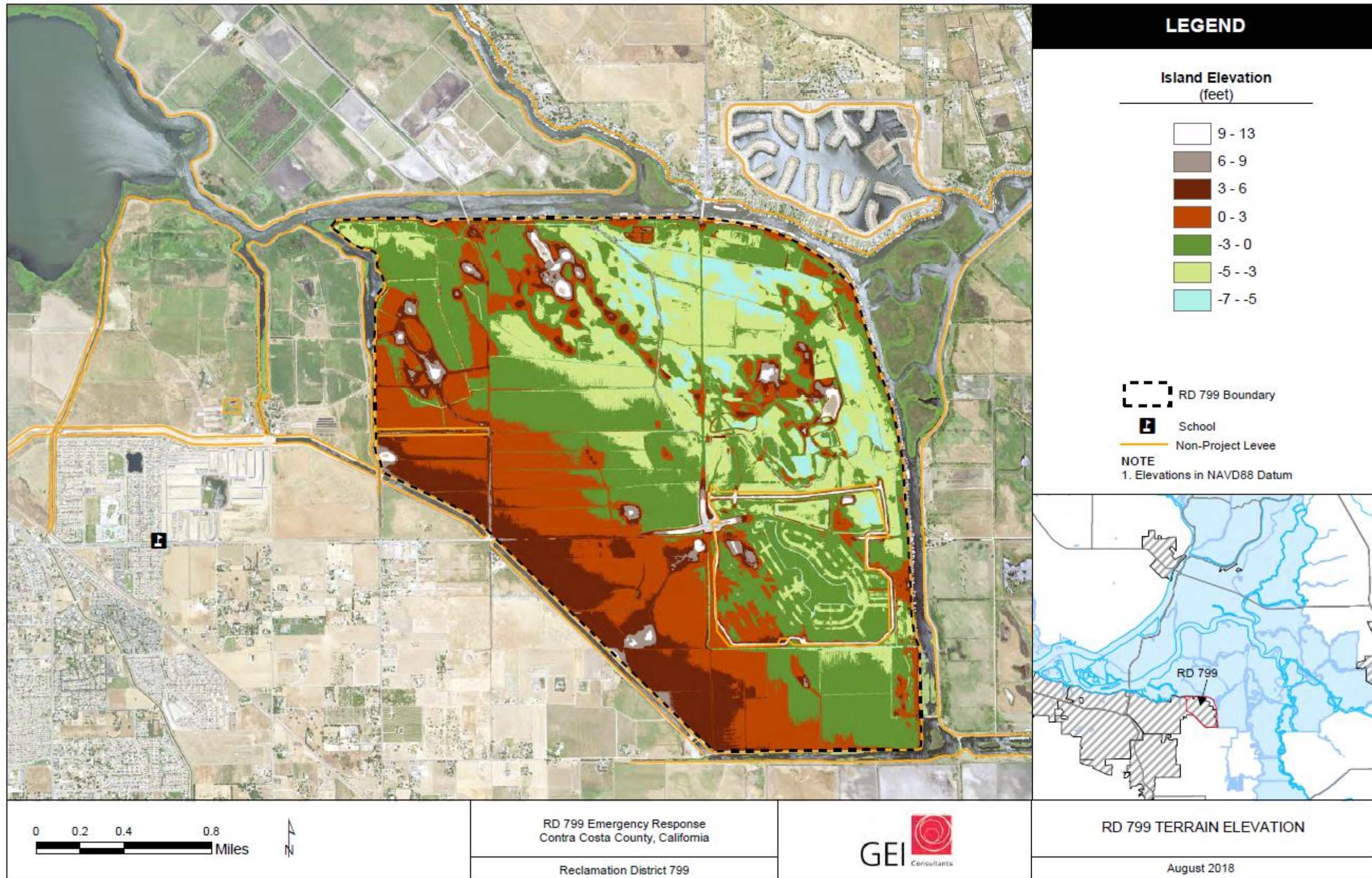


Figure 3: Elevation Map

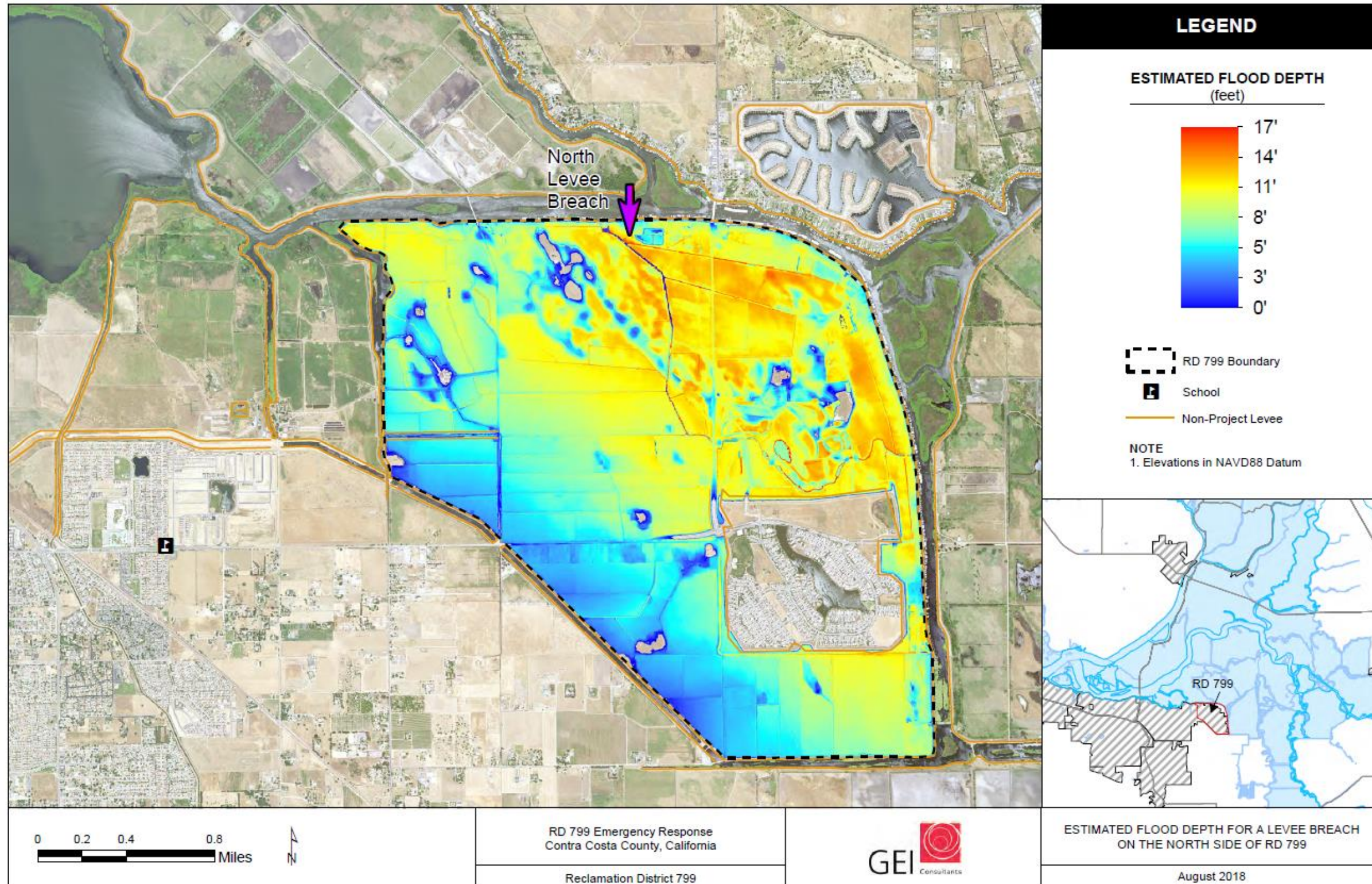


Figure 4: Floodwater Depth for Hypothetical Levee Breach on the North Side

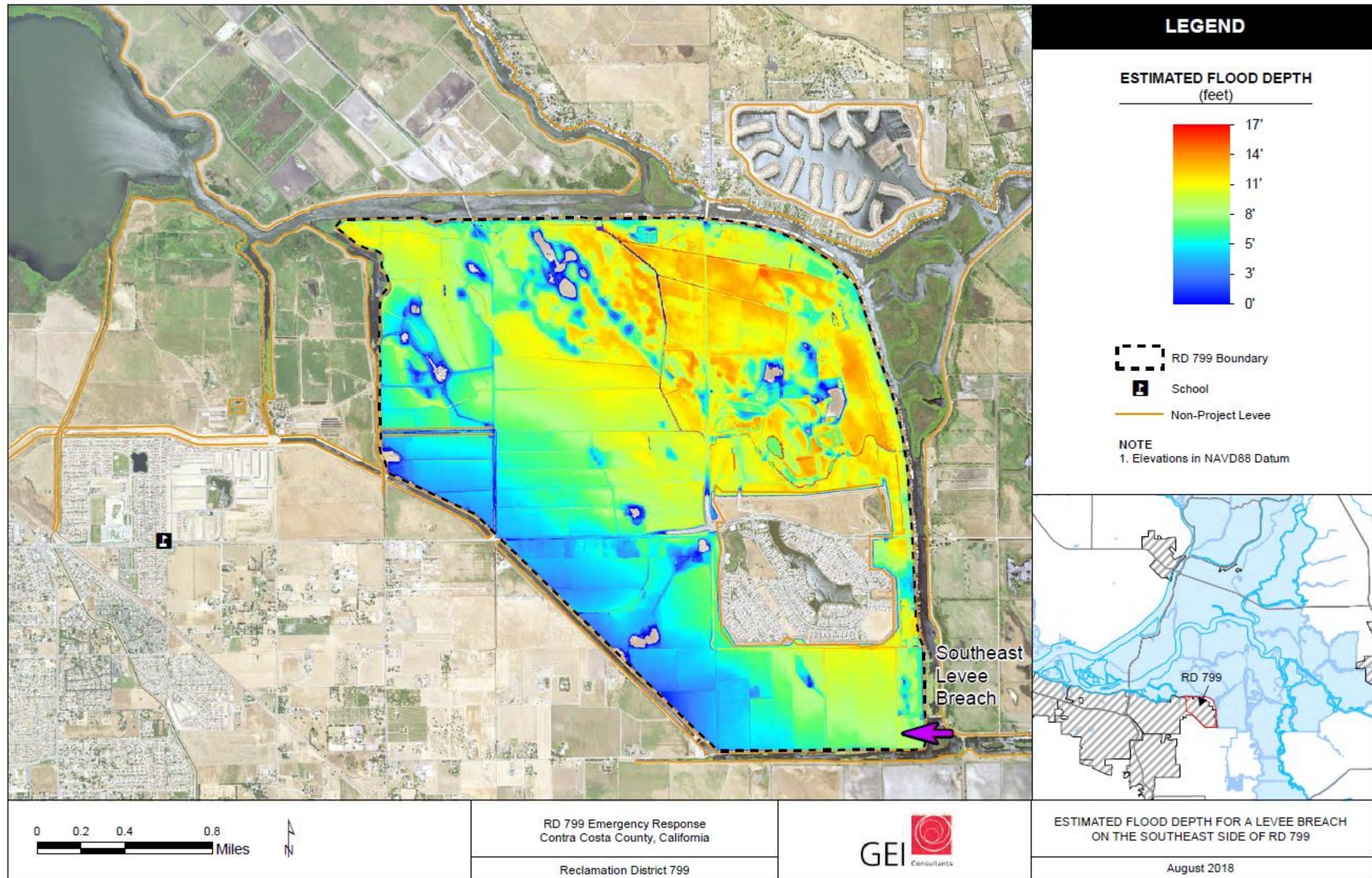


Figure 5: Floodwater Depth for Hypothetical Levee Breach on the Southeast Side

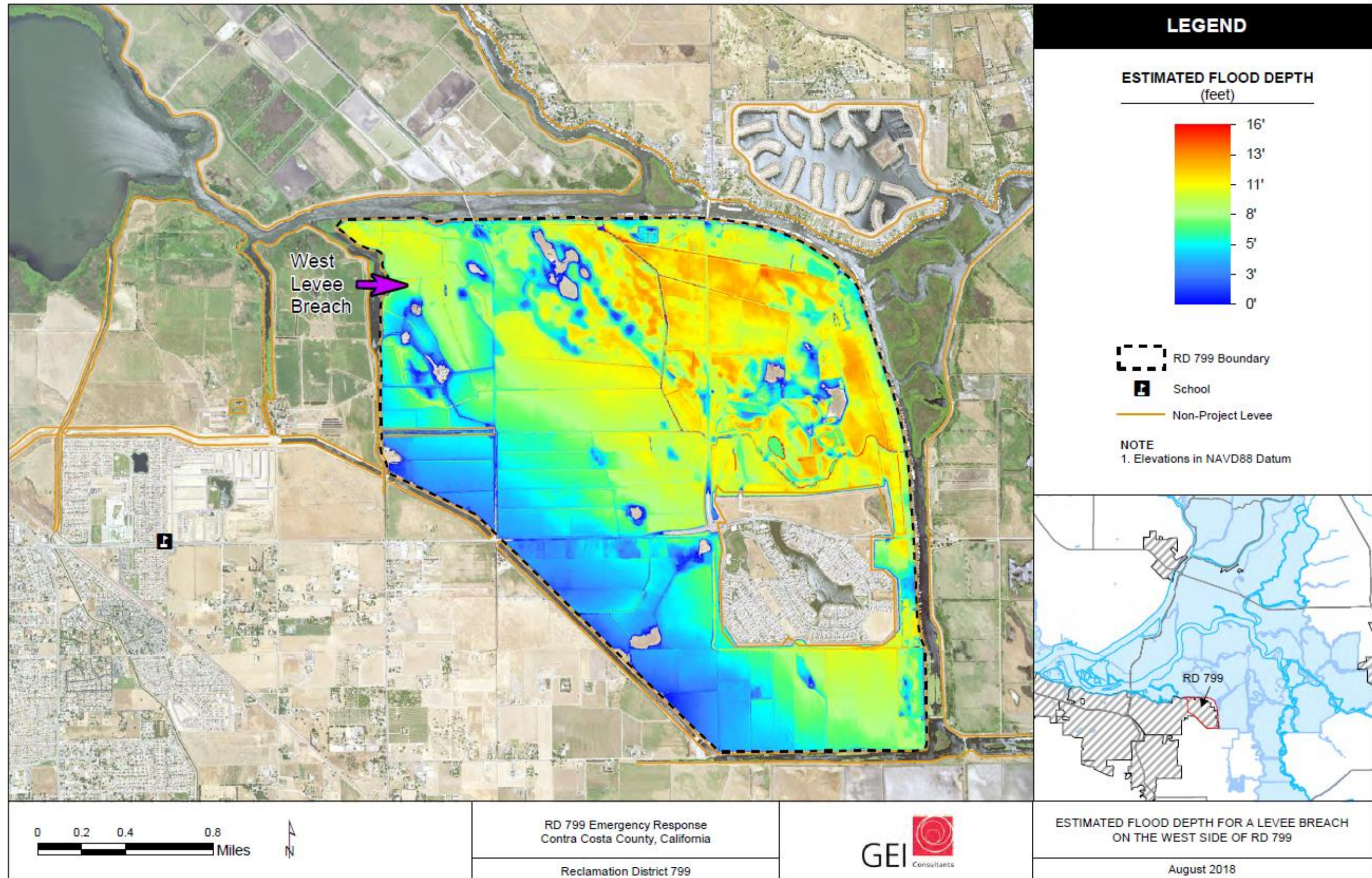


Figure 6: Floodwater Depth for Hypothetical Levee Breach on the West Side

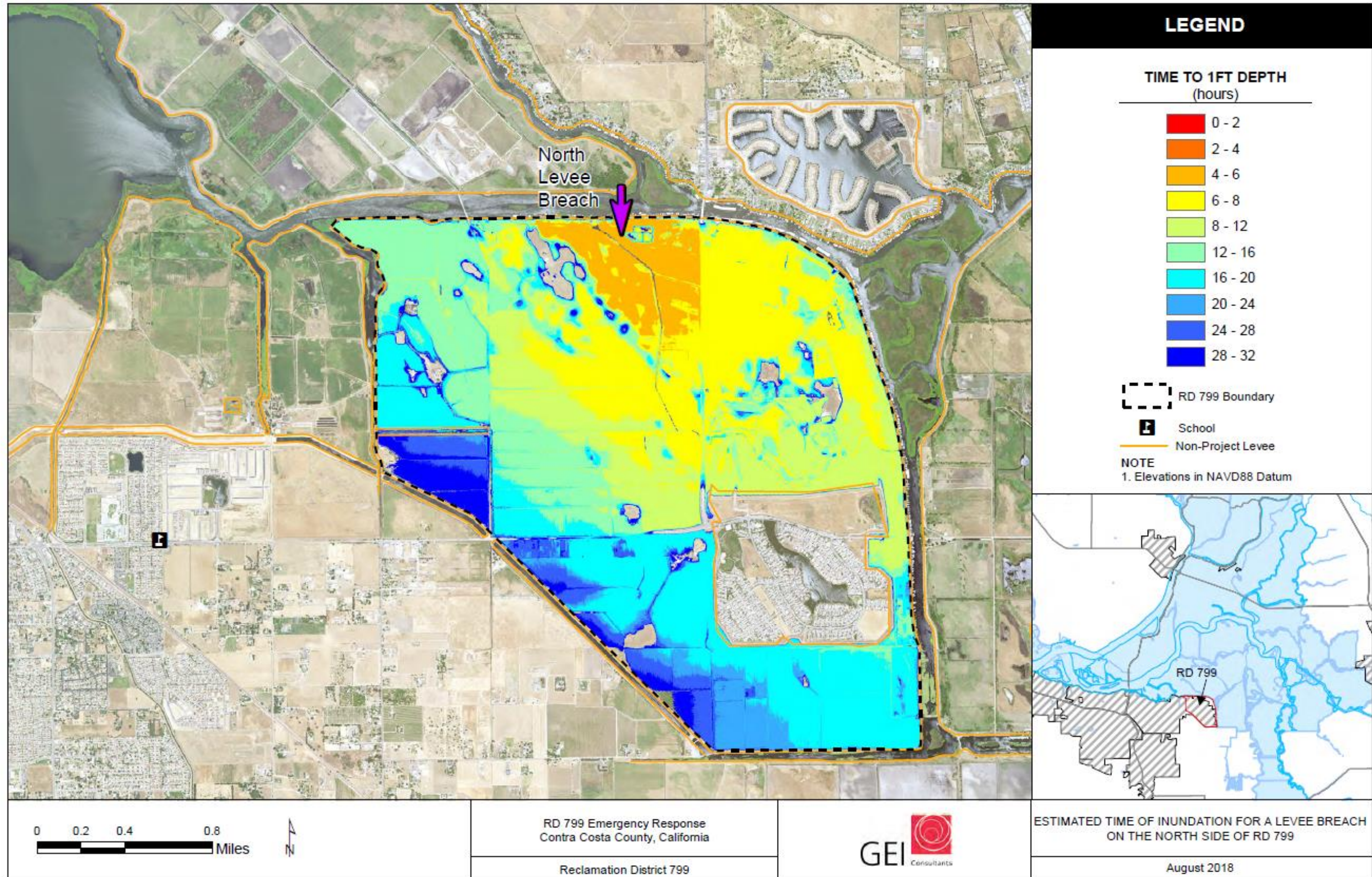


Figure 7: Estimated Time of Inundation for Hypothetical Levee Breach on the North Side

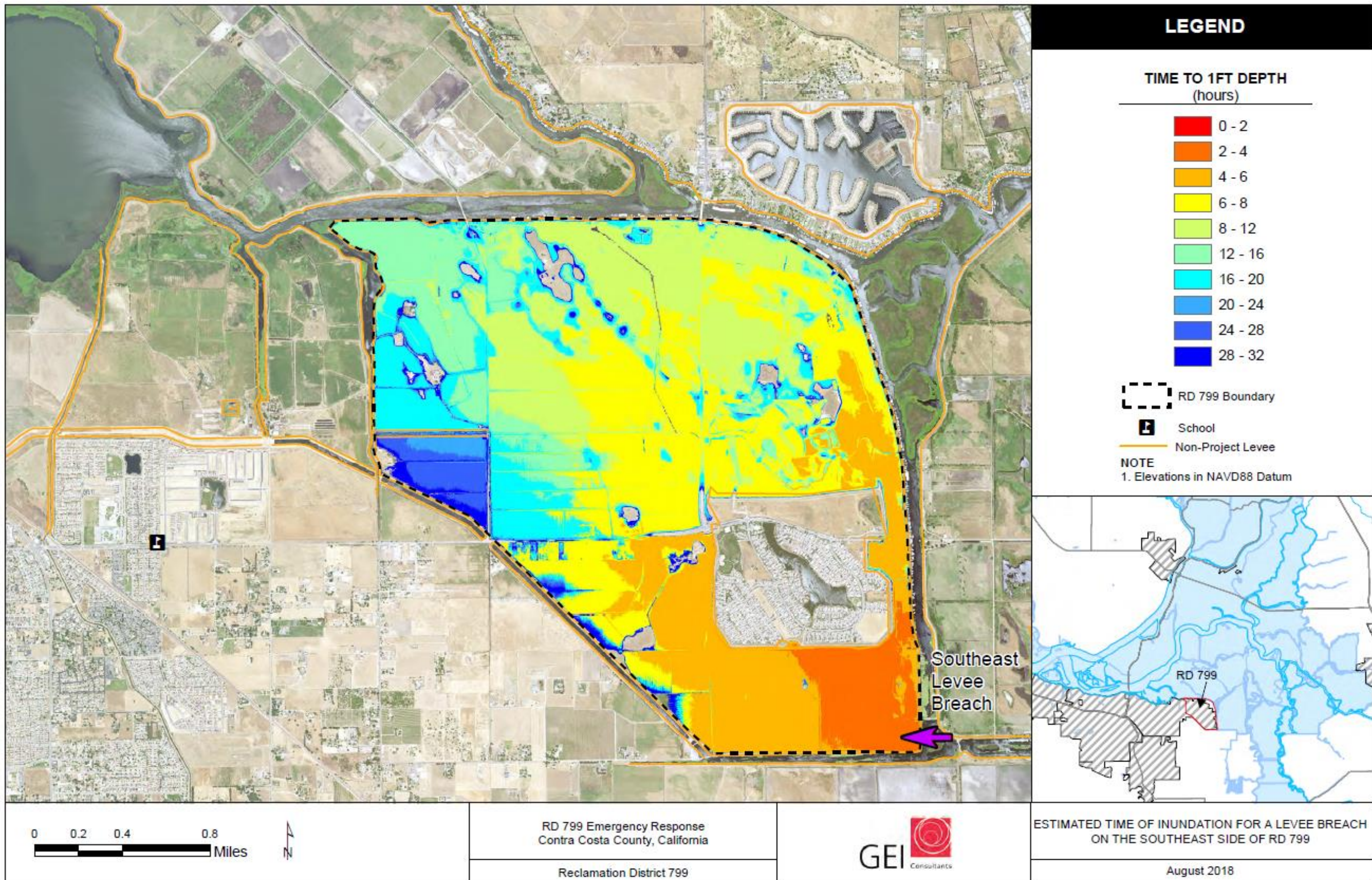


Figure 8: Estimated Time of Inundation for Hypothetical Levee Breach on the Southeast Side

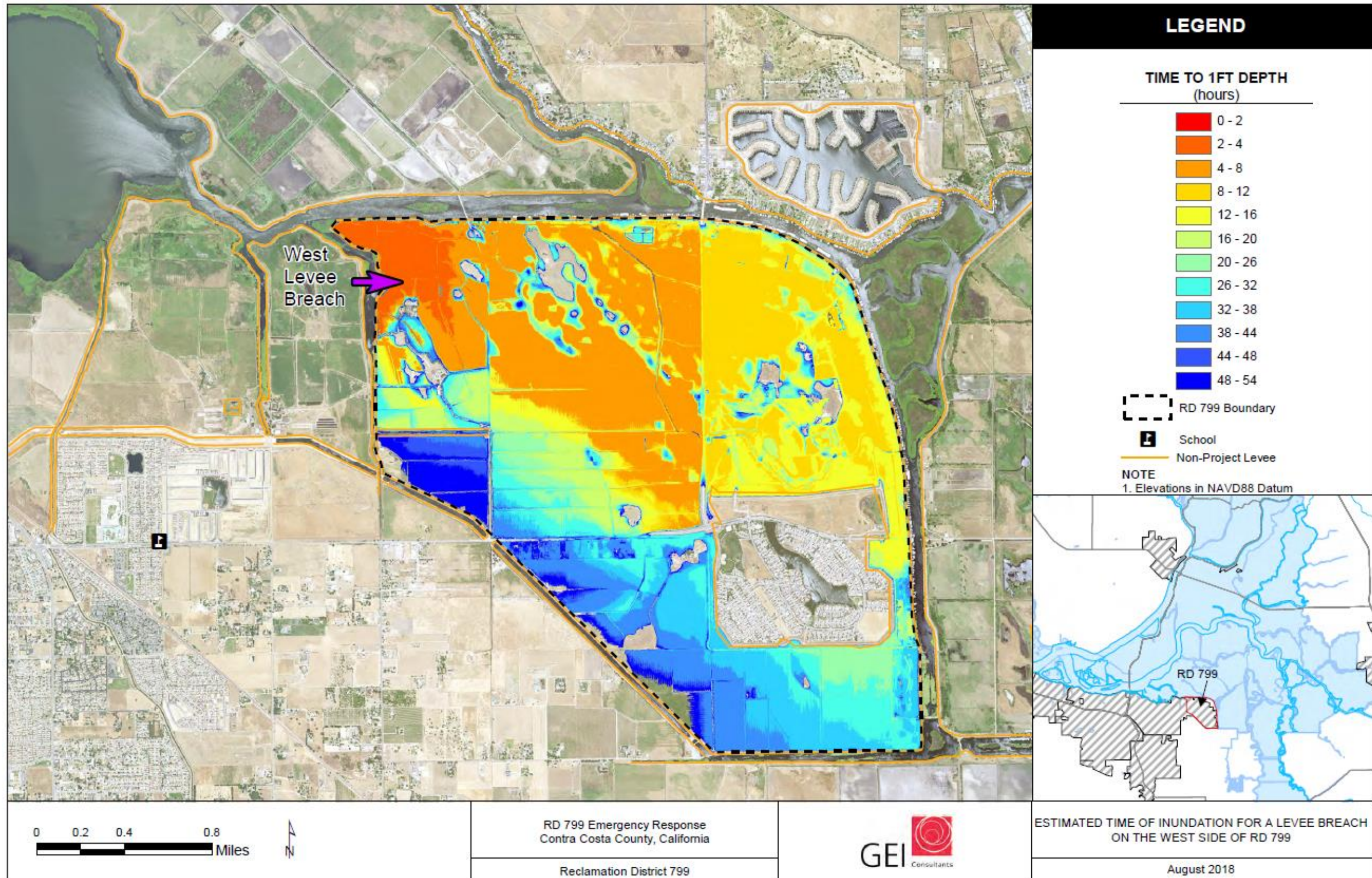


Figure 9: Estimated Time of Inundation for Hypothetical Levee Breach on the West Side

ATTACHMENT E – DETAILED COSTS

Cost of Maintenance Work

Item	Annual Estimated Cost (\$)	2020-2025 Estimated Cost (\$)
Inspection of levees	30,000	150,000
Rodent control, extermination of burrowing rodents and filling and compacting the open burrows	10,000	50,000
General maintenance of levee crown and all-weather roadway	30,000	150,000
Maintenance of ditch and toe drains	15,000	75,000
Minor repair of levee sections and access roads	20,000	100,000
Removal of deposits, debris and litter	5,000	25,000
Maintenance of landside slope	5,000	25,000
Cutting, removing or trimming excessive vegetation	5,000	25,000
Erosion repair and restoration of existing rock revetment	25,000	125,000
Storing adequate flood emergency materials	10,000	50,000
Addressing encroachments along the levee	10,000	50,000
Maintenance of appurtenances such as gates on the levee crown	5,000	25,000
Engineering services	10,000	50,000
Mitigation for impacts	20,000	100,000
TOTAL	\$ 200,000	\$ 1,000,000

Cost of Levee Rehabilitation and Other Flood Control Opportunities

Description	Unit	Quantity	Amount (\$)
Site Management	LS	1	150,000
Mobilization/Demobilization	LS	1	100,000
Clearing & Grubbing	LS	1	50,000
Levee Embankment Fill	CY	92,000	800,000
Levee Crown Surfacing & AB for All-weather Road	Ton	4,800	160,000
Seeding and Planting	Acre	12	70,000
Peat and Organic Material	CY	4,000	60,000
SWPPP Compliance	LS	1	60,000
Traffic Control	LS	1	50,000
Sheet Piling	LS	1	11,000,000
Contingency at 20%	LS	1	2,500,000
TOTAL			1,500,000

Seepage Control for One Mile of Levee

Description	Unit	Quantity	Amount for 1 Mile (\$)
Site Management	LS	1	100,000
Mobilization/Demobilization	LS	1	70,000
Clearing & Grubbing	LS	1	50,000
Internal Levee Drain – Sand Filter	Ton	4,140	250,000
Internal Levee Drain – Gravel Filter	Ton	3,300	200,000
Internal Levee Drain – Geotextile Filter	SY	12,000	80,000
Internal Levee Drain – Pipe	LF	1,030	80,000
Contingency at 20%	LS	1	166,000
TOTAL			996,000

The cost of seepage control for 2.7 miles of levee is about \$2.7 million.

Erosion Control for One Miles of Levee

Description	Unit	Quantity	Amount for 1 Mile (\$)
Site Management	LS	1	80,000
Mobilization/Demobilization	LS	1	40,000
Clearing & Grubbing	LS	1	35,000
Quary Stone Bank Protection	Ton	15,000	675,000
Contingency at 20%	LS	1	166,000
TOTAL			996,000

The cost of erosion control for 4.5 miles of levee is about \$4.5 million.