

North Shore Levee West Segment

Hoquiam, Washington

CLOMR Submittal

April 17, 2020



Table of Contents

- 1:** North Shore Levee West Segment Introductory Letter, KPFF Consulting Engineers
 - Introductory Letter Outlining the project and CLOMR submittal Package
- 2:** MT-2 Forms, Compiled by KPFF Consulting Engineers
- 3:** BFE Determination Technical Memorandum, Watershed Science & Engineering
- 4:** Biological Evaluation and Essential Fish Habitat Evaluation, KPFF Consulting Engineers
 - Analysis and discussion of species and habitat for Endangered Species Act compliance
- 5:** Geotechnical Analysis and Levee Certification Report, GeoEngineers
 - Analysis and discussion of soil conditions, including bearing capacity, settlement, seismic loading, and other soil properties
- 6:** Design and Construction Recommendations for Floodwalls and Embankment Levees Report for North Shore Levee West, GeoEngineers
 - Recommendations for the construction of earthen levees and concrete floodwalls
- 7:** Calculations: Structural Calculations for Flood Walls FEMA Submittal, KPFF Consulting Engineers
 - Calculations for concrete floodwalls
- 8:** North Shore Levee West Segment Interior Drainage Analysis, KPFF Consulting Engineers
 - Analysis and discussion of interior drainage, including delineation, characterization, and runoff modeling of outfall basins for pump station sizing.
- 9:** North Shore Levee West Segment CLOMR Plan Set, KPFF Consulting Engineers
 - Half-size 11x17-inch plan set identifying levee improvements
 - Full-size 22x34-inch plan set identifying levee improvements
- 10:** North Shore Levee West Segment Operations and Maintenance Manual, KPFF Consulting Engineers
 - Outline and instructions for the operation and maintenance of the levee
- 11:** North Shore Levee West Segment Emergency Preparedness Plan, KPFF Consulting Engineers
- 12:** North Shore Levee West Segment ESA Compliance Letter, KPFF Consulting Engineers



April 17, 2020

LOMC Clearinghouse
3601 Eisenhower Avenue, Suite 500
Alexandria, VA 22304-6426

Attention: LOMC Manager and Assigned Reviewers

Subject: Introductory Letter for CLOMR Application
North Shore Levee West Segment
Hoquiam, Washington
KPFF Project No. 10181900007

INTRODUCTION

This letter is provided to the reviewer as an abbreviated overview of the project and introduction to the forms, reports, and plans provided with this FEMA CLOMR submittal. We believe it is a helpful overview for the project's goals and objectives. A list of supporting materials being provided with this submittal, along with brief descriptions, is provided at the end of this letter.

Project Description

The objective of the North Shore Levee West Segment project is to design a levee for the City of Hoquiam, which once constructed will result in a revision of the National Flood Insurance Program (NFIP) mapping, removing the project areas from the 100-year flood plain.

The base flood elevation (BFE) for the project is elevation 13.0' NAVD 88. It has been determined that the total water level from the corresponding coastal flood event controls BFE in this area. One (1) foot of required freeboard above the total water level results in levee improvements to be constructed to elevation 14.0'. This BFE corresponds to the coast flood event Areas of high ground are identified along the levee alignment at elevation 13.0' or above. High ground does not need to be raised to the design height.

The project is entirely located within the City of Hoquiam in Grays Harbor County, Washington. The total length of the levee is approximately 5.2 miles. The north terminus of the levee alignment starts at the intersection of Highway 101 and Queen Avenue and heads northeast along Queen Avenue. The levee follows the Hoquiam River meander south utilizing existing high ground, proposed earthen levee, concrete, and sheet pile structures. At the mouth of Hoquiam River and Grays Harbor, the levee alignment turns west, utilizing portions of high ground where it reaches the south terminus at Paulson Road.

This project is a continuation of the North Shore Levee project located directly east of the Hoquiam River in East Hoquiam and West Aberdeen. That project received a CLOMR in 2017 (Case No. 17-10-1610R).

Purpose

The purpose of the levee is to protect the downtown business district, critical infrastructure, and residences in the City of Hoquiam from damaging floods and to reduce the financial burden of flood insurance and floodplain development regulations. The protected areas will be removed from the Special Flood Hazard Area Zone AE and placed in a Zone X. The City of Hoquiam has suffered from long-term economic depression and high unemployment. The removal of mandatory flood insurance for a majority of properties located within the floodplain will provide a desperately needed boost to the local economy.

Project Team

The City hired KPFF Consulting Engineers to be project manager and lead consultant to design the levee and assemble the needed documentation for the CLOMR submittal. Subconsultants include: Watershed Science and Engineering, GeoEngineers, and David Smith and Associates.

EXISTING CONDITIONS

Area History

The City of Hoquiam was originally developed over 100 years ago on a broad, flat plain adjacent to the Grays Harbor estuary and Hoquiam River. Elevations within the City generally range from 10 to 15 feet NAVD 88. Mean higher high tide in the adjacent water bodies is elevation 8.6 feet and the Base Flood Elevation calculated for this project is 14.0 feet.

Existing Protection

The project area is not currently protected by a formal levee system. The City has extensive piped stormwater conveyance systems with outfalls at the river and harbor. Some of these outfalls have pump stations and backflow prevention valves to promote positive drainage and prevent backwater flooding when river and harbor water levels are high. Additional drainage control structures to prevent backflow are proposed.

FLOODING SOURCE

The presence of the Hoquiam River and Grays Harbor adjacent to the project area result in strong tidal influence due to low gradients and proximity to the Pacific Ocean. There are two potential flooding sources in the area: Grays Harbor (coastal flooding) and the Hoquiam River (riverine flooding). Both coastal and riverine hydraulic conditions were evaluated to determine the BFE for the proposed levee. Effective studies have concluded that the Hoquiam River is totally influenced as far upstream as the Little Hoquiam River, therefore not providing any potential for riverine flooding in the project area. The 100-year base flood elevation and required 1 foot of freeboard along the levee is controlled by coastal flooding from Grays Harbor and is determined to be 14.0 feet NAVD88.

PROPOSED LEVEE

The levee runs through low, flat, mostly developed urban and suburban areas around the City. Many challenges arise for the construction of a new levee, such as space constraints due to dense development over the years and maintenance access. As a result, the levee includes several design types and special features as outlined below.

Design Height

Existing high ground is classified as areas located above the BFE of 13.0 feet NAVD88 and do not require levee improvements. Existing areas located below 13.0 feet NAVD88 will require levee improvements. The levee design height is 15.2 feet NVGD88 and consist of the BFE of 13.0 feet plus 1.0 foot of required freeboard and 1.2 feet for sea level rise. All levee improvements will be constructed to 15.2 feet NAVD88 or above.

The design height corresponds to the design height of 15.2 feet NAVD88 approved in the North Shore Levee CLOMR submittal (Case No. 17-10-1610R).

Earthen Levees

Earthen levees are proposed where feasible due to the simplicity of their design and construction, and their effectiveness. Other design types are proposed where space constraints occur, underlying sediment settling may occur, or access issues make earthen levees infeasible.

Concrete Flood Walls

Concrete flood walls are proposed where earthen levees are not feasible. More specifically, concrete T-walls with shallow spread footings with a maximum height of approximately 6 feet are proposed. Along Levee Street and at other limited locations, the concrete flood walls are integrated into sidewalk planters for aesthetics and public right-of-way beautification. Due to soil conditions not conducive to required levels of structural support, the concrete flood walls have wide footings of 9 feet for standard walls.

Sheet Pile Flood Walls

Sheet pile flood walls are proposed where earthen levees or concrete flood walls are not feasible. These sheet pile flood walls have an approximate 8-10 mm thickness with a design configuration width of 1.5 feet. Due to soil conditions not conducive to required levels of structural support, the sheet pile flood wall has an approximate minimum depth of three times the height of the flood wall for required friction value at the soil-wall interface.

Stoplog Closures for Access

Stoplog closures are proposed where space constraints do not allow acceptable vehicle and pedestrian grades to cross over the levee and where public or private access must be maintained. Stoplog closures consist of 5-foot spans of wooden stoplogs between concrete end walls with intermediate bollards for support. A closure plan is included with the project's Operation and Maintenance Manual. When an appointed levee superintendent orders the levee closed, the closure plan will be executed by maintenance crews. Complete closure of the levee will be completed within an estimated 185 minutes of the closure order.

Stormwater Conveyance System

The City has extensive piped stormwater conveyance systems with outfalls at the river and harbor. Under normal conditions, City stormwater is collected and conveyed via gravity flow to the river or harbor. In some cases, stormwater is pump-conveyed during high tide. At times, tidal waters prevent stormwater discharge from reaching the outfall as the system is surcharged.

This stormwater conveyance system will be slightly modified to separate the stormwater system into two systems: drainage inside the levee and drainage outside the levee.

Gravity conveyance will continue to be the primary source of stormwater discharge with the combination of existing pump stations that discharge stormwater via forcemain. The project proposes to relocate and upgrade the 10th Street Pump station within levee protection limits. The City of Hoquiam plans to upgrade other existing pump stations and conveyance lines as funding becomes available.

UNIQUE CONDITIONS

Urban Setting

A variety of design types have been proposed to accommodate space constraints and access requirements, and to avoid loading settlement-prone soils.

Stoplog Closures

There are a total of 59 stoplog closures to span openings in the levee for vehicular and pedestrian access to public and private properties. Closures have been proposed where acceptable grades over the levee could not be achieved, or where providing the grades would mean placing fill on settlement-prone soils that could damage nearby buildings via subsidence. A plan to close the levee within 185 minutes of an order to do so has been prepared. Ability to forecast closure events is aided by the tidal nature of the flooding.

Pipe Penetrations

The levee passes through an urban environment and thus there are a large number of existing pipes that the levee will be constructed over.

- Water and gas pipes are pressurized and will not directly transport water across the levee.
- The sanitary sewer system will utilize locking lids to prevent seepage into the system.
- Storm pipes will be retrofitted with backflow valves and pump stations.
- Other conduits such as telephone and power will be sealed based on risk assessment and feasibility.

MT-2 Forms

Some fields and questions within the MT-2 forms do not or only partially apply to this project. The rationale for excluding some responses is included in the submittal forms and attachments.

Please direct any content matters to the City of Hoquiam's City Administer, Brian Shay at 360-538-3966.

Sincerely,



Mark R. Steepy, PE
Principal

MRS:DP