VILLAGE OF GREENPORT

SUFFOLK COUNTY, NEW YORK

MITCHELL PARK BULKHEAD FEASIBILITY STUDY

FINAL

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.

WOODBURY, NEW YORK

MARCH 2018

VILLAGE OF GREENPORT
MITCHELL PARK BULKHEAD FEASIBILITY STUDY

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1.0 INTRODUCTION

1.1 Project Background

D&B Engineers and Architects, P.C. (D&B) has been retained by the Village of Greenport (Village) to prepare a feasibility study for the replacement of the 776-foot long timber bulkhead located at the Mitchell Park and Marina complex. Previously performed inspections have revealed that the bulkhead is in overall poor condition and is failing. The New York State Department of State Office of Planning and Development awarded the Village a Local Waterfront Revitalization grant through the Environmental Protection Fund to prepare a feasibility study to determine the best options for replacing the deteriorated bulkhead. This report will be used to support the development of plans and specifications for construction of the bulkhead replacement.

The Village is an economically distressed community with 17.7% of individuals living below poverty level compared to 7% in Suffolk County and 15.5% in the U.S. as a whole (U.S. Census American Community Survey). The Mitchell Park and Marina have been a major contributor to redeveloping the Village's downtown business district. The bulkhead is as essential component of the park and marina and its long-term viability. Since the Village depends on much of its economic vitality through tourism, projects that help preserve community character and waterfront access are vital in keeping the Village as an attractive destination for visitors. Strengthening the park's bulkhead infrastructure will ensure the continued operation of this important centerpiece of the Village.

2.0 EXISTING CONDITIONS

2.1 Site Location and Description

Mitchell Park is located at 115 Front Street in Greenport, New York. The northern property line is adjacent to Front Street while the southern property line is bordered by the subject timber bulkhead to Greenport Harbor (refer to Figure 2-1). The site is a 3.2-acre parcel located in the Waterfront Commercial District of the Village of Greenport. The Village Zoning Map is included as Figure 2-2. The site survey with boundary descriptions is included as Figure 2-3. The site was previously occupied by a boat marina and restaurant and was purchased by the Village on September 5, 1996. The property has since been redeveloped into public park space with an amphitheater, historic carousel, harbor walkway, and marina. The timber bulkhead was the only component of the park and marina complex that was not replaced during the redevelopment process.

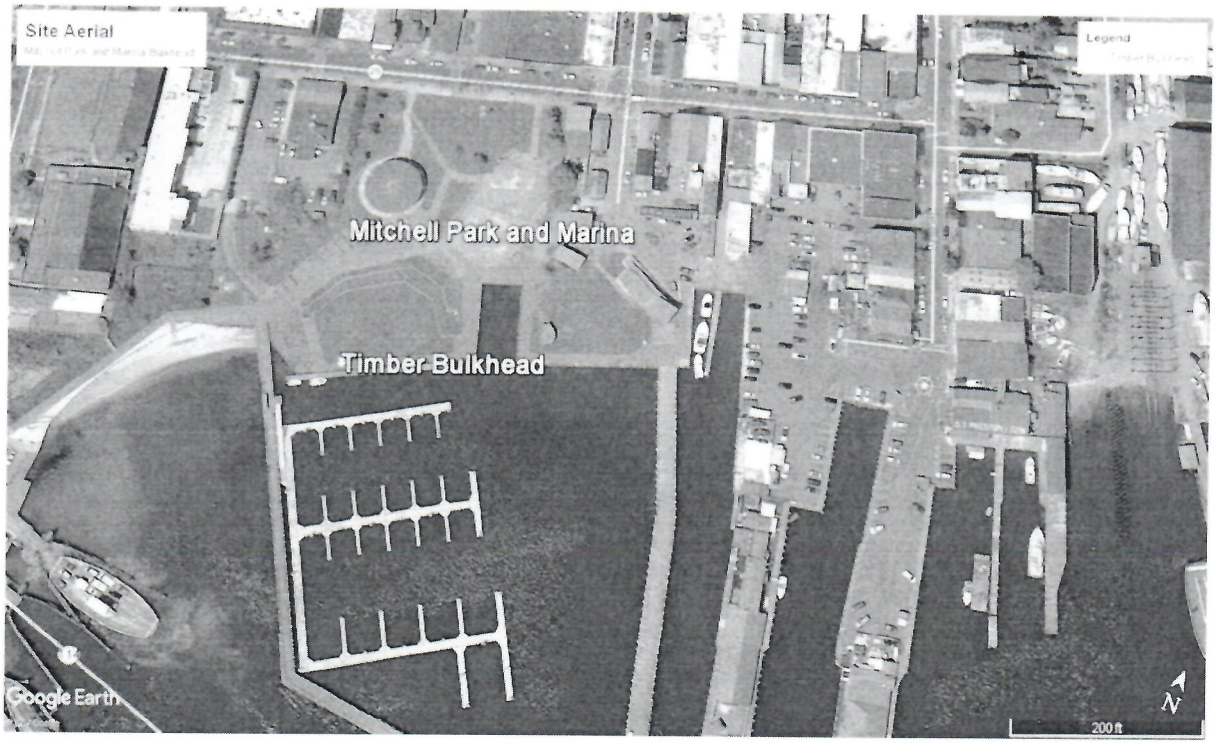

Figure 2-1: Site Aerial

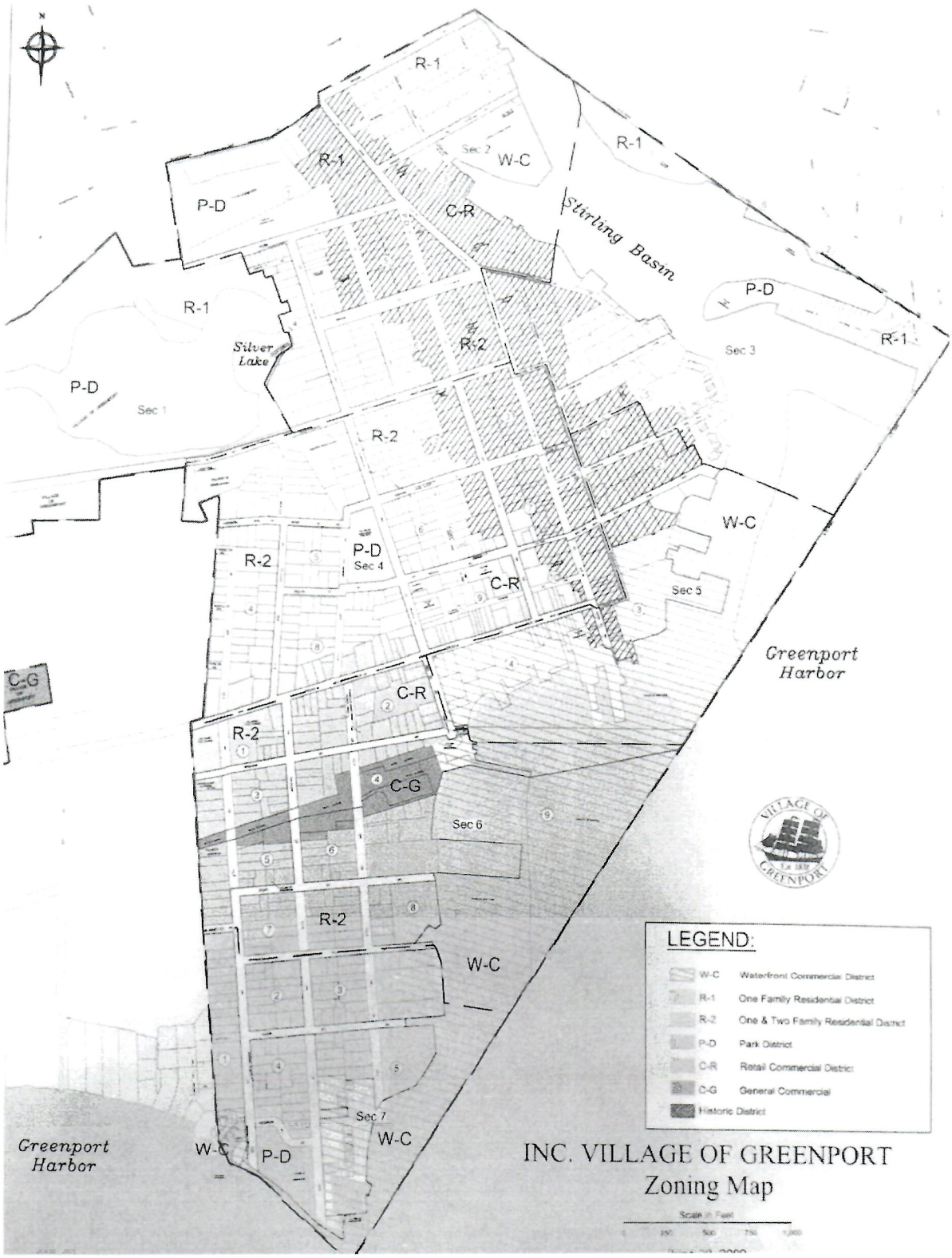

Figure 2-2: Village Zoning Map

SURVEY

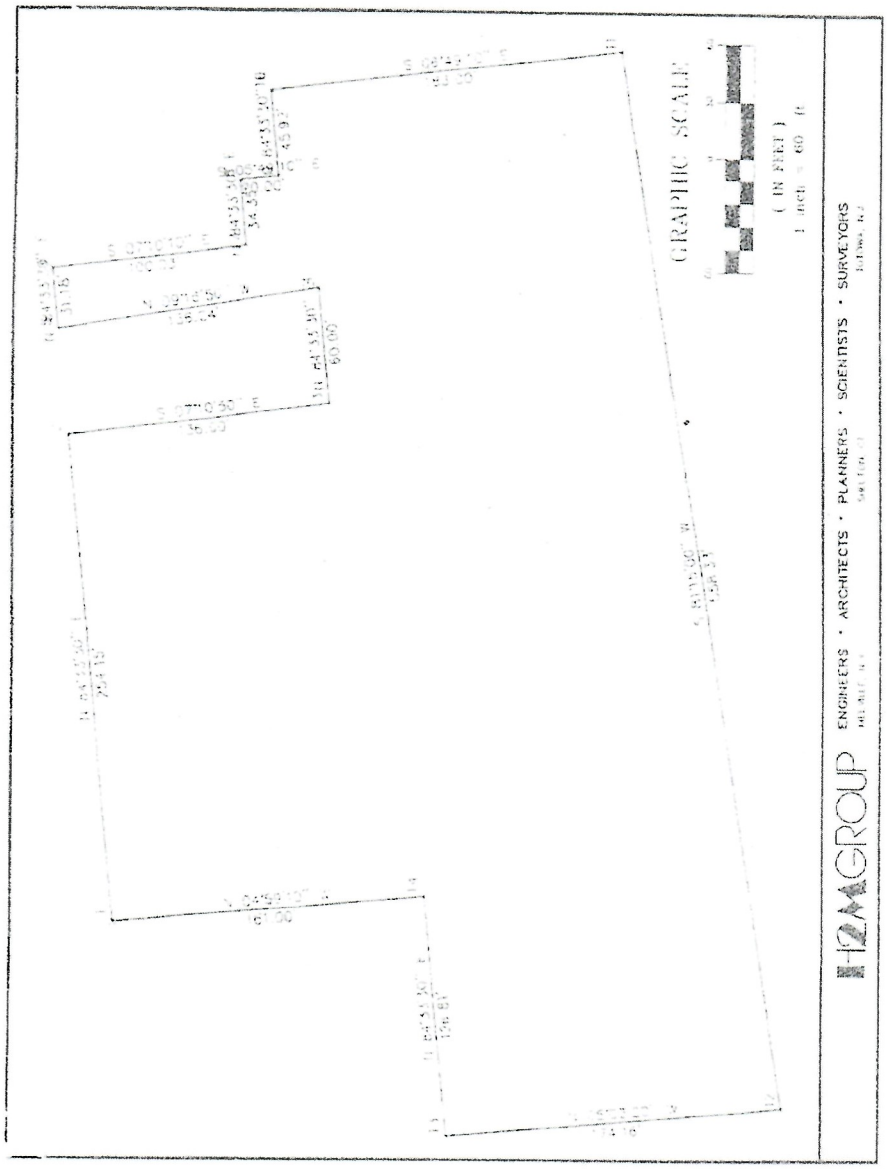

Figure 2-3. Site Survey

2.2 Site Information

Environmental Easement

The subject property went through a remediation program under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated with Brownfield Cleanup Agreement (BCA) Contract No. C301693, Site No.: B00027-1, which was executed on October 3, 2001. Identified contamination included arsenic, non-halogenated hydrocarbons and semi-volatile organic compounds. Upon completion of the site's Remedial Action Work Plan, some subsurface contamination remained. A Site Management Plan (SMP) was developed to manage the remaining contamination and to set Engineering and Institutional Controls at the site through an Environmental Easement. The SMP is included in this report for reference as Appendix A. The entire area of the site that contained contaminated soils was either covered with a minimum of 1-foot of clean fill and topsoil or capped with structures. The use and development of the site is restricted to passive recreational activities only.

Land Use

The existing site serves as a main gathering place in the "heart" of the Village. The Park functions on a year-round basis as a public park, a venue for maritime and other Village events, and a place of entertainment. Amenities in the park include an operational Carousel, working Marina with boat slips, observation deck and boardwalk, summer stage and dance floor, and a winter ice-skating rink.

Water Use

The southern limit of the site is bounded by the 776-foot bulkhead. There is an existing easterly timber pier approximately 630 feet in length. This pier has decking along the entire length and is accessible to the public. There is an existing westerly timber pier approximately 575 feet in length. This pier has decking along the entire length and is accessible to the public. There is an

inner 60 slip marina accessible by a gangway on the western pier. Refer to Figure 2-4 for the water structure outline.

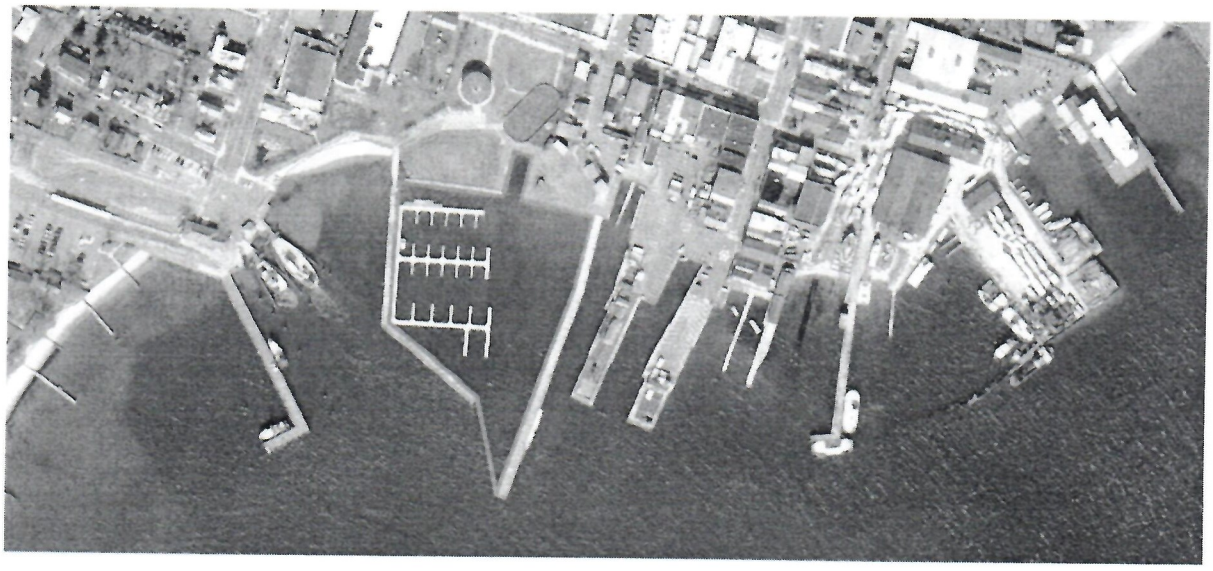

Figure 2-4: Water Structure Outline

FEMA Flood Zone

FEMA delineates Special Flood Hazard Areas (SFHA) as those subject to inundation by a flood that has a 1-percent or greater chance of being equaled or exceeded during any given year. This type of flood is commonly referred to as the 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. The existing site is primarily categorized as FEMA Flood Zone AE with a Base Flood Elevation (BFE) of 6 feet NAVD88. Refer to Figure 2-5 for the FEMA Flood Map.

It will be prudent early in the design to review post-Sandy practices and to establish a consensus as to realistic height parameters. Regardless of the bulkhead replacement alternative selected, the following items will be essential for determining the proper bulkhead elevation:

- Most recent flood height data;
- Long term sea-level rise projections;

- FEMA Flood Insurance Rate Map (FIRM); and
- Wave overtopping.

According to FEMA technical guidance (specifically technical fact sheet No. 1.6), the elevation for the 500-year flood event in a coastal flood hazard area can be approximated by multiplying the elevation of the 100-year BFE by 1.25. Therefore, the elevation of the 500-year flood event for this project is 7.5 feet NAVD88. However, in order to provide additional protection, freeboard should be considered to account for long-term sea level rise in accordance with NYSDEC sea-level rise projections as described in 6 NYCRR Part 490.

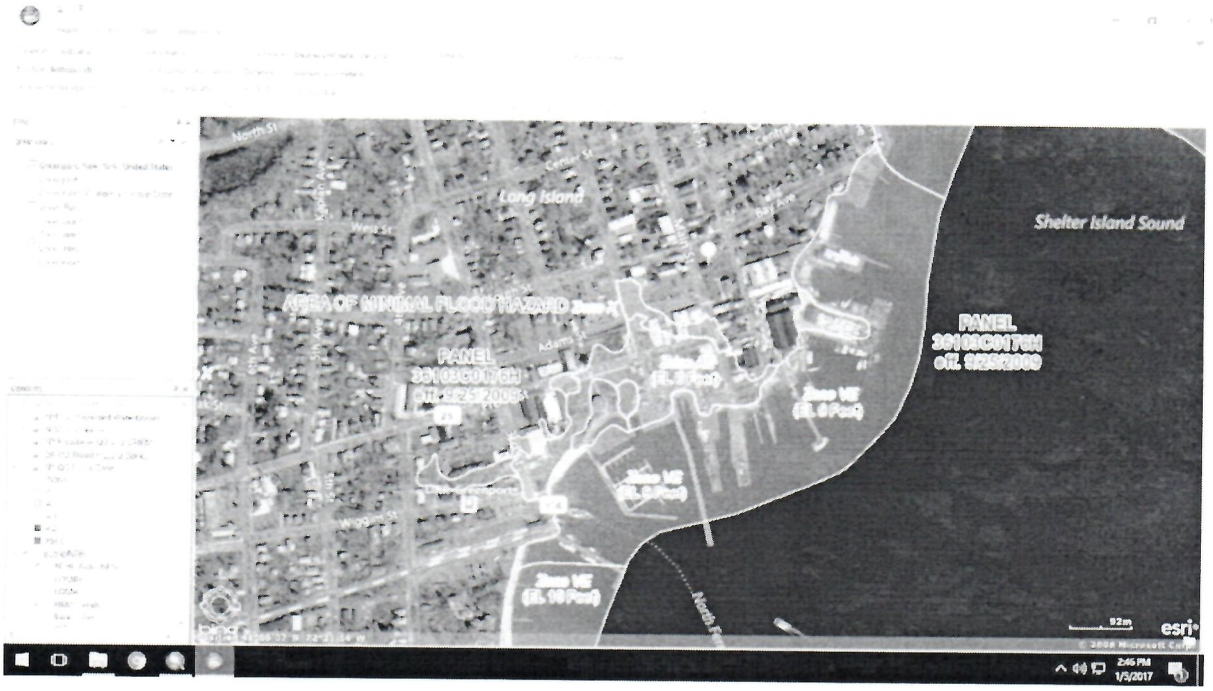

Figure 2-5: FEMA Flood Map

Site Topography

The site is generally flat with grade elevation ranging from 6 ft. NGVD to 7 ft. NGVD. There are no permanent streams or ponds on the property. Stormwater on the site infiltrates into a subsurface drainage system consisting of underground perforated piping that allows storage and groundwater recharge. There is one (1) 24" RCP outfall that runs through the eastern end of the

site and penetrates through the bulkhead. This outfall pipe collects runoff generated from off-site sources including catch basins on Front Street and First Street.

Geology

Groundwater flow direction on the site is to the south and southwest. Based on soil borings performed, depth to groundwater ranges from 5 feet to 8 feet below grade. Soil borings were completed behind the existing bulkhead on January 10th – 11th, 2018. In general, fill/wood/debris was found in shallow depths. Fine to medium to coarse sand and gravel was predominantly recovered at varying depths. Refer to Appendix B for the complete Soil Boring Report and Results.

Nearest/Receiving Waterbody

The project site is adjacent to Greenport Harbor.

Transportation Systems

The site is directly accessible and adjacent to Front Street. Transportation systems within walking distance of the project site include the Greenport terminal of the Long Island Railroad, North Ferry Landing, Hampton Jitney Terminal at the Larry Tuthill Park, and County public bus transit.

2.3 Existing Bulkhead Structure

The timber bulkhead is a 776-foot structure constructed in the early 1990's. Previous documents indicate that the bulkhead height ranges between 12 to 15 ft. above the mudline and structurally consists of 12-inch diameter piles, 8 in. by 8 in. upper and lower timber wales, and 3 in. by 10 in. tongue and groove timber sheets. One-inch diameter steel rods are utilized to connect the bulkhead structure to a subsurface timber anchor (deadman) system, composed of posts and lays. These are connected by a pair of 1-inch diameter steel rods to the timber piles at an upper and lower wale. All timber members were treated with Chromated Copper Arsenate (CCA) at

levels of 2 pounds per cubic foot for the sheeting and 1.5 pounds per cubic foot for all other timber elements. General photos of the bulkhead can be found in Figures 2-6 and 2-7.

The bulkhead is in overall deteriorating condition exhibiting heavy wood decay resulting from marine borers. The sheeting has experienced shifting from its original alignment and some sections have experienced bowing. Localized sinkholes can be found behind the bulkhead resulting from the deterioration of the sheeting. Gaps between the sheeting just above the mudline is characteristic of wood decay within the high tide/low tide interface, where daily dampness and drying over time accelerates the wood deterioration process. The openings created between the sheets result in soil loss behind the structure.

Due to the poor existing condition of the bulkhead and the anticipated continuation of its deterioration, the Village is considering complete replacement of the bulkhead structure, which has already exceeded its anticipated service life.

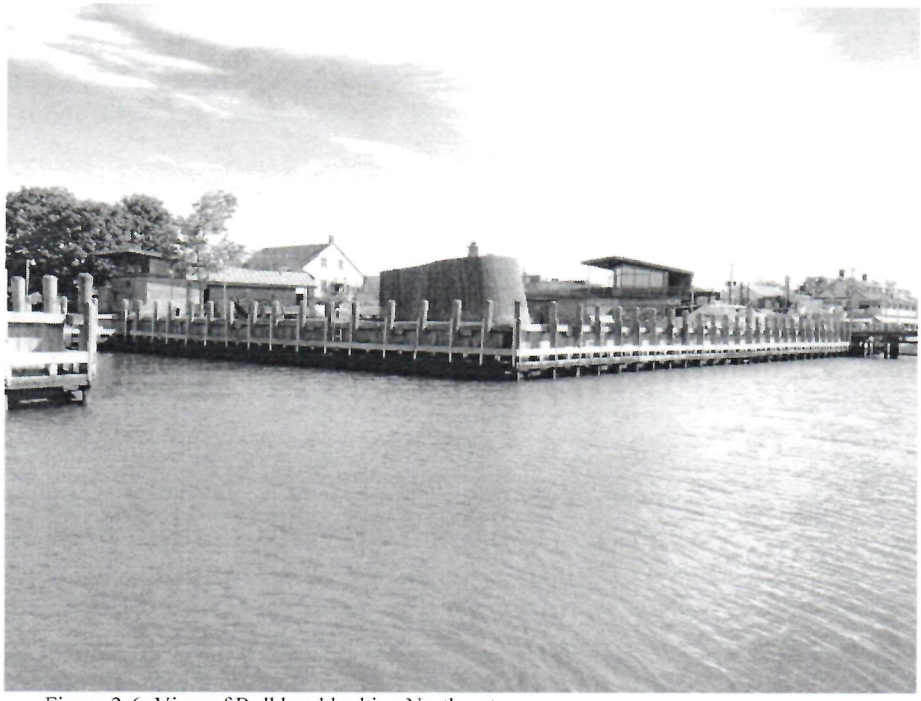

Figure 2-6: View of Bulkhead looking Northeast

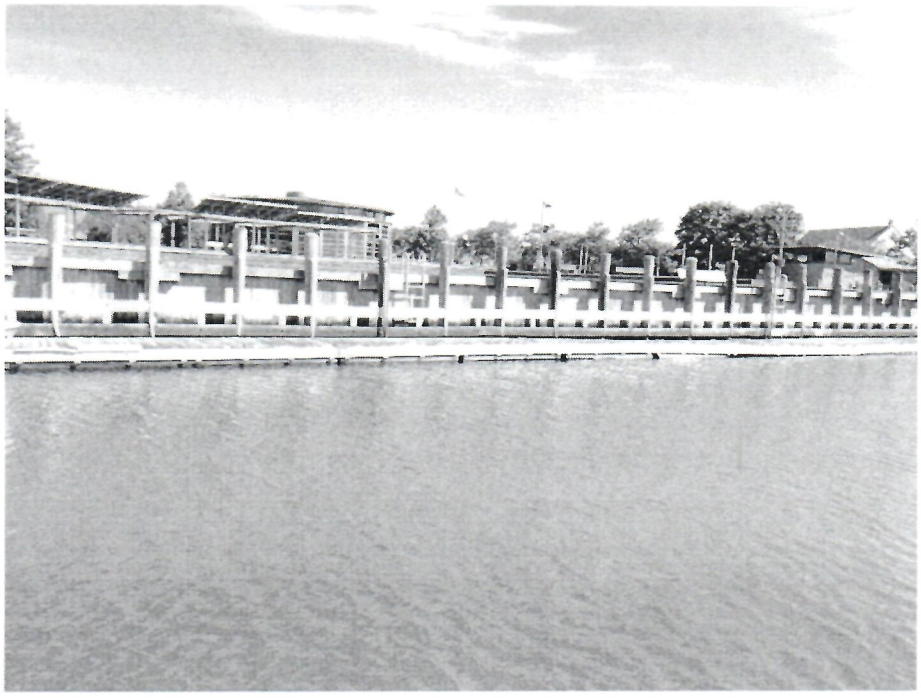

Figure 2-7: View of Bulkhead looking North

3.0 EVALUATION OF ALTERNATIVE SCHEMATIC DESIGNS

Material Consideration

There are several different types of materials that can be used for sheet piling including:

- *Concrete* – Concrete sheet piling configurations can provide a service life of over 30 years with the correct mix and structural design. Concrete will generally provide a long service life but it is not favorable on a first-cost basis.

- *Wood* – Wood is historically the most popular choice of material for bulkhead construction and may be the most cost effective regarding up front installation costs. However, because wood decays more rapidly than other materials, significant maintenance is required. If the lumber is properly pressure-treated, the wood is less susceptible to rot and has a service life of approximately 20 years.

- *Aluminum* – Aluminum sheet piling provides good corrosion resistance, but its limited strength will only allow for minimal exposed wall height. Aluminum sheet piling is also difficult to install in hard substrates.

- *Steel* – Steel sheet pilings provide excellent strength characteristics, have an interlocking seal, are generally easy to install, and are excellent for almost any size bulkheads. Steel bulkheads likely have the highest upfront costs and will tend to rust over time, especially in the splash zone of a salt water environment. However, when properly coated with an epoxy coal/tar and maintained, they can have a service life of over 25 years.

- *Vinyl* – Vinyl sheet pilings offer the most cost-effective alternative for the life-span of a new bulkhead installation. Vinyl sheet pilings offer low installation and maintenance costs, moderate strength, and excellent corrosion resistance. Projects along the north shore of Long Island have experienced constructability (drivability) problems with vinyl pilings. The presence of rock or debris can sometimes limit the depth to which the sheets can be installed. However, based on soil borings obtained at the site, and nearby bulkhead installations, drivability is not anticipated to be an issue. Vinyl sheets have the longest service life at over 50 years and require minimal maintenance. Due to the long service life, minimal maintenance, and cost-efficiency, **D&B recommends the use of vinyl sheet piling for this project.**

  Note: The use of Vinyl Sheeting will still require timber components including piles, wales, etc. These components shall be pressure treated to increase service life.

Evaluation and Comparison of Alternatives

The alternative schematic designs evaluated include:

1. No Action;
2. Rehabilitate Existing Bulkhead;
3. Complete demolition, excavation and removal, and in-kind replacement of the existing bulkhead within its current alignment;
4. Removal of existing bulkhead sheeting, abandonment of existing tie-rods, and installation of new bulkhead with horizontally drilled tie-rods; and
5. Abandonment of existing bulkhead in-place and installation of new bulkhead immediately seaward of the existing bulkhead.

3.1 Alternative 1: No Action

If no action is undertaken, the existing bulkhead will continue to deteriorate and may eventually collapse. Further deterioration and/or collapse of the bulkhead would likely result in a threat to public safety and property. Failure of the bulkhead would result in potential contamination of the adjacent waterway and public. Therefore, this alternative is not considered a feasible option.

This Alternative does not address the project objectives, and therefore, is not recommended.

3.2 Alternative 2: Rehabilitation of Existing Bulkhead

Repairs to the existing timber bulkhead would only provide a short-term solution to the ongoing deterioration and eventually would result in the failure of the bulkhead. Repairs would consist of patching the bulkhead and possibly fortifying it along selected portions. However, the deterioration of the bulkhead is widespread to the point that these types of repairs would be only partially effective and temporary at best. Failure of the bulkhead would result in potential

contamination of the adjacent waterway and public. Therefore, this alternative is not considered a feasible solution.

This Alternative does not address the project objectives and, therefore, is not recommended.

Feasible Alternatives

A number of replacement options were considered and assessed against set design constraints including impacts/disruption to local community and site facilities, constructability, maintenance, strength, long-term durability, cost, aesthetics and environmental impact. Three feasible alternatives were identified and are detailed below.

3.3 Alternative 3: Complete Demolition, Excavation and Removal, and In-Kind Replacement of the Existing Bulkhead within its Current Alignment

This Alternative includes the complete demolition, excavation, removal, and in-kind replacement of the existing timber (or a material of comparable strength and durability such as vinyl) bulkhead. It would be placed within the existing alignment.

This Alternative would involve the construction of a new timber or vinyl bulkhead nearly identical to the existing bulkhead in design and size, and it would not extend further into the water than the existing bulkhead. It most likely would be considered by the environmental regulatory agencies as an "in-kind and in-place" improvement and most likely would not be problematic from an environmental review and permitting perspective. As per the NYSDEC, when in-place replacement of an existing, functional structure is proposed, but the construction type or material will be altered, further review may be required to determine whether the alterations are minor and therefore still qualify the proposed project as an in-kind replacement as opposed to a more substantial and major improvement.

However, to remove and replace the existing tie rods and anchorage system, extensive excavation would be required at the site. Under this alternative, the contaminated material on-site

would be disturbed and therefore require remediation. Full compliance with the Site Management Plan and Environmental Easement would be required. According to the Site Management Plan, the remaining contamination on-site consists of arsenic, non-halogenated hydrocarbons and semi-volatile organic compounds. The Contractor removing the existing bulkhead and installing the new bulkhead would be required to remediate all encountered contaminated soils. It is anticipated that this procedure would significantly increase construction costs. Temporary sheeting would need to be installed seaward of the existing bulkhead during the removal of the existing timber sheets to retain any loose soil. However, even with the use of temporary sheeting, there still exists the risk of exposure of subsurface contamination to the adjacent waterways and public.

Therefore, although this Alternative is feasible, due to the potentially negative impacts to the waterway and public, this option is not recommended.

3.4 Alternative 4: Removal of Existing Bulkhead Sheeting, Abandonment of Existing Tie-Rods, and Installation of New Bulkhead with Horizontally Drilled Tie-Rods within its Current Alignment

This alternative includes the removal of the existing bulkhead with the exception of the tie-rods and anchor system. The tieback and anchor system would be abandoned in place while the sheeting components would be completely removed. Temporary sheeting may be installed seaward of the existing bulkhead during the removal of the existing timber sheets to retain any loose soil. The temporary sheeting would need to be installed with sufficient setback from the existing bulkhead to allow space for installation of new components. Abandoning the tieback and anchor system would reduce the need for excavation, and thus minimize the requirement to remediate the contaminated soils that would be encountered. Once the sheeting components are removed, a new timber bulkhead would be installed "in-kind" with the exception of the tieback and anchor system. The new timber bulkhead would utilize horizontally drilled tie-rods (also known as helical tie-backs) instead of the tie-rods and laying logs. The helical tiebacks are installed from the seaward side of the bulkhead and do not require an anchor system. The helical tie-backs would eliminate the need for excavation during the new bulkhead installation while simultaneously providing a new anchorage system.

Included in this Alternative would be the installation of a new bulkhead structure where the existing timber sheeting was removed. As stated previously, D&B recommends the use of vinyl sheeting for the new bulkhead.

This bulkhead under this Alternative would not be vastly different from the existing bulkhead in design and size, and it would not extend further into the water than does the existing seawall. It most likely would be considered by the environmental regulatory agencies as an "in-place" improvement and most likely would not be problematic from an environmental review and permitting perspective. As per the NYSDEC, when in-place replacement of an existing, functional structure is proposed, but the construction type or material will be altered, further review may be required to determine whether the alterations are minor and therefore still qualify the proposed project as an in-kind replacement as opposed to a more substantial and major improvement.

Although this Alternative reduces the need for excavation and subsequently the requirement to treat all contaminated materials encountered, it does not eliminate the risk of waterway contamination and public exposure. During the removal of the existing sheeting, contaminated material may be exposed and disturbed. The proposed temporary sheeting will also need to be installed far enough seaward to allow room for constructing the new bulkhead sheeting and installing the horizontally drilled tie-rods. Thus, the temporary sheeting is limited in it's ability to prevent contamination from entering the waterway. Furthermore, during the installation of the new horizontally drilled tie-rods, it is possible that the abandoned tie-rods and anchor system would interfere and cause blockage.

Therefore, although this Alternative is feasible, due to the potentially negative impacts to the waterway and public, this option is not recommended.

3.5 Alternative 5: Abandonment of Existing Bulkhead In-place and Installation of New Cantilevered Sheet Pile Bulkhead Immediately Seaward of the Existing Bulkhead

This Alternative includes abandoning the existing timber bulkhead in-place and installing a new bulkhead immediately seaward of the existing bulkhead.

Abandoning the existing timber bulkhead in-place would be advantageous for minimizing the amount of excavation required at the site. Abandoning the existing timber bulkhead would essentially involve no excavation. The existing bulkhead is anchored via 1-inch diameter steel tie rods from the timber piles to an anchor system consisting of posts and lay logs. As mentioned previously in this report, the site contains contaminated material below a 12" clean fill cap. Removing these tie rods and the associated anchor system would require significant excavation and disturbance of the contaminated material. As such, removal of these bulkhead components would require compliance with the Site Management Plan and Environmental Easement, which have several Engineering and Institutional Controls in place. Among these is the requirement to treat all contaminated materials encountered. In addition to risking potential contamination being released into the adjacent waterway and exposure to the public, it is likely that the Site Management Plan requirements would greatly increase construction costs. Under this alternative, the potential costs of treating the contaminated material would be avoided. Furthermore, the risk of exposing contaminated material to the adjacent waterway and public would be drastically reduced.

Included in this Alternative would be the installation of a new bulkhead structure in front of the abandoned timber bulkhead (within 18"). As stated previously, D&B recommends the use of vinyl sheeting for the new bulkhead.

The new vinyl bulkhead would be installed in front (seaward) of the existing timber bulkhead. A tie rod system for the new vinyl bulkhead that could be drilled through the abandoned sheeting would be selected. One option would be to utilize horizontally drilled tie-rods (also known as helical tie-backs) instead of traditional tie-rods and laying logs. The helical tiebacks are installed from the seaward side of the bulkhead, drilled through the abandoned bulkhead and soil, and would not require an anchor system. The helical tie-backs would eliminate the need for excavation during the new bulkhead installation while simultaneously providing a new anchorage system.

The installation of bulkheads seaward of existing bulkheads is not considered a best management practice by the regulatory environmental agencies. Although NYSDEC has historically allowed new bulkhead installations to be placed within 18 inches seaward of the

existing bulkhead, more recently NYSDEC has given considerable pushback on any seaward extension. The State tidal wetland regulations categorize the proposed "filling" of the wetland area along a sea wall as "presumptively incompatible" with the Part 661: Tidal Wetlands Land Use Regulations. As a result, NYSDEC generally does not approve projects that will encroach "seaward" of the face of the existing structure **without sufficient cause**. Due to the unique site constraints at this site including the risk of exposure of subsurface contamination to the adjacent waterways and public, there is sufficient cause and justification that would merit a seaward installation. Based on correspondence with the New York State Department of State Office of Planning and Development who awarded the Village the Local Waterfront Revitalization grant, it is likely that the regulatory environmental agencies would accept installation of the new vinyl bulkhead within 18" seaward of the existing bulkhead due to potential of waterway contamination if the existing structure were to be removed.

Due to this alternative's cost efficiency, drastic reduction in environmental risk and relatively minor environmental impact, this Alternative is found to be the most feasible approach and is therefore recommended for the Village to pursue.

4.0 ANALYSIS OF RECOMMENDED ALTERNATIVE

4.1 Environmental Impacts and Permitting Considerations

As stated above, it is anticipated that the regulatory environmental agencies would accept installation of the new vinyl bulkhead within 18" seaward of the existing bulkhead due to the presence of subsurface site contamination and the potential risk of exposure to adjacent waterways and the public that excavation and removal would cause.

Federal and State permits, approvals and/or certifications that would likely be required include the following:

Agency	Permit/Approval/Certification (1)
NYSDEC	Part 661 - Tidal Wetlands Part 608 - Protection of Waters Section 401 Water Quality Certification
NYSDOS	Coastal Zone Consistency Certification Significant Coastal Fish & Wildlife Habitats
SHPO	Consultation request
Army Corps of Engineers	Section 10 Rivers and Harbors Act Essential Fish Habitat Assessment for NOAA Endangered Species Act Assessment for NOAA

(1) The permits/approvals from the NYSDEC, Army Corps of Engineers and the NYSDOS can be obtained through a Joint Application Process.

The installation of a bulkhead seaward of an existing bulkhead would typically be considered an "Unlisted" action under New York State's Environmental Quality Review Act (SEQRA) and therefore will require formal environmental review.

The 18" extension precludes the applicability of a U.S. Army Corps of Engineers (ACOE) Nationwide Permit (i.e., No. 3) and would require an "individual" permit which is a lengthy review process. The bulkhead replacement would also require New York State Department of Environmental Conservation (NYSDEC) Tidal Wetlands, Protection of Waters, and Water Quality

Certification permits/approvals. In addition, a coastal consistency certification from the New York State Department of State (NYSDOS) would also be required. It is anticipated that moving forward with this Alternative will require extensive coordination with the involved regulatory environmental agencies.

4.2 Construction Requirement Analysis

In addition to the above-mentioned permit requirements, it is essential to consider construction-related impacts such as pedestrian detours, fugitive dust, and noise that would occur during the period of construction. These impacts, while sometimes intense, are temporary in nature and would not last beyond the construction period. This project will involve several important construction considerations due to its location in a park and its proximity to surface waters, possibly regulated wetlands. Measures can be taken to minimize anticipated impacts. Environmental controls as specified in environmental permits must be followed with respect to protection of natural resources. These controls may include seasonal phasing of work; facilities to minimize siltation turbidity in adjacent waters; and site safety for park users. Any contaminated soils encountered must be remediated in accordance with the Environmental and Institutional Controls identified in the Environmental Easement. There are multiple techniques that may be utilized for the installation of the vinyl bulkhead including vibratory plate, vibratory hammer, and jack hammer. Vibratory impacts, which go along with installing sheeting and pilings, will require monitoring. Pedestrian safety and community relations will be important considerations when scheduling the construction work.

4.3 Preliminary Cost Estimate

The following preliminary cost estimate shall be considered a Class 5 Estimate for conceptual purposes.

Table 4-1

PRELIMINARY COST ESTIMATE

Item	Quantity	Unit Price	Total Cost
General Requirements	1	$150,000.00	$150,000.00
Vinyl Bulkhead	776 Linear Feet	$1,950.00	$1,513,200.00
Clean Fill	875 Cubic Yards	$50	$43,750
		Total	**$1,706,950**

The following assumptions are included in this estimate:

- Prices are as of March 2018;
- General Requirements shall include mobilization and demobilization, construction staging and temporary facilities/utilities, erosion control, and stormwater control;
- The new vinyl bulkhead item consists of all components required for the construction of the new bulkhead including, but not limited to, the abandonment of the existing bulkhead sheeting and piles, and the installation of new sheeting, piles, wales, helical tie-backs, etc.; and
- Minimal remediation of contaminated soil.

4.4 Conclusion

The recommended alternative to **abandon the existing bulkhead in-place and install a new bulkhead immediately seaward of the existing bulkhead** is the most feasible and cost-effective alternative for the Village. This alternative accomplishes the project objectives of providing the proper stability and protection to the Mitchell Park and Marina facility. This goal is accomplished with minimal disruption to the contaminated soil and drastically reduces the environmental risk of contamination exposure to the adjacent waterway and public. Upon approval of the recommended alternative by the Village and funding agencies, a complete set of design drawings and specifications, and permit applications will be developed. Along with construction details, the plans must include provisions for construction access and staging areas, sequence of construction, and an erosion control plan and other stormwater management practices addressing construction near surface waters.