CAPE COD CANAL & SANDWICH BEACHES

SHORE DAMAGE MITIGATION PROJECT

APPENDIX H

COMMENTS, LETTERS AND RESPONSES

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Cape Cod Canal and Sandwich Beaches
Section 111 Shore Damage Mitigation Project
Public Comment Summary Report

Draft Detailed Project Report and Integrated Environmental Assessment Comments

The United States Army Corps of Engineers (USACE) issued the Public Notice of the availability of the Cape Cod Canal and Sandwich Beaches Section 111 Shore Damage Mitigation Draft Detailed Project Report and Integrated Environmental Assessment (DPR/EA) on 10 March 2021. USACE published the Draft DPR/EA and its Appendices on the New England District website and provided a link to the report in the Public Notice. Between 10 March 2021 and 10 April 2021, USACE accepted public comments on the Draft DPR/EA via electronic mail (email) and regular mail. The Project Manager, Mike Riccio, responded to all emails and letters at the time of their receipt. The comments received are included in the attached comment summary matrix and summarized with responses below. A total of 111 comments were received, 90 of which were pictures and letters drawn and written by attendees of Forestdale Elementary School.

Protection of Sandwich's shoreline

The majority of comments (106 emails/letters) received supported the project and noted the importance of Sandwich's shoreline for wildlife, recreation, and as a protective barrier for the marsh and downtown Sandwich. Ninety letters with hand-drawn pictures regarding the importance of protecting the Sandwich shoreline were sent to the USACE by Forestdale Elementary School children. Mr. Riccio and the Deputy District Engineer, Scott Acone, held a virtual call with Forestdale Elementary School attendees and staff on 28 April 2021 to discuss the project and answer questions.

The commenters urged regular replenishment of the Town Neck Beach and some (3 emails/letters) requested nourishment of Springhill Beach. USACE recognizes the need for replenishment of Town Neck Beach, and that those efforts would indirectly nourish Springhill Beach. Although the Canal FNP influences erosion along Springhill Beach, the projected shoreline retreat line does not intersect with any structures along that reach. As a result, the study did not focus on mitigating damages specifically to Springhill Beach and focused on addressing the more directly impacted area of Town Neck Beach. Beach nourishment will benefit the entire littoral system, indirectly helping to stabilize conditions along Springhill Beach too. The DPR/EA recommends additional USACE efforts towards developing a long-term sediment management strategy for the east entrance to the Cape Cod Canal. The goal of this effort would be to sustainably maintain the Sandwich shoreline.

Removal of jetties

One commenter urged the removal of the jetties at the east entrance to the Cape Cod Canal as a solution to the erosion issue. USACE considered the full removal of the jetties as an alternative in the DPR/EA. Removal of the jetties would cause extensive shoaling in the Cape Cod Canal such that the FNP would no longer be operable. Although jetty removal would

theoretically allow for increased downdrift sand migration, the economic impacts from allowing the Canal to close would outweigh the benefits. USACE also considered shortening the northern jetty at the east entrance of the Canal by 550 linear feet. Modeling did not, however, support this approach because it would only result in a maximum potential increase of 160 cubic yards of material bypassing the northern jetty per year. This volume is inconsequential relative to the rate of sediment loss downdrift of the Canal.

Technical comments

Several commenters (three letters/emails) questioned the dimensions of the Scusset Beach borrow site as well as the use of a background erosion rate determined from the 1952 dataset to predict future erosion rates on Town Neck and Springhill Beach. USACE provided a conceptual design of the Scusset Beach borrow area in the Draft DPR/EA. The dimensions and design of the borrow site will be finalized in the Preconstruction Engineering and Design phase of the project and are therefore subject to change.

A long-term background erosion rate of -1.1 ft/year was included in this analysis. The long-term shoreline change rate was considered to be a more representative background erosion rate than the short-term shoreline change rate for several reasons. First, the short-term rate is influenced by contemporary nourishments, with increased rates of shoreline change in those years which mask the true background erosion rate. Second, the short-term period from 2000-2018 was considered to be a relatively short timeframe to be used to generate a background erosion rate, prone to significant variation due to the limited number of shorelines used to derive the short-term rate. Therefore, the long-term change rate was used to evaluate performance of beach fill alternatives.

Using the long-term rate of background erosion of -1.1 ft/year, renourishment of the beach fill is anticipated to be needed after 9 years when 30 percent of the initial placement volume and a 30 ft wide berm remain. While the long-term rate of background erosion is considered more representative and reliable than the short-term rate, it is noted that increased rates of erosion have been observed. Should an increased rate of background erosion, consistent with the short-term shoreline change from 2000-2018, of -5 ft/year occur, the triggers for renourishment would be reached after 5 years.

Cape Cod Canal Section 111 Public Comment Log

COMMENT NO.	DATE OF LETTER	ORGANIZATION	COMMENT
1	3/12/2021	Private Citizen	Corps should take jetties out to solve problem.
2	3/18/2021	Private Citizen	All sand should to to Town Neck Beach.
3	n.d.	Private Citizen	Resident of Springhill Beach, wants yearly replenishment.
4	3/19/2021	Private Citizen	Support for project.
5	3/12/2021	Private Citizen	Urges regular replenishment.
6	3/30/2021	Private Citizen	Would like direct nourishment of Springhill Beach.
7	4/2/2021	Private Citizen	Urges regular replenishment.
8	3/20/2021	Private Citizen	Urges regular replenishment.
9	3/20/2021	Trustees of Sandwich Beaches	Email of support and questions about how shoreline change analysis was conducted.
10	4/1/2021	Trustees of Sandwich Beaches	Letter of support for the project and comments on the analysis. Disagrees with use of 1952 dataset for predicting future erosion rates. Would like more information on permanent bypassing system and a better solution for Springhill Beach. Additional questions about cost in Appendix 2.
11	3/14/2021	Private Citizen	Urges regular replenishment.
12	3/27/2021	Private Citizen	Support for project and urging sand bypassing.
13	3/18/2021	Private Citizen	Support for project and regular replenishment with Canal material.
14	3/22/2021	Private Citizen	Urges regular replenishment and shortening of jetty.
15	3/21/2021	Private Citizen	Urges regular replenishment.
16	4/2/2021	Private Citizen	30-day public notice was too short. Dimensions of Scusett borrow area incorrect for depth/volume calculations. Should evaluate the sand bypassing system more thoroughly.
17	3/23/2021	Barnstable County Commissioners	Letter of support for project and use of material from dredging the Canal FNP.
18	3/22/2021	Sandwich Conservation Commission	Letter of support for project and use of material from dredging the Canal FNP.
19	3/19/2021	Sandwich State Delegation	Letter of support for project and use of material from dredging the Canal FNP.
20	3/22/2021	Sandwich Board of Selectmen and Town Manager's Office	Letter of support for project and use of material from dredging the Canal FNP.
21	3/23/2021	Forestdale Elementary School	90 drawings and letters of support.

Town of Sandwich
The Oldest Town on Cape Cod

Sandwich Conservation Commission
16 Jan Sebastian Drive
Sandwich, MA 02563
(508) 833-8054

March 22, 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Via E-Mail: Michael.S.Riccio@usace.army.mil

Re: Town of Sandwich support for Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches

Dear Mr. Riccio:

On behalf of the Sandwich Conservation Commission and Department of Natural Resources, we are submitting these comments related to the Section 111 Shore Damages Mitigation Study for the Cape Cod Canal (Canal) and Sandwich Beaches.

The Town of Sandwich (Town) first approached the U. S. Army Corps of Engineers (Corps) with a formal request to commence a Section 111 study of this area on March 2, 2006. While it has taken 15 years to arrive at this stage in the process, we are pleased and grateful for the progress the Corps team has made to issue the final report for public comment. The report confirms what has long been Suspected – that the Canal itself is the primary cause of the dramatic erosion along Town Neck and Spring Hill Beaches in Sandwich. The report seeks to develop a long-term strategy for mitigating damages to public and private infrastructure caused by the Canal jetties and proposes a recommended mitigation plan.

In short, both the Sandwich Conservation Commission and Department of Natural Resources ***strongly*** support the primary recommendations in the report, which include:

- the recommended plan to restore a barrier beach and dune system to provide protection for a portion of the impacted study area that would reintroduce a substantial amount of sand to the impacted littoral system downdrift of the Canal east end jetties; this nourishment would be accomplished by dredging approximately 400,000 cubic yards of material from the Town permitted Scusset Beach bypass location and placing the compatible material in the Town permitted Town Neck Beach dune and beach reconstruction template.

- finding a long-term solution to the lasting negative impacts of the Canal jetties which are not being removed. From the Town's perspective, a reasonable solution would be amending the Corps' Canal operations and maintenance (O&M) dredging protocol to permanently require all compatible dredge material be beneficially reused and bypassed to Sandwich beaches at the Corps' expense; this would include not only the already permitted Town Neck Beach template, but may also include other Sandwich Beaches on Cape Cod Bay that fall within the influence of the Canal and could be permitted in the future, such as Spring Hill Beach. This beneficial reuse would provide bypassing material to Sandwich beaches and keep sediment in the littoral system rather than disposing the material offshore at the Cape Cod Canal Disposal Site in Cape Cod Bay.

- memorializing the proposed non-standard easement language found in the report for any private properties impacted by the recommended plan. This easement would provide the proper permanent authority for federal, state and local governments and related officials to perform their required work, but would not require public access on private land.

As you know, for more than two decades the Town of Sandwich has been relentless in our pursuit of solutions to address ongoing beach and dune erosion and coastal sustainability issues that have adversely impacted our community, especially at Town Neck Beach immediately adjacent to the Cape Cod Canal. With heightening climate change conditions, these continued erosional pressures have reached a critical stage resulting in unacceptable risks to important Town services, property and infrastructure, as well as scores of privates homes. Over the last month, 3 private homes on Spring Hill Beach have toppled onto the beach and been destroyed as drastic erosion continues to place public and private property in peril.

It's critical to note that the two primary recommended means of addressing the problem – providing a sediment source at the nearshore area off of Scusset Beach and placing the material within the Town Neck Beach dune and beach reconstruction template – have been funded, studied and permitted completely by the Town. Without these two permits in place, the Corps' ability to implement the recommended plan would be substantially hindered and delayed. To supplement the Corps' re-commended plan, the Town is diligently attempting to permit a limited dredging project within the Sandwich Old Harbor.

Understandably, there are no plans for the removal of the Canal jetties so their adverse impact on Sandwich is perpetual. The Corps' Section 111 study acknowledges that a longer-term sediment management strategy is needed over and above the recommended one-time engineered beach project which, in all likelihood, will completely expend the current $12.5 million cap for the approved Section 111 project. A partial, reasonable solution to address this problem is taking advantage of the reoccurring O&M dredging of the Canal, that usually occurs every 7-10 years. A new internal protocol requiring the Corps to place future Canal dredge material within permitted Sandwich beach templates would significantly help to address the permanent problems caused by the jetties and should be included in the final plan implemented by the Corps. Additionally, this change in policy provides long-term ecological and protective benefits by keeping sediment within the overall coastal system and fits within the Corps' Regional Sediment Management Program.

In addition, because of the permanency of the federal jetties' negative impact on Sandwich beaches, the Town will seek federal congressional support above the $12.5 million cap. It's clear that the problems created by the jetties will not go away and will likely only get worse over time.

More than anyone, the town knows the significant effort the Corps Team has undertaken to complete this comprehensive study. We ***strongly*** recommend that the Section 111 Shore Damage Mitigation

Report strategies be fully implemented and supplemented by the constant placement of Cape Cod Canal dredge spoils within the Town permitted beach nourishment templates within the Cape Cod Canal influence area as shown in the Section 111 study. We especially want to thank you and Planning Division Chief John Kennelly for your unwavering support throughout this review process.

Please feel free to contact our office if you have any questions.

Sincerely,

David J. DeConto
Director of Natural Resources
For The Sandwich Conservation Commission

Cc: Sandwich Conservation Commission
Sandwich Board of Selectmen
Town Manager
Town Counsel John W. Giorgio
Kirk Bosma, Woods Hole Group
John R. Kennelly, Army Corps of Engineers
Rep. William Keating
Sen. Edward Markey
Sen. Elizabeth Warren
Andrew Nelson, Cong. Keating's Office
Nolan O'Brien, Sen. Markey's Office
Hannah Benson, Sen. Warren's Office
Barnstable county Commissioners

The General Court of the Commonwealth of Massachusetts
State House, Boston 02133-1053

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March 19, 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers New England District
696 Virginia Road
Concord, MA 01742-2751

Via E-Mail: Michael.S.Riccio@usace.army.mil

Re: State Delegation Support for Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches

Dear Mr. Riccio:

As Sandwich's elected State delegation, we want to offer these comments and support for the Section 111 Shore Damage Mitigation Study for the Cape Cod Canal (Canal) and Sandwich Beaches.

Town of Sandwich (Town) officials first approached the U.S. Army Corps of Engineers (Corps) with a formal request to commence a Section 111 study of this area in 2006 and the final Section 111 report has just been issued for public comment. The final report issued by the Corps confirms what has long been suspected – the Canal itself is the primary cause of the dramatic erosion along Town Neck and Spring Hill Beaches in Sandwich.

Sandwich's elected State delegation strongly supports the primary recommendations in the report. This support includes:

- the recommended plan to restore a barrier beach and dune system to provide protection for a portion of the impacted study area that would reintroduce a substantial amount of sand to the impacted littoral system downdrift of the Canal east end jetties; this nourishment would be accomplished by dredging approximately 400,000 cubic yards of material from the Town permitted Scusset Beach bypass location and placing the compatible material in the Town permitted Town Neck Beach dune and beach reconstruction template; and

- finding a long-term solution to the lasting negative impacts of the Canal jetties which are not being removed; a potential solution would be amending the Corps' Canal operations and maintenance (O&M) dredging protocol to permanently require all compatible dredge material be beneficially reused and bypassed to Sandwich beaches at the Corps' expense; this would include not only the already permitted Town Neck Beach template, but may also include other Sandwich beaches on Cape Cod Bay that fall within the influence of the Canal and could be permitted in the future, such as portions of Spring Hill Beach; this beneficial reuse would provide bypassing material to Sandwich beaches and keep sediment in the littoral system rather than disposing the material offshore at the Cape Cod Canal Disposal Site in Cape Cod Bay.

The General Court of the Commonwealth of Massachusetts
State House, Boston 02133-1053

★ ★ ★

Sandwich has been relentless in its pursuit of solutions to address ongoing beach and dune erosion and coastal sustainability issues that have adversely impacted the area immediately adjacent to the Cape Cod Canal. With heightening climate change conditions, these continued erosional pressures have reached a critical stage resulting in unacceptable risks to important Town services, property, and infrastructure, as well as hundreds of private homes.

It's important to acknowledge that while the Corps was considering, then actually conducting the required analysis for the Section 111 study, Sandwich proceeded on its own permitting the Town Neck dune and beach reconstruction template and the nearshore borrow site off Scusset Beach at significant expense and effort. These two components make up the primary plan recommended in the Section 111 report so without these two direct Town efforts, the Corps' recommended plan could not be implemented timely and would require much greater regulatory scrutiny and permitting.

Because there are no plans to remove the Canal jetties, their adverse impact on Sandwich is permanent. The Section 111 study acknowledges that a longer-term sediment management strategy is needed over and above the recommended one-time engineered beach project which, in all likelihood, will completely expend the current $12.5 million cap for an approved Section 111 project. A partial solution to this problem is to take advantage of the recurring O&M dredging of the Canal, which usually occurs every 7-10 years. We fully support a new internal protocol be adopted by the Corps to require placement of all future Canal dredge material within the Town Neck Beach template. This would significantly help address the permanent problems caused by the jetties and needs to be included in the final plan implemented by the Corps.

We strongly recommend that the Section 111 Shore Damage Mitigation Report strategies be fully implemented as supplemented by the constant placement of Cape Cod Canal dredge spoils within the approved Town Neck Beach template. If the State can do anything to assist with these efforts, please let us know. If you have any questions about this request or would like to meet to discuss the details further, please do not hesitate to contact our collective offices.

Respectfully,

SUSAN L. MORAN
State Senator
Plymouth & Barnstable District

STEVEN G. XIARHOS
State Representative
5th Barnstable District

cc: Sandwich Board of Selectmen
Sandwich Town Manager

Town of Sandwich
THE OLDEST TOWN ON CAPE COD

130 MAIN STREET
SANDWICH, MA 02563

E-MAIL: selectmen@sandwichmass.org
E-MAIL: townhall@sandwichmass.org

BOARD OF
SELECTMEN

TOWN
MANAGER

TEL: 508-888-4910 AND 508-888-5144
FAX: 508-833-8045

March 22, 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Via E-Mail: Michael.S.Riccio@usace.army.mil

Re: Town of Sandwich Support for Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches

Dear Mr. Riccio:

On behalf of the Sandwich Board of Selectmen and Town Manager's Office, we are submitting these comments related to the Section 111 Shore Damage Mitigation Study for the Cape Cod Canal (Canal) and Sandwich Beaches.

The Town of Sandwich (Town) first approached the U.S. Army Corps of Engineers (Corps) with a formal request to commence a Section 111 study of this area on March 2, 2006. While it has taken 15 years to arrive at this stage in the process, we are pleased and grateful for the progress the Corps team has made to issue the final report for public comment. The report confirms what has long been suspected – the Canal itself is the primary cause of the dramatic erosion along Town Neck and Spring Hill Beaches in Sandwich. The report seeks to develop a long-term strategy for mitigating damages to public and private infrastructure caused by the Canal jetties and proposes a recommended mitigation plan.

In short, the Town strongly supports the primary recommendations in the report, which include:

- the recommended plan to restore a barrier beach and dune system to provide protection for a portion of the impacted study area that would reintroduce a substantial amount of sand to the impacted littoral system downdrift of the Canal east end jetties; this nourishment would be accomplished by dredging approximately 400,000 cubic yards of material from the Town permitted Scusset Beach bypass location and placing the compatible material in the Town permitted Town Neck Beach dune and beach reconstruction template;

- finding a long-term solution to the lasting negative impacts of the Canal jetties which are not being removed; from the Town's perspective, a reasonable solution would be amending the Corps' Canal operations and maintenance (O&M) dredging protocol to permanently require all compatible dredge material be beneficially reused and bypassed to Sandwich beaches at the Corps' expense; this would include not only the already permitted Town Neck Beach template, but may also include other Sandwich beaches on Cape Cod Bay that fall within the influence of the Canal and could be permitted in the future, such as portions of Spring Hill Beach; this beneficial reuse would provide bypassing material to Sandwich beaches and keep sediment in the littoral system rather than disposing the material offshore at the Cape Cod Canal Disposal Site in Cape Cod Bay; and

- memorializing the proposed non-standard easement language found in the report for any private properties impacted by the recommended plan; this easement would provide the proper permanent authority for federal, state, and local governments and related officials to perform their required work, but would not require public access on private land.

As you know, for more than two decades the Town of Sandwich has been relentless in our pursuit of solutions to address ongoing beach and dune erosion and coastal sustainability issues that have adversely impacted our community, especially at Town Neck Beach immediately adjacent to the Cape Cod Canal. With heightening climate change conditions, these continued erosional pressures have reached a critical stage resulting in unacceptable risks to important Town services, property, and infrastructure, as well as scores of private homes. Over the last month, 4 private homes on Spring Hill Beach have toppled onto the beach and been destroyed as drastic erosion continues to place public and private property in peril.

It's critical to note that the two primary recommended means of addressing the problem – providing a sediment source at the nearshore area off Scusset Beach and placing the material within the Town Neck Beach dune and beach reconstruction template – have been funded, studied, and permitted completely by the Town. Without these two permits in place, the Corps' ability to implement the recommended plan would be substantially hindered and delayed. To supplement the Corps' recommended plan, the Town is diligently attempting to permit a limited dredging project within Sandwich Harbor.

Understandably, there are no plans for the removal of the Canal jetties so their adverse impact on Sandwich is perpetual. The Corps' Section 111 study acknowledges that a longer-term sediment management strategy is needed over and above the recommended one-time engineered beach project which, in all likelihood, will completely expend the current $12.5 million cap for an approved Section 111 project. A partial, reasonable solution to address this problem is taking advantage of the recurring O&M dredging of the Canal, which usually occurs every 7-10 years. A new internal protocol requiring the Corps to place future Canal dredge material within permitted Sandwich beach templates would significantly help address the permanent problems caused by the jetties and should be included in the final plan implemented by the Corps. Additionally, this change in policy provides long-term ecological and protective benefits by keeping sediment within the overall coastal system and fits within the Corps' Regional Sediment Management Program.

In addition, because of the permanency of the federal jetties' negative impact on Sandwich beaches, the Town will seek federal congressional support above the $12.5 million cap. It's clear that the problems created by the jetty will not go away and will likely only get worse over time.

More than anyone, the Town knows the significant effort the Corps team has undertaken to complete this comprehensive study. We strongly recommend that the Section 111 Shore Damage Mitigation Report strategies be fully implemented as supplemented by the constant placement of Cape Cod Canal dredge spoils within Town permitted beach nourishment templates within the Cape Cod Canal influence area as shown in the Section 111 study. We especially want to thank you and Planning Division Chief John Kennelly for your unwavering support throughout this review process.

If you have any questions about this request or would like to meet to discuss the details further, please contact Town Manager Bud Dunham at 508-888-5144.

Sincerely yours,

Michael J. Miller
Chairman

Robert J. George
Vice-Chairman

David J. Sampson

Shane T. Hoctor

Charles M. Holden

George H. Dunham
Town Manager

Heather B. Harper
Assistant Town Manager

cc: Town Counsel John W. Giorgio
Director of Natural Resources
Kirk Bosma, Woods Hole Group
John R. Kennelly, Army Corps of Engineers
Rep. William Keating
Sen. Edward Markey
Sen. Elizabeth Warren
Andrew Nelson, Cong. Keating's Office
Nolan O'Brien, Sen. Markey's Office
Hannah Benson, Sen. Warren's Office
Barnstable County Commissioners

BARNSTABLE COUNTY COMMISSIONERS

SUPERIOR COURTHOUSE
3195 MAIN STREET
P.O. BOX 427
BARNSTABLE, MASSACHUSETTS 02630
PHONE: (508) 375-6648
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IN 1989

RONALD BERGSTROM
Chatham

MARK R. FOREST
Yarmouth

SHEILA R. LYONS
Wellfleet

March 17, 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Via E-Mail: Michael.S.Riccio@usace.army.mil

Re: Barnstable County Support for Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches

Dear Mr. Riccio:

Barnstable County would like to offer these comments and support for the Section 111 Shore Damage Mitigation Study for the Cape Cod Canal (Canal) and Sandwich Beaches.

Sandwich officials first approached the U.S. Army Corps of Engineers (Corps) with a formal request to commence a Section 111 study of this area in 2006 and the final Section 111 report has just been issued for public comment. The final report issued by the Corps confirms what has long been suspected – the Canal itself is the primary cause of the dramatic erosion along Town Neck and Spring Hill Beaches in Sandwich.

Barnstable County officials strongly support the primary recommendations in the report, which includes:

- the recommended plan to restore a barrier beach and dune system to provide protection for a portion of the impacted study area which would reintroduce a substantial amount of sand to the impacted littoral system downdrift of the Canal east end jetties; this would be accomplished by dredging about 400,000 cy of material from the nearshore Scusset Beach system and placing the compatible material in the permitted Town Neck Beach dune and beach reconstruction template; and

- amending the Corps' Canal operations and maintenance (O&M) dredging protocol to permanently require that all compatible dredge material be beneficially reused within the Town Neck Beach template permitted by the Town at the Corps' expense, rather than disposing the material offshore at the Cape Cod Canal Disposal Site in Cape Cod Bay.

Sandwich has been constant in its pursuit of solutions to address ongoing beach and dune erosion and coastal sustainability issues that have adversely impacted the area immediately adjacent to the Cape Cod Canal. With heightening climate change conditions, these continued erosional pressures have reached a critical stage resulting in unacceptable risks to important Town services, property, and infrastructure, as well as hundreds of private homes.

It's important to recognize that while the Corps was considering, then actually conducting, the required analysis for the Section 111 study, Sandwich proceeded on its own permitting the Town Neck dune and beach reconstruction template and the nearshore borrow site off Scusset Beach at significant expense and effort. These two components make up the primary plan recommended in the Section 111 report so without these two direct Town efforts, the Corps' recommended plan could not be implemented timely and would require much greater regulatory scrutiny and permitting. Barnstable County was well aware of these efforts and supported Sandwich in their permitting endeavors. In fact, we hope to play a direct role with the County dredge if Sandwich is successfully able to permit dredging portions of Sandwich Harbor.

Because there are no plans to remove the Canal jetties, their adverse impact on Sandwich is permanent. The Section 111 study acknowledges that a longer-term sediment management strategy is needed over and above the recommended one-time engineered beach project which, in all likelihood, will completely expend the current $12.5 million cap for an approved Section 111 project. A partial solution to this problem is to take advantage of the recurring O&M dredging of the Canal, which usually occurs every 7-10 years. We fully support a new internal protocol be adopted by the Corps to require placement of all future Canal dredge material within the Town Neck Beach template. This would significantly help address the permanent problems caused by the jetties and needs to be included in the final plan implemented by the Corps.

We strongly recommend that the Section 111 Shore Damage Mitigation Report strategies be fully implemented as supplemented by the constant placement of Cape Cod Canal dredge spoils within the approved Town Neck Beach template. If the County can do anything to assist with these efforts, including any initiatives with Sandwich Harbor, please let us know. If you have any questions about this request or would like to meet to discuss the details further, please do not hesitate to contact our office.

Sincerely,

Ronald Bergstrom, Chair
Board of Regional Commissioners

cc: Sandwich Board of Selectmen
Sandwich Town Manager

Trustees of Sandwich Beaches
60 Salt Marsh Rd
East Sandwich, Ma 02537
508-282-0532
wintertide60@gmail.com

1 April 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751 Via E-Mail: Michael.S.Ricco@usace.army.mil

Re: Trustees of Sandwich Beaches comments on Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches.

Dear Mr. Riccio;

The Trustees of Sandwich Beaches (TSB) are submitting these comments related to the Section 111 Shore Damage MItigation Study for the Cape Cod Canal and Sandwich Beaches.

The TSB is a registered 501(c)(3) non-profit organization composed primarily of Sandwich residents, but also includes other parties interested in mitigation of beach erosion along the Sandwich coastline. Our purpose and mission is to promote the restoration of Sandwich's beaches, dunes, waterways and salt marshes, and to protect them from further damage. Our goal is to preserve the natural beauty of the entire Sandwich shoreline and its historic town districts and boardwalk; to mitigate and prevent coastal flooding while promoting a balance of public access to the beaches and the conservation of their natural habitat. We seek to ensure the long-term stabilization of Sandwich's coastal resources, so they can be enjoyed for generations to come.

Some of us own property on Town Neck Beach, or Springhill Hill Beach, but most of us do not. We have all been very concerned about the accelerated coastline erosion occurring over the past 10 years. We were also all aware of aerial photographs of the Sandwich coastline that obviously shows a large buildup of sand behind the longest northern canal jetty and an obvious sand-starved beach on the south eastern side of the same canal that extends well past Town Neck beach, onto a substantial portion of Springhill Hill beach and beyond. Even damaging the Sandy Neck Beach and dunes in Barnstable.

We were also aware that the town had submitted a request for a Section 111 study to be completed by the Army Corp of Engineers in March of 2006 and wanted our voices heard in the larger community to stress the urgency of getting help with funding erosion mitigation as soon as possible if the canal jetties were found to be a significant cause of the erosion. We were also frustrated with the disposal of the O&M maintenance dredged material from the canal into Cape

Cod Bay or sold off to other projects with funding available including Boston Harbor, rather than placed on our sand-starved beaches. We have all felt that the dredged sand would have 'naturally' flowed to the Sandwich coastline, but for the disruption caused by the Cape Cod Canal, and more specifically by the jetties that jut far out into the sea.

On the plus side, we are relieved to finally see the completion of the Section 111 Shore Damage Mitigation Study and strongly support the primary recommendation made in the report to place 388,000 cubic yards of sand on Town Neck Beach, taken from Scusset beach as outlined. We also strongly support the additional requests made by our town government and suggested in the Section 111 study that we still need a long-term solution that can at least partially resolve the need for on-going maintenance. The most obvious partial solution to us and our town government is the re-use of the dredged material from the canal on our beaches rather than being dumped in Cape Cod Bay, as has been done in the past.

On the minus side, we find the calculations given in this report for estimated future erosion rates for both Town Neck Beach and Springhill Beach to be unrealistically-low, inconsistent with previous statements made by the WHG, and unconvincing., These concerns do not have to be resolved for the project to proceed as described above. However we strongly encourage our analysis to be seriously considered and modifications made to the Section 111 report where appropriate.

One of our members, an Engineering Consultant, did a deep dive into the 111 report's analysis of past and future erosion rates, using data provided in the report. The findings, concerns, and requests for additional information on this important issue are presented in Appendix 1 of this letter. The TSB fully supports this report and hopes that the ACE and WHG reconsider the use of the 1952 dataset for determining the long-term historic erosion rate, the partial use of the 1952 dataset for calculating the sand budget at TNB, and the use of the 1952 dataset for predicting the future erosion rates from TNB and SHB.

Following are a few additional comments the TSB has identified related to the Section 111 study that we want to bring to your attention during what we are finding to be a short comment period for such a large, technically challenging report for most audiences.

- We would have appreciated more information on installing a Permanent Bypass system, even if it resulted in having to share the cost of the system, and an initial placement of sand with the town of Sandwich.
- We do not think the future erosion rate estimates given in this report are realistic because they are based on the long term erosion rates of the past rather than the shorter term rates of the present. We think the town of Sandwich and the Army Corp of Engineers needs a realistic estimate of future erosion rates to allow for planning to preserve the barrier dune, salt marsh, the historic downtown area and the beachfront and salt marsh facing properties.

- We are concerned about what will happen to Springhill Beach in the short term. The report states that the Old Harbor inlet is approximately in the middle of the coastal area most impacted by the canal jetties. We are now losing homes on Springhill beach with several more at risk. The placement of 388,000 cubic yards of sand on Town Neck Beach benefits the western half of the impacted coastline in the short and long term, but not the eastern half of the impacted area, including Springhill beach and beyond in the short term. We understand the eastern half of the impacted area is outside the scope of the Section 111 report due to the financial constraints of this program, but storms breaching this sand-starved area still pose a significant risk to the barrier dune, salt marsh, historic downtown, and many beachfront and saltmarsh facing property owners.
- The TSB has some questions concerning the 111 Report which are shown in Appendix 2 of this letter. The TSB would appreciate answers to these questions

The Trustees of Sandwich Beaches appreciates the exemplary efforts of our town government, with a special thank-you to our Town Manager, Bud Dunham and the efforts of all those involved in the Army Corp of Engineers, most recently Mike Riccio, for keeping this project alive for so long and under challenging circumstances. We recognize and appreciate the enormous expense associated with placing 388,000 cy of sand on the permitted template of Town Neck Beach. We trust that all this time and effort by so many people will begin the restoration of our barrier dune and public beach.. This is vital for the protection of the great salt marsh and the many homes on Town Neck beach.. We also hope our town will receive future dredged material from the canal in whatever way can be worked out. Thank-you for providing an extended coastal future and your patience and understanding during the entire process.

In good faith, and kind regards,

Sincerely,

Laura Wing

President of the Trustees of Sandwich Beaches

TSB's Concerns of 111 Report Underestimating Erosion Loss from Town Neck and Spring Hill Beaches

Rev 1, March 29, 2021

Summary: The Trustees of Sandwich Beaches (TSB) is concerned that the Army Corps of Engineers' (ACE) 111 report is based on unrealistically-low, predicted future erosion rates from Town Neck Beach (TNB) and Spring Hill Beach (SHB). If this is true, then Section 8.6, "Additional Recommendations" of the main report, gives a misleading indication of the magnitude of the problem of maintaining these barrier beaches in the future.

111 Main Report. The main report provides three predictions of the future erosion rate of TNB and SHB.

Prediction 1. Prediction 1 is based on future erosion from TNB and SHB of 900,000 CY over the next 50 years, or 18,000 CY/Yr. Per pg 19 of the main report "Shoreline positions for each of the available dates between the period of 1952 and 2018 were developed and changes in shoreline position were evaluated along a series of 139 shore-perpendicular transects spaced at 100-foot intervals along 3.2 miles of the shoreline moving eastward from the Canal. At each shoreline change transect, distances of shoreline movement and annual rates of change were determined. Data from 1952 to 2018 was used to compute long-term rates of shoreline change while data from 2000 to 2018 was used to compute short-term rates of shoreline change." Figure 2.6 on pg 21 clearly shows that the short-term erosion rate (since 2000) is significantly higher than the long-term rate (since 1968) on both TNB (starting around transit 31) and SHB. The TSB could not find any prediction of the future erosion from TNB and SHB over the next 50 years based on the short-term erosion rate. Clearly it would be much higher than 900,000 CY. The TSB requests that the ACE determine the predicted future erosion from TNB and SHB over the next 50 years based on the short-term erosion rate.

Prediction 2. Prediction 2 is based on alternative 1A. Per pg 103 of the main report "Placed sediment will eventually erode off Town Neck Beach without additional sand input. It is anticipated that the placement of 388,000 cy of sand will take approximately nine years to reach a point at which the beach fill is reduced to 70% of the original design. At this point, an additional 279,000 cubic yards of material will need to be placed on the beach for the project to continue performing as intended." 279,000 CY divided by 9 gives an erosion rate just from the re-nourished area of TNB of 31,000 CY/Yr, a 72% higher erosion rate than that of prediction 1, while focused on a much shorter section of the shoreline than that of prediction 1.

The TSB understands that this erosion rate is based on WHG's modeling using the Pelnard-Considere method. However, WHG states on pg 66 of Appendix C, "All results include a background erosion rate corresponding to -1.1 ft/year, which corresponds to the long-term rate of erosion". The TSB believes this relatively low background erosion rate does not represent the current situation and that utilizing the short-term erosion rate based on 2000 - 2018 data would be more appropriate. The TSB requests that the Pelnard-Considere analysis be redone utilizing a background erosion rate corresponding to the short-term rate of erosion. The objective would be to develop a revised Fig 37 (pg 67 of Appendix C) to predict the performance of alternative 1A based on the short-term erosion rate as the background erosion rate.

Prediction 3. Prediction 3 is based on the WHG's Sediment Budget calculations and is shown in Fig. 2-23 on pg 38 of the main report as 38,500 CY/Yr. This number comes from pg 28 of Appendix C (the WHG Report) which follows:

"For Town Neck Beach, the volume loss estimate calculated using cross-shore profiles described in Chapter 2 was utilized to estimate volumetric change rates. Utilizing the cross-shore profiles, a change rate of approximately -10,000 cy/year was calculated. However, the cross-shore analysis utilized for the rough estimate determined in Chapter 2 did not extend to the depth of closure, likely causing an underestimation of the volumetric change. In addition, the shoreline change analysis conducted as part of this study included four shoreline position datasets from 2000-2018, and only one from prior to 2000 (1952). This value must be considered with considerable uncertainty, as the conditions at Town Neck Beach have likely changed drastically from the historical period (prior to 2000), as well as there being significant uncertainty associated (with) the 1952 shoreline position dataset. As such, an additional data set was considered in evaluating the volumetric rate of change on Town Neck Beach to verify the volume change in the Town Neck Beach cell. The Provincetown Center for Coastal Studies prepared a report (1980) summarizing an applied science study carried out for the Towns of Sandwich and Barnstable. As part of that study, a shoreline position change analysis was conducted. That study, which assessed shoreline positions in 1957 and 1972 found a volumetric rate of change of approximately -67,000 cubic yards per year out to a depth of -18 feet Mean Low Water. This value is significantly different than that calculated using the shoreline change analysis presented in Chapter 2, most likely due to the uncertainty with the 1952 information and the limited shoreline profile information (only going seaward to a depth of -5 feet NAVD88). Due to these uncertainties it was decided to average the two rates of change, and as such the volumetric rate of change for Town Neck Beach for the purposes of the sediment budget is 38,500 cy/year ($\Delta \boldsymbol{V}$**TN**)."

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Considering "the conditions at Town Neck Beach have likely changed drastically from the historical period (prior to 2000), as well as there being significant uncertainty associated (with) the 1952 shoreline position dataset", the TSB questions whether the volume loss estimate calculated using cross-shore profiles described in Chapter 2 should have had equal weighting to the 1980 Provincetown Center for Coastal Studies report value or 67,000 CY/Yr.

Kirk Bosna of Woods Hole Group stated in the past when proposing adding 400,000 CY of sand to TNB, that it was anticipated that this sand would be washed away within 5-7 years. If it is gone after 6 years, the annual erosion rate is the same 67,000 CY/Yr stated in the Provincetown Center for Coastal Studies report.

TSB Analysis of Erosion Rate at TNB. The TSB analyzed the erosion rate from TNB based on the loss of sand from the Jan, 2016 re-nourishment of a portion of TNB. In early Jan, 2016 120,000 CY of sand dredged from the canal was placed on a template approximately 1400' long on TNB. There is a small amount of this sand still present near the Sandwich Boardwalk going over the dune. However, the erosion at the western end of the template at 103 Wood Ave is substantially beyond the original dune line prior to this re-nourishment. Taking the net effect on both ends of the template into account, the TSB believes it is fair to say that approximately 120,000 CY of sand has been lost from this area of TNB since the re-nourishment.

The template for the Jan, 2016 re-nourishment was only approximately 1400' long. It's obvious that if the template had extended for a greater length, more than 120,000 CY of sand would have eroded away. The Google Earth ruler function was used to determine the length of each of the following four segments of TNB.

Segment	Location	length, ft
1	Groin near Drunken Seal to large groin near Dillingham Ave	1476
2	Large groin near Dillingham Ave to 103 Wood Ave	943
3	Template (103 Wood Ave to 200' to the east of the boardwalk)	1400
4	200' east of the boardwalk to the West Jetty of Old Harbor Inlet	1457
	Total	5274

The shoreline erosion rate along TNB over the last 18 years is shown in Fig 2-5 on pg 20 of the main report. This shows that the erosion rate in segments 2 and 3 are similar. The erosion rate for segment 1 is lower and that for segment 4 is higher than those for segments 2 and 3. The length of segments 1 and 4 are similar. The TSB considers it reasonable to assume that the "overage" for segment 4 compared to segments 2 and 3 is similar to the "underage" of segment 1 compared to segments 2 and 3. If so, the average erosion rate for TNB along these 4 segments is about that of the template area (segment 3). The length of the template area is 26.5% of segments 1 through 4. Thus, the sand that would have been lost from the Jan, 2016 re-nourishment if the template had included all four segments is 120,000 CY/0.265 or 452,800 CY. The sixth winter season since the Jan, 2016 re-nourishment is just about over. Dividing 452,800 CY by 6 seasons gives an annual erosion rate from TNB for the template proposed in Alternative 1A of the 111 report of 75,500 CY/Yr.

Why is the future erosion rate on TNB and SHB important? Section 8.6, "Additional Recommendations" states that the spoils from dredging the canal "would still provide substantial relief in the form of supplemental beach nourishment; conceptually offsetting erosion by 70%." This implies that maintaining TNB in the future is relatively easy and that most of the re-nourishment that would be required in the future could be supplied by canal dredging spoils. If the actual future erosion rate from TNB is 75,000 CY/Yr, then the canal dredging spoils would only provide 17% of the sand needed to maintain TNB. Significant additional sand and significant additional cost would be required to maintain TNB as a barrier beach.

The TSB requests an explanation from the ACE and the WHG as to why the WHG is predicting for the 111 report an erosion rate that is less than half of what it has told Sandwich in the relatively recent past. The TSB also requests of the ACE and WHG a critique of the analysis presented above resulting in an erosion rate of 75,500 CY/Yr from the Alternative 1A template area.

Erosion Rate on Spring Hill Beach. Per pg 23 of the main report "The erosional trend continues to approximately Transect 108, or 10,800 feet downdrift of the Canal, where erosion rates level off and the shoreline is increasingly stable. This distance of 10,800 feet was selected as a reasonable estimated extent of influence that the Canal has on downdrift erosion. In other words, the disruption to natural sediment transport attributable to the Canal and its structures was estimated to extend approximately 10,800 feet downdrift of the Canal".

Fig 2-6 on page 21 shows the long-term and short-term (since 2000) erosion rates based on transect analysis from the canal to 13900' down drift of the canal. While the long-term erosion rate appears to be close to zero around 10800' downdrift of the canal, the short-term erosion rate ranges from 2 to 5 ft/year from 10800' downdrift to 13900' downdrift where the graph data ends. This rate of erosion beyond 10800' is significant. The TSB believes that by utilizing the long-term erosion rate and ignoring the short-term erosion rate the ACE reached an unrealistic conclusion about the extent of erosion beyond 10800' down drift of the canal jetties.

Does the ACE have short-term transect data for beyond 13900' down drift of the canal jetties? If so, please add it to the 111 report.

The following table is from pg 9 of Appendix C:

Table 1. Data Sources for Shoreline Change Analysis

Year	Source
1952	MassCZM shoreline from U.S. Coast and Geodetic Survey
2000	USGS LiDAR, MassCZM
2009	USGS 30-cm Digital Orthophotography, MassCZM
2014	USGS Color Ortho Imagery via MassGIS
2018	Aerial Imagery TerraMetrics via Google Earth

Note there are no data sources between 1952 and 2000. WHG states "there being significant uncertainty associated (with) the 1952 shoreline position dataset" (pg 28 of Appendix C). It appears to the TSB that the short-term erosion rate determined in the 111 study is more likely to accurately represent the past, current, and future erosion rate than the long-term rate determined in the 111 study.

The TSB requests the ACE to provide a reason why the short-term data was not considered when making the determination that the influence of the canal did not extend beyond 10800' downdrift of the canal jetties, bearing in mind the "significant uncertainty associated (with) the 1952 shoreline position dataset" and that the 1952 data is a critical component for determining the long-term erosion rate.

APPENDIX II

Additional questions

Pg 130, section 8.3, Table 8-1. What is the difference between "Project First Cost" and "Fully Founded Cost"? Contingencies, cost estimate margin, other?

Pg 131, section 8.3. "Therefore, the cost sharing responsibilities of implementing the Recommended Plan will be 100% Federal and 0% non-Federal, so long as the project does not exceed the $12.5 million per project Federal cost limit under Section 111 authority."

What if the cost of the project exceeds $12.5 million? Does the project get scaled back in scope to stay within the $12.5 million limit? Or, does Sandwich become responsible for any project cost over $12.5 million? Or, something else?

"The cost limit includes the Federal cost of studies, design, implementation, and any participation in future renourishment." Does this mean that if the total project cost is significantly less than $12.5 million, which may occur if the project is done simultaneously with canal maintenance dredging, that the balance of funds up to the $12.5 million limit will be available for future renourishment. For example could this balance of funds be used for putting future canal maintenance spoils on Town Neck Beach?

What annual inflation rate was used for developing 50 year costs in Table 5-2?

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

23 April 2021

Planning Division

Laura Wing
Trustees of Sandwich Beaches
60 Salt Marsh Rd.
East Sandwich, MA 02537

Dear Ms. Wing:

I am writing you in response to the formal comments submitted to us by the Trustees of Sandwich Beaches (TSB) on April 21, 2021, regarding the draft report for the Cape Cod Canal and Sandwich Beaches Section 111 Shore Damage Mitigation Study. We appreciate the TSB's proactive engagement throughout this entire process and have provided the following responses to the questions raised in its comment letter.

1. We would have appreciated more information on installing a Permanent Bypass system, even if it resulted in having to share the cost of the system, and an initial placement of sand with the town of Sandwich.

   USACE took an initial look at the costs of installing a permanent bypass system that included two permutations of such a project. 1) Permanent Bypass Only and 2) Permanent Bypass with one-time placement of 224,000 cubic yards of material.

   Using the best readily available comparison (Cape May, New Jersey), we estimated that the initial construction of a permanent bypass system would cost approximately $9.9 million. This would include the design and construction of the pump, piping and associated infrastructure needed to get the system up and running. Assuming that estimate is reasonably accurate, a bypass system-only alternative could in theory be constructed within the federal expenditure limit of the Section 111 authority. By contrast, a bypass system plus an initial placement of 224,000 cubic yards of material, which would include an additional $14.3 million to place material on the beach, thereby bringing the initial construction cost to approximately $25 million, would not. These are the initial construction costs only, however. When factoring in the long-term costs, which include, manpower, routine maintenance, and replacement of equipment, the total project costs over a 50-year period were estimated to be $137 million and $151 million, respectively.

The total project costs of a permanent bypass system compared to those associated with the recommended beach nourishment plan are not significantly different, which certainly merits the question, "Why not do the bypass instead?" given that is potentially more sustainable over the long-term. To that question, the challenge is rooted in the completeness of the plan. Beach nourishment as a standalone project would provide substantial relief immediately upon completion of construction and would continue to provide relief for as long as the material lasts. Therefore, it was considered to be a complete project. By contrast, the relief provided by a permanent bypass system is critically dependent upon a long-term commitment to operate and maintain the system in out years. That long-term operation and maintenance is not something the Corps can commit to through this particular authority, nor is it something that we can commit the town to (in conversations with the town, that did not appear to be something they were prepared to commit themselves to either, as it would be a substantial undertaking). Without those long-term commitments in place, the project could not be considered incomplete. Consequently, a one-time beach nourishment project, albeit not a long-term solution, was considered feasible while a permanent bypass system was not.

We would also point out that while a permanent bypass system is not being recommended through this study, our report does suggest that such a system could be considered in the future. Where there is a potential for USACE to look more closely at a range of long-term solutions that it could participate in (as opposed to committing the town to bear the costs of all future operations and maintenance), from our perspective it stands to reason that consideration of a permanent bypass system would make more sense to include in a follow-on investigation as opposed to trying to force it through this particular authority.

We recognize that the laws governing this project limit our ability to develop a long-term solution. That being said, short of changes to the law, changes that are unrealistic to achieve in a timely manner with respect to the urgency of the problem at hand, we believe that one-time construction of a beach nourishment project affords us the best opportunity to provide meaningful relief from worsening erosion along the Sandwich shoreline.

2. <u>We do not think the future erosion rate estimates given in this report are realistic because they are based on the long-term erosion rates of the past rather than the shorter term rates of the present. We think the town of Sandwich and the Army Corps of Engineers needs a realistic estimate of future erosion rates to allow for planning to preserve the barrier dune, salt marsh, the historic downtown area and the beachfront and salt marsh facing properties.</u>

Regarding the erosion rates, there is a lot to consider based on the commentary you've provided. Upon receipt of the TSB's comment letter, we regrouped internally with the technical team members to make sure we were sound in our evaluation and did not to overlook your concerns. Following those discussions, we would offer the following:

- We do recognize the need to more adequately capture the short-term erosion rates as they relate to the projected lifespan of the recommended project, and we intend to update the projections included in our report to better reflect that. We caution, however, that the short-term erosion rates may not be truly reflective of the natural erosion processes at Sandwich as there have been a series of beach nourishments placed within the short-term period. Recognizing that beach fills erode faster than the existing beach due to end losses as the material placed spreads alongshore, and due to berm narrowing as the profile reaches an equilibrium position, simply using the short-term erosion rate as the background erosion rate is assumed to underestimate the longevity of the proposed beach fill.

- From a technical standpoint, we disagree with some of the assessments you've included and don't feel it is appropriate to address them all individually. That being said…

    i. We recognize that there is a dramatic difference between short-term and long-term erosion rates, but both the long-term and short-term erosion rates are snapshots of the existing conditions. They are helpful in informing our expectations but do not serve as a crystal ball. It is impossible to say exactly how erosion will persist in the future, and just as the long-term erosion rates may underestimate the future erosion, the short-term rates may similarly overestimate the future erosion. It is important to consider too that while we've seen an increase in erosion in recent years, erosion is a natural phenomenon. To that point, we've seen an increase in storm frequency and intensity during that same period. Consequently, we would argue that the increase in short-term erosion may more appropriately be attributed to Mother Nature as opposed to the Canal jetties and subsequent sediment starvation.

ii. The primary purpose of the shoreline change analysis conducted during this study was to confirm and quantify the cause-and-effect relationship between the Canal and the downdrift erosion in order to justify the need for a project, and to determine the lateral extent that impacts can be directly attributed to the Federal Navigation Project. While it is fair to suggest that a domino effect may cause erosion to extend further down the shoreline, we are confident in our analysis of the direct influence that the Canal jetties have on sediment starvation of the littoral system.

3. We are concerned about what will happen to Springhill Beach in the short term. The report states that the Old Harbor inlet is approximately in the middle of the coastal area most impacted by the canal jetties. We are now losing homes on Springhill Beach with several more at risk. The placement of 388,000 cubic yards of sand on Town Neck Beach benefits the western half of the impacted coastline in the short and long term, but not the eastern half of the impacted area, including Springhill beach and beyond in the short term. We understand the eastern half of the impacted area is outside the scope of the Section 111 report due to the financial constraints of this program, but storms breaching this sand-starved area still pose a significant risk to the barrier dune, salt marsh, historic downtown, and many beachfront and saltmarsh facing property owners.

I know we've talked about this in past public meetings and have empathetically expressed our understanding that the recommended plan does not provide direct relief to Springhill Beach; including the stretch that falls within our defined area of impact. Understanding that material moves through the system in a west-to-east direction, and given the relatively more imminent threat to public and private property and infrastructure presented by the eroding dune system along Town Neck Beach, we believe that maximizing the volume placed on Town Neck Beach maximizes the level of protection we can provide to the entire shoreline and backshore area. We understand that waiting for material to migrate from Town Neck Beach to Springhill Beach does not necessarily help Springhill Beach residents right now, but we do expect it to provide relief in the near future as material migrates eastward. Lastly, any future effort to this study would undoubtedly include consideration of direct placement of material on Springhill Beach. Again, we realize that the clock is ticking for many Springhill Beach residents and the resources behind the Springhill Beach dune system, but we are limited in what can be constructed through this effort and we strongly believe that our recommended plan will have the greatest impact on the largest area that we can realistically achieve at this time.

4. Pg 130, section 8.3, Table 8-1. What is the difference between "Project First Cost" and "Fully Founded Cost"? Contingencies, cost estimate margin, other?

   The project first cost is the estimated project cost in Fiscal Year 2021 whereas the Fully Funded Cost accounts for escalation through the mid-point of construction, which would be Fiscal Year 2023, assuming construction were to start in the fall of 2022.

5. Pg 131, section 8.3. "Therefore, the cost sharing responsibilities of implementing the Recommended Plan will be 100% Federal and 0% non-Federal, so long as the project does not exceed the $12.5 million per project Federal cost limit under Section 111 authority." What if the cost of the project exceeds $12.5 million? Does the project get scaled back in scope to stay within the $12.5 million limit? Or, does Sandwich become responsible for any project cost over $12.5 million? Or, something else?

   A more refined cost estimate will be prepared during the next phase (Design and Implementation) of the project. If the costs wind up exceeding $12.5 million we would need to either scale back the project or work with the town to make up the difference.

6. "The cost limit includes the Federal cost of studies, design, implementation, and any participation in future renourishment." Does this mean that if the total project cost is significantly less than $12.5 million, which may occur if the project is done simultaneously with canal maintenance dredging, that the balance of funds up to the $12.5 million limit will be available for future renourishment. For example could this balance of funds be used for putting future canal maintenance spoils on Town Neck Beach?

   If the costs were to be less than $12.5 million, that excess would be nominal, but it should be available to go towards additional renourishment.

7. What annual inflation rate was used for developing 50 year costs in Table 5-2?

   The inflation rate used, assuming construction begins in the fall of 2022, was approximately 6%.

I hope these responses are helpful in understanding our analysis of the problem and subsequent decision-making process. We again understand that it is the not a perfect solution and we sincerely intend to continue our efforts to more comprehensively and sustainable address the erosion problem along the Sandwich shoreline. In the meantime, we are focused on finalizing this report and implementing the recommended plan as quickly as possibly in order to provide meaningful relief before it is too late.

Again, we appreciate the TSB's proactive engagement in this process, and we are happy to continue this dialogue going forward, both with this project and any subsequent investigations resulting from this project. If you have any questions, please do not hesitate to reach out to me directly by phone at (978) 318-8685 or by e-mail at michael.s.riccio@usace.army.mil.

Respectfully,

Michael S. Riccio
Study Manager

Copy Furnished:

Bud Dunham
Town Manager
Town of Sandwich
130 Main Street
Sandwich, MA 02563

From:	Barry Haskell
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] Commentary on Beach Sand From Arlene Ellis, East Sandwich, MA
Date:	Friday, March 12, 2021 3:36:52 PM

Hello:

This is in reference to the Sandwich Enterprise articles of February 12 and 26, 2021. These articles delve into the loss of access to the valuable sand for Sandwich. Taking the jetty out at Town Neck Beach could be the best solution.

Do we need to continue to depend on the Army Corps of Engineers to dole out sand and have to buy more sand when the dredged sand continues to wash out to sea taking more sand with it?

The coast of Cape Cod is eroding, and the loss of our beaches affects all of the Cape. People love to come to the beaches and then visit local shops, restaurants, inns, etc. Our local economy is dependent on attracting these tourism dollars.

The Army Corps of Engineers responds by telling us how difficult it will be politically. It is complicated and not as simple as it seems, and we might not get sand for our beaches. Taking the jetty out will give us back the sand from Scusset Beach.

You have a tough job to do, but so do we if we don't want the burden of facing the costs of new bridges (Bourne and Sagamore) which will also require the added expense of on-going maintenance. Modern tankers can now go around Provincetown Point as they are equipped to do that.

The Army Corps of Engineers are wonderful people. They have much work to do and don't need this continual "sand" headache.

Thank you for taking the time to consider my comments on this matter.

Regards,

Arlene Ellis

I am writing this letter in support of the plan to renourish the Sandwich beaches by moving sand from the west side of the canal to the public beach in Sandwich.

My family has been on Springhill Beach (Salt Marsh Rd.) since 1921. My father named the road.

During the 50's and 60's we would see cycles of erosion and natural replenishment.

The natural replenishment ended with the installation of the jetty at the canal but the erosion continues.

In 1974 my father built a house at 100 Salt Marsh Rd. At the time we had 60 feet of dune between the house and the beach. That house just went over the edge this winter and has since been demolished.

My husband's family cottage went over the edge in the storm of 1991.

The house we live in now, we built in 2005 with 40 feet of dune in front. Now the dune is within 10 feet of our deck.

Through the 80's and 90's the erosion was gradual as we were still getting some sand from Town Neck Beach. Now that Town Neck beach is sand starved, the erosion has been much more dramatic. Three houses were demolished this winter.

We expected that erosion would eventually take our house but we didn't expect it to be in our lifetime (we are both in our 60's).

We raised our sons out here as pretty much the only year round residents and they both love this area. We would love to spend our retirement on SpringHill Beach and hope this will be possible if you replenish the Sandwich beach. Your plan is a good start but it is going to take yearly replenishment if we are going to keep our house (and the low lying areas of the town of Sandwich).

Thank you for reading my letter.

Sincerely,

Betsy B Pottey

Betsy Pottey
102 Salt Marsh Rd
East Sandwich, MA
bpottey@msn.com

From:	Ellyn Shields
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] town neck
Date:	Thursday, March 18, 2021 2:46:57 PM

Hi Michael,

I read your Cape Cod Canal Section 111 Shore Damage Mitigation project. I am writing to you to request to give all the sand to Town Neck beach in Sandwich!!

Thank you,
Ellyn

From: Gino Carlucci
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Town Neck Section 111 Report
Date: Friday, March 19, 2021 11:31:40 AM

Dear Mr. Riccio. I am writing to express my support for the recommended beach nourishment project at Town Neck Beach. The report does an excellent job of documenting the erosion problems over the years as well as the effectiveness of the proposed solution.

While the dredging and placement of 388,000 cubic yards of sand and rebuilding the dunes will restore the beach and should provide immediate relief, it is, as noted in the report, a temporary solution. Therefore, I especially support the recommendation that efforts to find a permanent solution continue. Depositing dredge material from the Canal every 7 or so years may be a significant part of that permanent solution but may not, by itself, be sufficient.

I very much appreciate your efforts (and that of the Corps of Engineers) to work with the Town of Sandwich and residents of Town Neck to study the problem and to propose what appears to be a viable solution. I look forward to additional initiatives toward a permanent solution.

Sincerely,

Gino Carlucci
11 Knott Avenue

From: Heidi Hawkins
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Cape Cod Canal and Sandwich Beaches comm ent
Date: Friday, March 12, 2021 12:19:00 PM

Hello, I have lived in Sandwich for 23 years and worked for the Town for 12 of those years. I worked in the Dept of Natural Resources for 10 years. A recurring topic was the starvation of sand on our beaches. In my time at the Dept we lost a house on Town Neck beach to the sea and this year 4 homes in March on Salt Marsh Road. My entire time here they told me there was a government study being done to see if the jetty was the cause of the sand starvation. I am glad to see that the Army Corp came up with the same conclusion that we had. I applaud them for approving the dredging of the Bay to deposit sand on our beaches, however, I feel they missed the mark by not approving an ongoing maintenance plan. Unless they are willing to take down the jetty extension, which clearly they are not, this will forever remain a problem. I hope that many people will write in to request this be added, it is crucial to the infrastructure of our Town and for the private homeowners along our shores.

Thank you

Heidi Hawkins
Sent from my iPhone

From:	Jean Schreiber
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] Sandwich beaches resident comment
Date:	Tuesday, March 30, 2021 8:02:12 PM

Hello, My name is Jean Schreiber. I am writing to you on behalf of my 98 year old mother and my two sisters. grandparents were some of the very first owner on Springhill Beach. They purchased the land now known as 111, 109 and 107 Saltmarsh Road in around 1912. They passed it on to my father, who passed it to my mother, who passed it on to her three daughters. Janet Snell, Carol Simpson and myself are now owners of the remaining portion of that land at 111, 111A and 111B Saltmarsh Road. My mother has been going to Springhill Beach every summer since 1945! The stories she could tell you! The one that is most amazing to me is how there used to be houses sitting on what is now the beach where water comes up! You can sometimes still see the fireplace stones on the beach from one of the cottages. When the erosion started to threaten the cottages after the jetties were built, she and my father's extended family and friends moved the cottage BY HAND by putting it on rollers and moving the cottage across the beach and setting it back farther! We have watched year after year as our beautiful beach has eroded away. I do not claim to understand the workings of government regarding this. All I know is that many of us private landowners, who have paid increasing taxes year after year for less and less beach have been gravely affected by this poor decision made years ago. For most of my life I have heard stories of how the jetties were affecting our beach. Every year it has gotten worse. I would love to know why the government IS responsible for the erosion to the Town Neck Beaches and is NOT responsible for helping the private owners who have been affected. We are not wealthy people. My grandparents hung on to this property when they lost everything else in the depression. My dad worked tirelessly trying to keep up the cottages. My mom helped him rent them out to be able to afford to pay the taxes each year. My sister and I are all school teachers. We need help too. I know everyone says that our beach will benefit too. But there is no guarantee of that. In fact, in seems like the sand that is drifting down is mostly being deposited in the ocean, making our waters more shallow but doing little to help our dune. My sister, who has the oceanfront cottage, has a deck that is beginning to hang over the dune. I know I am not telling you anything you don't already know but I wanted to register our concerns that the private owners on Springhill Beach are equally in need and equally deserving of assistance. Please add our names to the list of private owners asking for help. Thank you. Sincerely, Jean Schreiber 904 491-0796

From: Jennifer Madden
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Town Neck erosion Section 111 study comment
Date: Friday, April 2, 2021 8:10:19 AM

Dear Mr. Riccio:

I am pleased that the Army Corps has found that the jetties at the Cape Cod canal are responsible for the erosion of Town Neck beach and has allocated money to start to solve the problem. However I would like to urge more than a "one and done" solution. The current problem has been decades in the making, and will take decades to resolve. This $12.5 million is a good start, but if nothing more is done the Army Corps will have not lived up to their responsibility to solve the problem.

Jennifer Madden
34 Jarves Street
Sandwich MA 02563

From: Joan Margeson
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Sandwich MA Beach Renourishment
Date: Saturday, March 20, 2021 8:58:22 AM

Dear Mr. Riccio,

I am a resident of the Town Neck neighborhood in Sandwich, MA. As a regular beach walker here, I see the erosion caused by the loss of sand due to the Cape Cod Canal jetties built by the Army Corps of Engineers.

Because the maintenance of our shoreline is critical to the ongoing viability of my neighborhood and to the viability of our Sandwich town center, I am writing to urge the Army Corps of Engineers to speed the replenishment of sand to our shores as soon as possible, and further, to create a plan to regularly replenish the sand on an ongoing basis which can be accomplished by taking sand dredged regularly from the Canal and placing it back on Sandwich beaches rather than dumping it in Cape Cod Bay.

Thank you for your attention to and help with this matter.

Respectfully,

Joan Margeson
30 Chadwell Avenue
Sandwich, MA, 02563

From:	Laura Wing
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] Section 111 report public meeting
Date:	Saturday, March 20, 2021 12:00:32 PM
Attachments:	Questions on Section 111 Draft report to support comments due April 3 2021.pdf

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Hi Mike,

I plan to attend the zoom meeting scheduled for Tuesday night on the Section 111 report. Thanks so much for making yourself available for that.
I have attached to this email the contents of an email of questions I have about the report I sent to Bud Dunham and our Select Board below. You may be able to address some of them at this meeting.
I strongly support the chosen alternative written up in the report to help mitigate the erosion caused by the canal on our coastline. My main concern right now, is the estimates given for the erosion that has occurred and will occur and how they were derived.

I cannot possibly get these questions in during the meeting and allow others to get their questions in as well, so I wanted to send them ahead of time in case you could include what you find appropriate in your initial presentation.

I am looking forward to the zoom meeting and your presentation.

Laura Wing

Email sent to Sandwich Selectmen, Town Manager and Director of Natural Resources.
Subject: Questions on the ACOE Section 111 Report to support comments due on April 3rd, 2021.

Hello,

I understand some people in town that are reading this lengthy report want to have an opportunity to ask questions to Mike Riccio, and possibly the WHG before they write up comments within the 30 day window. Is it possible to set up a zoom meeting to provide this opportunity?

I, for one, have the following questions that I want answers to and it would be better if at all possible to have a dialogue rather than asking a question and getting a single response.

First I want to make it perfectly clear that I understand this report has been written under the constraints of the Section 111 program, most importantly the $12.5 million cap and it is trying to make the most of that program. That said I think the chosen alternative of taking 388,000 cy of sand from Scusset and placing it on Town Neck Beach may be the best choice to make.

However, I also think the damage to our coastline caused by the extension of the jetty is far greater than this report implies and I think it would be in our best interest to correct that perception moving forward.

So, questions:

The transport of sand, as described in the report, concludes that on average Town Neck Beach and Springhill Beach up to the 10,800 ft distance from the canal will lose approx 18,000 cy of sand a year for the next 50 years. This is based on an analysis of the change in the coastline from 50 years ago to the present.

1. Did this take into consideration the amount of sand that has been added to our coastline to maintain that shoreline, including the replenishment done in 2016, and the replenishments done by private property owners at their expense?
2. Did this calculation adequately account for the acceleration of erosion seen in the past 5 years, and expected to persist in the future?
3. The extension of the canal jetty is going to be with us in the forseeable future. Does this calculation take into account an increase in the transport of sand that would be available to our coastline due to increased erosion expected west of the canal if the extension of the jetty did not exist?

According to the Section 111 report the sediment transport northwest of the canal is 95,000 to 115,000 cy/year., ending at the Canal jetty. 54,700 cy of this material stays behind the Canal jetty. (page 38 in the report).

1. Why isn't the disruption to sediment transport caused by the canal jetty based on the 54,700 cy of sand stuck behind the jetty used in the calculation of harm caused by the jetty, rather than the calculation above based on change in the shoreline of 18,000 cy of sand expected to erode over the next 50 years?

The Section 111 report recommends that all material dredged from the canal, on average 90,000 cy of sand, every 7 to 10 years should be placed on Town Neck Beach to help maintain the Sandwich coastline into the future. The report claims that this will cover 70% of the expected erosion over this time assuming the erosion rate of 18,000 cy of sand is correct.

1. Does this equation take into account the expected loss of sand transported further east onto Springhill Beach etc. . . due to sand washing into the salt marsh at the Old Harbor opening, and washed out into the bay depending on the storm surge?
2. What is the impact to our beaches of depleting our coastline over that 7 to 10 year period, of up to 18,000 cubic yds of sand before another big replenishment occurs all at once when the canal is dredged?

Springhill Beach is in trouble now. We have lost three homes, with several more at risk that lie within the 10,800 ft area impacted by the extension of the jetty as shown on the ACOE map.

1. Does losing homes on Springhill Beach justify putting more sand on the east side of the Old Harbor creek opening sooner rather than later?

Thanks so much for your attention to this long email. I hope you find time to read it, and if possible respond as soon as possible. The TSB is working on a response to the report, and some of these issues will be included in our comments back to the ACOE.

In good faith, and kind regards,

Laura Wing
President of the Trustees of Sandwich Beaches
508-282-0532
wintertide60@gmail.com

From:	Laura Wing
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] Comments on Section 111 Sandwich Shore Damage Report - by TSB
Date:	Thursday, April 1, 2021 4:31:19 PM
Attachments:	Trustees of Sandwich Beaches - Comments on ACOE Section 111 Study - Final.pdf

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Hello Mike,

I have our comments on the Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches attached to the email.

Please let me know when you receive it and if you have any questions I can answer let me know.

In good faith and kind regards,

Laura Wing
Trustees of Sandwich Beaches
60 Salt Marsh Rd.
East Sandwich, Ma 02537
wintertide60@gmail.com

Trustees of Sandwich Beaches
60 Salt Marsh Rd
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508-282-0532
wintertide60@gmail.com

1 April 2021

Attn: Michael Riccio
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751 Via E-Mail: Michael.S.Ricco@usace.army.mil

Re: Trustees of Sandwich Beaches comments on Section 111 Shore Damage Mitigation Report for Cape Cod Canal & Sandwich Beaches.

Dear Mr. Riccio;

The Trustees of Sandwich Beaches (TSB) are submitting these comments related to the Section 111 Shore Damage MItigation Study for the Cape Cod Canal and Sandwich Beaches.

The TSB is a registered 501(c)(3) non-profit organization composed primarily of Sandwich residents, but also includes other parties interested in mitigation of beach erosion along the Sandwich coastline. Our purpose and mission is to promote the restoration of Sandwich's beaches, dunes, waterways and salt marshes, and to protect them from further damage. Our goal is to preserve the natural beauty of the entire Sandwich shoreline and its historic town districts and boardwalk; to mitigate and prevent coastal flooding while promoting a balance of public access to the beaches and the conservation of their natural habitat. We seek to ensure the long-term stabilization of Sandwich's coastal resources, so they can be enjoyed for generations to come.

Some of us own property on Town Neck Beach, or Springhill Hill Beach, but most of us do not. We have all been very concerned about the accelerated coastline erosion occurring over the past 10 years. We were also all aware of aerial photographs of the Sandwich coastline that obviously shows a large buildup of sand behind the longest northern canal jetty and an obvious sand-starved beach on the south eastern side of the same canal that extends well past Town Neck beach, onto a substantial portion of Springhill Hill beach and beyond. Even damaging the Sandy Neck Beach and dunes in Barnstable.

We were also aware that the town had submitted a request for a Section 111 study to be completed by the Army Corp of Engineers in March of 2006 and wanted our voices heard in the larger community to stress the urgency of getting help with funding erosion mitigation as soon as possible if the canal jetties were found to be a significant cause of the erosion. We were also frustrated with the disposal of the O&M maintenance dredged material from the canal into Cape

Cod Bay or sold off to other projects with funding available including Boston Harbor, rather than placed on our sand-starved beaches. We have all felt that the dredged sand would have 'naturally' flowed to the Sandwich coastline, but for the disruption caused by the Cape Cod Canal, and more specifically by the jetties that jut far out into the sea.

On the plus side, we are relieved to finally see the completion of the Section 111 Shore Damage Mitigation Study and strongly support the primary recommendation made in the report to place 388,000 cubic yards of sand on Town Neck Beach, taken from Scusset beach as outlined. We also strongly support the additional requests made by our town government and suggested in the Section 111 study that we still need a long-term solution that can at least partially resolve the need for on-going maintenance. The most obvious partial solution to us and our town government is the re-use of the dredged material from the canal on our beaches rather than being dumped in Cape Cod Bay, as has been done in the past.

On the minus side, we find the calculations given in this report for estimated future erosion rates for both Town Neck Beach and Springhill Beach to be unrealistically-low, inconsistent with previous statements made by the WHG, and unconvincing., These concerns do not have to be resolved for the project to proceed as described above. However we strongly encourage our analysis to be seriously considered and modifications made to the Section 111 report where appropriate.

One of our members, an Engineering Consultant, did a deep dive into the 111 report's analysis of past and future erosion rates, using data provided in the report. The findings, concerns, and requests for additional information on this important issue are presented in Appendix 1 of this letter. The TSB fully supports this report and hopes that the ACE and WHG reconsider the use of the 1952 dataset for determining the long-term historic erosion rate, the partial use of the 1952 dataset for calculating the sand budget at TNB, and the use of the 1952 dataset for predicting the future erosion rates from TNB and SHB.

Following are a few additional comments the TSB has identified related to the Section 111 study that we want to bring to your attention during what we are finding to be a short comment period for such a large, technically challenging report for most audiences.

- We would have appreciated more information on installing a Permanent Bypass system, even if it resulted in having to share the cost of the system, and an initial placement of sand with the town of Sandwich.
- We do not think the future erosion rate estimates given in this report are realistic because they are based on the long term erosion rates of the past rather than the shorter term rates of the present. We think the town of Sandwich and the Army Corp of Engineers needs a realistic estimate of future erosion rates to allow for planning to preserve the barrier dune, salt marsh, the historic downtown area and the beachfront and salt marsh facing properties.

- We are concerned about what will happen to Springhill Beach in the short term. The report states that the Old Harbor inlet is approximately in the middle of the coastal area most impacted by the canal jetties. We are now losing homes on Springhill beach with several more at risk. The placement of 388,000 cubic yards of sand on Town Neck Beach benefits the western half of the impacted coastline in the short and long term, but not the eastern half of the impacted area, including Springhill beach and beyond in the short term. We understand the eastern half of the impacted area is outside the scope of the Section 111 report due to the financial constraints of this program, but storms breaching this sand-starved area still pose a significant risk to the barrier dune, salt marsh, historic downtown, and many beachfront and saltmarsh facing property owners.
- The TSB has some questions concerning the 111 Report which are shown in Appendix 2 of this letter. The TSB would appreciate answers to these questions

The Trustees of Sandwich Beaches appreciates the exemplary efforts of our town government, with a special thank-you to our Town Manager, Bud Dunham and the efforts of all those involved in the Army Corp of Engineers, most recently Mike Riccio, for keeping this project alive for so long and under challenging circumstances. We recognize and appreciate the enormous expense associated with placing 388,000 cy of sand on the permitted template of Town Neck Beach. We trust that all this time and effort by so many people will begin the restoration of our barrier dune and public beach.. This is vital for the protection of the great salt marsh and the many homes on Town Neck beach.. We also hope our town will receive future dredged material from the canal in whatever way can be worked out. Thank-you for providing an extended coastal future and your patience and understanding during the entire process.

In good faith, and kind regards,

Sincerely,

Laura Wing

President of the Trustees of Sandwich Beaches

TSB's Concerns of 111 Report Underestimating Erosion Loss from Town Neck and Spring Hill Beaches

Rev 1, March 29, 2021

Summary: The Trustees of Sandwich Beaches (TSB) is concerned that the Army Corps of Engineers' (ACE) 111 report is based on unrealistically-low, predicted future erosion rates from Town Neck Beach (TNB) and Spring Hill Beach (SHB). If this is true, then Section 8.6, "Additional Recommendations" of the main report, gives a misleading indication of the magnitude of the problem of maintaining these barrier beaches in the future.

111 Main Report. The main report provides three predictions of the future erosion rate of TNB and SHB.

Prediction 1. Prediction 1 is based on future erosion from TNB and SHB of 900,000 CY over the next 50 years, or 18,000 CY/Yr. Per pg 19 of the main report "Shoreline positions for each of the available dates between the period of 1952 and 2018 were developed and changes in shoreline position were evaluated along a series of 139 shore-perpendicular transects spaced at 100-foot intervals along 3.2 miles of the shoreline moving eastward from the Canal. At each shoreline change transect, distances of shoreline movement and annual rates of change were determined. Data from 1952 to 2018 was used to compute long-term rates of shoreline change while data from 2000 to 2018 was used to compute short-term rates of shoreline change." Figure 2.6 on pg 21 clearly shows that the short-term erosion rate (since 2000) is significantly higher than the long-term rate (since 1968) on both TNB (starting around transit 31) and SHB. The TSB could not find any prediction of the future erosion from TNB and SHB over the next 50 years based on the short-term erosion rate. Clearly it would be much higher than 900,000 CY. The TSB requests that the ACE determine the predicted future erosion from TNB and SHB over the next 50 years based on the short-term erosion rate.

Prediction 2. Prediction 2 is based on alternative 1A. Per pg 103 of the main report "Placed sediment will eventually erode off Town Neck Beach without additional sand input. It is anticipated that the placement of 388,000 cy of sand will take approximately nine years to reach a point at which the beach fill is reduced to 70% of the original design. At this point, an additional 279,000 cubic yards of material will need to be placed on the beach for the project to continue performing as intended." 279,000 CY divided by 9 gives an erosion rate just from the re-nourished area of TNB of 31,000 CY/Yr, a 72% higher erosion rate than that of prediction 1, while focused on a much shorter section of the shoreline than that of prediction 1.

The TSB understands that this erosion rate is based on WHG's modeling using the Pelnard-Considere method. However, WHG states on pg 66 of Appendix C, "All results include a background erosion rate corresponding to -1.1 ft/year, which corresponds to the long-term rate of erosion". The TSB believes this relatively low background erosion rate does not represent the current situation and that utilizing the short-term erosion rate based on 2000 - 2018 data would be more appropriate. The TSB requests that the Pelnard-Considere analysis be redone utilizing a background erosion rate corresponding to the short-term rate of erosion. The objective would be to develop a revised Fig 37 (pg 67 of Appendix C) to predict the performance of alternative 1A based on the short-term erosion rate as the background erosion rate.

Prediction 3. Prediction 3 is based on the WHG's Sediment Budget calculations and is shown in Fig. 2-23 on pg 38 of the main report as 38,500 CY/Yr. This number comes from pg 28 of Appendix C (the WHG Report) which follows:

"For Town Neck Beach, the volume loss estimate calculated using cross-shore profiles described in Chapter 2 was utilized to estimate volumetric change rates. Utilizing the cross-shore profiles, a change rate of approximately -10,000 cy/year was calculated. However, the cross-shore analysis utilized for the rough estimate determined in Chapter 2 did not extend to the depth of closure, likely causing an underestimation of the volumetric change. In addition, the shoreline change analysis conducted as part of this study included four shoreline position datasets from 2000-2018, and only one from prior to 2000 (1952). This value must be considered with considerable uncertainty, as the conditions at Town Neck Beach have likely changed drastically from the historical period (prior to 2000), as well as there being significant uncertainty associated (with) the 1952 shoreline position dataset. As such, an additional data set was considered in evaluating the volumetric rate of change on Town Neck Beach to verify the volume change in the Town Neck Beach cell. The Provincetown Center for Coastal Studies prepared a report (1980) summarizing an applied science study carried out for the Towns of Sandwich and Barnstable. As part of that study, a shoreline position change analysis was conducted. That study, which assessed shoreline positions in 1957 and 1972 found a volumetric rate of change of approximately -67,000 cubic yards per year out to a depth of -18 feet Mean Low Water. This value is significantly different than that calculated using the shoreline change analysis presented in Chapter 2, most likely due to the uncertainty with the 1952 information and the limited shoreline profile information (only going seaward to a depth of -5 feet NAVD88). Due to these uncertainties it was decided to average the two rates of change, and as such the volumetric rate of change for Town Neck Beach for the purposes of the sediment budget is 38,500 cy/year ($\Delta \boldsymbol{V}$**TN**)."

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Considering "the conditions at Town Neck Beach have likely changed drastically from the historical period (prior to 2000), as well as there being significant uncertainty associated (with) the 1952 shoreline position dataset", the TSB questions whether the volume loss estimate calculated using cross-shore profiles described in Chapter 2 should have had equal weighting to the 1980 Provincetown Center for Coastal Studies report value or 67,000 CY/Yr.

Kirk Bosna of Woods Hole Group stated in the past when proposing adding 400,000 CY of sand to TNB, that it was anticipated that this sand would be washed away within 5-7 years. If it is gone after 6 years, the annual erosion rate is the same 67,000 CY/Yr stated in the Provincetown Center for Coastal Studies report.

TSB Analysis of Erosion Rate at TNB. The TSB analyzed the erosion rate from TNB based on the loss of sand from the Jan, 2016 re-nourishment of a portion of TNB. In early Jan, 2016 120,000 CY of sand dredged from the canal was placed on a template approximately 1400' long on TNB. There is a small amount of this sand still present near the Sandwich Boardwalk going over the dune. However, the erosion at the western end of the template at 103 Wood Ave is substantially beyond the original dune line prior to this re-nourishment. Taking the net effect on both ends of the template into account, the TSB believes it is fair to say that approximately 120,000 CY of sand has been lost from this area of TNB since the re-nourishment.

The template for the Jan, 2016 re-nourishment was only approximately 1400' long. It's obvious that if the template had extended for a greater length, more than 120,000 CY of sand would have eroded away. The Google Earth ruler function was used to determine the length of each of the following four segments of TNB.

Segment	Location	length, ft
1	Groin near Drunken Seal to large groin near Dillingham Ave	1476
2	Large groin near Dillingham Ave to 103 Wood Ave	943
3	Template (103 Wood Ave to 200' to the east of the boardwalk)	1400
4	200' east of the boardwalk to the West Jetty of Old Harbor Inlet	1457
	Total	5274

The shoreline erosion rate along TNB over the last 18 years is shown in Fig 2-5 on pg 20 of the main report. This shows that the erosion rate in segments 2 and 3 are similar. The erosion rate for segment 1 is lower and that for segment 4 is higher than those for segments 2 and 3. The length of segments 1 and 4 are similar. The TSB considers it reasonable to assume that the "overage" for segment 4 compared to segments 2 and 3 is similar to the "underage" of segment 1 compared to segments 2 and 3. If so, the average erosion rate for TNB along these 4 segments is about that of the template area (segment 3). The length of the template area is 26.5% of segments 1 through 4. Thus, the sand that would have been lost from the Jan, 2016 re-nourishment if the template had included all four segments is 120,000 CY/0.265 or 452,800 CY. The sixth winter season since the Jan, 2016 re-nourishment is just about over. Dividing 452,800 CY by 6 seasons gives an annual erosion rate from TNB for the template proposed in Alternative 1A of the 111 report of 75,500 CY/Yr.

Why is the future erosion rate on TNB and SHB important? Section 8.6, "Additional Recommendations" states that the spoils from dredging the canal "would still provide substantial relief in the form of supplemental beach nourishment; conceptually offsetting erosion by 70%." This implies that maintaining TNB in the future is relatively easy and that most of the re-nourishment that would be required in the future could be supplied by canal dredging spoils. If the actual future erosion rate from TNB is 75,000 CY/Yr, then the canal dredging spoils would only provide 17% of the sand needed to maintain TNB. Significant additional sand and significant additional cost would be required to maintain TNB as a barrier beach.

The TSB requests an explanation from the ACE and the WHG as to why the WHG is predicting for the 111 report an erosion rate that is less than half of what it has told Sandwich in the relatively recent past. The TSB also requests of the ACE and WHG a critique of the analysis presented above resulting in an erosion rate of 75,500 CY/Yr from the Alternative 1A template area.

Erosion Rate on Spring Hill Beach. Per pg 23 of the main report "The erosional trend continues to approximately Transect 108, or 10,800 feet downdrift of the Canal, where erosion rates level off and the shoreline is increasingly stable. This distance of 10,800 feet was selected as a reasonable estimated extent of influence that the Canal has on downdrift erosion. In other words, the disruption to natural sediment transport attributable to the Canal and its structures was estimated to extend approximately 10,800 feet downdrift of the Canal".

Fig 2-6 on page 21 shows the long-term and short-term (since 2000) erosion rates based on transect analysis from the canal to 13900' down drift of the canal. While the long-term erosion rate appears to be close to zero around 10800' downdrift of the canal, the short-term erosion rate ranges from 2 to 5 ft/year from 10800' downdrift to 13900' downdrift where the graph data ends. This rate of erosion beyond 10800' is significant. The TSB believes that by utilizing the long-term erosion rate and ignoring the short-term erosion rate the ACE reached an unrealistic conclusion about the extent of erosion beyond 10800' down drift of the canal jetties.

Does the ACE have short-term transect data for beyond 13900' down drift of the canal jetties? If so, please add it to the 111 report.

The following table is from pg 9 of Appendix C:

Table 1. Data Sources for Shoreline Change Analysis

Year	Source
1952	MassCZM shoreline from U.S. Coast and Geodetic Survey
2000	USGS LiDAR, MassCZM
2009	USGS 30-cm Digital Orthophotography, MassCZM
2014	USGS Color Ortho Imagery via MassGIS
2018	Aerial Imagery TerraMetrics via Google Earth

Note there are no data sources between 1952 and 2000. WHG states "there being significant uncertainty associated (with) the 1952 shoreline position dataset" (pg 28 of Appendix C). It appears to the TSB that the short-term erosion rate determined in the 111 study is more likely to accurately represent the past, current, and future erosion rate than the long-term rate determined in the 111 study.

The TSB requests the ACE to provide a reason why the short-term data was not considered when making the determination that the influence of the canal did not extend beyond 10800' downdrift of the canal jetties, bearing in mind the "significant uncertainty associated (with) the 1952 shoreline position dataset" and that the 1952 data is a critical component for determining the long-term erosion rate.

APPENDIX II

Additional questions

Pg 130, section 8.3, Table 8-1. What is the difference between "Project First Cost" and "Fully Founded Cost"? Contingencies, cost estimate margin, other?

Pg 131, section 8.3. "Therefore, the cost sharing responsibilities of implementing the Recommended Plan will be 100% Federal and 0% non-Federal, so long as the project does not exceed the $12.5 million per project Federal cost limit under Section 111 authority."

What if the cost of the project exceeds $12.5 million? Does the project get scaled back in scope to stay within the $12.5 million limit? Or, does Sandwich become responsible for any project cost over $12.5 million? Or, something else?

"The cost limit includes the Federal cost of studies, design, implementation, and any participation in future renourishment." Does this mean that if the total project cost is significantly less than $12.5 million, which may occur if the project is done simultaneously with canal maintenance dredging, that the balance of funds up to the $12.5 million limit will be available for future renourishment. For example could this balance of funds be used for putting future canal maintenance spoils on Town Neck Beach?

What annual inflation rate was used for developing 50 year costs in Table 5-2?

From:	Mike Kelly
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] public comment
Date:	Sunday, March 14, 2021 11:13:09 AM
Attachments:	NCSTransparent_f007be02-e007-4404-b34b-e718d44267e4.png

SECTION 111 SHORE DAMAGE MITIGATION STUDY CAPE COD CANAL AND SANDWICH BEACES SANDWICH, MASSACHUSETTS

I urge the federal government to put a maintenance plan in place to continuously mitigate the renourishment of the Sandwich beaches as long as the jetties remains in place causing the Town Neck and Spring Hill beach areas to be starved on sand. In addition, I request the proposed budget of $12.5mm be increased.

Michael Kelly
6 Linden Rd
East Sandwich, Ma 02537

NORTH COUNTRY
SMOKEHOUSE

Mike Kelly | Vice President, National Sales and Business Development
19 Syd Clarke Drive, Claremont, NH 03743
Direct: 508 559-4621
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From: Nate Carlucci
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Public Comment: USACE Section 111 Study - Sandwich, MA
Date: Saturday, March 27, 2021 10:59:29 PM

Dear Mr. Riccio,

I am writing to express my support for the proposed placement of ~388,000 cubic yards of sand on Town Neck Beach. Although this solution is temporary in nature, it will provide desperately needed relief, and will give all interested parties time to plan a permanent solution. It also appears to maximize the public's benefit within the limits of the 111 authority.

I am a fourth-generation visitor to Town Neck Beach as my parents, grandparents, and great grandparents have had houses in the neighborhood. During the past few decades, I have witnessed the devastating erosion of the dune systems and the beaches, as well as the tragic loss of houses that were separated from the ocean by hundreds of feet of sand until very recently. Indeed, that sand has seemed to disappear at a far faster rate than human-caused climate change or natural processes could explain. It is reassuring to see that the 111 study confirmed the impact of the jetties.

Finally, I want to strongly express my support for the Corps to continue its mitigation efforts after the 111 study by implementing a permanent solution, such as a bypass system. If the economic and public benefits of the Canal are too great to shut down the canal (as I firmly believe is the case), then by necessity, those benefits also justify the cost of mitigating the Canal's impact by moving sand from Scusset to Town Neck in perpetuity.

Thank you to you and other contributors at the Corps for your hard work and transparency on this project. Let's get that sand to its beach.

Sincerely,
Nathan Carlucci

From: Paul Schrader
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Cape Cod Canal Mitigation Project
Date: Friday, March 19, 2021 12:28:19 PM

Paul W. Schrader

204 Farmersville Road
Sandwich, MA 02563
508-477-3911
pwscapecod@aol.com

March 18, 2021

Mr. Michael S. Riccio, Project Manager
Army Corps Engineers
696 Virginia Road
Concord, MA 01742

Subject: Cape Cod Canal Mitigation Project

Dear Mr. Riccio:

I am writing in support of the Cape Cod Canal Section 111 Shore Mitigation project and the movement of Scusset Beach sand to Town Neck Beach in Sandwich.

I have been a resident of Sandwich for over twenty five years and the erosion of the dunes and shoreline has troubled me since my first trip to the beach as a resident.

Climate Change and Coastal Erosion have been significant concerns for many years and I have worked to bring the issues to the attention of as many people and organizations as possible. I regularly photographed the area to document my concerns. I have written op-ed articles in Cape newspapers, spoken about the issues at meetings in Sandwich and other Cape towns. Many of my photos and videos can be found on YouTube (https://www.youtube.com/watch?v=YE2PG10srXg) "Town Neck Beach Sands of Change" and on Facebook website "Trustees of Sandwich Beach".

I served on several Sandwich Town Beach Committees and on the Massachusetts Coastal Erosion Commission and learned much more about the problems our state and our world faces in the future.

I understand the ACOE issues with the sand that enters the canal and support the future use of this material to replace sand that will be washed away from TNB. Coastal erosion is a very significant issue for the entire world as sea levels continue to rise and we must do everything we can within our means to maintain and stabilize our shorelines.

I believe the proposed work will benefit the Town of Sandwich, our state of Massachusetts and the Army Corps of Engineers who maintain the Cape Cod Canal.

Thank you for all that you and the staff do.

Sincerely,

Paul W. Schrader

From: Peter Ashley
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Sandwich erosion.
Date: Monday, March 22, 2021 2:22:20 PM

Hi,

dumping the dredging sands near town neck beach also seems like it would be helpful for erosion when maintenance is performed. I saw an article explaining how this is done by the town of Barnstable pumping sand up to two miles through pipes.

Also, could the scusset jetty be shortened? There might be more dredging required but some sand migration around the end would be more likely.

Could the dredging also pick up more sand than just what's in the channel? I would image migrating sand would be carried into deeper water by the channel currents and those sands could be redeposited on the beach.

From: Raymond Howard
To: Riccio, Michael S CIV USARMY CENAE (USA)
Subject: [Non-DoD Source] Cape Cod Canal Section 111 Shore Damage Mitigation Project
Date: Sunday, March 21, 2021 9:37:58 AM

Hello Mr. Riccio,

Please accept this as my public comment on the Cape Cod Canal Section 111 Shore Damage Mitigation Project.

The US Army Corps of Engineers has created a permanent problem by starving the Sandwich beaches of sand. This permanent problem needs a permanent solution, not a one-time patch job. The beach erosion and starvation of sand due to the USACE threatens the mill creek marsh area, which is a cultural landscape with historic value. Further, this threatens the Jarvesville National Historical District and the town of Sandwich. In addition, the environmental impacts are devastating.

I urge you to put a long-term maintenance plan in place since this is a long-term problem created by the USACE. I also urge you to increase the budget. $12.5 million to fund a $100 million problem is embarrassingly insufficient.

Thank you for your time.

Raymond Howard
138 Main Street
Sandwich, MA 02563

From:	robert Deroeck
To:	Riccio, Michael S CIV USARMY CENAE (USA)
Subject:	[Non-DoD Source] Comments on Section 111 Report for Sandwich, MA
Date:	Friday, April 2, 2021 10:02:16 AM
Attachments:	RLD Comments on USACE 111 Study, Rev 0, Submitted to M. Riccio by Email on April 2, 2021.docx

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Dear Mr. Riccio:

Attached to this email message is a Word file with my comments on the draft report of the Section 111 Shore Damage Mitigation Study of Cape Cod Canal and Sandwich Beaches.

Please confirm receipt of this message and its attachment by return email.

Thank you.

Best Regards,

Robert DeRoeck

.

To: Mr. Michael Riccio
Planning Division, New England District
US Army Corps of Engineers
Email: Michael.S.Riccio@usace.army.mil

From: Robert DeRoeck
2 Sunrise Lane
Sandwich, MA 02563
rbtderoeck@verizon.net

Subject: Comments on Section 111 Shore Damage Mitigation Study of Cape Cod Canal and Sandwich Beaches, Sandwich, MA.

Submitted via email to Michael.S.Riccio@usace.army.mil on April 2, 2021

Dear Mr. Riccio:

I have the following comments on the Section 111 study on the Cape Cod Canal and Sandwich Beaches.

1. The 30 day public comment period was too short for such a large and technically-detailed report. This document is not a summer beach novel that you can breeze through in a few hours. It can take days to complete a comprehensive review of only a small section of the report, especially if reviews of the referenced sources are included. Plus additional days are necessary to compose reasoned and understandable comments for submission to the USACE. A public comment period of 60 or 90 days would have been more appropriate for allowing a thorough review of the entire report.

2. There is an error in the dimensions of the Scusset borrow site. On pg 101, section 6.1 of the main report it states "The average excavation depth across the site is approximately 5.7 feet ……". The 5.7 foot depth does not jibe with the dimensions shown in Fig 8-3 on pg 129 (1890' x 630') and an excavation volume of 388,000 cubic yards. The excavation depth would be about 8.8' for the Fig 8-3 dimensions. This dimension of 1890' x 630' is shown in numerous places within the 111 report, including the figures.

Pg A2-7 of Appendix A2 shows the borrow site is approximately 3000' x 600' which corresponds to an average excavation depth of about 5.8' and a borrow site size of approximately 41 acres. So, there is an inconsistency between the length and width dimensions of the borrow site within the 111 report (1890' x 630' and 3000' x 600').

3. I believe the USACE was too quick to reject alternative 6A, the permanent bypass system (PBS). The primary reason given in the 111 report for rejecting the PBS was both the short-term and long-term costs. The initial project cost estimate of $17.8 million included the PBS installation plus construction of a 224,000 cubic yard engineered beach. This initial project cost far exceeds the $12.5 limit for the Section 111 authority. Per pg 89 of the main 111 report the total project cost is estimated to be $145.3 million, presumably over a 50 year lifetime. The other concerns about the PBS described on pgs 87-88 of the main 111 report are: (1) constructability challenges, (2) maintenance challenges, (3) environmental impacts, and (4) long term costs. My comments on each of these items follow:

Constructability. The USACE concluded that the most practical way to put a pipeline across the canal would be via directional drilling (HDD) under the canal. The report states "That is inherently risky from a constructability and initial cost standpoint". There is always some risk with any type of construction, but HDD technology is well-proven with an excellent record. I've addressed the initial relatively high cost of the HDD pipeline, below.

Maintenance. Maintenance is a fact of life for any man-made system. The primary concerns should be the reliability of the system and the cost of maintenance. Sand bypass systems are relatively reliable, if they are properly designed. For example, 100% spare pumps are required to allow the system to continue to operate at design rate if there is a pump failure. The Nerang River bypass system in Australia has been reliably operating since 1984 (at least as of Nov, 2019, the most recent information I can find on the Web). The 111 report considers the cost of the most significant maintenance items by including total pump replacement every 12 years and total system replacement every 25 years in its long-term cost estimate ("total project cost") in Fig 5.2 on pg 90 of the main 111 report. I consider total replacement of both pumps and the entire system to be somewhat conservative, but I have no doubt that the pumps will require periodic, major maintenance and that much of the entire system will require replacement every 25 years or so. So while I believe total replacement based on the 111 report schedule is conservative, using that cost and schedule for planning purposes is not unreasonable.

Environmental Impacts. The 111 report states "if a permanent bypass were installed along Town Neck Beach (TNB), it would be designed to distribute material to the downdrift littoral system in an unconsolidated fashion. The material would be pumped onto the beach and into the intertidal zone, relying on natural processes to then redistribute the material along the shoreline over time. This would likely have significant negative environmental impacts on the intertidal zone as compared to an engineered beach nourishment project". The PBS proposed below would have sand pumped directly onto the western end of TNB with the sand from the first two years of operation made into an engineered beach using construction equipment. So, the impact on the environment at the TNB site would be no different than the proposed alternative 1A. Starting the third year after commissioning the PBS, the relatively low annual sand addition could either be pumped onto the western end of TNB or into the intertidal zone on the western end of TNB. This relatively small amount of sand if placed in the intertidal zone would mimic the original natural sand transport along TNB prior to construction of the canal. The environmental effects should be minimal. If the sand is pumped onto the beach and distributed using construction equipment, the environmental effect should be no different than the proposed alternative 1A.

Long-term Cost. I don't see a rationale for why the long-term cost for the PBS system was considered when evaluating whether this alternative was viable within the Section 111 authority. The proposed project alternative 1A has a long-term cost ("total project cost") of $197 million, far higher than that for the PBS, yet alternative 1A was considered not only a viable option, but the preferred option. So, I believe it is fair to say that the long-term cost was not a factor in determining the viability of any of the alternatives.

Another look at a Permanent Bypass System. If the capital cost and operating and maintenance cost estimates done by the USACE for the Cape May, NJ project in 2004 were

accurate, then I believe that a PBS system could be built and operated in such a way that 388,000 cubic yards (CY) of sand could be placed on TNB within 15 months of commissioning of the PBS for close to $12.5 million. I've estimated the cost to accomplish this, using calculations based on information on the Cape May PBS on pg 96 of Appendix C of the 111 report. The estimated cost for constructing and operating the PBS so that after 15 months TNB has 388,000 CY more sand than at the beginning of operation is $10.5 million. I will discuss, below, why I believe the construction cost and operating cost for the first 15 months will likely be higher than this $10.5 million. And, it may even exceed $12.5 million. But, it is likely to be close to $12.5 million. And, even if it were to slightly exceed the $12.5 million Section 111 authority limit, it's possible that the Town of Sandwich would be willing to pay for the relatively small amount over the $12.5 million limit. Why would the Town of Sandwich consider doing so? The answer is simple. The PBS provides a long-term solution to the problem which is much more cost effective than alternative 1A. The PBS provides other benefits compare to alternative 1A. TNB will be maintained in top condition on a yearly basis, instead of significantly degrading between periodic re-nourishment projects. The PBS will remove sand from the Scusset borrow site at a slower rate compared to alternative 1A over the first two years of operation and at a relatively low rate thereafter. This will allow the borrow site to recover more quickly compared to large alternative 1A-type re-nourishment projects in the future. If the erosion rate on TNB turns out to be much higher than predicted in the 111 Report, the PBS can handle the higher erosion rate, because it has been designed to do so. Conversely, a higher erosion rate than predicted in the 111 Report could cause TNB to return to its current condition in as little as 5-7 years.

If all this sounds too good to be true, maybe it is. But, maybe it isn't. Appended to this message are the Basis and the Calculations for the design and operating costs for the PBS system described above with a calculated installation and first two year's operating cost of $10.5 million. There are two primary reasons this cost estimate is probably too low. The first is that the cost of installing the pipeline under the canal using horizontal drilling is likely to be more expensive than the pipeline on the bottom level of the bridge on the Cape May project, but maybe not. The second is that, at least initially, the sand pumped under the canal and onto the beach on the western end of TNB will need to be shaped into an engineered beach using construction equipment. There will be some cost for distributing the sand over the first two years of operation, but this cost should be relatively low compared to a re-nourishment project using dredged sand. Once the engineered beach is formed within 15 months of commissioning the PBS, we'll have to wait and see if simply dumping the annual sand addition from the PBS onto the western end of TNB or into the intertidal zone nearby allows an acceptable natural distribution to take place or not. If not, redistributing the relatively small amount of annual "pumped sand" along TNB using construction equipment may be desired, but the cost of doing so should be relatively low and easy to determine.

A summary of the results of this evaluation follows:

SUMMARY OF CAPE COD CANAL PBS COST AND PERFORMANCE ESTIMATES

- Annual Operating Period: Oct 1 - Dec 31 each year
- Gross sand deposited on TNB 15 months after commissioning the PBS = 453,000 CY
- Net sand deposited on TNB 15 months after commissioning the PBS = 388,000 CY

- Construction and Operating Costs for First Two Years of Operation: $10.5 million
- Operating Cost Starting in Year 3: $493,000/yr plus inflation going forward.
- First Year of Operation: 259,000 CY transferred, Oct 1-Dec 30 operating 24/7
- Second Year of Operation: 194,000 CY transferred, Oct 1-Dec 7 operating 24/7
- 3rd Year of Operation and beyond: 65,000 CY transferred, Oct 1-Oct 23 operating 24/7
  or Oct 1-Dec 31 operating 8.3 hrs/day, 5 days a week

Appended to this memo are the Basis and the Calculations for the design and operating costs for the PBS system described. If you have any questions, you can contact me via email (my email address is given in the heading) or phone (508-888-2607).

Best regards,

Robert DeRoeck

Basis for Design for PBS at Cape Cod Canal

From Appendix C by WHG, Cost Estimates by USACE for 2004 Cape May, NJ PBS (CM)

- Total Installed Cost = $6.345 million (mm)
- Operation: Sept - April, 5 days/wk, 6 hours/day bypassing 150,000 - 180,000 CY per year
- Operation and Maintenance Cost: $613,000/yr

Cape Cod Canal PBS (CCC)

Design rate: 120 CY/hr of sand contained within a seawater/sand slurry
PBS Annual Operating Window: Oct 1 to Dec 31 each year.
Annual Sand Erosion Rate from TNB: 65,000 CY/yr

Calculations for Determining Construction and O&M Costs for Cape Cod Canal PBS

1. CM PBS annual operating hours = 8 months = 35 weeks x 5 days/wk x 6 hrs/day = 1050 hr/yr

2. CM PBS Pumping Rate (sand only): Avg of 150 K and 180 K CY/yr = 165,000 CY/yr.
   Hourly rate = 165,000 CY/yr/1050 hrs/yr = 157.1 CY/hr

3. CM PBS Operating and Maintenance Costs. I assumed that 1/3 of the O&M costs is for power and 2/3 is for labor.

Power: $613,000 x 1/3 = $204,000/yr
The retail cost for power in New Jersey in 2004 was $0.1123/KWH per the US Energy Information Administration.

Labor: $613,000 x 2/3 = $408,670/yr. Assume the workers at the CM PBS would have worked an 8 hour day, even though actual pumping was planned for only 6 hours/day. Therefore, working hours were 35 weeks x 5 days/wk x 8 hrs/day = 1400 hr/yr

The total labor cost per hour = $408,670/1400 hr = $292/hr

4. CCC PBS Construction Cost. Apply an economy-of-scale cost exponent of 0.70, which is typical for the chemical processing industry. This is appropriate because most of the cost of a PBS is pumps and piping, typical components of chemical processing plants. The CM PBS rate is 157.1 CY/hr per item 2, above. The CCC PBS rate is 120 CY/hr, per the Basis for Design.

The construction cost for the CCC PBS = $(120/157.1)^{0.7}$ x $6.345 mm = $5.26 mm in 2004 dollars.

The Chemical Engineering Plant Cost Index for 2004 was 444.2. The same cost index for Jan, 2018 was 576.4 resulting in a compound annual inflation rate of 1.0188 or 1.88%. Assuming a

2% annual rate from 2018 to Dec, 2022 gives 1.02^5 = 1.1041 x 576.4 = 636.4 CE Plant Cost Index expected for Dec, 2022.

The construction cost for the CCC PBS in Dec, 2022 is $5.26mm x (636.4/444.2) = $7.53 mm

5. Power cost for CCC PBS in first year of operation (assumed 2022). The current retail price for electricity on Cape Cod is approximately $0.22/KWH. Assume this does not change before the PBS is commissioned. Transfer 259,000 CY of sand. Power = $204,000/yr x (259,000 CY/165,000 CY) x ($0.22/$0.1123) = $627,300

6. Power cost for CCC PBS in second year of operation. Assume no change in the price for electricity. Transfer 194,000 CY of sand. Power = $204,000/yr x (194,000 CY/165,000 CY) x ($0.22/$0.1123) = $469,900

7. Power cost for CCC PBS in 3rd year of operation. Assume no change in the price for electricity. Transfer 65,000 CY of sand. Power = $204,000/yr x (65,000 CY/165,000 CY) x ($0.22/$0.1123) = $157,000

8. Labor cost for CCC PBS in first year of operation.

The Economic Policy Institute Wage Table for US wages based on 2019 dollars for workers in the 70th percentile of the wage scale shows:

Year	Hourly Wage in 70th percentile
2000	25.18
2007	25.92
2019	27.94

Interpolating for 2004 gives 25.60

The US Bureau of Labor Statistics CPI Inflation Calculator shows Jan, 2004 to Jan, 2019 inflation factor of 1.3591. Therefore actual 70th percentile wage for 2004 was 25.60/1.3591=$18.84.

Assume a 3% annual wage increase from 2019 to 2022 = 1.03^4 = 1.1255
Resulting in 2022 70th percentile wage of 27.94 x 1.1255 = $31.45
Thus labor cost from 2004 to 2022 increased by 31.45/18.84 = 1.669

Total labor cost on an hourly basis for CCC PBS is the CM PBS labor cost of $292/hr adjusted for inflation to 2022 = $292/hr x 1.669 = $487/hr.

CCC PBS year 1 labor cost: 259,000 CY/120 CY/hr = 2158 hrs x $487/hr = $1.051mm

9. Labor cost for CCC PBS in second year of operation. Assume no change in labor cost/hr from the first year of operation (only 12 - 15 months after commissioning).

CCC PBS year 2 labor cost: 194,000 CY/120 CY/hr = 1617 hrs x $487/hr = $787,300

10. Labor cost for CCC PBS in third year of operation. Assume 2 years of labor cost inflation at 3%/yr. Labor cost is 1.03^2 x $487/hr = $516.6/hr. Assume 1 shift/day and 5 days per week operation for 13 weeks from Oct 1 to Dec 31 = 65 days

    Actual Pumping Hours = 65,000 CY/120 CY/hr = 542 hrs / 65 days = 8.33 hrs/day. Assume the working day is 10 hours. Labor hours = 13 wks x 5 days/wk x 10 hr/day = 650 hours.

    CCC PBS year 3 labor cost = 650 hrs x $516.6/hr = $336,000

11. Total Cost for Construction and Operation for first two years for CCC PBS.

    = $7.53mm (Construction) + $627,300 (power year 1) + $469,900 (power year 2) + $1.051mm (labor year 1) + $787,300 (labor year 2) = $10.465mm, say $10.5mm.

12. Operating Cost for CCC PBS in 3rd year of operation.

    = $157,000 (power) + $336,000 (labor) = $493,000

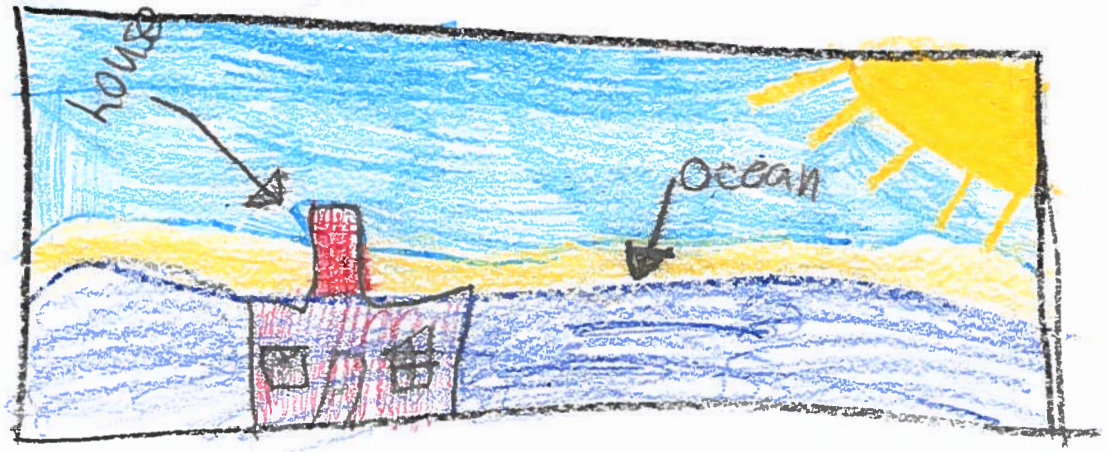
March 23, 2021

To Whom It May Concern,

Sandwich beaches are in trouble! Some time in the future those houses are going to fall in the ocean! What would you do? Would you build a barrier or not care and not do your job? Everybody **NEEDS** the Army Corps of Engineers to help Cape Cod beaches. I hope the Army Corps of Engineers can help. The marsh animals are in **TROUBLE too**!!! What if the houses get flooded. It would probably be your fault. Can you build a barrier? I love feeling the sand in my toes and swimming but nobody can swim in water with a bunch of houses floating all over the place,that's why you need to build a barrier.

From,

Minah
Arminah
Sandwich, MA



To Whom It May Concern,

Please save our beaches! Please add sand to our beaches!

I love to swim at the beach. I like to practice Ninja at the beach, When I fall I don't get hurt. I like to play football at the beach.

Please stop dumping the sand in the bay and put it on our beaches.

Thank You,

Brody

Brody

To Whom it May Concern,

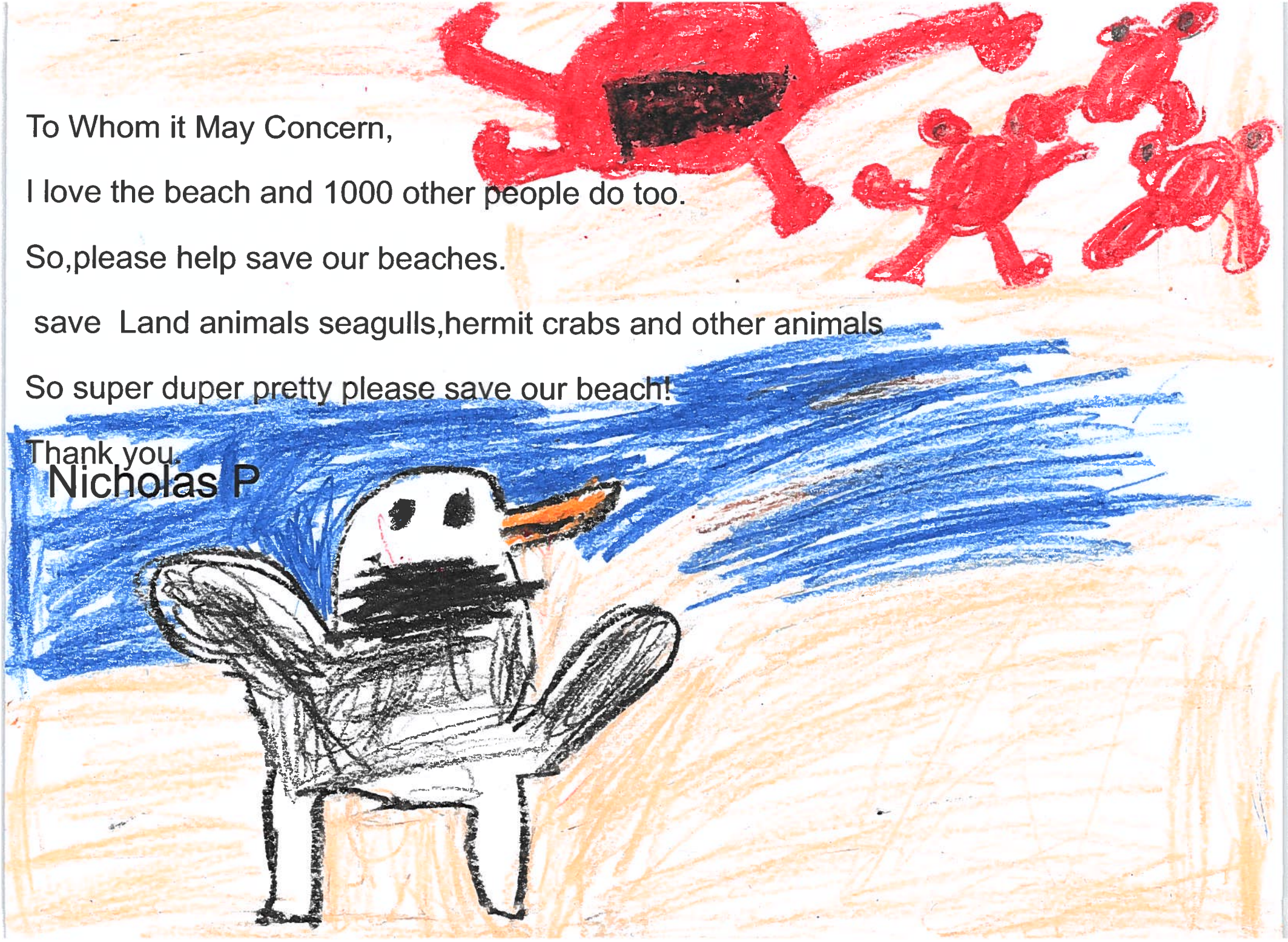
I love the beach and 1000 other people do too.

So,please help save our beaches.

save Land animals seagulls,hermit crabs and other animals

So super duper pretty please save our beach!

Thank you.
Nicholas P



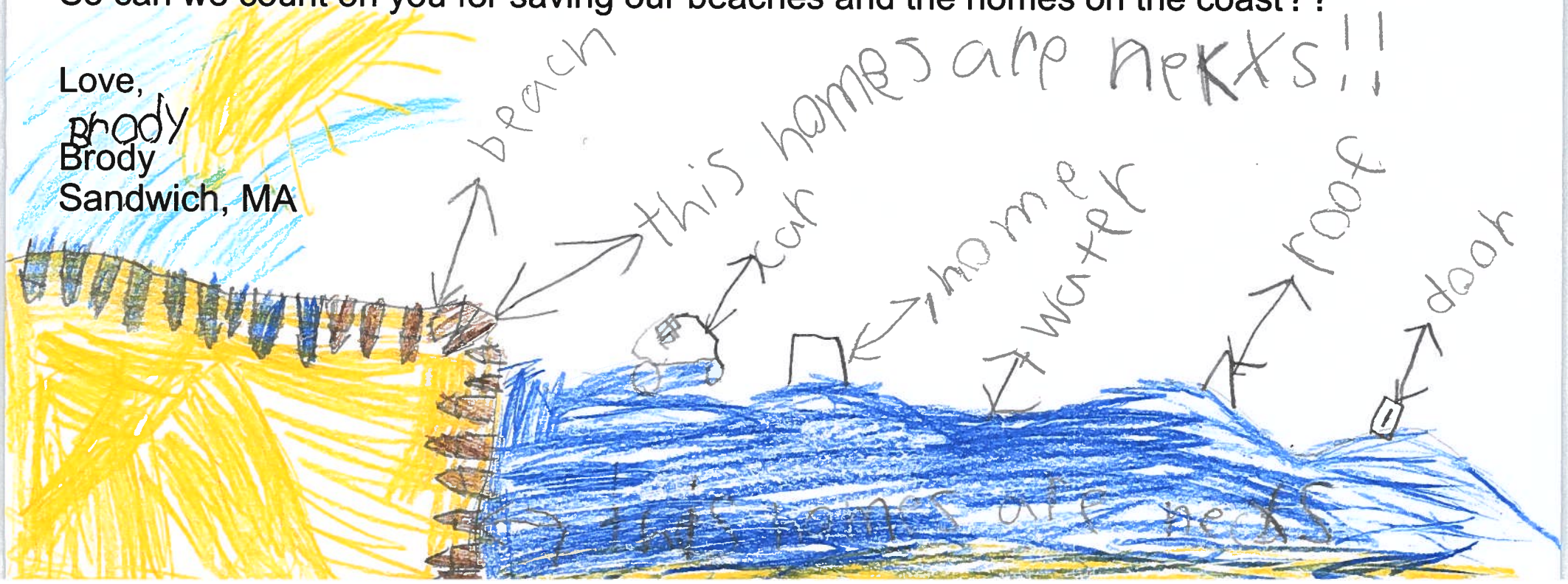
March 23, 2021

To Whom It May Concern,

Our beaches are in trouble in Sandwich! I love to jump into the creek and float down it. We need more sand so the coastline is bigger. If a person loved the beach and if the beach is not there the person can't go to the beach. We need more beaches to save our homes, the marsh, Mill Creek, the plants and animals and the boardwalk. Maybe you could put a barrier to keep the water from eroding away the sand.

So can we count on you for saving our beaches and the homes on the coast??

Love,
Brody
Brody
Sandwich, MA



March 23, 2021

To Whom It May Concern,

Sandwich beaches need our help!! We're depending on YOU to help us. Sandwich beaches really do need our help, because houses are falling into the ocean. I also love jumping off the boardwalk, and if you don't stop the erosion the Boardwalk is going to fall apart, and so is Mill Creek! To help our beaches, be a superhero and save the day! There are two things you have to do: make a barrier and move the sand from the canal to Town Neck not Cape Cod Bay. You have the power and you should use it. Think about those houses falling off the beach. Do you really want to build the boardwalk **again?!**

from,
Mary MARY
Sandwich MA.

Look at these people enjoying the beach.
Do you really want to ruin that?

March 26, 2021

To whom It May Concern

I am in Second grade I love the marsh because I like to go there and catch crabs. I like to go swimming in it too. I want to save it because a lot of baby fish have protection in the marsh from predators.

Also the problem is erosion. Erosion is somethin

that takes something away. Erosion is a problem because things are taking sand away. Some things that could happen are wind is taking sand away. water is taking sand away. We want you to bring sand to the beaches and dump it. We really want you to not give up. If you helped we could help the beaches

Still be a thing. Thank

you. Sincerely,

Sincerely,

Sam S

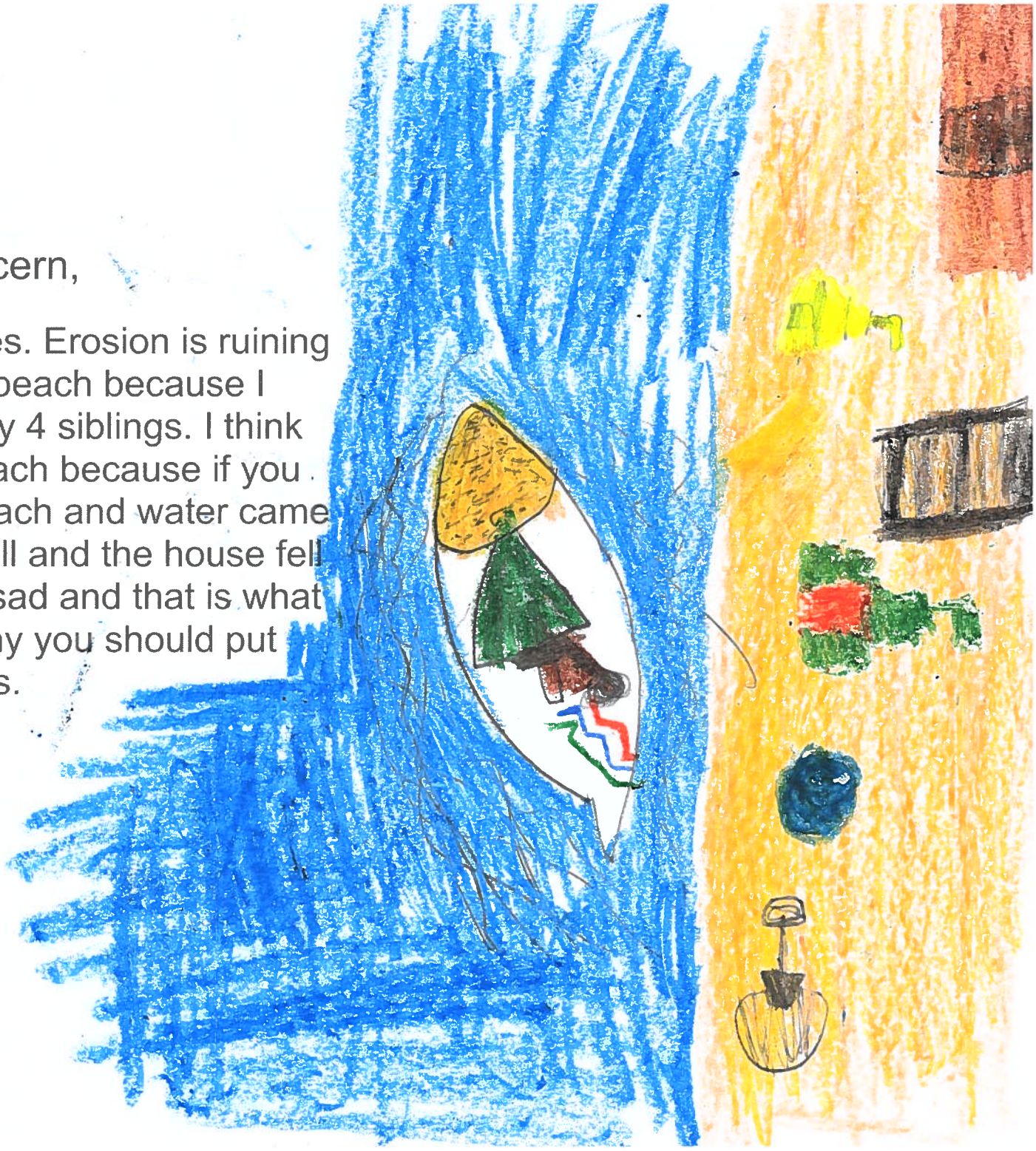
To Whom It May Concern,

Please save our beaches. Erosion is ruining our beaches. I love the beach because I love digging with with my 4 siblings. I think you should save our beach because if you have a house on the beach and water came up and all of the sand fell and the house fell I bet that you would be sad and that is what is happening. That is why you should put the sand on the beaches.

Thank You,

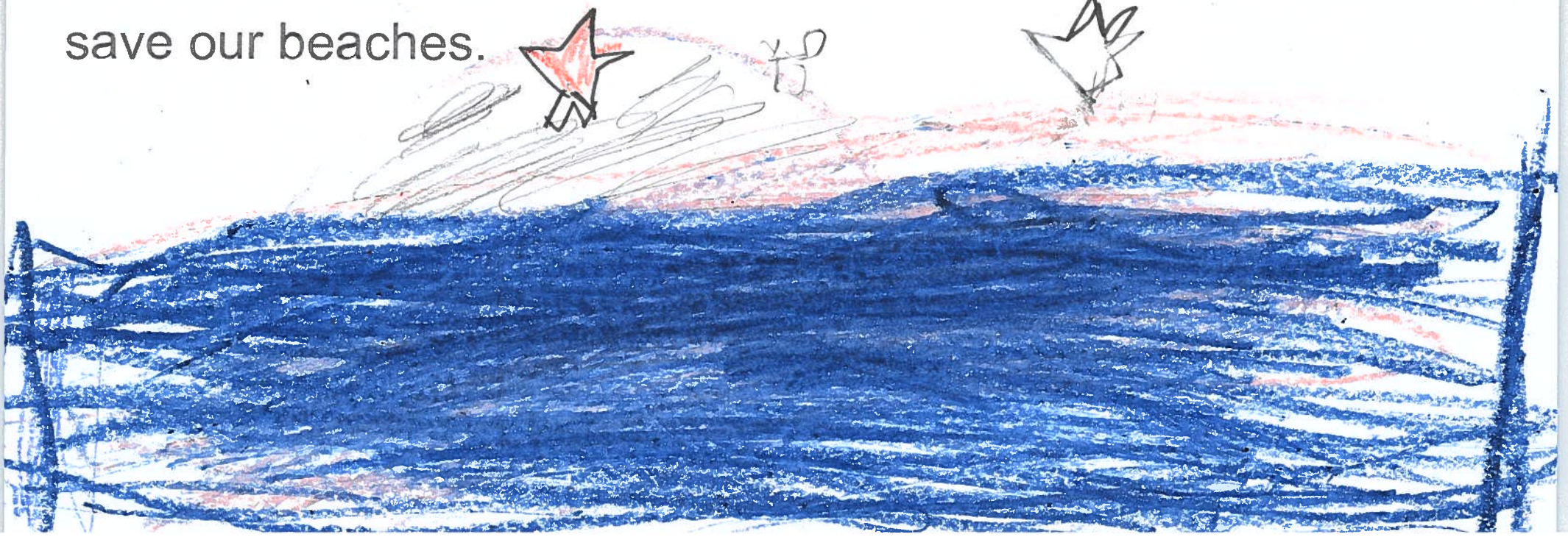
Macy

Macy



Emma

In my opinion we should save our beaches. First we need to protect habitats. Also people live on the beach. Another reason is that we need to protect against erosion. Finally people play on the beach. As you can see it is important to save our beaches.



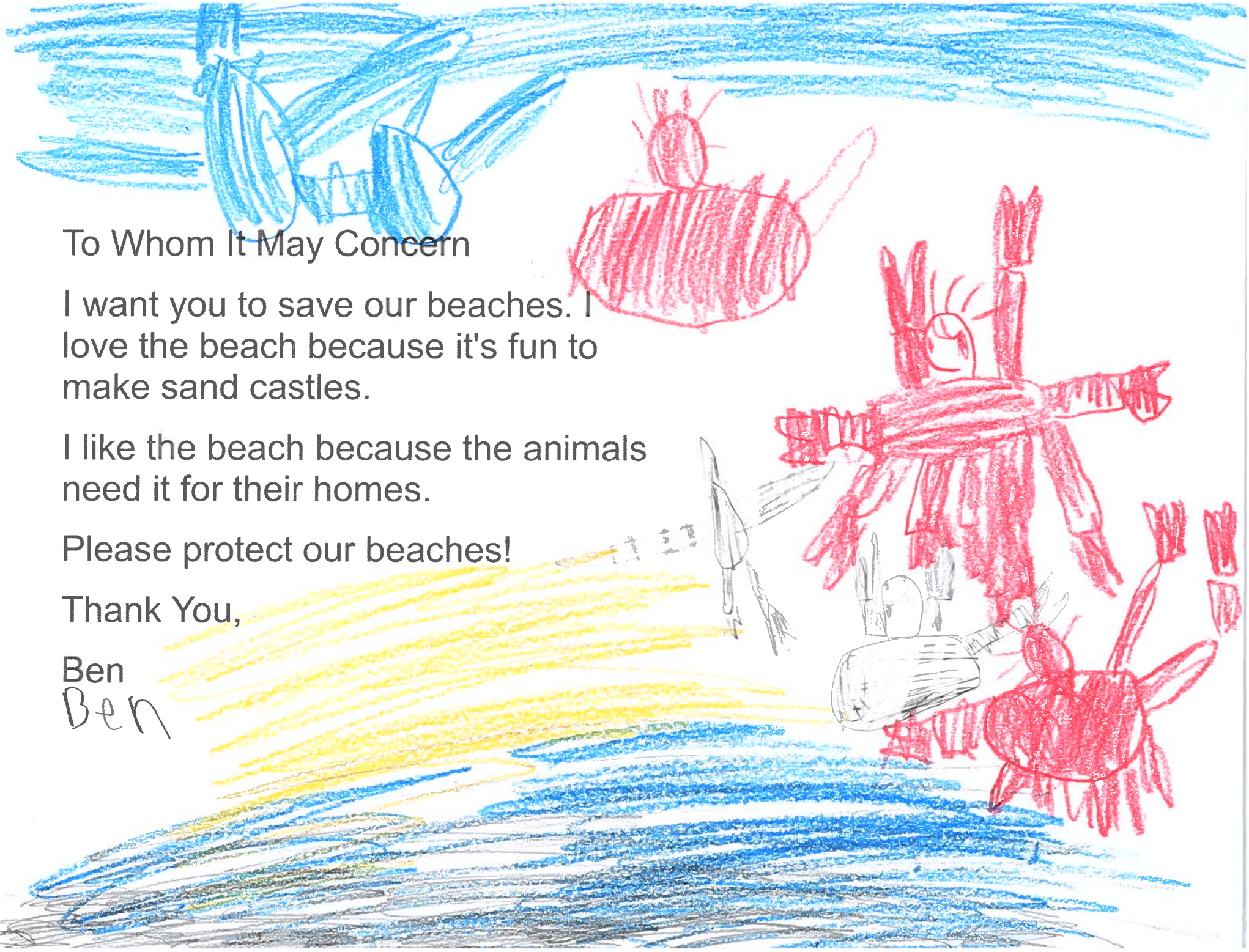
My name is Riley I would love if you could save our beaches. It would mean the world to me if you could. Here are my reasons why.

I love the beach because I love to play in the sand and me and my dog love to run on the beach. Many homes would not be there and it would be really really sad. There would be no more bonfires on the beach.

Please find ways to keep the sand on our Sandwich beaches- we need your help!

From

Riley



To Whom It May Concern

I want you to save our beaches. I love the beach because it's fun to make sand castles.

I like the beach because the animals need it for their homes.

Please protect our beaches!

Thank You,

Ben

Ben

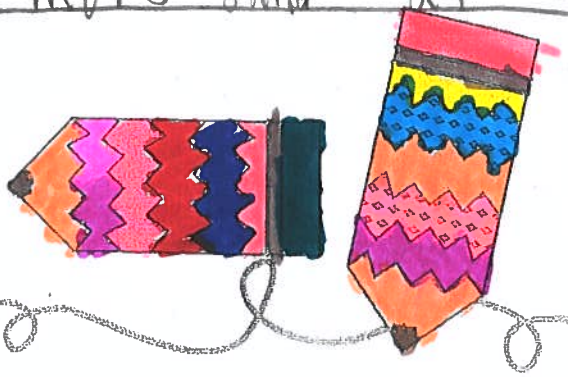
3/25/2021

Dear, Army Corps of Engineers

I think you should put more sand at the beaches **right now!** I'll give you four resons why. First, we are losing more and more sand to walk our dogs. Second, we need more sand to have picnics on and to play in. Third, we need more sand to be able to go to the beaches. Last, weathering and erosion is moving and taking the sand away. That is why we need you to put more sand at the beaches.

Sincerely

Caroline



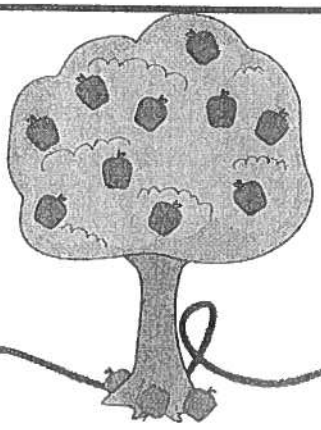
March 26th 2021

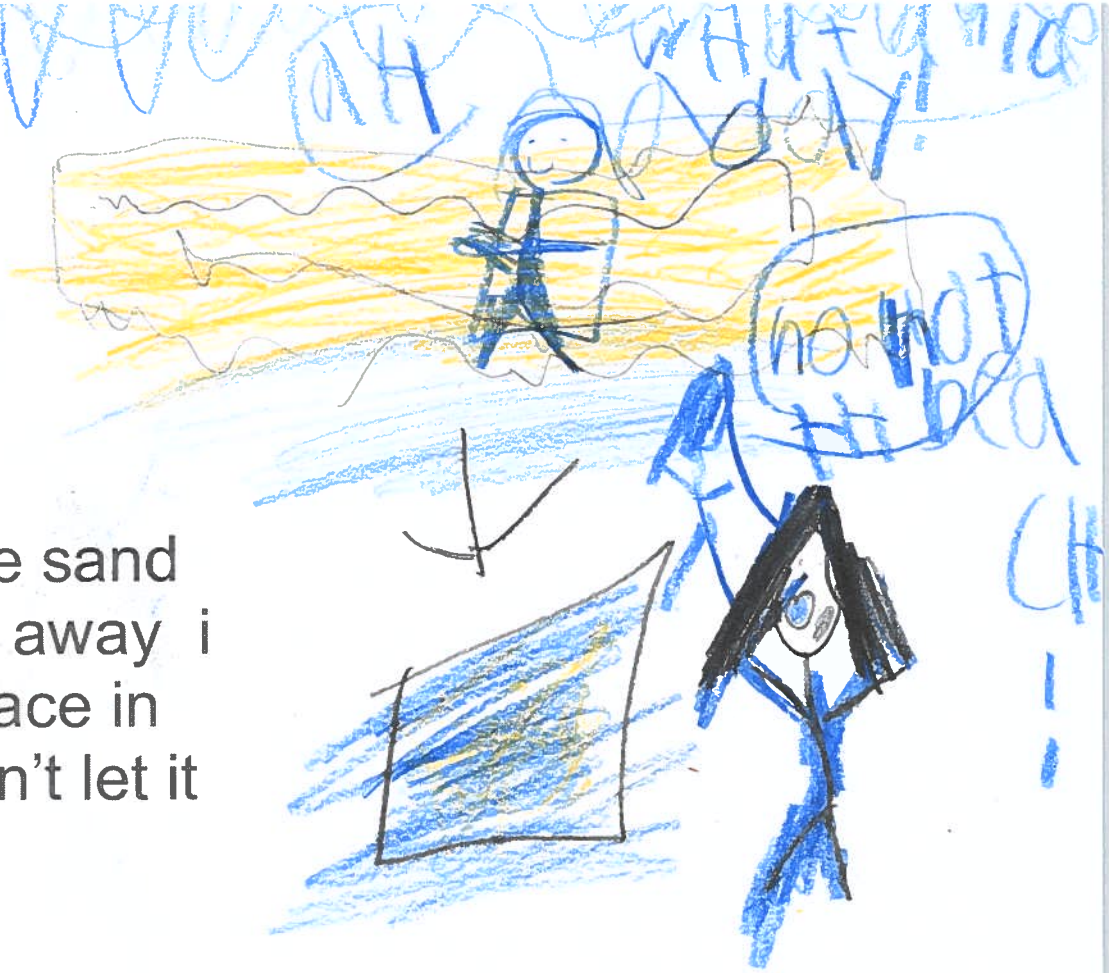
To whom it may concern.

You need to put more sand on Sandwich beaches because weathering and erosion is happening. we need more sand to stop weathering and erosion from happening. And the animals will be in danger! And if you don't put sand on the sandwich beaches the water will get to the marsh and the animals that live there their homes will be ruined!!! That is why we need the Army corps of Engineers to put more sand on our beaches.

Sincerely,

Arden





To Whom It May Concern,

Save our beach!

Because we won't have anymore sand cause the water will take it all away i love the beach it's the best place in the whole entire world you can't let it get destroyed!

Thanks for reading my letter,

Maddie

Maddie

To Whom it May Concern,

I like to walk on Town Neck Beach and it is having problems with erosion. Please save everyone's beach! Put concrete underneath to save houses. Please, I know you can fix the erosion . So that people can live In ~~a~~ their beach houses.

From,

Fallyn

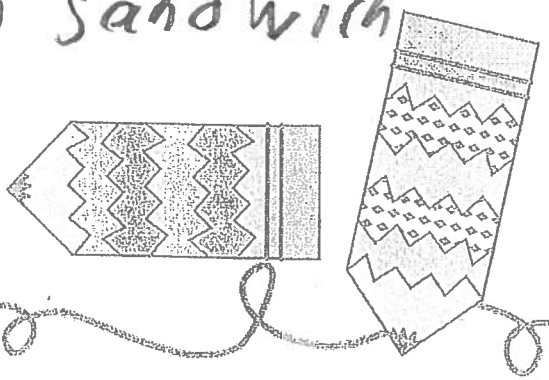
3/25/21

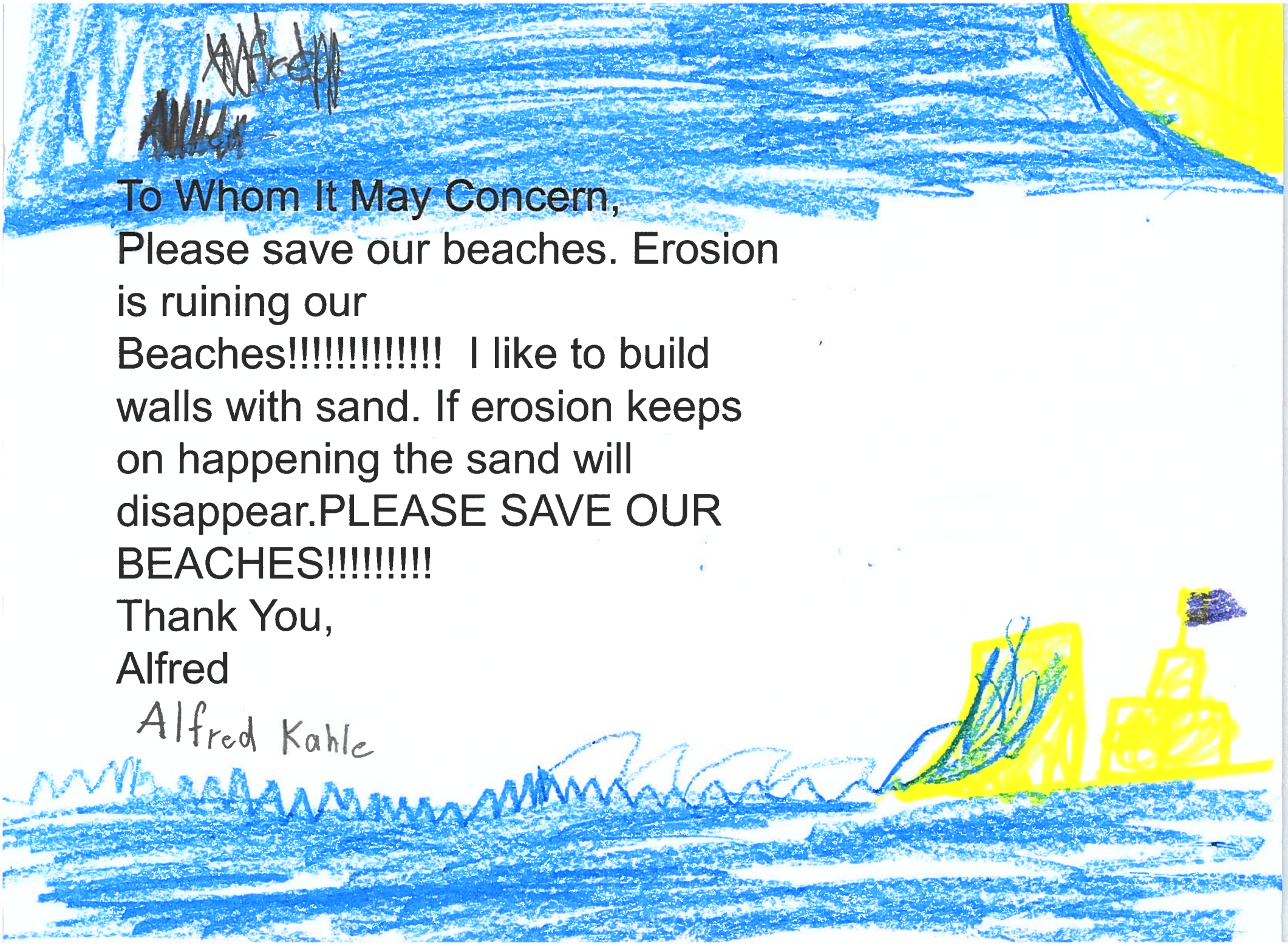
To whom it may concern,

I think sand should be put back in sandwich. If there is not that much sand in the sand dunes what would we do? If there are animals and they live on land they would have no place to live. If you are walking your dog or just walking there would be no sand to walk on. That is why I think that they should put sand back in beaches in sandwich

From

Michael





To Whom It May Concern,
Please save our beaches. Erosion is ruining our Beaches!!!!!!!!!!!!! I like to build walls with sand. If erosion keeps on happening the sand will disappear.PLEASE SAVE OUR BEACHES!!!!!!!!!
Thank You,
Alfred
Alfred Kahle

Laney

To Whom it May concern,

I LOVE the beach the sand is so soft and the water is so cool.

BUT...you and your people need to help our beaches Houses are collapsing animals are losing their homes you need to help us!

You and your people need to try to get more sand out of the water and put the sand back on the beach and the last time you dredged the sand out of the water

Was in 2016. and you should dredge at least once a year. Please try to make something to block the erosion ~~from~~ ~~Please help us.~~ Happing!!! Please help us.

From,

Laney

To Whom it May Concern,

Please help with the erosion problem on our beaches. We love our home. I suggest that you help by putting sand back on the beach for us.

Erosion is happening in Sandwich so please help our beaches!

From, I live nere a beach and I want too cepe my home.

Natalie

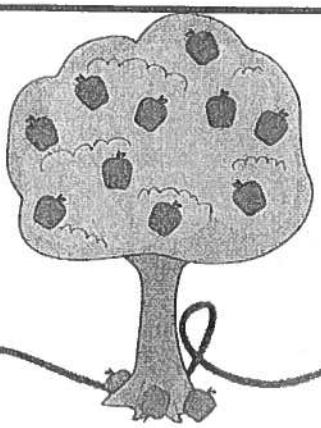
march 25 2021

To whom it may concern

We need more Sand on Sandwich beaches because we wouldn't be able to take a walk on the beach and walk dog's on the beach and people's home's will get ruined. Also people wouldn't be able to Sit on the beach. Also it will ruin animal's homes then it will keep Spreading and take the Sand. So that's why I think we need more Sand on Sandwich beaches.

from

IVY



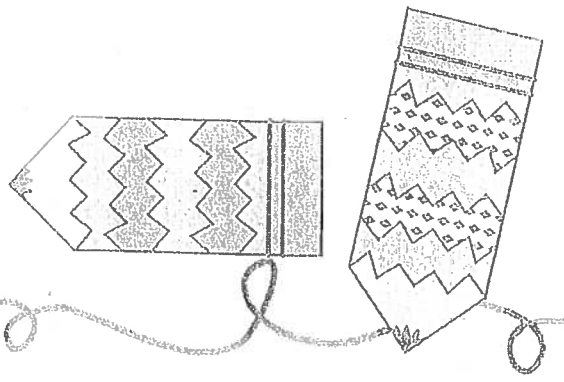
march 26 2021

to whom it may concern

If you don't put more sand on the sandwich beaches all the sand will disappear to the water and all of the animals will be in danger! and more erosion will happen and animals will be in danger! If there is a baby tree trying to grow and the water could get high enough to make the tree die and we don't want that, right?

from

Olivia



March 23, 2021

To Whom It May Concern,

The U.S Army Corps of Engineers **NEED** to save Sandwich from erosion and weathering. It is happening! You need to save our town! You should build a barrier? To save homes from falling in the ocean? It will help slow down erosion and weathering. So many houses are in **DANGER!** We **NEED** to replenish the sand. Also you need to pay more money to the town. I know $12,000,000 is a lot but we need more money for our town because we need erosion and weathering to stop! We need your financial support! I love our Sandwich beaches. I love to swim and make sand castles. **PLEASE** help our town!!

Love,
Charlotte
Charlotte
Sandwich, MA

March 23, 2021

To Whom It May Concern

Our beaches are in trouble! We need more sand because people like to swim in our beaches! Sandwich beaches need more sand! Some houses might flood. We need your support and help! You need to move the sand from the other side of the jetty to Town Neck Beach! The jetty is stopping all the sand from getting to our beach, Town Neck! Can you please help? We need more beach! If you don't do anything the marsh will be flooded too! All of the animals and plants will be in DANGER! I love to swim, do you? Do you want the boardwalk to be gone?! Please help! Everyone loves the beaches! What I love about the boardwalk is that you can jump off of it. Please keep the boardwalk safe! We really need your support! Another reason is we need you to keep everyone safe and their houses! Please keep everything safe!!! Please build a barrier! If the houses were floating all over the ocean we couldn't swim in it. I really want you to help us!

Love,
Callie
Sandwich, MA

March 23, 2021

To Whom It May Concern,

Sandwich beaches are in trouble! They are being weathered and eroded away! The animals that are in the mash are in trouble. So please get more sand on our beaches! I want you to get more sand from the bottom of the Cape Cod Canal. The boardwalk is in trouble too. Storms flood the boardwalk and break it. I love jumping off the boardwalk! I love feeling the sand. I really want you to help our beaches!

From,
Bella
Bella
Sandwich, MA

To Whom It May Concern,

Please save our beaches!

I like the beaches because you can dig holes and wonder how long it would take to get to the other side of the world! Also you should save our beaches because people have fun at the beach. That is why you should save our beaches!

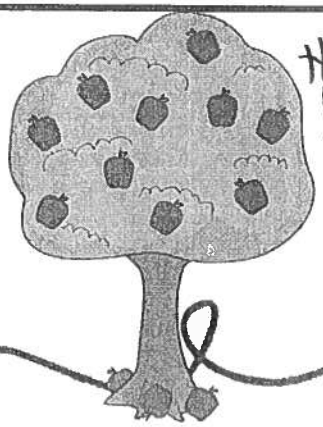
Thank You,

Toby
Toby

March 26, 2021.

To whom it may concern

this is my opinion why we should get more sand in our beaches. In sandwich. If it was really sunny out. And somebody wanted to go to the beach. And they brought a towel and wanted to sit on towel there would be less sand and the water could splash somebody. And If there were less sand the houses could get wrecked because of erosion. And If there was less sand and on a really windy day the waves of the ocean and get to the marsh with the animals would may be dip



that is why you should put more sand should be on our sandwich beaches

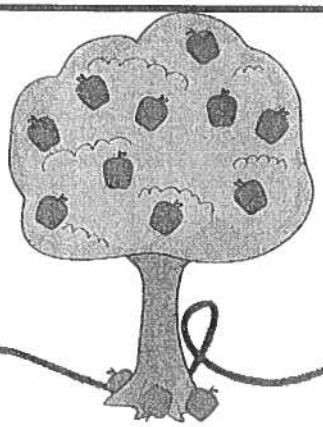
from Mia

Mia

March, 25, 2021

To whom it may concern

Our Sandwich beaches need sand because of erosion. You should give us sand because the water can flodd the marsh and do you want that? Also the extra sand you could give us can prevent time before the water takes more sand from the beach. And last it could destroy the sand dunes that we really need. That is why I think you should give us that extra sand our beaches need.



Sincerely
Charlotte

To Whom It May Concern,

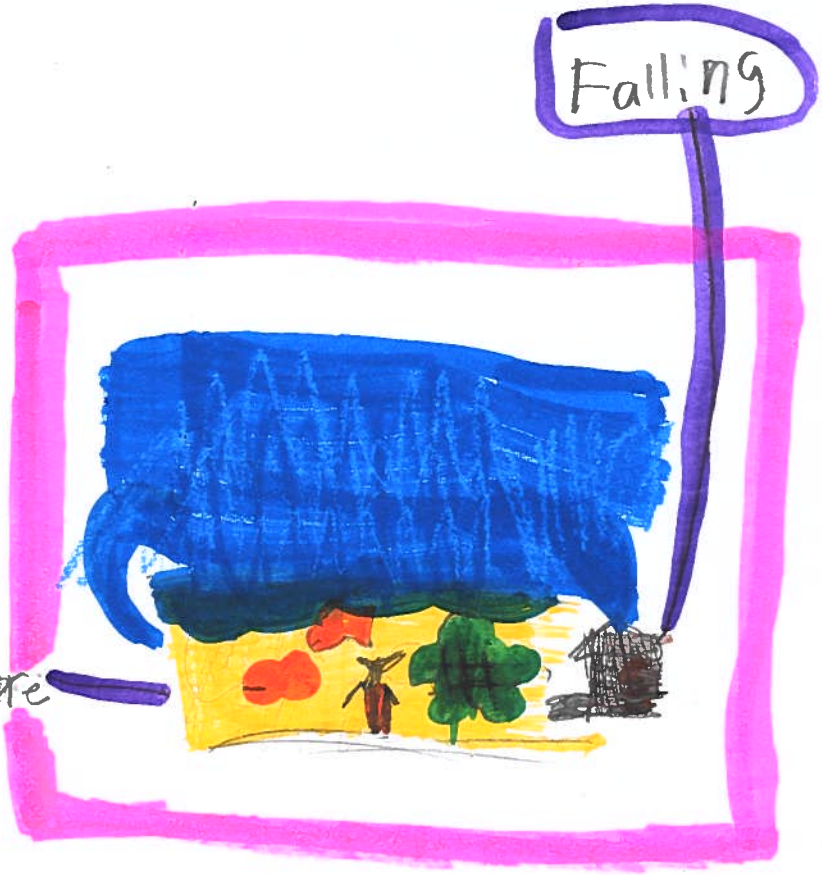
Please save are Beaches .

Erosion is happening. The sand is washing away!! If you save our beaches we CAN do more- like doing gymnastics and to swim and if you do not listen the animals will not live .if you do not save them the town of Sandwich could flood. Please put the sand on the beaches.

PLEASE SAVE OUR BEACHES.

Thank You,

Allison Allison



To Whom It May Concern,

Please save are beaches!

We need more sand!

We won't be able to climb the rocks!

With all due respect,

Patrick

Patrick

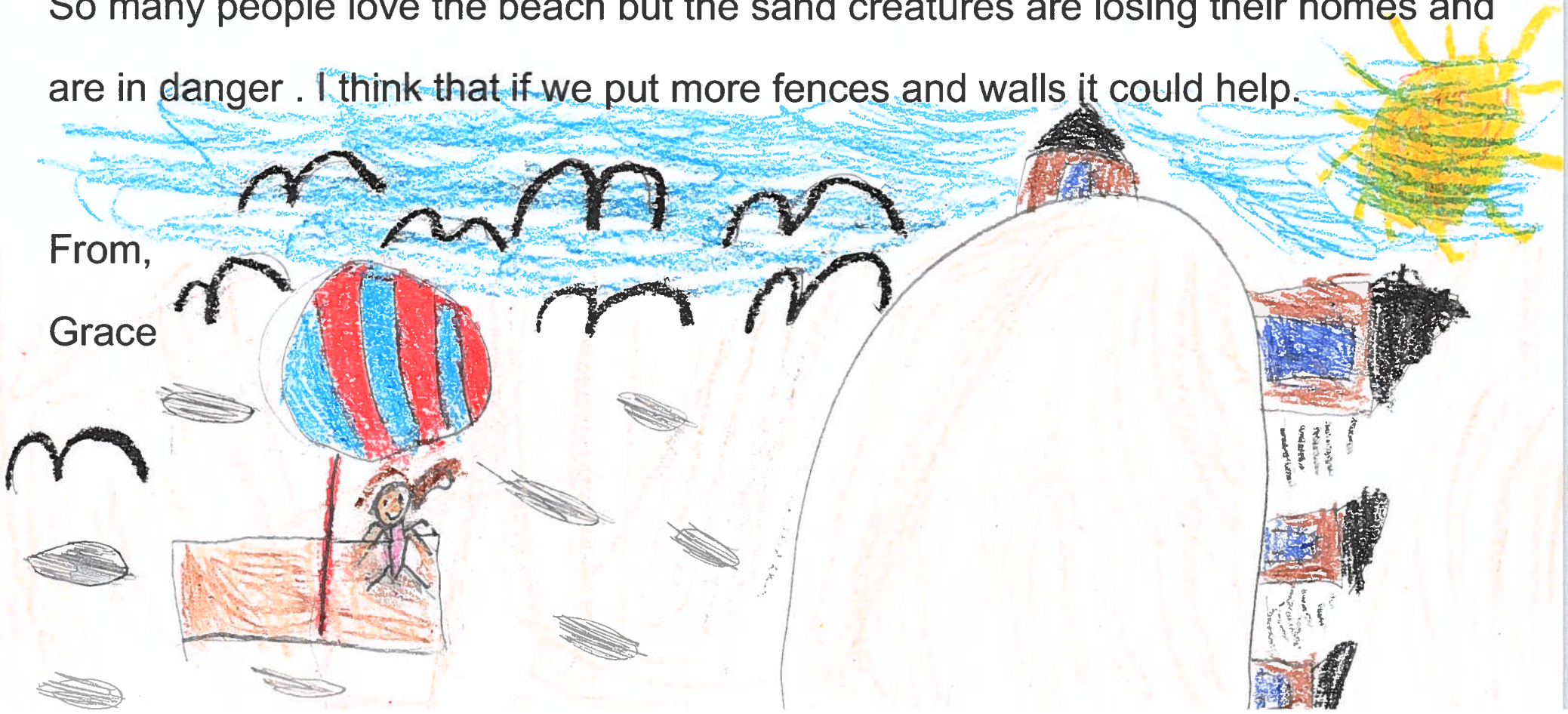
To Whom it May Concern,

Please replenish our beach sand. When you dredge it please put it back on the beach instead of the bay.

So many people love the beach but the sand creatures are losing their homes and are in danger . I think that if we put more fences and walls it could help.

From,

Grace

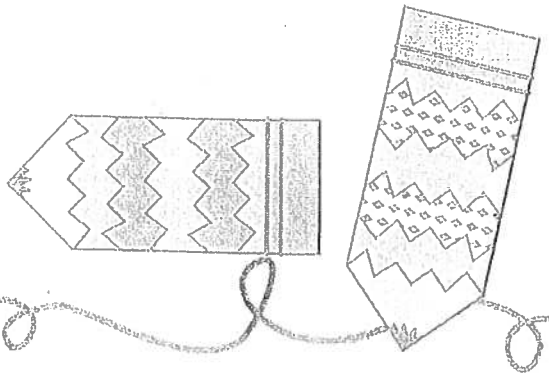


March 25, 20

To whom it may concern,

The water will flood because Erosion keeps happening very fast so we need more sand and so the Erosion can stop. and Allso we need more things to Help our beaches so Please put more sand Please!!

from Bailey



U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio,

Do you like the beach? Then it is importint to slow down Weathering and erosion in Sandwich. I
To start with erosion is destroying animals habbitats. For example where would the animals live.
Also erosion is taking animals away and some need the beach to live.
And its wonderful seeing animals at the beach.
lastly Sandwich's beaches are losing alot of sand and that will let the water to our homes.

As you can see Sandwich's beaches need the money to slow weathering and erosion down.

From, Margaret Sandwich, Ma 5

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio

Do you like the beach? If you do, you mite want to help Sandwich's beachs with wеathering and erosion. It is important to help our beache because littel birds live on the beach, homes are geting flooded from weathering! Erosion is carrying animals away. animals are and dieing! The birds are endangered. We shodl. Stop weathing from

Lucas
Sandwich, Ma

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr Riccio,

In the old days are beaches were so much bigger. I strongly believe we should stop weathering and erosion on cape cod.

First we are losing land to the sea. In fact we are losing so much land the beaches are getting smaller. Going to the beach is a great way to spend time with your famjie.

Also, it destroys trees. For instance trees make oxygen so we can breth.

Most importantly it floods our towns. The floods when they drain they take soil from our land.

As you can see we should stop weathering and erosion on cape cod.

from,
Grady
Sandwich, ma

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 22, 2021

Dear Mr. Riccio

Do you like the Beach? Then we shod slow down erosion from the Beaches on Sandwich.

Erosion careas away animals habytats.

In fact it desrorys are homes to.

Also it taks away land and careas it away.

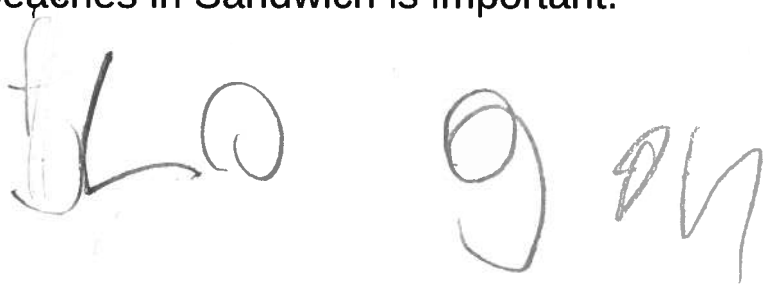
En fact it taks away Beachs.

Help

From Nick
Sandwich, ma

Dear Mr. Riccio,

Did you know beaches and animals are being hurt by erosion in Sandwich. I strongly think we should save the beaches in Sandwich.
Wind and water takes lots of sand away from beaches. It takes it other places. Some people live at the beaches and their Houses can fall down.
Storms can destroy trees and plants near the shore. It is a problem for the animals too. There are some endangered animals and they are losing their homes. I like having the animals there.
Saving the beaches in Sandwich is important.



U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear. Mr. Riccio

Do you like the Sandwich beaches? Because. . Erosion is taking part's of are beaches that we like and need.

When you lie in the worm sand does'nt it make you feel relaxed. Because erosion is deastroy tree's and all of our oxygen

all of our oxygen will be gone.

Don't the wave make you feel so peasful? Because erosion is taking away home's and nowone will have shelter.

So, pleces help fix from erosion from deastroying the beaches.

From Emma Sandwich Mas

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio,

Can you amagine Cape Cod without the beaches. I think that we Sould Stop erosion in Sandwich. First it destroys homes an example is it could wash a house away. It could also destroy animals habitat example it could make many animals endangered. Lastly we are loosing land. An example it takes sand away from the beaches. That's why we Should Stop erosion is Sandwich

From Everett Sandwich, Ma

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23,2021
Dear Mr. Riccio
I Strongly belive we should stop
Erosion on capecod. Do you
like going To The beaches?
I Like Going TO The beaches
I Hop You do I Think erosion
Should stop because it is taking
away oxagen an we Need oxagen
To bren and if we can't
breth That menes We will
die and I don't Think
Any one whats To die I
Hop The Town will Save money
So pepol don't die we
Need more Sand Walls in
Sandwhich So it pretects more
pepol My name is Jace DiRienzo
From Jace DiRienzo I Live
in Sandwhich ma.

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2024

dear mr. Riccio

i Fak we shoo5 stop wethring and erosiong.

it is Fidhine dwantown It wesT roys homes.

From Wyatt

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 28, 2021

Dear mr. Riccio do you like the beach? Well what if i told you the beach is geting smaller because of the water. It's actlly going into the water sand is gone it's going right into the water. Please build a sea wall

from Hayden Sandwichmas

by Ethan T

U.S. Army Corps of Engi
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio
if you the beach wach
stop weathering and erosio
sandwich is luring beach
ever year! It's destroying
tree No tree no O2 and also
is carring animals
Dont sam sem. It destroying
homes and habitat

From, Ethan
S.M.

oop

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23 2021

Dear Mr. Riccio,

Do you like going to the beach on a summer day? Based on what I know then we shold shold stop weathering and erosian on Cape Cod. To start with animals home's get taked away. For a example If they had know home's they wouldn't be protected and I love seeing animals. For second reason It can deshtery trees. We would loss oxsegen and we all need oxsegen to live. Lastly It can deshtery landforms for a example It'll deshtery hills and I love runing down hills. As you can see we need to stop weathering and erosion on Cape Cod. From,

Emlyn
Sandwichma.

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio,

Do you like going to the beach on a hot day? If so, then you should help stop weatering and erosion on the beach! One reason is it destroys houses and dunes.

It takes a lot of money to repair. Another reason is it can destroy animal homes. Many animals could DIE. Thats why we should stop weatering and erosion at the beach.

From, David K.

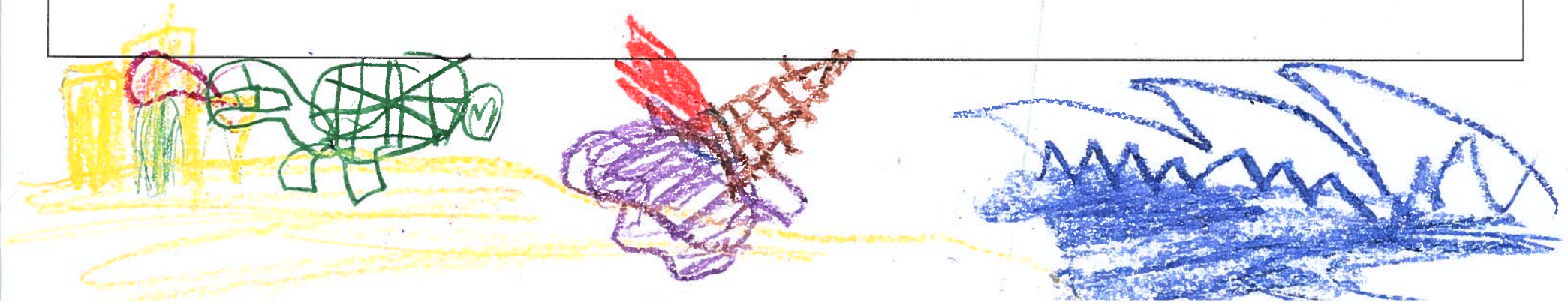
SANDWICH, M

Liam A

I think you should help save our beaches. First people live at the beach. Also save the beaches so we can go boating and save our boardwalk. Lastly, we have to protect the turtles. All in all this is why I think you should help save our beaches.

Henry

I think you the Army Corp of Engineers should save Sandwich's beaches! The marshes are in grave danger and the turtles! What about the people who want to go surfing how are they supposed to surf without a beach!The sand dunes are in danger. Water is slowly destroying it! You see Sandwich has a BIG erosion problem and we need your help.



U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio,

Do you Like the bech? we shouyld stop weathering and erosion on Cape Cod.

First... it is distroys trees. In fakt we will not have oxygen. another reasan is... it's distroying land. for example... it's distraying things that we like.

Lastly... it takes away Earth. In fakt... it's distroying beachis. As you can see we should stop weathering and erosion. from Brandon Sandwich ma

from me
Brandon
Sandwich ma

U.S. Army Corps of Engineers
New England Division
696 Virginia Road
Concord, MA
01742-2751

March 23, 2021

Dear Mr. Riccio,

Do you like the beach?
Because... my opinion is to
save the beach!
I like the beach the way
it was.
It was fun.
I like beaches because...
there's sand.
I like waves but not
what their doing.
There awsome.
Save the beach!

from,
C&M
Sandwich
Ma

Aidan

I think we should save our beaches. First save our animals and plants. Also save our turtles. Lastly save our fish. As you can see I think we should save our beaches.

March 23, 2021

To Whom It May Concern,

We all need your help to save our beaches! I love jumping off the boardwalk! Do you like to go to the beach? The beach is in **Danger!** We need financial support from the government to replenish the sand at Town Neck beach. Can you please build a barrier for the homes so they don't get destroyed?

Sincerely,
Connor
Connor
Sandwich, MA

Violet

To Whom it May Concern,

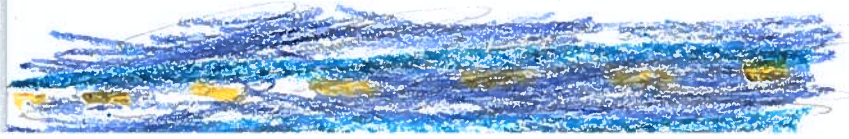
Please help save homes near the beach.

Please replenish the sand when you dredge it.

The animals homes are in danger.A lot of people LOVE different things at the beach. Please help as many beaches as you can!!!!!

From,

Violet



Caitlyn

I think you should help save our beaches .To start with people live at the beach. Also animals live there. Another reason is to protect our plants, Most importantly in summer people swim there. Lastly we need to protect against erosion. All in all, please protect our beaches.

CJ

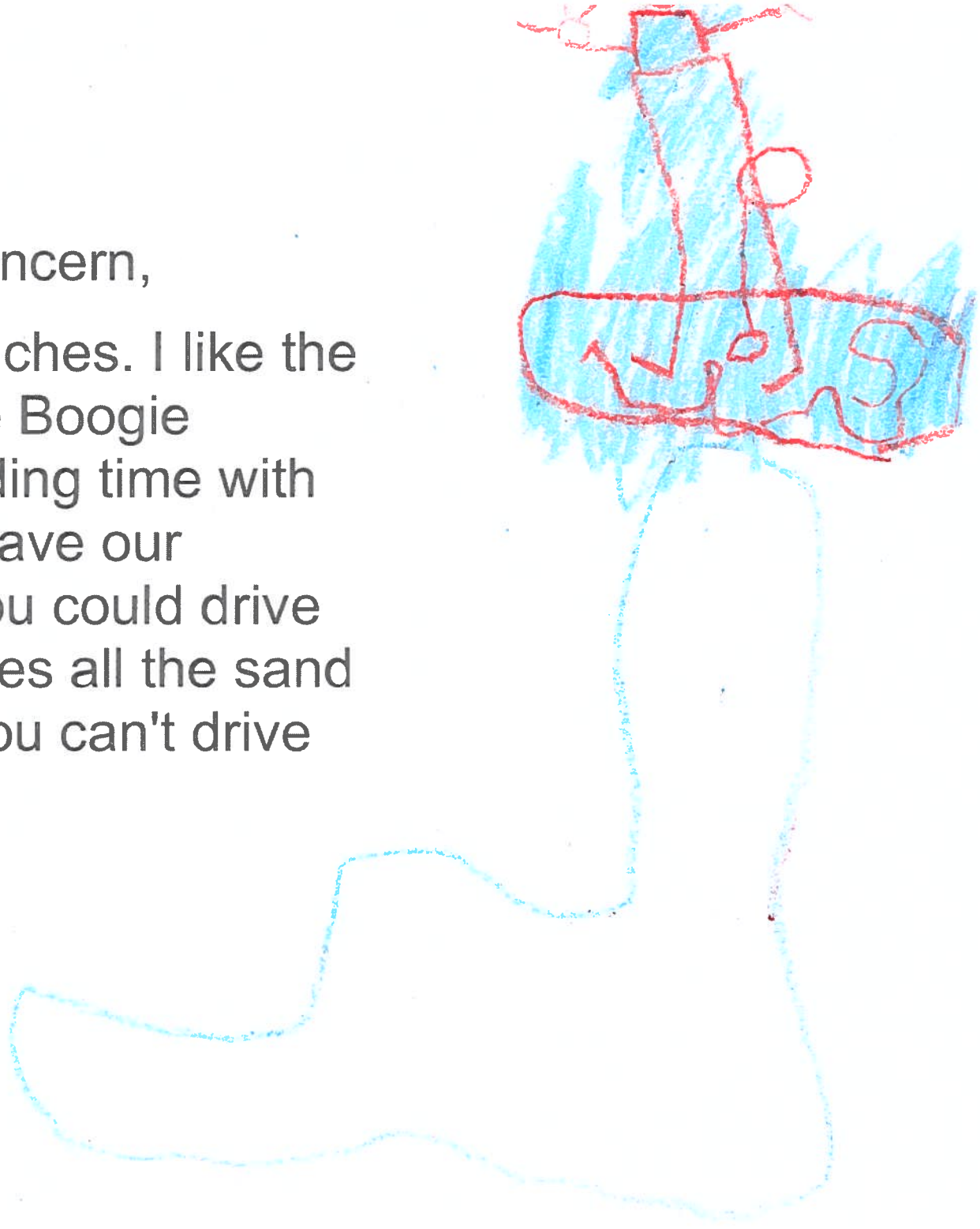
We have to help are beach. First sand dunes will get washed away. Secondly animals will need help. Thirdly no one will get to go on their boats. To sum it up we have to help are beach.

To Whom It May Concern,

Please save our beaches. I like the beach because I like Boogie boarding.I like spending time with my friends. Please save our beaches because you could drive on it. If the water takes all the sand off the beach then you can't drive on it anymore.

Thank you,

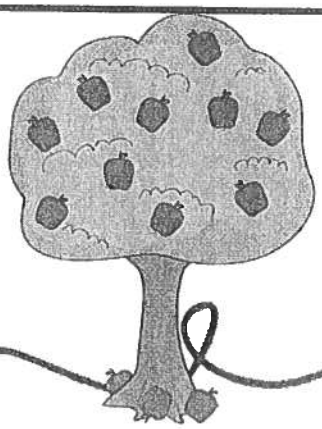
Kurtis



March 25 2021

Army corps of Engineers

Erosion is happening! if you dont give us sand quick we'll have no place to relax and crabs are scarey but they dont mean to, just let crabs and other animals live a life!. just put sand on sandwich beaches now!



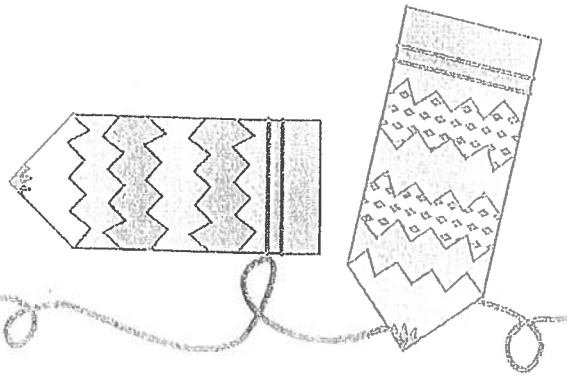
From Quinn

3/26/2021

To whom it may concern.

Dear Army corps of I think you should put that extra sand on our sandwich beaches please. Erosion & Weathering is making our beaches so tiny. U.S. Army corps you should put that extra sand on our beaches to stop erosion so we can walk on our beaches. **The sand dunes are falling because of erosin** and house's are falling apart too if you live on the sand dunes.

from James

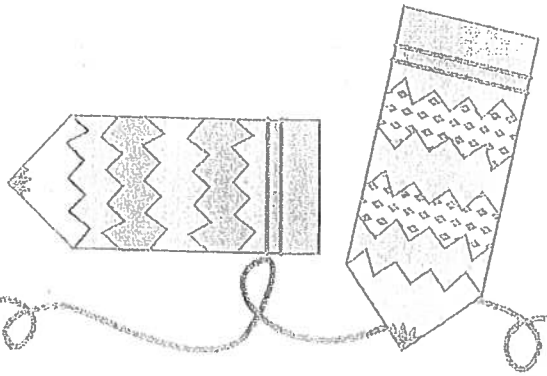


3/25/21.

Dear Army Corps of Engine

We need more sand at the sandwich beaches!!! We need more sand for sand castles! How will people put their feet in the sand and feed the warm sand on sandwich beaches! peoples horses will break; and that's why I think that sandwich beaches need more sand!!!

from: Ryersen.



March 23, 2021

To Whom It May Concern,

Sandwich beaches are in trouble! We want your help. The sand is going into Cape Cod Bay. We need money from the government.You can bring sand from the canal and from Scusset Beach and put it on Town Neck beach. The Sandwich boardwalk will get flooded from storms if something is not done to protect the coast. I love the Sandwich Boardwalk. Houses are in trouble too! Do you like beaches and do you like the houses around the beaches? We need money for the town. The town is falling into ocean! You have to help us!

From,
Ben
Sandwich, MA

March 23, 2021

To Whom It May Concern,

We need to save our **beaches!!!!** Our beaches are getting eroded and weathered away. Storms flood the marsh and hurt the plants and animals!! I want you to make a barrier out of strong big rocks. We need to save our beaches because our **Sandwich beaches** are FUN!!!! I love jumping off the boardwalk. I like how the sand feels on my feet. I love our **beaches!!!! We need your help because our beaches are going away.**

From,
Callie
Callie
Sandwich, MA

To Whom It May Concern,

I like to dig so I want more
sand pleas and love to swim.
Please save our beaches!

Thank You,
Cooper

Cooper

To Whom It May Concern,

Please help our beaches! I like the beach because I like to rest and relax on the sand. I like to fish too. I like to make sandcastles! Please help our beaches!

Thank You,

Cora

Emelia

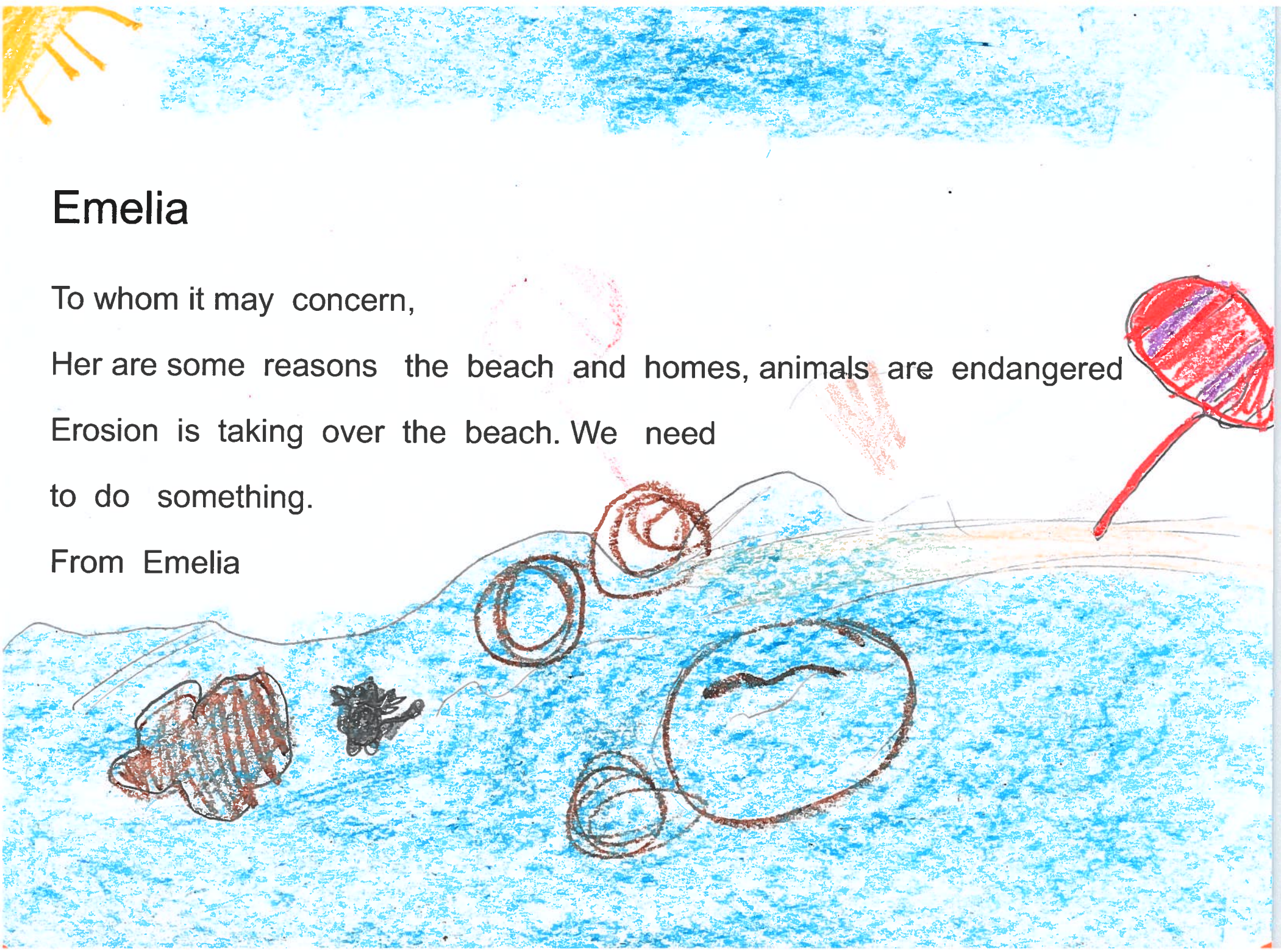
To whom it may concern,

Her are some reasons the beach and homes, animals are endangered

Erosion is taking over the beach. We need

to do something.

From Emelia

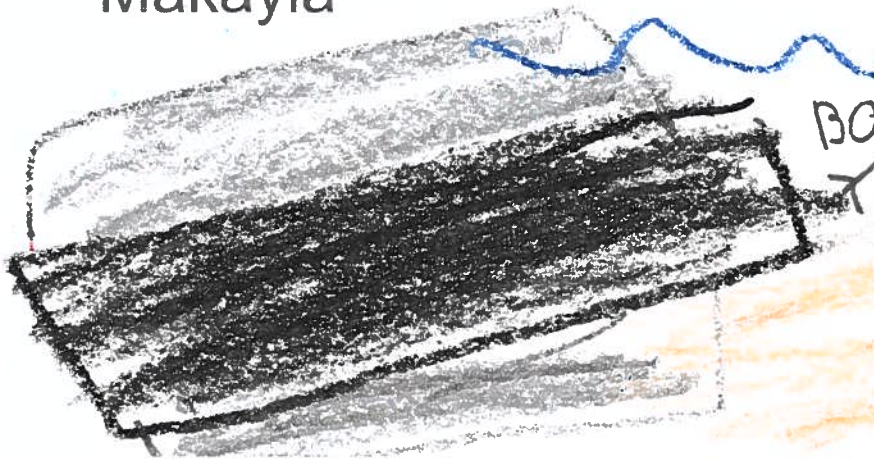


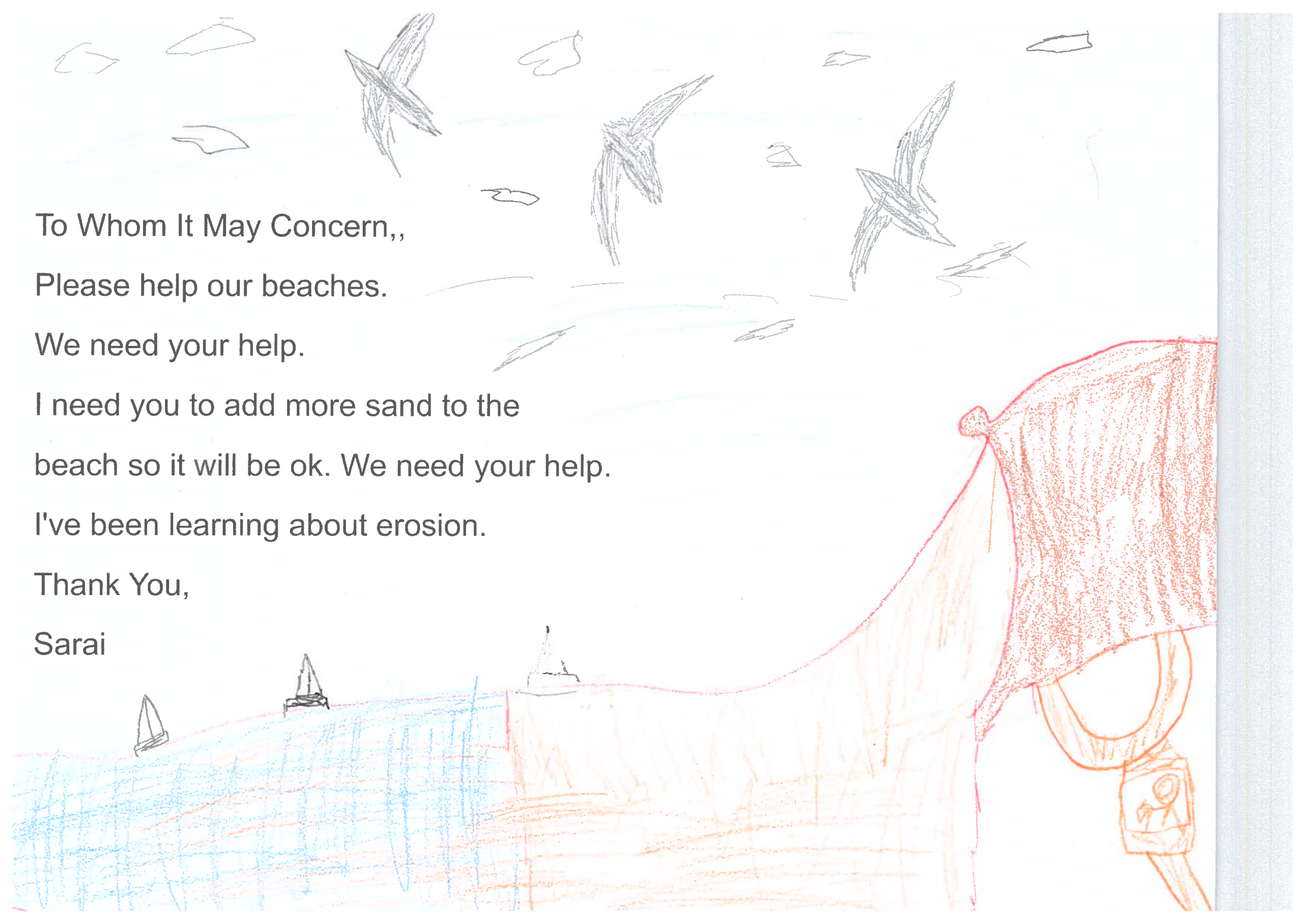
To Whom It May Concern,

Save the beaches! I want more sand to dig a hole. Please add sand to our beaches because sand is washing away from the waves.

Thank You,

Makayla





To Whom It May Concern,,

Please help our beaches.

We need your help.

I need you to add more sand to the

beach so it will be ok. We need your help.

I've been learning about erosion.

Thank You,

Sarai

Evan

To Whom it May concern,

We want the beach to not erode so can you please help.

Can you please not dump the sand in the bay we want the sand on the beach.

From Evan

To whom it may concern

Please help our BEACHES!!!

We are learning about erosion in class.

I really want the fun beaches to be ok!

I like the beach because me and my family LOVE the beach. WE LIVE BY THE BEACH!!! I love the water and the sand. I just want the beach and the ocean to be ok! I LOVE the sandcastles I want the fun beaches to be ok!

Thank You,

Ava

March 23, 2021

Dear, U.S Army Corps,

My name is Adley Galvano. I am a 2nd grade student at Forestdale in Cape Cod. And I am 7 about to turn 8 years old. I am writing this letter to you because our beaches are going away because Erosion. And I am asking you to help us change Erosion. Sometimes Erosion can be good but most of the time, it is not. So can you help us put rocks in front of the water so it can help stop Erosion.

Or...

We could do some other things like build something to cover it. Because if we don't do this we are saying goodbye to, beaches, boardwalks, sand on your feet, big waves, and a lot of stuff that you can do at the beach so i am asking you to help us.

Things That We Can Do

I did a project that we needed to stop Erosion and i put the rocks by the walter and the walter touched the sand just a little bit so i think it will be cool if we do that all over the beaches.

And we can donate money to the government and write a letter and it can help the water and the sand.

I think it is good that we are doing this because we love our beaches and we don't want them to go away. Will you help use and mostly the beaches.

Sincerely,
Adley Galvano .

Date: Tue. Mar. 23 2021

!!! Eeeek ….. I went to build a sandcastle today but there was not even one grain of sand on our beach!!!

Ok, I might be exaggerating a little bit

Dear U.S Army Corp

My name is Shane Alves

I am a second grade student at the Forestdale School in Sandwich and I am 8 years old.
I am writing because I am concerned about the erosion on the beaches.

I want to have sand for our beaches because I love to put my toes in the sand and build sandcastles with my family. Also, some houses are getting destroyed and that makes me feel sad.

Can you please help us to get more sand to help build our beaches up?

Thank you for reading my letter.

Sincerely,

Shane Alves

March 26, 2021

Dear U.S. Army Corp Of Engineers;

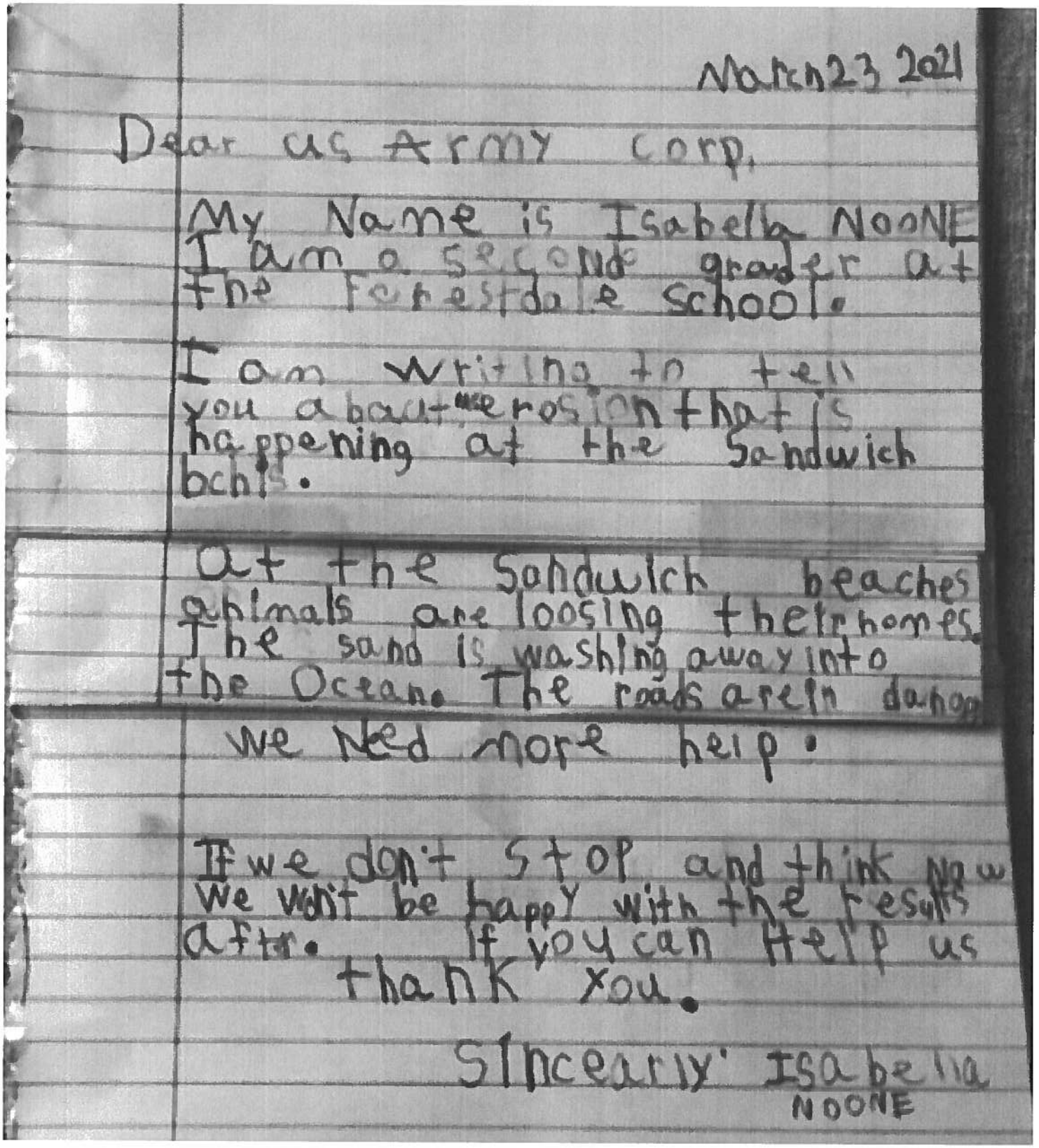
My name is Mason.I am a second grade student at the Forestdale School in Sandwich, Massachusetts. I love living here on Cape Cod and I am writing to you to ask that you help us protect our beaches.

Every year we lose some of our beaches to erosion. This erosion is destroying homes, flooding roads and hurting wildlife. We do not have the money to buy the supplies we need.

With your help we can keep the beaches open all summer long. We would have fun beaches to go to all summer long. Also, our animals wouldn't need to leave and find a new place to live.

It would be a big help if you could help us with the money we need to fix our erosion problems. Your help would make a lot of kids happy. The animals would be very happy too.

Thank you,
Mason G.



March 23 2021

Dear us Army Corp.

My Name is Isabella NooNE I am a second grader at the Forestdale School.

I am writing to tell you about the erosion that is happening at the Sandwich beach's.

At the Sandwich beaches animals are loosing their homes. The sand is washing away into the Ocean. The roads are in dang we Ned more help.

If we don't stop and think now we won't be happy with the results after. If you can Help us thank you.

Sincearly Isabella NOONE

March 23, 20[illegible]

Dear U.S. Army Corps

My name is Emma Gardner. I am a 2nd Grader, in Forestdale, MASS Sandwich. I'm writing because we need [illegible] help because erosion is [illegible] our beaches. When erosion happens, our beach sand washes away. Homes are being destroyed, pollution is in the water, animals are losing homes. I love making sand castles, playing in the water. We should save the [illegible] dunes.

Sincerely

March 24, 2021

Dear U.S. Army Corps.

My name is William. I am a second-grade student at Forestdale Elementary in Sandwich. Can you please help us with erosion?

Erosion is washing away beaches in Sandwich. Buildings are being destroyed. Animals are losing habitat.

The people in Sandwich need your help to stop erosion and build structures. Structures can slow down or stop erosion and save animals and building.

Sincerely,
William

March 26, 2021

Dear US Army Corps.,

My name is Isabella Gove from Forestdale School in Sandwich, MA. I am a second grade student.

I am writing you this because Sandwich needs help about beach erosion. Animals are getting sick and losing their homes because of the erosion. So we need your help!

So can you try to make some barriers made out of stone? We don't have that much money here, so do you think you could help?

Erosion is so bad for us, so please help us.

Thank You From,
Isabella Gove

March 23, 2021

Dear U.S. Army Corp,

My name is Joseph Jessop. I am a second-grade student at the Forestdale School. I am writing this to you about erosion in Sandwich which is getting much worse.

A couple of days ago we went to the beach. It looked different than a week ago. The sea glass was way up in the sand. We need support and materials like wood and cinder blocks to build barriers.

Please help us. If you do, it will save Cape Cod and the beaches. And it will save homes too.

Thank you!

JJ

March 25, 2021

Dear US Army Corps,

My name is Jack Tomlinson. I am a second grade student from the Forestdale School. We need your help to stop erosion at our Sandwich beaches because animals are getting destroyed and homes are getting destroyed on Sandwich beaches.

Erosion can happen on Sandwich beaches. Waves can pull sand into the ocean. This makes the beach smaller. Animal habitats can wash away. Also people's homes get washed away. Can you stop this from happening please? Erosion happens, can you please help?

We want to enjoy the beaches in Sandwich. I want to build sand castles at the Sandwich beaches. Please help us! Erosion is happening at our beaches!

Sincerely,
Jack Tomlinson

3-24-21

Dear army corps

My name is Krish. I'm a 2nd grader in Forestdale school. I live in Bourne. I am 7 years old. I Am writing this because we are losing land. We need your help! There is polluted ocean spreading from erosion. If we lose all of the beaches then all of the cape could get flooded. We can't do this without your help. We need money to do this, we need your help!

Sincerely
Krish Patel

March 25, 2021

Dear US Army Corps,

My name is Robbie. I am a second grade student at Forestdale School. We need your help in our town of Sandwich. Our beaches and sand dunes are being washed away because of erosion.

The erosion of our coast is causing the sand to wash away faster. Homes are being destroyed and falling into the ocean. The salt marsh is in danger of being destroyed and flooded by the ocean. Roads and neighborhoods are also flooding during storms.

We need to protect our beaches, homes and coastline from erosion. We also need to prevent damage to the salt marsh ecosystem because many sea animals live there.

I know it would cost lots of money so we need your support. Please consider funds for a solution. We need a protective barrier to slow down the erosion. I want to enjoy the beach for many years and also save homes and the sea animals that live in the salt marsh.

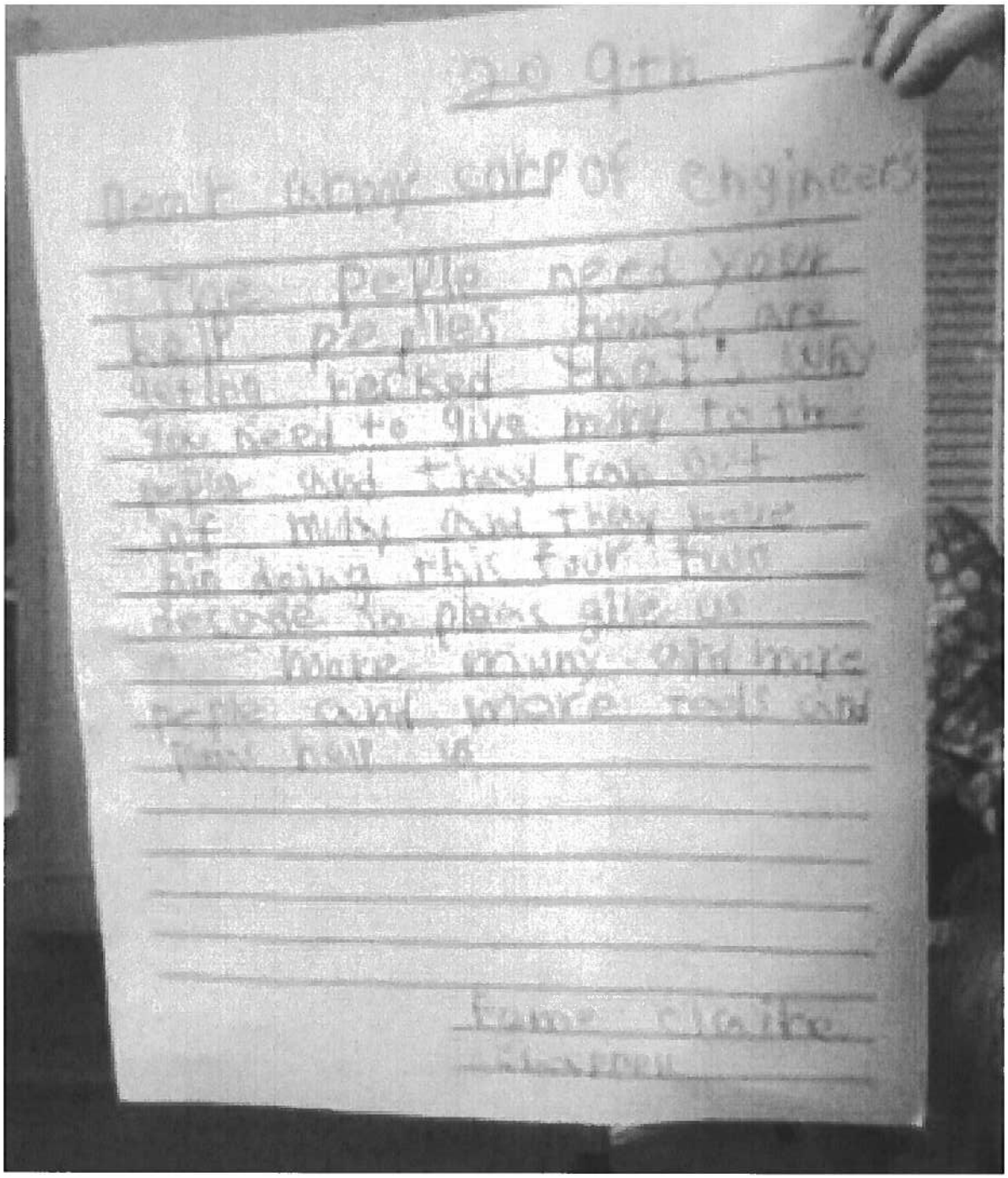
Sincerely,
Robbie

Dear Army Corps.,

My name is Reid and today is March 23, 2021. I am a 2nd Grade student at the Forestdale School in Sandwich. I am 8 years old. I need help from you because erosion in Sandwich is taking away our beaches. Every year erosion takes away 1-2 feet of beach. Some people's houses even fell into the ocean because of erosion. Our beaches are where we play, walk, swim, vacation, live and work. Our beaches are our home. Can you please help us by giving the government money so they can get stuff to block the water from the sand. We want to enjoy our beaches forever.

Sincerely,

Reid Kraihanzel



March 23 2012

Dear US Army corp

At my home is
erosion. Can you
pear for erosion?
The it peol
are being hurt by it.
erosion is when
water thacks the
It destroys houses
Erosion doesn't
give land back.
Erosion hurts people
and takes away land
if you cave the beach you can
Earn

You can buid a
brick wall
Please stop erosion

from Brandon
Carlson

3/25/21

Dear Ustr My corp of engineers,
I'm writing because of the erosion on Sandyneck beach. I am a second grader at Foresthale Elementary. Sandyneck is one of the best beaches in town. My Friend's house fell down because of the erosion. I know you have been trying to stop the erosion For almost 2 decades and you don't want to give money to our town. But it will still cost money to fix the houses that are falling down. I think you should keep giveing the money and help to help the beach! Hopefully You agree because this beach means a lot to our town!

From:
Rosie Spurling

Dear Sir/Madam:

My name is Alabama Breeuwsma and I go to Forestdale Elementary School in Sandwich, Massachusetts. The reason I am writing is that I am very concerned about the erosion on Town Neck Beach by the Cape Cod Canal. I feel that we need a permanent solution so that my town's beach will stay the same. My family says if nothing is done the marsh will flood and I may lose the town center. If this happens, it may also hurt the habitat in the area.

I am worried about the future of the beach. So many people enjoy Town Neck Beach and just recently houses have been destroyed, which makes me very sad. I wonder where the families that lost those house will sleep at night.

I think that The Army Corps of Engineers needs to fix this because they caused the damage by building jetties in the 1940's. The jetties are causing major erosion. The federal government built the jetties so they need to fix this problem.

I have an idea that may help. Maybe you could vibrate and pack the sand down and add rocks and mats at Town Neck Beach to stop the erosion. I saw this on a video about erosion in the Netherlands. Another idea would be to build another Jetty south of Town Neck Beach. I don't know how my ideas will affect the habitat. That would be something to figure out before using my ideas.

I know this this will cost a lot of money, but I think it is your responsibility to fix this problem.

Sincerely,

Alabama Breeuwsma
School Kid
Forestdale Elementary School
Sandwich, MA

3/23/2021

Dear USA Army Corp,

My name is Silas from Grade 2 in Forestdale School. I am writing about the erosion at Town Neck Beach in Sandwich. The water is washing the beach away. Can you help?

From,
Silas

march 25. 2021

Dear us Army corp:
my name is Logan cotter i'm in second grade i live on capecod i'm concerned about the erosion on town neck Beach.

I believe that erosion on town neck beach for 3 reasons 1st reason is strong currents coming from the canal 2nd reason is high tides and the 3rd reason is big waves during storms.

we can't stop storms.
we can't stop erosion tides,
but I think we can
change how currents
from the canal
come out and sweep
the sand from town
neck Beach.

my suggestion are
one: remove the
jetty.
two: make two new
jetties that send
the current out in
to the bay

sincerely
Logan Cutler

thu mar 25
2021

Dear us Army
Corp Im Deanie
the Beaches wares
are makeing the sand
go away and I know
we are trying
everything we can
Pleas Help us Army
corp and you can put
a fense and rocks

Deanie Mia

March 26, 2021

Dear U.S. Army Corp,

My name is Sofia Carey and I am a second grade stucent in Ms. Wudyka's class at the Forestdale school in sandwich Massachusetts I am writing to ask you to help us save the beaches that make cape cod great.

Town Neck Beach in sandwich Massachusetts is a special place. We can play and enjoy nature and it protects us from ocean waves. The storms have eroded the beach and it is dissapearing. Some houses have already been destroyed by waves. The town has worked for 20 years to put more sand on the beach but the problem keeps geting worse. We don't have enough money, supplies or helpers to save our beach.

I know you can help us. The Army has scientists, engineers, supplies and money for problems lik this.

Please think about it and help us we want the Army to save Town Neck Beach for the kids, families and visitors who need it.

Sincerely,
Sofia Carey

March 25, 2021

Dear Army Corps of Engineers,

Hello my name is Willow Mae and I am in second grade at the Forestdale School. I think it is important to help slow down or stop the beach erosion problem in Sandwich.

It is natural for erosion to happen at beaches with storms and oceans but maybe this erosion can be slowed down by building structures like jetties and strong rock walls to protect the dunes. It would also be good for houses not to be built so close to the beach. Most people love the beach and walking around but lots of walking on the dunes can cause erosion. Special paths and no walking in certain areas could help. I don't think dumping more sand on the beach helps because it keeps washing away but building structures and changing beach rules might help.

Going to the beach is a fun and important thing for people and families to do so I think keeping the beaches protected and in good shape is important.

Thank you,

Willow Mae

mar 23 2021

Dear us army Co

my name is Kylie and I am writeing this letter becaus I want to help save the houses and beaches I want to help becase I love to go to the beaches and collet sea shells. I love sandwich (beach) and I don't want it to be gone and a bunch of hom's live there to. houses are in portent and if the hous falls maybe someone was in there and gets hurt.

I know that your out of money still maybe you can make a career with rocks still the kid's can swim but its for the beach anyway at the dock where the boats are.

From Kylie

March 26, 2021

To Whom It May Concern,

I am in second grade.
I go to the beach a lot
in the summer with my
friends and family.

I really like to go swimming.
I like to find crabs.

Erosion is something that will

break Stuff in so many ways to destroy the beach. Erosion is taking Sand away. We need more sand on the beaches because a lot of erosion has been happening on the beach.

I want you to take Sand from the canal and put it on Town Neck Beach.

we can save so many animals.

Thank you.

Sincerely, Callah Y.

March 26, 2021

To Whom It May Concern,

I am in second grade. I love the boardwalk because I can jump off of it and I can play with my friends. Sometimes I go near my birthday. I go Sometimes with my friends. We jump off. It is

So fun!

Please help us with the erosion problem. Erosion is taking away the sand, so the boardwalk is going to get taken away. The boardwalk needs sand because it keeps the boardwalk up and if there is no sand there is no boardwalk.

Please give us Sand to solve our problem. We need sand because it is getting taken away So if we get a lot of Sand it can stop houses from eroding away. It will help the board walk stay up.

Thank you.

Sincerely,
Abby M.

March 26, 2021

To Whom It May Concern,

I am in second grade. I really like the beach. I like the beach because I can make sand cartles with my brothers. I want to save the beach because that is where sea animals live like sharks, tuna, and swordfish. The problem is erosion is taking

Sand away from the beach.
Erosion is taking things away
and if we don't stop it the
beach will be destroyed.
Erosion is when stuff like sand
and rock get taken away
by water. So, if when dredging
the canal, after can you
dump it on to the beach?
that will replace the beach.

Thank you.

Sincerely,

Zach W.