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KSN INC.
KJELDSEN SINNOCK NEUDECK
Consulting Engineers and Land Surveyors

1125-012

November 20, 1997

Board of Trustees
Reclamation District No. 501 - Ryer Island
c/o Mike Vinzandt
2121 Main Street
San Francisco, CA 94105

Re: US Army Corps of Engineers (USACOE), Prospect Island Project
DRAFT Modification Report

Dear Mike:

On behalf of Reclamation District No. 501 - Ryer Island, I have reviewed the subject report and submit the following comments.

I have recently undertaken two reviews of projects with similar impacts. Both of these reviews were done as part of a CEQA/NEPA process. The projects that I am referring to are: 1) the Interim South Delta Program which was a program jointly sponsored by the California Department of Water Resources and the US Bureau of Reclamation whom prepared an EIR/EIS designed to resolve water supply and circulation problems in the South Delta, and 2) the Delta Wetlands Project, which the California State Water Resources Control Board and the US Army Corps of Engineers prepared the EIR/EIS designed to divert and store water of two Delta Islands, coupled with the construction of recreation facilities and shallow water habitat.

It is not my intent to comment on the legal merits of whether or not an EIR/EIS should be prepared for this project other than to outline their purpose. Its my understanding that the purpose of an EIR/EIS is to 1) analyze and disclose the environmental effects of a project, 2) identify ways to reduce or avoid potential adverse environmental impacts resulting from the project, 3) identify and assess alternatives to the project, and 4) develop mitigation measures for the unavoidable impacts. The two areas in particular that I do not feel have been adequately addressed in this Project Modification Report are the full

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disclosure of the impacts (Item 1), and the development of mitigation measures to protect against the unavoidable impacts (Item 4).

The expressed purpose of the Project Modification Report was to provide a basis for design for improvements to Prospect Island, yet very little effort was spent evaluating the impacts that this project will have to the neighboring islands.

My foremost concern relates to the cumulative flood hazard impacts that Ryer Island will be exposed to. The Prospect Island Project will significantly increase these hazards rather than just maintain them. The Prospect Island Project creates two new flood hazards. First the adjoining levees and lands will be subjected to increased seepage. Secondly, there will be an extended risk to the adjoining levees due to wind waves generated across the flooded island.

Increased seepage has been demonstrated on numerous occasions in the past where delta islands flood, and portions of the levee systems and farming fields on adjacent islands become saturated. This phenomenon can be better illustrated on the attached figures. **Figure 1** is an example of what the current conditions are between Ryer and Prospect, whereas, Prospect is dry and the seepage can be attributed to Miner Slough. **Figure 2** demonstrates what occurs when a flooded island is adjacent to a nonflooded island and how the seepage transmits subterranean or beneath the slough and levee and surfaces behind the levee.

A historical example of this is the Mildred Island flood in 1983. The neighboring McDonald Island, experienced a significant increase in seepage along the adjacent levee. This increase in seepage resulted in a saturated levee foundation and unfarmable fields along the side adjacent to Mildred Island. I have enclosed two photographs depicting the before and after condition on McDonald Island in order to demonstrate this seepage phenomenon. You will note that in the 1963 photo, the fields along the west side of McDonald, adjacent to Mildred, extend all the way to the toe of the levee. In the 1994 photo, the condition is significantly different, and a band of unfarmable ground lies between the toe of the levee and where the fields start due to the extensive seepage.

The degree and extent of seepage to be expected on this project is difficult to predict and the correction is technically difficult and costly to implement. There is no question that seepage will occur and that it can be attributed to the flooding of Prospect Island. The challenge is to identify the degree and extent of the seepage through the development of a monitoring program, which would include, a detailed geotechnical investigation. This investigation and monitoring program must be developed in advance of the Plans and Specifications stage of this project and preferably prior to an EIR/EIS. Provided an EIR/EIS were prepared, the District would be granted an opportunity to evaluate sound technical data that would be properly collected over an extended period of time.

A seepage monitoring program must include two main elements. The first element should deal with identification of existing conditions. The second element should be a

preparation of a contingency plan that would include the identification and development of a variety of corrective and/or mitigation mechanisms. These corrective actions could then implemented in advance of any serious problems, or otherwise be available to offset and impacts that may arise later.

Identification of the existing problem which is the first element of a monitoring must take into account both the high seepage that passes through or immediately beneath the levee embankment (Fig. 1) as well as deep seepage which passes through more permeable materials below the peat that underlies the levee embankment (Fig. 2). Runoff generated from high seepage will be handled as it usually is through the District's existing collection and conveyance system as part of the District's overall drainage system. Subsurface sand layers, however, provide the primary conduits for deep seepage. These layers permit the seepage to travel from a flooded island onto an adjacent island. Accurate identification of the pre and post site conditions for use in analyzing the potential for seepage include but are not limited to investigation and measurement techniques such as:

1. borings
2. piezometers
3. geophysical surveys
4. use of surface water flow measuring devices (e.g., weirs in ditches)
5. water flow tracers
6. electrical conductance surveys
7. geothermal measurements
8. aerial photogrammetry

The second element of a monitoring plan includes the development of a contingency plan. This contingency plan will be the basis by which corrective action will occur. Having a contingency plan will also limit any dispute in the future if negative impacts prevail caused by the proposed project. In order to trigger implementation of the contingency plan, there first must be an established seepage performance standard. In order to establish seepage performance standards, one must derive extensive baseline data collected during the first element of the program. The standard would establish a range of operation for individual piezometers covering all periods of the year. This range then would be the basis for comparison of individual piezometer data. If individual or groups of piezometers consistently fell outside the range, then corrective action would be implemented. The following is a limited list of potential corrective and/or mitigation mechanisms which could be implemented provided seepage impacts were realized:

A. Installation of relief wells to reduce groundwater pressures within sand strata and control seepage flows and uplift forces as relief wells function by bleeding water to the surfaces by hydrostatic pressure. The effectiveness could be increased by adding pumps providing a positive head condition.

B. Installation of cutoff walls through the permeable sand strata to reduce and/or cutoff seepage. Cutoffs could be constructed using slurry walls, sheet piles, mix-in-place soil stabilization, etc.

C. Installation of drainage blankets composed of free draining material to collect seepage in areas of increased seepage or wet spots.

D. Grouting of sand strata could be used to reduce seepage.

E. Construction of setback levees constructed on prepared foundations and with engineered fill to limit, if not preclude any potential seepage problems.

The fact that there has been virtually no mention of the potential for destabilization of the District's levee due to an increase in seepage is unsettling. This condition must be evaluated and emphasized in its importance. Ryer Island is not willing to accept a reduction in levee stability that may result in increased piezometric conditions beneath their levee. Ryer Island will require the Corps to mitigate the reduction by implementing one of the above mitigation measures preferably on Prospect Island's side. If it is necessary to mitigate on Ryer Island's levee, then it is anticipated that the landowners will be fairly compensated for any losses due to construction of the mitigation measure.

The second area of flood hazard relates to extended risk to Ryer Island levees due to wind waves generated across the flooded island. **Appendix H** outlines the analysis conducted to determine the magnitude of wind induced wave action. The report states that "although the primary wind direction is from the south-east, the greatest wind-wave runup is caused by a north wind." The report goes on to state that "without some type of bank protection, levee erosion is likely along the north levee." Since the wave height is approximately the same for the south-east direction (2.1') vs. the north direction (1.8') one can derive the same conclusion that bank protection will be necessary to protect the levees against erosion. Unfortunately, nowhere in the report is this bank protection and erosion issue addressed. In fact, the term biotechnical plantings is the only type of protection method mentioned. My concern is that vegetation used as erosion protection rarely works against wind driven waves of the magnitude that can be expected across Prospect. It is interesting that the wind speed used to calculate the wave height does not take into account or use as the basis for design the maximum wind speeds that can be generated in the winter months in Sacramento. The fastest overwater wind speeds with recurrence intervals of 50 and 100 years are estimated to be 70 and 73 miles per hour, respectively (USACOE, 1978) for Sacramento.

On **page 5 of Appendix A** (Geotechnical Report) it states that it will take 5 to 8 years to build the interior mounds. This estimate in my opinion is optimistic considering they are building these mounds on a foundation with up to 21 feet of peat. The actual estimate of time it will take will be closer to of 10 to 12 years, unless consideration is made to remove all of the underlying organics prior to commencing with any fill for the mounds.

This design for building of soft foundations such as this will require staged construction over the period of time suggested. This staged construction spanning numerous years will also be applied to the flattening of the levee slopes. Yet, on **page 4, Attachment E** under the **preferred Alternative 5** it indicates that "construction will take place in the dry over a 1 year construction period". It appears that the project proponents have not read their own Geotechnical recommendations. I am concerned that there is confusion as to the complexity of constructing such a facility. This report has not adequately addressed the time it takes to properly construct earthen fills over deep peat areas. Without this understanding undoubtedly this project is doomed for failure. The sensitivity of the problem requires additional analysis and planning from experts that are familiar with this type of construction.

The above comments relate to the overall insufficient analysis conducted on measuring and mitigating the potential impacts of this project on Ryer Island. In addition to these comments I have listed below comments related to specific sections that I came across while reading the Project Modification Report.

Chapter II page 13, last Paragraph "Soils": Reference is made that *there is very little peat soil in the project area (Appendix A).* When you turn to Appendix A you will note that organic soil vary in thickness from 2 - 21 feet. I question the integrity of this report when contradictions of this magnitude are made.

Chapter II page 13, last Paragraph "Water Supply": *Increased Delta smelt larval may occur as a result of increases in shallow-water habitat associated with Prospect Island. This may cause additional restrictions on pumping at the Barker Slough diversion.* Ryer Island anticipates that this same impact will exist on their diversions for irrigation. The USACOE must therefore assure Ryer Island that there will be no restrictions placed on any of their diversions resulting from this increased smelt population caused by the Prospect improvements.

Page 49, first Paragraph "Water Quality": *Decreased flows in Miner Slough could result from this project. The decreased flow may degrade water quality in the slough.* Ryer Island landowners can not sustain any reduction of water quality resulting from this project. Ryer Island landowners rely on the water in Miner Slough to irrigate their crops. Therefore, any negative impacts to its quality will have a significant impact and must be fully mitigated.

Page 50 & 51, fifth Paragraph "Seepage": *Performing any analyses without site data would not result in reliable conclusions. The proposed exploration and survey data would be obtained during the plans and specifications.* I have aimed most of my comments in this letter at this subject. Yet I feel I need to draw one more comparison showing how unreliable the design of a system would be, provided they waited until the Plans and Specifications stage to undertake gathering this time sensitive data. The Delta Wetlands Project, which I introduced at the beginning of this letter, who, as part of an EIR/EIS

process, collected seepage data for analysis over a period of 8 years prior to presenting it for public review is in contrast to only a several months of data collected for this report.

Page 56, sixth Paragraph "Further Studies": *Soil explorations should verify that construction of Prospect Island would not cause additional seepage of ground water on neighboring Ryer Island.* What basis do they have for saying this? I think history can easily contradict this statement. Statements like this, with no factual basis, lower the credibility of this report.

Appendix A " Geotechnical Report", Figure 1: It is interesting to note that the proposed borrow area for this project is in the area of the deepest peat. Is it the plan of the USACOE to strip away the 20+' of peat to get down to good material or try and incorporate this highly organic, unstable material in as fill?

Appendix A " Geotechnical Report", Figure 2: A fact that appears to be overlooked is that water will now be up on both the land and waterside slopes of the levee. When depicting the design levee section it must show water surface elevations of equal height on **both** sides of the levee and not just on the typical riverside. This condition must be considered when evaluating the static and dynamic stability of Prospect's surrounding levee. Not only will the hydraulic parameters affect the waterside slopes it will now also affect the landside slopes. Saturation and rapid drawdown are features that must be considered and designed for when considering the parameters effecting the long-term stability of Prospect's levees.

Appendix C " Environmental Assessment/ Initial Study", Page 28, Paragraph 4.5.1 Baseline Conditions: In the first paragraph of this section it states "*A soil analysis and seepage study based primarily on county soils maps found that some seepage could result from piercing any impermeable layer on Prospect Island (Corps , 1997). Both analyses concluded that additional data should be taken before a final analysis is made about the seepage effect of a flooded Prospect Island on Ryer Island.*" The need to gather more data is the very basis of my concerns. How can Colonel Dorthy F. Klasse of the USACOE draw the conclusion that the proposed project will not result in significant impacts when the potential impacts have not even been studied or measured?

Appendix C " Environmental Assessment/ Initial Study", Page 45, Paragraph 10.0 List of Preparers: It is interesting to note that not one (1) Engineer assisted in the preparation of this report, yet numerous engineering conclusions were drawn throughout the report!

Appendix E " Basis of Design", Page 5, Paragraph D1.3: 1,000 foot setback zones from Prospect's levee toe for excavation will not preclude seepage from transmitting on to Ryer Island. The setbacks will lengthen the seepage path but not eliminate the potential for seepage.

I have identified numerous areas above that will require the USACOE to provide additional, data or analysis prior to developing an opinion as to the impacts of this proposed project on the District's facilities. If you have any questions please call me.

Sincerely,

KJELDSEN, SINNOCK & NEUDECK, INC.

Christopher H. Neudeck

Christopher H. Neudeck, RCE

CHN/ls
Encl.
cc: Trustees (w/encl.)
Donald H. Neudeck, consultant (w/encl.)
Gary E. Rook, Supt. (w/encl.)

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CONSULTING ENGINEERS & LAND SURVEYORS

McDONALD ISLAND
NOVEMBER 1994

Drn.: BAS	Ck.: CHN	SCALE: 1"=500'
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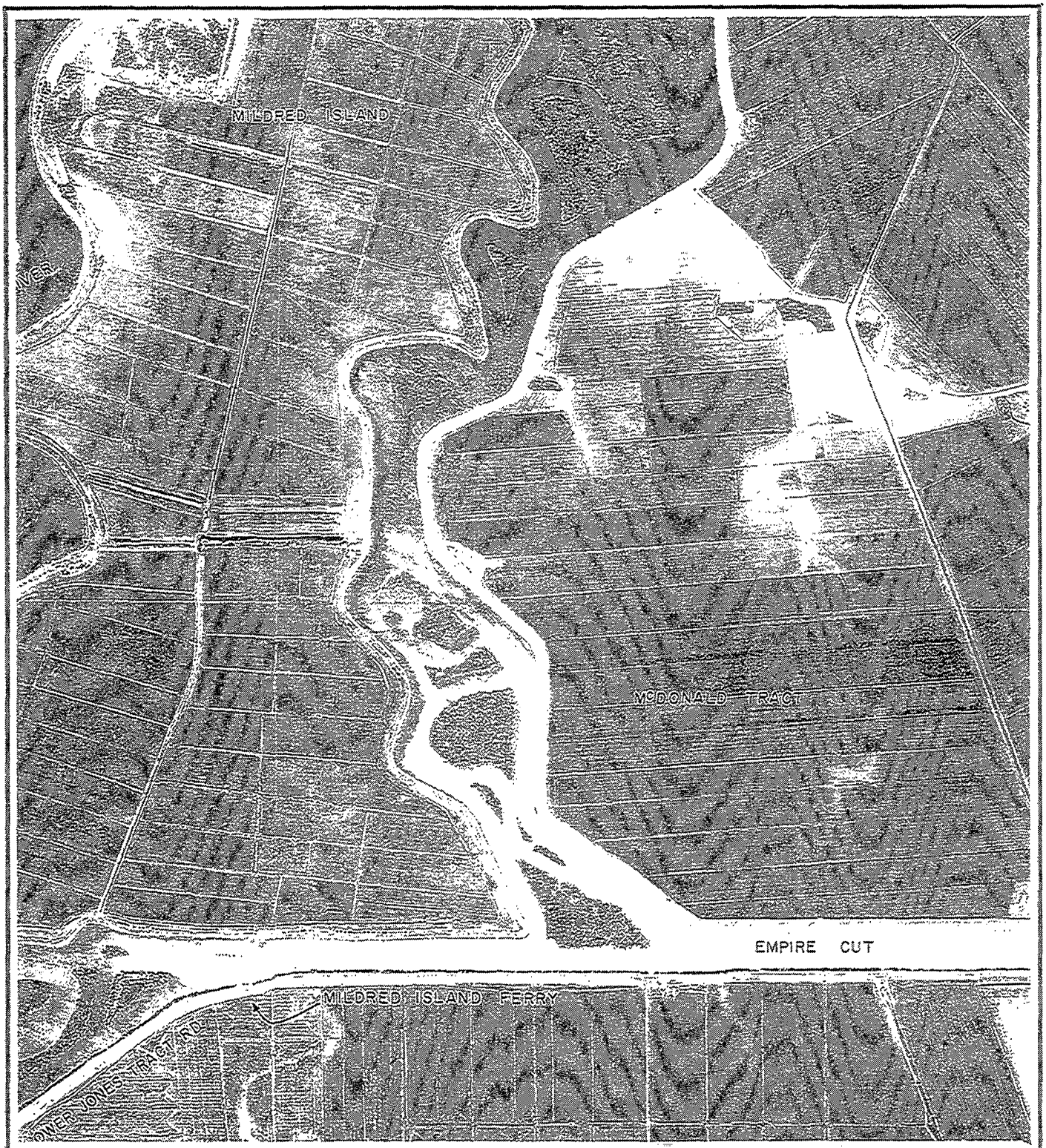

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McDONALD ISLAND
JUNE 1963

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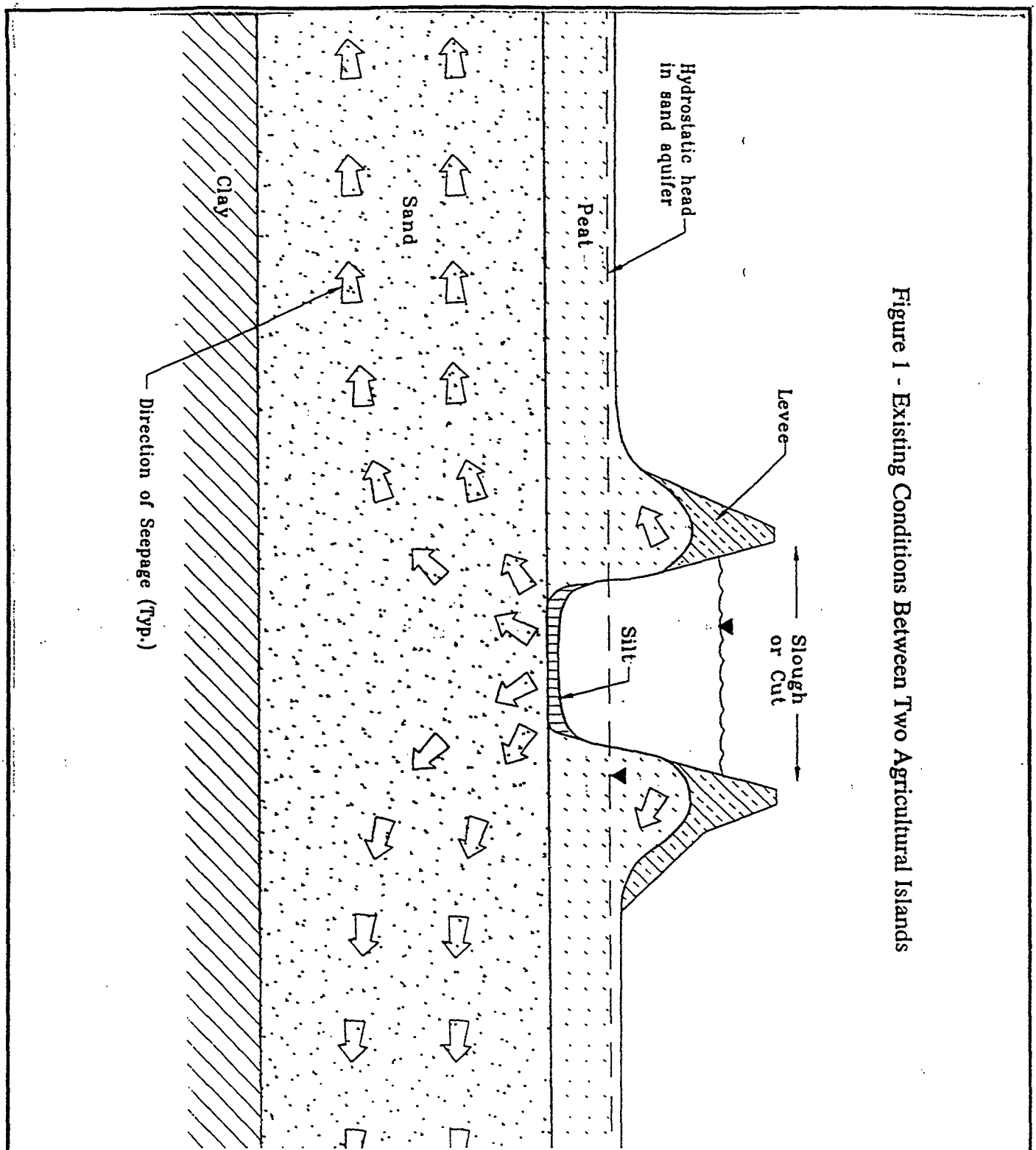

Figure 1 - Existing Conditions Between Two Agricultural Islands

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SOURCE: HULTREN & TILLIS ENGINEERS

DELTA WETLANDS PROJECT

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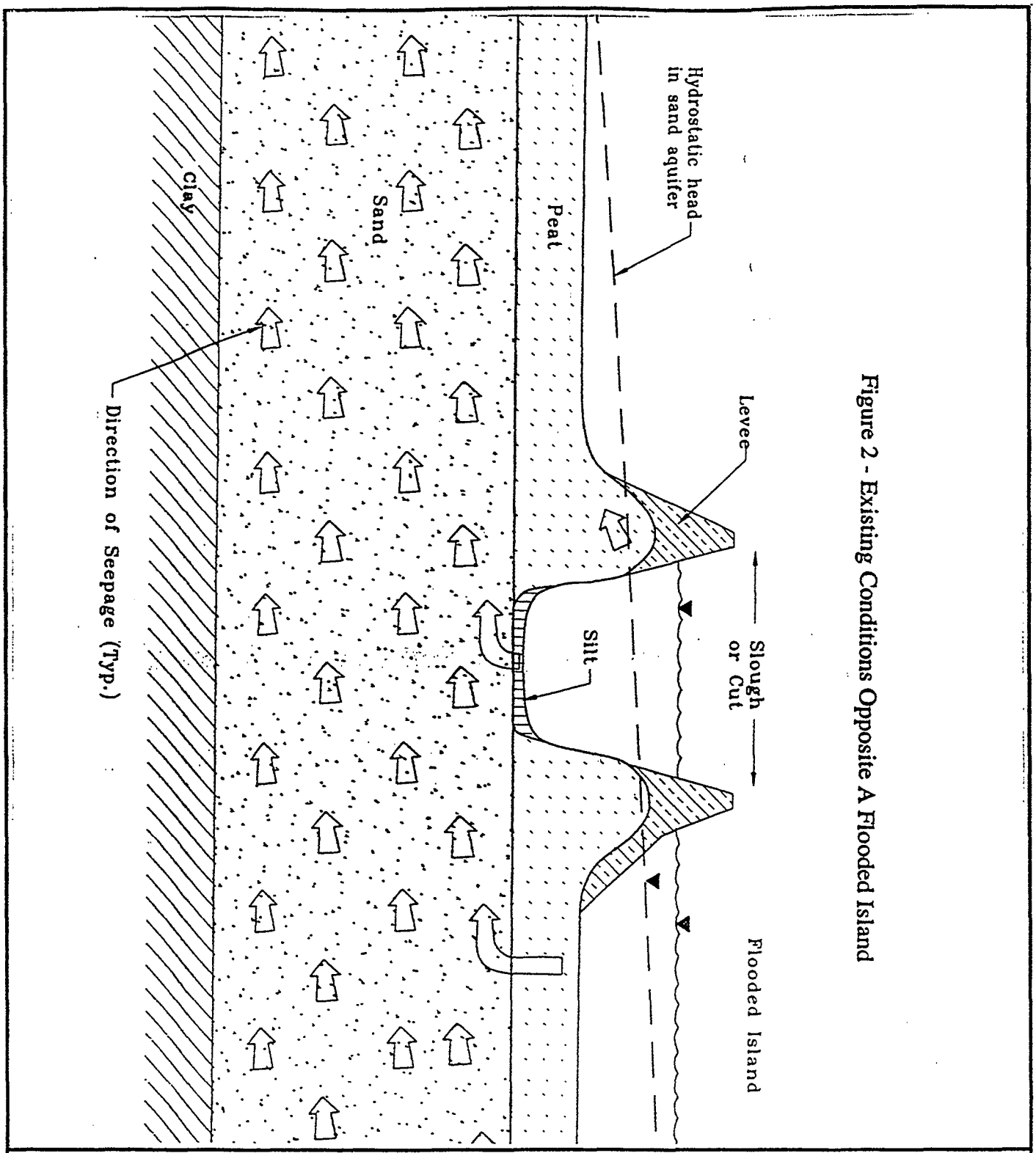

Figure 2 - Existing Conditions Opposite A Flooded Island

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SOURCE: HULTREN & TILLIS ENGINEERS	Drn.: BAS	Ck.: CHN	SCALE: NO SCALE
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