VILLAGE OF HESPERIA

EMERGENCY ACTION PLAN

FOR THE

HESPERIA DAM ON

THE WHITE RIVER

I.D. No. 678

Prepared for:

The Village of Hesperia
Hesperia, Michigan

Prepared: July 1998

Prepared by:

Nordlund & Associates, Inc.
813 East Ludington Avenue
Ludington, Michigan 49431

File: 241-23

VERIFICATION

VILLAGE OF HESPERIA

EMERGENCY ACTION PLAN

STATE OF MICHIGAN,

COUNTY OF OCEANA, ss:

The undersigned, being first duly sworn, states that he has read the following document and knows the contents of it, and that all of the statements contained in that document are true and correct, to the best of his knowledge and belief.

James T. Nordlund
Village Engineer

Sworn to and subscribed before me this 2nd of September 1998

Beverly J Hamilton

HESPERIA POLICE DEPARTMENT
33 EAST MICHIGAN
HESPERIA, MICHIGAN 49421
PHONE (616)854-1212 FAX (616)854-0263
CHIEF MIKE HART

August 13, 1998

Mr. James Nordlund
Nordlund & Associates, Inc.
813 East Ludington Ave.
Ludington, MI 49431

Dear Mr. Nordlund,

When notified of the threat of a dam failure at the Hesperia Dam, it is understood that the Hesperia Police Department is to notify the residents along the river between the Stone Road bridge and the dam site. The Sheriff's Department and the State Police are to be notified for blocking of roads when necessary.

Cordially,

Mike Hart

Michael Hart
Chief of Police

VILLAGE OF HESPERIA
EMERGENCY ACTION PLAN
FOR HART LAKE DAM

I. SCOPE:

This Emergency Action Plan has been developed to provide guidelines and reference materials to assist the Village of Hesperia and other agencies in the event of a failure or potential failure of the Hesperia Dam. This plan has been divided into four separate sets of recommendations; one for operation during flood flows, one for slowly developing failure, one for rapidly developing failure, and one for almost instantaneous failure such as an earthquake.

II. GENERAL

Due to the location of the Hesperia Dam, the danger to the public from dam failure is mitigated to a large extent. There are no homes or dwellings built below the elevation of the reservoir for approximately one half mile downstream.

There are three road bridges that have the potential for being damaged in the event of failure. These are:

The Division Street Bridge directly upstream from the dam;

The State Street bridge approximately 800 feet downstream from the dam;

The M-20 bridge, one and one fourth mile downstream from the dam.

The Division Street Bridge should be closed if the water is at flood stage and threatening the bridge superstructure. In the event of dam failure, the structural foundation and approach fills should be inspected to ascertain if the sudden draining of the reservoir has caused damage to either the pile foundation or approach fill.

The State Street Bridge is at an elevation above the top of the reservoir. The approach from the East is at an elevation that may flood if the dam should break during a major flood event. Water levels need to be monitored at this location and the roadway closed if flood waters encroach on the structure or approach fill. As the bridge narrows the waterway and contains a center pier, the structure should also be monitored to assure that a debris dam is not building on the upstream side of the structure. If the dam should fail the structure should be closed and the foundation and approaches inspected before opening the bridge to traffic.

The M-20 Bridge is far enough downstream and at an elevation significantly high enough to pass the flood flows without overtopping of either the structure or the approaches. The foundation and approaches should be monitored during the flood event and inspected after the flood waters recede.

There are a number of homes that are built adjacent to the river that are subject to periods of flooding during storm events. The flooding at these structures has not resulted in the loss of residences, but the flooding has resulted in flooded yards directly around the homes and the threat that if the water became higher the flood waters would enter the residences. During the flood of 1986 when the dam was intentionally breeched, there were a number of homes, estimated at less than 20, that experienced wet basements and/or wet crawl spaces.

In the event of the threat of dam failure the residents located between the dam site and Stone Road should be appraised of the situation so that they may make appropriate plans.

It should be noted that there is no possible action that will limit or reduce inflow to the reservoir, and there are no possible means of reducing downstream flows by controlling outflows from dams on tributary streams. Similarly stockpiling of emergency materials, other than unfilled sand bags for sand bagging adjacent to the dam, or advance coordination, etc. is not considered necessary and is not a part of this plan.

There are no dams downstream of the Hesperia Dam. There is a small dam at White Cloud located approximately 13 miles upstream.

III. OPERATIONAL INSTRUCTIONS

A. Operational Procedures During Flood Flows:

The Hesperia Dam was mechanically breeched at the North abutment during the floods of 1975 and 1986. The breeches were made by digging through the earthen embankment and were made to protect the concrete drop spillway section of the dam. When the dam was replaced in 1986 an emergency ungated spillway was constructed to convey flood flows.

Department of Environmental Quality has estimated the 200 year (0.5% recurrence) flood flow to be 4,640 cubic feet second (CFS). The flows at the dam during the 1986 flood have been estimated at 2,900 CFS. A hydraulic analysis was made of the structure during the Dam Inspection Report prepared in December of 1997. The analysis shows that in the event of a storm of the magnitude of 4,640 CFS, the dam will overtop by approximately 6 inches.

The following operational procedures need to be in place so that they may be implemented in the event that a major storm and corresponding flood flow is forecasted.

* Stop logs should be removed from the overflow spillway to the extent possible. This will lower the reservoir and allow for more flood storage when the flood peak reaches the dam. This will also reduce the head on the overflow spillway and reduce the possibility of the dam overtopping.

* It is imperative that an adequate supply of sand bags be readily available along with a source of sand that can be trucked to the dam and dumped near both abutments. Although the overflow and drop spillways and the area in between the two spillways are provided with protection against erosion, the sections of the dam at the north and south abutments are not. It will be necessary to sand bag at both abutments to train the river to overflow the dam at the spillway section. This will avoid the potential for the river to erode the downstream embankment in an area not designed for water flow. Attached is a sketch showing the approximate locations where sand bags need to be placed during a major flood event.

* Notify the appropriate law enforcement officials, State and Local agencies (see Appendix A).

* Notify the residents on the river below the dam who may be affected by high water.

* Barricade Division Street, State Street and M-20 until such time as it is deemed safe and prudent for these structures to be open to traffic.

* Local contractors and public agencies with heavy equipment capabilities should be contacted to provide emergency assistance.

B. Slowly Developing Failure:

The Hesperia Dam was originally constructed to generate hydroelectric energy by Consumers Energy. The dam is an earthenfill dam with a reinforced emergency overflow spillway and a drop spillway section controlled by stop logs. A swimming hole is adjacent to the emergency overflow spillway and separated from the river proper by an earthen dike. The swimming area level is maintained via stop logs in a control manhole structure.

In the 1950's Consumers ceased generating electricity at the site and donated the dam and adjacent property to the Village. As part of the ongoing operations and maintenance of the dam, inspection of the dam's integrity is routinely performed. If any of the following items are noted, the reservoir and swimming hole (if appropriate) should be lowered through the removal of stop logs.

1. Transverse cracks are evident in the dam.
2. Sloughing occurs on the downstream slope.
3. If the seepage at the toe of the emergency spillway indicates any turbidity in the water, or if the seepage water flow increases.
4. Any evidence of sand boils at the downstream slope or in the flood plain directly downstream of the dam.
5. Any evidence that the grouted rip rapped spillway has become undermined.
6. Any evidence of structure failure in the concrete drop spillway section of the dam.

In addition, any items that appear unusual or potentially dangerous, should be called to the Engineer's attention for observation. These could include; cracking with displacement of concrete, settlement, sloughing of upstream slope of earth embankments, inability to operate stop logs, etc.

By removing the stop logs, the head upstream of the dam can be lowered from approximately a five foot depth to essentially no head.

In conjunction with the lowering of the reservoir, the Village should obtain technical assistance from their local engineer and from the State Agencies listed in the appendix. The local radio stations and newspapers should also be contacted so that the public may be made aware of the reservoir lowering. The Village Police, the Oceana and Newaygo County Sheriff's Departments, and the Michigan State Police should also be advised of the condition. It drawdown occurs during the winter, with ice on the reservoir, measures must be taken to prohibit recreational use of the lake. In addition, the residents living downstream of the dam should be notified of the dam's condition and appraised of the situation should the reservoir fail. The local radio stations can be used to update these effected individuals. See appendix A for a listing of telephone numbers.

In addition, local contractors and public agencies with heavy equipment capabilities should be advised of the dam's conditions, and asked to prepare for mobilization should conditions necessitate their assistance.

C. Rapidly Developing Failure:

In the event of rapidly developing failure, such as would be caused by an uncontrolled overtopping of the dam or rapidly developing piping under the dam, the following steps should be taken.

1. The reservoir should be lowered as rapidly as possible without causing severe damage to the tailrace structure through the removal of stop logs.

2. Notify the appropriate law enforcement officials, State and Local agencies (see Appendix A).

3. Notify the residents on the river below the dam who may be affected by high water.

4. Barricade Division Street, State Street and M-20 until such time as it is deemed safe and prudent for these structures to be open to traffic.

5. Local contractors and public agencies with heavy equipment capabilities should be contacted to provide emergency assistance. Through the use of emergency construction measures, it may be possible to mitigate a rapidly developing failure until the reservoir is lowered to a safe level.

D. Instantaneous Failure:

In the event of almost instantaneous failure such as an earthquake, all of the procedures outlined under Item C, "Rapidly Developing Failure", should be followed. The Village of Hesperia and the law enforcement agencies need to immediately notify residents adjacent to the reservoir, and those property owners who own land downstream of the dam of the dam failure.

IV. COMMUNICATIONS:

The primary means of communications will be by radio through the Michigan State Police Dispatcher. In the event this mode of communication should fail, telephone or personal contact via messengers would be used for back-up communications.

V. SUMMARY OF ASSUMPTIONS:

The criteria used to evaluate the areas affected by a possible failure of the Hesperia Dam were as follows:

A. The reservoir elevation is approximately 722 feet above sea level at time of failure, and there are no downstream residences below this elevation for a least 1/2 mile downstream. Also when the last two dam breeches occurred, downstream residences were not flooded on the first or main floor, but the extent of the inconveniences and wet conditions was confined to yards, crawl spaces and basements. Therefore, it was assumed that the danger to downstream residences is minimal.

B. The bridges both upstream and downstream have proven themselves in that they have not failed and/or been inundated during the previous two dam failures. This is not a guarantee that they will withstand another flood and/or dam failure without damage and caution is required in closing the roadways and evaluation of the structures after the flood event.

APPENDIX A

Individuals to be notified in the event of dam failure (either slowly developing, rapidly developing, or instantaneous).

Agencies			Telephone Numbers
Hesperia DPW			854-2901
Local Government			
Hesperia Village Hall			854-6205
Oceana County Civil Defense			873-4473
Law Enforcement Agencies			
Oceana and Newaygo Counties		All	911
Road Commission			
Oceana County Road Commission			873-4226
State Government			
Pollution Emergency Alert System			1-800-292-4706
Dam Safety Unit			517-335-3171
Local Radio Stations for Emergency Broadcasts			
WKBZ	-	Muskegon	798-2222
WMUS	-	Muskegon	733-2600
WBLV	-	Twin Lake	894-2616
WQWQ	-	Muskegon	798-7245
WEFG	-	Whitehall	893-2247
WSHN	-	Fremont	924-4700
WCXT	-	Hart	725-9105

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