



# **DAM SAFETY ENFORCEMENT PROGRAM**

DIVISION OF WATER



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Files located at M:\Common\DSEP\Enforcement (ODNR network server, internal access only)

Manual in pdf format available at  
<http://www.dnr.state.oh.us/water/dsafety/publications.htm>

## INTRODUCTION

Pursuant to Chapter 1521. of the Ohio Revised Code, the Division of Water of the Ohio Department of Natural Resources is responsible for enforcing the state's dam safety laws and regulations. This enforcement serves the statutory goal of protecting the safety of the state's citizens and its resources.

To facilitate the fulfillment of its enforcement responsibility, the division, through the work of a quality improvement team, has created this manual. Its creation was guided by the overriding principle that dam safety is a cooperative process between the regulators and those regulated. The division realizes that a dialogue can accomplish more than a command. The division will strive for voluntary compliance by consistently informing owners of their responsibilities, rights, and options. However, the division may sometimes be forced to either issue an administrative order or seek the assistance of the courts to remedy a violation.

Safety and funding dictate the prioritization of violations. A risk-based analysis with numerous criteria has been developed and is included as Appendix A. At the present time, these criteria will be applied to Class I high-hazard dams. The height, storage, and flood capacity criteria were used to identify an initial group of unsafe dams. In the future, dams not meeting these criteria but having unique circumstances may still be considered for prioritization. As these violations are resolved, and as staffing and funding permits, these criteria will be applied to Class II and III dams, respectively. The General Guidelines section describes seven enforcement tracks and the amount of staff time that will be allocated to each one.

Each problem will be unique, and its identification and resolution will not follow a set pattern. Determining which violation to address and determining an appropriate enforcement method will never be a completely objective process. It is important, however, for the staff to have a general idea on how to proceed with a particular type of violation. This manual includes flowcharts for seven enforcement scenarios. They are meant to serve as guidelines, not as predetermined pathways.

The enforcement process will need to be continuously refined. This manual includes a section outlining the steps that the enforcement team will take to improve this product.

# GENERAL GUIDELINES

These guidelines are designed to help users understand the enforcement manual, in particular the use of the enforcement flowcharts.

There are seven different enforcement processes, each documented by a separate flowchart. The processes cover the types of violations likely to occur and the methods by which they come to the attention of the Dam Safety Program. Every violation of dam safety statutes and rules must be addressed; however, limited resources and funding dictate some prioritization of violations.

## Priorities

The following enforcement tracks will run simultaneously. Prioritization will be accomplished through the allocation of available enforcement hours.

- Track 1: Inspection Follow-Up (Including Existing Deficient Class I Dams) - These dams are the highest priority and will be listed based upon the application of Risk Indexing and other factors. The final decision as to enforcement will be made by the chief. These dams have had deficiencies noted during prior inspections. The PIPES inspection checklist will be used for follow-up inspections in the field, but the Class III inspection checklist should be filled out in the office beforehand so that the inspector is aware of the existing problems. The follow-up inspection report would consist of a cover letter, remedial measures, a report cover page, photos and the “Remediation Alternatives” fact sheet. This would be the first step toward obtaining voluntary compliance. A Notice of Violation [“NOV” (see Appendix E)] may also be sent at this time. It is anticipated that the equivalent of 0.4 FTE will be allocated to this track.
- Track 2: Dams Built Without a Permit - The Attorney General’s office will be requested to seek an injunction requiring the immediate draining of most dams built without a permit (some may not fit the criteria, see Appendix B). An injunction will not be sought until an owner has failed to act upon the division’s prior written request to voluntarily drain the lake. The division’s letter will have provided all options to the owner. The division will adopt a follow-up plan for checking on drained lakes. It is anticipated that this track will have allocated to it whatever hours it needs. Since the division does not know how many such dams it will encounter, a specific time estimate is not possible. The time will come directly from the Permits program. All dams (regardless of class) that fall into this track will be handled as they develop.
- Track 3: Repairs Without Plan Approval - For completed repairs on Class I dams, the Risk Indexing criteria will be used to determine what action is appropriate. For repairs under construction, there is a need for immediate action. An NOV with deadlines will be sent to Class I dams. All Class I dams in this track will be resolved

in some way as they develop. Because of the current time and funding available, Class II and III dams will be issued an NOV without timelines. It is anticipated that whatever hours are necessary will be allocated to this track and the time will come directly from the Repairs program.

- Track 4: Violation of Approved Repairs During Construction - Violations in this track with Class I dams will be resolved as they develop. Because of the current time and funding available, Class II and III dams will be issued an NOV without timelines. It is anticipated that all necessary hours will be allocated to this track and that the time will come directly from the Repairs program.
- Track 5: Violation of Permit During Construction and Violation of Permit Terms - All violations in this track will be resolved as they develop. A performance bond exists for these dams to aid in bringing them to resolution. It is anticipated that the hours allocated to this track will be the equivalent of 0.2 FTE.
- Track 6: Existing Orders and Violations - A prioritized list of these dams will be developed by the team. The chief will make the final prioritization decision. It is anticipated that this track will be allocated the equivalent of 0.4 FTE.
- Track 7: Lack of an OM&I Manual and an EAP - Enforcement of these violations will not take place unless they exist at a dam in conjunction with other violations that fall within another track.

## **Flowcharts**

Each flowchart addresses these common areas:

- Identification of the problem. The violation may be found through an inspection, a site visit, or a phone call from the public.
- Communication with the owner. The next step is to notify, discuss, and educate the owner on the problem, and try to obtain an adequate voluntary resolution to the problem. This contact with the owner must be documented either by a memo to the file of a phone conversation, or by a letter to the owner requesting a compliance schedule. This letter may include a Notice of Violation. That different actions are dictated by the different problems is reflected in the flowcharts.
- Determination of Emergency/Non-emergency Status. If the problem is an emergency, follow the Internal Emergency Action Plan. If the problem is not an emergency and an adequate resolution is not proposed, an NOV or Chief's Order will be sent to the owner. Again, you will be guided by the flowchart on which to send.
- Non-voluntary Resolution. The flowcharts explain the processes that may be used to compel compliance by an owner. If a Chief's Order is issued, an owner may either

request an administrative hearing, attempt to comply, or ignore the division. The flowcharts explain how the division reacts to these different owner responses. Also, Appendix H of this manual includes two documents delineating the Appeal Process.

### **Staff Security**

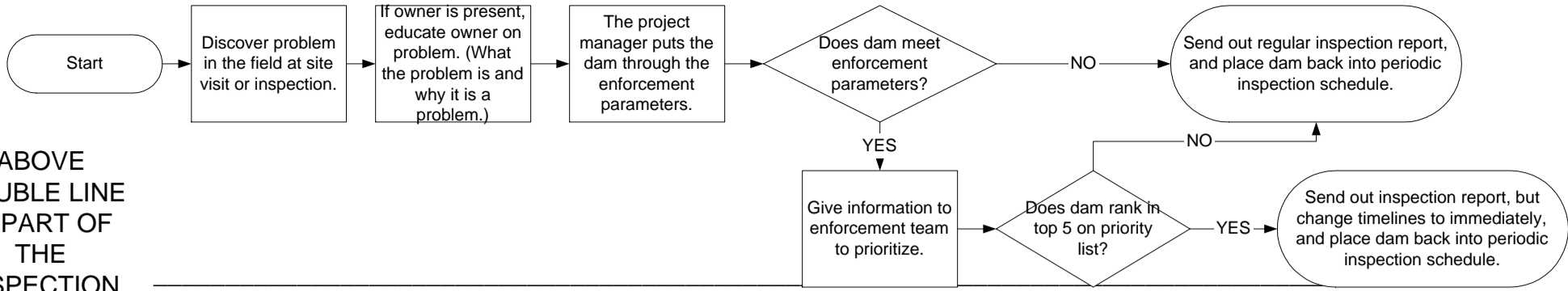
When enforcing violations of dam safety regulations staff must be aware of the following security measures:

- Never go to a site alone
- Meet offsite in public places
- Consider requesting the Sheriff's office to accompany you to site
- Check in with office regularly and follow a developed itinerary
- Always carry cell phones and pagers and have them turned on
- Visits must be well announced
- Carry pepper spray
- Wear orange safety vests
- Wear ODNR badges/identification and carry business cards

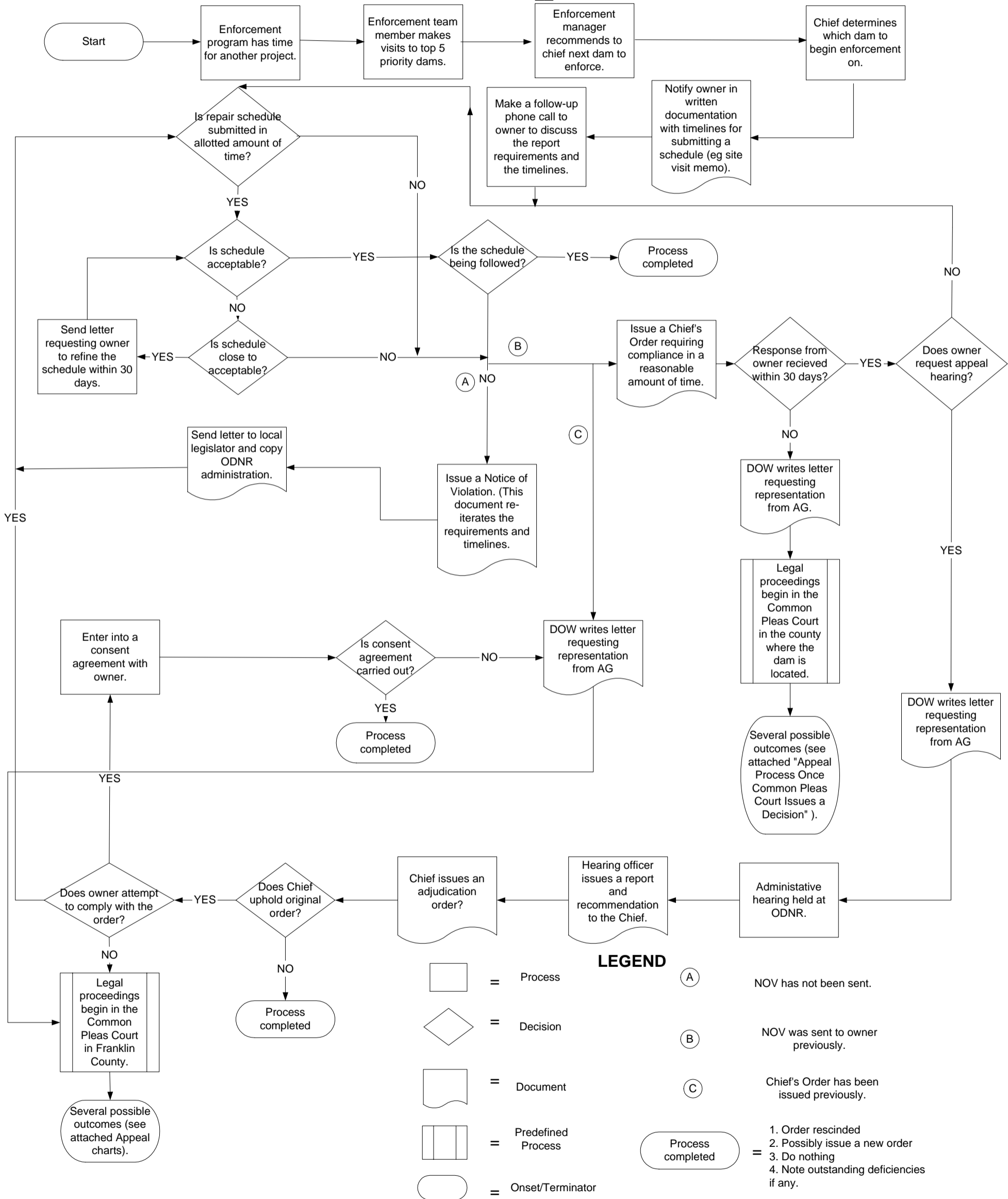
## INSPECTION FOLLOW-UP

- All items above the double lines will be done by the inspector, project manager, or the enforcement team and will be part of the standard inspection process.
- If the dam has no engineering items, a regular inspection report is sent to the owner and the dam is placed back into the periodic inspection schedule. If the dam is found to be in need of engineering items, the project manager will determine if the dam meets the enforcement parameters. If the dam meets the enforcement parameters, the project manager will discuss the dam's problems with the enforcement team.
- The enforcement team will evaluate the secondary criteria for the dam and rank its priority. (Some dams that have not been recently inspected may also be on the priority list.)
- If the dam **is not a high priority**, a normal inspection report is sent to the owner and the dam is placed back into the periodic inspection schedule. If the dam **is a high priority**, an inspection report is sent to the owner, but the timelines will say to complete immediately. This way, the dam can be enforced when the division has the resources and funding to pursue additional enforcement projects.
- When the division has the resources and funding to pursue additional enforcement projects, an enforcement team member will make site visits to the five top priority dams. The enforcement manager will then recommend to the Chief the next dam to enforce.
- Prior to making the site visits to the priority dams, the enforcement team member will fill out a Class III checklist of prior problems. They will then return to the site and complete the Class III checklist in addition to the regular inspection checklist. If the dam has not been inspected in the past few years, and there are significant changes in the prior problems noted on the Class III checklist, then the enforcement team member will use the longer checklist and write a current inspection report to be sent to the owner. If the dam has been recently inspected, and there are no significant changes in the prior problems, the enforcement team member will send the owner a site visit with a cover sheet and photos with the Class III checklist attached.
- When notifying the owner in writing, timelines for submitting repair schedules and for completing repairs must be given for the engineering items. Once the owner is required to send schedules within a certain time frame, the division has then begun its enforcement process.
- ***Is the schedule acceptable?*** Often an owner or engineer will submit a schedule that is not sufficient. (Examples: not enough detail, no specific timelines, timelines too lengthy, etc.) With the desire of achieving voluntary compliance, we will send the schedule back with comments and ask for changes within a prescribed amount of time. If the schedule has been sent back several times, or not resubmitted in the allotted amount of time, then the schedule is not close to acceptable.
- ***Is the schedule followed?*** There will be some leeway here. We will not immediately start legal action if the owner is late a day or two. But changes in the schedule should be requested, approved, and must be clearly documented. Depending on the relationship with the owner, it may need to be documented by a phone log, e-mail (in file), or a letter. The enforcement manager will decide when to proceed with enforcement when a schedule is not followed.
- If a repair schedule is not submitted or is not acceptable, an NOV will be sent to the owner. The NOV will reiterate the timelines of the original correspondence to the owner. The NOV is another attempt to have the owner voluntarily comply.
- If the NOV does not resolve the problem, a Chief's Order will be issued. Timelines will also be set in the Order. The owner will then have 30 days from the issue date of the Chief's Order to respond. The owner may choose not to respond, may respond by notifying us that they will submit the requested items within the allotted amount of time, or may respond by requesting a hearing.
- With any of the following scenarios, the division will write a letter requesting representation from the Attorney General: 1) the owner chooses to submit the requested information but doesn't follow through; 2) the owner requests a hearing; or 3) the owner does not respond to the Chief's Order within the 30 days.
- If the owner does not respond to the Chief's Order within 30 days, or if the owner responds to the Order by submitting the requested material but doesn't follow through, legal proceedings will begin in the Common Pleas Court in the county where the dam is located. If the owner requests a hearing and is not satisfied with the outcome of that hearing, legal proceedings will continue in the Common Pleas Court in Franklin County.

# INSPECTION FOLLOW-UP



ABOVE  
DOUBLE LINE  
IS PART OF  
THE  
INSPECTION  
PROCESS

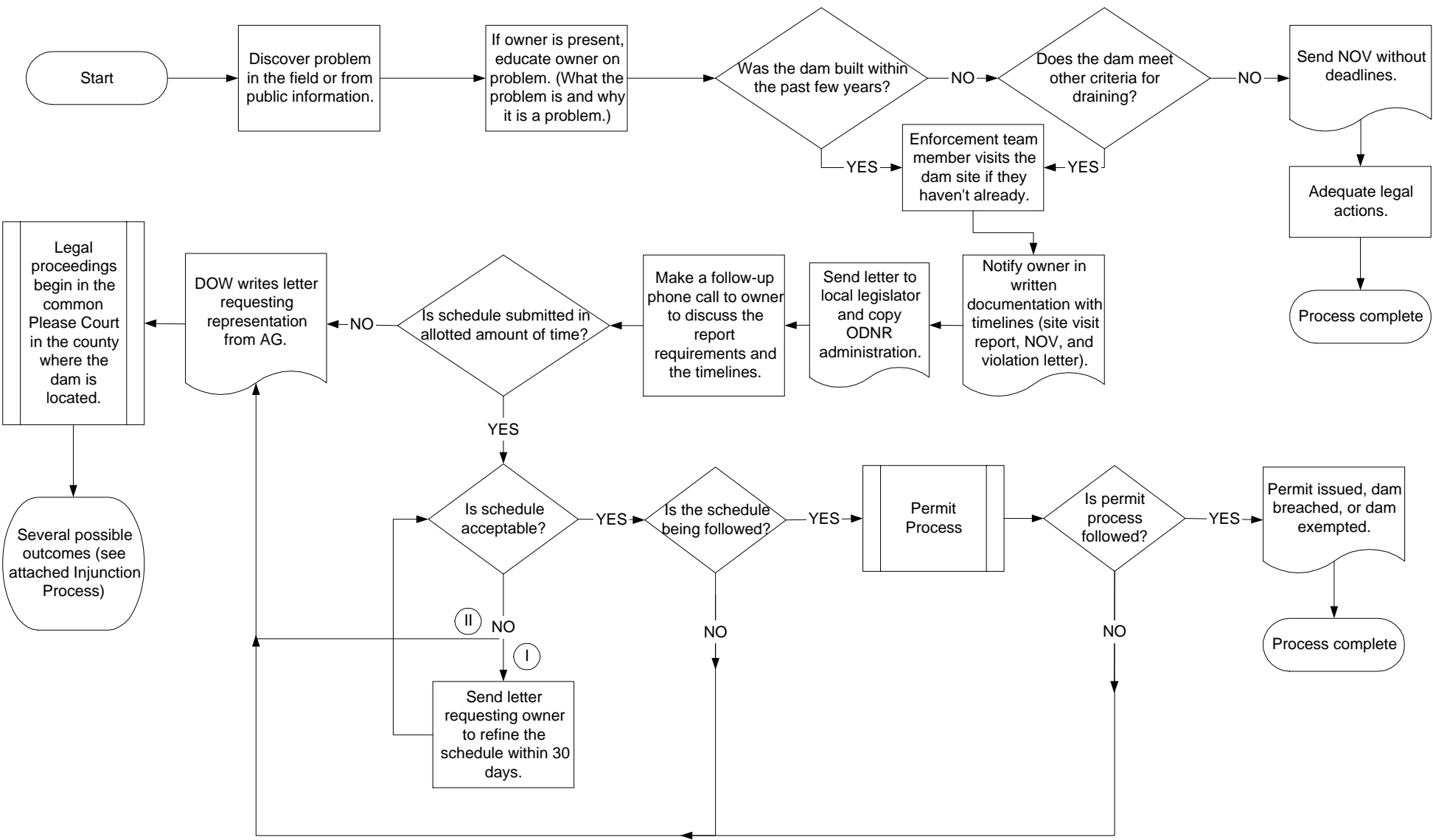


## DAM BUILT WITHOUT PERMIT





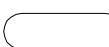
The general strategy is to get the dam drained so that it does not pose an immediate threat to public safety. After it has been drained, the owner has some flexibility to review and implement alternatives to bring the dam into compliance.



- ***Was the dam built within the past few years?*** All Class I, II, and III dams built within the past few years without a permit will be enforced. If the dam has been in existence for more than a few years, ***does it meet other criteria for draining?*** The criteria for requiring a lake to be drained is included in this document as Appendix B.
- For new dams encountered that have been in existence for more than a few years and does not meet the other criteria for draining, then an NOV without deadlines will be sent to the owner, and adequate legal actions will be taken. It is up to the enforcement manager and the Attorney General to decide what legal actions are appropriate; however, **it should always be stated in subsequent reports that this dam was built in violation.**
- If the dam was built within the past few years, written notification to the owner will require times for submitting a schedule for draining the lake and keeping it drained, for submitting a preliminary design report or other alternatives noted, and for completing modifications.
- ***Is the schedule acceptable?*** Often an owner or engineer will submit a schedule that is not sufficient. (Examples: not enough detail, no specific timelines, timelines too lengthy, etc.) With the desire of achieving voluntary compliance, we will send the schedule back with comments and ask for changes. If the schedule has been sent back several times, or not resubmitted in the allotted amount of time, then the schedule is not close to acceptable.
- ***Is the schedule followed?*** There will be some leeway here. We will not immediately start legal action if the owner is late a day or two. But changes in the schedule should be requested, approved, and must be clearly documented. Depending on the relationship with the owner, it may need to be documented by a phone log, e-mail (in file), or a letter. The enforcement manager will decide when to proceed with schedule not followed.
- If the owner does not respond to the NOV, or the schedule is not acceptable or followed, then the Attorney General will begin legal actions. The first action will be a request for a judge to issue an injunction to drain the lake.

# DAM BUILT WITHOUT PERMIT



## LEGEND

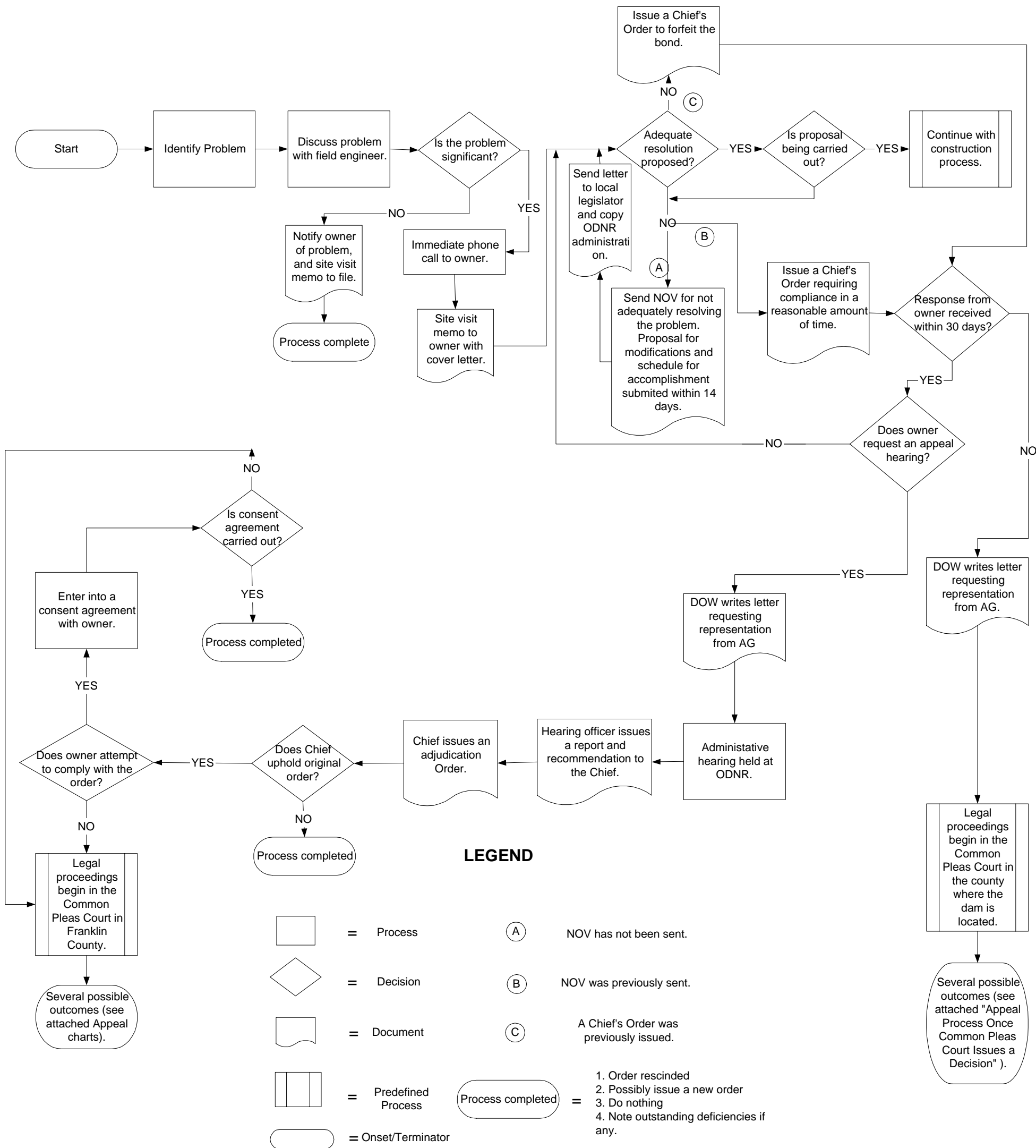
-  = Process
-  = Decision
-  = Document
-  = Predefined Process
-  = Onset/Terminator

-  I First submittal or owner is making progress to acceptable schedule.
-  II Owner has been given sufficient chances to submit acceptable schedule.

## VIOLATION OF PERMIT DURING CONSTRUCTION

- There are several problems that can be considered a violation of the permit during construction. (Examples: beginning construction before the pre-construction meeting, not submitting a construction schedule, having no inspector on site, not submitting construction reports, not giving ODNR notification of critical construction items, placing fill without tester on site, making changes without approval, closing lake drain prior to approval, etc.)
- *Is the problem significant?* Some **minor problems** don't need any discussion with owner. (Examples: topsoil 4 inches deep instead of six, granular bedding on top of filter fabric is ODOT Number 1 stone instead of No. 57's, etc.) Some problems may be **non-significant**, but must still be discussed with the owner and documented in the file because they may cause maintenance problems in the future. (Examples: no bedding between filter fabric and riprap, minor deviations of fill specifications, a change in materials without significant change in quality, minor elevation and dimension changes, etc.) A **significant problem** is defined as a problem that may become a long-term problem, possibly affecting the structural stability or integrity of the dam, or be a primary or secondary cause of failure. (Examples: not meeting fill placement specifications, lack of core trench, incorrect material used, poor construction (e.g., concrete placement), etc.)
- *Adequate resolution proposed?* If an adequate resolution is not proposed, then for scenario A and B, an NOV must be sent to the owner with the surety company and engineer copied. For scenario C, the Chief's Order must be addressed to both the owner and the surety company and the engineer copied.

# VIOLATION OF PERMIT DURING CONSTRUCTION



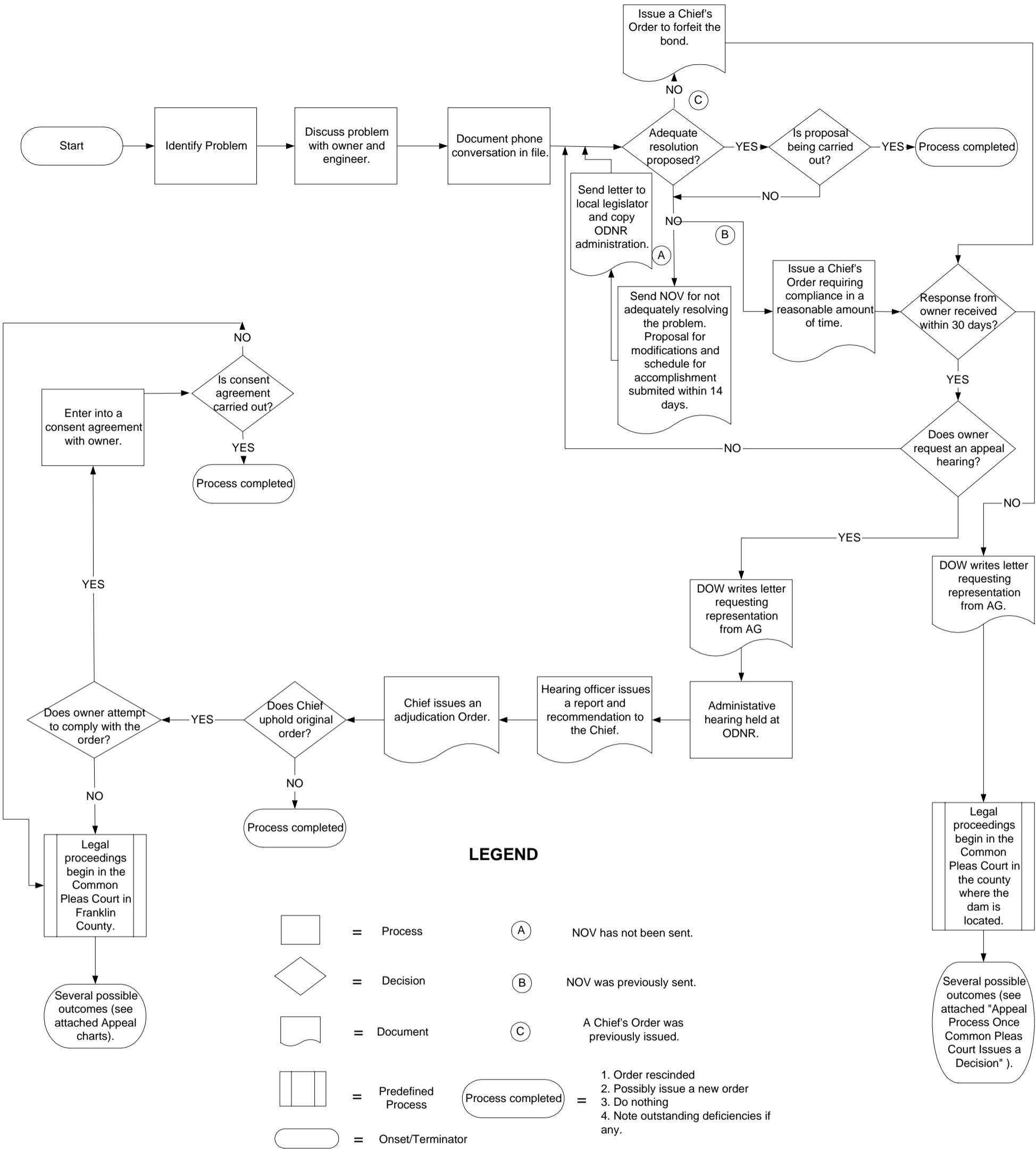
### LEGEND

- |  |           |  |                          |  |                            |  |  |  |  |
|--|-----------|--|--------------------------|--|----------------------------|--|--|--|--|
|  | = Process |  | = Decision               |  | = Document                 |  | = Predefined Process                     |  | = Onset/Terminator                       |
|  |           |  | = NOV has not been sent. |  | = NOV was previously sent. |  | = A Chief's Order was previously issued. |  | =  |
|  |           |  |                          |  |                            |  |  |  | 1. Order rescinded                       |
|  |           |  |                          |  |                            |  |  |  | 2. Possibly issue a new order            |
|  |           |  |                          |  |                            |  |  |  | 3. Do nothing                            |
|  |           |  |                          |  |                            |  |  |  | 4. Note outstanding deficiencies if any. |

## VIOLATION OF PERMIT TERMS

- This process is used when the permit terms are not met after construction has been completed. (Examples: no manuals, no as-builts, no engineer's certification, or closing the lake drain without approval.)
- ***Identify Problem*** - These problems can be identified during a meeting, when the permit is ready to expire, or when the owner requests permission to close the lake drain.
- If the owner requests permission to close the lake drain, they must first provide a schedule of when the outstanding items will be completed.
- Discuss the problem(s) with the owner and engineer prior to the permit expiring.
- ***Adequate resolution proposed?*** – If an adequate resolution is not proposed, then for scenario A and B, an NOV must be sent to the owner with the surety company and engineer copied. For scenario C, the Chief's Order must be addressed to both the owner and the surety company with a copy to the engineer.

# VIOLATION OF PERMIT TERMS



### LEGEND

- |   |  |  |
|---|--|--|
| <p> = Process</p> <p> = Decision</p> <p> = Document</p> <p> = Predefined Process</p> <p> = Onset/Terminator</p> | <p> A = NOV has not been sent.</p> <p> B = NOV was previously sent.</p> <p> C = A Chief's Order was previously issued.</p> | <p> Process completed =</p> <ol style="list-style-type: none"> <li>1. Order rescinded</li> <li>2. Possibly issue a new order</li> <li>3. Do nothing</li> <li>4. Note outstanding deficiencies if any.</li> </ol> |
|---|--|--|

## VIOLATION OF APPROVED REPAIR DURING CONSTRUCTION

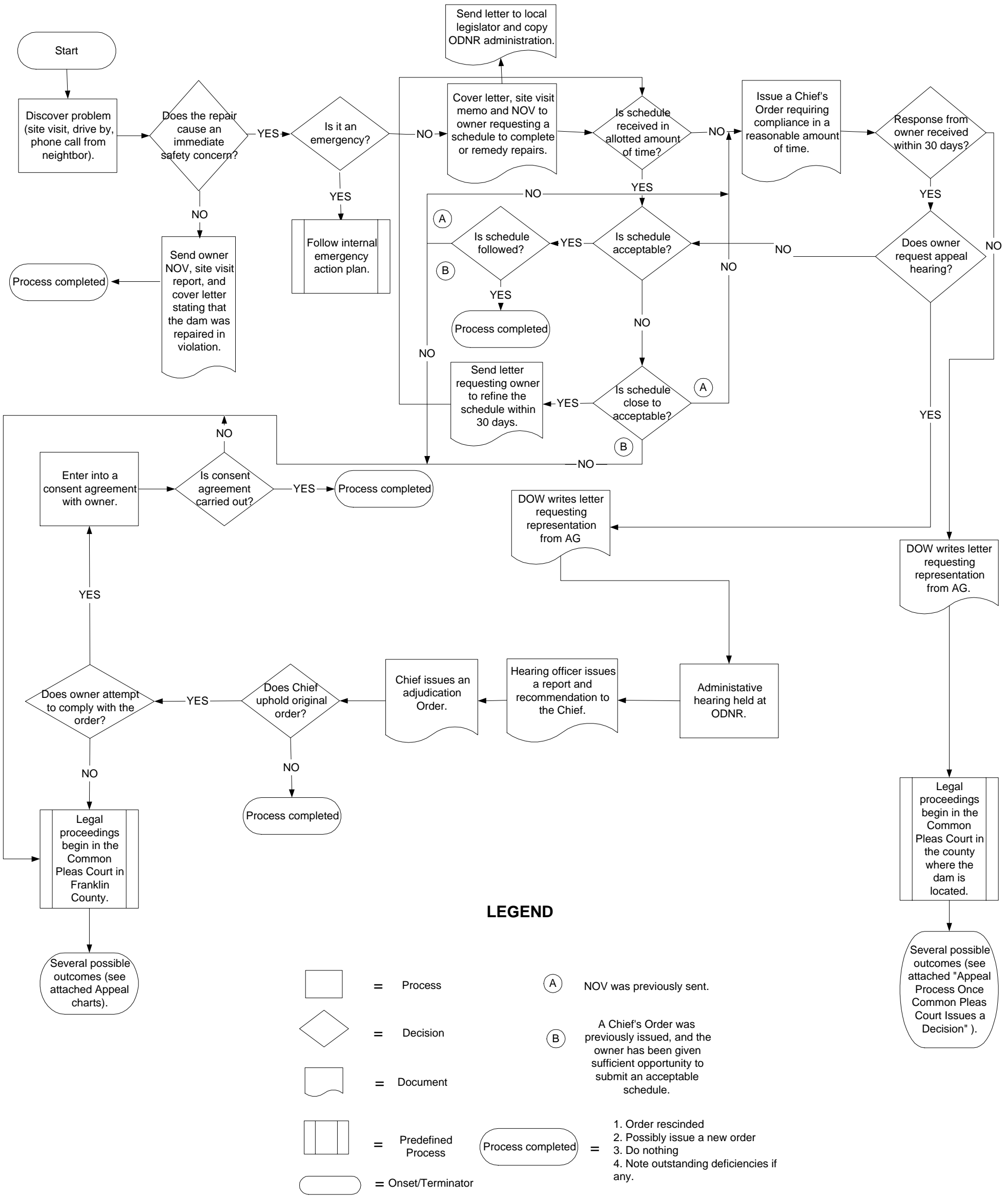
- *Is the problem significant?* Some **minor problems** don't need any discussion with owner. (Examples: topsoil 4 inches deep instead of six, granular bedding on top of filter fabric is ODOT Number 1 stone instead of No. 57's, etc.) Some problems may be **non-significant**, but must still be discussed with the owner and documented in the file because they may cause maintenance problems in the future. (Examples: no bedding between filter fabric and riprap, minor deviations of fill specifications, a change in materials without significant change in quality, minor elevation and dimension changes, etc.) A **significant problem** is defined as a problem that may become a long-term problem, possibly affecting the structural stability or integrity of the dam, or be a primary or secondary cause of failure. (Examples: not meeting fill placement specifications, lack of core trench, incorrect material used, poor construction (e.g., concrete placement), etc.)
- *Adequate resolution proposed?* If an adequate resolution is not proposed, then for scenario A an NOV must be sent to the owner and the engineer copied; for scenario B a Chief's Order will be sent to the owner and the engineer copied; and for scenario C the division will write a letter to the Attorney General requesting representation to begin legal actions.



## **REPAIR WITHOUT PLAN APPROVAL**

- ***Does the repair cause an immediate safety concern?*** An immediate safety concern is defined as a problem that could lead to rapid failure of the dam. (Examples of immediate safety concerns: deep pipe penetration, seepage under or around the spillway pipe, loss of freeboard, reduction in crest width, steepening of downstream slope, etc.—Examples of non-immediate concerns: installing some slant pipes (depending on size of dam, amount of head, size of drainage area, etc.), flattening of downstream slope, installing siphon lake drain, installing upstream slope protection, raising the crest, installing a plunge pool or stilling basin, excavating an emergency spillway, etc.)
- When a repair or problem does not cause an immediate safety concern, an NOV is sent. This NOV does not have deadlines and the division does not pursue enforcement, but the NOV must have a directive to monitor the problem and hire an engineer if the problem worsens. The NOV and any other correspondence with the owner must be documented in the file.
- ***Is it an emergency?*** If the problem is an emergency, go to the division’s “Internal Emergency Action Plan”. (Examples: active sinkhole, evidence of piping, boil, upstream whirlpool, collapsed spillway, overtopping or near overtopping (extreme loss of freeboard), plugged spillway, massive slide that is into the crest or has water seeping through it.)
- ***Is the schedule acceptable?*** Often an owner or engineer will submit a schedule that is not sufficient. (Examples: not enough detail, no specific timelines, timelines too lengthy, etc.) With the desire of achieving voluntary compliance, we will send the schedule back with comments and ask for changes. If the schedule has been sent back several times, or not resubmitted in the allotted amount of time, then the schedule is not close to acceptable.
- ***Is the schedule followed?*** There will be some leeway here. We will not immediately start legal action if the owner is late a day or two. But changes in the schedule should be requested, approved, and must be clearly documented. Depending on the relationship with the owner, it may need to be documented by a phone log, e-mail (in file), or a letter. The enforcement manager will decide when to proceed with schedule not followed.

# REPAIR WITHOUT PLAN APPROVAL



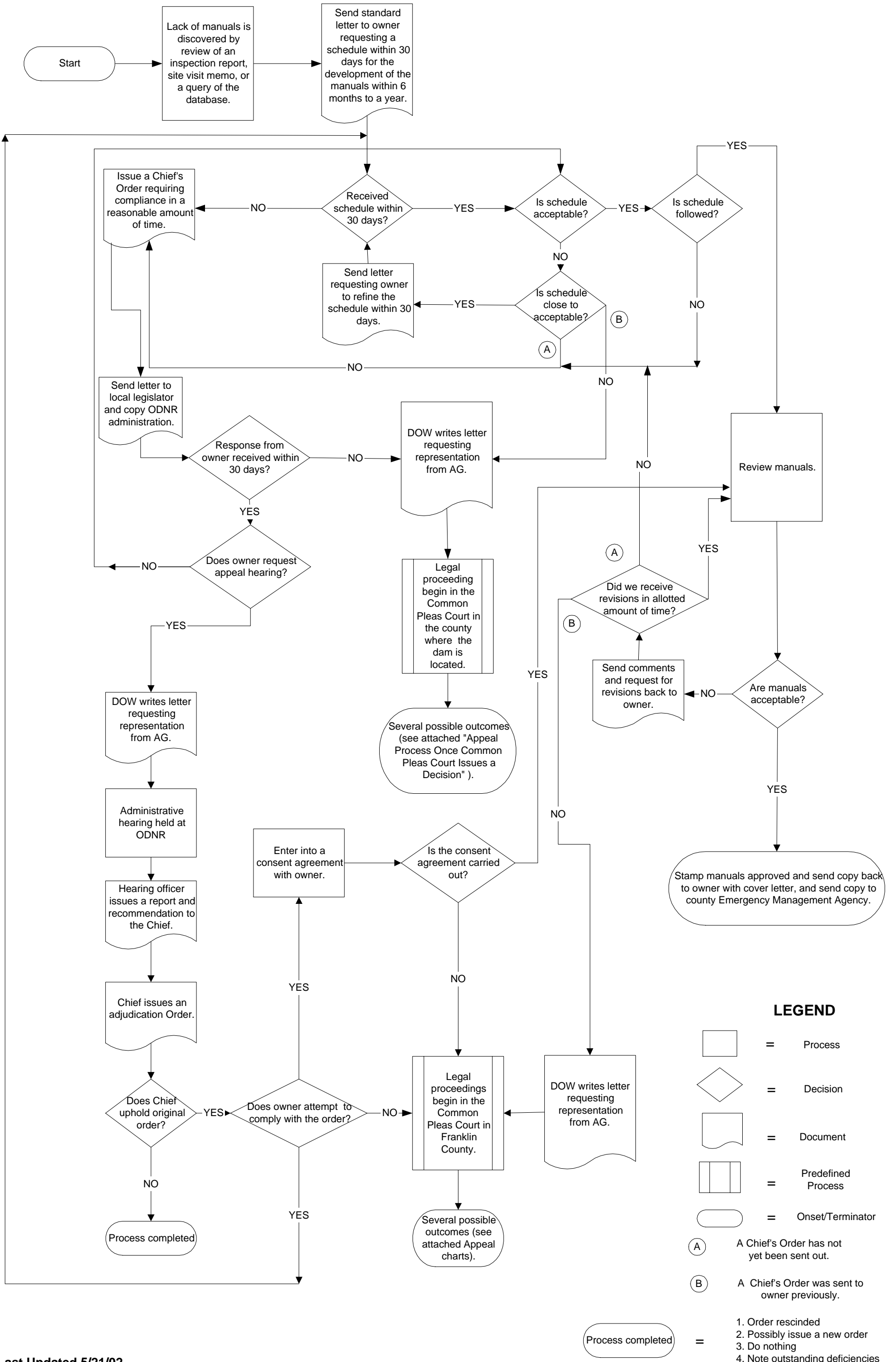
## LEGEND

- = Process
- = Decision
- = Document
- = Predefined Process
- = Onset/Terminator
- A = NOV was previously sent.
- B = A Chief's Order was previously issued, and the owner has been given sufficient opportunity to submit an acceptable schedule.
- =  =   
1. Order rescinded  
2. Possibly issue a new order  
3. Do nothing  
4. Note outstanding deficiencies if any.


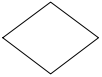

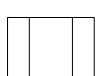
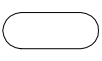
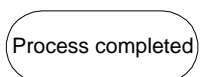
## LACK OF OM&I AND EAP

- When resources allow us to pursue this enforcement track, the division will first look at Class I dams with high hazard.
- *Is the schedule acceptable?* Often an owner or engineer will submit a schedule that is not sufficient. (Examples: not enough detail, no specific timelines, timelines too lengthy, etc.) With the desire of achieving voluntary compliance, we will send the schedule back with comments and ask for changes. If the schedule has been sent back several times, or not resubmitted in the allotted amount of time, then the schedule is not close to acceptable.
- *Is the schedule followed?* There will be some leeway here. We will not immediately start legal action if the owner is late a day or two. But changes in the schedule should be requested, approved, and must be clearly documented. Depending on the relationship with the owner, it may need to be documented by a phone log, e-mail (in file), or a letter. The enforcement manager will decide when to proceed with schedule not followed.
- Three copies of the manuals are required. When the manuals are acceptable, they are to be stamped approved. One copy is to remain in the division file, one copy is to be sent to the owner with a cover letter stating that it is approved and that it should be updated yearly, and one copy should be sent to the county Emergency Management Agency.

# LACK OF OM&I AND EAP



## LEGEND

-  = Process
-  = Decision
-  = Document
-  = Predefined Process
-  = Onset/Terminator
- (A) = A Chief's Order has not yet been sent out.
- (B) = A Chief's Order was sent to owner previously.
-  = 1. Order rescinded  
2. Possibly issue a new order  
3. Do nothing  
4. Note outstanding deficiencies

## **CONTINUOUS IMPROVEMENT PROCESS**

The enforcement processes are detailed but will need to be revised as deficiencies/inefficiencies are discovered. The team hopes to receive input from both internal and external users. The team will reconvene once a month for at least the first year to incorporate any needed revisions. All projects will be tracked for project progress, hours, and deadlines. It is anticipated that due to the nature of these processes, the division will receive more phone calls and media inquiries. The staff will be trained in certain areas such as customer and media relations. However, any phone calls concerning the enforcement of a dam should be forwarded to the enforcement manager. Below are the means that the team will use to continuously improve the enforcement processes.

- All processes will be clearly documented with guidelines to help the users understand the processes.
- All documents used in the enforcement processes will be placed on the M:\Common\Enforcement directory. These will include the Notice of Violation, the flowcharts, the Consent Agreements, the appeal procedure outcomes, letter templates, etc.
- Any comments on the processes or documents should be e-mailed to the Enforcement Manager. A folder will be kept on the M:\Common\Enforcement directory that will address the comments made and how they were resolved.
- The enforcement team will create an area on the division's web page for customer comments. This is intended to be anonymous, and comments back to the public will not be given unless requested. The comments received on the web page, by telephone, or by written communication will be reviewed and considered at the team's monthly meeting.
- The enforcement manager will use a tracking system to produce a monthly report indicating the number of enforcement projects, where each project is in its enforcement process, the number of enforcement hours spent on each project, deadlines, etc. These reports will be distributed to the division's administration for review.
- As part of the continuous improvement process, the team will develop a survey that is to be given to the Ohio Dam Safety Organization once per year for customer feedback.

# Prioritization of Dams for Enforcement

January 2002

## **Overview**

The purpose of dam prioritization was to identify the most hazardous dams (based on their current condition) to people and property. The concept of risk is used to help evaluate the hazard that dams pose. Risk can be defined as follows... “risk is a characteristic of a situation or action wherein two or more outcomes are possible, the particular outcome that will occur is unknown, and at least one of the possibilities is undesired.” (Covello & Merkhofer, 1993) Assessing the risk that a dam poses to downstream areas can be divided into 3 separate analyses: (1) analysis of the probability of an uncontrolled release of the reservoir, (2) analysis of the inundation from the uncontrolled release, and (3) analysis of the consequence of the release. For the core purpose of the Dam Safety Engineering Program, negative impact on people and property is the only undesired result. Therefore, the dam must fail, the failure must cause flooding downstream, and the flooding must have a negative impact on people or property for the dam to be hazardous. To perform quantitative, thorough probability analyses to assess risk is very difficult, time-consuming, and expensive. Risk indexing is an easier, faster way to evaluate risk but is less detailed. Risk indexing is a process that creates quantitative data about each dam, typically by use of a scoring system.

### (1) Analysis of the Probability of an Uncontrolled Release of the Reservoir

The assessment of the probability of an uncontrolled release has two components: (1) initiating events and (2) the response of the dam. Although there is some knowledge of both components, the probability of an uncontrolled release cannot be determined for Ohio’s inventory of dams (to any certainty relative to other dams). The initiating events for failure vary greatly. Initiating events include seepage, earthquakes, floods and rainstorms, and wave action. The response of the dam to initiating events can be analyzed to a higher degree, but is still relatively uncertain. Examples of dam responses are complete failure, partial failure, structural damage, and no significant damage. For instance, it could be calculated that a dam overtops by 6 inches during a flood event. The response of the dam is relatively uncertain. The dam could partially fail or not be damaged at all. The response of the dam is difficult to determine because dams are unique, complicated structures and difficult to test (i.e. manufacturing machinery can be tested rather thoroughly in a lab to determine response to initiating events).

### (2) Analysis of the Inundation from the Uncontrolled Release

The assessment of inundation from the uncontrolled release can be quantified with relatively high accuracy; however, it is extremely expensive and it is generally not available. Estimation of inundation by dam safety staff is generally based on estimation, “guesstimation”, experience, and conservatism. It should be noted that inundation of some areas can be determined with higher certainty. This is especially true for bigger dams. Difficulties for inundation assessment include wide variety of failure scenarios, complexity of downstream reach, modelling rapidly-varying unsteady flow, and other local flooding.

### (3) Analysis of the Uncontrolled Release Consequences

The consequence assessment for probability of lives lost (property damage is not discussed here) can be determined with relatively low accuracy, especially for small-sized and medium-sized dams, and at relatively high cost. The program uses lives at risk as an indicator of probability of lives lost. Lives at risk is based on the number of people in inhabitable structures in the inundation area. Probability of lives lost and lives at risk are significantly different. Consider a nursing home with 15 residents and a fire station with 15 residents. Considering inundation is estimated to be the same, the lives at risk are equal: 15. The probability of lives lost are significantly different. Probability of lives lost consider warning systems, the physical and mental condition of the people and timing. It can be seen that relatively healthy, fit men and women at a fire station are more likely to be able to avoid flooding and death than the elderly in a nursing home.

#### **Philosophy Used for Prioritization**

Rather than analyzing initiating events and responses separately for the assessment of probability for an uncontrolled release of the reservoir, two main failure scenarios were used: sunny day and rainy day. The sunny day scenario assumed some initiating event caused a complete failure of the dam by seepage or instability. The rainy day scenario assumed a flood event resulted in complete failure of the dam by overtopping or problems associated with saturated embankments, flow through spillways, and elevated pool levels. Assuming that dams are subjected to similar initiating events and have similar responses, the potential for an uncontrolled release can be determined relative to other dams by evaluating the dam's deficiencies. The dam's deficiencies can be evaluated using risk indexing for each failure scenario based on known problems with stability, seepage, and structural integrity of the spillways and based on the flood capacity of the dam. Recent inspection reports are available for most dams and provide qualitative data concerning deficiencies. Inspection reports are generated in a relatively consistent manner with supervision of a professional engineer. The reports contain information regarding problems with stability, seepage, and structural integrity of the spillways and usually an evaluation of the flood capacity of the dam. The information in the inspection reports, therefore, has relatively high quality and low uncertainty.

The assessment of inundation and consequences was not evaluated beyond (1) selection of Class I dams having a hazard classification of loss of life and (2) quantifying lives at risk. As noted above, the hazard classification is based on an estimation of inundation and review of structures in the inundation area. Again, note the difference between lives at risk and potential loss of life. Each dam failure has a range of potential consequences; some of the consequences have a relatively high probability of occurring, and others a relatively low probability of occurring. Each dam failure, regardless of classification, has a probability of loss of life. However, it is estimated that Class I dams have a significant probability to cause loss of life whereas the other classes have a relatively low probability to cause loss of life. In addition, the team assumed that larger dams store more water (therefore have more water to drive a breach), create larger flood waves upon failure, and are more likely to have more hazardous consequences.

#### **Prioritization Process**

The Division of Water's dam inventory database was transferred from Paradox to Access in August of 2001. The division regulates about 1650 dams. All dams that were not Class I were eliminated. The database has 479 Class I dams. Dams that are owned by USACE or USDA or

that are part of active mining were removed due to potential jurisdiction conflicts and because they are generally in good condition. The list was reduced to 444. The next step of the process was to gather information about these dams for risk indexing. Since data gathering for 444 was beyond the resources and time constraints of the team, the team decided to narrow the search based on data available in the Division of Water’s dam inventory. Considering two main failure scenarios, sunny day and rainy day, larger dams with bigger drainage areas tend a higher chance of complete failure with the release of a significant flood wave. The team decided that dams were a significant rainy day concern if their flood capacity was less than 40% of the Probable Maximum Flood (PMF), the height of the dam was greater than 35 feet, the total storage capacity at the top of dam elevation was greater than 100 acre-feet, and the drainage area for the dam was at least 1 square mile (Table 1). The team decided that dams were a significant sunny day concern if the elevation between the downstream toe and the normal pool level was greater than 20 feet and total storage capacity at normal pool level was at least 200 acre-feet (see Table 1). These parameters are based on engineering experience and do not relate to any studies. The list was reduced to 154. This was a manageable number for attaining additional information on each dam for risk indexing. Each engineer in the program was given a list of dams and a description of the data to gather (see Figure B). The engineers were instructed to review Division of Water files, and make approximations if flood capacity and lives at risk were not provided. The data was compiled in an Excel spreadsheet.

Table 1 – Sunny Day & Rainy Day Selection Parameters

	Flood Capacity (% PMF)	Height (Feet)	Volume at Top of Dam (Ac-Ft)	Drainage Area (Acres)	Height Between Toe and Normal Pool (Feet)	Volume at Normal Pool (Ac-Ft)
Rainy Day	<40	>35	>100	>640	-	-
Sunny Day					>20	>200

The formulas for risk indexing used were based on risk indexing used by NRCS and the State of Washington. The team created formulas to evaluate dams based on the data gathered (see Figure C). Lives at risk was not part of the formulas. The team’s formulas assessed points for sunny day failure potential (up to 100 points) and rainy day failure potential (up to 100 points), a possible total of 200 points for a dam in extremely poor condition. [Both scenarios are assumed to be equally possible, but note that higher points are assessed for rainy day scenario when dams have low flood capacity.] The formulas were applied to the list of 154 dams. An engineer reviewed the data that was entered into the spreadsheet to assure accuracy. The list was then circulated to all program engineers for confirmation, correction, question, comment, or no comment. The list was revised based on the information attained from the program engineers. Dams were taken off the list if none of the problems required a registered professional engineer for remediation or if the dam is currently under repair.

The process for prioritizing dams was discussed with the Chief of the Division of Water. Opinions varied among team members and among the staff as to the proper use of the lives at risk data for prioritizing dams. The Chief directed the team to provide two parallel lists for his review: one based on lives at risk and one based on risk indexing score.

Each of the lists was created (see Figures D & E). The team selected the top twenty dams from each list for further analysis. The team agreed upon secondary criteria for evaluating safety: gradient of downstream slope, crest width, OMI, EAP, and availability of on-site personnel. (Although this information was not used in the formulas for scoring, it was provided for review

and selection of the most hazardous dams.) The team, as a group, reviewed the file for each dam to confirm or adjust the risk indexing score and to discuss information about the dam that could not be quantified. The team prioritized the top 10 most hazardous dams from each list (Table 2 & Table 3). Comparing the two lists, the team created a final prioritized list of dams that are recommended to begin the enforcement process (Table 4).

Table 2 – Prioritization of Dams based on Total Score

	<b>FLD CAP</b>	<b>Lives</b>	<b>Total</b>	<b>Height</b>	<b>tod V</b>
C Dam	0.080	5	200	43	43
E C DAM	0.400	3	174	54	358
F S DAM	0.250	100	153	49	1924
L G DAM	0.499	35	134	43	2040
J DAM	1.000	50	102	55	1362
R R DAM	0.100	3	113	39	256
G P DAM	0.250	5	147	40	632
H DAM	0.499	100	140	77	3329
W R DAM	0.250	15	113	62	410
S DAM	0.400	3	127	38	596
H E DAM	0.750	50	114	60	4278

FLD CAP – flood capacity, Lives – lives at risk, Total – total points from risk indexing, Height – height of dam, tod V – total storage volume at top of dam elevation

Table 3 – Prioritization Based on Lives at Risk

	<b>FLD CAP</b>	<b>Lives</b>	<b>Total</b>	<b>Height</b>	<b>tod V</b>
F S DAM	0.250	100	153	49	1924
H DAM	0.499	100	140	77	3329
L G DAM	0.499	35	134	43	2040
J DAM	1.000	50	102	55	1362
W C DAM	1.000	65	100	43	7300
B DAM	0.250	100	87	34	2402
S R Dam	1.000	30	67	90	6124
H DAM	0.750	50	114	60	4278
U G DAM	0.499	35	100	55	4289
M DAM	1.000	100	36	42	13119

FLD CAP – flood capacity, Lives – lives at risk, Total – total points from risk indexing, Height – height of dam, tod V – total storage volume at top of dam elevation

Table 4 – Prioritized Recommendations for Enforcement

	<b>S</b>	<b>L</b>	<b>FLD CAP</b>	<b>Lives</b>	<b>Total</b>	<b>Height</b>	<b>tod V</b>
F S DAM	3	1	0.250	100	153	49	1924
C Dam	1		0.080	5	200	43	43
H DAM	8	2	0.499	100	140	77	3329
E C DAM	2		0.400	3	174	54	358
L G DAM	4	3	0.499	35	134	43	2040
J DAM	5	4	1.000	50	102	55	1362
W C DAM		5	1.000	65	100	43	7300
R R DAM	6		0.100	3	113	39	256
G P LAKE DAM	7		0.250	5	147	40	632
B DAM		6	0.250	100	87	34	2402

S – ranking based on total points from risk indexing (score), L – rank based on lives at risk  
 FLD CAP – flood capacity, Lives – lives at risk, Total – total points from risk indexing, Height – height of dam, tod V – total storage volume at top of dam elevation

A meeting will be held with the Chief to review the process and prioritized lists. With the Chief's approval, engineers will revisit dams in accordance with the enforcement guidelines to assure that the current condition of the dam warrants enforcement. The program will enforce the dam safety regulations on deficient dams, beginning at the top of the list. The list will be updated, changed, and reprioritized as dams are improved and other deficient dams are found.

#### Important Definitions:

"Probable maximum flood" or "PMF" means the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin under study. The "PMF" is derived from the probable maximum precipitation and is determined by using a hydrologic model to simulate the drainage basin's response to those critical conditions which produce the most severe flood runoff.

"Storage volume" or "storage capacity" means the volume of water or other liquefied material, which is or may be impounded by a dam at a given elevation above the natural stream bed or above the natural grade for upground reservoirs. Impounded material that can be shown to the satisfaction of the chief to be non-liquefied can be excluded from the storage volume.

"Dam" means any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material. Upground reservoirs and lagoons are considered to be dams. A fill or structure intended solely for highway or railroad use that does not permanently impound water or other liquefied material as determined by the chief is not considered a dam.

"Height-of-dam" means the vertical dimension as measured from the elevation of the natural stream bed, watercourse, or lowest ground elevation at the downstream or outside toe of a dam to the elevation of the top of the dam.

"Dam Classification" - For the purpose of this chapter, dams shall be divided into four classes, which shall be known as class I, class II, class III, and class IV. The chief shall use the following paragraphs as a guideline in the classification of dams. Such classification shall be determined by the chief during the preliminary review described by rule 1501:21-5-02 of the Administrative Code or during the periodic inspection described by rule 1501:21-21-01 of the Administrative Code.

(1) A dam shall be placed in class I when failure of the dam would result in probable loss of human life. Dams having a total storage volume greater than five thousand acre-feet or a height of greater than sixty feet shall be placed in class I.

## CRITERIA FOR REQUIRING A LAKE TO BE DRAINED

1. The dam has been built within the past few years, or
2. It is an older dam with significant problems.

A **significant problem** is defined as a problem that may become a long-term problem, possibly affect the structural stability or integrity of the dam, or be a primary or secondary cause of failure. (Examples: not meeting fill placement specifications, lack of core trench, incorrect material used, poor construction (e.g., concrete placement), etc.)

These older dams will be evaluated based on the following parameters:

- Downstream Hazard
- Dam Classification
- Height
- Drainage Area
- Storage Capacity
- Slope Gradient
- Evidence of Instability
- Crest Width
- Seepage or Piping
- Lack of Freeboard
- Lack of Spillway Capacity

It is difficult to support immediate draining of a lake that has been in operation for several years without sufficient justification to show a hazard to people or property. An injunction to drain an older non-permitted dam should only be requested when the division has reason to believe the dam presents a safety hazard.

# Remediation Alternatives

The Division of Water, Dam Safety Engineering Program, has the statutory responsibility to ensure that human life, health, and property are protected from dam failures. The program regulates dams meeting certain height and storage criteria based on the provisions of the Ohio Revised Code (ORC) and Ohio Administrative Code (OAC). These criteria are listed in the ORC and OAC and in the Division of Water's Construction Permit and Dam Classification fact sheets. For all dams meeting these criteria, the program regulates their construction, operation, and repair to ensure that dams meet the required safety standards set forth in the ORC and OAC.

When the program finds that a dam has been constructed without a permit or that an existing dam does not meet the required safety standards, the Division of Water directs the owner to bring the dam into compliance. For a dam built without a construction permit, the owner would receive a letter that directs the owner to obtain a construction permit by following the construction permit requirements listed in the OAC and ORC. For an existing dam, the owner would receive a dam safety inspection report that lists required remedial measures. The owner must accomplish all of these required remedial measures. As alternatives to obtaining a construction permit or to accomplishing the required remedial measures listed in the inspection report, the owner may (a) remove the dam, (b) breach the dam, (c) modify the height of the dam to make it exempt from all or a portion of the construction permit and periodic inspection requirements, or (d) modify the purpose of the structure so that it does not meet the definition of a dam. Additional information about each of these alternatives is listed below.

## **Remove the Dam**

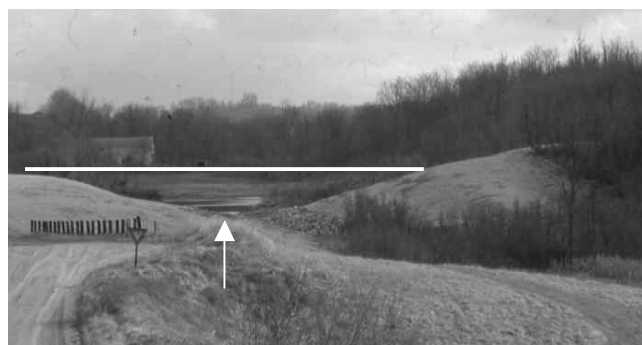
Description: Dam removal consists of complete removal of the dam embankment to restore the original relief of the site. Removing the dam alleviates the need to obtain a construction permit or to accomplish the required remedial measures listed in the inspection report.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Water for review and approval: a plan for lowering the lake level, construction plans and specifications for removing the embankment, plans and specifications for controlling sediment in the impoundment, a description of erosion protection in the breach and dam embankment foundation areas, and a

construction schedule. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

## **Breach the Dam**

Description: A breach is defined as an opening in a dam that prevents the dam from impounding a significant amount of water (see photograph). A breach extends from the upstream side of the embankment to the downstream side and typically has mild side slopes. A dam breach could be considered partial removal of a dam. Breaching the dam alleviates the need to obtain a construction permit or to address the required remedial measures listed in the inspection report.



Photograph of dam breach from downstream. White line shows former dam crest, and arrow shows center of breach.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Water for review and approval: a plan for lowering the lake level, construction plans and specifications for constructing the breach, plans and specifications for controlling sediment in the impoundment, calculations or justification for sizing the breach, a description of erosion protection in the breach area, and a schedule for construction. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

## **Modify the Height of the Dam**

Description: Reducing the height of a dam reduces the dam's storage volume. This can make the dam exempt from the construction permit and periodic inspection requirements of the ORC or change the classification of the structure. Refer to the ORC for a complete description of the height and storage volume criteria. In summary, a dam is exempt from the construction permit

and periodic inspection requirements when (a) it is not more than 6 feet high, or (b) it has not more than 15 acre-feet of storage volume at the top of dam elevation, or (c) it is not more than 10 feet high and has not more than 50 acre-feet of storage volume at the top of dam elevation. For reference, a dam that is 15 feet high and impounds a 2.5-acre lake has a storage volume of about 15 acre-feet. Modifying the dam to meet the above criteria alleviates the need to obtain a construction permit or to accomplish the required remedial measures listed in the inspection report.

The classification of a dam is based on three factors: the dam's height, storage capacity, and potential downstream hazard. Each factor is evaluated, and the final classification of the dam is based on the highest individual factor (Class I being the highest and Class IV being the lowest). When the classification based on downstream hazard is lower than the classification based on height and storage capacity, it is possible for the final classification of the dam to be changed if the height of the dam is reduced. In addition, reducing the height of a dam could change the potential impact of a dam failure on the downstream area, and thereby change the hazard classification. Changing the classification could alleviate the need to accomplish some or all of the required remedial measures listed in the inspection report. It should also be noted that Class IV dams do not require a construction permit; however, they do require submittal of the preliminary design report to the Division of Water for approval.

**Requirements:** The following items must be prepared by a registered professional engineer and submitted to the Division of Water for review and approval: a plan for lowering the lake level, detailed storage volume calculations, construction plans and specifications for lowering the dam crest, and supporting justification and calculations showing that the modified dam will operate safely. Other items such as a dam failure analysis may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

### **Modify the Purpose of the Structure**

**Description:** In accordance with OAC Rule 1501:21-3-01, the definition of a dam is "any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material...A fill or structure intended solely for highway or railroad use that does not permanently impound water or other liquefied material as determined by the Chief is not considered a dam." It is possible to modify the dam so that it no longer meets the definition above. For example,

draining the lake and installing a culvert at the streambed elevation or modifying the existing spillway to be a culvert may be acceptable. This alleviates the need to obtain a construction permit or to address the required remedial measures listed in the inspection report.

**Requirements:** The following items must be prepared by a registered professional engineer and submitted to the Division of Water for review and approval: a plan for lowering the lake level, construction plans and specifications for the modification, plans and specifications for controlling sediment in the impoundment, calculations or justification for design, and a schedule for construction. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

As a temporary measure, the lake level of a dam may be lowered and maintained at a lower level. A lower lake level makes the dam safer by reducing water pressure on the dam and its foundation, reducing the volume of water that would be released during a failure, and providing more flood storage capacity. Maintaining the lake at a lower lake level could allow for a less stringent time schedule for obtaining a construction permit, accomplishing required remedial measures, or modifying the size of the dam.

Other local, state, and federal approval may be required for the construction activities listed above. It is recommended that the owner contact the Ohio Environmental Protection Agency, Division of Surface Water - 401 Certification at (614) 644-2135, the local floodplain administrator, and the U.S. Army Corps of Engineers district office. You may also refer to the Division of Water's web site ([www.dnr.state.oh.us/water](http://www.dnr.state.oh.us/water)) to review "Stream Management Guide, Permit Checklist for Stream Modification Projects, Guide No. 6" for more information regarding other agency approval or to review all of the Division of Water's fact sheets.

For additional information please contact:

The Ohio Department of Natural Resources  
Division of Water  
Dam Safety Engineering Program  
1939 Fountain Square  
Columbus, OH 43224-1385  
Phone (614) 265-6731  
Fax (614) 447-9503  
E-mail [water@dnr.state.oh.us](mailto:water@dnr.state.oh.us)

## Guidelines for Submitting a Schedule for Permits

Frequently, an owner will be required to submit a schedule. The schedule must set forth timelines for completion of the project. The schedule will explicitly state the required activities and the time required to complete each activity. Each schedule will be project specific. The schedule gives the owner the opportunity to plan for the unique circumstances involved with their project. Many things may impact the activities required and amount of time allotted for each activity. Some of the issues to be considered include the size of the dam, complexity of the problem, environmental issues, type of funding, time of year, etc. ODNR, Division of Water will review the submitted schedule for reasonableness considering the factors listed above. Revision of the schedule may be required. The following list describes the activities that may be required on the schedule. Please note that not all items may be necessary or there may be additional activities needed. The schedule must be tailored to each project.

**1. Investigate Funding.** Depending on the situation, it may be necessary to obtain funding from various sources. Estimated time to complete this activity will be dependent on the owner's resources.

**2. Create a list of engineers.** A registered professional engineer who is qualified in the design, construction, and inspection of dams is required. A list of engineering firms who have worked with ODNR on dam design or repair projects or who are interested in working on dam projects can be downloaded from the Division of Water web page at <http://www.dnr.state.oh.us/water/dsafety/>. Estimated time to complete this activity should be no more than 1 month. See Ohio Administrative Code (OAC) Rule 1501:21-3-02 for additional information.

**3. Select an engineer.** Please refer to the ASDSO pamphlet titled "Dam Ownership, Procuring the Services of a Professional Engineer" for information on how to choose an engineer. The pamphlet can be obtained from the *resource center* portion of the ASDSO website at [www.damsafety.org](http://www.damsafety.org) or by telephone at 606-257-5140. Estimated time to complete this activity should be no more than 90 days.

**4. Secure other permits.** Other permits may be required from other governmental agencies such as the U.S. Army Corps of Engineers or the Ohio Environmental Protection Agency (OEPA). The Corps of Engineers, through Section 404 of the Clean Water Act, requires permits for activities that involve a discharge of dredged or fill material into a water of the United States including wetlands. Activities that will drain or flood a wetland or significantly disturb the soils of a wetland also require a permit. Examples of regulated activities include but are not limited to: dredging, filling, excavating, land clearing using mechanized equipment, ditching, stream channelization and relocation. Information regarding the Corps of Engineers regulatory program can be obtained from their website at [www.usace.army.mil/inet/functions/cw/cecwo/reg/](http://www.usace.army.mil/inet/functions/cw/cecwo/reg/). You may also be required to obtain a Section 401 Water Quality Certification from the OEPA. The OEPA website can be found at [www.epa.state.oh.us/dsw/401/401WetlandSection.html](http://www.epa.state.oh.us/dsw/401/401WetlandSection.html). ODNR, Division of Water has developed a stream management guide that covers many of the types of permits that may be needed for work in or near streams. The guideline is titled "Permit Checklist for Stream Modification Projects (guide no. 6) and can be downloaded at [http://www.dnr.state.oh.us/water/pubs/fs\\_st/stfs06.htm](http://www.dnr.state.oh.us/water/pubs/fs_st/stfs06.htm) or requested by phone at (614) 265-6740. Estimated time to complete this activity will be dependent on the processing time of other agencies. Please work with your engineer to determine which, if any, other permits are required and a reasonable amount of time to obtain the needed permits. The estimated time to obtain these permits typically ranges from a few months to a year or two.

**5. Engineer investigates site and prepares preliminary design report.** Estimated time to complete this activity is about 1 to 6 months. Please work with your engineer to estimate the actual time and date. See OAC Rule 1501:21-5-02 for specific requirements of the preliminary design report.

**6. Submit preliminary design report.** ODNR, Division of Water has 30 days to review each submittal according to OAC Rule 1501:21-5-02. Please allow time for review and any corrections required. Estimated time should include 30 days for review of the submittal plus additional time for any required changes. ODNR will approval or disapprove the preliminary design report and establish the classification of the proposed structure at this time. Typically, the time required to complete this activity is about 60 days.

**7. Engineer prepares final design report, plans, and specifications.** Information regarding foundation, on-site materials, surveys, hydrologic and hydraulics investigations can be found in OAC Chapter 1501:21-11. Information regarding design flood, spillway design, pipe conduit spillways, drains and other pipes, freeboard, and additional design requirements can be found in OAC Rule 1501:21-13-02 through 1501:21-13-08. Estimated time to complete this activity will depend on the complexity of the project. It may take a few months for smaller projects to a year for larger projects. Please work with your engineer to estimate the time required.

**8. Prepare OM&I/EAP.** The Operation, Maintenance, and Inspection Manual (OM&I) and the Emergency Action Plan (EAP) are required. The OM&I/EAP can be completed at any time once the scope of the project is known. The OM&I/EAP must be submitted before or at the same time as the engineer's certification and as-built plans. See the

description of Activity 17 below for additional information. Additional information can be found in the following documents: "The EAP: Format and Content" and "Guidelines for an Operation, Maintenance, and Inspection Manual". The documents can be downloaded from ODNR, Division of Water website at <http://www.dnr.state.oh.us/water/dsafety/publications.htm> or requested by telephone at 614-265-6731.

**9. Submit final design report, plans, and specifications.** The final design report, permit application form, statutory filing fee, and the original surety must also be submitted at this time. Information regarding the final design report, plans, specifications, filing fee, and surety bond requirements can be found in OAC Rules 1501:21-5-04 through 1501:21-5-07 and 1501:21-7-01. ODNR, Division of Water has 30 days to review each submittal. Additional information or changes may be requested by ODNR if errors are found or if more information is needed to thoroughly review the project. Please allow time for review and any corrections required. You should allow 30 days for review of each submittal. The time required for this activity will depend on the complexity of the project and the thoroughness of the prepared documents and supporting calculations. This activity may take a few months to a year depending on the project. Please work with your engineer to estimate the time required.

**10. Secure Funding.** Funding must be available to pay for the construction costs, the statutory filing fee, and the surety bond. See OAC Rule 1501:21-5-07 and Chapter 1501:21-7 for information regarding the filing fee and the surety bond.

**11. Obtain bids from contractors.** Please refer to the Ohio Dam Safety Organization pamphlet titled "Guidelines on Hiring an Engineer or Contractor for Dam Evaluation or Repair" for information on choosing a contractor. The pamphlet can be downloaded from [www.wmao.org/div/odso/publications.shtml](http://www.wmao.org/div/odso/publications.shtml) or by telephone at 614-292-1851. Estimated time to complete this activity should be no more than 60 days.

**12. Choose a contractor.** Using the guidelines described in the pamphlet mentioned in Activity 11 above, select a contractor to construct your project. Estimated time to complete this activity should be no more than one month.

**13. Develop a construction schedule.** This activity will outline the planned sequence of construction. Your engineer should develop this schedule. The time to complete construction will be dependent on the complexity of the repair, obtaining other permits, the time of year and weather conditions, and/or other circumstances. It should be noted that earth fill activities may not be allowed between December 15 and March 15. Estimated time to complete this activity should be about one month. See OAC Rule 1501:21-15-01 for additional information.

**14. Hold pre-construction meeting.** This meeting is required as a term of the permit. The meeting should include the owner, engineer, contractor, materials tester, and a representative from ODNR. Estimated time to complete this activity is one day. You should work with your engineer and contractor to determine the actual date once a permit has been received.

**15. Start construction.** The timing of this activity will most likely be dependent on the time of year and weather conditions as well as the time it takes to obtain other needed permits. Please work with your engineer and contractor to schedule the construction.

**16. Complete construction.** See OAC Rules 1501:21-15-02, 1501:21-15-03, 1501:21-17-01 and 1501:21-17-02 for information and requirements of construction. The construction schedule developed above in Activity 13 should be used to estimate the completion date of construction.

**17. Submit as-built plans, engineer's certification, and the Emergency Action Plan/Operation, Maintenance, and Inspection Manual (EAP/OM&I) to ODNR.** The as-built plans and engineer's certification must be prepared after construction is complete. However, the EAP/OM&I can be prepared at any time. Typically, the as-built plans and engineer's certification should be completed within one month of the completion of construction. The EAP/OM&I should be submitted before or at the same time as the as-built plans. Information regarding these items can be found in OAC Rules 1501:21-15-04 through 1501:21-15-07.

**18. Construction Inspection by ODNR, Division of Water.** ODNR, Division of Water will perform an inspection within 30 days of the receipt of the as-built plans, engineers' certification, and the EAP/OM&I. If it appears that construction was performed according to the approved plans, ODNR will approve the construction and notify the surety within 14 days of the construction inspection.

**19. Final Inspection and Bond release.** ODNR will perform a final inspection 12 months after the construction inspection noted in Activity 14 above. If it is apparent that the construction was performed according to the approved plans and specifications and that the completed construction would not endanger life, health, or property, ODNR will give final approval of the construction and release the surety bond.

## Proposed Schedule for Permits

This schedule sets forth timelines for construction of \_\_\_\_\_ Dam.

This schedule should reflect any unique circumstances of this project. Please refer to the Guidelines for Submitting a Schedule for additional information about each activity. Only include the activities that are applicable to your project. You may need to alter some activities or add additional activities depending on your project. Each activity must have a proposed date that it will be completed.

<u>ACTIVITY</u>	<u>DATE TO BE COMPLETED</u>
1. Investigate funding	
2. Create a list of engineers	
3. Select an engineer	
4. Secure other permits	
5. Engineer investigates site and prepares preliminary design report.	
6. Submit preliminary design report to DOW	
7. Engineer prepares final design report, plans and specifications	
8. Prepare OM&I and EAP	
9. Submit final design report, plans and specifications	
10. Secure funding	
11. Obtain bids from contractors	
12. Choose a contractor	
13. Develop a construction schedule	
14. Hold pre-construction meeting	
15. Start construction	
16. Complete construction	
17. Submit as-built plans and engineer's certification to ODNR, and finalized EAP & OM&I	
18. Construction approval inspection by ODNR	
19. Final Inspection by ODNR and release of bond	

## Guidelines for Submitting a Schedule for Repairs

Frequently, an owner will be required to submit a schedule. The schedule must set forth timelines for completion of the project. The schedule will explicitly state the required activities and the time required to complete each activity. Each schedule will be project specific. The schedule gives the owner the opportunity to plan for the unique circumstances involved with their project. Many things may impact the activities required and amount of time allotted for each activity. Some of the issues to be considered include the size of the dam, complexity of the problem, environmental issues, type of funding, time of year, etc. ODNR, Division of Water will review the submitted schedule for reasonableness considering the factors listed above. Revision of the schedule may be required. The following list describes the activities that may be required on the schedule. Please note that not all items may be necessary or there may be additional activities needed. The schedule must be tailored to each project.

**1. Investigate Funding.** Depending on the situation, it may be necessary to obtain funding from various sources. Low interest loans may be available from the Ohio Water Development Authority. For **publicly owned dams**, you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer, Sue Farmer, at 614/466-5822. For **privately owned dams**, you may qualify for a reduced-interest loan to make required repairs through the Dam Safety Linked Deposit Program administered by the Ohio Water Development Authority (OWDA). To find out about this program, please contact OWDA's Comptroller, Ronald Shankman, at 614/466-5822.

**2. Create a list of engineers.** A registered professional engineer who is qualified in the design, construction, and inspection of dams is required. A list of engineering firms who have worked with ODNR on dam design or repair projects or who are interested in working on dam projects can be downloaded from the Division of Water web page at <http://www.dnr.state.oh.us/water/dsafety/>. Estimated time to complete this activity should be no more than 1 month. See Ohio Administrative Code (OAC) Rule 1501:21-3-02 for additional information.

**3. Select an engineer.** Please refer to the ASDSO pamphlet titled "Dam Ownership, Procuring the Services of a Professional Engineer" for information on how to choose an engineer. The pamphlet can be obtained from the *resource center* portion of the ASDSO website at [www.damsafety.org](http://www.damsafety.org) or by telephone at 606-257-5140. Estimated time to complete this activity should be no more than 90 days.

**4. Secure other permits.** Other permits may be required from other governmental agencies such as the U.S. Army Corps of Engineers or the Ohio Environmental Protection Agency (OEPA). The Corps of Engineers, through Section 404 of the Clean Water Act, requires permits for activities that involve a discharge of dredged or fill material into a water of the United States including wetlands. Activities that will drain or flood a wetland or significantly disturb the soils of a wetland also require a permit. Examples of regulated activities include but are not limited to: dredging, filling, excavating, land clearing using mechanized equipment, ditching, stream channelization and relocation. Information regarding the Corps of Engineers regulatory program can be obtained from their website at [www.usace.army.mil/inet/functions/cw/cecwo/reg/](http://www.usace.army.mil/inet/functions/cw/cecwo/reg/). You may also be required to obtain a Section 401 Water Quality Certification from the OEPA. The OEPA website can be found at [www.epa.state.oh.us/dsw/401/401WetlandSection.html](http://www.epa.state.oh.us/dsw/401/401WetlandSection.html). ODNR, Division of Water has developed a stream management guide that covers many of the types of permits that may be needed for work in or near streams. The guideline is titled "Permit Checklist for Stream Modification Projects (guide no. 6) and can be downloaded at [http://www.dnr.state.oh.us/water/pubs/fs\\_st/stfs06.htm](http://www.dnr.state.oh.us/water/pubs/fs_st/stfs06.htm) or requested by phone at (614) 265-6740. Estimated time to complete this activity will be dependent on the processing time of other agencies. Please work with your engineer to determine to determine which, if any, other permits are required and a reasonable amount of time to obtain the needed permits. The estimated time to obtain these permits typically ranges from a few months to a year or two.

**5. Engineer investigates site and prepares design report, plans, and specifications.** Information regarding foundation, on-site materials, surveys, hydrologic and hydraulics investigations can be found in OAC Chapter 1501:21-11. Information regarding design flood, spillway design, pipe conduit spillways, drains and other pipes, freeboard, and additional design requirements can be found in OAC Rule 1501:21-13-02 through 1501:21-13-08. If the repair is motivated by an inspection report issued as part of a periodic inspection performed by ODNR, plans and specifications must be prepared for the items listed in the "Required Remedial Measures" section of the report. Other routine items listed in other sections of the inspection report are not required to have plans and specifications developed. Estimated time to complete this activity will depend on the complexity of the project. It may take a few months for smaller projects to a year for larger projects. Please work with your engineer to estimate the time required.

**6. Prepare OM&I/EAP.** The Operation, Maintenance, and Inspection Manual (OM&I) and the Emergency Action Plan (EAP) may be required. The OM&I/EAP can be completed at any time once the scope of the project is known. The OM&I/EAP must be submitted before or at the same time as the engineer's certification and as-built plans. A description of the OM&I/EAP can be found in OAC Rules 1501:21-15-06 and 1501:21-15-07. Additional information can be found in the following documents: "The EAP: Format and Content" and "Guidelines for an Operation, Maintenance, and Inspection Manual". The documents can be downloaded from the ODNR, Division of Water website at <http://www.dnr.state.oh.us/water/dsafety/publications.htm> or requested by telephone at 614-265-6731.

**7. Submit design report, plans, and specifications.** Information regarding the final design report, plans, and specifications requirements can be found in OAC Rules 1501:21-5-04 through 1501:21-5-06. ODNR, Division of Water has 30 days to review each submittal. Additional information or changes may be requested by ODNR if errors are found or if more information is needed to thoroughly review the project. Please allow time for review and any corrections required. You should allow 30 days for review of each submittal. The time required for this activity will depend on the complexity of the project and the thoroughness of the prepared documents and supporting calculations. This activity may take a few months to a year depending on the project. Please work with your engineer to estimate the time required.

**8. Secure Funding.** Funding must be available to pay for the construction costs. No filing fee or surety bond is required for projects classified as repair projects. A filing fee and surety bond are required for projects requiring a permit.

**9. Obtain bids from contractors.** . Please refer to the Ohio Dam Safety Organization pamphlet titled "Guidelines on Hiring an Engineer or Contractor for Dam Evaluation or Repair" for information on choosing a contractor. The pamphlet can be downloaded from [www.wmao.org/div/odso/publications.shtm](http://www.wmao.org/div/odso/publications.shtm) or requested by telephone at 614-292-1851. Estimated time to complete this activity should be no more than 60 days.

**10. Choose a contractor.** Using the guidelines described in the pamphlet mentioned in Activity 9 above, select a contractor to construct your project. Estimated time to complete this activity should be no more than one month.

**11. Develop a construction schedule.** This activity will outline the planned sequence of construction. The time to complete construction will be dependent on the complexity of the repair, obtaining other permits, the time of year and weather conditions, and/or other circumstances. It should be noted that earthfill activities may not be allowed between December 15 and March 15. Your engineer should develop this schedule. Estimated time to complete this activity should be about one month. See OAC Rule 1501:21-15-01 for additional information.

**12. Hold pre-construction meeting.** This meeting may be required depending on the complexity of the project. Please contact ODNR for guidance. The meeting should include the owner, engineer, contractor, materials tester, and a representative from ODNR. Estimated time to complete this activity is one day. You should work with your engineer and contractor to determine the actual date.

**13. Start construction.** The timing of this activity will most likely be dependent on the time of year and weather conditions as well as the time it takes to obtain other needed permits. Please work with your engineer and contractor to schedule the construction.

**14. Complete construction.** See OAC Rules 1501:21-15-01 through 1501:21-15-03 for information and requirements of construction. The construction schedule developed above in Activity 13 should be used to estimate the completion date of construction.

**15. Submit as-built plans, engineer's certification, and the Emergency Action Plan/Operation, Maintenance, and Inspection manual (EAP/OM&I) to ODNR.** This activity may not be required. Please consult with ODNR for guidance. The as-built plans and engineer's certification must be prepared after construction is complete. However, the EAP/OM&I can be prepared at any time. Typically, the as-built plans and engineer's certification should be completed within one month of the completion of construction. The EAP/OM&I should be submitted before or at the same time as the as-built plans and engineer's certification. Information regarding these items can be found in OAC Rules 1501:21-15-04 through 1501:21-15-07.

**16. Final inspection and approval by ODNR, Division of Water.** ODNR, Division of Water will perform an inspection within 30 days of the receipt of the as-built plans, engineers' certification, and the EAP/OM&I, if required. If it appears that construction was performed according to the approved plans, ODNR will approve the construction within 14 days of the construction inspection.

## Proposed Schedule for Repairs

This schedule sets forth proposed timelines for repairs to \_\_\_\_\_ Dam.

This schedule should reflect any unique circumstances of this project. Please refer to the Guidelines for Submitting a Schedule for Repairs for additional information about each activity. Only include the activities that are applicable to your project. You may need to alter some activities or add additional activities depending on your project. Each activity must have a proposed date that it will be completed.

<u>ACTIVITY</u>	<u>DATE TO BE COMPLETED</u>
1. Investigate funding	
2. Create a list of engineers	
3. Select an engineer	
4. Secure other permits	
5. Engineer investigates site and prepares design report, plans and specifications	
6. Prepare OM&I and EAP	
7. Submit design report, plans, and specifications	
8. Secure funding	
9. Obtain bids from contractors	
10. Choose a contractor	
11. Develop a construction schedule	
12. Hold pre-construction meeting	
13. Start construction	
14. Complete construction	
15. Submit as-built plans and engineer's certification to ODNR, and finalized EAP & OM&I	
16. Final inspection and approval by ODNR	



# NOTICE OF VIOLATION



Owner: Bobby Beaver  
123 Damnation Road  
Floodville, Ohio 43222

Re: Mudpile Lake Dam  
File Number: 1414-009  
Maverick County

Certified Mail: 0000 0000 0000 0000 0000  
NOV No.: 2002-1001

Tina i and Keith Banachowski of the Division of Water inspected Mudpile Lake Dam on March 1, 2002. In an inspection report dated April 1, 2002, you were notified of several deficiencies with your dam. That report gave you thirty days to submit a repair schedule. The deadline for that submission has passed.

## **YOU ARE IN VIOLATION OF THE FOLLOWING PROVISIONS OF STATE LAW**

### Observed Condition

### Statute (ORC) / Rule (OAC)

Insufficient spillway capacity to safely pass 50% PMF

ORC Section 1521.062 (D) "The owner of a dam ...shall monitor, maintain, and operate the structure and its appurtenances safely in accordance with state rules, terms and conditions of permits, order, and other requirements..."

OAC Rule 1501:21-13-03(A) "Every dam shall have a spillway system which will safely pass the design flood..."

OAC Rule 1501:21-13-02(A)(2) "...The minimum design flood will be: for class II dams, Fifty percent of the PMF..."

## **REQUIRED REMEDIATION**

You shall submit a schedule within thirty days to address the above violations. The schedule must provide for satisfactory remediation of all deficiencies detailed in the inspection report, including maintenance and monitoring items.

Failure to submit the schedule may result in further legal action, including the issuance of a Chief's Order that is enforceable in Common Pleas Court.

Please note that remediation can also consist of one of the options listed in the enclosed "Remediation Alternatives" fact sheet.

Issued By: \_\_\_\_\_  
Enforcement Manager

Date: \_\_\_\_\_

You must send a legislator letter if your NOV has deadlines. Click on one of the hyperlinks below to open a *read only* version of a legislator letter.

[Enforcement Legislator Notice - Inspection](#)

[Enforcement Legislator Notice - Permit Violation](#)

Issued By: \_\_\_\_\_  
Enforcement Manager

Date: \_\_\_\_\_

## **ORDER BY THE CHIEF**

**Order Number 2001-100**

TO: (Owner's name and address)

(Second owner's name and address if more than one owner)

RE: Lake Name  
Township, County  
File Number  
Permit Number

DATE:

SUBJECT:

Pursuant to Ohio Revised Code Section [1521.062 (for repairs) or 1521.06 (for permits)] the Chief of the Division of Water hereby makes the following Findings and issues the following Order to (name of owner).

### **FINDINGS**

1. In 1991, Beaver Lake Dam was inspected by division personnel as a routine periodic safety inspection. A report outlining the findings of the inspection and the required remedial measures was issue to you.
2. On November 20, 200, the dam was inspected again by division personnel as a routine periodic safety inspection. A copy of this inspection report is included with this Order.
3. During the November 20, 2000 inspection, a severe seepage or "piping" situation was discovered. Piping is a sign that erosion of the dam is occurring and that the dam is at a greater than normal risk for failure. Division personnel directed the owner to take immediate measures to prevent the seepage from continuing. Lowering the lake level and constructing a blockade to the entrance of the seepage were the recommended measures.
4. By late Wednesday, November 22, 2000, the division personnel were unable to determine whether any action had been taken by the owner. Therefore, on November 24, 2000, division personnel then attempted to block the seepage with sandbags.
5. The owner contracted a consulting engineering firm, Build It and They Will Come, to investigate the situation and make recommendations. A phone conversation between Construction Bob of Built It and They Will Come and division personnel revealed that, as of December 4, 2000, the owner had taken no action.

6. Pursuant to Rule 1501:21-21-04 of the Ohio Administrative Code, and in accordance Ohio Revised Code Section [1521.062 (for repairs) or 1521.06 (for permits)], an owner is responsible for the continued safe operation of a dam.

### **ORDER**

1. (Owner's name) shall lower the lake level by a minimum of five feet below normal pool within fifteen days of the issuance of this Order. (Owner's name) shall notify the division that the lake level has been lowered.
2. (Owner's name) shall maintain the lower lake level until permanent repairs are made.
3. Within ninety days of the issuance of this Order, (owner's name) shall do one of the following:
  - a. Submit an approvable set of plans prepared by a qualified professional engineer for the breaching of the dam; or
  - b. Submit an approvable set of plans prepared by a qualified professional engineer for the repair of the seepage problem.
4. (Owner's name) shall complete the repairs or breach the dam within ninety days of the approval of the submitted plans.
5. You are further notified that you may request and will be afforded a hearing on this Order if the request is made, in writing, within thirty days of the date of mailing of this Order. That request must be addressed to the Chief of the Division of Water. At the hearing you may appear in person, be represented by your attorney, be represented by such others as are permitted to practice before the agency, or you may present your positions, arguments or contentions in writing. At the hearing you may present evidence and examine witnesses appearing for and against you.

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Issue Date

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Richard S. Bartz  
Chief, Division of Water

BEFORE THE CHIEF  
OF THE DIVISION OF WATER

BUCKY BEAVER,	)	
Appellant	)	
v.	)	Appeal of Chief's Order
DIVISION OF WATER,	)	No. 1111111
Appellee	)	

CONSENT AGREEMENT

Now come the parties, appellant Bucky Beaver, and appellee Division of Water (hereinafter "Division"), which, in order to settle the above referenced administrative proceeding pertaining to the Wellbuilt Dam in Rodney County, stipulate to the following facts and conditions:

**FACTS**

1. Bucky Beaver is the owner of the Wellbuilt Dam, permit No. 1, 123 Damnation Rd., Floodville, Ohio.
2. Inspection by the Division on \_\_\_\_\_ found the Wellbuilt Dam to be in violation of the following provisions of the Ohio Revised Code:
3. Bucky Beaver failed to remedy these violations and on \_\_\_\_\_ Chief's Order 111111 was issued. Bucky Beaver has requested a hearing on this Order.

**CONDITIONS**

4. By \_\_\_\_\_ Bucky Beaver will submit a schedule from a qualified engineer that provides for the submission of plans for the repair/construction of:  
The schedule and plans must be approved by the Division.
5. The schedule must specify that the work will be completed by \_\_\_\_\_.
6. All work on Wellbuilt Dam shall be performed in compliance with Revised Code chapter 1512 and Ohio Administrative Code 1501:21.
7. Nothing in this Consent Agreement shall be construed so as to prejudice the right of the Division to issue other decisions and orders in regard to the Wellbuilt Dam to

enforce the provisions of R.C. Chapter 1512 and O.A.C. Chapter 1501:21 including an action for failure to comply with this Consent Agreement.

8. In the event of default of the terms set forth herein, the Division may elect any and all remedies it deems appropriate. Further in the event of default, Bucky Beaver, his heirs, assigns, and successors-in-interest agree that, in any litigation brought by the Division to enforce this Consent Agreement: a.) venue shall be proper in the Franklin County, Ohio Court of Common Pleas, and b.) service of process and summons thereof are hereby waived.

9. This Appeal is dismissed with prejudice.

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Bucky Beaver  
Address

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Joan I. Fishel  
address

## Division has Issued Chief's Order

### Process Upon Appeal of Adjudication Order

- appeal is to Franklin County Common Pleas Court
- dam owner may request a stay of execution. Pursuant to R.C. 119.12 must show "unusual hardship"

### **Common Pleas Court Issues Decision**

#### -Favorable to Division

- owner can:
  - 1) comply by entering into consent agreement
  - 2) file motion for reconsideration
  - 3) appeal to Court of Appeals; may have to post bond  
must be filed within 30 days; stay of execution may be requested
  - 4) neither comply nor appeal  
Division files Motion for Contempt

#### -Favorable to Owner

- if court tells Division to *correct order* Division can
  - 1) file motion for reconsideration
  - 2) hold new hearing
  - 3) issue new order with correction( i.e.-orig. order said dam is Class II and needed appropriate spillway capacity--court said facts show Class III rather than II—new order would change spillway requirements)
  - 4) appeal to Court of Appeals; no bond required  
must be filed within 30 days
- if Division told to *dismiss order* Division can
  - 1) start over (i.e-had made procedural error-now will do it right)
  - 2) file motion for reconsideration
  - 3) appeal to Court of Appeals: no bond required  
must be filed within 30 days

#### -Favorable and Unfavorable

both sides can choose to appeal or not

### **Court of Appeals Issues Decision**

#### -Favorable to State

Same possibilities as with unfavorable Common Pleas decision except Ohio Supreme Court has discretion as to whether to take an appeal. Notice of appeal must be filed

within 45 days

-Favorable to Owner

Same possibilities as with unfavorable Common Pleas decision except Ohio Supreme Court has discretion as to whether to take an appeal. Notice of appeal must be filed within 45 days

**Supreme Court Issues Decision**

Neither party has further appeals but can request reconsideration  
Negotiate Consent Agreement  
State would still have to bring Motion for Contempt if owner noncompliant

## Division has Filed Civil Suit

### Process Upon Appeal of Common Pleas Decision

#### -Favorable to State

owner can:

- 1) comply by entering into consent agreement
- 2) file motion for reconsideration
- 3) appeal to Court of Appeals; may have to post bond  
must be filed within 30 days; stay of execution may be requested
- 4) neither comply nor appeal  
State files Motion for Contempt

#### -Favorable to Owner

Division can:

- 1) file motion for reconsideration
- 2) start over
- 3) appeal to Court of Appeals; no bond required  
must be filed within 30 days

### **Court of Appeals Issues Decision**

#### -Favorable to State

Same possibilities as with unfavorable Common Pleas decision except Ohio Supreme Court has discretion as to whether to take an appeal. Notice of appeal must be filed within 45 days

#### -Favorable to Owner

Same possibilities as with unfavorable Common Pleas decision except Ohio Supreme Court has discretion as to whether to take an appeal. Notice of appeal must be filed within 45 days

### **Supreme Court Issues Decision**

Neither party has further appeals but can request reconsideration  
Negotiate Consent Agreement  
State would still have to bring Motion for Contempt if owner noncompliant

## **INJUNCTION PROCEDURE**

Section 1521.06 of the Revised Code (R.C.) gives the Chief the authority to request the Attorney General to seek an injunction against anyone building a dam without a permit. This can be done without the prior issuance of a Chief's Order. This authority is well-suited to the situation of a dam built without a permit.

The procedure would be as follows. First, a complaint will be filed in the common pleas court of the county in which the dam is located alleging a violation of R.C. 1521.06. Filed along with the complaint will be a Motion for a Preliminary Injunction. The motion will argue that safety concerns, specifically the fact that there is no information as to how the dam was built, require that the dam be drained until such time as the owner has complied with the permit requirements.

Next, the court will hold a hearing on the motion. The division must be prepared to show that this dam is within its jurisdiction and that it attempted to achieve the owner's voluntary compliance. Further, the division must explain the hazards presented by a poorly built dam. The owner will likely present evidence along two lines: one—that the dam is of a size or storage capacity that takes it out of the division's jurisdiction; or two—that the dam had been there for [however long is the case-six months, one year, eighteen months, etc.] without any problems and draining it would be an unnecessarily extreme measure.

A preliminary injunction ordering the draining of the dam may or may not be issued. Regardless, the division can proceed with its case and its goal of a court order requiring the owner to comply with R.C. 1521.06.