High Hazard Potential Dams Annex to the South Carolina State Hazard Mitigation Plan

June 16, 2023

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Section I: Planning Process

The South Carolina Department of Health and Environmental Control's (SCDHEC) approach to hazard mitigation incorporates planning, regulation, and enforcement to ensure owners of regulated dams meet minimum regulatory standards. Specifically, state-regulated dam infrastructure is monitored by SCDHEC staff and dam safety is an area of particular mitigation concern. The South Carolina Dam Safety Program (SCDSP), housed within SCDHEC, administers the High Hazard Potential Dams Rehabilitation Grant Program for South Carolina as a mitigation tool to address the risks posed by unsafe High Hazard Potential Dams (HHPDs). This plan is the product of a collaborative effort between the South Carolina Emergency Management Division (SCEMD) and SCDSP. The two agencies worked together to provide expertise from their respective areas to develop a state level strategy, risk analysis tools, and mitigation activities addressing HHPDs that will satisfy the requirements of the *State Mitigation Planning Policy Guide* (FEMA, 2022) and, more importantly, reduce the risks posed by the state-regulated HHPDs across South Carolina for the benefit of its citizens' lives and welfare.

An important companion to this Annex is the *State of the Dams*, published by SCDSP in August 2020, to provide a detailed analysis of the state-regulated dams in South Carolina. This report is a valuable source of information for understanding the inventory of state-regulated dams. The report can be downloaded from the following URL:

https://scdhec.gov/sites/default/files/media/document/State%20of%20the%20Dams%20_FINAL_8-20-2020_0.pdf

Section II: Risk Assessment

Sub-Section II.a – Background

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic extremes, and population growth in floodplain areas downstream from dams have resulted in an increased emphasis on dam safety, operation, and maintenance. According to the US Army Corps of Engineers National Inventory of Dams (NID) there are over 91,000 *regulated* dams in the United States as of June 2023, the majority of which are privately owned. There is no known official estimate for the number of unregulated dams in the US, but the SCDSP estimates there may be as many as 50,000 *unregulated* dams in South Carolina alone. Besides private entities, dam owners may also be state and local authorities, public utilities, or federal agencies. Dams provide numerous benefits, including water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. Each dam in the state of South Carolina, however well-constructed and maintained, has the potential to fail and suddenly release its reservoir and flood land downstream. This threat is only exacerbated by aging infrastructure dams (i.e., dams built to serve a public use, such as flood control or hydropower) and the multitude of typically smaller dams built primarily for recreational and aesthetic purposes. Dams built before 1977 pre-date the SC Dams and Reservoirs

Safety Act and were constructed without the need for a construction permit from the SCDSP. Aside from Federally-owned or regulated dams, based on the limited records available it is likely that most of these pre-law dams were built without the involvement of a licensed Professional Engineer, the use of commonly accepted design standards and best engineering practices, or regulatory oversight of any kind. Furthermore, dams built since the passage of the Act have been subject to an evolution of design standards and best engineering practices that have seen many once-standard practices (such as seepage cut-off walls and use of geotextiles) become frowned upon. These aging and sub-standard dams make up the bulk of South Carolina's inventory.

SCDSP oversees permitting, inspections and general compliance for over 2,200 state-regulated dams under authority vested by the SC Dams and Reservoirs Safety Act, SC Code Ann. §49-11-110, *et seq*. and the SC Dams and Reservoirs Safety Act Regulations, SC Code Regs. 72-1, *eq seq*. A dam subject to state regulation is classified based on its potential to cause loss of life or damage to improved property in the event of the dam's failure or improper operation. Consequences from dam failure that the SCDSP considers when evaluating and assigning Hazard Potential Classifications include potential impacts to homes, businesses, roads, railroads, commercial and industrial facilities, and public utilities (i.e., water, sewer, electric, gas). There are three hazard potential classifications defined by the SC Dam and Reservoirs Safety Act and Regulations — High, Significant, and Low. **TABLE I** explains these classifications. This Annex will focus on the High Hazard Potential Dams (HHPDs) only.

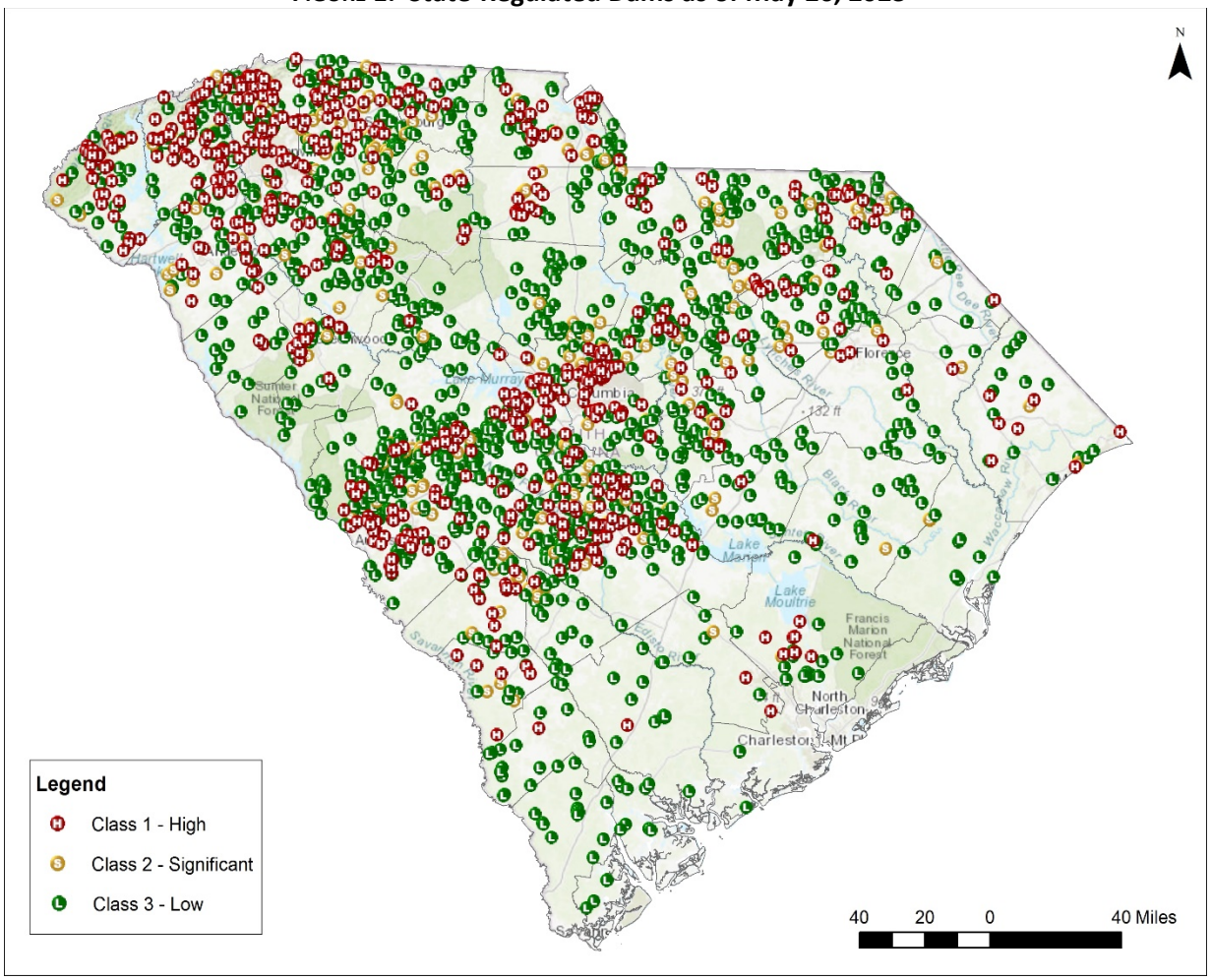
TABLE I: South Carolina Hazard Potential Classification of Dams

CLASS I	CLASS 2	CLASS 3
High Hazard	**Significant Hazard**	**Low Hazard**
Dam failure will likely cause loss of life or serious damage to home(s), industrial and commercial facilities, important public utilities, main highway(s) or railroads.	Dam failure will not likely cause loss of life but may damage home(s), industrial and commercial facilities, secondary highway(s) or railroads, or interrupt the service of relatively important public utilities.	Dam failure may cause minimal property damage to others. Loss of life is not expected.

Source: South Carolina Code of Regulations, Reg. 72-2.C. Hazard Potential Classification.

According to the SCDSP's Geographic Information Systems (GIS) web application (https://gis.dhec.sc.gov/scdams), as of May 26, 2023, there are 2,212 state-regulated dams in South Carolina. This is depicted geographically in **FIGURE 1**. Of these 2,212 total dams, 614 are classified as High Hazard Potential Dams (HHPDs). This information is summarized in **TABLE II** and depicted in map form in **FIGURE 2**. The SCDSP's publicly-available GIS web application is the preferred source of information for HHPDs in the planning area as it reflects SCDSP's data on all state-regulated dams in real-time and also provides a wealth of additional information and tools that assist users in performing detailed analysis of the geographic environment and upstream/downstream impacts of almost every dam subject to state regulation.

FIGURE 1: State-Regulated Dams as of May 26, 2023



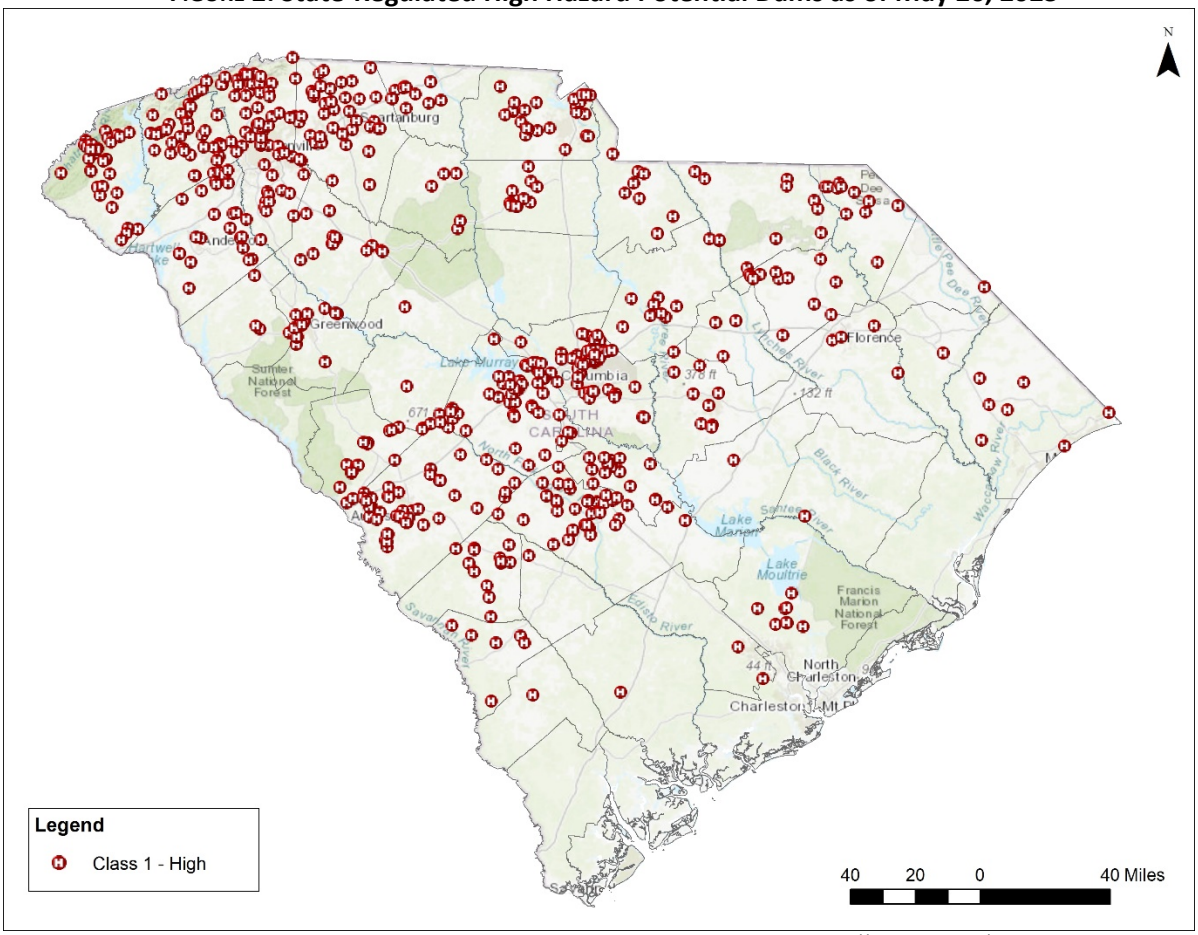
Source: South Carolina Department of Health and Environmental Control, 2023; Dynamic Map available at https://gis.dhec.sc.gov/scdams

TABLE II: Summary of High Hazard Potential Dams

CLASSIFICATION	TOTAL
CLASS 1 – HIGH HAZARD	587
STATE CLASS 1 – HIGH HAZARD	27
TOTAL	**614**

Source: South Carolina Department of Health and Environmental Control, 2023

FIGURE 2: State-Regulated High Hazard Potential Dams as of May 26, 2023



Source: South Carolina Department of Health and Environmental Control, 2023; Dynamic Map available at https://gis.dhec.sc.gov/scdams

As shown in **TABLE II**, State Class 1 dams are a sub-set of Class 1 dams that are less than 25 feet in height and have a storage capacity of less than 50 acre-feet (i.e., "Very Small" size class as shown in **TABLE I**) and may cause loss of life in the event of dam failure. The reason for this distinction is that State Class 1 dams do not meet the federal definition of "dam" found at 33 U.S.C. §467(3), and therefore are not eligible for the HHPD Rehabilitation Grant Program. While State Class 1 dams are smaller and impound less than other Class 1 dams, they still represent a potential to cause loss of life and thus should not be treated as any less important. The authority to regulate these dams comes from the SC Dams and Reservoirs Safety Act, SC Code Ann. §49-11-110, *et seq*.

Another important sub-set of dams are the 105 dams (including some Low and Significant Hazard class) that were built by the United States Department of Agriculture (USDA) between 1954 and 1990 under Public Law 566 to serve a flood prevention, watershed protection, or water supply purpose. These dams represent some of the largest state-regulated dams in South Carolina and thus deserve special mention in this Annex. Public Law 566 was passed in 1954 by the US Congress and established a program by which the USDA would design and build dams on watersheds of ≤250,000 acres and with ≤5,000 acre-feet in storage capacity with the intention of turning over maintenance and operations of said dams to local project sponsors. Project sponsors included many Watershed Conservation Districts (WCD), which are state-chartered public service districts that exist for the sole purpose of maintaining and operating

the PL-566 dams and related activities. County and municipal governments also often served as project sponsors or have since taken over jurisdiction for a project. There are 20 Watershed Conservation Districts and 6 other political subdivisions in South Carolina that own/operate a combined 72 PL-566 dams classified as HHPDs, as shown in **TABLE III** below.

TABLE III: Number of PL-566 Sponsors with at least one HHPD

PROJECT SPONSOR	# OF HHPDS / Total # of Dams under sponsor's control	COUNTY(IES)	PURPOSE
BEAVERDAM CREEK WCD (OCONEE)	4 / 4	Oconee	Flood Control
BEAVERDAM CREEK WCD (EDGEFIELD)	2 / 2	Edgefield	Flood Control
BEAVERDAM-WARRIOR CREEK WCD	1 / 5	Laurens	Flood Control
BIG CREEK WCD	2 / 2	Anderson	Flood Control
BROADMOUTH CREEK WCD	2 / 4	Anderson	Flood Control
BROWN'S CREEK WCD	1 / 1	Union	Flood Control
BRUSHY CREEK WCD	4 / 4	Anderson	Flood Control
CANE CREEK WCD	4 / 4	Lancaster	Flood Control
CITY OF GREER (GREER CPW)	1 / 1	Spartanburg	Water Supply
CITY OF LAURENS (LAURENS CPW)	1 / 1	Laurens	Water Supply
DUNCAN CREEK WCD	3 / 6	Laurens	Flood Control
FISHING CREEK WCD	4 / 4	York	Flood Control
GEORGE'S CREEK WCD	1 / 1	Pickens	Flood Control
HILL'S CREEK WCD	1 / 1	Chesterfield	Flood Control
GREENVILLE COUNTY SWCD	5 / 5	Greenville	Flood Control
LITTLE LYNCHES RIVER WCD	1 / 1	Lancaster	Flood Control
LITTLE RIVER WCD	4 / 13	Laurens	Flood Control
OOLENOY RIVER WCD	3 / 3	Pickens	Flood Control
OCONEE COUNTY SWCD	4 / 4	Oconee	Flood Control
PICKENS COUNTY SWCD	7 / 7	Pickens	Flood Control
RABON CREEK WCD	2 / 2	Laurens, Greenville	Flood Control
ROCKY CREEK WCD	2 / 4	Chester	Flood Control
SOUTH TYGER RIVER WCD	2 / 3	Greenville	Flood Control
STARTEX-JACKSON-WELLFORD-DUNCAN WATER DISTRICT	1 / 1	Spartanburg	Water Supply
THICKETTY CREEK WCD	6 / 6	Cherokee	Flood Control
THREE AND TWENTY CREEK WCD	4 / 4	Anderson	Flood Control
TOTAL # HHPDS	**72**		

Source: South Carolina Department of Health and Environmental Control, 2023
Note: WCD = Watershed Conservation District; CPW = Commission of Public Works; SWCD = Soil and Water Conservation District

Sub-Section II.b - What is Dam Risk?

When talking about dams, overall risk can be thought of as a function of three main components: 1) **Hazard**, 2) **Resistance** (ability to withstand the hazard, also called "Performance"), and 3) **Consequences**. Any one factor can completely control risk (e.g., if there are no consequences from dam failure, there is no risk), but this is usually unrealistic if not impossible to realize, and so risk has to be reduced by a combination of efforts that target all three components of risk. Obviously, some hazards are outside of human control (e.g., extreme rainfall, earthquakes), and so our efforts are generally targeted at *increasing* the dam's resistance to hazards or *reducing* the consequences from dam failure. **FIGURE 3** below depicts the three-component nature of risk as it pertains to dams.

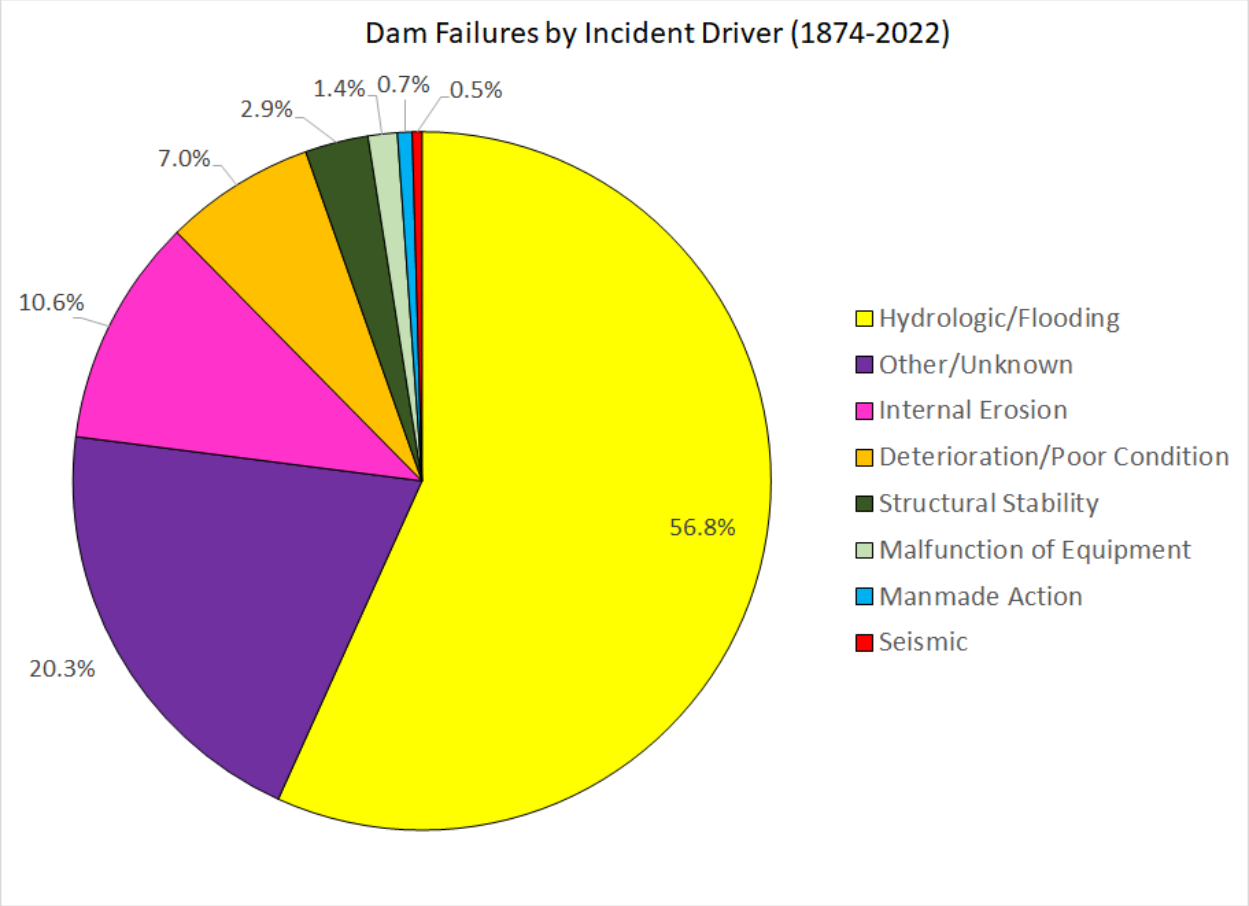
FIGURE 3: The Three Components of Dam Risk

Source: US Army Corps of Engineers, https://www.nwp.usace.army.mil/Missions/Flood-Risk-Management/Dam-Safety/Managing-Risk/

Sub-Section II.c – What are the Hazards that can Impact Dams?

The Association of State Dam Safety Officials (ASDSO) provides a database of recorded dam failures in the United States since 1874 and the attributed driving force behind these failures. From this database, last updated in February 2023, there are 9 categories of "Incident Drivers" that led to a recorded dam failure in the United States. **FIGURE 4**, below, provides a breakdown of the 444 dam failures.

FIGURE 4: Historical Dam Failures by Incident Driver



Source: Association of State Dam Safety Officials, 2023 (https://damsafety.org/incidents)

As **FIGURE 4** shows, the Hydrologic/Flooding incident driver is responsible for the greatest number of recorded dam failures in the US, and by a significant margin. A large percentage of dam failures fall in the Other/Unknown category, but this is not surprising as dams often fail when there is no one there to observe/record the mechanism (or mechanisms) responsible for the failure and most of the evidence for a particular incident driver is washed away in the resulting flood. Another large percentage of failures can be attributed to human action (or inaction). The Deterioration/Poor Condition, Malfunction of Equipment, and Manmade Action categories are all directly attributable by either an action or failure to act of a dam owner or operator. A notable statistic is how few dams have failed directly as a result of seismic activity, although one must remember that the historical record of dam failures (only 148 years as presented here) is extremely short relative to the recurrence period of major earthquakes, which can be on the order of tens of thousands of years.

For planning purposes, 22 hazards are discussed and ranked for their potential severity of impact to dams, as shown in **TABLE IV**. There are 18 hazards found in the State Hazard Mitigation Plan that are expected to occur in South Carolina, but not all of these hazards will impact dams; additionally, an additional 4 hazards will only impact dams, and thus are examined solely in this Annex. An additional discussion on cascading hazards, i.e., two or more hazards that occur in combination or series and that have a synergistic effect on dams, is also provided.

TABLE IV: Hazards Affecting Dams

Hazard Category	Potential Severity of Impact to Dams	Reasoning
Extreme Temperature	Low	Dams can be significantly impacted by extreme temperature lows. Frigid temperatures can adversely affect operation of mechanical equipment as well as cause ice flows and ice jams behind a dam. The Spencer Dam failure in Nebraska in 2019 was the result of an ice flow, the third breach of the dam caused by ice flows since it was constructed in 1927. South Carolina is fortunate that extremely low temperatures for a prolonged duration are exceptionally rare. Extremely high temperature can pose a risk from the perspective that it can become dangerous for humans that must perform maintenance on dams and operate spillway control equipment to be outdoors in such conditions, but these types of events are usually short in duration such that the actual hazard is low in relation to other hazards on this list.
Hail	Minimal	Hail would have little impact on a dam. Potential impacts could include damage to monitoring equipment, security systems, or other outdoor electronics.
Lightning	Minimal	Lightning would have little impact on a dam. Potential impacts could include damage to monitoring equipment, security systems, or other electrical systems. Trees could be struck by lightning, but rarely does a lightning strike cause uprooting of a tree. Tree death would be expected, but this would not represent an immediate dam safety concern.
Severe Thunderstorms	High	Severe thunderstorms pose a risk from the high winds and the extreme, intense rainfall that can be generated. Severe thunderstorms usually occur on a smaller spatial extent than tropical cyclones (i.e., at the County scale or smaller), but the impacts are very similar. High winds can cause uprooting of trees, and the intense rainfall can cause flash flooding which can overwhelm dam spillways. The combination of

		high reservoir water levels and high winds is especially concerning. Uprooting of trees on a dam with a high reservoir water level can cause a breach to form in the void created by the extracted root ball. Wind-wave action can cause overtopping of a dam and erosion of the dam crest. The Kingsley Dam in Nebraska was nearly breached as a result of a wind storm in May 1982 that created 10-foot waves during a time of an already high reservoir water level. The frequent occurrence of severe thunderstorms state-wide during the warmer months, combined with short warning times, give these events "High" severity for potential impacts to dams.
Tornado	Moderate	Tornados pose a hazard from the high winds that can be generated, and the potential for tree uprooting. The hazard is similar to severe thunderstorms in that very little warning time may be available, but dissimilar in that tornados are not necessarily accompanied by extreme rainfall. Potential for occurrence exists statewide, but not as common in South Carolina as in mid-western states.
Tropical Cyclone	Extremely High	The historical record speaks clearly that tropical cyclones (depressions, storms, and hurricanes) pose an extreme hazard to dams in South Carolina. These events have the potential for state-wide impacts and reliably occur multiple times every year between the months of June to November (i.e., the Atlantic Hurricane Season). The greatest impacts are usually felt closer to the Atlantic seaboard but can also be caused by Gulf of Mexico-fed storm systems. Hurricanes do not necessarily represent a greater threat than tropical storms or depressions. Hurricanes may have greater wind speed, but it is the path and speed of the system that determines rainfall, and rainfall is the critical factor for impacts to dams. A prolonged multi-day rainfall over vast areas associated with these storms is what poses the greatest hazard to dams. The state of modern weather forecasting provides a significant advance notice of these monster storms (usually one week or longer), such that warning time is usually available for preparatory actions by dam owners and

		operators. The SCDSP utilizes a mass alert system called ReadyOp to advise dam owners when to start preparing their dams for the potential for extreme rainfall and flooding at their dams. Still, no amount of advance notice and warning can fully prepare dams for the sheer volume of precipitation and runoff that can be generated by these monster storm systems. The scale of these events can comprise multiple counties, up to and including the entire state.
Wind	Moderate	As mentioned previously, wind is a concern for dam safety due to the potential for uprooting of trees and for wind-wave action that can cause erosion of earthen dams. Trees don't belong on dams, and the SCDSP has increased efforts to eliminate trees on HHPDs, but many remain. Critical areas for tree uprooting include the crest of the dam, where the sudden loss of large mass of soil can cause a sudden release of the reservoir, and in the lower half of the downstream slope, where the loss of a soil mass can initiate internal erosion and "piping" if the phreatic surface is close to the newly created void. Wind storms alone pose a much lower hazard than high wind in combination with extreme rainfall, as a high reservoir water level and the potential for overtopping of the embankment combined with uprooting of trees makes a dam failure and uncontrolled release from the reservoir more likely.
Winter Weather	Low	South Carolina is not typically subject to extreme winter weather, but an ice storm is one type of winter weather that can cause loss of electrical power, cause equipment to become inoperable, and cause disruptions to highway travel such that operational control of a dam could be jeopardized. As discussed above, extreme low temperatures can be problematic for dams, but usually requires an extended duration before problems occur, which is extremely rare in South Carolina.
Coastal Hazards	Minimal	A look at **FIGURE 2** shows that the majority of HHPDs in the state are far from the coastal zone. This is primarily a result of topography, as the comparatively flat coastal plain offers few desirable

		locations for dam construction. Dams constructed across wide, flat floodplains generally must be much longer to contain the impoundment compared to dams constructed in deep and narrow floodplains. Furthermore, dams in flat areas cannot be very tall, as the area that would be inundated by the impoundment grows almost exponentially with increasing dam height. Dams that are located close enough to the ocean to be tidally influenced are generally exempt from regulation, as the areas downstream of these dams are already built to withstand high tides, and a dam failure poses no incremental risk to downstream areas should a dam breach occur.
Drought	Low	A prolonged period of dry weather, whether an officially designated "drought" or not, generally reduces the risks posed by HHPDs, as reservoir water levels drop and the hydraulic loading on the dams is reduced. This makes the likelihood of dam overtopping and internal erosion failure events less likely while the drought persists. However, droughts can pose a unique hazard for HHPDs as well, especially if the drought is followed by extreme precipitation. A prolonged period without rainfall in a dam's watershed will reduce inflows and cause the water level in the reservoir to drop. If all inflow ceases, the reservoir level will drop below normal pool, or could even dry up completely. If this happens at an earthen embankment dam, any clay soils in the dam may begin to desiccate (dry out), which results in shrinking and desiccation cracking in clays. Slow refilling of the reservoir would allow the clays to saturate and swell, essentially self-repairing these cracks, but a fast refilling may cause seepage through the cracks in the clay and lead to internal erosion. This process is known as "piping" within the dam, where internal erosion pathways act as hydraulic conduits, similar to actual pipes. Should these "pipes" grow large enough, the "pipe" ceiling will collapse, a sinkhole will appear on the dam's surface, and a dam failure mechanism will have initiated. Another concern for drought is with the erosion protection that grass and other vegetation provide erosion protection for an earthen dam. Prolonged

		drought may kill this vegetation, which would reduce a dam's resistance to erosion from overtopping. Therefore, while during a drought risk is generally reduced, when the drought ends, risk may be increased compared to what it was prior to the drought occurring.
Flood	Extremely High	The field of hydrology is, in essence, the interaction of rainfall with terrain. The construction of dams alters the response of the land to rainfall. For a dam constructed on a natural watercourse (i.e., not a lagoon or basin with pumped or regulated inflow), rainfall and runoff in the dam's watershed causes inflow into the impounded reservoir, which increases the forces acting on the dam. The hydrology-driven failure mode is well understood as the most common dam failure mode category for dams, and by a large margin (see **FIGURE 4**). If the dam's spillway system cannot safely pass the inflow flood water, the reservoir water level will rise and can overtop the dam. Overtopping of an earthen embankment dam that has no overtopping protection may lead to erosion of the downstream side of the embankment, which is made up of soil placed and (hopefully!) compacted by the dam builder and is much more susceptible to erosion than natural ground. Dams with overtopping protection may be able to resist the flow of water over the crest and down the downstream slope, but different types of overtopping protection will have different degrees of resistance. Grass is one type of overtopping protection and can perform well at resisting erosion of the downstream side of the embankment when the overtopping depth is low, velocities are slow, and the duration of overtopping is short. Other types of overtopping protection can resist greater depths, velocities, and durations of overtopping, to the extent that a concrete structure can be designed to withstand virtually any degree of overtopping. Once erosion begins on the downstream side of the dam, a process called head cutting will gradually remove soil from the dam and will erode in the upstream direction. The rate of erosion will vary based on multiple factors and will be greater in non-cohesive (sandy) soils than cohesive (silty and clayey) soils.

		Once erosion reaches the crest of the dam and begins to approach the impounded reservoir, there is relatively little soil left to be removed before an uncontrolled release of the reservoir occurs. By this point, a reservoir breach is imminent and little time remains before the crest is entirely eroded through and the reservoir begins flowing through the breach and rapidly expanding it in size.
Wildfire	Moderate	While not a common occurrence, and generally limited in extent when they do occur, wildfires can pose a hazard to dams in South Carolina. As mentioned above in the discussion on drought, if the vegetation on an earthen dam is killed, that dam loses its resistance to erosion. Wildfire is more common during periods of dry weather, and so this is a case of cascading hazards, where drought + wildfire followed by extreme precipitation could combine to cause overtopping of dam and increased susceptibility to erosion of the earthen embankment. Another risk wildfire poses is to any components of a dam that are made of plastic. Plastics are in common use on dams, whether in the form of pipe for spillways and siphons, or in the form of Turf Reinforcement Matting (TRM) for adding additional erosion protection for vegetated slopes. Frequently, old metal corrugated pipe that has reached the end of its useful life is rehabilitated with a plastic liner pipe. A wildfire on a dam could ignite plastic pipe, causing it to severely jeopardize a dam's spillway. If plastic pipe was to ignite, it would be difficult to extinguish, and the melting of plastic caused by the intense heat would cause the pipe to plug itself and thus means for safely passing flood flows would be jeopardized. It is also possible the pipe could burn completely through the dam, causing a structural weakness and pathway for seepage, piping, and embankment collapse. Should TRM ignite, this would be much more of an intense fire than a grass fire alone and would certainly remove any erosion protection the dam may have had. Lastly, depending on the severity of the wildfire, power lines or communication lines could be damaged, resulting in potential loss of electricity,

		instrumentation, communications, security, and warning systems at a dam.
Infectious Disease	None	Not expected to have any impact on dams.
Earthquakes	High	An earthquake is a seismic event that causes shaking at the ground surface and results in a cyclic loading on a dam. The motion imparted by a seismic event can cause deformation in an earthen embankment, cracking in a concrete structure, and deformation in the foundation materials beneath a dam. Deformation of earthen embankments may take many forms but is commonly seen as longitudinal (parallel to dam) or transverse (through dam) cracking, settlement (differential or global), and sliding/sloughing of slopes. Slope failures can reduce the width of the embankment and cause uncontrolled release of the impounded water. Cracking in the embankment can create pathways for flow through the embankment which, through internal erosion processes, can grow to cause uncontrolled release of the reservoir. The motion associated with an earthquake can also cause damage to concrete or metal spillways and other appurtenant structures, as well as to any electrical and mechanical equipment, instrumentation, security features, etc., present on the dam. Another earthquake-induced mechanism that can result in loss of integrity in the embankment and foundation soils is liquefaction, where the ground acceleration and cyclical shaking caused by an earthquake causes the pore water pressure in saturated soils to increase such that the soil mass itself loses all structural integrity. If liquefaction occurs in the foundation soil, the dam may settle, which reduces dam height and, correspondingly freeboard, which makes overtopping more likely. Foundation settlement is also likely to cause cracking of the embankment or concrete, depending on type of construction. Depending on the saturated zone with the embankment (the larger the zone of saturation, the more likely liquefaction is to cause dam failure), liquefaction can also cause a deformation in the embankment itself. Dams built on foundations composed of alluvial deposits (i.e., soil particles carried by water and deposited in ancient floodplains) are more

		prone to liquefaction, and the deeper the alluvial layer the more settlement would be expected to occur. Embankment dams with no internal drainage features (i.e., design features incorporated into the dam during construction to reduce the extent of the saturated zone) are also more prone to liquefaction. The 1886 Charleston Earthquake is known to have caused at least one dam failure. The USGS estimates based on historical damage reports that this was a Magnitude 7.0 earthquake. The Langley Pond Dam, an earthen dam in Aiken County approximately 115 miles from the estimated earthquake epicenter near Hanahan, failed completely. The cause of failure is reported as internal erosion through the cracks and fissures that developed in the dam following the violent shaking experienced around 9:50 PM on August 31, 1886. The resulting downstream flooding damaged railroad tracks and subsequently caused the derailment of a passenger train. An 1889 report by Clarence E. Dutton summarizes the impacts felt over 100 miles from the epicenter as follows: "A few miles to the northeast of Augusta is a little railway station named Langley, where a small tributary of the Savannah River has been dammed to secure water power. The ground in this neighborhood, which is a loose soil thinly covering harder rocks below, was in many places fissured by the earthquake and opened in many cracks, some of which were several inches in width. A number of large cracks passed through the dam, opening passages for the water in the reservoir, which quickly enlarged the fissures. The country below was quickly aflood. The railway track was swept, and before warning could be given a passenger train ran into the flood and upon the broken track, where it was wrecked, with some loss of life. In this neighborhood the towns of Bath, Graniteville, and Vaucluse, which stand upon outcrops of crystalline rocks, report shocks of very great severity. Still farther to the northeastward, Batesburg, Leesville, and Lexington give similar reports. Passing beyond Columbia along the same line of contact, we find reports of very violent shocks at Blythewood, Camden, Chesterfield, and Cheraw."
Landslides/Mass Wasting	Low	The threat of landslides poses a risk to dams where one finds specific site topography such as cliffs or

		hillsides/mountainsides in close proximity to, and at an elevation above, the reservoir. In the event of an unstable land mass and a triggering event (e.g., earthquake or extreme rainfall) that initiates collapse of the cliff or hillside/mountainside, the hazard to a dam is that the water displaced by the collapsing land mass will raise the water level in the reservoir and create waves, such that dam failure by overtopping and erosion of the crest and downstream slope is possible. Concrete dams or earthen dams with robust overtopping protection would be much less vulnerable to this hazard. Oconee, Pickens, Greenville and Spartanburg Counties, as some of the most mountainous counties in South Carolina, possess the topography that makes landslides a real possibility. The remaining counties are much less mountainous and thus is not of concern for this analysis. While the threat exists, the data represented by **FIGURE 4** above indicates not a single recorded dam failure was caused by landslide within the reservoir. Therefore, for purposes of this plan and threat analysis, landslides will be considered a remote threat to HHPDs until more detailed analysis can be performed.
Hazardous Materials	None	Not expected to have any impact on dams.
Nuclear Incident	None	Not expected to have any impact on dams.
Terrorism	Low	The hazard posed by malicious actors intent on causing destruction and harm is, and will always be, a real and possible threat. Terrorism is usually an action that is conducted with the intention of causing destruction and harm to as many people as possible in a pre-meditated fashion. Terrorism is likely preceded by the actors researching and investigating the dam, its vulnerabilities/deficiencies, its security and defensive design features, and the consequences of dam failure. Terrorism is likely the most difficult hazard to protect against, as the sophistication and dedication of the malicious actors can never be foreknown. Additionally, terrorism can be expected to result in the worst-case scenario for consequences from uncontrolled release and/or dam failure, as the actors can choose the time and circumstances of the destructive act so to

		maximize the damage to areas downstream.
Vandalism	Low	Vandalism covers a range of actions, from simple and (generally) harmless graffiti, to theft, to unauthorized operation of equipment and controls, up to and including the intentional destruction of property. Vandalism is separated from terrorism in that the actors committing vandalism are generally not doing so with the intent of causing destruction and harm to the larger public and are likely unaware of the potential repercussions of their actions. However, the end result can be the same as an act of terrorism: an uncontrolled release of the impounded fluid from a dam. From the historical database of dam failure incidents maintained by ASDSO (**FIGURE 4**), of the three dam failures attributed to "Manmade Action," none make any indication that an act of vandalism or terrorism was associated with the dam failures; however, there is a large category of "Unknown" dam failures (nearly 20%) where little information is known as to the cause of the incident. It is likely the hazard posed by vandalism and terrorism is under-reported, as all trace of any malicious actions are likely lost following an incident, and very few dams, even HHPDs, maintain a human presence and/or security system to monitor for and record unauthorized personnel and trespass.
Human Negligence	High	The South Carolina Dams and Reservoirs Safety Act (SC Code § 49-11-110, *et seq.*) states that "The owner of a dam or reservoir constructed in this State solely is responsible for maintaining the dam or reservoir in a safe condition throughout the life of the structure." Unfortunately, it is the failure of some dam owners to take this responsibility seriously, and this failure is most egregious in the case of High Hazard Potential Dams, where failure or misoperation of the dam is likely to cause loss of life or seriously damaging consequences that may threaten human life indirectly. A dam owner who takes this responsibility seriously will keep well-informed on the condition of their dam by: • Making frequent visits to the dam to perform self-inspections • Regularly testing equipment to ensure operability and reliability • Staying on top of all required maintenance

		tasks • Having a current Emergency Action Plan A dam owner who relies solely on SCDHEC's bi-annual inspections for awareness of the condition of their dam is not a responsible dam owner. Some of the most common forms of dam owner or operator negligence include: • Failure to keep spillways free from accumulated trash and debris • Failure to keep woody vegetation and trees off the dam • Failure to maintain erosion protection on the dam • Failure to regularly test and maintain water control devices on the dam (e.g., low-level drain valves, spillway gates, siphon spillways) • Failure to control burrowing animals and beavers • Failure to work with a licensed Professional Engineer • Performing unpermitted modifications and repairs • Failure to maintain waterproofing in concrete joints • Failure to inspect embankment drain pipes and clean out as needed • Failure to maintain a current Emergency Action Plan
Misoperation	Moderate	All dams require at least some human intervention to operate properly. Ideally, a dam will have been designed and built with a means to control the water level in the reservoir. Typical means for water level control include low-level lake drains, siphons, lift gates, and removable stop logs. An owner or operator of a dam with such water-level control features must be able to rely on said features at all times. Furthermore, owners and operators must be responsible (and not negligent, as previously discussed) such that water level control features are operated at the <u>appropriate</u> times, to include in advance of large rainfall events, during times of dangerously high water levels, and when performing sensitive maintenance or repairs on the dam. Failure to operate these features in a responsible manner and at the appropriate times can put not just the entire dam at risk of failure,

		but can also cause non-breach flooding of upstream and downstream areas. Larger dams generally serve an industrial or economic purpose and thus generally require more operational management and control than smaller dams, which are mostly for recreation. Dams that provide a raw water source for drinking water or that contain hydroelectric generation stations generally operate with a small amount of freeboard (i.e., the separation distance between the reservoir's normal water level - "normal pool" - and the elevation of the emergency or auxiliary spillway) to maximize the efficiency and reliability of their operations. The less freeboard a dam maintains the higher the requirements on operational control and water level management. With this high demand for operational control comes an increased risk of misoperation, as the monitoring of weather and inflow river gages becomes more critical so that reservoir releases are timed correctly and release volumes are only as much as are needed and no more, as loss of raw water storage or loss of head for hydroelectricity generation equates to lost revenue. An exception to this among the larger state-regulated dams are the flood control dams built by the USDA-Natural Resources Conservation Service (NRCS) and operated and maintained by Watershed Conservation Districts (WCD) (see **TABLE III**). The WCD dams that are used for flood control are typically operated with a large amount of freeboard such that they require less operational management than other types of large dams. For a dam that does not impound a river or stream and does not receive inflows that result from rainfall and runoff, overtopping is also a possibility, but is not associated with a hydrological event. These types of impoundments are most commonly used by industries and utilities that need storage of process fluids or waste waters and have a regulated inflow/outflow (e.g., filled and emptied via sluice gates or via pumping). This type of impoundment could be overtopped from rainfall that falls entirely within the perimeter of the dam, but such an occurrence would almost certainly involve a contributing human error/misoperation

		component. Dams that are operated with little or no freeboard (i.e., available storage) and do not have free outflow are at greater risk of being overtopped from a rainfall event. This regulated inflow and outflow creates the possibility for overtopping via human or equipment misoperation. One famous example of overfilling that resulted in total failure of a dam happened in Missouri in 2005. The Taum Sauk Dam was a pumped storage reservoir that failed and caused over $1 billion in damages and 4 injuries (but no loss of life) as a result of a faulty Supervisory Control and Data Acquisition (SCADA) system. The SCADA system didn't correctly register the high water level and operators continued filling the basin until the dam was overtopped and the embankment eroded to the point of a complete breach.
Internal Erosion	Moderate	Internal erosion occurs within a dam when water can move relatively quickly through a dam unimpeded. Internal erosion is exacerbated by an elevated water surface in the reservoir, as the driving mechanism is the water pressure, or "head", that causes water to seek a lower elevation outlet. The mechanism behind internal erosion begins at the downstream portion of the dam, where soil particles are able to dislodge and exit the dam easiest, and then progresses upstream as increasing numbers of soil particles are removed by water flowing through the dam. If this process continues long enough, such that soil loss has progressed backward toward the reservoir, then the internal erosion pathways act as hydraulic conduits, similar to actual pipes. This process is known as "piping" within the dam. Should these "pipes" grow large enough, the "pipe" ceiling will ultimately collapse, causing a sinkhole or sliding failure on the downstream slope of the dam. The flowing water will remove the remains of the collapsed pipe and the process will begin again, growing closer to the reservoir. Certain soils are more capable of maintaining a "pipe" roof, and dams constructed with these soils are more prone to piping. Once the piping makes a direct hydraulic connection with the reservoir the failure mode will advance quickly and a dam breach will occur.

		A similar mechanism as described above can occur not within the embankment dam itself but under it, through the dam's foundation soils. When this occurs, it is referred to not as "piping" but as a "boil," as the exiting water and soil appears (generally) downstream of the toe of the dam and bubbles up from the ground, as if the emerging soil-water mixture is boiling. It is the same mechanism at work, but is usually a result of poor (or no) treatment or excavation of highly permeable in situ soils (or highly fractured rock) prior to or during the construction of the dam.
Cascading Impacts	Moderate	As already mentioned somewhat in the discussions above, hazards that impact dams can have a synergistic effect when occurring simultaneously or in a succession. For example, drought can cause a domino effect of problems for dams if later followed by wildfire and/or extreme precipitation. Drought can dry out ("desiccate") clay soils in a dam, which causes shrinking and desiccation cracking in the part of the dam that is supposed to be a low-permeability zone that is resistant to seepage. Seepage and piping (i.e., internal erosion mechanisms) will be more likely if a dam has experienced prolonged dryness such that clays have experienced desiccation cracking. Drought can also kill grasses that provide erosion protection in auxiliary spillways and on the surface of dams. Droughts make wildfire more intense and harder to control, and thus more likely to occur and to burn a larger area. Extreme precipitation following a drought and/or wildfire will have more erosive power as soils will be exposed. An earthquake is also capable of causing cascading impacts that can have a synergistic effect and increase the impact from one of the hazards listed above occurring on its own. An earthquake could cause a landslide into the reservoir in addition to stressing the dam, such that the dam could experience the equivalent of a flood event while being subjected to deformation forces. An earthquake could also occur during passage of a flood event caused by extreme precipitation, but these two relatively rare events occurring together is generally considered too remote a risk to take into consideration.

		The most common cascading impact from dam hazards would have to be manmade action (meaning misoperation or inaction) occurring simultaneously with or in succession to a natural hazard. Dams without robust and tested EAPs, dams with untrained or inexperienced operators, dams with unreliable control devices, etc., are all examples of how manmade action can exacerbate the risk from a natural hazard alone.

Sub-Section II.d – What are the Consequences of Dam Failures?

Dams represent a hazard to public safety in three main ways: 1) non-breach flooding, 2) breach (i.e., dam failure) flooding, and 3) upstream flooding. Additionally, a dam breach failure can be broken down into two main types: sunny-day and rainy-day.

TABLE V: Spillway Design Flood Criteria for HHPDs

Size Classification (by Height OR Impoundment Volume)	**Spillway Design Flood (SDF)**
Very Small (<25 ft and <50 acre-ft)	**100-year to ½ Probable Maximum Flood (PMF)[1]**
Small (≥25 ft and <40 ft OR ≥50 and <1,000 acre-ft)	**½ PMF to PMF**
Intermediate (≥40 ft and <100 ft OR ≥1,000 acre-ft and <50,000 acre-ft)	**PMF**
Large (≥100 ft OR ≥50,000 acre-ft)	**PMF**

Source: South Carolina Code of Regulations, Reg. 72-1, et seq.
Note: [1]"Probable Maximum Flood (PMF)" is defined in SC Reg. 72-1 as "the largest flood that theoretically could occur at a given site during our present geological and climatic era."

A non-breach flood event is generally the result of necessary or intentional releases that, while rare occurrences, are much higher in flow rate and total volume than normal releases. These releases can be through the dam's spillway system (i.e., auxiliary or "emergency" spillways) or can be the result of overtopping of dams that are designed to overtop (i.e., concrete dams, or earthen dams that have armoring designed to withstand overtopping without eroding). This type of event poses a flood risk in that downstream populations may be caught unaware and locations that do not normally experience flooding may flood. For example, a HHPD is required to have spillway capacities that comply with the Spillway Design Flood criteria found in SC Code of Regulations 72-1, *et seq.*, and repeated in **TABLE I** below. As is apparent from **TABLE V**, a HHPD can and should have spillway capacity in excess of the 100-year flood. As a result of FEMA's National Flood Insurance Program, local ordinances have restricted development within FEMA-approved 100-year flood plains but not wider, the result being a HHPD that is simply operating as it was designed has the ability to threaten areas where no building

restrictions apply and where populations may not expect flooding to occur. Additionally, a dam that is designed to overtop could conceivably pass flood flows so extreme a large downstream area (potentially larger than the dam's breach inundation area) would need to be notified of the flood risk, even though the dam is not at risk of breaching.

It is not uncommon to see structures built in the auxiliary spillway channel downstream of a dam, especially when these channels/flow paths are on property not under the control of the dam owner. In the event of imminent activation of an auxiliary spillway, owners/residents of these structures (whether homes, roadways, or other infrastructure) may need to be notified and emergency protective measures taken.

As the Limitations section of this document will address, the SCDSP is unable to provide detailed analysis of the non-breach flooding risk for HHPDs in the planning area at this time. This is a limitation that the SCDSP plans on utilizing FEMA grant funding and contractual assistance to correct in the next 12 months.

A dam breach is a failure of a dam structure resulting in an uncontrolled release of water or other fluids from the impounded reservoir that causes downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events (e.g., extreme precipitation events, earthquakes), human-induced events (e.g., misoperation, lack of or deferred maintenance, vandalism, terrorism), or, more commonly, some combination of the two. The most common cause of dam failure in earthen dams is prolonged rainfall that produces inflow into the reservoir in excess of the dam's spillway capacity, causing dam overtopping and erosion of the earthen dam embankment until an uncontrolled release occurs. The human-induced factor in these overtopping dam failure events is usually related to the dam's spillway system, and the loss of spillway capacity thereof: either a spillway is obstructed by debris, is not in proper functioning condition, requires manual operation (which never comes or comes too late), or a combination of all three. There are two main types of dam breach, which are defined by the hydrologic conditions surrounding the dam failure:

- The sunny-day dam breach is an event that occurs without any antecedent or concurrent rainfall and by definition occurs when the reservoir is at normal pool elevation, i.e., the water level established by a primary spillway's inflow elevation, and the downstream receiving stream is also at a normal water level such that all downstream floodplain storage is available.

- The other type of breach event, a rainy-day breach, occurs as a result of antecedent or concurrent rainfall somewhere in the dam's watershed and/or in the downstream floodplain and can be any of a range of scenarios where the reservoir is above normal pool elevation (up to the crest of the dam or even slightly above if the dam is being overtopped in the scenario), is receiving increased inflow from the upstream watershed, and the downstream floodplain storage is limited or fully exhausted.

Sub-Section II.d.i – Consequences Estimation Methodology

The evaluation and estimation of the consequences of a dam's failure is a complex and multi-disciplinary endeavor. In this report, dam failure consequences have been estimated using a consistently applied methodology adopted by the SCDSP. More detail on this methodology is available in **APPENDIX A**, but the critical information is that dam failure is modeled as a sunny-day dam failure with water level at the top of the dam and the dam breaches suddenly and completely.

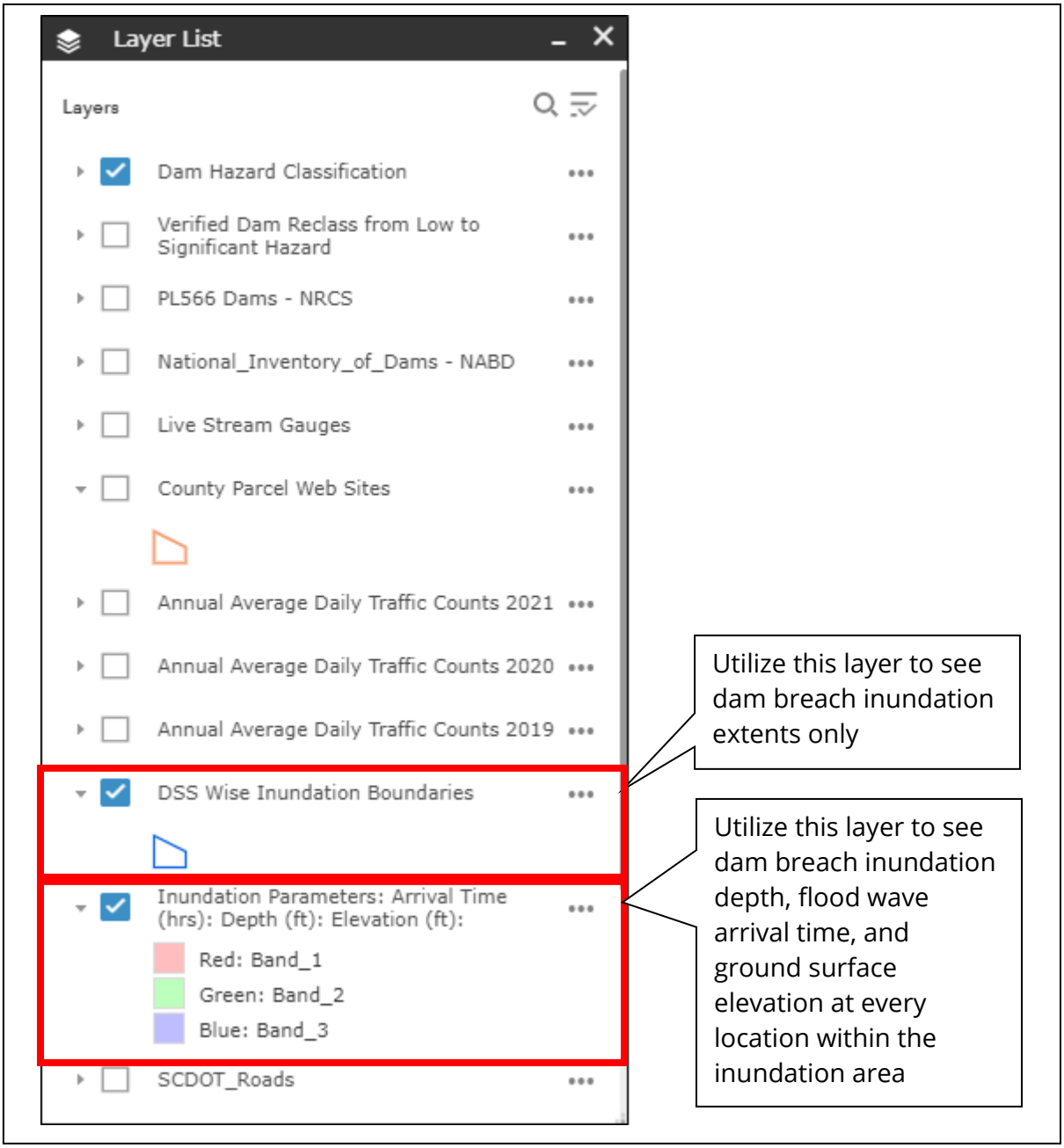
The Decision Support System for Water Infrastructure Security (DSS-WISE™) Lite software system is used to perform the dam breach simulations as previously described. DSS-WISE™ Lite was chosen by the SCDSP as the best tool for this purpose, mostly out of necessity, but without sacrificing public safety. The "necessity" previously referenced arises from the fact that comparable 2-dimensional hydrodynamic models (i.e., models necessary for simulating non-steady state conditions like a dam breach), such as FLO-2D®, HEC-RAS, and MIKE 21, require a great amount of training and technical expertise to set up and run and have confidence in the results. DSS-WISE Lite, on the other hand, was designed and created with the intention of providing a powerful yet extremely simple 2-dimensional model specifically for simulating the effects of dam breaches. Using a 2-dimensional model is preferable to using a 1-dimensional model for dam breach analysis because in a 2-d model the general path of the water coming out of the breach does not need to be known. A 2-d model also provides flow data, such as depth and velocity, at every point in the simulation domain, whereas a 1-d model only provides information at user defined cross-sections along the floodplain. A 2-d model is also needed for areas where flow is encountering a built environment such as buildings, walls, and similar obstructions to flow, and flow paths may be repeatedly diverging and converging.

The use of DSS-WISE Lite software allowed the SCDSP to set up and perform detailed dam breach modeling in literally minutes per dam. The good fortune of having statewide Light Detection and Ranging (LiDAR) coverage freely available from the Department of Natural Resources meant that the most challenging inputs (bottom of dam elevation, top of dam elevation, normal pool elevation, maximum pool elevation, normal pool volume, maximum pool volume – see **FIGURE 6**) for dam breach modeling could be obtained relatively easily, yet without sacrificing accuracy, via Geographic Information Systems (GIS) software and methods. The statewide LiDAR also provided a highly detailed terrain model for inclusion in the DSS-WISE Lite software program. The SCDSP's use of DSS-WISE Lite (as described in **APPENDIX A**) allowed for virtually all 2,200± state-regulated dams to have breach simulations performed, with inundation maps and associated GIS files available to the public. The SCDSP makes the results of these DSS-WISE Lite simulations available via its GIS web application at https://gis.dhec.sc.gov/scdams.

The SCDSP's GIS web application provides inundation extent, max inundation depth, and flood wave arrival time for the sunny-day, maximum pool dam breach for every state-regulated HHPD in South Carolina. This data was produced by the SCDSP exclusively utilizing the DSS-WISE™ Lite dam breach simulation software. After accessing the web application from any up-to-date internet browser, selecting the layer titled "DSS Wise Inundation Boundaries" from the Layer List will provide inundation extent polygons for every state-regulated HHPD in South Carolina (see **FIGURE 5**). A different layer titled "Inundation Parameters: Arrival Time (hrs); Depth (ft): Elevation (ft)" will provide the depth of inundation at every point within the inundation extent, along with the flood wave arrival time and the ground surface elevation at the selected location. The user should be aware that the "Inundation

Parameters" layer will only become visible once the zoom level is 1:320,000 (i.e., 1 inch = 5 miles) or closer.

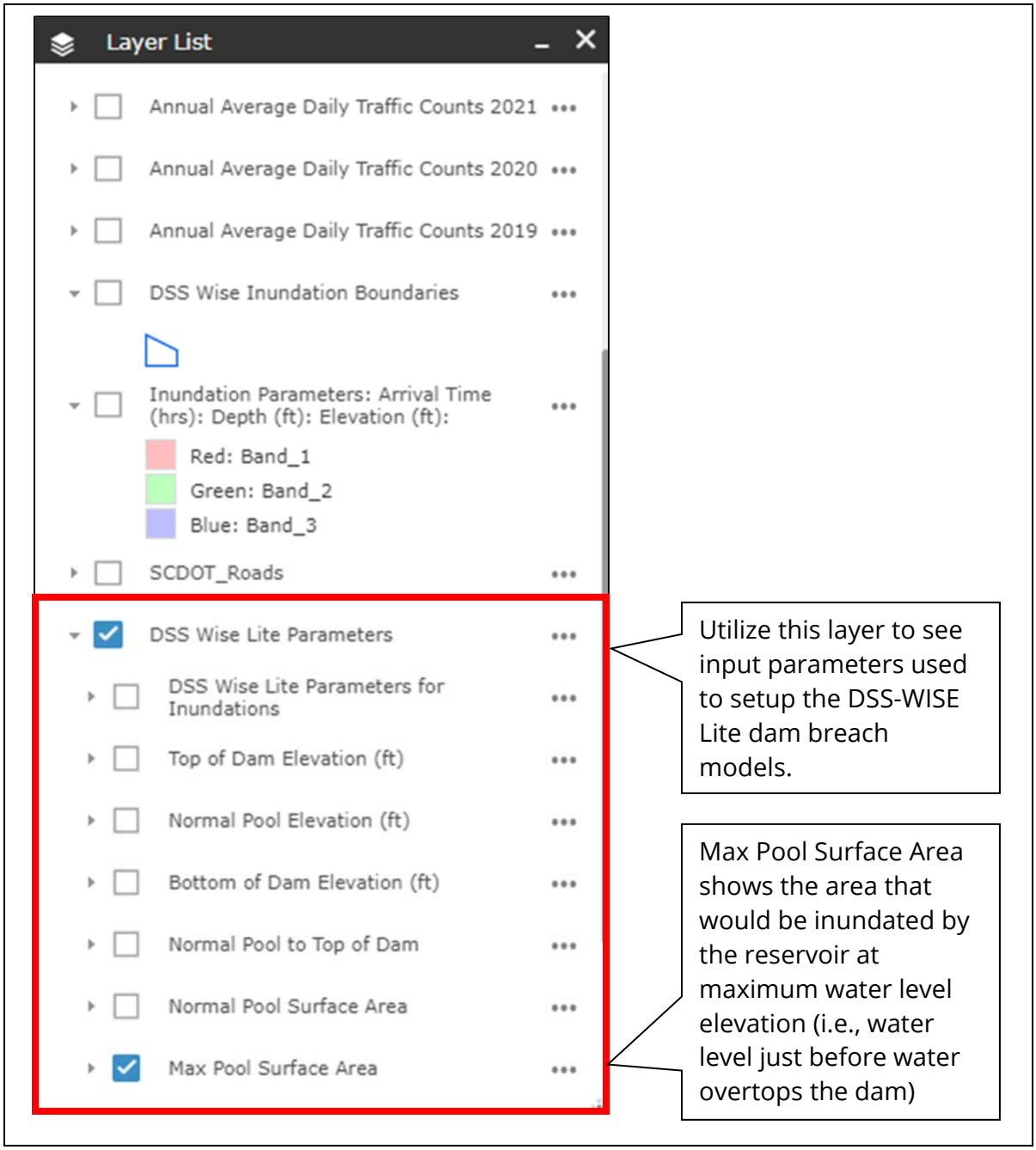
FIGURE 5: SCDSP GIS Web Application Layer List for DSS-WISE Lite Outputs



Dams can also represent a hazard to upstream areas (i.e., areas around the impounded reservoir and within the floodplain of the impounded stream) in the event of extreme inflow events or misoperation of the dam that results in water level in the impounded reservoir reaching or exceeding the top of the dam. While this is usually a much smaller flood risk (i.e., much lower flood depths and velocities) than the downstream flood risk from non-breach or breach flooding, upstream populations can be caught unawares from a rise in the reservoir water level that exceeds the normal range of reservoir fluctuation. This type of flooding usually represents a much lower risk for loss of human life than downstream

flooding, but can represent a significant risk for property damage, flooding of roadways, and other adverse infrastructure impacts. As the Limitations section of this document will address, a statewide effort to analyze and compile consequences from upstream flooding for all state-regulated HHPDs has not been conducted as of the time of plan creation, but the SCDSP's GIS web application provides inundation extent for reservoirs at their maximum pool water level. This is a limitation that the SCDSP plans on utilizing FEMA grant funding and contractual assistance to correct in the next 12 months. For the present, accessing the web application and selecting the layer titled "DSS Wise Lite Parameters" from the Layer List will provide the Max Pool Surface Area polygon for every state-regulated HHPD (see **FIGURE 6**).

FIGURE 6: SCDSP GIS Web Application Layer List for DSS-WISE Lite Inputs



Sub-Section II.d.2 – Population-at-Risk

The SCDSP relies on the DSS-WISE Lite Human Consequence Module (HCOM), which utilizes a combination of LandScan data, a product of Oak Ridge National Laboratory, and US Census data to determine both daytime and nighttime Population-at-Risk (PAR) for the dam breach inundation area delineated by the DSS-WISE Lite hydraulic simulation module. These PAR estimates have been provided for each of the 614 HHPDs in South Carolina in **APPENDIX B**.

No additional effort has been made in the determination of potential loss of life beyond the use of DSS-WISE Lite HCOM for calculating Population at Risk (PAR). The evaluation of Potential Life Loss (PLL) is an advanced and highly subjective scientific, engineering, and sociological analysis that is beyond the scope of this analysis and is something that has never been undertaken by the SCDSP because of a lack of resources and expertise. PLL is a sub-set of PAR where factors such as warning initiation time, warning diffusion time, evacuation time, etc., are all factored in to determine how much of a dam breach inundation area's PAR is able to receive warning in time to evacuate, and how many lives are expected to be lost from not receiving warning or not receive warning in time to evacuate.

Sub-Section II.d.3 – Social, Environmental, and Economic Consequences

TABLE VI: Dam Failure Consequences

Category	Impact Rating	Description of Impacts
Social	Moderate	As the 2015 Floods in South Carolina showed, dam failures are non-discriminatory when they fail and send flood waters rushing downstream. Poor and prosperous areas alike in the Columbia Metro Area were impacted by flooded homes and businesses and impassable roads when five dams failed in the Gills Creek Watershed and three dams failed in the Twelvemile Creek Watershed. However, when it comes to recovering from these impacts, it is much more difficult for low-income families to rebound and rebuild. The disproportionate challenge of recovery faced by low-income families is really no different with dam failures than it is from most other natural disasters, except for one key difference: most dam failures are preventable. Thus the disproportionate impact of dam failures on low-income flood victims is a social inequality that can be mitigated by regulatory oversight and other mitigation actions, such as those discussed herein. When dams fail, the consequences for the dam owners and lakefront property owners can be very disproportionate to the general population as well. For instance, the vast majority of dams in South Carolina are privately-owned and provide a recreational or aesthetic benefit in the form of the impounded reservoir. The loss of the dam, and thus the recreational and aesthetic benefit, can drive down real

		estate values for those homes who formerly benefitted from lake access. This is an impact that disproportionately affects more prosperous/wealthy families, as a lakefront or lake access home is an amenity that relatively few can afford. Many of the impacts associated with dam failure are the same as those that would be associated with a flood event. However, the primary difference for members of the public in the case of a dam failure is that often citizens who might be impacted by a dam failure may believe themselves to be protected from flood events as a result of the dam and, therefore, may not be anticipating the event. This may have a severe impact on public confidence in the long run as citizens may view this as a failure of government institutions to properly regulate and control the dam. That is to say, they may ultimately view the incident as preventable, unlike a flood that occurs purely from natural causes.
Environmental	Low	The vast majority of dams in South Carolina impound natural water bodies (e.g., streams, creeks, rivers) and so do not represent a significant potential source of harmful contaminants if these dams were to fail. While impacts such as sediment release and damage to ecological habitat should be expected from a dam failure, the impacts would be relatively non-threatening to human health. Furthermore, historical dam breaches show that ecosystems rebound relatively quickly following a dam failure event, and the ecosystem may even recover in better condition than when the dam existed. This assumption of relatively low environmental impact for impoundments on natural water bodies may not hold if there are chemical, petroleum or other hazardous material storage facilities in the potential dam breach inundation area. The presence of hazardous materials in the dam breach inundation areas has not been investigated for state-regulated dams as of this writing, but the SCDSP intends to complete this analysis within the next 12 months using contractual support. Furthermore, some regulated HHPDs are used as containment structures in industrial and utility operations for wastewater management. The release of the contents of a wastewater lagoon into the environment could have significant short and long-term impacts on the natural environment and pose great risk for human health. Additionally, some dams located on natural water bodies are also acting as containment structures for contaminated sediment that is the result of industrial wastewater discharges prior to the passage of

		the Clean Water Act and the South Carolina National Pollutant Discharge Elimination System (NPDES) Regulations placing limits on what could be released to the environment without pre-treatment. Lake Conestee Dam in Greenville County is one such dam that is known to be impounding over 2 million cubic yards of sediments contaminated with heavy metals, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and other persistent contaminants. A failure of this dam and release of the stored contaminated sediments would, at a minimum, jeopardize use of downstream Lake Greenwood as a raw water supply for two large drinking water utilities that combined serve over 85,000 residential customers in Laurens and Greenwood Counties.
Economic	High	The economic impacts of a dam failure could be high. The large majority of HHPDs in South Carolina would cause serious damage to a main roadway, and the highway system is the lifeblood of economic activity in the state. This is exacerbated by the fact that the SCDOT does not design bridges and culverts for the potential flood flows one should expect with dam failures. As the October 2015 rainfall and flooding, and the 50 state-regulated dams that failed as a result, showed us, there can be a great deal of development outside of the 100-year flood plain that is still vulnerable to dam breach inundation. Total statewide economic damages from the 2015 flooding has been estimated at $1.492 billion (Source: *Service Assessment: The Historic South Carolina Floods of October 1-5, 2015*, US Dept. of Commerce, NOAA-NWS, July 2016), and while not all of the flooding and economic loss can be associated with dam failures, impacts on the Gills Creek watershed in Richland County and Twelvemile Creek watershed in Lexington County was almost entirely the result of dam failures. Statewide, 541 roads were closed from submergence by floodwaters during the 2015 flood, and nearly 3 weeks later 129 seriously damaged roads remained closed, including 12 primary routes. (Source: https://www.wistv.com/story/30347371/forest-drive-open-after-repairs-on-flood-damage/) Only two state-regulated dams produce hydroelectricity but of the ones that do, the failure will result in a loss of revenue for the owner, which may also result in temporary power outages (although most communities do not rely solely on hydroelectric power, so this is less likely). The vast majority of hydroelectric generating stations are regulated by the Federal Energy Regulatory Commission (FERC). Several state-regulated dams provide public recreation opportunities and serve as tourist attractions. The SC State Parks Department has 14 state-regulated HHPDs under its ownership, and the loss of any of these reservoirs could have devastating economic impacts on that

		particular park. Lastly, financial liability for a dam failure should not be overlooked. The costs to the dam owner, if found responsible for the failure, could be extreme. These costs could be passed on to taxpayers for dams that are publicly-owned, or to rate payers for dams that are owned by utilities.

Sub-Section II.e – Screening Level Risk Analysis (SLRA)

The SCDSP utilizes a methodology for assessing the state-regulated dams based on specific, critical risk factors including dam condition, performance under extreme load conditions, and consequence of failure called Screening Level Risk Analysis (SLRA).[1] Based on these critical risk factors, the dams are given a risk rating called Total Risk Factor (TRF). The SLRA accounts for possible dam failures due to flooding, seismic events, and static instability. This methodology is used to produce Total Risk Factor (TRF) scores and rankings that reflect the relative risk posed by the portfolio of HHPDs in the planning area. The information is not shared publicly for multiple reasons but available to government officials for mitigation planning purposes. This methodology requires quantitative or qualitative assessment of the following factors:

- Dam Height
- Dam Size
- Reservoir Size (Capacity)
- Dam Age
- Evacuation Requirements (i.e., Population-at-Risk)
- Downstream Damage
- Seismic risks, loading, and liquefaction potential
- Slope Condition
- Piping, Seepage Condition
- Spillway Condition
- Overtopping Protection Condition
- Tree Coverage
- Spillway Capacity
- Inspection condition rating and frequency
- Seepage protection, embankment zoning
- Instrumentation

These factors/conditions are formulated into an overall risk assessment via a Screening Level Risk Analysis (SLRA) that addresses all three key components of dam risk (hazard, performance, and consequence). The SLRA also addresses potential failure modes under static, seismic, and flood loading conditions.

Dam breach inundation modeling conducted by SCDSP has identified the areas potentially impacted by

failure of state-regulated HHPDs in South Carolina, and this information has been made publicly available through a SCDHEC web application, viewable at https://gis.dhec.sc.gov/scdams. The "Evacuation Requirements" and "Downstream Damage" risk factors that are factors in the SLRA methodology are derived from the SCDSP's use of DSS-WISE™ Lite for dam breach inundation modeling.

The main purpose of the SLRA is to rank all high hazard potential dams in the state inventory based on overall risk. A Total Risk Factor (TRF) for a dam is determined by combining all the risk factors and risk reduction factors and then calculating TRF in accordance with the equation shown in **FIGURE 7**, below. The terms, a, b, and c are weighting factors with set values that ensure each term contributes one-third of the TRF score and that the maximum TRF does not exceed 500, an arbitrary value set by SCDSP.

FIGURE 7: **Total Risk Factor Equation**

$$\text{Total Risk Factor (TRF)} = (\text{Hazard Risk Factor})^{a} \times (\text{Resistance Risk Reduction Factor})^{b} \times (\text{Consequences Risk Factor})^{c}$$

There are three main categories of hazards that can threaten a dam's integrity – a flood event, a seismic event, and static instability. As flooding hazards from tropical cyclones (i.e., hurricanes, tropical storms, tropical depressions) often occur on an annual or higher frequency basis in South Carolina, a Total Risk Factor-Flooding (TRF-F) is calculated by using a "Flood Risk Factor" as the "Hazard Risk Factor" term in the equation above. The Flood Risk Factor is the ratio of actual spillway capacity to the regulatory-required Spillway Design Flood, which is stipulated in Table I of Regulation 72-9, and is a function of a dam's size and hazard potential classification. Should the TRF-F indicate a dam that is at significantly greater risk than all other dams, then mitigation actions or funding decisions that address the flooding hazard are likely justified. Similarly, the Total Risk Factor-Seismic (TRF-S) will be used to identify a dam that poses a higher relative risk than other dams by using "Earthquake Severity Index" in the "Hazard Risk Factor" term in the above equation. This will allow prioritization of mitigation actions or funding decisions that address the seismic hazard for that dam. The static instability hazard concerns dam failure modes that arise not from a powerful external loading (e.g., flood event or earthquake) but from internal weakness in the dam that can be the result of design or construction flaws, slowly developing failure modes that arise due to a normal loading on the dam (e.g., internal erosion/piping), or even human error with respect to dam operations and reservoir level management (e.g., rapid drawdown of water level results in a slope failure).

The SCDSP maintains the TRF database and will keep a ranking of HHPDs by the various TRFs. This data will not be made publicly available for security reasons. The SCDSP will provide relative risk rankings upon request to mitigation planners, local planning and floodplain management officials, emergency management professionals, and other appropriate requestors that serve the public interest.

As of this update, 516 state-regulated High Hazard Potential Dams (HHPD) have been assigned Total Risk Factor (TRF) scores out of 614 state-regulated HHPDs in South Carolina, which means 98 state-regulated dams have not been through the SLRA risk-estimation process. SCDSP has CDM Smith under contract through June 2027 and is utilizing its FEMA National Dam Safety Program State Assistance grant funds to support development and refinement of the SLRA process and to complete SLRA on all 614 HHPDs in the State's inventory. The SCDSP will continue to utilize Federal and/or State dollars to refine the SLRA methodology and to ensure the Total Risk Factor ratings provide an accurate representation of the relative risks posed by the State's HHPDs. SCDSP will also continue to periodically reassess low and significant hazard potential regulated dams as well as unregulated dams in the state to determine if they meet HHPD criteria and require SLRA analysis. See **APPENDIX B** for a listing of the 614 state-regulated HHPDs as of May 26, 2023.

In addition to changes to the overall HHPD inventory, SLRA source data will be regularly updated to reflect new findings. It is expected that each routine state inspection or completed repair project should provide updated and more accurate risk factor component information that contribute to the Total Risk Factor (TRF). This will result in frequent adjustments to the overall risk rankings and, possibly, to statewide mitigation strategy.

The SLRA process has significant limitations and deficiencies that must be clearly understood. For instance, the Total Risk Factors (TRFs) that result from the SLRA process rely heavily on visual assessments and qualitative considerations (e.g., routine biennial SCDSP inspections), not rigorous engineering analysis. This is why the process is called a *Screening Level* Risk Analysis and not a Semi-Quantitative Risk Analysis (SQRA) or Quantitative Risk Analysis (QRA), which involve increasing levels of engineering analysis, respectively. Some factors are extracted/derived from GIS products (such as topographic information from LIDAR) or are based on limited information (such as locations of liquefiable soils throughout South Carolina). The TRF scores and rankings are meant to have only relative significance (i.e., only to be compared to each other); the TRF values should not be considered to have any absolute significance (i.e., cannot compare TRF-F to TRF-S or compare with any other risk assessment methodology). The magnitudes and ranges of values for the factors considered in the SLRA methodology were developed by CDM Smith and SCDSP using engineering judgment to adjust how much each listed factor contributes to the TRF. These ranges and magnitudes are subject to adjustments and refinement as the SCDSP builds experience applying the SLRA process. Additionally, as more information on the hazards, conditions of HHPDs, and consequences of failure becomes available, new factors may be added and contribute toward the TRFs.

Section III: Mitigation Goals

The state's goals for mitigation of the risks posed by HHPDs are as follows:

1. Continually educating dam owners and operators on all aspects of dam safety, to make them more informed and aware of the risks posed by their dams and better prepared to respond in the event of a dam emergency.
2. Informing the public of the existence, location, hazards and potential consequences of HHPDs.
3. Removal of the highest-risk HHPDs.

4. When dam removal is not possible, the State's goals for mitigation will be to identify and fund the most cost-effective mitigation activities on the dams that rank highest in SCDSP's SLRA ranking.
5. All HHPDs have current Emergency Action Plans with accurate inundation mapping.

Section IV: Mitigation Actions

Noteworthy mitigation actions taken to-date include:

- Funding the construction of a new spillway at Langley Pond Dam (NID # SC00287) with an approximately $8 million grant from FEMA's Hazard Mitigation Grant Program and with approximately $2.7 million in matching funds from Aiken County, the dam's owner. Aiken County also rehabilitated the dam's embankment section for approximately $4.3 million.
    - How reduces risk? This action rehabilitated and upgraded the performance of this High Hazard Potential Dam which was in an official "Unsatisfactory" condition in 2014 and presented a very real failure risk prior to this project.
    - How contributes to goals? This mitigation action pre-dates SCDHEC's creation of the SLRA risk ranking methodology. Nevertheless, Langley Pond Dam posed a high risk in its previous condition and the mitigation action likely prevented loss of human life and costly damage to infrastructure, utilities, and economic disruption. Within Langley Pond Dam's breach inundation area are approximately 51 structures (residential and others), SC Highway 421, 6 state secondary roads, a main railway (Norfolk Southern), a County Park, along with other potential impacts.
    - How links to state mitigation strategy? The funding and execution of this project achieves multiple mitigation goals established in the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as this project was designed to reduce the impacts of the hazard represented by the dangerously unsafe Langley Pond Dam, and in completing the project the hazard was greatly reduced. Goal #5 of the SHMP is met as the design, permitting, and execution of this project was a multi-jurisdictional collaboration between SCEMD as the administrator of the HMGP, SCDHEC as the regulatory agency for dam safety, USACE as the regulatory agency for impacts to Waters of the US, and Aiken County as both the dam's owner and the local authority for administering the County's floodplain management ordinance and FEMA's flood insurance program. Goal #8 of the SHMP is met as this project leveraged Federal and County funds to accomplish the dam rehabilitation and benefitted the entire downstream inundation area, which represents a variety of stakeholders in the form of residents, highly-traveled public roadways, a County park, and a main railway.

- Removal of Mandel Park Pond Dam (NID # SC00105) by the SCDHEC through its construction contractor.
    - How reduces risk? This action removed a High Hazard Potential Dam that was severely damaged during the historic 2015 floods in South Carolina, completely eliminating the risk posed by this deficient dam.
    - How contributes to goals? Removal of High Hazard Potential Dams is a mitigation goal.

- How links to state mitigation strategy? The funding and execution of this project achieves multiple mitigation goals established in the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as the removal of the dam eliminated the threat the dam posed to downstream life and property and significantly reduced the potential flood impact downstream. The dam's removal involved coordination between multiple agencies and stakeholders, with SCDHEC (with contractor support) serving as the regulatory agency for dam safety and coordinator for the design, permitting, and execution of the project. The USACE was involved in the project as the regulatory agency for impacts to Waters of the US and authorizer of construction under the Nationwide Permit, while Richland County was involved in obtaining required stormwater permits coordinating with FEMA to revise local flood maps.

- Removal of Wesley North Dam (NID # SC83513) by the SCDHEC through its construction contractor.
    - How reduces risk? This action removed a High Hazard Potential Dam that was essentially abandoned by its owner and had no functioning spillway and was constantly overtopping. The dam's owner told DHEC that they had no means to resolve the dam's deficiencies or remove the dam.
    - How contributes to goals? Removal of High Hazard Potential Dams is a mitigation goal.
    - How links to state mitigation strategy? The funding and execution of this project achieves multiple mitigation goals established in the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as the removal of the dam eliminated the threat the dam posed to downstream life and property and significantly reduced the potential flood impact downstream. The dam's removal involved coordination between multiple agencies and stakeholders, with SCDHEC (with contractor support) serving as the regulatory agency for dam safety and coordinator for the design, permitting, and execution of the project. The USACE was involved in the project as the regulatory agency for impacts to Waters of the US and authorizer of construction under the Nationwide Permit, while Richland County was involved in obtaining required stormwater permits coordinating with FEMA to revise local flood maps.

- Removal of Upper North Lake Dam (NID #SC02612) by the SCDHEC through its construction contractor.
    - How reduces risk? This action removed a dam that, in combination with failure of the dam directly downstream, would have posed a potential risk for loss of life for impacts to an apartment complex and a well-traveled state secondary road. SCDHEC's attempts to force the dam's owners to either resolve the dam's deficiencies or remove the dam resulted in prolonged litigation and ultimately a Consent Order whereby DHEC was given consent to remove the dam.
    - How contributes to goals? Removal of High Hazard Potential Dams is a mitigation goal.

- How links to state mitigation strategy? The funding and execution of this project achieves multiple mitigation goals established in the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as the removal of the dam eliminated the threat the dam posed to downstream life and property and significantly reduced the potential flood impact downstream. The dam's removal involved coordination between multiple agencies and stakeholders, with SCDHEC (with contractor support) serving as the regulatory agency for dam safety and coordinator for the design, permitting, and execution of the project. The USACE was involved in the project as the regulatory agency for impacts to Waters of the US and authorizer of construction under the Nationwide Permit, while Richland County was involved in obtaining required stormwater permits coordinating with FEMA to revise local flood maps.

- Updating the program's EAP template to more closely align the SCDSP template with that provided in FEMA 64 "*Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners'* and in accordance with the principles contained therein.
    - How reduces risk? A robust EAP that includes all or most of the content and recommendations found in FEMA 64 will greatly reduce the consequences of a dam failure, as a significant portion of the downstream population should receive warning and be able to evacuate or shelter in place. While this assumes the information specific to the dam and the downstream area is accurate, and timely identification of the emergency situation and implementation of the EAP by the dam owner, any reduction in consequences from dam failure reduces the risk posed by the dam.
    - How contributes to goals? All High Hazard Potential Dams having current Emergency Action Plans is a mitigation goal. The improvement of the SCDHEC EAP template by more closely aligning it with FEMA 64 improves all EAPs for HHPDs in the state.
    - How links to state mitigation strategy? The creation of a new EAP template more closely aligned with FEMA 64 achieves several mitigation goals established in the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as the new EAP template represents a state policy designed to reduce the impacts on the hazard of dam failure on people and property. Goal #5 of the SHMP is met as the new template was developed in collaboration with SCEMD and improves the overall state of planning for dam failures, as the EAPs are distributed to State and County EM agencies. Goal #8 of the SHMP is met as the new EAP template is a mitigation action that benefits virtually the entire state and all its residents.

- Establishing a free SCDSP service to assist dam owners in assembling a basic EAP following FEMA 64 principles. This service includes the dam breach inundation modeling and identification of potentially inundated properties as well as partial prefilling of the SCDSP's EAP template.
    - How reduces risk? Having a robust Emergency Action Plan in place that describes and shows the potential impacts of a dam failure and contains all the information needed to effectively notify the population at risk is one way of reducing the consequences of dam failure. Reducing the consequences of dam failure reduces

the overall risk.

- How contributes to goals? All High Hazard Potential Dams having current Emergency Action Plans is a mitigation goal. This service makes it easier than ever before for an owner/operator of a HHPD to obtain an EAP that meets state regulatory requirements.
- This service addresses Goal #1 of the SHMP as by assisting dam owners in their development of baseline EAPs that incorporate generally accepted EAP design principles and reliable dam failure inundation maps, those owners as well as local and state emergency services are better prepared to detect and respond to potential and imminent dam failures and ensure those at-risk downstream are properly notified. As a novel outreach effort, this service also addresses Goal #3 of the SHMP and informs dam owners of the hazard their dam poses and the role of the EAP in mitigating potential negative consequences downstream. Goal #8 of the SHMP is met as the new EAP template itself in addition to the dam breach inundation modeling of all state-regulated dams is a mitigation action that benefits virtually the entire state and all its residents.

- Beginning development on a web-based Emergency Action Plan creation and storage application to make it easier for dam owners to create an EAP and update it as needed and that will simplify and automate distribution of EAPs to state and local emergency management officials. Completion of this project is expected in 2024.
    - How reduces risk? Having a robust Emergency Action Plan in place that describes and shows the potential impacts of a dam failure and contains all the information needed to effectively notify the population at risk is one way of reducing the consequences of dam failure. Reducing the consequences of dam failure reduces the overall risk.
    - How contributes to goals? All High Hazard Potential Dams having current Emergency Action Plans is a mitigation goal. The web-based EAP application will continue the free service for EAP creation offered by SCDSP and ease the burden of SCDSP staff from things like document creation and formatting to allow a new focus on EAP content, improved planning and tabletop exercises.
    - How links to state mitigation strategy? This action is still in progress, and while significant progress has been made, the application itself is still at least 12 months away from its go-live to the public. Once the application is complete and available as a free resource for dam owners, it will meet Goal #1 of the SHMP as this project should increase not only the number of HHPDs with EAPs, but also the frequency at which dam owners update their EAPs, as the application is designed to make creation and updating EAPs easier than ever before.

- Utilizing DSS-WISE™ Lite to produce dam breach modeling and mapping for nearly every regulated dam in South Carolina and placing the inundation areas on the Dam Safety Program's GIS-based web application for use by State and local government officials and the general public (see https://gis.dhec.sc.gov/scdams).
    - How reduces risk? Having a robust Emergency Action Plan in place that describes

and shows the potential impacts of a dam failure and contains all the information needed to effectively notify the population at risk is one way of reducing the consequences of dam failure. Reducing the consequences of dam failure reduces the overall risk.

- How contributes to goals? All High Hazard Potential Dams having current Emergency Action Plans is a mitigation goal. Without the use of DSS-WISE Lite the SCDSP could not have provided the EAP creation service mentioned above at no cost to dam owners. DSS-WISE Lite allows for dam breach inundation modeling to be conducted at very little cost to the state and have results available the same day. SCDSP does not pass the cost along to dam owners and operators. Comparable modeling if performed by a consulting engineer would cost in the thousands of dollars per dam. Additionally, by making this information public, the state is closer to achieving its goal of Informing the public of the existence, location, hazards and potential consequences of HHPDs.
- How links to state mitigation strategy? This action has contributed to achieving multiple goals of the 2023 State Hazard Mitigation Plan. Goal #1 of the SHMP is met as information on the hazards posed by HHPDs is publicly available on the internet for any and all parties and stakeholders, and knowledge of the geographical impacts of dam failures can result in massive reductions, and even elimination in some cases, of the hazards posed by HHPDs on people and property. Goal #3 of the SHMP is met as the public availability of this information can be a valuable training and education tool to inform the public of the exact locations of HHPDs and the potential impacts of their failures. Goal #4 is met as the data this action provides is critical in planning, policy making, and prioritization of mitigation projects. Goal #5 of the SHMP is met as this information is meant to be shared with other agencies, and can be quickly and easily accessed by hazard mitigation planners and emergency management professionals at all levels to inform decision making and plan development.

- Developing a methodology for risk assessments and ranking of High Hazard Potential dams; completing the Screening Level Risk Analysis of 519 HHPDs as of May 26, 2023, and working to complete SLRA on all 614 HHPDs.
    - How reduces risk? The SLRA methodology allows for an understanding, albeit with limitations as described in Section II, of the risks posed by the state's HHPDs. We cannot attempt to reduce risk without first attempting to understand it and which dams pose greater risk than others.
    - How contributes to goals? The SLRA methodology, and its implementation, makes the 3rd and 4th listed goals possible. It is instrumental to developing a full picture of the spectrum of risk posed by the state's 614 HHPDs, without which, knowing how each dam's risk compares with all the others in a relative sense would be impossible.
    - SLRA methodology overall is designed to improve the program's capacity to assess relative dm risk and formulate strategies to reduce the risk posed by high-scoring dams. This policy serves SHMP Goal #1 while also involving data collection aspects associated with Goal #4.

- Conducting a 1-day Association of State Dam Safety Officials (ASDSO) workshop for dam owners led by licensed Professional Engineers. The workshop was recorded and is available via the SCDSP website.
    - How reduces risk? Any education that increases dam owners' knowledge in any aspect of dam design, construction, maintenance, repair, operation, or emergency preparedness and response will have some effect on reducing risk. This workshop provides a wealth of information for dam owners and operators on all aspects of dam ownership and operations.
    - How contributes to goals? This workshop, and the video recording that is available via the SCDSP website, is providing dam owners and operators valuable information to make them more informed and aware of the risks posed by their dams and better prepared to respond in the event of a dam emergency.
    - This workshop and associated training video addresses aspects of dam hazard classification and the associated downstream risks dams pose as well as best practices for maintaining and operating their dam in a manner that reduces failure risk , serving SHMP Goal #3.

- Developing a four-part webinar series for dam owners. The webinar series covers topics ranging from understanding basic dam design, functioning and terminology; creating and implementing an Emergency Action Plan; risk and crisis communication strategies; best practices in dam maintenance and operation; working with an engineer; insurance for liability; funding options and mechanisms for dam repairs; and much more. The webinar series is available via the SCDSP website.
    - How reduces risk? Any education that increases dam owners' knowledge in any aspect of dam design, construction, maintenance, repair, operation, or emergency preparedness and response will have some effect on reducing risk. These webinars provide a wealth of information for dam owners and operators on all aspects of dam ownership and operations. Furthermore, these webinars provided additional content that was specifically targeted to a sub-set of dam owners that face a unique set of challenges – Homeowners Associations – and provided knowledge and advice to help them overcome these challenges.
    - How contributes to goals? This webinar series, and the video recording that is available via the SCDSP website, is providing dam owners and operators valuable information to make them more informed and aware of the risks posed by their dams and better prepared to respond in the event of a dam emergency.
    - These training videos cover, among other things, hazard assessment and risk reduction strategies as well as the importance of having a robust EAP and serve Goal #3 of the SHMP.

- Applying for and receiving the inaugural HHPD rehabilitation grant, which is to be used for performing a Semi-Quantitative Risk Analysis on 10 publicly-owned HHPDs in South Carolina, with the goal of positioning those dams for HHPD rehabilitation projects in future years.
    - How reduces risk? The point of performing the Semi-Quantitative Risk Analysis on

the 10 publicly-owned HHPDs is to better understand the risks these dams pose. Once the risk is better understood, and the biggest contributors to that risk identified, specific rehabilitation projects that achieve the greatest risk reduction for the dollar can be designed and implemented.

- How contributes to goals? This action aligns directly with the goal of identifying and funding the most cost-effective mitigation activities. The 10 publicly-owned dams may not be among the highest risk HHPDs overall, but they do represent a set of dams that were deemed eligible for the FY19 High Hazard Potential Dams Rehabilitation Grant and are most likely to receive a HHPD grant in the future because, unlike a privately-owned dam, publicly-owned dams do not have to find an eligible Project Sponsor. The owners of these 10 dams are municipal, county and state governments, and can apply for HHPD grant funds directly.
- This SQRA process is a comprehensive approach to assess downstream risk and prioritize specific rehabilitation projects and mitigation activities that lead to overall risk reduction, furthering Goal #1. SQRA relies on collecting and updating risk-linked data for the selected dams. It also allows for the identification of potential mitigation projects and strategies for these 10 dams and prioritization of the relative risk each poses, serving Goal #4.

- Applying for the Federal Fiscal Year (FFY) 2020 HHPD Rehabilitation Grant and executing a sub-award with Oconee County to fund a rehabilitation study on the Chattooga Lake Dam (NID # SC00519).
    - How reduces risk? Chattooga Lake Dam is a HHPD that was given an overall rating of "Poor" at its last SCDHEC inspection. The grant dollars will be used to better assess the condition of the dam and to develop a permit application to for repairs and/or alterations to the dam to improve its safety.
    - How contributes to goals? The project allows the risk is better understood, and the biggest contributors to that risk identified, specific rehabilitation projects that achieve the greatest risk reduction for the dollar can be designed and implemented.
    - This grant-funded rehabilitation study will lay the groundwork for a future permit application and subsequent repairs that will reduce the risk of failure, furthering Goal #1 of the SHMP. In addition, the act of collecting assessment data supports Goal #4.

- Acquiring membership in and participating with the South Carolina Aquatic Connectivity Team, a workgroup of public and private non-profit organizations with a shared goal of removing dams in South Carolina. The ACT represents a group of potential eligible applicants that can sponsor dam removal projects funded by the HHPD grant program. SCDSP frequently relies on the SC ACT as a resource to assist dam owners interested in dam removals.
    - How reduces risk? The SCACT is an association of multiple players from many sectors that when working toward the common goal of removing antiquated, neglected, and unsafe dams to provide multiple benefits to the public, in the form of eliminating dam failure risk, eliminating non-failure safety risk, and providing ecological benefits. The members of the SCACT include: US EPA, NOAA, USACE, US

FWS, SCDNR, SCDHEC, American Rivers, Trout Unlimited, The Nature Conservancy, Naturaland Trust, and others. This partnership of public/private, state/federal players can pool resources and find solutions to effect dam removals much more quickly and efficiently than. The SCACT also represents a very eager and willing pool of Project Sponsors for federally-funded dam removal projects where the subject dam is privately-owned. This group has proven very useful in matching Project Sponsors with private dam owners for dam removal projects in South Carolina. Additionally, the SCACT provides resources and trainings to get dam removal projects off the ground and executed smoothly and cost-effectively. The SC Dam Removal Handbook (mentioned below) is one such example of a resource that was made possible through this partnership.

- How contributes to goals? Obviously strongly associated with Goal #3 and also provides education and knowledge for dam owners and operators in association with Goal #1.
- Interagency coordination with SCACT meets Goal #5 of the SHMP, while the overall dam removal efforts promoted by SCACT and supported by SCDHEC serve Goal #1, as dam removal is a significant risk-reduction measure. With SCACT coordination and support, this message can be disseminated to dam owners in accordance with Goal #3.

- Developing a Dam Removal Handbook for South Carolina in collaboration with the SC Aquatic Connectivity Team and American Rivers. This handbook is available at: https://www.americanrivers.org/wp-content/uploads/2022/01/SC-Dam-Removal-Handbook_FNL.pdf
    - How reduces risk? The dam removal handbook helps dam owners navigate the complex legal, regulatory and technical challenges associated with dam removal. As dam removals represent the greatest possible risk of any dam project, any guidance, advice, or resource that makes dam removal easier reduces risk in some way.
    - How contributes to goals? Obviously strongly associated with Goal #3 and also provides education and knowledge for dam owners and operators in association with Goal #1.
    - This guide addresses Goal #3 of the SHMP as an outreach tool to assist owners in pursuing dam removals and subsequently significantly reducing downstream flood risk and threats to life and property, also serving Goal #1. In addition, this handbook is the result of interagency coordination and planning, in accordance with Goal #5.

- Requesting and receiving an increase to the state's annual appropriation for SCDSP starting in State Fiscal Year 2022, which allowed all SCDSP staff positions to be placed on state funding and allowing the FEMA National Dam Safety Program State Assistance Grant to be freed up for more creative uses, such as for paying for trainings for dam owners and consulting engineers, and for the development of the EAP web app mentioned above.
    - How reduces risk? By placing all of the SCDSP staff on state funding, this allows the SCDSP to utilize its FEMA State Assistance Grant for discretionary and creative endeavors, such as developing the SLRA and undertaking SQRA on 10 publicly-

owned dams. The SCDSP is continuing to rely on its engineering consultant, CDM Smith, to assist in its risk assessment efforts and the funding to do so will come from the FEMA State Assistance Grant. The Grant also funds the vast majority of training and travel for SCDSP staff, trainings for dam owners and for consulting engineers, equipment purchases, pilot studies of new technologies, and other projects the SCDSP believes will advance its overall effectiveness in reducing risk posed by unsafe dams in South Carolina.

- How contributes to goals? The FEMA State Assistance Grant is used in a manner that contributes in some way to all 5 of the above-listed goals.
- How links to state mitigation strategy? This increased appropriation and spending flexibility serves SHMP Goal #2 as SCDSP is better positioned to obtain equipment, training, and other resources that meet evolving program needs in both day-to day operations as well as emergency responses. Goal #3 of the SHMP is met as well as portions of the FEMA State Assistance Grant can now be directed to expanded staff training efforts as well as public trainings, seminars, and webinars on the hazards dams pose and strategies to mitigate the impact of potential dam failure.

Section V: Funding Sources

Funding sources currently available for mitigation activities on HHPDs include:

- State tax credit for 25% of total costs, up to $2,500 maximum, for repairs on dams that serve a qualifying purpose. Tax credit can be carried over for up to 5 sequential tax years. See SC Code of Laws § 12-6-3370.
- High Hazard Potential Dams Rehabilitation Grant Program. Authorized by the Water Infrastructure Improvements for the Nation Act in 2016, first grant awards were in FFY2019. Starting in FFY2020, allows for sub-awards to be made to project sponsors to fund eligible pre-construction and construction activities on eligible dams. This program is administered at the state level by SCDHEC.
- Building Resilient Infrastructure and Communities (BRIC) Grant Program. This program is administered at the state level by SCEMD.
- Hazard Mitigation Grant Program. This program is administered at the state level by SCEMD.
- US Army Corps of Engineer's Corps Water Infrastructure Financing Program (CWIFP), a low-interest loan program that can fund dam repairs.
- National Fish Passage Program Bipartisan Infrastructure Law, administered by the US Fish and Wildlife Service and which prioritizes dam removals.

Section VI: Local Mitigation Practices

The HHPD Rehabilitation Grant began in Fiscal Year 2019 with the Notice of Funding Opportunity (NOFO) requirement that Local Hazard Mitigation Plans address "all-dam risk" for grant-eligible HHPDs. Subsequent NOFOs have modified the requirement for Local Hazard Mitigation Plans, expanding the scope from grant-eligible HHPDs to all HHPDs in the planning area. The *Local Mitigation Planning Policy Guide* published on April 19, 2022 and effective one year later, has now made permanent this requirement for all jurisdictions that seek HHPD eligibility. At the time of this writing, only one local

mitigation plan in South Carolina has addressed the requirements of the *Guide*. This being the case, it is difficult to comment on the effectiveness of local mitigation policies, programs, and capabilities pertaining to HHPDs. Assessments will be made in future revisions to this Annex as more local plans with HHPD elements are approved by FEMA and adopted by local planning jurisdictions. Should any local plans that seek to address HHPD requirements be received by SCEMD, they will review the plan for alignment with federal requirements and provide it to SCDSP for technical analysis of the HHPD elements. Upon request, both agencies will assist local jurisdictions on topics pertaining to HHPDs.

There are a small number of local jurisdictions that have implemented policies/programs or developed capabilities that have an impact on mitigating risks posed by HHPDs. Examples of these mitigation activities include:

1. Anderson-Oconee Joint Regional Hazard Mitigation Plan. This plan, approved by FEMA on May 26, 2023, includes Mitigation Actions that the two counties have committed to implement in 2026 to help to reduce risks posed by HHPDs. The mitigation actions from this plan are:
    a. Prioritize dam removals for mitigation funding, and if a private dam owner wishes to remove a dam, serve as a project sponsor under the HHPD Grant Program to make more dam removal projects eligible under the grant.
    b. Map dam breach inundation areas in addition to 100-year flood elevations to help identify potentially at-risk structures using SCDHEC data on dam breach inundation areas, population at risk (PAR) estimates, and other data about breach consequences to enhance the understanding of flood risks posed by dam failure.
    c. Work with local jurisdictions, SCDHEC, and dam owners to develop Emergency Action Plans for all Class 1 and Class 2 dams that have an impact on the residents of Anderson and Oconee Counties.
    d. Conduct more Emergency Action Plan (EAP) exercises including SCDHEC, SCEMD, and Anderson and Oconee Counties.
    e. Provide Operations and Maintenance training for private dam owners to mitigate against risks associated with potential dam failure and flooding as recommended in FEMA's Mitigation Dam Task Force Strategic White Paper on Dam Risk (November 2015).

    The SCDSP is hopeful that the Anderson-Oconee Joint Hazard Mitigation Plan will serve as a template for other planning jurisdictions in the updating of their local HMPs.
2. Oconee County sponsorship of a FY20 HHPD Rehabilitation Grant for Chattooga Lake Dam (NID # SC00519). The dam owner, a private Homeowners Association, was not eligible to apply directly for the grant even though the dam was an eligible dam. Oconee County applied for the grant and was successful in obtaining $42,000 to fund an engineering study and develop a permit application to bring the dam into compliance with the SC Dams and Reservoirs Safety Act Regulations.
3. Richland County sponsorship of a FY22 HHPD Rehabilitation Grant for Springwood Lake Dam (NID # SC00090). Again, a private Homeowners Association owns the dam, and Richland County was willing to serve as the Project Sponsor and apply for the grant on the HOA's behalf.
4. Greenwood County held an EAP creation workshop on October 23, 2018, to help dam owners create effective EAPs.

With respect to effectiveness of the local mitigation policies, programs and capabilities listed above and their applicability to high hazard potential dams, the following have a direct impact on mitigating potential consequences associated with dam incidents:

- The ability of local governments to enact land use regulations in areas downstream of dams,
- The ability of local governments to participate in mitigation grant programs that fund programs such as acquisitions,
- The ability of local governments to develop and implement emergency management plans (such as Emergency Operations Plans that address dam failure, and the Emergency Action Plans that are specific to the dams themselves) that specifically address high hazard potential dams.

Some of the challenges to implementing local mitigation policies, programs and capabilities to reduce vulnerabilities to and from high hazard potential dams are that not all local governments have the capacity to implement the tools mentioned above. This specific challenge can be overcome by providing more direct technical assistance to these local governments to help them implement such tools and to help the local government develop mitigation actions to reduce risks to and from high hazard potential dams through local capabilities.

SCDSP has given a new capability to local governments through its "Dams and Inundations" web application, mentioned repeatedly throughout this document. This web application is an enormously powerful tool that local mitigation planners and emergency responders can use to evaluate exactly where flooding impacts from dam failures are likely to occur, as well as the depth of flooding and the arrival time of maximum flooding. This will assist and inform these governments in dam-related planning, preparedness and response. SCDSP has an instructional video on use of this web application at the following URL: https://www.youtube.com/watch?v=dlA_pw_abig

SCDSP has also been educating dam owners on the capabilities of local emergency management offices with respect to their assistance during times of emergency and when Emergency Action Plans need to be implemented and downstream at-risk persons need to be notified of a potentially life-threatening situation. Collaboration between dam owners and County Emergency Managers has been stressed repeatedly (via newsletter, website, a workshop, and a series of webinars) as essential in developing an effective Emergency Action Plan. Many county emergency managers have embraced this role and have provided critical assistance and information to dam owners regarding the County's preferences for being contacted, capabilities for notifications and alerts, and other available services.

A major challenge for mitigation of risks posed by HHPDs is that mitigation of one hazard must sometimes compete with other community hazards for funds and attention. Local elected officials must balance many competing interests when allocating limited resources. Highly visible problems, such as roads, schools, housing, and health services, often grab the immediate attention of constituents. However, many local governing boards throughout South Carolina have come to realize that money invested in hazard mitigation activities can save millions of dollars in property damage by reducing losses from inevitable natural hazards. Keeping businesses open, residents in their homes, and basic services operating following an emergency demonstrates resilience in economic security and social

stability for local communities. Residents in many South Carolina localities have seen the devastation caused by dam failures, especially widespread dam failures that can occur from hurricanes and hurricane-related flooding, firsthand. Because of these experiences, many South Carolinians have learned that mitigation efforts can help prevent some degree of future devastation and build resilience.

Local capabilities to conduct hazard mitigation activities varies across South Carolina jurisdictions. Differences in resources, staffing levels, and access to expertise between local governments with smaller populations or in rural parts of the state and their larger, more urban counterparts are evident in disparities in status of mitigation plans and the number and complexity of grant project applications and successful awards. Disparity among South Carolina counties, primarily based on resources and local government capacity, affects the comprehensiveness, participation, and timeliness of planning activities. Less well-resourced and less well-staffed counties tend to experience challenges in updating local hazard mitigation plans before expiration dates. Ten councils of government (COG) established by the state support local governments in developing and maintaining comprehensive plans and in development planning. A statewide repository of local government land use and zoning ordinances and plans does not exist but would be valuable to support vulnerability research, mitigation and disaster resilience planning, and mitigation project scoping activities. Another challenge in preparing and maintaining relevant local plans lies in the uncertainty created by climate change. While international and national research and projections are improving, localized data may not be available or accessible for all areas. Planning based on historic hazard occurrence data is likely insufficient to analyze future risk from hazards that can significantly affect dams, including drought, flood, severe thunderstorms, tornadoes, tropical cyclones, and wind.

Regardless of the local government's capabilities and resources, state and federal aid is a critical part of many local governments' revenue stream, especially at the county level. Grants and other aid programs help local governments meet specific needs, including disaster recovery and hazard mitigation. Usually, conditions are attached to grants; South Carolina requires that all local governments with identified flood hazards participate in the National Flood Insurance Program (NFIP) in order to receive mitigation grant funds for flood related projects.

Many government grant programs, in the FEMA suite of mitigation programs, require a nonfederal match in order to receive the funds. Local, state or any non-federal funds can be used to meet the match. Community Development Block Grant (CDBG) funds can also be applied as a match (CDBG funds, although they are issued by the U.S. Department of Commerce, lose their federal status when allocated to the state level).

Section VII: Prioritization of Funding

Funding for HHPDs is available under several state and federal programs as listed in Section V. Prioritization for funding for any HMA grants is outlined in the SCSHMP. Prioritization and selection of HHPD project funding is determined by SCDSP through its State Administrative Plan for the HHPD Rehabilitation Grant, which gives top priority to dam removal projects. Should the applications received for sub-awards under the state's HHPD grant program exceed available funding in a given fiscal year, the

state uses its Screening Level Risk Analysis described in Section II to inform the selection of rehabilitation projects for funding. Additionally, the SCDSP has made projects that propose rehabilitation of breached dams ineligible for the HHPD grant as these dams are already in a very low risk condition and restoring the dam's ability to impound water (even if the rehabilitated dam far exceeds regulatory standards) could actually increase risk.

Accurately knowing the full risk posed by every HHPD in the state will likely never be achieved, as the effort involved would be prohibitively expensive. Not to mention that such an understanding, even if achievable, would quickly lose relevance, as the conditions contributing to each dam's risk are dynamic, sometimes highly so. Therefore, a limitation is that funding decisions will have to rely on an imperfect understanding of the risks posed by each HHPD, and that the limitations and deficiencies of the SLRA process described in Section II are limitations and deficiencies here as well. The state's approach to addressing these limitations and deficiencies will be to make the funding decision-making process as fluid and adaptable as possible, where mis-prioritizations can be minimized through open channels of communication between planners, risk assessors, and funders, and when mis-prioritizations happen, attempt to correct course through collaboration with stakeholders and partners in the risk mitigation community.

Section VIII: Limitations

There are multiple, significant limitations to the risk assessment and consequence estimates portrayed in this plan, which the reader must be aware of. The SCDSP and SCEMD were unable to perform an analysis of social, environmental, and economic impacts from HHPDs as this is information that has never been compiled and tracked before the *State Mitigation Planning Policy Guide* (FP 302-094-2, FEMA, 2022) made it a requirement and the aforementioned agencies do not have the staff expertise or funding to do so at this time. The SCDSP also does not have extensive information on non-breach risk for HHPDs and thus cannot provide an analysis of this risk category at this time. The SCDSP has a plan to utilize its FEMA National Dam Safety Program State Assistance grant in Federal Fiscal Year 2023 to acquire contractual support to fill data gaps and perform the associated all-dam risk analysis for each HHPD in the state. The information gained from this statewide effort will feed into every local plan as well as the State's HHPD Dams Annex that is to be updated in approximately the next 12 months.

There are also significant limitations to the data presented herein. First, in performing the Screening Level Risk Assessment, the SCDSP focused on the Hydrologic (Overtopping) and Seismic Hazards. Secondary hazards that could reduce a dam's resistance to these primary factors, such as drought, wildfire, human misoperation, and vandalism, were not analyzed. Incorporation of these factors would exceed the scope (and objective) of the Screening Level Risk Analysis, which is performed on the state's complete inventory of HHPDs, and would be more appropriate for a Semi-Quantitative or Quantitative Risk Analysis performed on a single dam (i.e., a significantly more expensive and time-consuming undertaking). Third, as mentioned previously, the scenario used by the SCDSP for dam breach modeling was a sunny-day, maximum pool dam failure and the modeling was performed using the DSS-WISE™ Lite software. The use of this single scenario and modeling software offers both benefits and limitations, as can be found discussed in Appendix A. The limitations include: 1) DSS-WISE Lite, which was developed to be easy-to-use and return results quickly, places severe constraints on the model developer (e.g., terrain model cannot be edited, pressurized flow in pipes and culverts cannot be modeled, conveyances less

than 10-feet in diameter cannot be “seen” by the model, etc.), and 2) no rainy-day scenarios were analyzed, and thus consequence estimates do not reflect dam breaches with downstream areas already in a state of flooding.

There is currently no plan to address the limitations described above for the Screening Level Risk Assessment and use of DSS-WISE Lite; there may be no justification to do so anyway. The Screening level Risk Assessment and DSS-WISE Lite are not meant to be precise tools and should not be utilized for engineering or design purposes. They are, however, suitable for planning and emergency preparedness purposes. The point in discussing the limitations here is so that the reader is better informed about the information that is being used for planning decisions and understands that if more precise and accurate information is required for a given dam, then a Semi-Quantitative or Quantitative Risk Analysis and/or use of advanced hydraulic modeling software is needed.

Federally-owned or -regulated HHPDs are also a risk to the planning area, but these are already discussed outside of this HHPD Annex, in the main State Hazard Mitigation Plan. The detailed summary of the HHPDs and potential impacts from upstream flooding and downstream dam breach inundation is presented herein for planning purposes and to assist in identification of the dams of greatest risk, with the ultimate goal to aid in risk-informed decision making that will result in effective protective actions.

The limitations and deficiencies of this plan and its constituent data are mostly a product of the recent implementation of the *State Mitigation Planning Policy Guide* (April 2022) and the SCDSP’s lack of data and expertise to provide all FEMA requires in Pages 33-37 of the *Guide*. The data and analysis presented herein is by far the most detailed analysis to date of the state-regulated HHPDs that are located in and/or could impact the planning area. Further analysis of this data will be ongoing as the SCDSP plans on utilizing specialist contractual support to look at the impacts examined herein as well the social, environmental, and economic impacts of the HHPDs examined herein.

APPENDIX A
SCDSP Methodology for Dam Breach Inundation Modeling

What is a Dam Breach Inundation Map?

A dam breach inundation map depicts an estimate of the flooding that can reasonably be expected to occur from the failure of an *individual* dam. The dam breach flood inundation extents and hazards are primarily caused by the stored water behind a dam and the magnitude of discharge when that water is suddenly released when a dam fails. The sudden release of stored water from a dam is depicted herein *separately* from flood hazards such as natural riverine flooding. In other words, this map is NOT intended to show the flooding downstream of a dam that would result from rainfall events. Because flooding frequently occurs without a dam breach please consult FEMA's Flood Map Service Center or the appropriate county website for maps depicting normal riverine flooding caused by rainfall events where a dam breach is *not* involved (e.g., map of the 100-year floodplain).

How does SCDHEC model dam breaches?

The practice of dam breach modeling and inundation mapping relies on scientific and physical principles, limited and imperfect data, assumptions, and approximations. Vast amounts of data and computer processing are needed to perform the highest-accuracy modeling currently achievable, which results in a cost- and time-prohibitive endeavor for SCDHEC to undertake for every dam. To protect the public, it is necessary to decrease overall accuracy for the sake of cost and efficiency to provide complete inundation mapping for the state. To ensure that this is accomplished with minimal sacrifice of public safety, a degree of reasonableness and conservatism in the dam breach scenario is introduced as a "safety factor." This scenario, wherein the maximum water volume that can be held by a dam is rapidly released in a catastrophic dam failure, is considered to represent an extreme, but probable, dam failure event. Additionally, SCDHEC staff utilize a sunny-day condition to achieve a clear understanding of a dam's hazard potential. This sunny-day, maximum pool, rapid release scenario represents an intermediate scenario between those specified by Regulation[1], and its use by SCDHEC is primarily as a preliminary screening tool. *The scenario just described should not be viewed as a worst-case scenario, but rather one that can be used to illustrate potential downstream impacts solely caused by the dam and the impounded water*. Computer software known as DSS-WISE™ Lite is used to simulate the breach of the dam and the resulting downstream flooding.

What is DSS-WISE™ Lite?

DSS-WISE™ stands for *Decision Support System for Water Infrastructure Security*. The DSS-WISE™ Lite program was created at, and is operated by, the University of Mississippi's National Center for

Computational Hydroscience and Engineering (NCCHE) with funding provided by the Department of Homeland Security (DHS). SCDHEC has access to DSS-WISE™ Lite thanks to this DHS funding and manages access to DSS-WISE™ Lite for dams located in South Carolina. The following NCCHE website provides additional detail on DSS-WISE™ Lite: https://dsswiseweb.ncche.olemiss.edu/. More-advanced, feature-rich, and customizable
software exists.

What is a Dam Breach Scenario?

Dams can fail in many different ways (i.e., failure modes) and under a wide range of conditions. The dam breach scenario is the specific combination of failure mode, antecedent weather conditions and downstream conditions, plus assumptions and approximations, that are required to successfully simulate a dam breach. Various scenarios may be needed to fully describe all potential impacts of a dam failure for planning and design purposes, but for screening and emergency response purposes, the scenario described previously provides a conservative result and is useful in approximating the dam breach impacts for use in decision-making.

What is a "Sunny Day" dam breach scenario?

SCDHEC's approach to dam breach modeling utilizes a "sunny day" dam failure scenario to represent an "any given day" type of breach that is NOT hydrologically induced (i.e., not rainfall driven), but is more likely caused by some weakness in the dam that may have gone unnoticed. There is no antecedent rainfall in a "Sunny Day" scenario; that is, the period of time before the dam breach has been free of rainfall, so there is no rainfall runoff flowing into the reservoir and the downstream floodplain is not experiencing any degree of flooding. The "sunny day" scenario provides a useful understanding of the flooding potential that the dam *alone* possesses, without any complications introduced by recent or concurrent rainfall and flooding. While this scenario may not represent the worst-case scenario, it is a reasonable approach that simplifies the analysis and serves as a useful screening tool to allow SCDHEC staff to ascertain the hazard potential of the dam more clearly.

What is a "Complete and Sudden" Dam Breach?

A "complete and sudden" breach implies a failure where the entire dam is removed instantaneously at a point in time in the simulation. Because there are many areas of uncertainty in how a breach can occur, the complete and sudden failure takes the approach of looking at this extreme failure mode to again add conservatism to the results. For example, the time that it takes for a breach to fully form, and the ultimate dimensions of that breach, are just two areas of uncertainty. Other uncertainties are predicting where the breach occurs in and along the dam, and the type of failure or failure mode (e.g., overtopping, piping, slope failure, foundation failure). A complete and sudden dam failure removes these uncertainties.

What is a "Progressive" Dam Breach?

DSS-WISE™ Lite allows the user to define a progressive failure mode with a specific breach location and a breach progression that grows over time to a final width and height. There have been many studies of real dam breaches conducted over the years to determine progressive breach characteristics of dams in relation to the different failure modes. From these case studies, empirical relationships have been created that provide estimates for dam breach parameters such as breach formation time, final breach

width, final breach height, and peak outflow. SCDHEC primarily uses the empirical relationship established by David C. Froehlich, Ph.D., P.E., which was presented in his 2008 paper *Embankment Dam Breach Parameters and Their Uncertainties*, available at the following website: https://doi.org/10.1061/(ASCE)0733-9429(2008)134:12(1708)

The empirical relationships for breach characteristics from this study were selected due to the large number of earthen embankment dams used in the study, the same type of dam that makes up the overwhelming portion of regulated dams in South Carolina.

What are the limitations with SC DHEC's Dam Breach Inundation Modeling methodology?

As stated before, SCDHEC utilizes a "Sunny Day" scenario. Due to the complexities associated with modeling a hydrologic event occurring simultaneously with dam failure, SCDHEC focuses on the "Sunny Day, Maximum Pool" failure, which provides a reasonably conservative approach. The "Sunny Day, Maximum Pool" scenario can be thought of as a screening tool. By the term "screening tool" we mean that if a dam has the potential to cause high hazard impacts in the "Sunny Day, Maximum Pool" failure, then it is at least capable of those impacts in the "Maximum Pool During Passage of the Spillway Design Flood" dam failure, the second scenario required by Regulation[1]. *The modeling presented here should not be considered a complete picture of the potential hazards posed by the dam. The mapping is not intended for use in dam design or construction. The intent of this mapping is to provide a preliminary understanding of a dam's hazard potential for use in emergency.* It is the dam owner's responsibility to perform a dam breach analysis consistent with the scenarios required by Regulation[1].

Other limitations include:

- DSS-WISE™ Lite cannot model pressurized flow (e.g., flow in pipes and culverts). If flow through a pipe or culvert is included in the model, it is modeled as open channel flow. However, small culverts should be expected to become obstructed with debris in the event of a dam breach, and so, *for small culverts*, not including them in the model is not considered a limitation.
- DSS-WISE™ Lite is limited in how the underlying terrain model can be modified. The terrain model is based on a Digital Elevation Model (DEM) created from Light Distance and Ranging (LiDAR) data collected between 2007 and 2013. Changes to terrain since that time will not be captured until the terrain model is updated with more current LiDAR data. Additionally, buildings and similar obstructions to overland flow are not captured in the terrain model and the water levels in lakes, ponds, rivers, and streams represent the water surface elevation at the time the LiDAR data were collected and are unchangeable.
- DSS-WISE™ Lite cannot simulate cascading dam failures. Each simulation can account for only one dam failure. In other words, dams both upstream and downstream of the study dam are assumed to NOT fail. If failure of an upstream dam were to cause failure of the downstream dam, the flooding (both in extent and in depths and velocities) could be worse than the inundation map shows.

APPENDIX B

List of State-Regulated High Hazard Potential Dams (614 total) as of May 26, 2023, with Total Risk Factor-Flooding, Total Risk Factor-Seismic, and Population-at-Risk

National Inventory ID #	State Inventory ID #	Dam Name	County	Coordinates	TRF-Flooding Rank	Total Risk Factor - Flooding	TRF-Seismic Rank	Total Risk Factor - Seismic	PAR Day	PAR Night	PAR Max
SC00735	D3346	SILVER LAKE DAM	SPARTANBURG	34.8854, -82.1043	1	93.61178188	98	39.89579341	50	18	50
SC02202	D3353	E CAULDWELL POND DAM	SPARTANBURG	34.9175, -82.0125	2	92.60607869	237	21.31395337	11	24	24
SC00180	D0986	SILVER LAKE DAM	LEXINGTON	33.8827, -81.0468	3	82.56256056	14	87.23165713	37	127	127
SC00046	D0549	LAKE COLUMBIA DAM	RICHLAND	34.1749, -80.9182	4	75.76975978	9	105.4024132	95	336	336
SC00091	D0571	WINDSOR LAKE DAM	RICHLAND	34.0677, -80.9399	5	71.31361418	7	108.5884099	360	284	360
SC01380	D1958	WILLIAM EVATT DAM	PICKENS	34.8550, -82.7172	6	68.97693948	227	22.03147183	6	12	12
SC01285	D0550	NORTH SPRINGS LAKE DAM	RICHLAND	34.1338, -80.8939	7	68.81810142	16	83.43877091	73	322	322
SC02482	D2714	ARROWHEAD LAKE DAM	SPARTANBURG	34.9340, -81.9694	8	66.31107757	126	35.25026645	10	9	10
SC00100	D0567	WILDEWOOD POND DAM 2	RICHLAND	34.0967, -80.8864	9	60.21344162	51	56.02499725	50	181	181
SC00209	D0963	MISTY LAKE DAM	LEXINGTON	33.8839, -81.2493	10	59.87505981	40	62.01028134	7	11	11
SC03514	D4886	A. PARKS SHORT BRANCH DAM	GREENVILLE	35.1349, -82.4362	11	58.82606021	253	20.04476582	5	7	7
SC00697	D1950	FINLEYS LAKE DAM	PICKENS	34.9644, -82.7070	12	58.45296001	208	23.73085892	0	9	9
SC00001	D3984	LAKE LANIER DAM	GREENVILLE	35.1968, -82.2352	13	57.423559	92	41.30734552	126	21	126
SC01758	D2857	BRUCE LAKE DAM	GREENVILLE	34.9070, -82.4214	14	56.50566661	83	43.47343475	65	29	65
SC00092	D0560	PINE SPRINGS LAKE DAM 1	RICHLAND	34.1042, -80.9215	15	55.92936719	26	75.65025671	131	207	207
SC01287	D0561	PINE SPRINGS LAKE DAM 2	RICHLAND	34.1051, -80.9237	16	54.55744694	36	63.67493872	102	207	207
SC00090	D0558	SPRINGWOOD LAKE DAM	RICHLAND	34.0748, -80.9526	17	53.27148952	8	107.0336794	206	160	206
SC01171	D0206	CHESTER STATE PARK DAM	CHESTER	34.6780, -81.2470	18	52.67491723	177	27.02299185	6	10	10
SC02071	D2945	ROLLINS POND DAM	MARLBORO	34.7237, -79.8625	19	51.3094755	197	24.88785712	5	6	6
SC00147	D0972	FORT POND DAM	LEXINGTON	33.7578, -81.2421	20	50.22980441	59	52.57036831	5	8	8
SC01293	D0570	UPPER WINDSOR LAKE DAM	RICHLAND	34.0741, -80.9291	21	50.08211411	24	76.37010644	88	164	164
SC00611	D0011	PRESTWOOD LAKE DAM	DARLINGTON	34.3861, -80.0681	22	49.58656252	55	53.86452897	261	33	261
SC02607	D4341	UPPER GOLDEN HILLS DAM	LEXINGTON	33.9969, -81.2129	23	49.22864455	60	52.12990211	16	44	44
SC00021	D2850	LOOK UP LODGE DAM	GREENVILLE	35.1015, -82.4134	24	49.20850531	161	28.69619118	11	20	20
SC03562	D4932	OLD STILL DAM	RICHLAND	34.1053, -80.8884	25	48.97969715	31	66.84471173	13	44	44
SC01464	D2523	UPPER SUNNY HILL POND DAM	KERSHAW	34.2905, -80.6252	26	48.07306091	45	58.14802922	16	34	34
SC00292	D4238	BRIDGE CREEK POND DAM	AIKEN	33.5767, -81.8056	27	47.75436153	101	39.42953338	20	9	20
SC00068	D0027	LAKE KATHERINE DAM	RICHLAND	33.9976, -80.9662	28	47.5268002	29	68.91778321	336	173	336
SC01152	D0874	LAKE HUNTINGTON DAM	EDGEFIELD	33.5721, -81.9654	29	47.4032667	82	43.78739427	9	15	15
SC01281	D0573	HUGHES POND DAM	RICHLAND	34.0948, -80.8669	30	44.67771531	23	77.00482118	19	59	59
SC01305	D2023	LAUREL LAKE DAM	AIKEN	33.5746, -81.9208	31	43.83002248	94	41.05284714	14	34	34
SC02637	D4377	WHISPERLAKE DAM	LEXINGTON	33.9796, -81.2462	32	43.82747556	11	94.07713913	131	198	198
SC02181	D3389	TB PIERCE POND DAM	SPARTANBURG	34.7321, -81.8922	33	43.70973551	187	25.66688247	0	5	5

National Inventory ID #	State Inventory ID #	Dam Name	County	Coordinates	TRF-Flooding Rank	Total Risk Factor - Flooding	TRF-Seismic Rank	Total Risk Factor - Seismic	PAR Day	PAR Night	PAR Max
SC01739	D1174	LAKE MOLLIRENE DAM	GREENVILLE	35.1045, -82.4266	34	43.66218854	358	11.44539599	8	20	20
SC02464	D0184	SHIMMY'S POND DAM	RICHLAND	34.0385, -81.0830	35	42.94361944	13	90.05407175	110	434	434
SC01438	D1577	SHULER POND DAM	SUMTER	33.8492, -80.4133	36	42.84571414	88	42.74770572	1	3	3
SC01771	D1399	LAKE PLACID DAM	GREENVILLE	34.9287, -82.3666	37	41.26882277	228	22.00755536	36	100	100
SC00200	D0930	SHEALY POND DAM	LEXINGTON	33.9067, -81.5238	38	40.94369159	50	56.32829256	8	19	19
SC02214	D2747	ROBINSON FARMS POND	SPARTANBURG	34.9124, -82.1552	39	40.84979788	129	34.38116121	11	25	25
SC00058	D0569	SESQUI DAM	RICHLAND	34.0829, -80.9060	40	39.1468376	34	63.92295041	3	10	10
SC00364	D2164	EDNA YON DAM	AIKEN	33.6301, -81.2444	41	38.93523747	63	50.81305978	1	1	1
SC00160	D0982	SWANSEA LAKE DAM	LEXINGTON	33.7325, -81.1087	42	37.55486591	52	55.91825953	5	9	9
SC01200	D1666	BEAVERDAM CREEK WCD DAM 2	OCONEE	34.5711, -82.9684	43	37.51006506	343	12.26593299	9	15	15
SC02137	D3770	LIVINGSTONS LAKE DAM	ORANGEBURG	33.4355, -80.9071	44	37.4637446	22	77.98398427	13	19	19
SC00013	D2894	HUNTINGTON LAKE DAM	GREENVILLE	34.8428, -82.2976	45	37.22306166	141	31.75713786	126	125	126
SC02575	D4324	SUTCLIFFE POND DAM	ORANGEBURG	33.5189, -80.8639	46	37.15542708	17	82.69839547	112	151	151
SC01676	D3065	FULLER POND DAM	BARNWELL	33.2034, -81.3592	47	36.91193917	28	68.98964706	14	13	14
SC00003	D0016	TABLE ROCK RESERVOIR DAM	GREENVILLE	35.0646, -82.6721	48	36.70567	160	28.70267781	61	200	200
SC02410	D1566	LAKE PRINCETON DAM	LEXINGTON	33.8907, -81.1388	49	36.66371428	38	62.81561101	9	21	21
SC00665	D1227	UPPER YORK RESERVOIR DAM	YORK	35.0022, -81.2531	50	36.64163557	205	24.23386358	19	8	19
SC00960	D3467	MOSS GROVE PLANT DAM 1	BERKELEY	33.1608, -80.0412	51	36.51574176	1	205.7673775	38	116	116
SC02238	D3313	R MILLIKEN POND 1 DAM	SPARTANBURG	35.0832, -82.0669	52	36.33445415	147	31.07063928	20	21	21
SC01817	D3108	GLENN POND DAM 2	ANDERSON	34.4779, -82.7407	53	36.28884246	137	32.25687413	6	11	11
SC01838	D3477	WHALEY POND DAM	BERKELEY	33.1076, -80.0338	54	35.71406625	276	17.65690328	4	7	7
SC02496	D4025	EMERALD LAKE DAM	YORK	34.9096, -80.9160	55	35.41429109	235	21.38378783	7	12	12
SC00536	D1646	BOOKER'S LAKE DAM	OCONEE	34.8249, -83.0660	56	35.39155473	186	25.75548896	7	15	15
SC00641	D0021	LAKE WALLACE DAM	MARLBORO	34.6311, -79.6817	57	35.2958828	65	50.35230545	299	344	344
SC00290	D0004	VAUCLUSE POND DAM	AIKEN	33.6131, -81.8062	58	34.19167749	42	60.36717361	48	41	48
SC00082	D0587	CONGAREE CONST UPPER DAM	RICHLAND	33.9600, -80.7954	59	34.13813048	171	27.39285029	7	4	7
SC00123	D1784	CANE CREEK WCD DAM 7	LANCASTER	34.7795, -80.6958	60	34.0175608	212	23.40022317	13	27	27
SC02376	D4135	PUCKETTS FERRY DAM C1	GREENWOOD	34.2586, -82.0425	61	33.9373251	282	17.46993663	39	110	110
SC00694	D1932	B F FINLEY DAM 2	PICKENS	34.8750, -82.5513	62	33.88834065	286	17.33557086	7	16	16
SC00016	D2841	SWAN LAKE DAM	GREENVILLE	34.9250, -82.4433	63	33.87800007	254	19.94472207	183	56	183
SC00742	D3357	LAKE ZIMMERMAN DAM	SPARTANBURG	34.8539, -81.8944	64	33.67274482	287	17.28092856	6	6	6
SC00734	D3338	APALACHE MILLPOND DAM	SPARTANBURG	34.9621, -82.2058	65	33.3736093	185	25.76580054	51	81	81
SC02404	D4095	MALLARD LAKES DAM 2	LEXINGTON	33.9933, -81.2182	66	33.28059274	44	59.96135784	11	25	25

National Inventory ID #	State Inventory ID #	Dam Name	County	Coordinates	TRF-Flooding Rank	Total Risk Factor - Flooding	TRF-Seismic Rank	Total Risk Factor - Seismic	PAR Day	PAR Night	PAR Max
SC00072	D0563	CLARK LAKE DAM	RICHLAND	34.1212, -80.9043	67	33.16742848	25	76.23167434	97	421	421
SC00403	D0022	LAKE LYALL AFPOA DAM	ORANGEBURG	33.5593, -80.8793	68	32.89687511	18	80.5002965	29	29	29
SC00297	D1995	CLEARWATER LAKE DAM	AIKEN	33.5026, -81.8929	69	32.79341166	41	60.99365995	132	332	332
SC03518	D4582	EAST VILLAGE CR FARM POND	OCONEE	34.8603, -83.1348	70	32.7574085	379	9.805775833	5	6	6
SC02402	D0517	WHITEHALL DAM 2	LEXINGTON	34.0509, -81.1415	71	32.36041493	30	68.5926113	74	150	150
SC00412	D3760	RUESCH POND DAM	ORANGEBURG	33.4733, -80.7947	72	32.11999652	61	51.97505897	0	1	1
SC02818	D4562	CLIFFS VALLEY DAM	GREENVILLE	35.1347, -82.4447	73	31.47619765	310	15.05939383	11	21	21
SC00093	D0557	ARCADIA WOODS LAKE DAM	RICHLAND	34.0539, -80.9630	74	30.94237295	12	90.98853043	15	51	51
SC02208	D3398	N TYGER RIVER WCD DAM 2	SPARTANBURG	34.9915, -82.0950	75	30.89291742	256	19.7888683	64	151	151
SC02472	D0099	CAPT JIMS POND DAM	RICHLAND	33.9680, -80.8930	76	30.78456447	35	63.81961126	12	37	37
SC01151	D0873	CAPERS POND DAM	EDGEFIELD	33.5554, -81.9931	77	30.50522221	115	37.14190676	44	22	44
SC01717	D2825	LAKE GINTOMO DAM	GREENVILLE	35.0732, -82.6582	78	30.45789459	357	11.56043019	5	7	7
SC01816	D3109	GLENN POND DAM 1	ANDERSON	34.4790, -82.7389	79	30.44290568	130	33.8810713	6	9	9
SC01012	D3622	COASTAL TIMBER CO DAM	HORRY	33.9011, -79.0483	80	30.41917929	112	37.40630696	40	31	40
SC00994	D2603	LAKE WARREN ST PARK DAM	HAMPTON	32.8361, -81.1641	81	30.29309459	47	56.84378226	5	9	9
SC02153	D1246	MCCORKLE POND DAM	YORK	34.9914, -80.9325	82	30.23358733	223	22.69004329	20	50	50
SC02375	D4134	PUCKETTS FERRY DAM A1	GREENWOOD	34.2566, -82.0352	83	30.11831268	282	17.46993663	30	86	86
SC02243	D3319	GIBSON POND DAM	SPARTANBURG	35.0298, -82.0922	84	30.10229702	265	18.66362079	14	27	27
SC00004	D2853	PARIS MOUNTAIN RESERVOIR 3	GREENVILLE	34.9528, -82.3932	85	30.07676709	317	14.57418028	115	77	115
SC00054	D0585	HARMONS POND DAM	RICHLAND	33.9767, -80.8276	86	29.94756298	102	39.42620069	0	1	1
SC00625	D3530	LAKE DARPO DAM	DARLINGTON	34.4573, -79.8804	87	29.60780963	120	36.27565348	0	2	2
SC00098	D0553	SANDHILL REC POND DAM	RICHLAND	34.1370, -80.8647	88	29.33896358	19	79.9886901	36	142	142
SC01743	D2839	LINDSEYS LAKE DAM	GREENVILLE	34.9929, -82.4429	89	29.17656505	314	14.7093767	5	5	5
SC00361	D2032	EDISTO LAKE DAM	AIKEN	33.6806, -81.3193	90	29.16065054	100	39.45513289	4	5	5
SC01314	D2137	RIDGELY LAKE DAM	AIKEN	33.5028, -81.7582	91	29.07256266	111	37.77106755	9	27	27
SC02154	D3648	HERITAGE LAKE DAM	YORK	35.0601, -80.9084	92	28.75033574	62	51.74665045	25	86	86
SC00401	D4179	ETHEREDGE MILLPOND DAM	ORANGEBURG	33.6273, -81.0503	93	28.51687333	76	46.64382407	6	15	15
SC00088	D0555	MOORES POND DAM	RICHLAND	34.1036, -80.9678	94	28.27702777	53	55.39171366	24	78	78
SC02743	D4489	MOUNT VINTAGE HOUNDS LAKE	EDGEFIELD	33.6655, -81.9727	95	28.16100628	258	19.27398112	5	8	8
SC01630	D2805	MORRIS POND DAM	BAMBERG	33.3582, -81.1814	96	28.15745239	69	48.52542134	2	4	4
SC02177	D3385	G LANFORD POND DAM	SPARTANBURG	34.7466, -82.0569	97	28.06214196	247	20.56385219	4	4	4
SC01180	D1180	BATESBURG RESERVOIR DAM	LEXINGTON	33.8943, -81.5289	98	27.8971617	79	45.81569723	6	19	19
SC00968	D0037	LAKE SATOKO DAM	BERKELEY	33.1010, -80.0822	99	27.42396499	2	197.4745117	13	33	33

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SC02228	D3303	D HONEY NO 3 POND DAM	SPARTANBURG	35.1493, -82.0955	100	26.9920879	307	15.3136752	7	10	10
SC00022	D2893	OAK GROVE LAKE DAM	GREENVILLE	34.8466, -82.2856	101	26.75519828	198	24.80743571	123	55	123
SC00017	D1108	JB TANKERSLEY POND DAM	GREENVILLE	35.0991, -82.5515	102	26.72239584	172	27.35911363	5	5	5
SC02678	D4425	JIMMY RICE POND DAM	GREENVILLE	34.8246, -82.2041	103	26.68347808	226	22.56824303	6	8	8
SC00663	D1230	CALDWELL LAKE DAM	YORK	34.9880, -81.2881	104	26.61706519	259	19.25463489	9	11	11
SC00743	D3360	HILLBROOK FOREST LAKE DAM	SPARTANBURG	34.9630, -81.8703	105	26.52227597	170	27.66870569	28	89	89
SC01614	D0516	WHITEHALL DAM 1	LEXINGTON	34.0504, -81.1440	106	26.35523859	32	65.65721445	91	180	180
SC00690	D3645	FOREST LAKE DAM	YORK	35.0607, -80.9442	107	25.83607991	215	23.18951548	9	19	19
SC01682	D3064	EDGAR A BROWN LAKE DAM	BARNWELL	33.2462, -81.3691	108	25.65076481	43	60.33707098	56	19	56
SC00291	D0002	FLAT ROCK POND DAM	AIKEN	33.5792, -81.8093	109	25.54039915	66	49.67894321	62	80	80
SC02085	D3449	BECKER POND DAM	MARLBORO	34.6244, -79.7668	110	25.2552373	174	27.3103586	0	0	0
SC00028	D3225	EUREKA LAKE DAM	CHESTERFIELD	34.6428, -79.8935	111	25.23325027	144	31.70271435	3	7	7
SC00970	D3465	JOHN BALLENTINE DAM	BERKELEY	33.1607, -80.1620	112	25.21955625	4	148.3899014	1	2	2
SC02468	D4139	HARBISON FLOODWTR DET DAM	RICHLAND	34.0723, -81.1276	113	25.21532156	27	71.30388063	249	893	893
SC00618	D3543	NORRIS DAM	DARLINGTON	34.3735, -79.8133	114	25.03743506	86	43.322478	1	2	2
SC01234	D1267	J R DARRAGH DAM 1	GREENWOOD	34.1433, -82.2183	115	25.00265353	125	35.36752559	6	8	8
SC01162	D0226	SMALL UPPER MTN LAKE	CHESTER	34.6566, -81.2626	116	24.97593161	133	32.74478226	9	9	9
SC01635	D0450	ENTRANCE LAKE DAM	RICHLAND	34.1011, -80.9185	117	24.93721668	15	83.47409692	270	200	270
SC01181	D0207	CHESTER RES DAM	CHESTER	34.7097, -81.2554	118	24.92548482	108	38.30666288	12	29	29
SC01138	D0896	J W YONCE POND DAM	EDGEFIELD	33.8361, -81.7611	119	24.83084928	272	18.05296999	5	6	6
SC01840	D3479	LAKE HASTIE DAM	BERKELEY	33.0931, -79.9592	120	24.78226803	6	110.9577593	6	16	16
SC01800	D2911	MOON LAKE DAM	GREENVILLE	34.9828, -82.2257	121	24.59582954	277	17.64181401	15	23	23
SC01347	D1786	CANE CREEK WCD DAM 18A	LANCASTER	34.7370, -80.7144	122	24.49047532	225	22.64418526	2406	638	2406
SC01521	D2160	DALTON LAKE DAM	UNION	34.5993, -81.4875	123	24.4428029	169	27.71217681	6	8	8
SC02092	D3680	GRANGER POND DAM	ORANGEBURG	33.6881, -81.0502	124	24.40256284	72	47.47023951	0	5	5
SC00519	D1637	CHATTOOGA LAKE DAM	OCONEE	34.8939, -83.1556	125	24.08707322	360	11.39427046	15	33	33
SC01843	D3416	COUNTRY CLUB POND DAM	CHEROKEE	35.0305, -81.6280	126	23.99951078	305	15.54947538	0	6	6
SCD5040	SCD5040	PARRIS BRIDGE ROAD DAM	SPARTANBURG	35.0460, -81.9370	127	23.8696401	209	23.61110798	11	28	28
SC01854	D3234	LAKE SUSAN DAM	CHESTERFIELD	34.5551, -79.8800	128	23.80856162	191	25.36688924	1	1	1
SC01946	D3510	CHARLES LUTHERS DAM	DARLINGTON	34.4028, -80.1992	129	23.7205955	182	25.97443365	4	10	10
SC02503	D4239	NINE TIMES DAM	PICKENS	34.9344, -82.7964	130	23.39972912	234	21.46247579	6	9	9
SC00546	D0006	BIG CK WCD - SHOREBROOK 1	ANDERSON	34.6285, -82.4865	131	23.24866242	239	21.26237078	51	82	82
SC00699	D1954	TWELVE MILE CK WCD DAM 16	PICKENS	34.8406, -82.6908	132	23.14170144	389	9.038033312	47	104	104

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SC01273	D0556	VILLAGE LAKE DAM	RICHLAND	34.0918, -80.9885	133	23.0946782	99	39.61194474	25	78	78
SC02521	D4099	NORTH STONE LAKE DAM	GREENVILLE	34.8803, -82.3765	134	23.09095484	260	19.08387882	6	8	8
SC00693	D1931	B F FINLEY DAM 1	PICKENS	34.8789, -82.5563	135	23.03986552	319	14.39457999	6	10	10
SC01885	D3202	KING MILLPOND DAM	CHESTERFIELD	34.4254, -80.2102	136	22.94216166	274	17.87226586	5	10	10
SC00695	D1930	B FRANK FINLEY DAM	PICKENS	34.8824, -82.5616	137	22.85793661	316	14.64030859	6	10	10
SC02082	D3442	BULLARDS MILLPOND DAM	MARLBORO	34.7039, -79.7311	138	22.85145285	213	23.3188537	1	1	1
SC02261	D2261	UPPER QUAIL HOLLOW DAM	LEXINGTON	34.0161, -81.1199	139	22.65028996	37	63.37978924	25	73	73
SC02658	D4405	CURLTAIL DAM	GREENWOOD	34.2040, -82.2261	140	22.59158188	336	13.32412052	21	48	48
SC01383	D1949	OOLENOY RIVER WCD DAM 10	PICKENS	34.9915, -82.7327	141	22.37118957	409	8.186267853	14	39	39
SC00750	D3355	VIRGINIA TAYLOR DAM	SPARTANBURG	34.8785, -81.9971	142	22.32125885	134	32.61422057	6	4	6
SC01741	D2837	STEVENS POND DAM	GREENVILLE	35.0585, -82.4420	143	21.93943818	292	16.69139319	10	22	22
SC01973	D3580	BOLING POND DAM	FLORENCE	34.0380, -79.5370	144	21.89241611	413	7.923127739	0	0	0
SC00025	D0015	N SALUDA RESERVOIR DAM	GREENVILLE	35.1394, -82.4069	145	21.56372406	275	17.68405331	995	1018	1018
SC00619	D3512	BEAVERDAM MILLPOND DAM	DARLINGTON	34.3863, -80.1825	146	21.4867378	153	29.93279611	7	17	17
SC01736	D1171	LAKE LYNN DAM	GREENVILLE	35.1377, -82.4485	147	21.24994521	332	13.40409988	10	17	17
SC02260	D2260	LOWER QUAIL HOLLOW DAM	LEXINGTON	34.0161, -81.1148	148	21.14515608	75	46.6585694	11	32	32
SC02239	D3316	T RAGAN DAM	SPARTANBURG	35.0659, -82.1400	149	21.09078343	241	21.20993797	6	7	7
SC00356	D4934	MCGRADY DAM	COLLETON	32.8472, -80.7728	150	21.03799175	181	26.35164427	0	0	0
SC01185	D1762	LANCASTER CO WTRWRKS DAM	LANCASTER	34.7016, -80.7539	151	20.89043385	232	21.79886609	135	58	135
SC01740	D1179	MCCARTER POND DAM	GREENVILLE	35.0745, -82.4267	152	20.88339862	378	10.01749261	7	10	10
SC00354	D2019	TARRANTS MILLPOND DAM	AIKEN	33.4974, -81.5824	153	20.48740584	139	31.9758982	5	5	5
SC01987	D3561	CANAL IND POND DAM	FLORENCE	34.2117, -79.6429	154	20.32585723	230	21.88146718	3	7	7
SC00199	D1712	HERBERT RISINGER DAM	LEXINGTON	33.8237, -81.4616	155	20.32269539	77	46.10761579	5	8	8
SC00559	D4470	HOLLIDAYS BRIDGE DAM	GREENVILLE	34.5298, -82.3768	156	20.1639646	294	16.49499958	10	10	10
SC02589	D4339	BRADY PORTH DAM	LEXINGTON	34.0244, -81.3149	157	20.14237939	67	49.02176347	7	10	10
SC00402	D3726	JEANNE KEAN DAM	ORANGEBURG	33.5143, -81.3182	158	20.12307438	110	37.9710875	0	0	0
SC00578	D2631	LIGHTIZER POND DAM	CALHOUN	33.7012, -80.8290	159	19.94703453	164	28.14749563	6	7	7
SC00516	D1645	CRYSTAL LAKE DAM	OCONEE	34.8271, -83.1435	160	19.8691354	390	8.953829544	16	7	16
SC01018	D3634	BURROUGHS & CHAPIN DAM 2	HORRY	33.7666, -78.7948	161	19.50859372	156	28.87041819	24	26	26
SC01460	D2552	LAKE CAIRE YELLEAU DAM	DORCHESTER	33.0170, -80.2489	162	19.25760986	3	153.5197667	8	16	16
SC00714	D1961	TWELVE MILE CK WCD DAM 5	PICKENS	34.8863, -82.7731	163	19.17813989	363	10.89641943	16	20	20
SC01527	D2862	BECKYDON LAKE DAM	GREENVILLE	35.1052, -82.3808	164	19.11348352	211	23.43275339	14	28	28
SC01775	D2878	TROLLINGWOOD LAKE DAM	GREENVILLE	34.6680, -82.3561	165	19.10401624	334	13.38353738	7	7	7

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SC00545	D3139	BRUSHY CK WCD DAM - TRIPP 18	ANDERSON	34.7374, -82.5213	166	18.94373378	416	7.546576842	27	76	76
SC01294	D0564	WILDEWOOD POND DAM 4	RICHLAND	34.1027, -80.8870	167	18.91939155	117	36.6629672	13	52	52
SC02159	D1233	KINGSLEY CLEAR SPRGS DAM	YORK	35.0223, -80.9665	168	18.8776949	289	17.25818591	9	19	19
SC02382	D4060	CANE CREEK WCD DAM 10D	LANCASTER	34.6820, -80.6886	169	18.62413121	163	28.38952049	1290	818	1290
SC02777	D4520	MT VINTAGE IRRIGATION DAM	EDGEFIELD	33.6703, -81.9702	170	18.48577128	178	26.89519285	6	11	11
SC00668	D3662	FISHING CREEK WCD DAM 2	YORK	34.9610, -81.2168	171	18.28256164	293	16.58230313	13	37	37
SC02247	D2722	THOMPSON POND DAM	SPARTANBURG	35.1600, -81.8868	172	18.25301324	242	21.16261885	7	14	14
SC00298	D1996	LAKE FLORENCE DAM	AIKEN	33.3904, -81.8132	173	18.15332478	145	31.62324048	3	1	3
SC02779	D4522	DAN BILTON DAM	ABBEVILLE	34.2117, -82.3988	174	18.13089702	302	15.72857877	5	5	5
SC00010	D2877	HUFF CREEK WCD DAM 4C	GREENVILLE	34.7053, -82.3474	175	18.10363166	342	12.29855054	12	25	25
SC00398	D2145	SEIVERN LAKE DAM	AIKEN	33.7341, -81.4869	176	17.92349394	199	24.78198111	0	0	0
SC01583	D2679	GRIFFITH POND DAM	CALHOUN	33.6678, -80.8420	177	17.74057561	54	55.04651161	6	10	10
SC00560	D3153	SEATON ACRES POND DAM	ANDERSON	34.4549, -82.4298	178	17.56453828	312	15.01919214	9	19	19
SC02573	D4313	LAMB POND DAM	AIKEN	33.7139, -81.7796	179	17.54512237	132	32.98455062	7	7	7
SC01714	D3297	LAKE CALDWELL DAM	GREENVILLE	35.1280, -82.3762	180	17.3444748	377	10.05606101	7	7	7
SC01169	D0209	LARGE UPPER MTN LAKE	CHESTER	34.6591, -81.2569	181	17.32748327	184	25.81957644	5	9	9
SC01594	D2629	PARADISE POND DAM	CALHOUN	33.6907, -80.8151	182	17.2586422	173	27.35189644	0	1	1
SC02570	D4321	RABON CREEK WCD DAM 20	GREENVILLE	34.6173, -82.2294	183	17.11545449	270	18.27342551	6	16	16
SC01109	D0891	BEAVERDAM CREEK WCD DAM 1	EDGEFIELD	33.7794, -81.8985	184	16.9954629	104	39.02801704	43	59	59
SC02072	D3429	GRANTS MILLPOND DAM	MARLBORO	34.7186, -79.8066	185	16.83112893	167	27.75019882	6	12	12
SC00431	D3710	JODY MILHOUSE DAM	ORANGEBURG	33.5318, -80.9764	186	16.73316327	58	52.6118558	2	6	6
SC01368	D1706	CHAPIN PARK DAM	LEXINGTON	34.1625, -81.3361	187	16.68581332	74	47.17567976	14	40	40
SC02492	D4033	STROM DAM	GREENVILLE	35.0976, -82.4759	188	16.62750809	318	14.4233302	6	7	7
SC01108	D0892	BEAVERDAM CREEK WCD DAM 2	EDGEFIELD	33.7735, -81.9023	189	16.60769121	220	22.86854724	28	40	40
SC00143	D0958	LEX OLD MILL POND DAM	LEXINGTON	33.9767, -81.2293	190	16.59771566	295	16.38443482	121	106	121
SC01779	D2885	ANTHONY LAKE DAM 1	GREENVILLE	35.0553, -82.3385	191	16.55452001	350	11.7648391	4	12	12
SC01773	D2873	STONE LAKE DAM	GREENVILLE	34.8748, -82.3770	192	16.51619689	407	8.22334102	66	70	70
SC00392	D0826	ROBERT E KIRBY POND DAM	AIKEN	33.6612, -81.6208	193	16.39015357	109	38.12105505	0	1	1
SC02252	D3275	ALVERSON POND DAM	SPARTANBURG	34.8851, -82.1330	194	16.36548896	298	15.94644088	12	32	32
SC00737	D3340	LYMAN LAKE DAM	SPARTANBURG	34.9822, -82.1938	195	16.31408292	337	13.30969479	170	276	276
SC01396	D1934	LOYDS POND DAM	PICKENS	34.8347, -82.5619	196	16.31019084	308	15.21045608	11	36	36
SC00959	D3466	THORNLEY POND DAM	BERKELEY	33.2179, -80.0113	197	16.23678755	5	117.9470443	5	9	9
SC02327	D4080	LAZAR DAM	FLORENCE	34.1699, -79.7896	198	16.19894252	135	32.39448063	14	22	22

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SC01406	D1976	BARNETTS POND DAM	SUMTER	34.0648, -80.4204	199	16.13859014	96	40.86487031	2	10	10
SC00632	D0010	LAKE ROBINSON DAM	DARLINGTON	34.4014, -80.1517	200	15.93789859	57	53.19539984	1403	1708	1708
SC00451	D3723	ZEIGLER POND DAM	ORANGEBURG	33.5737, -80.7884	201	15.83880991	81	45.05018107	0	1	1
SC00642	D3444	BURNT FACTORY POND DAM	MARLBORO	34.6704, -79.6664	202	15.81195922	194	25.05950372	44	41	44
SC02160	D3644	GIBSON POND DAM	YORK	35.0445, -80.9798	203	15.72484016	281	17.4868566	12	37	37
SC01167	D0217	LAKE OLIPHANT DAM	CHESTER	34.7979, -81.1841	204	15.67578822	243	21.03836275	0	1	1
SC02690	D4438	SUMMIT DAM 1	RICHLAND	34.1636, -80.8904	205	15.56018914	91	41.39872242	21	77	77
SC00640	D3459	DRIGGERS POND DAM	MARLBORO	34.4471, -79.6288	206	15.53104576	333	13.4	0	0	0
SC02328	D4007	LAKE ROBINSON DAM	GREENVILLE	34.9950, -82.2945	207	15.49903832	284	17.45063723	516	1114	1114
SC00472	D1145	MACDONALD WILLETTS DAM	KERSHAW	34.2498, -80.6413	208	15.35503826	155	28.97194355	27	11	27
SC02150	D3660	BELTON POND DAM	YORK	35.0336, -81.1483	209	15.11962676	255	19.8443952	5	7	7
SC01155	D0224	PINEVIEW LAKES DAM 1	CHESTER	34.6802, -81.2049	210	15.01984609	236	21.36637878	0	0	0
SC00671	D3673	FISHING CREEK WCD DAM 50	YORK	34.9347, -81.1840	211	14.99409375	344	11.98255362	4	12	12
SC00703	D1968	GERTRUDE HARRIS DAM	PICKENS	34.9866, -82.8573	212	14.97046827	315	14.66781959	11	22	22
SC02268	D0832	FLORENCE T HALL DAM	AIKEN	33.8360, -81.5412	213	14.93684291	140	31.92272438	0	0	0
SC01667	D3062	BARNWELL ST PARK LWR DAM	BARNWELL	33.3304, -81.3051	214	14.88321531	49	56.34321855	0	0	0
SC02232	D3307	GRAMLING POND 1 DAM	SPARTANBURG	35.0746, -82.1499	215	14.84058843	321	14.29583935	1	2	2
SC00512	D1634	TOWNES CREEK DAM	OCONEE	34.9036, -83.0587	216	14.80511282	462	5.479258972	15	33	33
SC02429	D4088	STILLINGER LAKE DAM	ORANGEBURG	33.4735, -80.9234	217	14.75274094	78	45.85987824	66	49	66
SC00534	D1650	HORSESHOE LAKE DAM	OCONEE	34.7748, -83.2674	218	14.73682936	430	6.619395252	8	8	8
SC02447	D4175	TONY STIWINTER DAM	PICKENS	34.9145, -82.6377	219	14.63403473	304	15.64862346	2	6	6
SC02169	D3336	CHESTNUT LAKE DAM	SPARTANBURG	35.0084, -82.0495	220	14.58445319	349	11.7860542	9	4	9
SC00525	D1648	LAKE JEMIKE DAM 1	OCONEE	34.7833, -83.1342	221	14.54755675	502	3.909297918	10	14	14
SC02128	D3752	EA FOGLES POND DAM	ORANGEBURG	33.4499, -80.9870	222	14.41028004	154	29.79760952	1	1	1
SC00043	D3168	HILLS CREEK WCD DAM	CHESTERFIELD	34.7797, -80.4412	223	14.32320183	203	24.33828403	0	5	5
SC00122	D1785	CANE CREEK WCD DAM 16	LANCASTER	34.7712, -80.6690	224	14.19132602	190	25.63675611	16	36	36
SC00148	D1717	BARR LAKE DAM	LEXINGTON	33.9587, -81.2597	225	14.01707169	84	43.41232084	113	122	122
SC02372	D4058	CREEKSIDE EAST POND DAM	GREENWOOD	34.2555, -82.1691	226	13.83944204	229	21.91517092	9	24	24
SC02438	D4166	JOSEPH HEADDEN DAM	ORANGEBURG	33.5810, -81.1032	227	13.72682345	39	62.75373272	34	14	34
SC01102	D0910	SLADE LAKE DAM	EDGEFIELD	33.7805, -81.9197	228	13.59949154	179	26.45414143	25	37	37
SC01542	D2563	FURSE MILLPOND DAM	ALLENDALE	33.0978, -81.5247	229	13.58332331	278	17.60592347	0	0	0
SC00235	D3557	FOREST LAKE DAM	FLORENCE	34.1582, -79.8290	230	13.56815538	148	31.03237871	99	281	281
SC02263	D4035	WALTERS POND DAM	ABBEVILLE	34.1996, -82.3814	231	13.5226585	326	14.01068562	26	13	26

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SC01752	D1373	RICE POND DAM	GREENVILLE	35.0990, -82.4093	232	13.51086692	296	16.36038508	5	8	8
SC02630	D4374	BARNWELL ST PARK UPR DAM	BARNWELL	33.3363, -81.3054	233	13.48213937	68	48.98588314	0	0	0
SC01182	D1281	LITTLE COLDSTREAM DAM	LEXINGTON	34.0668, -81.1964	234	13.37410273	136	32.36211791	19	43	43
SC02168	D3315	J B JOHNSON POND DAM	SPARTANBURG	35.0560, -82.1390	235	13.33866621	273	17.9595661	5	9	9
SC01815	D3265	RANKEN POND DAM	ANDERSON	34.5394, -82.6640	236	13.26248954	373	10.21141798	10	26	26
SC00246	D3042	SAUER POND DAM	ABBEVILLE	34.3977, -82.4031	237	13.2160313	356	11.56815988	8	12	12
SC01199	D1649	LAKE JEMIKE DAM 2	OCONEE	34.7816, -83.1338	238	13.00995998	442	6.061928566	4	7	7
SC00331	D2143	ONEAL MILLER DAM	AIKEN	33.7161, -81.3701	239	12.98934697	150	30.35055257	5	5	5
SC00269	D3780	LAKE CHEROKEE DAM	CHEROKEE	35.0412, -81.5726	240	12.9887663	353	11.66100734	4	6	6
SC00249	D2986	DUNCAN CREEK WCD DAM 2	LAURENS	34.5081, -81.8812	241	12.96425793	436	6.229818488	4	7	7
SC00261	D0008	LAKE WHELCHEL	CHEROKEE	35.1085, -81.6201	242	12.96210362	325	14.06010312	250	354	354
SC00300	D2030	LONGLEAF PLANTATION DAM	AIKEN	33.5356, -81.4117	243	12.94096346	196	24.90113344	3	1	3
SC00715	D1955	PICKENS CITY RESERVOIR DAM	PICKENS	34.9083, -82.7356	244	12.82928833	424	7.05274762	20	16	20
SC01610	D2620	WANNAMAKERS UPPER DAM	CALHOUN	33.7221, -80.9117	245	12.76495264	70	48.33990442	0	0	0
SC01805	D0513	BAXLEY 501 POND DAM	MARION	34.1114, -79.3352	246	12.68177854	327	13.94972136	3	1	3
SC02205	D3361	PARK LAKE DAM	SPARTANBURG	34.9441, -81.8882	247	12.6615683	387	9.162632828	9	27	27
SC01912	D3170	TOWN POND DAM	CHESTERFIELD	34.7539, -80.3973	248	12.63326458	90	42.21857317	0	8	8
SC00167	D0965	LAKE PAULINE DAM	LEXINGTON	33.9153, -81.1683	249	12.56654011	71	47.9815452	29	40	40
SC02373	D4059	OAKBROOK MEMORIAL DAM	GREENWOOD	34.2522, -82.2201	250	12.55862704	266	18.63712163	1	6	6
SC00011	D2883	SOUTH TYGER WCD DAM 5C	GREENVILLE	35.0733, -82.3406	251	12.52565034	480	4.997206226	23	60	60
SC00436	D3754	FOGLE DAM 1	ORANGEBURG	33.4731, -80.9323	252	12.43198158	192	25.26241103	65	47	65
SC00102	D0565	WILDEWOOD POND DAM 5	RICHLAND	34.1004, -80.8919	253	12.26992721	195	24.9179107	15	61	61
SC00542	D3130	BRUSHY CK WCD - HOPKINS 11A	ANDERSON	34.7782, -82.5586	254	12.25985932	420	7.376057407	28	89	89
SC01539	D2564	BARKERS POND DAM	ALLENDALE	33.0324, -81.3277	255	12.22964613	201	24.38564288	3	7	7
SC02691	D4439	SUMMIT DAM 6	RICHLAND	34.1605, -80.8885	256	12.21981119	127	35.18482007	25	105	105
SC00555	D3119	MCGEE POND DAM	ANDERSON	34.3506, -82.6968	257	12.21046057	268	18.55097145	6	8	8
SC02747	D4493	SJWD WATER DIST RCC DAM	SPARTANBURG	34.9403, -82.0543	258	12.16401036	395	8.741597017	11	26	26
SC01373	D1970	KEASLER POND DAM	PICKENS	34.9164, -82.8417	259	12.10990801	285	17.35174581	9	20	20
SC02618	D4368	WOODSIDE DAM 4	AIKEN	33.4807, -81.7294	260	12.09768927	85	43.39994081	9	16	16
SC01724	D1103	TANKERSLEY LAKE DAM	GREENVILLE	35.0999, -82.5476	261	12.04064432	380	9.69296099	4	5	5
SC02569	D4320	RABON CREEK WCD DAM 32	LAURENS	34.4772, -82.1433	262	12.00910943	301	15.75028508	106	309	309
SC01765	D2865	S TYGER RIVER WCD DAM 2C	GREENVILLE	35.0685, -82.3797	263	11.94141819	452	5.775206771	14	22	22
SC00583	D2634	SWEETWATER LAKE DAM	CALHOUN	33.6267, -80.8949	264	11.90668334	202	24.35674539	1	2	2

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SC00650	D3432	WILLAMETTE INDUSTRIES DAM	MARLBORO	34.7245, -79.7894	265	11.78589625	252	20.19083066	8	3	8
SC02136	D3769	LIVINGSTONS POND DAM	ORANGEBURG	33.4389, -80.9064	266	11.77086623	21	79.35723834	19	38	38
SC01419	D1442	DUBOSE POND DAM	SUMTER	33.9626, -80.3366	267	11.73138122	107	38.48563373	100	103	103
SC00226	D3406	THICKETTY CRK WCD 19	CHEROKEE	35.0862, -81.7405	268	11.70656419	341	12.34456025	7	9	9
SC00432	D3766	E & M MILLER DAM	ORANGEBURG	33.4174, -81.0042	269	11.70547512	189	25.64093764	0	0	0
SC02131	D3757	FLEMINGS POND DAM	ORANGEBURG	33.4608, -80.9125	270	11.66447697	267	18.61890912	22	11	22
SC00437	D3756	FOGLE DAM 2	ORANGEBURG	33.4716, -80.9274	271	11.63072203	192	25.26241103	52	36	52
SC01351	D1011	SHIRLEY & FRED SPECHT DAM 1	LEXINGTON	33.8868, -81.4978	272	11.61582985	299	15.85750497	0	0	0
SC01296	D1935	MALLARD COVE (FOREST DR)	PICKENS	34.8199, -82.5720	273	11.56143441	443	6.0250114	18	58	58
SC01716	D3983	ASBURY HILLS DAM	GREENVILLE	35.0810, -82.6394	274	11.5090427	419	7.494935899	9	8	9
SC02562	D4314	HALF MILE LAKE DAM	GREENVILLE	34.9038, -82.3745	275	11.50838907	368	10.50635667	58	194	194
SC01770	D2871	CARDINAL LAKE DAM	GREENVILLE	34.9426, -82.3653	276	11.46869884	456	5.662803057	11	21	21
SC01322	D2050	OAKMAN LAKE DAM	AIKEN	33.4818, -81.7245	277	11.43108684	95	41.04783168	10	21	21
SC02220	D3333	EW NOLAND POND DAM	SPARTANBURG	35.0499, -82.0000	278	11.36204212	352	11.66681118	11	27	27
SC02655	D4403	W B MANUEL DAM	ALLENDALE	33.0320, -81.2009	279	11.30509738	204	24.31507325	0	0	0
SC01311	D2025	BURGESS LAKE DAM	AIKEN	33.4388, -81.8131	280	11.29074439	183	25.82100646	1	1	1
SC02583	D4333	JOHN RAINSFORD POND DAM	EDGEFIELD	33.6952, -81.9411	281	11.26536221	263	18.84993348	5	10	10
SC00702	D1933	GEORGES CREEK WCD DAM 1A	PICKENS	34.8685, -82.5856	282	11.24428518	403	8.356507969	19	63	63
SC01685	D3051	MIXON POND DAM	BARNWELL	33.3837, -81.5075	283	11.20269235	138	32.02466492	3	5	5
SC02308	D3824	RH GANDY DAM	CHESTERFIELD	34.7265, -80.0325	284	11.12351716	206	24.2316223	0	7	7
SC02115	D3724	PRICKETTS POND DAM	ORANGEBURG	33.5461, -80.7418	285	11.09378804	245	20.64670531	1	1	1
SC00600	D2652	DERRENBACHER POND DAM	CALHOUN	33.8146, -80.9930	286	11.04426395	250	20.32417227	1	1	1
SC00700	D1957	TWELVE MILE CREEK WCD 54A	PICKENS	34.8628, -82.7217	287	10.97335896	455	5.666072085	13	31	31
SC02765	D4508	KINGS SUNSET NURSERY DAM	PICKENS	34.7648, -82.6672	288	10.91951337	393	8.855933904	4	5	5
SC00459	D0018	KENDALL LAKE DAM	KERSHAW	34.2570, -80.5913	289	10.8502046	46	57.05044122	536	50	536
SC02201	D3352	CLEVELAND PARK LAKE DAM	SPARTANBURG	34.9669, -81.9503	290	10.84472158	384	9.24799496	32	15	32
SC00218	D1714	STERLING LAKE POND DAM	LEXINGTON	34.0226, -81.2703	291	10.8279231	323	14.19736458	53	60	60
SC01869	D3219	CHATHAM LAKE DAM	CHESTERFIELD	34.6732, -79.9104	292	10.81863928	219	22.91885435	6	0	6
SC01675	D3052	FOLKS UPPER POND DAM	BARNWELL	33.3862, -81.4257	293	10.76791279	103	39.18076468	1	2	2
SC02469	D0089	CENTEX HOMES DAM	RICHLAND	33.9643, -80.9331	294	10.64462007	87	43.06351658	124	471	471
SC00267	D0009	THICKETTY CREEK WCD 26	CHEROKEE	35.0783, -81.7773	295	10.4720076	361	11.26296429	11	22	22
SC01440	D2061	DESCHAMPS MID POND DAM	SUMTER	33.8370, -80.3676	296	10.44389427	143	31.73248534	10	22	22
SC01694	D3057	STILLS POND DAM	BARNWELL	33.3993, -81.2702	297	10.44388633	113	37.3571978	6	10	10

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SC00328	D0821	CAMP LONG LAKE DAM	AIKEN	33.6808, -81.6192	298	10.3950296	320	14.35943043	0	0	0
SC00667	D3659	FISHING CREEK WCD DAM 1	YORK	35.0057, -81.1996	299	10.30574936	345	11.94340493	30	80	80
SC01353	D1010	BOICE PORTH DAM	LEXINGTON	33.9973, -81.2967	300	10.26165461	246	20.61065374	22	69	69
SC02264	D4039	GREENWOOD WEST POND DAM	ABBEVILLE	34.1863, -82.2506	301	10.25971973	465	5.428487735	6	5	6
SC00511	D1632	LAKE CHEOHEE DAM	OCONEE	34.9289, -83.0682	302	10.1873886	505	3.819632601	14	32	32
SC00552	D3124	3&20 CK WCD - JAMESON 5B	ANDERSON	34.7090, -82.6404	303	10.17380074	388	9.126405864	5	5	5
SC01782	D2888	J B GREEN POND DAM	GREENVILLE	34.7660, -82.3247	304	10.16761493	385	9.237657389	40	129	129
SC00522	D1652	CONEROSS CREEK WCD DAM 1A	OCONEE	34.7232, -83.1046	305	10.11579332	471	5.239918553	26	44	44
SC02461	D4200	WILES POND DAM	CALHOUN	33.6998, -80.6404	306	10.07857881	222	22.70404542	0	0	0
SC00712	D1942	MERRITTS POND	PICKENS	34.7749, -82.5872	307	10.07538583	303	15.72223795	7	10	10
SC02010	D3619	ALLSBROOK POND DAM	HORRY	34.0030, -78.9763	308	9.941613218	176	27.15261278	0	1	1
SC00421	D2307	MACKIE TYLER DAM	ORANGEBURG	33.5828, -81.1006	309	9.931169849	48	56.42762931	25	9	25
SC02167	D3314	ED LEE POND DAM	SPARTANBURG	35.0580, -82.1412	310	9.914710763	311	15.05655387	6	11	11
SC01248	D0842	FRICKS POND DAM	SALUDA	33.8843, -81.5787	311	9.90221897	210	23.51021944	4	5	5
SC00024	D4469	SALUDA LAKE DAM	GREENVILLE	34.8524, -82.4843	312	9.891856395	422	7.325168608	135	323	323
SC02426	D4186	FIDDLERS COVE DAM	OCONEE	34.8867, -83.0442	313	9.74471387	428	6.732052614	10	25	25
SC01674	D3061	EDISTO REC POND DAM	BARNWELL	33.3510, -81.3114	314	9.679793	106	38.64105983	0	0	0
SC01883	D3203	TEALS POND DAM	CHESTERFIELD	34.7515, -80.0309	315	9.498266872	218	23.05339245	0	2	2
SC00265	D3405	THICKETTY CRK WCD 20	CHEROKEE	35.0913, -81.7360	316	9.450161747	457	5.626212995	6	7	7
SC01462	D2554	MIDDLETON LAKE DAM	DORCHESTER	32.8972, -80.1385	317	9.32754084	20	79.93919122	11	24	24
SC02113	D3721	GRESSETTES POND DAM	ORANGEBURG	33.5536, -80.8473	318	9.313945802	200	24.73443645	2	4	4
SC00524	D1656	CONEROSS CREEK WCD DAM 21	OCONEE	34.7010, -83.0169	319	9.237280838	497	4.144885457	8	10	10
SC00263	D3413	THICKETTY CREEK WCD 16B	CHEROKEE	35.0638, -81.6869	320	9.202815681	453	5.745947178	8	11	11
SC00518	D1638	MOUNTAIN REST LAKE DAM	OCONEE	34.8782, -83.1633	321	9.180074561	467	5.417967091	8	15	15
SC01240	D1273	BARBARA BARNETTE DAM	GREENWOOD	34.0775, -82.0895	322	9.168210484	118	36.45661663	0	1	1
SC02423	D4026	BEAVERDAM CK WCD DAM 3A	OCONEE	34.5288, -82.9978	323	9.166945393	375	10.15216903	6	13	13
SC02538	D4104	DICKERSON FISHING LAKE	OCONEE	34.6477, -83.0390	324	9.123234572	418	7.502396469	2	7	7
SC02452	D4036	OOLENOY WCD DAM 40	PICKENS	35.0169, -82.6884	325	9.120101795	399	8.477386152	12	27	27
SC02703	D4451	DANNY COX DAM	PICKENS	34.9293, -82.6248	326	9.084481804	354	11.6603754	7	8	8
SC01378	D1960	BIG ROCK LAKE DAM	PICKENS	34.9534, -82.7858	327	9.072109217	448	5.90093189	9	17	17
SC01405	D1461	DINKINS MILLPOND DAM	SUMTER	34.0402, -80.5342	328	9.06066611	142	31.73266126	1	1	1
SC01257	D1156	R M WATSONS POND DAM	SALUDA	33.8334, -81.6543	329	9.060442297	97	40.13287679	0	0	0
SC00532	D1635	LEONIDAS DAM	OCONEE	34.9144, -83.0153	330	9.039333741	506	3.805419845	1	8	8

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SC00460	D0017	HERMITAGE MILL POND DAM	KERSHAW	34.2438, -80.5716	331	8.980399739	216	23.18720067	11	3	11
SC01384	D1948	OOLENOY RIVER WCD DAM 9	PICKENS	34.9929, -82.7065	332	8.96759387	382	9.45950877	6	11	11
SC02428	D2435	SMOAK POND DAM	ORANGEBURG	33.5214, -80.8718	333	8.867990551	10	100.8267987	477	50	477
SC00674	D3480	LAKE PATRICIA DAM	YORK	35.0343, -80.9531	334	8.855013999	338	13.24786526	0	5	5
SC00487	D1071	DON TAYLOR DAM	KERSHAW	34.2085, -80.7638	335	8.835738577	151	30.30003701	7	10	10
SC02632	D4378	WILLIAM BOLEN DAM	BARNWELL	33.2987, -81.4244	336	8.816324633	119	36.45545282	6	9	9
SC02123	D3746	LOWER SANTEE SHORES DAM	ORANGEBURG	33.4896, -80.4849	337	8.801058102	257	19.75956062	13	37	37
SC02596	D4346	AMICK FARMS DAM	AIKEN	33.8553, -81.5756	338	8.68061531	157	28.84758394	0	0	0
SC01671	D3053	FOLKS LOWER POND DAM	BARNWELL	33.3798, -81.4246	339	8.668935979	123	36.07251935	4	5	5
SC00521	D1653	CONEROSS CREEK WCD DAM 8	OCONEE	34.7254, -83.0820	340	8.601349451	498	4.044349757	14	11	14
SC02446	D1362	JAMES CUSHMAN DAM	PICKENS	35.0637, -82.8187	341	8.539321313	398	8.542843467	5	6	6
SC00065	D0581	MIRROR LAKE DAM	RICHLAND	33.9680, -80.8967	342	8.495681453	168	27.73740738	5	12	12
SC00696	D1946	PINNACLE LAKE DAM	PICKENS	35.0265, -82.6972	343	8.44739344	355	11.59659076	0	5	5
SC01361	D1705	NURSERY HILL DAM	LEXINGTON	34.0639, -81.1883	344	8.424211798	264	18.70917782	15	39	39
SC02029	D2968	TEAGUE LAKE DAM	LAURENS	34.5422, -82.0563	345	8.389037644	414	7.88375201	24	14	24
SC00066	D0582	LAKE TROTWOOD DAM	RICHLAND	33.9698, -80.8930	346	8.272790108	122	36.09047067	16	51	51
SC01518	D2157	JETER POND DAM	UNION	34.5696, -81.4989	347	8.254765121	249	20.3723554	0	0	0
SC01491	D1326	PARKERS POND DAM	KERSHAW	34.3116, -80.7247	348	8.200832026	231	21.86476679	0	3	3
SC00264	D3407	THICKETTY CRK WCD 18	CHEROKEE	35.0891, -81.7286	349	8.16566661	478	5.027092123	6	7	7
SC01424	D1444	SECOND MILLPOND DAM	SUMTER	33.9169, -80.3809	350	8.131466664	93	41.26336161	31	56	56
SC01280	D0057	HARBISON NEW TOWN LAKE	RICHLAND	34.0773, -81.1482	351	8.128545485	279	17.57646856	525	1261	1261
SC01780	D2886	LAKE FAIRFIELD DAM	GREENVILLE	34.8767, -82.3423	352	8.122134239	417	7.518992433	43	128	128
SC00094	D0588	GWINNS POND	RICHLAND	33.9527, -80.7986	353	8.087229774	175	27.22731599	1	5	5
SC00005	D2914	H C HARPER POND DAM	GREENVILLE	34.7696, -82.1841	354	8.026641796	466	5.42109534	10	30	30
SC01064	D0023	COLUMBIA RESERVOIR DIKE	RICHLAND	34.0043, -81.0545	355	7.879405709	128	34.73547063	12	7	12
SC01612	D2686	WHETSTONE POND DAM	CALHOUN	33.6170, -80.7289	356	7.846992925	238	21.28105932	0	0	0
SC02466	D4083	WOODLAKE DAM	RICHLAND	34.1591, -80.8647	357	7.833401582	56	53.76686014	7	20	20
SC00550	D3143	BROADMTH CK WCD - PHILLIPS 8	ANDERSON	34.5405, -82.4609	358	7.811617323	474	5.185459484	5	8	8
SC00698	D1965	LAKE CALTON DAM	PICKENS	34.9245, -82.8238	359	7.794157107	410	8.142524737	3	17	17
SC00458	D2502	COLONIAL LAKE DAM	KERSHAW	34.3159, -80.6055	360	7.758182457	158	28.79376474	5	1	5
SC00018	D2828	FRIDDLE LAKE DAM	GREENVILLE	35.1262, -82.5362	361	7.733199869	461	5.485599865	5	6	6
SC01787	D2897	BROOKS POND DAM	GREENVILLE	34.7102, -82.2836	362	7.731033209	369	10.47020131	28	80	80
SC02651	D4398	BOB EDWARDS DAM	OCONEE	34.8182, -83.0787	363	7.718964399	427	6.790674439	6	7	7

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SC00268	D3408	THICKETTY CRK WCD 25	CHEROKEE	35.0120, -81.7294	364	7.701448369	415	7.584864685	10	17	17
SC02470	D0090	SE COMMUNITY PARK DAM	RICHLAND	33.9625, -80.9337	365	7.69102172	269	18.3718661	197	759	759
SC02405	D4085	HARBISON STRUCTURE 9	LEXINGTON	34.0772, -81.1622	366	7.650174919	214	23.2801348	1195	440	1195
SC00547	D0005	BIG CK WCD - RENTZ/WILLM 2	ANDERSON	34.6253, -82.4999	367	7.568648303	386	9.236064684	30	48	48
SC02065	D3022	BEAV-WARR CK WCD - DAM 1M	LAURENS	34.6363, -82.0703	368	7.437276121	421	7.338032305	6	10	10
SC00717	D1951	TWELVE MILE CK WCD DAM 8	PICKENS	34.9599, -82.7032	369	7.421219448	496	4.235743462	9	10	10
SC00574	D2625	SPEIGNERS POND DAM	CALHOUN	33.7116, -80.8114	370	7.356075194	288	17.27637002	0	1	1
SC02331	D4187	BOLING POND DAM	GREENVILLE	34.9488, -82.3425	371	7.321965665	488	4.570691935	11	25	25
SC01792	D2903	SHANNON LAKE DAM	GREENVILLE	34.8495, -82.2708	372	7.32107929	372	10.28078722	135	166	166
SC01183	D1277	LAKE QUAIL VALLEY DAM	LEXINGTON	34.0722, -81.1672	373	7.315291049	309	15.16259437	363	293	363
SC02289	D4153	FOREST SMITH POND DAM	CALHOUN	33.7231, -80.8459	374	7.290479544	152	30.21749895	0	0	0
SC00049	D0025	SPRING LAKE DAM	RICHLAND	34.0371, -80.9563	375	7.221883948	73	47.42635027	156	146	156
SC02558	D4309	LITTLE RIVER WCD DAM 2B	LAURENS	34.5396, -82.0440	376	7.184050343	447	5.946074787	22	8	22
SC12284	D4887	WS LEE PAB DAM	ANDERSON	34.6041, -82.4415	377	7.145065732	431	6.56840653	7	3	7
SC00564	D3126	3&20 CK WCD - TRIPP 14	ANDERSON	34.7437, -82.5773	378	7.114163883	439	6.156966719	5	9	9
SC01851	D3238	KIRKLEY SMALL POND DAM	CHESTERFIELD	34.5278, -80.3316	379	7.106857728	207	24.01400505	0	0	0
SC02406	D4176	WHITEFORD LAKE DAM	LEXINGTON	34.0083, -81.2228	380	7.102984442	248	20.44663958	40	138	138
SC00739	D4002	LAKE BOWEN DAM	SPARTANBURG	35.1076, -82.0177	381	7.099459106	434	6.421369566	105	161	161
SC01706	D3151	FRIDDLE POND B DAM	ANDERSON	34.4579, -82.4170	382	7.045286654	396	8.60909916	5	5	5
SC01524	D2163	BROWN'S CREEK WCD DAM 2	UNION	34.7713, -81.5609	383	7.043247051	425	6.87431586	5	7	7
SC02725	D4471	CRYOVAC DAM	SPARTANBURG	34.9069, -82.1100	384	7.033662167	376	10.10022667	0	0	0
SC00517	D1642	OCONEE STATE PARK DAM 1	OCONEE	34.8647, -83.1022	385	7.027702461	503	3.859893185	5	7	7
SC02391	D4127	LITTLE RIVER WCD DAM 3	LAURENS	34.5331, -82.0403	386	6.932516297	445	5.970986965	20	11	20
SC02109	D3713	PRATERS POND DAM	ORANGEBURG	33.5647, -80.9165	387	6.879431349	159	28.71488798	3	5	5
SC02120	D3735	WM DAVIS POND DAM	ORANGEBURG	33.5246, -81.0549	388	6.753908325	124	36.01283521	0	6	6
SC01016	D3623	LOWER HEATHER LAKES DAM	HORRY	33.8904, -78.5956	389	6.66951542	329	13.82054468	19	11	19
SC00551	D3142	BROADMOUTH CK WCD - DAM 9	ANDERSON	34.5361, -82.4674	390	6.6522821	441	6.095906105	9	14	14
SC00520	D1651	BROWNS LAKE DAM	OCONEE	34.7716, -83.0491	391	6.642402573	501	3.950349325	37	103	103
SC00554	D3132	3&20 CK WCD - ROBINSON 15	ANDERSON	34.7339, -82.5737	392	6.553931362	437	6.199006504	7	6	7
SC01578	D2615	EDENS SMALL POND DAM	CALHOUN	33.7858, -81.0360	393	6.504556592	162	28.40508082	10	19	19
SC03549	D4919	FOX HAVEN SUBDIVISION DAM	AIKEN	33.5323, -81.6742	394	6.49813247	335	13.36030344	6	4	6
SC02721	D4465	RABON CREEK WCD DAM 21	LAURENS	34.6250, -82.1738	395	6.361676158	460	5.498568294	16	40	40
SC02650	D4397	ROBERT CONNELLY DAM 2	ALLENDALE	33.0577, -81.2188	396	6.352540115	306	15.34700425	0	0	0

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SC00527	D1667	BEAVERDAM CREEK WCD DAM 4	OCONEE	34.5534, -82.9744	397	6.350359348	493	4.370549247	5	19	19
SC00070	D0029	NORTH LAKE DAM	RICHLAND	34.0397, -80.9515	398	6.32683755	330	13.80744179	67	87	87
SC00186	D1709	LL RIKARD DAM	LEXINGTON	33.9595, -81.3572	399	6.318059472	381	9.689738434	49	75	75
SC00002	D3985	LAKE CUNNINGHAM DAM	GREENVILLE	34.9781, -82.2452	400	6.254658249	440	6.130175916	39	55	55
SC00418	D3725	ROBERT SHIRER DAM	ORANGEBURG	33.5396, -80.5630	401	6.243155957	224	22.65995582	7	3	7
SC00510	D1639	LAKE LEROY DAM	OCONEE	34.8702, -83.1501	402	6.225349269	513	2.802578138	11	20	20
SC00420	D3706	ALEC CHAPLIN DAM	ORANGEBURG	33.5641, -81.0582	403	6.213359915	251	20.23505864	0	1	1
SC01161	D0227	JAMES A THOMPSON DAM 2	CHESTER	34.6517, -81.2383	404	6.200786282	367	10.5321908	1	2	2
SC02279	D4163	GEM LAKE ESTATES DAM 1	AIKEN	33.5101, -81.7492	405	6.197872729	166	27.86367851	5	10	10
SC00526	D1665	BEAVERDAM CREEK WCD DAM 5	OCONEE	34.5685, -82.9238	406	6.138036057	491	4.46075497	5	7	7
SC00051	D0595	MURRAY POND DAM	RICHLAND	33.9856, -80.7080	407	6.136676572	364	10.89092633	9	34	34
SC02566	D4318	ROYAL LAKE DAM	AIKEN	33.4990, -81.7183	408	6.126415136	131	33.36881936	15	40	40
SC00672	D3668	FISHING CREEK WCD DAM 4	YORK	34.9296, -81.1432	409	6.093627781	383	9.455164177	13	37	37
SC01523	D2162	LAKE JOHN D LONG	UNION	34.7733, -81.5062	410	6.054173529	408	8.216090637	0	8	8
SC01439	D2060	LAKEWOOD POND DAM	SUMTER	33.8442, -80.3643	411	6.04368476	370	10.46903997	33	12	33
SC00745	D3987	SMITH-CANTRELL POND DAM	SPARTANBURG	35.0018, -81.9812	412	6.024103364	433	6.491288907	120	86	120
SC00575	D2627	SIMENSEN POND DAM	CALHOUN	33.7142, -80.8176	413	6.020949777	297	16.07335846	0	0	0
SC00040	D3227	KIRKLEYS POND DAM	CHESTERFIELD	34.5257, -80.3339	414	5.959193486	397	8.568258851	0	0	0
SC01784	D2892	CARISBROOKE S/D DAM	GREENVILLE	34.8730, -82.2991	415	5.936857207	394	8.802398558	62	199	199
SC01712	D0223	JAMES A THOMPSON DAM 1	CHESTER	34.6518, -81.2342	416	5.929547959	340	12.82932129	1	2	2
SC01238	D1271	TOWN AND COUNTRY DAM 1	GREENWOOD	34.1693, -82.2168	417	5.921033492	404	8.355625556	8	10	10
SC02602	D4352	MARVIN ATKINS DAM	GREENVILLE	35.1200, -82.2220	418	5.821181817	477	5.035296863	0	7	7
SC00399	D3741	PATTEN SEED CO DAM	ORANGEBURG	33.4945, -80.7801	419	5.769233365	116	36.96209631	16	8	16
SC01239	D1272	TOWN AND COUNTRY DAM 2	GREENWOOD	34.1724, -82.2125	420	5.72136243	402	8.387452041	15	38	38
SC01596	D2927	PETER BUYCK'S HOUSE DAM	CALHOUN	33.7208, -80.7765	421	5.695439296	233	21.60070836	0	1	1
SC00254	D2999	DUNCAN CREEK WCD DAM 8	LAURENS	34.4902, -81.8389	422	5.652934613	401	8.451012692	1	0	1
SC02778	D4521	LAKE CAROLINA DAM	RICHLAND	34.1769, -80.8759	423	5.640679979	114	37.30838611	20	23	23
SC01666	D3059	ANDERSONS POND DAM	BARNWELL	33.3299, -81.4492	424	5.625652669	149	30.61601935	3	8	8
SC00585	D0007	LAKE INSPIRATION DAM	CALHOUN	33.6716, -80.7761	425	5.589377336	180	26.445667	5	8	8
SC01227	D4089	LAKE CHINQUAPIN DAM	GREENWOOD	34.1721, -82.2177	426	5.565098167	404	8.355625556	9	18	18
SC00701	D1952	TWELVE MILE CK WCD DAM 22	PICKENS	34.9378, -82.7003	427	5.551467573	494	4.262903539	26	30	30
SC02480	D4006	H TAYLOR BLALOCK RES DAM	SPARTANBURG	35.0527, -81.8632	428	5.549889817	429	6.716316885	113	70	113
SC00738	D3324	SOUTH PACOLET RIVER RES 1	SPARTANBURG	35.1111, -81.9702	429	5.520184755	450	5.793876757	54	60	60

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SC02574	D4325	SUNNY SLOPE FARMS DAM	CHEROKEE	35.0475, -81.7931	430	5.519593041	476	5.041541358	5	6	6
SC02489	D4147	W AND W FARMS DAM	SUMTER	34.1151, -80.5361	431	5.496212463	244	21.01190233	6	22	22
SC00523	D1655	CONEROSS CREEK WCD DAM 9A	OCONEE	34.6927, -83.0934	432	5.418079499	512	2.995116	11	9	11
SC00579	D2632	GRESSETT POND DAM	CALHOUN	33.6796, -80.8997	433	5.341858451	300	15.77024068	1	1	1
SC01170	D0208	LAKE ASHLEY DAM	CHESTER	34.6640, -81.2662	434	5.318434501	449	5.802213428	0	0	0
SC00048	D4434	FOREST LAKE DAM	RICHLAND	34.0221, -80.9627	435	5.312165882	89	42.74626633	851	569	851
SC02008	D3621	WOODROW SMITH DAM	HORRY	33.9202, -79.1305	436	5.273258997	280	17.54922196	17	36	36
SC00008	D2879	HUFF CREEK WCD DAM 2A	GREENVILLE	34.6501, -82.3596	437	5.201859553	475	5.133767969	7	15	15
SC01791	D2901	STONEBROOK FARM SD DAM	GREENVILLE	34.8360, -82.2382	438	5.18532092	362	11.2076392	129	34	129
SC00513	D1636	WHITEWATER LAKE DAM	OCONEE	34.9080, -83.0043	439	5.168509856	515	2.547454747	65	178	178
SC00617	D3550	BETHEA BAPTIST HOME DAM	DARLINGTON	34.2535, -79.8347	440	5.139777413	359	11.43673286	1	2	2
SC00515	D1641	MTN LAKE DAM (LAKE BECKY)	OCONEE	34.8458, -83.1176	441	5.09403	479	5.011425395	8	21	21
SC02486	D3977	OAK CREEK PLANTATION DAM	SPARTANBURG	34.9371, -81.8526	442	5.08912788	469	5.319756587	7	12	12
SC02839	D4597	CLIFF RIDGE POND DAM	GREENVILLE	35.1118, -82.6176	443	5.05170158	463	5.457207571	11	18	18
SC01708	D3147	G STEVENS POND DAM	ANDERSON	34.4995, -82.4545	444	5.028418921	470	5.254177523	6	9	9
SC00544	D3131	BRUSHY CK WCD - GANTT 17	ANDERSON	34.7674, -82.5376	445	4.995894347	483	4.73287753	10	27	27
SC02806	D4549	JACKSON PROPERTIES DAM	SPARTANBURG	35.0926, -82.1093	446	4.939523068	486	4.684582043	10	33	33
SC02648	D4396	STANLEY MCJUNKIN DAM	PICKENS	34.8902, -82.5080	447	4.922429931	511	3.371123714	17	41	41
SC01066	D4003	BOYDS MILLPOND DAM	LAURENS	34.4552, -82.1993	448	4.915251073	464	5.44211802	24	10	24
SC00341	D2014	SWINTS LAKE DAM	AIKEN	33.5925, -81.9165	449	4.849077865	291	16.77211716	9	14	14
SC02523	D4227	HUTTO POND DAM	ORANGEBURG	33.5835, -80.8373	450	4.848214107	105	38.90162975	0	0	0
SC02736	D4482	LAKE EMORY DAM	SPARTANBURG	35.0357, -82.0622	451	4.800908586	481	4.835348771	26	5	26
SC01777	D2882	SHELBY JOINES POND DAM	GREENVILLE	35.1028, -82.3279	452	4.787228288	492	4.421964375	4	6	6
SC02396	D4132	LITTLE RIVER WCD DAM 23	LAURENS	34.5155, -82.0593	453	4.7618671	446	5.957150152	52	11	52
SC00050	D0026	CARYS LAKE DAM	RICHLAND	34.0487, -80.9579	454	4.714824135	328	13.86964233	448	276	448
SC00253	D3005	DUNCAN CREEK WCD DAM 7	LAURENS	34.4857, -81.8334	455	4.704302135	432	6.504501822	2	0	2
SC02436	D4168	JAMES ALBERGOTTI DAM	ORANGEBURG	33.5149, -80.9020	456	4.685381906	121	36.12476537	9	12	12
SC02385	D4038	BAILEY DAM	LAURENS	34.4891, -81.9040	457	4.655776291	435	6.333401197	6	9	9
SC01377	D3981	PRATERS CREEK DAM	PICKENS	34.8459, -82.7786	458	4.655070125	459	5.572098975	8	14	14
SC02397	D4133	LITTLE RIVER WCD DAM 24	LAURENS	34.5155, -82.0542	459	4.649306946	444	5.976519395	48	12	48
SC00576	D2628	RILEYS POND DAM	CALHOUN	33.6991, -80.8155	460	4.571448767	331	13.72572613	0	1	1
SC02284	D4149	DOROTHY B RAST POND DAM	CALHOUN	33.5656, -80.6181	461	4.538531705	339	13.12451572	6	4	6
SC00380	D2134	GEM LAKES EST ASSOC DAM	AIKEN	33.5075, -81.7513	462	4.538116562	188	25.65560963	10	25	25

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SC02532	D4125	MOSS GROVE PLANTATION DAM	BERKELEY	33.1630, -80.0321	463	4.524070785	64	50.47903264	0	0	0
SC00577	D2630	DRAWDY POND DAM	CALHOUN	33.7005, -80.8257	464	4.496087666	271	18.18385573	3	3	3
SC01245	D1256	BURTON POND DAM	SALUDA	33.8483, -81.6202	465	4.202997381	400	8.472479801	3	0	3
SC02501	D4184	GEM LAKE ESTATES DAM 2	AIKEN	33.5055, -81.7547	466	4.193286231	217	23.1847372	4	11	11
SC00557	D3123	LAKE HUNTINGTON DAM	ANDERSON	34.5348, -82.6444	467	4.091847237	514	2.717143006	112	76	112
SC00069	D0028	ROCKY FORD LAKE DAM	RICHLAND	34.0361, -80.9521	468	4.020601694	146	31.43531709	109	121	121
SC02617	D4367	GLENN FOREST DAM	SPARTANBURG	34.9372, -81.8458	469	4.01486634	472	5.228435328	5	8	8
SC02227	D3302	D HONEY NO 1 POND DAM	SPARTANBURG	35.1393, -82.1158	470	3.946987221	487	4.609157734	9	25	25
SC02842	D4600	JOE DAVES DAM	YORK	34.9394, -81.1917	471	3.934645702	495	4.240416166	2	7	7
SC01681	D3068	LAKE CYNTHIA DAM	BARNWELL	33.3340, -81.2656	472	3.878438791	240	21.22861732	1	1	1
SC02267	D2007	JOHNSONS LAKE DAM	AIKEN	33.4380, -81.8085	472	3.878438791	262	19.00393499	6	1	6
SC00201	D0933	JW CORLEY DAM	LEXINGTON	33.8689, -81.5199	472	3.878438791	391	8.909047103	6	3	6
SC01515	D2154	UNION WATER WORKS DAM	UNION	34.7272, -81.6150	472	3.878438791	438	6.169342925	6	5	6
SC01541	D2577	CULBERTSON POND DAM	ALLENDALE	33.0609, -81.4386	476	3.865397153	451	5.793490351	0	1	1
SC02661	D4409	STEVE WINGARD DAM	GREENVILLE	34.9557, -82.3846	477	3.862796779	510	3.416811645	5	6	6
SC01190	D1640	GORDONS LAKE DAM	OCONEE	34.8791, -83.1314	478	3.850988738	507	3.744616805	6	5	6
SC02114	D3722	GUES POND DAM	ORANGEBURG	33.5655, -80.8082	479	3.816115264	406	8.300666913	0	1	1
SC00445	D3683	KITCHENS DAM	ORANGEBURG	33.6293, -81.1214	480	3.793878908	290	16.96984482	3	1	3
SC01794	D2905	FAIRVIEW LAKE	GREENVILLE	34.7005, -82.2480	481	3.716569097	473	5.191194842	15	41	41
SC00360	D2042	MISTY LAKE DAM	AIKEN	33.5624, -81.9055	482	3.716140488	365	10.77885011	9	3	9
SC02271	D4069	WOODSIDE DAM 1	AIKEN	33.4964, -81.7344	483	3.600210558	347	11.85456193	8	14	14
SC03534	D4904	ORCHARDS DAM	YORK	35.0613, -80.9257	484	3.443852948	509	3.443852948	37	119	119
SC02531	D4236	STROMAN/RICHARDSON DAM	ORANGEBURG	33.4919, -81.2061	485	3.425440741	366	10.68418381	7	6	7
SC02798	D4541	DR OLIVER T WILLARD DAM	GREENWOOD	34.2765, -82.0918	486	3.421287146	482	4.801529087	7	10	10
SC00278	D1416	SUNNY SLOPE FARMS	CHEROKEE	35.0464, -81.7897	487	3.339082551	423	7.203874741	8	6	8
SC02809	D4553	POOLE DAM	GREENVILLE	35.0150, -82.3910	488	3.277173151	490	4.515098808	1	1	1
SC01569	D2922	BOOZER LOWER POND DAM	CALHOUN	33.8173, -81.0060	489	3.253090491	348	11.81515805	4	4	4
SC01828	D3140	LOLLIS POND DAM	ANDERSON	34.5720, -82.5133	490	3.186413449	468	5.402722003	8	2	8
SC00305	D2034	AW BAILEY DAM	AIKEN	33.5946, -81.2860	491	3.166980542	322	14.22821126	0	0	0
SC00716	D1940	TWELVE MILE CR WCD DAM 12	PICKENS	34.8702, -82.6303	492	3.149290023	517	1.991501591	41	94	94
SC00084	D0543	OAK HILLS GOLF CLUB DAM	RICHLAND	34.1098, -81.0363	493	3.12655633	374	10.17316587	12	5	12
SC00428	D3692	NORTHSIDE CC DAM	ORANGEBURG	33.6077, -80.9977	494	3.103632557	324	14.14063073	0	1	1
SC01731	D2834	SAM HOFFMAN POND DAM	GREENVILLE	35.0567, -82.4919	495	3.09511992	499	4.030238432	4	5	5

National Inventory ID #	State Inventory ID #	Dam Name	County	Coordinates	TRF-Flooding Rank	Total Risk Factor - Flooding	TRF-Seismic Rank	Total Risk Factor - Seismic	PAR Day	PAR Night	PAR Max
SC02272	D4075	WOODSIDE DAM 2	AIKEN	33.4929, -81.7331	496	3.093965576	346	11.91499821	5	8	8
SC00543	D3137	BRUSHY CK WCD - KRAEMER 16	ANDERSON	34.7851, -82.5222	497	2.879422679	484	4.727004986	10	32	32
SC02563	D4315	WAYNE KING DAM	EDGEFIELD	33.6132, -82.0231	498	2.877145356	412	7.989969785	10	26	26
SC00592	D2643	DOROTHY RAST DAM 1	CALHOUN	33.5688, -80.6173	499	2.861095568	313	14.86859256	6	5	6
SC01705	D3152	FRIDDLE POND A DAM	ANDERSON	34.4575, -82.4156	500	2.855001652	500	3.951647502	4	4	4
SC00662	D1215	ADAMS POND DAM	YORK	35.0911, -81.3092	501	2.827236248	504	3.855151545	1	0	1
SC01545	D2570	IVANHOE PLANTATION DAM	ALLENDALE	32.8136, -81.3498	502	2.660155387	454	5.690178172	0	0	0
SC02251	D1129	SWEETWATER INC DAM	GREENVILLE	35.1155, -82.4817	503	2.56	351	11.7	6	7	7
SC02666	D4413	LITTLE LYNCHES WCD DAM 12	LANCASTER	34.5522, -80.6081	504	2.407037832	221	22.75148745	30	40	40
SC02133	D3765	WHETSTONE FISHING LAKE	ORANGEBURG	33.4009, -81.0730	505	2.367782836	489	4.518349	0	1	1
SC00540	D3128	ANDERSON POND DAM	ANDERSON	34.6228, -82.5847	506	2.34213803	508	3.598037718	19	52	52
SC02337	D2081	JORDAN POND DAM	GREENVILLE	34.9817, -82.3264	507	2.323357815	516	2.257438531	20	21	21
SC02435	D4183	KENNY BATES DAM	ORANGEBURG	33.4540, -80.9851	508	2.095151217	458	5.603837099	1	1	1
SC02369	D2710	DRUID HILLS DAM	GREENWOOD	34.2276, -82.1830	509	2.032093203	485	4.706232442	8	9	9
SC00456	D2510	RALEY MILLPOND DAM	KERSHAW	34.5322, -80.3774	510	1.910631882	165	27.95453987	0	7	7
SC00553	D3112	3&20 CK WCD - GRIFFIS 9B	ANDERSON	34.6790, -82.7267	511	1.90027101	518	1.569700558	6	9	9
SC02280	D4164	HOUNDSLAKE CC DAM	AIKEN	33.5257, -81.7440	512	1.846436957	411	8.002807622	40	19	40
SC02568	D4319	PAUL GEDDINGS DAM	ORANGEBURG	33.6243, -81.0049	513	1.833862049	426	6.793155316	0	0	0
SC02835	D4587	JOCASSEE RIDGE REFL DAM	OCONEE	34.9234, -82.9629	514	1.46145708	519	0.987726026	14	35	35
SC02105	D3705	HUTTOS MILLPOND DAM	ORANGEBURG	33.5567, -81.0569	515	1.405002528	392	8.865329292	1	0	1
SC01914	D3492	EDNA WARD POND DAM	CLARENDON	33.7140, -80.2694	516	1.094988445	371	10.28079866	7	14	14
SC00293	D1993	SUDLOW LAKE DAM	AIKEN	33.5462, -81.8849	----[1]	----[1]	33	65.44068399	10	10	10
SC00175	D0953	FRANCES AND BILL IRWIN DAM	LEXINGTON	33.9274, -81.2672	----[1]	----[1]	80	45.17887598	7	9	9
SC01297	D0672	CAPERS MILLPOND DAM	AIKEN	33.5771, -81.2903	----[1]	----[1]	261	19.02705756	0	0	0
SC00287	D0003	LANGLEY POND DAM	AIKEN	33.5207, -81.8451	----[1]	----[1]	----[1]	----[1]	150	267	267
SC00103	D0137	DEERLAKE DAM	RICHLAND	34.0838, -80.8741	----[1]	----[1]	----[1]	----[1]	5	4	5
SC02826	D0213	ROCKY CREEK WCD DAM 6	CHESTER	34.7442, -81.1726	----[1]	----[1]	----[1]	----[1]	7	14	14
SC01157	D0214	ROCKY CREEK WCD DAM 8	CHESTER	34.6670, -81.1747	----[1]	----[1]	----[1]	----[1]	1	2	2
SC01159	D0228	ATKINSON POND DAM	CHESTER	34.7246, -81.1451	----[1]	----[1]	----[1]	----[1]	1	1	1
SC01283	D0544	LINCOLNSHIRE HOA DAM	RICHLAND	34.0888, -81.0364	----[1]	----[1]	----[1]	----[1]	7	19	19
SC01288	D0559	LOWER SPRING VAL LAKE DAM	RICHLAND	34.1034, -80.9258	----[1]	----[1]	----[1]	----[1]	117	31	117
SC01289	D0562	PARK SHORE LAKE DAM	RICHLAND	34.1178, -80.9210	----[1]	----[1]	----[1]	----[1]	19	76	76
SC00101	D0566	WILDEWOOD POND DAM 3	RICHLAND	34.1006, -80.8801	----[1]	----[1]	----[1]	----[1]	69	17	69

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SC00073	D0572	WALDEN PLACE POND DAM	RICHLAND	34.1167, -80.8459	----[1]	----[1]	----[1]	----[1]	18	66	66
SC00104	D0574	BEAVER LAKE DAM	RICHLAND	34.1170, -80.8292	----[1]	----[1]	----[1]	----[1]	8	5	8
SC00107	D0575	WOODCREEK DAM	RICHLAND	34.1212, -80.8116	----[1]	----[1]	----[1]	----[1]	38	35	38
SC00067	D0579	SUNVIEW LAKE DAM	RICHLAND	33.9666, -80.9116	----[1]	----[1]	----[1]	----[1]	14	6	14
SC00055	D0580	PINEWOOD LAKE DAM	RICHLAND	33.9442, -80.9120	----[1]	----[1]	----[1]	----[1]	1	0	1
SC01286	D0589	PEELER'S POND DAM	RICHLAND	33.9482, -80.8004	----[1]	----[1]	----[1]	----[1]	4	1	4
SC00302	D0696	AIKEN OUTING CLUB DAM	AIKEN	33.5949, -81.7609	----[1]	----[1]	----[1]	----[1]	9	6	9
SC00327	D0808	MICHAEL LAUGHLIN DAM	AIKEN	33.6389, -81.5815	----[1]	----[1]	----[1]	----[1]	0	0	0
SC00326	D0827	LAUGHLIN POND DAM	AIKEN	33.6393, -81.5758	----[1]	----[1]	----[1]	----[1]	0	0	0
SC01132	D0899	KELSEY POND DAM	EDGEFIELD	33.8263, -81.7915	----[1]	----[1]	----[1]	----[1]	6	10	10
SC01143	D0902	KENT-LEPARD POND DAM	EDGEFIELD	33.6966, -81.9928	----[1]	----[1]	----[1]	----[1]	11	4	11
SC01106	D0911	RAINSFORD POND DAM	EDGEFIELD	33.6926, -81.9494	----[1]	----[1]	----[1]	----[1]	8	18	18
SC00183	D0944	CLAYTON RAWL FARMS DAM	LEXINGTON	33.9483, -81.3164	----[1]	----[1]	----[1]	----[1]	64	136	136
SC00169	D0959	GIBSON'S POND DAM	LEXINGTON	33.9694, -81.2434	----[1]	----[1]	----[1]	----[1]	79	97	97
SC00142	D0960	SAXE-GOTHA MILLPOND DAM	LEXINGTON	33.9292, -81.2422	----[1]	----[1]	----[1]	----[1]	7	9	9
SC00150	D0966	JEFF HUNT DAM	LEXINGTON	33.9098, -81.1653	----[1]	----[1]	----[1]	----[1]	54	58	58
SC00144	D0969	MORANGE POND DAM	LEXINGTON	33.8750, -81.2459	----[1]	----[1]	----[1]	----[1]	31	49	49
SC00162	D0980	POOLES UPPER MILLPOND DAM	LEXINGTON	33.6949, -81.1823	----[1]	----[1]	----[1]	----[1]	4	1	4
SC02143	D1222	LOWER YORK RESERVOIR DAM	YORK	34.9994, -81.2534	----[1]	----[1]	----[1]	----[1]	20	8	20
SC02158	D1234	LAKE ELLIOTT DAM	YORK	35.0169, -80.9708	----[1]	----[1]	----[1]	----[1]	11	25	25
SC00457	D1329	ADAMS MILLPOND DAM	KERSHAW	34.2839, -80.5234	----[1]	----[1]	----[1]	----[1]	8	24	24
SC01087	D1470	NEELS POND	NEWBERRY	34.2819, -81.7348	----[1]	----[1]	----[1]	----[1]	5	5	5
SC01250	D1597	HERLONGS POND DAM	SALUDA	33.9885, -81.7254	----[1]	----[1]	----[1]	----[1]	5	8	8
SC00538	D1643	OCONEE STATE PARK DAM 2	OCONEE	34.8605, -83.1094	----[1]	----[1]	----[1]	----[1]	6	10	10
SC00131	D1777	ANDREW JACKSON ST PK LAKE	LANCASTER	34.8443, -80.8085	----[1]	----[1]	----[1]	----[1]	0	0	0
SC00711	D1925	LAWRENCE LEDFORD DAM	PICKENS	34.9870, -82.5706	----[1]	----[1]	----[1]	----[1]	6	10	10
SC00710	D1969	LAKE DIANA DAM	PICKENS	34.9210, -82.8674	----[1]	----[1]	----[1]	----[1]	7	15	15
SC00708	D1971	NORTON DAM	PICKENS	34.8588, -82.8499	----[1]	----[1]	----[1]	----[1]	6	9	9
SC01416	D1986	FRIERSON POND DAM	SUMTER	33.9595, -80.4497	----[1]	----[1]	----[1]	----[1]	37	13	37
SC00289	D1992	MCELMURRAY POND DAM	AIKEN	33.4153, -81.8204	----[1]	----[1]	----[1]	----[1]	8	1	8
SC00296	D1994	NEESES LAKE DAM	AIKEN	33.5824, -81.5111	----[1]	----[1]	----[1]	----[1]	3	1	3
SC00308	D2003	BAKER POND DAM	AIKEN	33.5733, -81.8820	----[1]	----[1]	----[1]	----[1]	20	9	20
SC00311	D2004	CHAPMAN POND DAM	AIKEN	33.4735, -81.6523	----[1]	----[1]	----[1]	----[1]	9	15	15

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SC00317	D2005	TRUST POND DAM	AIKEN	33.5387, -81.8929	----[1]	----[1]	----[1]	----[1]	19	56	56
SC00332	D2010	STURM DAM	AIKEN	33.5071, -81.7704	----[1]	----[1]	----[1]	----[1]	6	10	10
SC00333	D2011	RAY CAMPBELL DAM	AIKEN	33.4101, -81.8149	----[1]	----[1]	----[1]	----[1]	0	1	1
SC00502	D2411	CEDAR CREEK MILLPOND DAM	LEE	34.2245, -80.3491	----[1]	----[1]	----[1]	----[1]	1	3	3
SC00500	D2414	LAKE ASHWOOD DAM	LEE	34.1002, -80.3161	----[1]	----[1]	----[1]	----[1]	7	12	12
SC01636	D2416	DENNY POND DAM	LEE	34.2307, -80.2587	----[1]	----[1]	----[1]	----[1]	33	79	79
SC01755	D2854	MOUNTAIN LAKE DAM	GREENVILLE	34.9361, -82.3906	----[1]	----[1]	----[1]	----[1]	4	6	6
SC01774	D2875	PARKINS LAKE DAM	GREENVILLE	34.8048, -82.3595	----[1]	----[1]	----[1]	----[1]	42	26	42
SC00009	D2880	HUFF CREEK WCD DAM 3A	GREENVILLE	34.6344, -82.3521	----[1]	----[1]	----[1]	----[1]	7	15	15
SC00007	D2889	HUFF CREEK WCD DAM 1B	GREENVILLE	34.6928, -82.3407	----[1]	----[1]	----[1]	----[1]	10	25	25
SC00006	D2890	HUFF CREEK WCD DAM 5B	GREENVILLE	34.6693, -82.3396	----[1]	----[1]	----[1]	----[1]	10	20	20
SC00975	D3081	KNOLLWOOD DAM 2	WILLIAMSBURG	33.5049, -79.9522	----[1]	----[1]	----[1]	----[1]	0	0	0
SC00045	D3228	SANDHILL ST FOREST DAM 6	CHESTERFIELD	34.5333, -80.0807	----[1]	----[1]	----[1]	----[1]	0	0	0
SC00649	D3428	CHARLOTTE BOURNE DAM	MARLBORO	34.7241, -79.8473	----[1]	----[1]	----[1]	----[1]	1	4	4
SC02073	D3430	MCMEEKIN POND DAM	MARLBORO	34.7377, -79.7993	----[1]	----[1]	----[1]	----[1]	2	5	5
SC01945	D3511	HILTON KINGS POND DAM	DARLINGTON	34.3954, -80.1938	----[1]	----[1]	----[1]	----[1]	14	20	20
SC01943	D3517	HIGHLAND POND DAM	DARLINGTON	34.4098, -80.0803	----[1]	----[1]	----[1]	----[1]	6	10	10
SC01941	D3520	DOGWOOD LAKE DAM	DARLINGTON	34.3879, -80.0282	----[1]	----[1]	----[1]	----[1]	3	15	15
SC01951	D3527	CITY OXIDIZATION POND	DARLINGTON	34.1776, -80.0498	----[1]	----[1]	----[1]	----[1]	2	7	7
SC00624	D3537	RAMSEY POND DAM	DARLINGTON	34.2928, -79.9102	----[1]	----[1]	----[1]	----[1]	3	22	22
SC01962	D3601	SPIVEYS MILLPOND DAM	DILLON	34.3552, -79.1514	----[1]	----[1]	----[1]	----[1]	1	2	2
SC02012	D3616	GRAHAM MILL POND DAM	HORRY	34.0174, -79.1730	----[1]	----[1]	----[1]	----[1]	4	5	5
SC02003	D3630	MARTIN DUCK POND DAM	HORRY	33.7880, -79.1647	----[1]	----[1]	----[1]	----[1]	3	6	6
SC00681	D3643	BYRDS LAWN & LANDS INC DAM	YORK	35.0331, -81.2462	----[1]	----[1]	----[1]	----[1]	5	8	8
SC00686	D3649	KAISER DAM	YORK	34.9960, -80.9692	----[1]	----[1]	----[1]	----[1]	46	63	63
SC02152	D3650	WILLIAMS POND DAM	YORK	34.9117, -80.9260	----[1]	----[1]	----[1]	----[1]	9	22	22
SC00670	D3665	JOE DAVES DAM	YORK	34.9143, -81.1962	----[1]	----[1]	----[1]	----[1]	7	24	24
SC00683	D3672	MARSHALL DAM	YORK	34.8611, -81.0198	----[1]	----[1]	----[1]	----[1]	14	7	14
SC02463	D4021	SIDNEY BOUKNIGHT DAM	RICHLAND	34.1524, -81.2172	----[1]	----[1]	----[1]	----[1]	24	8	24
SC02270	D4029	MALLARD LAKE DAM	AIKEN	33.5254, -81.7032	----[1]	----[1]	----[1]	----[1]	26	12	26
SC02329	D4034	LAUREL LAKE SUBDIV DAM	GREENVILLE	34.8200, -82.1966	----[1]	----[1]	----[1]	----[1]	6	3	6
SC02476	D4124	RM WATSON DAM	SALUDA	33.8292, -81.6564	----[1]	----[1]	----[1]	----[1]	0	0	0
SC02467	D4146	WEST LAKE FARMS DAM	RICHLAND	34.1826, -80.9440	----[1]	----[1]	----[1]	----[1]	22	99	99

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SC02629	D4373	WILLIAM JENKINS DAM	BARNWELL	33.1292, -81.3516	----[1]	----[1]	----[1]	----[1]	3	3	3
SC02752	D4498	DIXIE CLAY COMPANY DAM	AIKEN	33.4935, -81.8593	----[1]	----[1]	----[1]	----[1]	89	231	231
SC00356	D4933	HAILE GOLD MINE TSF	LANCASTER	34.6144, -80.5397	----[1]	----[1]	----[1]	----[1]	5	6	6
SCD5010	D5010	DAM ON CHRISTINE DRIVE	PICKENS	34.7646, -82.6720	----[1]	----[1]	----[1]	----[1]	1	5	5
SCD5021	D5021	HUFFSTETLER POND DAM	LEXINGTON	33.9623, -81.1185	----[1]	----[1]	----[1]	----[1]	19	59	59
SCD5026	D5026	HUFFS LAKE DAM	GREENVILLE	34.8745, -82.4598	----[1]	----[1]	----[1]	----[1]	22	70	70
SCD5031	D5031	DOGGISH POND DAM	EDGEFIELD	33.8236, -81.8031	----[1]	----[1]	----[1]	----[1]	23	51	51
SCD5032	D5032	MCLAURINS MILLPOND DAM	MARLBORO	34.6546, -79.5360	----[1]	----[1]	----[1]	----[1]	4	8	8
SCD5034	D5034	LAKE CHARLOTTE DAM	YORK	34.9390, -81.0890	----[1]	----[1]	----[1]	----[1]	13	30	30
SCD5037	D5037	FIRST QUALITY TISSUE ASB DAM	ANDERSON	34.4469, -82.6886	----[1]	----[1]	----[1]	----[1]	3	4	4
SCD5038	D5038	OLEANDER DRIVE DAM	ORANGEBURG	33.5592, -80.9208	----[1]	----[1]	----[1]	----[1]	1	2	2
SCD5041	D5041	FASKIN LANE DAM	LEXINGTON	33.9941, -81.2643	----[1]	----[1]	----[1]	----[1]	21	75	75
SCD5044	D5044	LONGBRANCH FISH POND DAM	RICHLAND	33.8739, -80.6754	----[1]	----[1]	----[1]	----[1]	3	18	18
SCD5045	D5045	LONGBRANCH DUCK POND DAM	RICHLAND	33.8734, -80.6682	----[1]	----[1]	----[1]	----[1]	5	7	7
SCD5046	D5046	LAUREL MEADOWS DRIVE DAM	LEXINGTON	34.0005, -81.1413	----[1]	----[1]	----[1]	----[1]	22	52	52
SCD5053	D5053	ALLANS MILL S/D POND 1 DAM	RICHLAND	34.0764, -80.8887	----[1]	----[1]	----[1]	----[1]	1	5	5
SCD5059	D5059	BUSH GARDENS DAM	LEXINGTON	34.0375, -81.1348	----[1]	----[1]	----[1]	----[1]	10	21	21
SCD5060	D5060	FOREST LAKE DAM	GREENWOOD	34.2133, -82.1934	----[1]	----[1]	----[1]	----[1]	55	53	55
SCD5061	D5061	TIFTON DR E DAM	GREENWOOD	34.2154, -82.1923	----[1]	----[1]	----[1]	----[1]	26	26	26
SCD5062	D5062	KIMBERTON AVE DAM	BERKELEY	34.2133, -82.1934	----[1]	----[1]	----[1]	----[1]	6	13	13
COUNT	**614 HHPDs**				**516 HHPDs w/ TRF-F**		**519 HHPDs w/ TRF-S**		**614 HHPDs w/ PAR**		

Note: [1]Complete data for scoring was not available at time of this document's publication