Flood Control

CENTENNIAL 1912-2012

NM D+

NEW MEXICO

LAND OF ENCHANTMENT

Conchas Dam was built during the 1930s.
U. S. Army Corps of Engineers, Albuquerque District, New Mexico.
prn1/553118_10150707387691585_367402591584_9438001_1571999896_n.jpg.

Overview: Flood Control

In the 2005 Infrastructure Report Card, participating agencies reported a total of 390 dams permitted by the Office of the State Engineer's (OSE) Dam Safety Bureau, 194 miles of flood control channels, and a financial need of $585 million to bring the state's flood control infrastructure up to par.

The report assigned a grade of D+ to the flood control infrastructure in New Mexico. That report, like this one, does not address larger storage and regulating dams and levee systems operated by federal agencies, as they are included in the 2009 report Card for America's Infrastructure compiled by the American Society of Civil Engineers (ASCE).

Since the 2005 Infrastructure Report Card for the State of New Mexico, some noteworthy developments have occurred with respect to the state's flood control infrastructure:

(1) In 2006, the Village of Hatch in Doña Ana County was devastated by flooding from extreme rainfall during the monsoon season. The Placitas Arroyo, which drains out of the Sierra de Las Uvas, has no flood control dams on it, so there was no dam overtopping or failure. The arroyo overtopped both banks, flooding into downtown Hatch as well as significant acreage of agricultural land. There was no loss of life in the event, but the damage to property and economic loss was significant.

Two years later, flooding induced by the remnants of Hurricane Dolly caused extensive flooding and property damage in Ruidoso. Again, an extreme weather event hit a watershed with relatively little protection.

(2) In 2009, the statutory definition of a jurisdictional dam was changed, reducing the number of dams that are classified as jurisdictional.

The new definition, consistent with the definition of an Inventory Dam under the National Dam Safety Inspection Act, excludes: (a) Dams less than 25 feet high with less than 50 acre-feet of storage

Overview (cont'd)

capacity, (b) Dams less than six feet high regardless of capacity, and (c) Dams with less than 15 acre-feet of storage capacity regardless of height.

(3) A few agencies responsible for flood control dams developed, as required by state engineer dam safety regulations, flood inundation mapping and emergency action planning; which, while it does not constitute physical infrastructure, certainly demonstrates planning and improvements in public safety. The work is underway, with much left to do.

(4) The state's existing physical infrastructure got seven years older.

Many of the flood control dams were built with a 50 year design life, and of those several are beyond that age. While maintenance may extend the useful life of facilities, routine upkeep is an issue in the state. Many of the flood control dams do not comply with current dam safety regulations, and information to support the design of the dam is not available to the state regulatory authority. As a result of this missing critical data, the state has classified these dams in poor conditions based on the 2008 National Inventory of Dams definitions for the condition assessment.

The Village of Hatch, NM.
Photo by Gary Esslinger
(August 2006).

Overview (cont'd)

There remains a broad spectrum of infrastructure conditions in the state, making it difficult to assign a meaningful grade to the state as a whole. Urban and peripheral suburban areas tend to have much better flood control infrastructure, reflective of more severe consequences of failure and better planning and enforcement.

Rural areas continue to be plagued by development around aging low hazard dams without upgrading them to reflect the high hazard nature of the developed state. Inadequate spillway capacity, deterioration of pipes, gates, valves, etc. continue to be problematic.

However, summary indicators such as the grading system employed here provide useful guidance to policy makers in the form of a distilled snapshot without the encumbrance of voluminous detail.

Current discussions on a National Levee Safety Program (NLSP) could have significant impacts on New Mexico's flood control infrastructure rating. The NLSP in its current form would classify above-grade irrigation canals as levees.

New Mexico has thousands of miles of irrigation canals, many of which are more than a century old, and the vast majority were not designed with engineered levee specifications. The discussion over classification of irrigation canals is ongoing. Non-federal levee systems are generally not regulated. Specifications for levees associated with dams are included in the Dam Safety Bureau's rules and regulations.

Levees as components of flood control systems are reviewed by federal, city, county, and soil and water conservation districts as appropriate for location, but there appears to be no centralized database on the existence or status of levees not directly associated with dams. While the NLSP could assist in the development and maintenance of such a database, the administrative investment required is daunting, particularly if irrigation canals are included.

Furthermore, there is a huge number of levees that have not gone through a review process, particularly on private land, and capturing them in a database would be problematic.

Capacity

Condition

Some 390 dams, regardless of the purpose, were identified in the 2005 report card, 20% of which did not meet design standards. Recent changes in the definition of jurisdictional dams have reduced the number of jurisdictional dams to 300. An effort by the OSE Dam Safety Bureau to assign a condition classification to all dams began in 2006. In 2008, the National Inventory of Dams established standard definitions for the condition assessment, which were very similar to the definitions used by the Dam Safety Bureau. All have been classified with a condition assessment. There are 218 dams (73%) considered deficient or not in satisfactory condition. Of the jurisdictional dams, 144 are for flood control and 112 (78%) are considered deficient or not in satisfactory condition. Weight: 10%; Score: 66; Grade: D.

Water main break. 4 April 2007.

Condition

Urban areas tend to have facilities in better condition. Many rural and suburban areas have dams that were not built for their current hazard level, are at or beyond their design life, have accumulated significant amounts of sediment, and have deteriorating structural components. The diversity of physical conditions reflects the broad range of funding availability and organizational capacity. Weight: 30%; Score: 70; Grade: C-.

Operation and Maintenance

The Dam Safety Bureau periodically inspects high and significant hazard dams on a yearly to every five years basis depending on the hazard classification, purpose and capabilities of the owner. Low hazard dams are inspected every five years. Resources are limiting the frequency with which dams are inspected. However, State Engineer Dam Safety regulations require every owner of a high or significant hazard potential dam owner to have an

Public Safety

Funding

operation and maintenance manual. 33 dams out of 211 classified as high or significant hazard potential have an approved operation and maintenance manual. Required work ranges from maintenance to major rehabilitation. Again, urban infrastructure tends to be better maintained than rural systems. Weight: 15%; Score: 70; Grade: C-.

Public Safety

The Dam Safety Program helps to ensure public safety related to dams in urban and many suburban areas. However, a large number of rural and suburban residential areas are in areas nominally protected by dams and flood channels that are not built for high hazard duty. Emergency action planning somewhat mitigates the risk of loss of life. The Hatch flood of 2006 and other events in Ruidoso in 2008 suggest that public safety is at risk in some areas not due to aged or poorly maintained flood control infrastructure, but by anomalous storms striking watersheds with little or no protective facilities. While property damage was extensive in both cases, there was no loss of life. Weight: 15%; Score: 68; Grade: D+.

Funding

Particularly rural and suburban areas have antiquated and inadequate funding mechanisms. For example, Land Improvement Districts assess levies on properties in the areas they protect, but the rates are generally far out of date. Soil and Water Conservation Districts have the ability to assess levies, but they must be passed by referendum, and such levies are not generally popular.

The report card in 2005 presented funding needs of $585 million in surveyed areas. The current value for dams, provided by the Dam Safety Bureau, is $240 million for all dams and $135 million for flood control dams. A value was not estimated for this report for all flood control infrastructure. The value is likely higher as the backlog of maintenance, rehabilitation, and reconstruction needs grows as the infrastructure ages.

Weight: 10%; Score: 64; Grade: D.

Planning

Resilience

Planning

Planning is traditionally a problematic area, where arroyos may pass through several flood management jurisdictions that have little coordination. Regional coordination in urban areas can provide flood master planning ability. Progress has been made in breach analyses, flood plain mapping, and emergency action planning. Ongoing efforts to coordinate regionally (e.g. South-Central New Mexico Stormwater Management Coalition) are encouraging. Weight: 10%; Score: 72; Grade: C-.

Resilience

Active planning and development of emergency action plans in many areas of the state has improved responsiveness to potential failures of flood control dams. Much work remains to be done.

Many flood control structures, particularly in rural areas have been designed and built with little attention to upstream or downstream facilities, creating the potential for cascading failures.

Coordination and master planning can help going forward, including identifying and prioritizing areas with heightened hazards from interaction among structures. Climate change is emerging as an issue of long term concern. Recent and on-going climate change research is settling on the conclusion that the southwestern United States, including New Mexico, will likely be faced with more extreme events, with altered timing, in the future climate.

Flood control infrastructure design standards implicitly assume statistically stationary behavior in flood events, and so a system or structure that was designed for a 100 year event in 1975 may be entirely inadequate for the equivalent probability event in 2040.

Weight: 10%; Score: 67; Grade: D.

FLOOD CONTROL

The condition of flood control infrastructure in New Mexico varies widely, with larger municipalities having more effective facilities than rural areas. Many rural and suburban locales have dams that were not built for their current hazard level, are at (or beyond) their design life, have accumulated significant amounts of sediment, and have deteriorating structural components.

On balance, 73% of all jurisdictional dams and 77% of jurisdictional flood control dams are considered deficient or not in satisfactory condition. Ongoing work should improve 16% of jurisdictional dams classified as high or significant hazard potential. However, there are significant shortcomings in the state's flood control infrastructure that are expected to worsen over time.

Summary NM Flood Control 2012:

D +

Evaluation Criteria	Grade
Capacity	D
Condition	C -
Operation and Maintenance	C-
Public Safety	D+
Funding	D
Planning	C-
Resilience	D
Flood Control Final Grade = D+ (68.8)	

Recommendations

Equitable funding mechanisms should be developed and implemented to provide resources for increasingly expensive maintenance and rehabilitation, and where development raises hazard level, redesign and reconstruction. While this is a political hot potato, necessary work will not get done without it.

The ongoing effort to complete breach analyses, inundation mapping, and emergency action planning should be a priority among planning agencies and the entities that allocate resources to them

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The OSE Dam Safety Bureau, like many state agencies, has critical functions but few resources to carry them out. Permitting, inspection, and general interaction with the community of dam owners and managers could be improved with additional support.

A discussion of the impacts of climate change is underway among the community of flood control managers and regulators. Support in guiding this discussion to productive conclusions will help.