

## COORDINATION WITH LOCAL INTERESTS

173. In accordance with the resolution authorizing this study, close coordination has been maintained with the DRBC. That coordination was initiated concurrent with the start of this study and has been maintained throughout. That effort has included exchange of correspondence, meetings between members of the respective offices, and the furnishing of data pertinent to the study by DRBC. That office was given the opportunity to review and comment on this report throughout the various study phases. It is believed that this coordination effort and information furnished by the DRBC has strengthened the findings and conclusions reached as a result of the study. Pertinent documentation on this coordination effort is included at the end of this report.

174. The officials of each of the 12 municipalities for which nonstructural flood control measures were found to be economically justified were contacted by letter and by telephone to advise them of the findings and to determine their interest in sponsoring further studies of those measures. One community, the Township of Bristol, Pennsylvania, advised that it would be willing and able to act as a non-Federal sponsor.

175. The counties in which those 12 municipalities are located were also contacted and advised of the study findings and of the degree of interest expressed by the municipalities in sponsoring further studies. The counties were offered the opportunity to act as non-Federal sponsor in those instances where the municipalities declined to do so. No county accepted the offer.

176. Pertinent correspondence on the matter of non-Federal sponsorship is also included at the end of this report.

## ENVIRONMENTAL EVALUATION

177. While the absence of a recommendation for Federal construction under this study authority precludes the need for a formal environmental assessment or impact statement, certain measures have been identified as feasible for Corps implementation under Section 205 of the Flood Control Act of 1948 or by non-Federal interests. These actions could have an effect on ecological and cultural resources and the following evaluation reviews the various options with a goal toward impact minimization. In the absence of detailed specific proposals, only a general evaluation indicating overall impacts is possible.

### FLOOD WARNING

178. Flood warning has proven invaluable in saving lives and giving people in flood prone areas an opportunity to remove or protect some of their possessions. Given a sufficient period of notice, a sizable reduction in property damage can occur, with a commensurate reduction in social disruption.

179. No significant environmental impacts are associated with implementing a floodwarning system. Impacts could involve only the temporary inconvenience associated with noise, turbidity, and dust that accompany the placement of such items as gaging stations or sensing equipment to provide automation and remote data transfer.

## OTHER NONSTRUCTURAL MEASURES

180. Several different means of providing flood protection to individual structures are involved. Each causes different types of impacts, the extent of which depends to a large degree on site specific conditions.

181. Floodproofing, while much more practical when applied to new construction, has viability for certain existing structures. Benefits would be limited to prevention of damage to structure contents. Ecological impacts should be minor, and at most, limited to disturbance of shrubbery adjacent to the structure. With this vegetation being generally located in an open suburban habitat, the effect of its disturbance on wildlife should be minor.

182. Cultural resource impacts would be dependent on the type of structure being modified and the nature of the modification. Care would need to be taken with historical properties to insure that alterations do not damage an important cultural attribute or alter the historic value of the setting; external above ground modifications should generally be prohibited.

183. Construction of individual floodwalls and levees would necessitate relatively intensive site construction. They have the advantage of protecting the whole enclosed areas rather than just the buildings. These measures are also useful for protecting buildings for which other floodproofing measures cannot be used because of a building's size or lack of structural strength. However, walls and levees may sometimes be unattractive, are subject to failure and/or overtopping or may even intensify flood problems on adjacent property by redirecting flood flows. Ecological impacts would be dependent on the type and amount of terrestrial habitat eliminated. The historic setting of the protected or adjacent sites could be altered and this would affect overall cultural significance of historic structures.

184. Another frequently used nonstructural method is elevation of buildings above expected flood levels. Existing structures can sometimes be raised and the original foundation extended upward with walls, piers, or columns. These measures are best suited for smaller structures with basements or crawl spaces. Ecological impacts would be primarily limited to disturbance of adjacent shrubbery and have minor permanent wildlife impact. Impacts to historic structures would depend on the amount and type of elevation proposed. Preservation of an appropriate historic setting would be difficult with major raisings.

185. Acquisition of floodplain property includes relocating existing buildings to safe sites or demolishing undesirably located structures and providing replacements in a flood free site. Coupled with zoning it can allow for creation of needed open park space in a community. The social benefits of reduced flood trauma must be balanced against that of forced relocation. Depending on the subsequent land use, wildlife enhancement is possible. For historic buildings, acquisition and conversion to a use with contents less susceptible to flood damage would be recommended as opposed to relocation or demolition.

## CONCLUSIONS

186. Although there exists a potential for catastrophic losses if the area should suffer an occurrence of an event equal to or greater than the 1955 flood, local structural measures could not be justified solely on the basis of

flood reduction benefits. This is because high zero-damage elevations in the study area and the older and complex infrastructure that characterize the main stem result in high project costs relative to flood damages reduced. Main stem control requirements, unavailability of many sites, and high relocation costs at many sites render single purpose flood control impoundments infeasible. However, flood control should still be considered as an add-on to reservoirs being considered for development by non-Federal interests for other purposes.

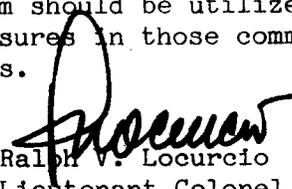
187. Based on a survey level analysis using March 1983 price levels and a discount rate of 7-7/8 percent, there are 12 communities out of a total of 58 communities in the study area for which varying levels of individual nonstructural protection are economically justified. A sensitivity analysis determined that the use of more current price levels (May 1984) and discount rate (8-1/8 percent) would not affect that finding. Those structures for which nonstructural protection may be feasible comprise a very small percentage (less than 2 percent) of the total floodplain structures (12,000) along the main stem Delaware River within the study area. Interest at the local level in sponsoring further studies of nonstructural protective measures for their community is extremely limited. Only one community, the Township of Bristol in Bucks County, Pennsylvania, stated that it was willing and able to act as non-Federal sponsor of further studies.

188. Flood warning and preparedness plans for the main stem Delaware River were also examined. It was found that existing NWS flood forecasting systems function well and that flood warnings are timely and reliable. However, the effectiveness of river stage forecasts and subsequent state and county flood warning issuances decreases with diffusion to the local level. This is because local flood warnings and preparedness plans are left largely to the discretion of local interests with a subsequent wide variety in plans and procedures. More coordinated and uniform local preparedness plans would help maintain a high level of effectiveness of regional flood warning extending to the local level. Federal participation in flood damage reduction along the main stem can also include the provision of data and technical assistance to State and local authorities in the area of flood warning and emergency preparedness.

#### RECOMMENDATIONS

189. It is my recommendation that, after giving due consideration to the results of the studies reported on herein, the nature of the study area, the type and scope of protective measures that showed economic justification and the limited interest indicated by local officials in further studies, that no further action should be taken by the Corps of Engineers under the current Survey Authority.

190. The Continuing Authorities program should be utilized for further studies of nonstructural protective measures in those communities that are willing and able to sponsor such studies.

  
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District Engineer

NADDE (Sep 84) 1st Ind  
SUBJECT: Delaware River Basin Study

DA, North Atlantic Division, Corps of Engineers, 90 Church Street,  
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I concur in the District Commander's conclusions and recommendations.

*Charles E. DeWent*  
For: PAUL F. KAVANAUGH *COL CE*  
Brigadier General, USA  
Division Commander