



# PWA

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# Introduction

Philip Williams & Associates, Ltd. (PWA) offers professional consulting services in all aspects of hydrology, hydraulic engineering, geomorphology and water resource planning.

PWA's staff possesses the broad range of skills necessary for developing practical solutions to complex multi-objective water resource management problems, expanding beyond traditional single-focus water engineering approaches.

Our staff of civil engineers, hydrologists, and geomorphologists has years of technical and field experience in hydraulic analysis, computer modeling, flood hazard determination, sediment transport, watershed management and environmental planning.

**PWA'S technical expertise in environmental water resource management combined with our knowledge of project planning and the regulatory process means that we provide our clients with cost-effective analysis, design and professional advice.**

In addition to providing expertise in the traditional hydrologic areas of flood hazard analysis, sediment transport and watershed modeling, PWA is a recognized leader in integrating advanced hydrologic analysis with environmental resource management and restoration.

The firm has completed numerous successful restoration and management plans for coastal estuaries, watersheds, wetlands and riparian corridors, often working on interdisciplinary teams with resource planners, public works engineers, biologists and landscape architects. We have gained from this experience a unique perspective for developing practical solutions that are adapted to the natural and social environment.

PWA has completed more than 1,200 projects for a full range of clients including government agencies, developers, attorneys, citizens' groups and other consultants. We have developed solutions to a wide variety of problems, ranging from policy recommendations to construction design.



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# Professional Services

## Fluvial & Watershed Processes

- Watershed hydrologic and geomorphic analysis
- Flood hazard analysis and floodplain mapping
- Computer simulation of hydrologic, hydraulic, sediment and water quality processes
- Urban stormwater management
- Geologic and geomorphic mapping
- Wetland restoration and management
- Sediment transport analysis and erosion control
- Water resources planning, analysis, and policy
- Fishery enhancement and instream flow studies
- Reservoir operation planning
- Water supply investigations
- Groundwater hydrology
- Riparian delineation assistance

## Estuarine & Coastal Processes

- Wetland restoration and management
- Coastal flooding and erosion
- Estuarine sedimentation analysis
- Tidal hydrodynamic modeling
- Water quality studies
- Coastal wave monitoring and analysis
- Wetland delineation assistance

## Environmental Planning & Management

- Environmental assessments and impact analysis
- Environmental permit assistance and regulatory compliance
- River corridor planning and design
- Lake planning and management
- Watershed management
- Floodplain management
- Expert witness testimony



Multidisciplinary site planning

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# Watershed & River Corridor Management

During the past two decades, a public and legislative mandate has emerged to protect and restore our nation's rivers and urban streams to serve multiple purposes. The new "multi-

objective" river corridor management approach adds the goals of maintaining wildlife and fishery habitat, promoting wetland and riparian vegetation, addressing aesthetic concerns,

enhancing recreational opportunities and public access to the existing management considerations (flood and erosion control, public safety, pollution control, and navigation).



Before: Deeply eroded channel, Miller Creek, Marin County



After: Grading to create two-stage channel

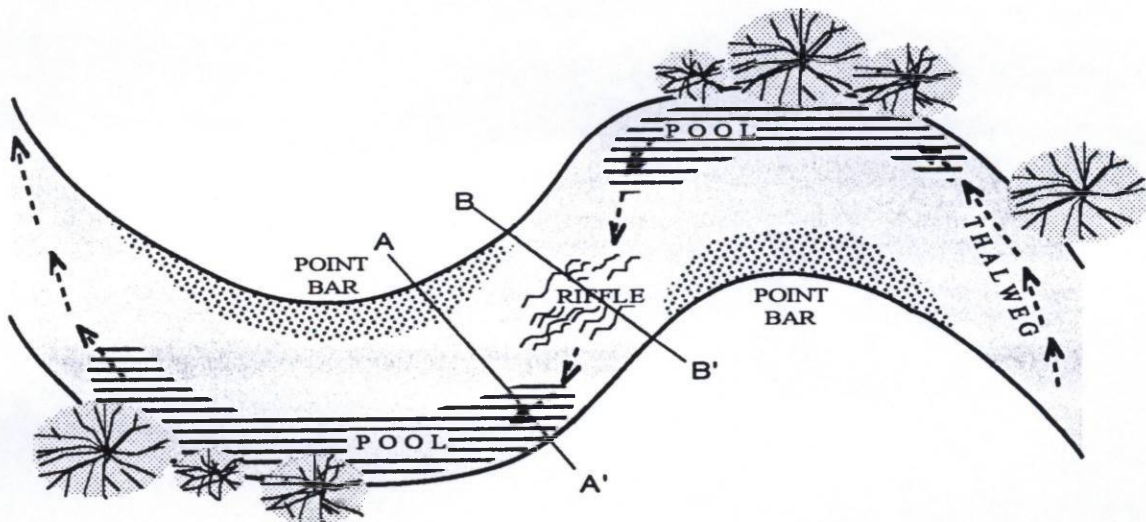
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**Successful river corridor management requires the integration of ecological and land use planning values with riverine science and engineering.**  
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Critical to this success is a detailed understanding of the physical behavior of the river. PWA's range of capabilities, combined with our knowledge of environmental planning and natural resource management, uniquely enables the firm to develop innovative, environmentally sensitive design solutions to complex and controversial projects.

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Specifically, PWA's expertise in river corridor management includes:

- Watershed management, including urban runoff reduction and treatment, detention basins and project master plans
- Riparian ecosystem restoration, including channel, bank and floodplain enhancement
- Riverine ecosystem restoration for fish passage and spawning/rearing habitat
- Gravel mining management and site rehabilitation
- Urban greenway design
- Floodplain corridor planning
- Bank stabilization using traditional and biotechnical methods
- River and creek channel maintenance planning
- Design of riparian wetlands for water quality improvement
- Instream flow studies for restoring aquatic ecosystems
- Analysis of groundwater/river hydrologic interactions



The meandering flow pattern increases the length of the channel and effectively dissipates the force of the stream's energy over a longer distance than in a straight channel.

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# Flood Hazard Analysis & Management

Flood hazard assessment and reduction is an essential element in urban planning and river corridor management. Emerging problems and public dissatisfaction with traditional flood control designs has created a demand for new approaches.

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**PWA has taken a leadership role in the development of multiobjective designs that incorporate environmental and aesthetic values, reduce maintenance costs and enhance adjacent land values.**

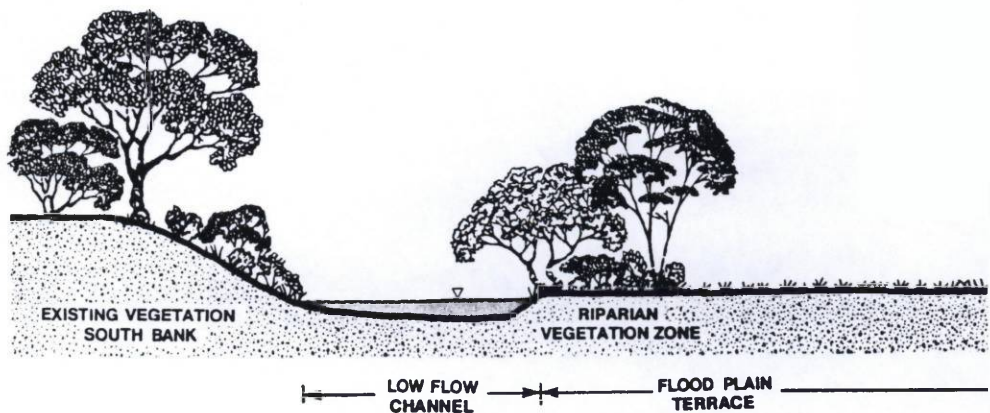
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Application of this approach streamlines the approval process and results in projects which are recognized as a community asset.

PWA's approach to flood hazard analysis focuses on the client's



Soquel Creek: Flooding damage and debris blockage during the 1986 floods.



Alternative Flood Control:

Multi-stage channel and riparian corridor at Wildcat Creek, Contra Costa County

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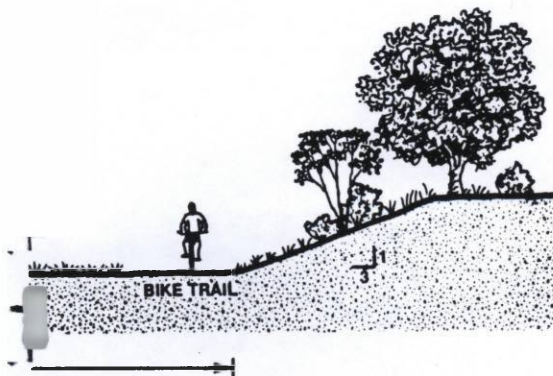


management goals. In contrast to traditional single-purpose solutions (including artificially straightened, unvegetated or concrete channels), our approach addresses the reduction of safety risks and property damage due to flooding in conjunction with wider planning goals.

Applying this broader perspective, we view flood management as a system with structural, nonstructural, operational, maintenance, and monitoring components. This has prompted the firm to develop

innovative and cost effective solutions for flood protection and reduction of flood damages. In addition, our approach extends beyond simplistic, "clear flow" assumptions to include all the processes that affect flood risk, such as sediment transport, potential debris obstruction, channel migration, and river bed scour or deposition. To accomplish these objectives, we integrate the science of natural rivers – fluvial geomorphology – with hydrology and engineering hydraulics.

One example of this new design approach is the two stage flow channel of Wildcat Creek in Richmond, California, which the firm designed as an alternative to a proposed concrete channel. This project has now been adopted by the U.S. Army Corps of Engineers as an example of new approaches in flood control design.



## **PWA's broad spectrum of professional services in flood management includes:**

- Flood hydrology, including the evaluation of watershed management effects on flood hazards
- Flood hydraulics, including two-dimensional flow, dynamic wave and dam break analysis, and erodible channel modeling
- Floodplain mapping including FEMA flood insurance studies
- Flood scour and bank erosion analysis
- Flood management systems including:
  - Flood channel design and maintenance
  - Flood detention basins
  - Flood warning and monitoring systems
- Coastal and estuarine flooding analysis, including:
  - Wave processes, storm surges, and tsunamis
  - Extreme high tides and joint tidal/rainfall flood probabilities
  - Long-term sea level rise
  - Shoreline erosion

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## Expertise in Wetlands Hydrology

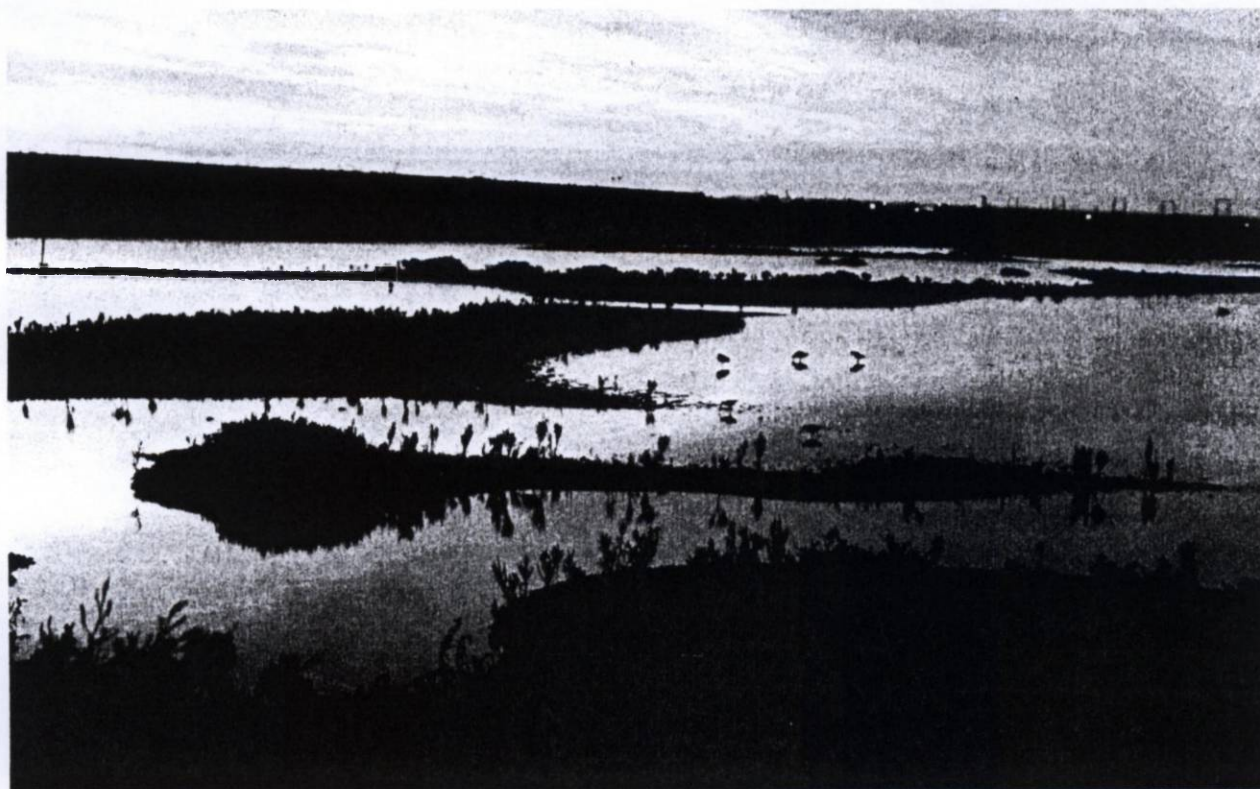
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**PWA has developed a  
national reputation in  
estuarine processes,  
tidal hydrodynamics,  
sedimentation and  
wetland hydrology.**  
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Our broad base of expertise enables us to assess the effects of flood flows, sediment delivery, tidal circulation, and groundwater movement to solve a wide variety of problems in natural and managed fresh and salt water wetlands.

Our approach is to first gain an understanding of the natural hydraulic and hydrologic processes influencing the site.

We then work with biologists and planners to determine the environmental opportunities and constraints affecting a site before developing a specific technical solution.

In addition to working with many private developers, non-profit groups, and local government agencies, PWA has been retained as consultants by several federal and California



Vener Pond, San Diego

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