EXPERTS

Mr. Chad Drummond, P.E. is a Senior Engineer with HSW and has over 8 years experience performing surface and groundwater flow modeling on several key projects. His projects often require complex contaminant transport modeling to assess human impacts on the environment, followed by designing engineered solutions to meet client needs.

Dr. Ken Watson, C.P.H. is President of HSW and has over 25 years of modeling and project management experience. He has qualified as an expert in groundwater modeling and applied mathematics.

WE HAVE THE TOOLS

HSW uses non-proprietary modeling software whenever possible. All the model codes are verifiable and defensible. Our belief is that once the model is developed it belongs to you. You need to only have the publicly-available software to use the model. The list below is not exhaustive but covers many of the industry-standard publicly available hydrology/ hydraulic models employed by HSW.

Groundwater Flow
ModFlow, FEFLOW, GMS, GW Vistas, WinFlow, GW/SW interface analytic solutions

Solute Transport
MT3DMS, RT3D, N3Dade, WinTran

Surface Water Flow
SWMM, HEC-RAS, WASP-WASP5, MOD Ret, PONDS, ICPR

Watershed Modeling
HEC-HMS, Basins

Hydraulics
KY Pipe, WaterCAD, FlowMaster

Mixing Zone
CORMIX, PLUMES

UnSat Flow
SUTRA, Analytic solutions

Natural Attenuation
MONA - Monitored Natural Attenuation Data Toolkit
Bioscreen/Bioplume, ModPath

HSW

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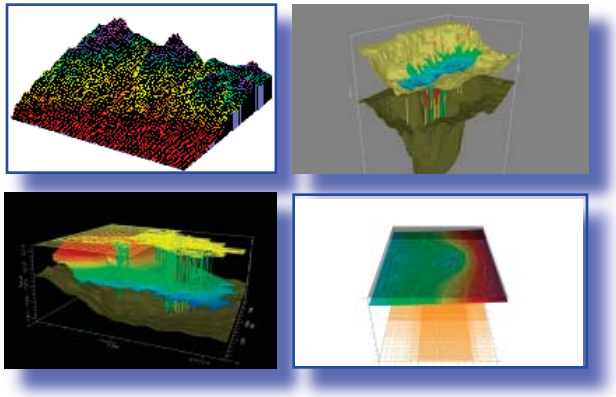
INTEGRATED HYDROLOGY AND HYDRAULICS MODELING GROUP

Integrated Modeling Of Groundwater And Surface Water Flow, Solute And Sediment Transport, And Hydraulics



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HYDROLOGY & HYDRAULICS MODELING GROUP

WHO WE ARE

The HSW Hydrology and Hydraulics Modeling Group is comprised of HSW Engineers and Scientists and contracted experts specializing in high-level numerical modeling of solutions to hydrology and hydraulics water quantity and quality problems. Highlights of our modeling capabilities include:

- Watershed Modeling and Flood Area Delineation
- Safe Aquifer Yield Determination
- Establishment of Minimum Flows and Levels
- Water Distribution System Design and Optimization
- Storm Water Conveyance and System Design
- Environmental Remediation Evaluation, Design & Optimization
- Environmental Forensics
- Nutrient and Sediment Transport
- Estuarine Systems

WHY HSW

With advances in pre- and post-processors in the Windowns environment, much of the difficulty in applying complex models to real world problems has been removed. What has not changed is the complex nature of the underlying problems and the need for efficient yet defensible solutions. By concentrating our efforts on developing internal expertise and collaborating with experts in the world market, we can bring cost-effective proficiency to complex hydrology and hydraulics problems. Because of our focused expertise, we can take any scenario from the conceptual model stage to defense of results in court.

HYDROLOGY & HYDRAULICS MODELING GROUP

AREAS OF EXPERTISE

- 3-D Groundwater Flow
- Water Resources
- Water Distribution
- Watershed and Non-Point Source Pollution
- Storm Water Drainage and Conveyance
- 3-D Contaminant Fate & Transport (Single & Multiphase)
- Nutrient and Sediment Transport
- GIS Interface

HOW WE DO IT

You understand your needs best and are the paramount resource for defining the hydrology/hydraulics problem. We listen and then we assign the best personnel to interface directly with you or other engineering firms to develop a conceptual model of the underlying processes. Ideally we are brought in at the planning stage to help ensure that appropriate data are available or collected. We can then apply appropriate model(s) to find efficient and feasible solutions to the problem. We then prepare a clear and concise report of model results in written and presentation formats.

HYDROLOGY & HYDRAULICS MODELING GROUP

WE HAVE DONE THIS BEFORE

Our engineers and scientists have applied our modeling expertise to almost every kind of hydrology and hydraulics problem. We have numerous completed projects across the country and understand local and regional impacts.

- Arizona National Guard, *162nd Fighter Wing*
  Groundwater Flow and Contaminant Transport Modeling
  Tucson, Arizona

- AFCEE, *Wurtsmith Air Force Base*
  Groundwater Flow and Contaminant Transport Modeling
  Oscoda, Michigan

- Elsinore Valley Municipal Water District
  Elsinore Basin Water Management Plan
  Aquifer Yield and Groundwater Basin Recharge Numerical Modeling, Elsinore, California

- Northrop Grumman
  Bioaugmentation Design Modeling
  Milledgeville , GA

- Lockheed Martin Missiles and Fire Control - Orlando
  Groundwater and Solute Transport Modeling
  Orlando, Florida

MODELING IS ECONOMICAL

Accurate, defensible models save money. A quantitative understanding of processes will allow you to identify data gaps, collect appropriate information, and efficiently design engineered solutions. Developing in-house expertise is expensive, and retaining full-time employees to do part-time work is cost prohibitive. Complex and defensible modeling requires a skill level and a variety of expertise that is difficult to retain at any one company or agency. Our staff and collaborative partners have the skills and experience to get to the answer quickly, defensibly, and efficiently.