

Program

Welcome to the
40th Australian Groundwater School
Perth October 2010

Supported by:

**NATIONAL CENTRE FOR
GROUNDWATER RESEARCH AND TRAINING**

sustaining a vital water resource



Department of
Agriculture and Food



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Environment and Conservation

Our environment, our future



Government of **Western Australia**
Department of **Water**



THE UNIVERSITY OF
WESTERN AUSTRALIA

Achieve International Excellence



CSIRO

40th Australian Groundwater School

Monday 11th – Saturday 16th October 2010

Novotel Perth Langley, Perth, Western Australia

For information about this program please contact the course coordinator, **Joel Voortman**
Phone: +61 8 8201 5683 **Fax:** +61 8 8201 5635 **Email:** joel.voortman@groundwater.com.au

DAY 1 - Monday 11 th October 2010			
Chair: Tony Laws – Hydrogeologist WA			
Time	PPT Chapt	Topic	Presenters
8 - 8.15	Registration		
Welcome to the School			Tony Laws Chairman
8.15 – 8.30	National Centre for Groundwater Research and Training (NCGRT) <i>Brief overview of the Centre</i>		David Pannell University of Western Australia
8.30 – 9.30	National Perspectives on Water <i>Water Policy, National Water Initiative, National Assessment & Implementation, Water Pricing</i>		
5 Minute Break - Housekeeping and other Announcements.			
9.35 – 10.05	1	How Important is Groundwater? <i>Overview of groundwater: Location, Role, Uses, Significance, Impact; Aquifer types and relative importance.</i>	Tony Laws Chairman
10.05 – 10.25	Morning Tea		
10.25 – 11.25	2	Hydrogeology I <i>Overview of the occurrence, nature, extent, availability and vulnerability of groundwater</i>	Tony Laws Chairman
5 Minute Break			
11.30 – 12.30	2	Hydrogeology II: <i>Overview of the occurrence, nature, extent, availability and vulnerability of groundwater</i>	Tony Laws Chairman
12.30 – 1:15	Lunch		
1.15 – 2.15	3	How is Groundwater Stored & How Does it Move? <i>Darcy's Law, Hydraulic conductivity, Storage coefficient</i>	Colin Hazel Groundwater Engineer
5 Minute Break			
2.20 – 3.20	4	Surfacewater Hydrology <i>Basic understanding of surfacewater, covering: Rainfall, evaporation, streamflow, flooding, altered catchments, measurement, water quality, climate change</i>	Peter Muirden Department of Water, WA
3.20 – 3.40	Afternoon Tea		
3.40 – 4.45	5	Groundwater / Surfacewater Interaction <i>Groundwater Processes, Types of Discharge, Effects of Pumping, Base Flow</i>	Sandie McHugh Department of Water, WA
End day 1			

DAY 2 – Tuesday 12th October 2010
Chair: Tony Laws – Hydrogeologist WA

Time	PPT Chapt	Topic	Presenters
8.30 – 9.30	6	Recharge / Discharge Determination <i>Characteristics, Definitions, Processes, ASR, Water Balance, Hydrographs, Rainfall Recharge, Residual Mass Curve</i>	Colin Hazel <i>Groundwater Engineer</i>
5 minute break			
9.35 – 10.35	7	Groundwater Chemistry <i>Chemical Composition of GW, Sampling, Analysis and Data Integrity, Dissolved Salts, Pollution</i>	Steve Appleyard <i>WA Dept Environment & Conservation</i>
10.35 – 10.55	Morning Tea		
10.55 – 11.45	8	Environmental Isotopes in Groundwater <i>What Isotopes are and use, Stable Isotopes, GW Dating</i>	Steve Appleyard <i>WA Dept Environment & Conservation</i>
5 minute break			
11.50 – 12.50	9	Data Collection for Interpretation: <i>Monitoring, Collection, Storage, Retrieval</i>	Tony Laws <i>Hydrogeologist</i>
12.50 – 1:40	Lunch		
1.40 – 2.40	10	Groundwater Hydraulics I <i>Properties of Water, Soil, Aquifers, Hydraulic Head, Darcy's Law, Pumping Tests, Measurement, Flow Types, Type Curve Analysis, Jacob's Equation, Bore Performance Tests</i>	Colin Hazel <i>Groundwater Engineer</i>
5 minute break			
2.45 – 3.45	10	Groundwater Hydraulics II <i>Properties of Water, Soil, Aquifers, Hydraulic Head, Darcy's Law, Pumping Tests, Measurement, Flow Types, Type Curve Analysis, Jacob's Equation, Bore Performance Tests</i>	Colin Hazel <i>Groundwater Engineer</i>
3:45 – 4:05	Afternoon Tea		
4:05 – 5.00	10	Groundwater Hydraulics III <i>Properties of Water, Soil, Aquifers, Hydraulic Head, Darcy's Law, Pumping Tests, Measurement, Flow Types, Type Curve Analysis, Jacob's Equation, Bore Performance Tests</i>	Colin Hazel <i>Groundwater Engineer</i>
6 – 9pm	Dinner <i>This is an occasion to meet informally with colleagues.</i> <i>Location: Grosvenor Hotel, 339 Hay Street, PERTH</i>		
End day 2			

DAY 3 - Wednesday 13th October 2010**Chair: Tony Laws – Hydrogeologist WA**

8.30 – 10.00	11	Geophysics <i>Surface, Airborne, Downhole</i>	Gary Humphreys <i>Dept Water</i>
<i>5 minute break</i>			
10.05 – 11.35	12	Groundwater Modelling <i>Model Types- Conceptual Analytical and Numerical, Purposes, Process, Guidelines</i>	Ryan Vogwill <i>Dept of Environment & Conservation</i>
11.35 – 11.55	Morning Tea		
11.55 – 1.00	13	Tutorials <i>Pump Test Analysis, Water Budgets, Constructing a Water Table Contour Map, Conceptual model</i>	Tony Laws Colin Hazel
1.00 – 1.50	Lunch		
1.50 – 3.00	14	Salinity <i>Dryland, Irrigation, Solute transport, Seawater Intrusion</i>	Richard George <i>Dept Agriculture and Food</i>
3.00 – 3.15	Afternoon Tea		
3.15 – 5.00	13	Tutorials <i>Pump Test Analysis, Water Budgets, Constructing a Water Table Contour Map, Conceptual model</i>	Tony Laws Colin Hazel
End day 3			

DAY 4 - Thursday 14th October 2010
Chair: Tony Laws – Hydrogeologist WA

Time	PPT Chapt	Topic	Presenters
8.30 – 9.30	15	Safety Issues in Collecting Water Data <i>Responsibilities, Hazard Awareness, Managing the Risk</i>	Tony Laws <i>Hydrogeologist</i>
<i>5 Minute Break</i>			
9.35 – 11.00	16	Groundwater Microbiology <i>Issues for GW, Pathogens: Risk, Removal & Decay, Microbial Metabolism, Bioremediation, Detection & Collection</i>	Simon Toze <i>CSIRO</i>
11.00 – 11.20	<i>Morning Tea</i>		
11.20 – 12.30	17	Water Well Technology <i>Drilling Methods, Casing, screens and cementing, Production & Piezometer design and development, Pumps</i>	John McAvan <i>Water Corporation</i>
12.30 – 12.30	<i>Lunch</i>		
1.30 – 2.30	18	Mine Dewatering: Control of Groundwater Inflow <i>Reasons, Methods and Design, GW Control Systems, Pit Lakes</i>	Gary Humphreys <i>Dept of Water, WA</i>
<i>5 Minute Break</i>			
2.35 – 3.35	19	Groundwater Contamination <i>Introduction, Sources of pollution, What happens to contaminants in aquifers, How partitioning and reactions affect distribution of contaminants, Examples</i>	Greg Davis <i>CSIRO</i>
3.35 – 3.55	<i>Afternoon Tea</i>		
3.55 – 5.00	20	Groundwater and Soil Remediation <i>General options for groundwater remediation, Limitations, Pilot-scale examples</i>	Greg Davis <i>CSIRO</i>
<i>End day 4</i>			

DAY 5 - Friday 15th October 2010
Chair: Tony Laws – Dept of Water WA

Time	PPT Chapt	Topic	Presenters
8:30 – 09:25	21	Groundwater Dependent Ecosystems: <i>Principles of Reliance, Types of GDE's, Terrestrial Fauna & Vegetation</i>	Rick Evans SKM
5 Minute Break			
9.30-10.15	22	Water Trading <i>Types of Trading, Price, History, Water Re-allocation, Impediments</i>	Rick Evans SKM
10.15 – 10.45	23	Groundwater Management <i>Planning & allocation, Sustainability, Water Reform, Management & Planning Cycles, Climate Change & EWPs, COAG</i>	
10.45 – 11.05	Morning Tea		
11.05 – 1.00	23	Groundwater Management <i>Planning & allocation, Sustainability, Water Reform, Management & Planning Cycles, Climate Change & EWPs, COAG</i>	Rick Evans SKM
1.00 – 1:50	Lunch		
1.50 – 2.45	24	Groundwater Quality Protection <i>Characteristics, Waterborne Pathogens, Risk, Point & Diffuse Source Contamination, Guidelines,</i>	Tony Laws Hydrogeologist
2.45 – 3.15	25	Protecting Drinking Water: A WA Perspective <i>Why protect drinking water sources? How is it done in Western Australia?</i>	Tony Laws Hydrogeologist
3.15 – 4.15	26	Managed Aquifer Recharge <i>Future of Perth's water</i>	Nick Turner Water Corporation
Closing Comments			Joel Voortman Tony Laws
End day 5			

DAY 6 - Saturday 16th October 2010
Field Study Tour - include a number of sites around Perth
 Led By: Peter Muirden and Tony Laws.

8.15am	Meet at																								
8.30	Board buses and depart from																								
The Field Study Tour will include a number of sites around PERTH Participants will visit sites highlighting: - • Historical aspects • Groundwater use for industry and recreational purposes; • Groundwater/surface water ecosystem interaction; • Contamination of groundwater resource; • Resource management issues in an existing highly urbanised and industrialised setting particularly in regard to changing land use and new infrastructure developments.																									
Proposed Sites: <table border="0"> <tr> <td>1. DALKEITH</td><td>12. GWELUP BOREFIELD</td></tr> <tr> <td>2. MASONS GARDENS</td><td>13. GWELUP TREATMENT PLANT</td></tr> <tr> <td>3. LAKE CLAREMONT</td><td>14. LAKE GNANGARA</td></tr> <tr> <td>4. SUBIACO WASTEWATER TREATMENT PLANT</td><td>15. LAKE JANDABUP</td></tr> <tr> <td>5. BROCKWAY TIP</td><td>16. WANNEROO BOREFIELD & GROUNDWATER TREATMENT PLANT</td></tr> <tr> <td>6. CONTAMINATION OF GROUNDWATER BY TRICHLOROETHENE (TCE)</td><td>17. NORTH COASTAL GROUNDWATER SCHEME</td></tr> <tr> <td>7. CSIRO AND PERRY LAKES</td><td>18. LAKE JOONDALUP</td></tr> <tr> <td>8. REABOLD HILL – BOLD PARK No 2 AND BOLD PARK RESERVIOR</td><td>19. WANNEROO GROUNDWATER AREA</td></tr> <tr> <td>9. COASTLINE</td><td>20. GNANGARA MOUND</td></tr> <tr> <td>10. YARRAGADEE BORES</td><td>21. MELALEUCA PARK</td></tr> <tr> <td>11. HERTHA ROAD AND JONES ST</td><td>22. BULLSBROOK TOWN WATER SUPPLY</td></tr> <tr> <td></td><td>23. SWAN VALLEY</td></tr> </table>		1. DALKEITH	12. GWELUP BOREFIELD	2. MASONS GARDENS	13. GWELUP TREATMENT PLANT	3. LAKE CLAREMONT	14. LAKE GNANGARA	4. SUBIACO WASTEWATER TREATMENT PLANT	15. LAKE JANDABUP	5. BROCKWAY TIP	16. WANNEROO BOREFIELD & GROUNDWATER TREATMENT PLANT	6. CONTAMINATION OF GROUNDWATER BY TRICHLOROETHENE (TCE)	17. NORTH COASTAL GROUNDWATER SCHEME	7. CSIRO AND PERRY LAKES	18. LAKE JOONDALUP	8. REABOLD HILL – BOLD PARK No 2 AND BOLD PARK RESERVIOR	19. WANNEROO GROUNDWATER AREA	9. COASTLINE	20. GNANGARA MOUND	10. YARRAGADEE BORES	21. MELALEUCA PARK	11. HERTHA ROAD AND JONES ST	22. BULLSBROOK TOWN WATER SUPPLY		23. SWAN VALLEY
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4.30pm	Drop off at the, Perth airport.																								
5.00pm	Arrive back to the Novotel Perth Langley Hotel																								
<i>End of 40th Australian Groundwater School</i>																									

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