DEPARTMENT OF CITY AND REGIONAL PLANNING
University of North Carolina at Chapel Hill

PLAN 745: DEVELOPMENT IMPACT ASSESSMENT

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Spring 2009
12:30 – 1:45 T, TH (Peabody Hall 306)
Lab: 2:00 – 3:15 W (New East 2nd Floor Computer Lab)

http://blackboard.unc.edu

Objectives

This course provides intensive instruction in methods for predicting, evaluating, and mitigating potential adverse impacts of land development projects. Its purpose is to develop basic skills in using impact assessment techniques, an ability to apply those techniques to the assessment of impacts from actual development projects, and an ability to report impact assessment analyses, findings, and recommendations in a competent, professional manner, assuming your report is to be read and understood by both professional and nonprofessional audiences.

Development impact assessment methods are used in a variety of ways in public and private planning, including evaluation of land use planning alternatives, assessment of private and public development proposals, and marketing of development proposals. By analyzing and discussing various examples of those applications, the course will help develop an appreciation of the strengths and limitations of various impact assessment approaches in specific applications.

Course Format and Requirements

The course will meet for three sessions each week. Sessions on Tuesdays and Thursdays will include lectures and discussion of key concepts covered in lectures and assigned readings. Wednesday course sessions will consist of occasional software tutorial labs and field trips. While the lectures, labs, and readings are important, an equally critical aspect of learning in this course comes from student preparation of a comprehensive impact assessment for a large proposed mixed use project.

Course requirements include: (1) class attendance and participation (10% of course grade); and (2) completion of a comprehensive impact assessment for a large mixed-use project (90% of course grade). Although participation in them will not be required, you should be aware that

Wednesday lab sessions will cover detailed questions regarding the software and methods that will be used in various parts of the course.

The comprehensive assessment is conducted by analyzing ten potential impacts (grouped into 6 modules) of a proposed mixed-use project and combining the assessments into a comprehensive report. This report will detail a set of your personal recommendations to the town manager for dealing with the impacts you have identified. Each section of the comprehensive impact assessment is prepared by students working as *individual* analysts and will be graded separately (see below for section grading).

Details of the comprehensive impact assessment exercise are provided in the appendix to this syllabus and in detailed data and instructions, which will be posted on Blackboard (http://blackboard.unc.edu).

Course Materials

Required:

1. Haested Methods Staff. 2007. Computer Applications in Hydraulic Engineering: Connecting Theory to Practice (7th edition). Bentley Systems: Exton, PA. Available at UNC Student Bookstore.
2. PLAN 745 Course pack containing required readings is available at the UNC Student Stores

Additional reading materials will be posted on the Blackboard website.

Course Grading

Students are required to complete seven mandatory sections of the comprehensive report (70 points), and a final comprehensive report with corrections to sections of the report completed earlier in the semester and final recommendations in the form of a memo to the town manager (20 points).

The final impact assessment report will be graded based on completion of additional sections (title page, contents, memorandum of town manager with your personal recommendations) *and* upon inclusion of corrected versions of reports prepared earlier in the semester with a note to the instructor indicating the specific corrections that have been made.

Each section (and the final report) is graded as follows:

H: 9+ per section or 18 points for total report)
P: 8+ or 16 points)
L: 6.5+ or 13 points)
F: 6 or 12 points)
Missing or late assignments receive 0 points

Final grades are based on this scale:

H (93+ points)
P (78+ points);
L (63+ points)
F (62 or fewer points).

Grading Notes:

Generally, **H** work goes beyond the bare minimum requirements (e.g., reports results of sensitivity analyses of key assumptions, models changes proposed as mitigation, or includes outstanding maps and illustrations of results). **L** or **F** work substantially fails to meet minimum requirements either due to incomplete coverage of required information, incorrect results, or sloppy, unprofessional reporting of results.

Policy on Late or Incomplete Work: In order to be fair to your fellow students (particularly in light of the extensive time requirements of this course), late assignments will not ordinarily be accepted. Zero points will be assigned to work not completed on time.

Grades of incomplete may be given in the event of a medical or other emergency. In these cases, a written application for an incomplete on any assignment, including the term project, must state the reasons for the request and propose a new deadline.

The University's Honor Code is in effect. The University of North Carolina at Chapel Hill has had a student-administered honor systems and judicial system for over 100 years. Because academic honesty and trustworthiness are important to professional planning, this is a significant University and Departmental tradition. Your attention is called to the Instrument of Student Judicial Governance for policies and procedures pertaining to the honor system. Please consult with the instructor if you are uncertain about your responsibilities under that code with respect to this course.

Assignments are expected to be completed individually. Discussions with classmates about assignments are encouraged, but all final work must be entirely your own.

- **Late homework assignments will not be accepted.**
- All assignments must be completed **individually**.
- Assignments should be turned in during class on the due date.
- Please contact the instructor or TA if you have any questions, problems with the readings or the course, or any other issues that you wish to discuss
- Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately early in the semester to discuss your specific needs. Students with documented disabilities should contact the Department of Disability Services at 919-962-8300 (SASB North, Suite 2126) to coordinate reasonable accommodations.

- **Please arrive on time and turn off cell phones in class.**

Deadlines

Deadlines for completion of each section of the report and points available for it are as follows:

Interim reports

1. Introduction (project description and environmental and public service setting, objectives of the assessment) (10 points): February 5
2. Public Service Impacts (10 points): February 17
3. Traffic level of service impacts (10 points): March 3
4. Water supply impacts (10 points): March 19
5. Wastewater impacts (10 points): March 26
6. Stormwater discharge impacts (10 points): April 9
7. Climate Change impacts (10 points): April 23

Final impact assessment report, with the following sections (20 points): April 27

1. Title page
2. Contents
3. Memorandum to town manager that summarizes impacts you have identified and recommends specific mitigation actions for each impact that fails to meet town standards and should be required as a condition for approval of the project and granting of building and occupancy permits (i.e., specify action required, timing, responsibility, monitoring, financial performance guarantees, etc.).
4. Introduction (project description, environmental and public service setting, and objectives of the assessment)
5. Public Service Impacts
6. Traffic level of service impacts
7. Water system impacts
8. Wastewater impacts
9. Stormwater impacts
10. Climate change impacts
11. Appendices

All reports are to be turned in at the end of class on the date they are due. To be fair to your fellow students, exceptions will only be made in case of documented illness or family emergency.

Topic Outline and Schedule

I. Background and Basic Concepts in Development Impact Assessment

Overview of course (1/13)

1. Introduction to comprehensive impact assessment exercise and report (1/15)
2. Key choices: (1) whether to conduct an impact assessment, (2) approach employed, (3) impacts evaluated, and (4) methods used (1/20)
3. Key choices: (5) standards adopted, (6) mitigation required, (7) monitoring and enforcement procedures (1/22)
4. Overview of GIS methods (1/27, 1/28(lab), 1/29, 2/3)

II. Estimating the Impacts of Development

5. Public Services (2/5, 2/10)
6. Traffic level of service (2/12, 2/17, 2/19, 2/24)
7. Water supply (2/26, 3/3, 3/5)
8. Wastewater (3/17, 3/19)
9. Stormwater (3/24, 3/26, 3/31, 4/2)
10. Habitat (4/7)
11. Wetland (4/9, 4/14)
12. Climate change (4/16, 4/21)

III. Putting It All Together

13. Course review, feedback, and discussion of final impact assessment reports (4/23)
14. Submission of individual final impact assessment reports
    (Monday, 4/27 by 5pm in TA's box on second floor of New East)

Reading Material

Reading selections that elaborate on concepts presented in lectures are available in the course reader and on Blackboard. Any information in non-digital format will be placed on reserve in the UNC Planning Library on the 2nd floor of New East. Portions of the course dealing with water supply, wastewater, and stormwater use readings and software in Haested Methods, *Computer Applications in Hydraulic Engineering: Connecting Theory to Practice*, Seventh Edition, a student version of which should be purchased from the UNC student bookstore. The student version comes with software you will be using for several aspects of your Roberson Square impact assessment.

Detailed instructions for completing the required sections of the impact assessment report will be available on Blackboard. The instructions include background information, methods, and data that you would normally assemble from a wide variety of sources. To make the impact assessment feasible to conduct in a very short period of time, this material is pre-packaged.

Course resource materials are listed below. For each course topic a key required reading is provided to enhance your understanding of class lectures and for use in estimating and mitigating development impacts. Following each required reading, additional resources are listed that can examined in detail depending upon your interest in the subject. We recommend downloading and reading through all of the materials, as they may serve you as useful references during future classes or in your career.

I. Background and Basic Concepts in Development Impact Assessment

January 13: ***Class 1: Overview of course***

R.K. Jain, et. al. "Introduction". *Environmental Assessment, 2nd Edition*. New York: McGraw-Hill, 2002, pp. 1-12

Mary M. Edwards, "Chapter 1, Introduction" and "Chapter 6, Putting It All Together," in *Community Guide to Development Impact Analysis*," Madison, WI: Wisconsin Land Use Program, University of Wisconsin-Madison, March 2000, pp. 3-7 and 73-76.

January 15: ***Class 2: Introduction to Comprehensive Impact Assessment Reporting; Introduction to the Development***

Robert W. Burchell, et al., "Environmental Setting," in *Development Impact Assessment Handbook*, Washington, DC: Urban Land Institute, 1993, pp. 38-41.

On Blackboard: Robert D. Sculley, "A Basic Strategy for EIR Preparation," San Francisco, CA: Tetra Tech, Inc., October 1998.

Additional resources:

Bruce Hendler, *Caring for the Land*, Planning Advisory Service Report No. 328. Chicago: American Planning Association, 1977, pp. 5-65. (shelved with PAS Reports)

On Blackboard: Also note that a variety of resources related to the Roberson Square impact assessment are available on Blackboard. These resources will help you understand the project and complete the first assignment.

January 20: ***Class 3: Key choices: (1) Whether to Conduct Impact Assessments; (2) Approach Employed; (3) Impacts Evaluated, (4) Methods Used***

Edward J. Kaiser, David R. Godschalk, and F. Stuart Chapin, Jr., "Development Proposal Evaluation," in *Urban Land Use Planning*, Fourth Edition, Urbana, IL: University of Illinois Press, 1995, pp. 438-453.

Leonard Ortolano, "Chapter 16: Forecasting Environmental Effects of Proposed Projects and Regulatory Actions," *Environmental Regulation and Impact Assessment*, New York: John Wiley and Sons, Inc., 1997, pp. 347-373.

Additional resources providing an overview of development impact assessment:

California Environmental Quality Act (CEQA) model: Robert Olshansky. "The California Environmental Quality Act and Local Planning". *Journal of the American Planning Association*. Vol. 62, No. 3, Summer 1996, pp. 313-330

North Carolina State Environmental Policy Act (SEPA): N.C. Department of Administration. "Environmental Assessment Guidelines". March 1999, pp. 1-7.

Developer perspectives: Robert W. Burchell, et al., "Chapter 2: Legal and Administrative Considerations," in *Development Impact Assessment Handbook*, Washington, DC: ULI-the Urban Land Institute, 1994, pp. 16-25.

Additional resources:

Tim Snell and Richard Cowell. "Scoping in environmental impact assessment: Balancing precaution and efficiency?" *Environmental Impact Assessment Review*, Volume 26, Issue 4, May 2006, Pages 359-376.

Thomas D. Boston. "The Effects of Revitalization on Public Housing Residents: A Case Study of the Atlanta Housing Authority". *Journal of the American Planning Association*. Vol. 71, No. 4, December 2005, pp. 393-407.

January 22: ***Class 4: Key choices: (5) standard, (6) mitigation, (7) monitoring and enforcement***

Carissa Schively Slotterback. Evaluating the Implementation of Environmental Review Mitigation in Local Planning and Development Processes. *Environmental Impact Assessment Review*, 2008 (article in press, accepted January 3, 2008).

David P. Lawrence. Impact Significance Determination – Back to basics. *Environmental Impact Assessment Review*, 27, 2007, pp. 755–769.

On Blackboard: Examples of Master Environmental Assessments

World Trade Center: Lower Manhattan Development Corporation. 2004. The World Trade Center Memorial and Redevelopment Plan Final Generic Environmental Impact Statement. [Online]. Available: http://www.renewnyc.com/plan_des_dev/environmental_impact_contents_april2004.asp

Domestic Example: City of Lakewood, CA. 2007. Master Environmental Assessment (MEA) for the City of Lakewood Comprehensive General Plan. [Online]. http://www.lakewoodcity.org/civica/filebank/blobdload.asp?BlobID=4725

International Example: Dublin Docklands Development Authority. 2003. Dublin Docklands Area: Strategic Environmental Assessment of the Draft Master Plan. [Online]. Available: http://www.dublindocklands.ie/files/business/docs/seareportfinal030603.pdf

January 27, 29, February 3: ***Classes 5-7: Geographic Information Systems (GIS) for Impact Assessment***

*****This section will be guest taught by Jennifer Doty and Amanda Henley, UNC GIS and Planning Librarians. We will also be moving to a different room for this section of the class – Davis Library Room 247 (also includes Wednesday Lab)*****

Students are encouraged to enroll in the free Environmental Systems Research Institute (ESRI) Virtual Campus course entitled "Learning ArcGIS Desktop." This course will augment the GIS overview section of this course and consists of 8 modules scheduled to take 24 hours. This course is very well laid out and can be completed on your own. Module 1 can be skipped if you feel you completed the GIS work in PLAN 714 successfully. The course can be accessed at: http://training.esri.com/gateway/. IDs and Passwords used to access the course will be sent to each student during the first week of class by the Planning Librarian (Jennifer Doty).

Kang-tsung Chang. Chapter 1 – Introduction, pp. 1-10; Chapter 3 – Vector Data Model, pp. 31-49; and Chapter 6 – Attribute Data Input and Management, pp. 100-113 in *Introduction to Geographic Information Systems*, Boston: McGraw-Hill, 2002.

Additional resources:

Juliana Maantay and John Ziegler. "Map projections and coordinate systems," Chapter 2 – Spatial Data and Basic Mapping Concepts, pp. 39-53 and Chapter 6 – Sources of Urban Data, pp. 157-177 in *GIS for the Urban Environment*. Redlands, CA: ESRI Press, 2006.

Agustin Rodriguez-Bachiller with John Glasson. "GIS and Impact Assessment" (Chapter 3), pp. 52-80 in *Expert Systems and Geographic Information Systems for Impact Assessment*. London: Taylor and Francis, 2004.

Robert B. Kent and Richard E. Klosterman. 2000. GIS and Mapping: Pitfalls for Planners. Journal of the American Planning Association 66(20): 189-198

II. Estimating the Impacts of Development

February 5, 10: *Classes 8-9: Public Service impacts*

School impacts

Larry W. Canter. "Education Services Impacts," pp. 519-525 in Chapter 14 – Prediction and Assessment of Impacts on the Socioeconomic Environment, *Environmental Impact Assessment, 2nd Edition*. New York: McGraw-Hill Science/Engineering/Math, 1995.

Mary M. Edwards, "Worksheet 4.5: Education and Libraries" in *Community Guide to Development Impact Analysis*," Madison, WI: Wisconsin Land Use Program, University of Wisconsin-Madison, March 2000, pp. 104 (A20).

Parks and recreational facility impacts

Sue Enger. "Parks/Open Space/Recreation Facilities Standards," pp. 21-37 in *Level of Service Standards - Measures for Maintaining the Quality of Community Life*. Report No. 31, Municipal Research and Services Center of Washington, September 1994.

On Blackboard: James D Mertes and James R. Hall. "Section 3: Level of Service Guideline for System Planning." *Park, Recreation, Open Space, and Greenway Guidelines,* National Recreation and Park Association: Lubbock, TX, 1995

On Reserve in Planning Library: James D Mertes and James R. Hall. *Park, Recreation, Open Space, and Greenway Guidelines,* National Recreation and Park Association: Lubbock, TX.

Public safety impacts

Larry W. Canter, Samuel F. Atkinson, and F. Larry Leistritz, "Police and Fire Protection," pp. 104-117 in *Impact of Growth: A Guide for Socio-Economic Impact Assessment and Planning*, Chelsea, MI: Lewis Publishers, Inc., 1985.

Mary M. Edwards, "Worksheet 4.4: Public Safety" in *Community Guide to Development Impact Analysis*," Madison, WI: Wisconsin Land Use Program, University of Wisconsin-Madison, March 2000, pp. 103 (A19).

February 12 – 24: ***Classes 10-13: Traffic level of service impacts***

*****This section will be guest taught by Rynal Stephenson and Justin McCurry, Traffic Engineering Consultants at Ramey Kemp and Associates, Inc. We will also be moving to a different room for this section of the class – To Be Announced*****

Methods for Predicting Traffic Impacts:

Available on Blackboard: Institute of Transportation Engineers. Transportation Impact Analyses for Site Development (Student Supplement), 2006.

Papacostas, P. and P. Prevedouros. "Traffic Impact and Parking Studies". Transportation Engineering and Planning, 3rd edition. Upper Saddle River, NJ: Prentice-Hall, Inc. Chapter 9: Traffic Impact and Parking Studies, 2001, pp. 456-497

Additional resources:

Numerous Examples of Traffic Impact Assessment Reports are located on Blackboard

U.S. Department of Transportation, Federal Highway Administration. "Chapter 4C. Traffic Control Needs Studies". *Manual on Uniform Traffic Control Devices, 2003 Edition* with Revisions 1 and 2, December 2007.

Examples of Traffic Impact Assessment Requirements: Chapel Hill, NC, Montgomery County, MD and County of Barnstable, MA

Town of Chapel Hill, "Transportation Impact Statement Guidelines", Chapel Hill, NC, October 2001.

The Maryland-National Capital Park and Planning Commission, Montgomery County Department of Park and Planning, "Local Area Transportation Review and Policy Area Mobility Review Guidelines," Silver Spring, MD, 2008. [Online]: Available: http://www.mc-mncppc.org/transportation/latr_guidelines/latr_guidelines_2008.shtm

Cape Cod Commission, Guidelines for Transportation Impact Assessment, Technical Bulletin 96-003, County of Barnstable, MA, Revised January 9, 2003.

Additional resources:

Reid Ewing and Robert Cervero. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record, 1780: 87-114.

Randall Crane, "Cars and Drivers in the New Suburbs: Linking Access to Travel in Neotraditional Planning," *Journal of the American Planning Association*, (Winter 1996): 51-65.

February 26 - March 5: ***Classes 14-16: Water supply impacts***

*****March 5: Ed Holland (OWASA Planner), Guest Speaker*****

Textbook: Haested Methods. 2007. Computer Applications in Hydraulic Engineering: Connecting Theory to Practice (7th edition). Bentley Systems: Exton, PA. Chapter 1 (Sections 1.1 - 1.2, 1.4 – 1.6, 1.10 – Problems 2 – 8, 13 and 14), Chapter 6 (Sections 6.1 – 6.3, 6.5, and 6.9 – 6.10 for tutorial and examples). Also, review Appendix A for information on software installation and Appendix B for more software information.

On Blackboard: Insurance Service Office, "Guide for Determination of Needed Fire Flow," Jersey City, NJ: Insurance Service Office, 2008.

On Blackboard: Tony Nye and Karen Mancl. "Fact Sheet: Water Sources for Fire Protection in Small Communities." Columbus, OH: The Ohio State University Extension, 2001

Additional resources:

Jerry A. Nathanson. "Chapter 2: Hydraulics," pp. 27-41; and "Chapter 7: Water Distribution Systems," pp 181-184, 200-211 in *Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control*. 4th ed., Englewood Cliffs, NJ: Prentice Hall, 2002.

Ronald F. Cilensek. "Water Treatment Plant Construction Cost Estimating," Ch. 26 in: American Water Works Association. *Water Treatment Plant Design, 4th edition*. New York: McGraw-Hill Professional, 2005.

March 6 - 15: Spring Break

March 17, 19: ***Classes 17-18: Wastewater impacts***

Textbook: Haested Methods, *Computer Applications in Hydraulic Engineering: Connecting Theory to Practice*, Haested Methods, Inc., 2007, Chapter 7.

Additional resources:

Ronald F. Cilensek. "Water Treatment Plant Construction Cost Estimating," Ch. 26 in: American Water Works Association. *Water Treatment Plant Design, 4th edition*. New York: McGraw-Hill Professional, 2005.

Jerry A. Nathanson. "Chapter 2: Hydraulics," pp. 41-44; and "Chapter 8: Sanitary Sewerage Systems," pp 217-231 in *Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control*. 4th ed., Englewood Cliffs, NJ: Prentice Hall, 2002.

March 24 – April 2: ***Classes 19-22: Stormwater impacts***

Peak Discharge Impacts:

Textbook: Haested Methods, *Computer Applications in Hydraulic Engineering: Connecting Theory to Practice*, Haested Methods, Inc., 2007, Chapters 2 and 5.

Jerry A. Nathanson. "Chapter 9: Stormwater Management," pp. 251-269 in *Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control*. 4th ed., Englewood Cliffs, NJ: Prentice Hall, 2002.

On Blackboard (skim, but important): Natural Resource Conservation Service (NRCS). Urban Hydrology for Small Watersheds (Second Edition). Washington, D.C.: U.S. Department of Agriculture, 1986

Water Quality Impacts:

Jerry A. Nathanson. "Chapter 9: Stormwater Management," pp. 269-273 in *Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control*. 4th ed., Englewood Cliffs, NJ: Prentice Hall, 2002.

On Blackboard: John Randolph, "Chapter 13, Land Use, Stream Flow, and Runoff Pollution," pp.392-406; 434-466 in *Environmental Land Use Planning and Management,* Washington, DC: Island Press, 2004.

Additional resources:

North Carolina Department of Natural Resources. "Selecting the Right BMP," pp. 4-1 -7 in *Stormwater Best Management Practices Manual*, July 2007.

April 7: ***Class 23: Habitat impacts***

On Blackboard: Sharon K. Collinge. 1996. "Ecological consequences of habitat fragmentation: implications for landscape architecture and planning," Landscape and Urban Planning 36: 59-77.

April 9, 14: ***Classes 24-25: Wetland impacts***

Palmer Hough and Morgan Robertson 2008. Mitigation under Section 404 of the Clean Water Act: where it comes from, what it means. Wetlands Ecology and Management (In Press).

On Blackboard: Todd BenDor, Nicholas Brozovic, and Varkki George Pallathucheril. 2007. Assessing the Socioeconomic Impacts of Wetland Mitigation in the Chicago Region. Journal of the American Planning Association 73(3): 263-282.

April 16, 21: ***Classes 26-27: Climate change impacts***

Reid Ewing, et. al. "Overview," pp. 1-16 in *Growing Cooler: The Evidence on Urban Development and Climate Change*. Washington, DC: Urban Land Institute, 2007.

R.K. Jain, et. al. "Global Warming". *Environmental Assessment, 2nd Edition*. New York: McGraw-Hill, 2002, pp. 327-39.

April 23: ***Class 28. Course review and discussion of final impact assessment report***

April 27: ***Final Roberson Square Impact Assessment Report: Due at 5pm in TA's mail box on second floor of New East.***

Tentative Lab Schedule:

January 28: GIS Lab (Davis Room 247)

March 4: Water Treatment Plant Field Trip – details TBA

March 18: Wastewater Treatment Plant Field Trip – details TBA

April 1: Sarah Bruce, *Upper Neuse* River Basin Association, Guest Speaker – room TBA