NAME:

75 MINUTES; HAND IN YOUR 1 SHEET OF NOTES WITH THE EXAM; ASK FOR EXTRA PAPER IF NEEDED. MAKE (AND STATE) ANY REASONABLE ASSUMPTIONS NECESSARY TO GET AN ANSWER IN ADDITION TO THOSE GIVEN. CHECKING WHETHER THE ANSWER MAKES SENSE MAY HELP YOU EARN PARTIAL CREDIT IF YOU WENT WRONG SOMEWHERE.

PROBLEM 1 (21 pts total): Write 1-2 sentences explaining each of the following concepts as they relate to this course.

Fundamental canons

In the ASCE Code of Ethics, these are basic rules of professional ethics for civil engineers (more detailed than their fundamental principles). Among them is putting highest priority on the public welfare and striving to achieve sustainable development.

Minutes

Summary of what went on in a meeting, including decisions and action items. An element of effective teamwork.

Envision™

A new rating system for the environmental impact of infrastructure projects, intended to be similar to the LEED rating system for buildings.

Whole-system perspective

Considering the impact of different project alternatives across environmental attributes and media. This is important because looking at only some attributes and media can lead to bad decision making in terms of having the best overall impact.

Type II action

In the environmental quality review process, this is a type of project that is considered to have minor environmental impacts or to otherwise deserve to be exempt from further review.

Positive declaration

Finding by the lead agency involved in EQR that based on the submitted EAF, a project is likely to have significant environmental impact and needs to undergo a full EIS.

Critical environmental area

A zone declared by the state to be of greater ecological significance, so that projects proposed there must undergo heightened scrutiny under EQR.

PROBLEM 2 (40 pts total): A project P involves the construction of a new ice hockey arena. Alternatives explored for the project include A1: No build, A2: refurbish old meatpacking plant into arena, and A3: new arena with underground parking and connection to subway station. The impact categories considered and outcomes for each alternative are:

Water quality (nutrients discharged):
P: 200
A1: 100
A2: 100
A3: 150

Traffic congestion (cars/hour):
P: 1000
A1: 500
A2: 1000
A3: 700

Solid waste generated during construction:
P: 1000
A1: 0
A2: 500
A3: 800

Neighborhood play space:
P: 70
A1: 50
A2: 60
A3: 70

Use the scaling increments
Water quality: 50 (more is negative)
Traffic: 500 (negative)
Waste: 200 (negative)
Play space: 10 (positive)

Suppose that an incremental worsening in water quality is twice as important as any of the other factors. Which alternative would have the best overall performance? Show your work.

Assume that existing is the same as no-build (A1). M factors using Eq. 3.1 are: 2, 0, 0, 1; 1, 0, 1, 0.4; 5, 0, 2.5, 4; 2, 0, 1, 2. I factors are -1, -0.5, -0.5, +0.5. Overall scores per alternative are -4, 0, -1.25, -2.2. So A1 (no-build) has the best overall performance, while A2 (refurbish) is second-best.

PROBLEM 3 (39 pts total): *To answer these questions, read the article excerpted in the pages below. This article was published a few weeks ago in the New York Law Journal.*

a) According to the author, under what circumstances can climate change adaptation projects undertaken by New York state and city agencies not require environmental impact assessment? List and explain which Type II categories such projects may fall into.

The author argues that many such projects can be considered Type II and therefore not require EIS, which would enable them to be started faster. The Type II categories involved include:

1) MTA building on their existing property, without starting new transport projects -- this could cover things like building flood barriers around subway tunnels and stations.

2) Response to an emergency. This exemption may hold even if the emergency is not immediate, at least for measures that can immediately reduce hazards while a more comprehensive plan is developed and goes through EQR.

b) According to the author, how might environmental quality review be relevant to regulating a new project that is proposed in an area that is at risk of flood damage?

The main purpose of EQR is to assess impacts of the proposed project on the environment, not the risk to the project from the environment (for example, flood hazard). Nevertheless, NYC has been requiring EIS for building projects to include descriptions of hazards that residents might face, since a description of the "environmental setting" is mentioned as part of EIS in the state law. Further, projects that are likely to get flooded will tie up emergency response resources when there is a hurricane, which can count as a significant impact to the (social) environment.

Environmental Review of Climate Change Adaptation After Sandy

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The devastation caused by Sandy may have stunned most New Yorkers, but it came as no surprise to the climatologists, urban planners and government officials who have been focusing with an ever-increasing level of concern on the implications of a changing climate on the long-term well-being of New York City.

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These efforts take on a new sense of urgency in the wake of Sandy. In light of the destruction that storm caused, the city and state are focusing on whether and how they can provide for the safe and productive development of coastal areas. New York City alone has 578 miles of coastline shouldering residential, commercial and industrial neighborhoods in all five boroughs. On a larger scale, they will also be working on plans to protect the city's infrastructure from sea level rise,

storm surges and the other dangers that climate change is increasingly certain to bring. Thus, Governor Andrew Cuomo recently announced the formation of the NYS 2100 Commission, which has been tasked with finding ways to improve the resilience and strength of the state's infrastructure in the face of natural disasters and other emergencies. Bloomberg has asked various city officials to take the lead in, among other things, investigating ways to contend with future storm surges and working with the city's hospitals to develop better preparedness and recovery plans.

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SEQRA

It is fair to say that SEQRA (which is implemented by New York City agencies under the City Environmental Quality Review procedures) dramatically changed how government agencies in the State of New York go about their business. Under SEQRA, a state or local agency may not undertake a discretionary action (such as directly undertaking a project, issuing a discretionary permit or providing funding) without first making a determination as to whether that action "may have a significant effect on the environment." If the agency determines that the action may have at least one significant adverse environmental impact, it cannot proceed without first preparing an environmental impact statement (EIS) that thoroughly examines such impacts and identifies how they could practicably be minimized or avoided. This is a broad and flexible mandate that has made SEQRA a fundamental planning tool for addressing emerging environmental issues.

One pressing question is whether the immense projects that may be necessary to protect our coastal city from the ravages of climate change over the coming decades are subject to the environmental review requirements of SEQRA. As a general rule, the answer to that question would be in the affirmative, unless the project is federally funded and an EIS is prepared under the National Environmental Policy Act, in which case state and local agencies could discharge their responsibilities under SEQRA by relying on federal documents. However, there are a number of exceptions to this general rule with relevance to climate change adaptation.

For example, the New York Public Authorities Law exempts from SEQRA transportation projects carried out by the Metropolitan Transportation Authority (MTA) on property previously in transportation use or on an insubstantial addition to such property, so long as the project would not substantially change the nature of such prior transportation use. Accordingly, projects undertaken by MTA to protect subway tunnels or other essential infrastructure from flooding may enjoy an exemption under this statutory provision, even if their cost were to run into the billions. Moreover, replacements of existing structures in kind, on the same site, may be exempt from environmental review under a "Type II" category established by the SEQRA regulations. This exemption could cover much of the reconstruction needed in the aftermath of an extraordinary storm event.

SEQRA also includes an emergency exemption, which applies to actions that are immediately necessary on a limited and temporary basis to protect or preserve "life, health, property or natural resources," provided that such actions are directly related to the emergency and are performed to cause the least disturbance practicable to the environment. Thus, for this exemption to apply there must be a real emergency, the agency action must be tailored in scope and duration to address that emergency, and the action must be urgently required and must cause as little environmental disruption as practicable.

Since a general consensus has developed among credible experts that a crisis is looming as a result of climate change and its potentially profound global and localized environmental consequences, an argument could be made—given the apparent inability to predict the timing of the next extraordinary storm event in New York—that a climate-related emergency within the meaning of the SEQRA regulations now exists.

It should be noted, in this regard, that the emergency exemption under SEQRA has been applied not only to sudden catastrophic events, but also to emergency situations that have emerged over time. For example, courts have sanctioned application of the exemption where the city proposed to renovate existing buildings for use as homeless shelters and to temporarily deploy a prison barge to ease overcrowding in prisons. In such cases, courts have allowed immediate action to address emergencies that had developed over the course of years. However, the courts have indicated that agencies must still proceed with environmental review prior to the completion of permanent measures.

An agency would be hard pressed to characterize a mega-project such as a multibillion-dollar storm barrier as being "limited" or "temporary" in nature for purposes of the SEQRA regulations. Nevertheless, the exemption could come into play in the event the state and city were to take a phased approach to shoreline and infrastructure protection, with immediate interim steps being taken while longer-term solutions are developed. With such an approach, it is possible that the emergency exemption could be brought to bear to allow implementation of first-phase measures while planning, along with a comprehensive environmental review, is carried forward for the subsequent phases of the effort.

Another important issue is whether agencies should address in their SEQRA review of public or privately sponsored shoreline projects the risks of climate change (such as flooding or erosion). It is not clear from its statutory and regulatory language that SEQRA should cover those sorts of issues because the statute is focused on the impacts that an action would have on the environment, not the impact that the environment (as altered by a warming climate) would have on the action.

Yet for decades agencies have required applicants seeking discretionary approvals to site residential buildings near stationary sources of air pollution, to examine the impacts of those sources on the proposed buildings' future residents. Likewise, agencies regularly require that an EIS assess levels of traffic noise from adjacent highways at the windows of proposed buildings. Some regulatory basis exists for this prior agency practice, since the SEQRA regulations require an EIS to include "a concise description of the environmental setting of the areas to be affected [by an action]." See 6 N.Y.C.R.R. §617.9(b)(5)(ii). It would be a logical extension of such precedent to require analysis of the impacts of sea level rise on a development project proposed for the shoreline.

Moreover, as was well illustrated by incidents occurring during recent storm events, people trapped by floodwaters put first responders at risk. It follows that placing large numbers of new residents in coastal areas without appropriate safeguards could have an indirect effect on emergency services, an area of concern that has long been examined under SEQRA.

Thus, when past agency practice and the indirect effects of climate change are taken into account,

it appears that in appropriate cases an agency considering whether to issue a discretionary approval would be acting well within its discretion to require that climate change risks be examined in an environmental review under SEQRA. Indeed, the New York State Department of Environmental Conservation has stated, in guidance issued on greenhouse gas emissions and SEQRA, that "impacts of climate change on a project may be important in some cases," and that "[q]uestions regarding how climate change may potentially affect a proposed project will need to be decided on a case-by-case basis."
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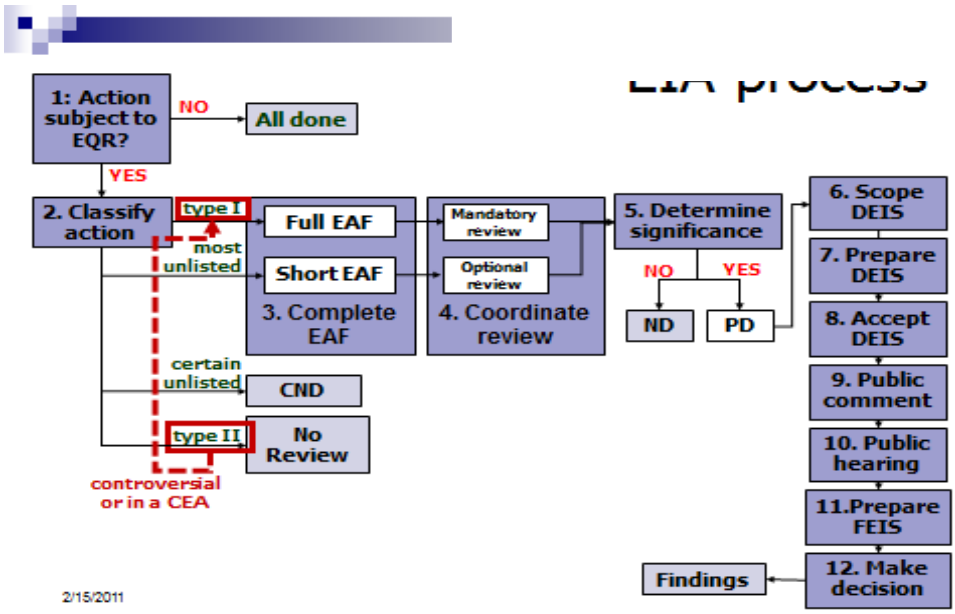
GIVEN INFORMATION

1. The SEQR environmental quality review process



2. Equations

$$(E3.1)\quad M=\frac{\text{Impacted condition}-\text{Existing condition}}{\text{Increment criterion}}$$

$$(E3.2)\quad M=\frac{\text{Impacted condition}}{\text{Threshold criterion}}$$

$$(\text{E3.3})\quad \text{Overall rating for each alternative} = \sum_{n=1,N} I_n M_n$$

3. Environmental attributes (those with * are in the CEQR technical manual):

Human

- Public health *
- Socioeconomic conditions *
- Infrastructure *
- Community facilities *
- Historic resources *
- Traffic & parking *
- Transit & pedestrians *
- Waterfront revitalization plan *
- Neighborhood character *
- Urban design *
- Visual resources *
- Shadows *
- Public policy *
- Natural resources *, Energy *, Solid waste & sanitation *

Air

- Air quality *, Atmospheric stability

Land

- Land-use, zoning *, Open space *, soil contamination, soil erosion

Water

- Water quality, water quantity, flow variations, aquifer yield

Sound

- Noise *