MINNESOTA
ENVIRONMENTAL QUALITY BOARD

June 2026 Environmental Quality Board meeting

Wednesday, June 17 from 1 – 4:00 p.m.

Join in person or online

- In person: 520 Lafayette Road, St. Paul, MN 55155, lower level conference rooms
- Online: For the meeting link and more information, visit the board meeting webpage

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Participating in board meetings

Attending in person

The Environmental Quality Board (EQB) will convene its meeting in person at the Minnesota Pollution Control Agency St. Paul office building. All visitors must sign in at the front desk.

Transportation options:

- Bicycle: Visit the Saint Paul Bike Map webpage for route information. Outdoor bicycle parking is available to the left of the front doors near the loading dock.
- Transit: Use Metro Transit's Trip Planner to determine the best routes and times.
- Car: You may park in a Visitor Parking space in the parking lot just outside the front door, or park in one of the visitor lots. The visitor lots are the Blue Lot (Olive St. and University Ave.) and the Jupiter Lot (on Grove St. across from the Ramsey County Law Enforcement Center); please see the parking map. Parking in these lots is free of charge. You must register your vehicle at the front desk upon arrival.

Attending virtually

Members of the public may join the meeting virtually using the Teams link at the board meeting webpage link above. Please review the Guide to Teams Participation for additional information.

Accessibility

Please contact Environmental Quality Board (EQB) staff at least one week prior to the event at info.EQB@state.mn.us to arrange an accommodation. Meeting materials can be provided in different forms, such as large print, braille, or on a recording.

Public engagement opportunities at EQB meetings

EQB encourages public input and appreciates the opportunity to build shared understanding with members of the public. The opportunities for public engagement for this meeting are below.

Public comment opportunities at EQB meetings

EQB encourages public engagement and appreciates the opportunity to build shared understanding with members of the public. There are multiple ways to engage with staff and board members. One important way is to provide public comment at a board meeting.

The public comment period(s) at a board meeting provide an opportunity for members of the public to inform the board about their views related to the specific item under discussion or something related to the board's purview or authority. Tips for providing comments:

- Ensure that your comments are relevant and specific to the topic you are addressing.
- Say what you want the board to know or consider in moving forward with a piece of work.
- Identify a specific action that you want the Board to take.

If you have a question for the board or EQB staff, it will be noted by staff who will get back to you at a later time. This ensures that we have enough time at a meeting for all commenters to provide input to the board and that your questions can be fully considered.

Oral public comment

At each meeting, the agenda will show when the board will accept oral public comment. The chair will use their discretion to direct public comment and ensure the board's ability to effectively conduct business.

Procedure for giving oral public comment:

- **Virtual:** when prompted, use the "raise hand" feature in Teams, located at the top of your screen.
- **In person:** sign up at the welcome table before the meeting starts.
- When the chairperson calls on you to speak:
    - Introduce yourself before beginning your comment.
    - Please keep your remarks to the agenda item at hand.
    - Please be respectful of board members, staff, and other meeting participants. The chair, vice-chair, or other presiding officer will not tolerate personal attacks.
- The chairperson may limit commenters' time for remarks to ensure there is equal opportunity for the public to comment. Generally, your remarks will be limited to two (2) minutes.
- The chairperson may discontinue a commenter's time to speak if the comments are not reasonably related to the agenda item at hand.

Written public comment

You may submit written comment to EQB by emailing your letter to info.EQB@state.mn.us or mailing to: Environmental Quality Board, 520 Lafayette Road, Saint Paul, MN 55155. Comments must be received by EQB staff **by noon the day before the meeting**.

Staff will compile letters, make them available to members and the public, and attach them to the public record. Any written comments received after this deadline will be included in the next meeting packet.

Please only submit information that you wish to make available publicly. EQB does not edit or delete submissions that include personal information. We reserve the right to not publish any comments we deem offensive, intimidating, belligerent, harassing, bullying, or that contain any other inappropriate or aggressive behavior.

Agenda

Note that all listed times are estimates and are advisory only.

1. Welcome and roll call (1:00 pm)

Nancy Daubenberger – Chair, EQB; Commissioner, Department of Transportation

2. Approval of consent agenda (1:10 pm)

- Meeting minutes from the April 15, 2026, Environmental Quality Board meeting on packet page 5
- Preliminary agenda for the June 17, 2026, Environmental Quality Board meeting

3. Executive Director's report (1:15 pm)

Catherine Neuschler – Executive Director, EQB

4. EQB overview and work updates (1:20 pm)

Type of item: Informational

Summary: As part of our welcome and orientation of new members, the Director will present a brief overview of EQB, including statutory roles and authorities, resources available to carry out our work, and the strategic plan. She will also provide a fiscal year end update on the progress and completion of key projects in the FY26 EQB workplan.

Outcome: Board members understand EQB's roles and authorities, and have a grounding in key work to support work plan discussions upcoming in July and August.

Presenter: Catherine Neuschler – Executive Director, EQB

Break (2:00 pm / 5 minutes)

5. Health in ER update (2:05 pm)

Type of item: Informational

Summary: Formally integrating the concepts of "human health" and "public health" in environmental review (ER) has been a longstanding topic of interest for the Board. Our current workplan includes an item to "summarize most recent work" and "develop potential options for considering health in ER for Board discussion." EQB staff will provide a summary of past work and discuss potential FY27 work to begin to consider the scope, means, and methods for how health impacts could be incorporated into the program in a way that aligns with current environmental review procedures.

Outcome: Introduction to the topic and board discussion on next steps.

Presenter: Kayla Walsh – Environmental Review Program Administrator, EQB

6. Public comment (3:05 pm)

The board welcomes any additional oral public comment. Please see guidance and procedures on packet page 2.

7. Closing and adjournment (3:30 pm)

MINNESOTA
ENVIRONMENTAL QUALITY BOARD

April 2026 Environmental Quality Board meeting

Wednesday, April 15, 2026 | 1:00-4:00 p.m. | 520 Lafayette Road, St. Paul, MN 55155, lower level conference rooms and online via Teams.

Minutes

1. Welcome and roll call

Vice Chair Dan Katzenberger called to order the regular meeting of the Environmental Quality Board.

Members present: Grace Arnold, Peter Bakken, Joseph Bauerkemper, Nancy Daubenberger, Tamar Gronvall, Todd Holman, Daniel Katzenberger, Katrina Kessler, Nicholas Martin, Paul Nelson, Angie Smith, Sarah Strommen

Members excused: Ed Brands, Brooke Cunningham, Rylee Hince, Robin Hutcheson, Thom Petersen, Matt Varilek

Proxies present: Myra Kunas (for Cunningham), Peter Lindstrom (for Hutcheson), Kevin McKinnon (for Varilek), Stephan Roos (for Petersen)

EQB staff present: Catherine Neuschler, Stephanie Aho, Rebeca Gutierrez-Moreno, Hazel Houle, Jesse Krzenski, Sarah Lerohl, Sophia Musiak, Priscilla Villa-Watt, Kayla Walsh

Approval of consent agenda

- Meeting minutes from February 18, 2026, Environmental Quality Board meeting
- Proposed agenda for April 15, 2026, Environmental Quality Board meeting

Motion: Board Member Kessler moved to approve the consent agenda; Board Member Holman seconded.

In favor: Arnold, Bakken, Bauerkemper, Gronvall, Holman, Katzenberger, Kessler, Martin, Nelson, Smith, Strommen

Opposed: none

Excused: Brands, Cunningham, Daubenberger, Hince, Petersen, Varilek

2. Executive Director's report

Catherine Neuschler – Executive Director, EQB

- Staffing update – Sophia Musiak, new EQB Environmental Review team staff

- EIS scoping rule update – The Administrative Law Judge (ALJ) reviewed and approved parts of the rule but disapproved of other parts. Staff will submit a revised rule to the Court of Administrative Hearings for review. The judge's report is posted on the Rules and regulations webpage.
- Continuous improvement – Public engagement process is on the EQB website and open through May 1st.
- Health in ER – In 2018 the Environmental Review Advisory panel provided recommendations for the board to act on both climate change and health. Climate is now well integrated into the EQB program, so ready to move forward with integrating health concepts into environmental review and this is on the staff workplan for this year. Staff will present on this subject at the May board meeting. Staff will reach out to the Association of Family Physicians for input and possibly to present to the Board.
- Legislative session – There have been some discussions around feedlots, data centers, drainage and similar items.
- Public member appointments – No information yet on appointees.

3. Spring pollinator report update

Presenter: Rebeca Gutierrez-Moreno, PhD – State Pollinator Coordinator, EQB

Type of item: Informational

Summary: The interagency pollinator protection team is planning to commemorate the 10-year anniversary of Minnesota's interagency efforts to protect pollinators. They presented their plans for public engagement and outreach actions and the draft outline of the annual pollinator report, which they will then bring to the board during the fall of 2026.

Outcome: The board was informed about the potential contents of the 2026 Pollinator Annual Report and had an opportunity to provide feedback to the Interagency Pollinator Protection Team about the contents of the report and the activities to commemorate the 10-year anniversary of interagency efforts.

4. Gas resource development projects mandatory category rulemaking approval

Presenter: Jesse Krzenski – Environmental Review Program Director, EQB

Type of item: Decision

Summary: In April 2025, the Board decided to move forward with the process of developing rules to establish mandatory categories for environmental review for gas production. EQB staff have been conducting research, engagement, and collaborating with other state agencies and Tribes to develop draft rules. Staff will present the draft rules and recommend that the Board approve the draft rules to be proposed and noticed for public comment.

Legislative language requires that the EQB use the expedited rulemaking process for promulgating these rules and formally propose the rules by publishing a Notice of Intent to Adopt rules no later than May 22, 2026.

Discussion:

Board members asked for clarity on the following issues:

- Is the threshold of wells per landowner/company, or per entity, or by geography?
- Do the rules and environmental review capture projects below the thresholds, with different applicants but which are adjacent? Or multiple phases or expansions (that are below the thresholds)? (connected and phased actions)
- Did staff look at more than one potential project to arrive at the five well threshold?
- Will siting prohibitions be clearly identified, so people can understand what the prohibitions entail for a specific resource?
- Is there a set term for DNR permits, do they have to be renewed, and if so, do the wells have to be inspected?
- What is the timeline for DNR rules?

Board members had the following input:

- Appreciate the charts that show the extent of Tribal input; keep that input in mind as the process continues.
- Consider how the gas rules could align with existing rules regarding feedlots and drinking water.
- Helium and hydrogen development is specific; Tribal input could touch on, potentially, all of the environmental review process. We need to find a way to address Tribal concerns.
- Make sure it's clear that the rule language establishes the mandatory categories and communicates how phased and connected actions are dealt with.
- Consider impacts on treaty reserved and ceded territory in the rule language, both here in and in other opportunities. Figure out how we move forward and capture this in rule.
- It is important that mandatory categories be developed so that they are clearly implementable. DNR's authorities do not extend to the creation of gas, just extraction.

Public comment:

- Board members were directed to written input provided by Darren Vogt, Resource Management Division Director, 1854 Treaty Authority (included in the April meeting packet, additional comments).

- Krishna Woerheide - Environmental Director, Grand Portage Band of Lake Superior Chippewa. Submitted written input (included in the April meeting packet, additional comments). Supports moving forward with the proposed rules with the understanding that Tribes will continue to work with EQB staff to affect at least some of the changes requested, particularly in the protection of water resources when it comes to drilling.

Motion: Board Member Kessler moved to approve moving forward with the gas mandatory category rules; Board Member Holman seconded.

In favor: Arnold, Bakken, Bauerkemper, Daubenberger, Gronvall, Holman, Katzenberger, Kessler, Martin, Nelson, Smith, Strommen

Opposed: none

Excused: Brands, Cunningham, Hince, Petersen, Varilek

Outcome: The Board approved the resolution to move forward with the gas rulemaking process.

5. Public comment

- Jamie Conniff provided written comment and input to multiple Board members regarding health impact assessments (attached to the April packet).

6. Closing and adjournment

Having reached the end of the agenda, the Chair asked if there was any further business.

Board member Bakken inquired about House file 3466 which would require EQB to draft EAW rules for drainage projects.

Executive Director Neuschler responded that she would be attending a House hearing on the subject. Some concerns because the bill would direct EQB to use exempt rulemaking.

Adjournment:

With no further business, the Chair adjourned the meeting.

MINNESOTA
ENVIRONMENTAL QUALITY BOARD

Memo

Date: June 5, 2026

To: Environmental Quality Board members

From: Kayla Walsh, Environmental Review Program Administrator

RE: Health concepts in environmental review

Formally integrating the concepts of "human health" and "public health" in environmental review (ER) is a longstanding topic of interest for the Board. Since 2012, the Board has heard presentations and recommendations related to this topic. In 2016, the EQB convened an Environmental Review Advisory Panel (ERAP) to review the program, identify areas of concern, and propose changes.

The ERAP looked at multiple topics, including climate and health impacts. Following ERAP, the Board chartered the Environmental Review Implementation Subcommittee (ERIS) as a venue for deeper discussion on big ideas. This included evaluating the environmental review program "to ensure alignment with the most recent technical information on climate impacts and human health concerns on a consistent basis."

EQB chose to focus first on consistently integrating climate into environmental review, while continuing to recognize the need to "evaluate and consider options to understand and address potential health impacts through environmental review."[1] The work to integrate climate was a considerable lift and resulted in changes to the program (such as a revised EAW form and supporting guidance, and the climate calculator).

EQB's initial launch of climate resources is now largely complete, allowing us capacity to consider additional programmatic initiatives. Recent public feedback – through avenues such as continuous improvement and mandatory category report comments – shows ongoing public interest in the topic of health. Generally, this renewed interest at Board meetings and members signaled their interest in re-examining this topic.

Staff believe it's a good time to move forward with work on considering health impacts in ER. Our current (FY26) EQB workplan includes an item to "summarize most recent work" and "develop potential options for considering health in ER for Board discussion."

This memo summarizes previous discussions with the Board to help establish a shared understanding of 'health in environmental review' and lays the foundation for future conversations related to:

- Ways to define "health impacts" and how to scope health for ER
- How health impacts are already being assessed in ER
- How health should or could be further effectively considered in ER

Staff will move forward at the Board's direction to consider options for incorporating health impacts in a way that aligns with current environmental review procedures and supports our criteria for an effective program.

[1] EQB's FY20-21 workplan included this item.

Health concepts in ER

The environmental review (ER) process gathers information on a project's environmental impacts to inform decision-makers and the public. While ER emphasizes understanding a project's ecological impacts, it also informs decision-makers and the public on how communities may be impacted by potential changes to their built and natural environment.

The importance of human health is stated in the Minnesota Environmental Policy Act (MEPA), which governs environmental review. The purposes of MEPA are:

> "(1) to declare a state policy that will encourage productive and enjoyable harmony between human beings and their environment;
>
> (2) to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of human beings; and
>
> (3) to enrich the understanding of the ecological systems and natural resources important to the state and to the nation." – Minn. Stat. 116D.01

MEPA also asserts that state agencies have a responsibility to use all practicable means to "…assure for all people of the state safe, healthful, productive, and aesthetically and culturally pleasing surroundings" (Minn. Stat. 116D.02, Subd. 2).

MEPA speaks to human health, but in practice there are few specific prompts and no standardized ways of considering health in ER documents. Even without direct prompts, some environmental reviews do include health impact information; some process documents (such as the environmental assessment worksheet) ask for information on potential impacts to climate, air pollution, noise, water quality, and other areas. Such impacts can affect both the environment and human health.

Past research shows some states address public health more directly in their ER processes. For example, they might require information on whether projects create hazards to human health and safety or expose people to potential substantial adverse effects.[2] We can review these processes for ideas on ways to incorporate health impacts in ER in Minnesota.

Health Impact Assessments

Internationally and nationally, there is a growing body of work on the topic of considering health effects when planning or reviewing policies or projects. One method for doing this is to use Health Impact Assessments (HIAs). Since HIAs are mentioned frequently when discussing health in ER, it is helpful to understand what they are.

A health impact assessment, or HIA, is a repeatable framework with standardized steps. It's used internationally and nationally in several policies and programs. According to a 2012 report prepared by the Minnesota Department of Health (MDH), *Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet,* "HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population."

[2] Minnesota Department of Health (2012, September). Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet. See Appendix B of the report.
A copy of the report is attached to this memo.

MDH also noted in 2012 that early HIAs used a narrow, quantitative assessment of health. But the field of public health has helped expand our view of health to include social determinants of health and equity.[3] According to the 2012 study, HIAs have increasingly taken this broader look, and "this has resulted in an increased acceptance of less quantitative risk assessment and inclusion of qualitative evidence and best practices."

The MDH study goes on to discuss the integration of environmental review and HIAs, noting "a growing collection of literature looking at the effectiveness of incorporating the two processes."

HIAs mirror environmental reviews in that they use community input and are proactive, collaborative, rigorous, and inform decision-making. They offer flexibility because they can be scaled to meet available timelines and resources. Comprehensive HIAs tend to be completed over a year or two and can provide a more complete picture of health impacts. Comprehensive HIAs involve robust public engagement so that the communities' priorities and health concerns are considered and addressed.

As the MDH study says, "incorporating health into the environmental review process faces many challenges, such as the unknown and disputed cause-and-effect relationships of hazards and health outcomes; the complex nature of environmental health impacts; the general reluctance to use a broader, social definition of health; lack of involvement from health professions in environmental review; and a shortage of resources to implement HIAs…" The report goes on to discuss the major steps in completing an HIA, benefits and barriers to implementation, and possible strategies for overcoming barriers.

MDH launched the MN HIA Coalition to promote HIA use and collaboration (2013-2017). This included an HIA Action Guide. MDH performed HIAs on comprehensive, residential, and transportation plans, including the 2016 Minnesota Statewide Multimodal Transportation Plan. As of 2019, MDH was aware of 33 HIAs in Minnesota, of which 21 were assisted or led by MDH. Many of the HIAs focused on built-environment projects and planning.

Work completed to date

Significant work since 2010 laid the foundation for the Board's recognition of the need to evaluate and consider options for integrating health impacts in ER. This deep history of conversations and research into health in ER means that we don't need to start from the beginning.

MDH study (2010 – 2016)

In 2010, the Minnesota Department of Health (MDH) received funds from the Centers for Disease Control and Prevention (CDC) to increase the capacity of the state to perform Health Impact Assessments (HIAs) as a means of ensuring health considerations in planning and policy decisions. As part of that grant, MDH explored whether climate change and health effects were being considered in the Environmental Assessment Worksheet (EAW). MDH published their results in their 2012 report (attached).

The study notes the following benefits to incorporating health into ER:

- Addressing health as intended in national and state environmental policy acts
- Using the existing framework of environmental review reduces confusion and duplication of work
- Considering health and environmental impacts together leads to more holistic conclusions to guide better outcomes

[3] MDH provides information on Health Impact Assessments and social determinants of health on their website. The World Health Organization notes that the determinants of health include the social and economic environment, the physical environment, and a person's individual characteristics and behaviors.

This report also included an examination of federal and state ER practices, a review on incorporating health impact assessments (HIAs) into the environmental review process, a review of Minnesota's EAW for health impacts, and recommendations.

MDH found the following health indicators were already addressed in the EAW form, though not always in obvious/direct connections to health:

- Minimizing exposure to harmful noise, hazardous sites and sources of air pollution emissions
- Providing access to parks, community gardens, and trails for physical activity
- Providing affordable and diverse housing options to improve community stability and foster social networks and community
- Providing access to healthy food retailers and emergency services
- Protection from flooding and impaired water quality
- Proximity and provision of public transit, bicycle lanes, and trails

MDH concluded that the EAW process, while addressing some health indicators, inconsistently evaluates public health risks; and advocated for integration of health concepts for a holistic, data-driven framework. They also recommended coming to agreement on a broad definition of health and using expert collaboration during project scoping to enhance long-term public health resilience. The study noted other health indicators that could fit into the existing items of the form and/or within ER guidance documents including food availability, housing, urban heat island effect, connectivity of recreation facilities and multi-modal trails, response times for emergency services, etc.

The study highlights some key barriers to implementing health in ER – namely lack of uniformity in content and process and lack of formal requirements – but indicates that most could be overcome by creating a standardized process for considering health impacts and providing guidance, training, and coordination with health officials.

The study offered the following recommendations at the time of publication:

- Minor changes to the language in the streamlined EAW form
- Additional guidance language in the EAW guidance documents
- Addition of a MDH staff person to review EAWs as a screening tool for recommending HIAs
- A revised EAW form that adds health considerations to the existing item prompts.

Public interest in Health Impact Assessments (2014-2017)

Around 2014, members of the public expressed interest in the potential health impacts of certain large projects undergoing environmental review, such as the PolyMet NorthMet mine and the Enbridge Line 3 pipeline. The Minnesota Association of Family Physicians (MAFP) requested a comprehensive HIA be completed alongside a supplemental environmental impact statement (EIS) on the PolyMet project due to potential impacts from pollutants like mercury and lead. In April 2015, MAFP passed a resolution supporting independent health risk and health impact assessments for any sulfide mining proposals.

In May 2016, MAFP unanimously passed a resolution supporting a petition for HIA rulemaking to require that a comprehensive, independently produced HIA be prepared for all sulfide mining projects requiring the completion of an EAW or EIS. The petition for rulemaking was sent to the Board in June 2016; it was discussed at the October 2016 Board meeting with multiple presentations and public comment.

ERAP (2017 – 2018)

In 2017, the Board decided to begin work to modernize the environmental review program and convened the Environmental Review Advisory Panel (ERAP). Panelists were tasked to produce a report with actionable recommendations in key areas of discussion, including health impacts. Through the work of ERAP, the Board heard presentations on HIAs and how the state of Alaska created formal technical guidance for HIAs in their reviews, focusing on impacts to indigenous communities. In October 2018, ERAP submitted a final report with recommendations to the Board. ERAP agreed that health impacts should be evaluated as part of the ER process. They also agreed to the following 'problem statement': "There isn't a consistent approach for assessing all aspects of health in the ER process."

However, the panel could not reach agreement on recommendations for how to integrate health in ER. Members disagreed to what extent health is currently incorporated and some noted that health equity or community-wide health impacts are currently not (consistently) addressed. Members could not agree on how to define "health" for the ER process. Members discussed HIAs as one tool that could be used.

Members did agree, however, that no matter the path forward, EQB should provide guidance and training on how to incorporate health impacts in the ER process. The report says, "this guidance should provide a variety of options, including but not limited to how to complete the EAW form with greater human health impacts considered in each question; using EAWs as a screening tool for an HIA; including HIAs in EISs — particularly in scoping of the EIS and any other method that could better integrate a human health perspective into ER."

ERAP highlighted the need to gather additional input to help address some remaining questions around health. In November 2018, EQB staff shared a memo with the Board providing additional insights into the ERAP discussions and summarizing public comments. Much of the panel's discussion centered around what types of health information should be provided, how detailed the analysis should be, and whether an RGU has the technical expertise to do a review. Public comments then demonstrated concerns that:

- Potential health impacts are not adequately evaluated in the current ER process.
- RGUs do not have the necessary technical expertise to evaluate potential health impacts and would benefit from assistance from State agency experts.
- A broader stakeholder engagement process is needed to determine the appropriate level of review for potential health impacts in ER documents.

The Board discussed the ERAP report results and determined what work to move forward. The Board approved a workplan that focused on integrating both the topics of 'climate change' and 'health' into environmental review with a biennial focus (FY20-21) to "support coordinated, effective, and meaningful action on climate mitigation and adaptation in Minnesota." Even with an initial focus on climate, the Board included an item to "evaluate and consider options to understand and address potential health impacts through environmental review."

Most recent work (2019 – today)

In 2023, the EQB launched our formal continuous improvement process; the public engagement components resulted in many responses related to including health or HIAs in environmental review.

In November 2024, the Minnesota Indian Affairs Council passed a resolution supporting a comprehensive and independent HIA be prepared for projects in Minnesota that require an EIS. In December 2024, the idea of adding "health" to environmental review came forward during public comments for the Mandatory Category Report and in August 2025, the Board added "Health impacts considerations" to staff's FY26 workplan.

Future work and next steps

Past work helps us identify the open questions that need to be answered as we consider all possible options for elevating health in environmental review.

How health is currently included in ER: The ERAP members documented their disagreement about the extent to which health was incorporated into environmental review. The previously completed study by MDH (2012) reviewed how health or public health considerations were being incorporated in environmental review documents. EQB staff can consider reviewing recent environmental review documents to see if health is included or discussed, and to what extent. Staff would first need to develop at least a preliminary scope and definition of "health" to be used in conducting the research.

Definition and scope: Both the ERAP and the study by MDH note that the lack of a definition for "health" within ER is a gap, saying that a definition needs to be agreed upon at the start. In the ERAP meetings, some said that the EQB's definition of "environment" does not explicitly include the word "health" and therefore ER should not consider health. Although humans and our built environment are intrinsically a part of the environment, explicitly defining "health" provides certainty and clarity on the role of health in the ER program.

Improving the consistent consideration of health in ER hinges on a clear understanding of which health impacts or health determinants are most useful and relevant for ER, both generally and for specific projects. Scope should align with program objectives to provide usable information and reduce uncertainty. For example, health assessments typically identify potentially affected groups of people and disproportionate impacts; this aligns with ongoing work to measure cumulative impacts and identify environmental justice areas. Scope should also consider implementation of new ideas and the RGU's capacity to do so successfully.

Commensurate level of review: When considering the elements of an effective climate assessment, the EQB's workgroup identified as a guiding principle that "the level of effort should be proportional to the proposed project's potential level of impact to/from climate change." This principle likely holds for consideration of health. Likely an EAW and an EIS should assess different determinants of health and/or assess health at a different level of detail. Ascertaining requirements or guidance that is commensurate with the effort of an EAW and EIS respectively will be an important consideration. As one example of what is meant by "commensurate," a full HIA might be best suited for EISs (or even EISs of certain project types) and a less in-depth health review might be sufficient for EAWs.

Tools: Although the idea of using HIAs as the specific tool for considering health has been a prominent throughline in EQB discussions, there have also been concerns about the level of work and expertise HIAs require. There are other potential tools, and we will need to evaluate all potential mechanisms for integrating health concepts. EQB can consider EAW form updates, guidance updates, rule changes, and other ways to incorporate the framework of health. Rule changes, depending on the Board's directive, could include evaluating definitions, mandatory categories, decision criteria, or new rules altogether.

Knowledge and capacity building: Whether RGUs conduct analysis themselves or contract with technical experts to complete the work, this may require staff, funding, or other additional resources. Regardless of how we move forward, EQB staff recommend providing sufficient resources, guidance, and training so RGUs can perform any newly required or recommended analyses, and the public will understand the results.

Next steps

Staff plan to develop a recommendation for the FY27 workplan to start evaluating some of the open questions described above and to support staff and the Board's continued learning about health impacts. For continued learning, staff plan to host a guest speaker at an upcoming Board meeting to share new research on Indigenous indicators of health in ER. We can also consider more Board discussion on benefits and barriers of specific tools and/or levers, including HIAs, and on other global and national policies for health impacts. We envision the FY27 workplan could include the following:

- Convene discussions about definition/scope of health information that may be useful and practical in ER
- Developing preliminary ideas for potential definition/scope of health information
- Reviewing recent ER documents to see how they are already including health information (based on the preliminary definitions or scoping of "health")

- Review and update information from past studies and literature reviews, especially documenting policies, practices, tools, and definitions used in other states' ER programs when including health impacts

This work will require engagement across the state enterprise, and with key external partners, to help explore various options. At this time, staff are most interested in hearing Board member feedback on the potential work and topics for continued learning for FY27.

Attachment 1
Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet

This report was prepared in September 2012 by the Minnesota Climate and Health Program, Minnesota Department of Health Environmental Impacts Analysis Unit.

This document is almost 15 years old, and the information and conclusions that would be reached today have likely evolved since the production of this report.

Due to recent web updates, the report is not currently accessible online. Therefore, it is being included in the Board packet because it provides a good foundation for understanding the Board's past consideration of health impacts, and identifies concepts that remain important and are worth re-examining.

Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet

Minnesota Climate and Health Program

Minnesota Department of Health

Environmental Impacts Analysis Unit

September 2012

Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet

Minnesota Climate & Health Program
Minnesota Department of Health
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September 2012

Table of Contents

I. Background

In 2010, the Minnesota Department of Health (MDH) received funds from the Centers for Disease Control and Prevention (CDC) to review the state Environmental Assessment Worksheet (EAW), part of the environmental review process in Minnesota. The purpose of the review was to discern whether climate change and health effects were being considered in the EAW. The scope of the project included an examination of the best practices of federal and state environmental review processes regarding the inclusion of human health and climate change, a literature review on incorporating health impact assessments (HIAs) into the environmental review process, a review of legislation requiring HIAs, a desktop HIA on a mixed-use project that completed an EAW in Minnesota, and a review of Minnesota's EAW for present assessment of health and climate change impacts.

As the culmination of this effort, MDH developed recommendations on incorporating health and climate change considerations into the EAW itself and the EAW Guidelines which are used to help guide preparation of the worksheet. The recommendations will be presented to the Environmental Quality Board (EQB), which oversees the state environmental review process, for its review and approval. Incorporating consideration of human health and climate change impacts within the EAW could have significant positive effects on human health and climate change adaptation and mitigation in Minnesota.

The built environment impacts the health of the public and can also influence factors that drive climate change. For example, developing a subdivision on the outskirts of an urban area may remove existing vegetation and trees and increase vehicle-miles traveled (VMT). Increases in VMT may increase greenhouse gas (GHG) emissions that contribute to climate change and can also result in negative health effects, including reduced air quality, increased motor vehicle-related injuries, and promotion of more sedentary life-styles. The EAW is used to assess a wide range of projects that can alter the natural and/or built environment, including mining operations, hog farms, and mixed-use developments. Addressing the potential negative health and climate change effects of increased vehicle traffic induced by new projects, or the positive effects of increasing density and walkability, can provide critical information to the public and decision makers for promoting a healthy built environment.

This report includes an evaluation of the environmental review process, an examination of potential methods for addressing public health and climate change through environmental review, and provision of specific recommendations to the EQB for how to address health and climate change in the Minnesota EAW.

II. Minnesota environmental review process

The Minnesota Environmental Policy Act of 1973 (MEPA) established a formal environmental review process to provide information about the environmental impacts of projects before necessary permits or approvals are issued. MEPA established the EQB to develop policies, create long-range plans and review proposed projects that would significantly influence Minnesota's environment. The EQB brings together the Governor's Office (as chair), five citizens and the heads of several state agencies (i.e., the Department of Agriculture, the Minnesota Pollution Control Agency (MPCA), the Department of Employment and Economic Development, the Department of Health, the Department of Natural Resources (DNR), the Minnesota Department of Transportation (MnDOT), the Department of Commerce, and the Board of Water and Soil Resources) that play a role in Minnesota's environmental quality and economic development.

The EQB writes rules for conducting environmental reviews, which are carried out by state and local governments.[1] At the state level, agencies responsible for carrying out environmental reviews include the MPCA, MnDOT, and the DNR. At the local level, watershed districts, counties, townships, and cities conduct environmental reviews under MEPA.[2]

An environmental review as outlined in Chapter 116D of Minnesota Statutes examines how a proposed project could potentially affect the environment and ways to avoid or minimize impacts before the project is permitted and built. Not all development projects require environmental review. The need for review is determined by the nature, size and location of a project. An environmental review must be conducted for any project or action that directly or indirectly alters the physical environment; involves governmental approval, assistance, or action; and has not yet been permitted or constructed (i.e., no retroactive reviews). Additionally, citizens can request an environmental review by petition. If an environmental review is required, the governmental body with jurisdiction over the project (i.e., the Responsible Government Unit, or "RGU") works with the developer to complete one or both of the following documents:

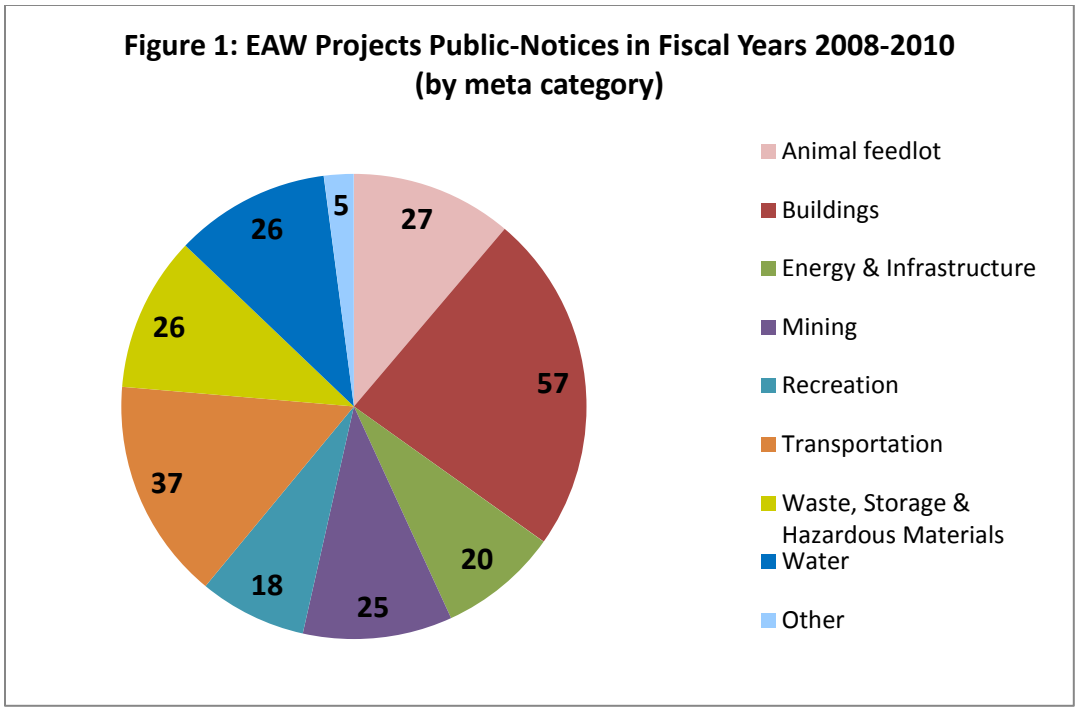
- Environmental Assessment Worksheet (EAW): A screening tool to determine whether a full environmental impact statement is needed. The worksheet is a six-page questionnaire about the project's environmental setting, the potential for environmental harm and plans to reduce the harm. Approximately 150 worksheets are completed each year.
- Environmental Impact Statement (EIS): An in-depth analysis used for major development projects that will significantly change the environment. The EIS covers social and economic influences, as well as environmental impact, and looks at alternate ways to proceed with the project. Seven EISs for private sector proposals were started between 2007 and 2010.[3]

According to EQB guidance documents, the EAW process typically requires 3 to 4 months to complete and has a total of six steps. First, the RGU determines if an EAW is needed. Second, the RGU obtains data

needed for the completion of the EAW from the project's proposer. Third, the RGU completes the EAW and distributes it to agencies for review. The member agencies of the EQB receive and review EAWs, as well as other local, state, and federal agencies, depending on the project type and location. Fourth, notice of the EAW is published in the EQB Monitor[a] and a press release is given to a local newspaper. Fifth, any interested person can review the EAW and submit written comments to the RGU within 30 days following the Monitor notice. Comments may address the accuracy and completeness of information, additional environmental effects or corrective actions that should be considered and the potential for significant environmental effects due to the project. Finally, the RGU considers the EAW information and the comments received, and officially decides if the project has the potential for significant environmental impacts. If it is determined that there are no significant impacts or that impacts will be mitigated, the environmental review process is over. Any appeal of this decision must be made in district court within 30 days.[4] If the project is determined to have the potential for significant impacts, an EIS is required.

MDH chose to review the EAW because more projects in the state complete an EAW than an EIS. Therefore, if public health and climate change analysis were included in the EAW, it would affect more projects overall. Figure 1 below demonstrates the nature and quantity of projects that undergo an EAW. Figure 1 includes all EAW projects that were published in the EQB Monitor during fiscal years 2008, 2009, and 2010. Projects published in fiscal years 2008 and 2009 were categorized by the MPCA and EQB staff for the Environmental Review Streamlining report published in December 2009.[5] MDH staff categorized projects from fiscal year 2010 using EQB files and archived issues of the EQB Monitor. MDH aggregated EAW categories into nine meta-categories for Figure 1. A full list of projects by EAW category is provided in Appendix A. The categories used are consistent with the mandatory EAW categories defined by Minnesota Administrative Rule 4410.4300.

[a] EQB Monitor is a biweekly publication of the Environmental Quality Board that lists descriptions and deadlines for Environmental Assessment Worksheets, Environmental Impact Statements and other notices. Available online at http://www.eqb.state.mn.us/monitor.html



The EQB has reviewed the EAW process in recent years to find areas to simplify the process for the RGU. In 2009, the MPCA was charged by the legislature to study options to streamline the environmental review process in Minnesota. The final report, *Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input*, noted that past efforts to explore broad streamlining of environmental review have often resulted in polarized views among stakeholders and these efforts have largely been unable to find a path toward consensus.[6] The report demonstrated that there is still a divide among stakeholders on whether environmental review should be streamlined. In 2011, a working group of state agency staff and consultants that regularly complete EAWs developed a streamlined version of the worksheet. The majority of the content of the EAW remained the same, but was reorganized to flow better and reworded to provide clarity. Within this report, the EAW that was streamlined in 2011 will be referred to as the "streamlined EAW," the EAW in operation at the time of this writing will be referred to as the "EAW," and the documents that guide practitioners through completing EAWs will be referred to as the "EAW Guidelines."

III. Health and climate change in federal and state environmental review

Many countries, including the United States, have enacted legislation or given executive orders to address the environmental impacts of policies and projects that affect the health of their citizens. In 1970, the United States passed the National Environmental Policy Act of 1969 (NEPA) [42 U.S.C. 4321 et seq.] to establish national environmental policy and goals for the protection, maintenance, and enhancement of the environment. The legislation provides a process for implementing these goals within the federal agencies.

The Act also established the federal Council on Environmental Quality (CEQ).[7] The purposes of this Act are to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man. . ."[8] In its original context, the federal environmental review process was intended to ascertain the effects of federal projects and actions on public health. Since implementation, the focus has been on the environment and biosphere with little review of human health except in cases where project-related pollution exposure may lead to cancer.[9]

More recently, the potential impacts of climate change have led the U.S. government to look at GHG emission reductions. In February 2010, the CEQ released Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. The purpose of the draft guidance is to encourage agencies to use the NEPA process "to reduce vulnerability to climate change impacts, adapt to changes in our environment, and mitigate the impacts of Federal agency actions that are exacerbated by climate change." As rationale for this guidance, the CEQ cites Federal statutes, Executive Orders and agency policies committing the government to the goals of energy conservation, reducing energy use, eliminating or reducing GHG emissions, and promoting the deployment of renewable energy.

Around the same time of the passage of NEPA, many states enacted state environmental policy acts to address the environmental impacts of actions and projects by states and other local governments not covered by NEPA. In addition to Minnesota, 15 states and the District of Columbia have enacted state environmental policy acts, often called "mini-NEPAs". Minnesota's response to NEPA was enacting MEPA, as described in Section II. Table 2 provides a list of states with state

Table 2
States with state environmental policy acts

State	Act/Regulation	Climate Change?	Public Health?
California*	CEQA	YES	YES
Connecticut	CEPA	NO	YES
District of Columbia	EPA	NO	YES
Georgia	GEPA	NO	NO
Hawaii*	OEQC	NO	YES
Indiana	IDEM	NO	YES
Massachusetts*	MEPA	YES	YES
Maryland	MEPA	NO	NO
Minnesota	MEPA	YES	YES
Montana	MEPA	NO	YES
New Jersey	Executive Order #215	NO	YES
New York*	SEQR	YES	YES
North Carolina	SEPA	NO	NO
South Dakota	Statute 34A	NO	NO
Virginia	Virginia Code 3.2	NO	NO
Washington*	SEPA	YES	YES
Wisconsin	WEPA	YES	YES

*States reviewed in more detail for climate change and public health measures.

environmental policy acts. These Acts established environmental review processes that range from a sentence or two of regulation requiring that a project must state its environmental impact, to full checklists and guidelines for completing the review.

MDH reviewed the 17 mini-NEPAs and found that the health issues of air quality (including odor and air pollution emissions), noise, hazardous activities or waste, aesthetics and scenic vistas, active transit and recreational resources, economic and cultural welfare, and climate change issues related to GHGs have been incorporated into the environmental review process of some states. Six states directly or indirectly address public health, another six states directly or indirectly address both public health and climate change or GHG emissions. The mini-NEPAs that address public health use language such as, does a project "expose people to potential substantial adverse effects/a significant risk" or "create hazards to human health and safety." The mini-NEPAs that address climate change refer to the generation and mitigation of GHG emissions and require the RGU to comply with existing climate change or GHG emission policies.

MDH reviewed five of these states in detail because their environmental review process are comprehensive and include a worksheet similar to the Minnesota EAW. The five states were California, Massachusetts, New York, Washington, and Hawaii. Full review details are included in Appendix B. One of the strengths of California's environmental review checklist is that it addresses the displacement of existing housing and people due to the development of a new project. Recent studies and health impact assessments have shown the health impact, especially mental health impact, experienced by displaced persons.[10] A notable inclusion in Massachusetts's environmental notification form is within the Traffic Impacts and Permits section. Subsection D asks, "How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?" Massachusetts is one of the only states to reference physical activity and accessibility as key public health issues. New York State included a section in their environmental assessment form specifically called "Impact on Public Health," which asks "will proposed action affect public health and safety?" New York State and Washington State both provide detailed guidance on calculating projected GHG emissions from proposed projects. Hawaii does not currently require the calculation of GHG emissions, but undertook a report in 2010 that discussed whether the environmental assessment or impact statement is the appropriate tool for addressing climate change and GHGs. The report noted a few reasons for why the environmental review may not be the appropriate tool for addressing climate change. See Table 3 for a brief summary of this discussion.

Table 3: Why the EIS may not be the appropriate tool for addressing climate change
• It will just be another barrier to prevent development. • It would just add cost to the project. • Do not add another layer. If there are no consequences for not doing it, why require it? • The EIS process is too late. It should be addressed in master planning. • Is it fair or practical to ask developers to evaluate these issues? • This should be addressed through strategic environmental assessment (SEA).

Source: http://tinyurl.com/HawaiiERSReport

While the use of mini-NEPAs for promoting public health and climate change is in its infancy, it is encouraging to note that several states, as described above, have been able to use the authority given by their environmental protection legislation to begin addressing public health and climate change issues. Minnesota may want to consider some of these notable examples for the EAW. Other public health issues that could potentially be addressed by environmental review, such as affordable housing, food security, and social determinants of health, have yet to be addressed through environmental review.

IV. Incorporating health impact assessments (HIA) with environmental review

Purpose of HIA

A key question of this project was whether Health Impact Assessment (HIA) would be an effective tool for incorporating public health and climate change evaluation into the EAW. HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population.[11] HIA provides recommendations on monitoring and managing those effects.

HIA has developed into a framework that contains six major steps, including: screening, scoping, assessment, recommendations, reporting, and evaluation and monitoring. The screening step primarily determines whether a project or policy could benefit from an HIA and whether the HIA could affect a decision that would mitigate negative health impacts and/or improve beneficial health impacts. The scoping step determines the health issues that will be assessed. The assessment step determines the health impact (direction, magnitude and severity) of a project. The recommendations step develops recommendations for promoting positive health impacts and/or mitigating the negative health impacts of a project. The reporting step reports the findings and recommendations to the decision makers. The last step, evaluation and monitoring, evaluates the HIA process and monitors the effect the HIA had on the decision being made and ultimately the health of the population being affected.

History

HIAs originated in the 1980s and have been primarily conducted in Australia, Europe (especially the UK), and the US. HIAs are frequently initiated by local public health authorities or local communities concerned about the health impacts of a policy or project within their community. HIAs began with a narrow definition of health favoring quantitative risk assessment and precision. Since then, public health has helped broaden the definition of health to include the social determinants of health[b] and health equity[c].[12] This has resulted in an increased acceptance of less quantitative risk assessment and inclusion of qualitative evidence and best practices.

To date, the majority of HIAs are conducted voluntarily. In the US, six states have attempted to pass legislation promoting HIA use. Five states were unable to pass legislation including, California, Maryland, Alaska, Illinois, and Minnesota. California and Maryland introduced legislation in 2008 to integrate HIAs into the public health decision making process. Alaska explored the idea of requiring an HIA to provide analysis and insight on human health prior to any government action in 2010.[13] Illinois attempted to require HIAs through an Environmental Policy Act update in 2011. Minnesota introduced language in the 2011 Healthy Communities Act to provide funding for HIAs on projects, programs, or policies identified by the community.[14] Massachusetts is the only state to successfully pass legislation to require HIA. The 2009 legislation reorganized the Massachusetts transportation department and established a 'healthy transportation compact' which includes 11 actions steps, including Action (v) "establish methods to implement the use of health impact assessments to determine the effect of the transportation projects on public health and vulnerable populations" and Action (x) "institute a health impacts assessment for use by planners, transportation administrators, public health administrators and developers."[15]

HIAs can be combined with environmental impact assessments. There is a growing collection of literature looking at the effectiveness of incorporating the two processes. Proponents of integrating HIA with environmental review cite the similar processes used in both assessments; the similar purpose of both assessments to provide decisions makers information on mitigating risks and maximizing benefits; the existing multidisciplinary input of environmental assessment that provides a place for health to be addressed; and the established public involvement process that is key to both assessment processes.[16] However, incorporating health into the environmental review process faces many challenges, such as the unknown and disputed cause-and-effect relationships of hazards and health outcomes; the complex nature of environmental health impacts; the general reluctance to use a broader, social definition of health; lack

[b] The social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. (WHO, source: http://www.who.int/social_determinants/en/)
[c] Health equity is the "attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities." (Healthy People 2020, Accessed online: http://www.healthypeople.gov/2020/about/DisparitiesAbout.aspx)

of involvement from health professions in environmental review; and a shortage of resources to implement HIAs, which means that health is not seen as a priority.[17] The next sections address the benefits of incorporating HIA with environmental review, the barriers, and possible strategies for overcoming barriers.

Benefits of incorporating HIA with environmental review

Integrating HIA with environmental review provides the opportunity to examine the health impacts of industry and government actions, which is one of the original purposes of NEPA in addition to many state Environmental Policy Acts.[18]

The similar procedural steps of environmental reviews and HIAs assist in the integration of the two processes. First, there is no need to develop a new framework, which could be confusing and potentially duplicate work already in the Environmental Assessment Worksheet (EAW).[19] For example the EAW has a section on the environmental impact of air pollutant emissions. Instead of a separate HIA checklist including air pollution, the EAW could consider both the environmental and public health impacts in one framework to prevent duplication of work. Second, there is no need to learn a new process, which enables practitioners in the health, environmental, and planning fields to be more familiar with the tool and saves on staff training or requiring potentially expensive external expertise.

The existing multidisciplinary input of environmental assessment provides a place for health to be addressed more thoroughly. For example, a housing development in San Francisco underwent an environmental review process for the demolition of an affordable, rent-controlled housing project and the development of a new residential development in its place. The environmental review found no adverse impacts on human populations and housing because the project would contribute a net gain in dwelling units. However, San Francisco Department of Public Health conducted a rapid HIA and found health impacts related to "psychological stress, fear, and insecurity due to eviction; crowding or substandard living conditions due to limited affordable replacement housing; food insecurity or hunger due to increased rent burdens; and the loss of supportive social networks due to displacement."[20] These are major health concerns that would have impacted already marginalized populations had they not been addressed through an HIA during the environmental review process.

In the example of San Francisco, the health issues that were analyzed were concerns primarily brought up by the residents themselves. Public involvement is a required component of the environmental review process and public input will often bring up issues such as housing affordability and displacement.[21] This is a benefit of HIA because federal and state agencies are more likely to accept input of health professionals when information is not only scientifically grounded, but presented in participation with an affected stakeholder community.[22] Coordinating the public involvement for the environmental review with HIA can allow for more meaningful conversations and address citizens' concerns of real or perceived risk.

Finally, one of the most important benefits is that HIA improves decision making. When processes are combined the authority making the ultimate decision must consider all information together at once – which provides for more comprehensive, holistic conclusions.[23] The HIA considers not only the negative impacts, but also the positive ones, which is not required for federal and some state environmental reviews.[24] It allows decision makers to see a more complete picture of the impact of a proposed project.

Barriers to incorporating HIA with environmental review

There are a number of barriers that have limited the use of HIAs. Researchers generally agree that the number one barrier to implementing HIAs is the general uncertainty of health risks, including the probability, magnitude, and severity of potential health effects.[25,26,27] The uncertainty of health risks is compounded by the lack of available health data.[28,29] HIAs are often more qualitative than quantitative, which can be seen as a weakness, but stories and anecdotes can be informative and persuasive regarding previously unforeseen health issues. This realization may be causing a trend change. Risk assessments, which are generally viewed as highly quantitative, acknowledge that the relative importance of an impact is influenced by the experiences and biases of those involved in the process because not every risk or impact has been established through a quantitative, scientific study.

Tied to the uncertainty of health risks, is the initial problem of identifying potential risks to human health or climate change from a proposed project. Agencies and organizations that conduct environmental reviews frequently do not have expertise in the health field. Additionally, there is a general lack of coordination with public health professionals.[30,31,32,33] Health impacts related to water and air pollution are generally the most accepted and comprehensive impacts because more quantitative information exists. Environmental reviewers often lack the experience, expertise, and capacity to identify more complex health issues around socio-economic status, mental health, and perceived risks that can vary considerably by geography, project size and population composition.[34,35,36]

If health was a higher priority in the review process, authorities and political leaders might provide more resources, incentives and linkages to health professionals, who have experience and expertise, for determining health impacts within the environmental review process.[37,38,39] The relatively low importance of health in the mission of some authorities or organizations can be tied to the lack of involvement in the environmental review process by health professionals. Bringing health professionals to the table will highlight the public health impacts of projects undergoing environmental review. Authorities may not be aware that public health is high priority issue because the problems have not been brought to their attention.

An issue related to the relative importance of public health is the resulting informality of the current attempts to integrate HIAs with environmental review processes. Without the support of an explicit formal requirement and clear administrative procedures, the quality and content of informal attempts are inconsistent and potentially ineffective.[40] Legislative and administrative support, and especially funding and resources, would promote integrating and streamlining HIAs with environmental review.

Finally, some of the remaining barriers to incorporating HIAs in the environmental review process include lack of uniformity in both content and administrative structure between the two processes[41,42,43]; the reactionary nature of the environmental review – the assessment occurs too late in the decision making process[44,45,46]; and the underdeveloped or missing risk assessment and risk mitigation[47]. However, these barriers are not insurmountable. For example, uniformity could be addressed with proper resources and support from authorities. The reactionary nature of the HIA in the environmental review process could be addressed by considering health at the beginning of a project before the environmental review is initiated. Additionally, mitigation strategies to prevent harm to public health will likely develop with advances in risk assessment.

Below is a chart that summarizes some of the main benefits and barriers to incorporating HIA into the environmental review process. (See Table 4.)

Table 4
Benefits and Barriers to Incorporating HIA into the Environmental Review Process

Benefits	*Barriers*
Address health as intended in national and state Environmental Policy Acts. (NPHP, 2005)	Limited quantitative health data and limited literature (quantitative and qualitative issues). (Kemm JR, 2004)
No need to develop new framework, reduce confusion and duplication of work (NPHP, 2005)	May require more time and resources in the current environment of tight budgets and limited resources
Combining processes requires consideration of all information together for combined, holistic conclusions. (Bond et al, 2001)	Difficulty in interpreting which impacts are more important; risks emphasizing one issue over the other (e.g., environment versus health). (Kemm JR, 2000)

Overcoming barriers and general recommendations

Most of the issues with conducting HIAs or integrating HIAs with environmental review can be remedied through standardization of process, guidelines, trainings, experience, and coordination with health officials.[48] However, a single standardized method of integrated health assessment is not recommended because context also is important: project size, historical/cultural context, stage in the planning process that the health assessment is taking place, etc.[49,50]

The definition of health is important and needs to be agreed upon within the environmental review process. Health definitions vary from narrow and quantitative (e.g., the presence of illness, such as cancer) to holistic definitions of health, such as from the World Health Organization (WHO) that states that health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[51] Among the reviewed studies, there is general consensus that the definition of health should be broad and include socioeconomic status, mental health, and other health determinants.[52,53,54,55]

HIAs should incorporate qualitative information into health risk assessment; accept the inability to document direct cause-effect relationships; and listen to human 'canaries' – those who may see symptoms first and call out the signs of potential trouble.[56] Anecdotal information, case studies, and doctors' observations (i.e., "soft data") can complement other sources of environmental health data.[57] To improve and increase knowledge on health impacts from specific hazards, health outcomes of current decisions should be monitored to improve future decisions.[58]

As previously mentioned, health professionals at all levels must be involved in guiding health incorporation. Additionally, health professionals have a role in convincing other agencies and authorities of the importance of including health.[59,60,61]

Also, it is critical to involve the public early and throughout the process. Issues identified by the public, including perceived risks, will be different than those identified by public health professionals but no less influential.[62] Empowering individuals through effective public participation can provide support for the HIA and any mitigation measures that result.[63,64]

For governments and agencies that choose to embed HIAs in environmental review processes, there are some general recommendations found in literature. At the screening stage, determine first if an environmental review is necessary and then if an HIA is necessary. All screening procedures should consider the need to assess a project's potential effects on health.[65] In the scoping process, work with health professionals to select the health indicators to include based on the impacts that are more likely to occur as a result of the specific project or policy. Impact mitigation should start with risk reduction measures, where decisions are made on a combination of impacts and risks.[66,67] Overall, identify the potentially affected groups/populations; current health status of said population; and likely effects of the project on said population based on literature review, case studies, site visits, and other information.[68]

Some literature questioned the suitability of the environmental review as the place for the HIA to be conducted. The HIA may be more effective if it considered health impacts, mitigation and alternatives at an earlier stage – in the development of the plans and policies, not at the environmental review stage.[69,70]

However, environmental review in collaboration with HIA can result in better outcomes and further public consideration of underlying health issues.[71,72]

V. Overview of Divine Mercy Development desktop HIA

MDH undertook a desktop HIA on a mixed-use development EAW to inform the development of MDH recommendations on incorporating health and climate change indicators into the EAW process. The HIA was intended to be a pilot for how HIA or health indicators might be incorporated or combined with the EAW. Therefore, the actual public health impacts of the project were not considered as important as the findings that could be generalized to mixed-use projects overall and incorporated into the EAW. Determining the health impacts that are currently missing from the EAW was the primary objective.

The desktop HIA included five of the six standard steps in HIAs: Screening, Scoping, Assessment, Recommendations, and Reporting. To select the project, MDH screened all of the mixed-use development projects that completed an EAW between fiscal years 2008-2010. The Divine Mercy Development EAW was selected because it screened positive for an HIA and contained more information for analysis than other EAWs. A group of internal MDH staff with knowledge of HIAs and experience completing environmental reviews selected the health indicators that would be used for the assessment. Health indicators were selected from research-based measures of the built environment and land use that relate to public health and climate change mitigation and adaptation. MDH chose indicators using the following criteria: 1) whether the indicator was directly related to public health, 2) whether the indicator addressed climate change or public health impacts from climate change, and 3) whether the EQB would have the authority to include the measure in the EAW (e.g., not a municipal ordinance or regional system). Generally an indicator had to meet at least two of the three criteria to be included.

Health indicators that directly related to public health included the following:

- minimizing exposure to harmful noise, hazardous sites and sources of air pollution emissions;
- providing access to parks, community gardens, and trails for physical activity;
- providing affordable and diverse housing options to improve community stability and foster social networks and community; and
- providing access to healthy food retailers and emergency services.

Health indicators that addressed climate change or public health impacts from climate change included the following:

- protection from flooding and impaired water quality;

- proximity and provision of public transit, bicycle lanes, and trails;
- provision of mixed-use buildings; and
- permitted clustered or high-density development.

A complete list of the health indicators included in the final HIA report is provided in Appendix C. The full HIA report is available online at http://www.health.state.mn.us/divs/hia/reports.html.

MDH analyzed the Divine Mercy Development EAW based on the selected health indicators. Analyses that are missing from the EAW that were identified via the HIA include:

- Food availability (farm land impacts and accessibility to stores/farmers markets/etc.)
- Housing
- Urban heat island effect
- Connectivity of recreation facilities and multi-modal trails related to activity and obesity levels
- Pedestrian/vehicular safety and response times for emergency services
- Secondary effects (e.g., the need for new public facilities, such as schools, fire, and police)

MDH acknowledges that examining only one type of project does not provide sufficient information to discover all of the climate change and public health impacts of the different types of EAW projects. The pilot project provides an example of how projects in one category (i.e., mixed use) could benefit from implementing an HIA. It also demonstrates the health impacts associated with one specific mixed-use project that completed an EAW.

VI. Review of Minnesota's EAW for health and climate change impacts

To some degree all of the projects that undergo environmental review will impact public health – either positively or negatively – and many of them will also affect climate change or be affected by climate change. In 2011, a working group of state agency staff and consultants that regularly complete EAWs developed a streamlined version of the worksheet. MDH reviewed the streamlined EAW to determine if direct or indirect health and climate change language was already included.

Overall, the EAW does include some components related to public health and climate change. The analysis of air quality impacts is the most comprehensive in terms of health effects and GHG emissions. Other components include impacts from hazardous waste (exposure or groundwater/soil contamination that could lead to exposure), water quality, and noise.

Public health

Similar to the national and other state environmental review worksheets, the streamlined EAW most often refers to health indirectly. The streamlined EAW contains 20 categories of questions, called "items." The specific streamlined EAW items that address health impacts include the following:

- *Item 11b (water and wetlands, wastewater)*: "3) If the wastewater discharge is to surface water – Identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges."
- *Item 12 (contamination/hazardous materials/wastes)*:
    - "Pre-project site conditions – Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or groundwater contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines."
    - "Project related generation/storage of solid wastes – Discuss potential environmental effects from solid waste handling, storage and disposal."
    - "Project related use/storage of hazardous materials – Discuss potential environmental effects from accidental spill or release of hazardous materials."
    - "Project related generation/storage of hazardous wastes – Discuss potential environmental effects from hazardous waste handling, storage, and disposal."
- *Item 16 (air)*:
    - Stationary source emissions - "Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria."
    - Vehicle emissions – "Discuss the project's vehicle-related emissions effect on air quality."
    - Dust and odors - "Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life."
- *Item 17 (noise)*: "Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life."
- *Item 18a (transportation)*: "Describe traffic-related aspects of project construction and operation. Include . . . and 5) availability of transit and/or other alternative transportation modes."

Climate change

The only item in the streamlined EAW that address climate change (either adaptation or mitigation) is *item 16 (air)*. The two subparts to this item that address emissions include the following:

- Stationary source emissions – "Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous pollutants, criteria pollutants, and any greenhouse gases."
- Vehicle emissions – "Describe the effects of the project's traffic generation on air emissions."

MDH met with the EAW workgroup to discuss adding greenhouse gases to the Vehicle emissions subpart. The workgroup informed MDH that vehicle emissions (including greenhouse gases) are thoroughly addressed by the MPCA for those projects that generate additional vehicle trips and traffic. Additionally, "projects currently subject to the Minnesota Environmental Policy Act, under the jurisdiction of MPCA, and requiring a federal or state air emissions permit due to emission of criteria pollutants regulated under the Clean Air Act must calculate a 'carbon footprint'."[73]

VII. Discussion

While the EAW addresses some health and climate change issues, the streamlined EAW could be improved to more thoroughly address public health and climate change impacts. There are several strategies that could be used to improve public health and climate change mitigation/adaptation including the following: requiring a full HIA, integrating HIA with the EAW, including more public health professionals in the EAW process, using the EAW to screen for HIA, and more.

As part of the process of developing the report's final recommendations, MDH shared draft strategies for including health and climate change with the EAW working group. One of the major hurdles identified in the discussion was the narrow definition of 'environment' that the EQB uses in rule. EQB rules define "environment" to include: "land, air, water, minerals, flora, fauna, ambient noise, energy resources, and man-made objects or natural features of historic, geologic or aesthetic significance (part 4410.0200, subpart 23)." The EAW working group members, while not against the consideration of public health and climate change, questioned the ability to discuss human health in a forum where environment is defined so narrowly that the EAW can only analyze direct impacts to the environment that would result in a health impact and not health impacts that are indirectly related to changes in the environment. For example, the workgroup considered contaminated ground water from construction a direct impact, but vehicle-related injuries because of additional car and truck traffic as an indirect impact. Safety was one of the issues of human health that the EAW working group questioned specifically as not appropriate in the EAW. However, the EAW Guidelines already includes language about safety. Under "Guidance for certain types of projects," on page 15 under *Item 21 Nonmetallic mineral mining*, the guidelines read, "Although safety-related traffic concerns are not "environmental" in nature, nearby residents will likely want to know about the numbers and routing of truck traffic to and from the mine."

MDH has found that there are many questions in the EAW that suggest the process was developed for the benefit of human health. Additionally, the declaration of state environmental policy in statue indicates a responsibility to "…assure for all people of the state safe, healthful, productive, and aesthetically and culturally pleasing surroundings…" (116D.02, Sudv.2). It could be argued that including consideration of human health is much more in line with the purpose of the original Act than including items such as minerals, man-made objects and energy resources, which are in place for economic, not ecologic, reasons.

It would be ideal to agree upon the Minnesota environmental review's purpose and reconstruct the EAW process with the consideration of health and climate change. Coincidentally, a Governor's Order was issued on November 16, 2011 to review the entire environmental review process in Minnesota. MDH staff was invited to participate on two of the working groups. While this could be a great opportunity for promoting health, it is not the only way or even the most likely way to incorporate health and climate change into the process. In that regard, MDH has considered a suite of potential recommendations to the EQB, which are described in the next section.

VIII. Recommendations to the EQB

Using results from the literature review, measures from other states, the Divine Mercy Development HIA, and conversations with the EQB and the EAW working group, MDH has the following recommendations for the EQB for incorporating climate change and public health measures into the EAW process. The recommendations are threefold: minor changes to the language in the streamlined EAW form, inclusion of additional guidance language in the EAW Guidelines (which have not been revised to match the streamlined EAW), and the addition of a MDH staff person to review EAWs as a screening tool for recommending HIAs.

Changes to the EAW

MDH is recommending four changes to the streamlined EAW; they include the following:

- *Item 11c: Stormwater*, MDH recommends changing the first sentence from ""Describe the quantity and quality of stormwater runoff at the site prior to construction," to "Describe the quantity and quality of stormwater runoff at the site prior to and post construction."
- *Item 11: Water and Wetlands*, MDH proposes adding the following question: "11f: Floodplains – If the project is located in a designated 100-year floodplain, describe any anticipated impacts to the floodplain as a result of construction, including reduced floodplain function, and identify measures to mitigate any anticipated impacts."
- *Item 16a: Stationary source emissions*, MDH recommends including the list of GHGs. The first sentence should read, "Describe the type, sources, quantities and compositions of any emissions

from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases (such as, carbon dioxide, methane, and nitrous oxide)."

- *Item 19: Cumulative potential effects*, MDH recommends reinserting "impacts to infrastructure and public services" which were removed from the streamlined EAW (originally *Item 28: Infrastructure and public services*). The piece of *Item 28: Infrastructure and public services,* "streets," was included in the streamlined EAW under *Item 18: Transportation*. MDH recommends that *Item 19: Cumulative potential effects* in the streamlined EAW include both "connected actions" identified in previous versions of the EAW and "consequential actions," such as the addition of police protection, fire protection and schools to serve both the existing area and the new project which may not fall under "connected actions."

Changes to the EAW Guidelines

Based on the literature review, it is beneficial from a public health perspective to include health indicators in the EAW because the reviewer/decision maker and even the public will have information on all benefits and risks to inform the final decision. However, MDH recognizes the need to keep the EAW concise; therefore, the majority of the recommendations are to add specific guidance and examples of health impacts or mitigation strategies in the EAW Guidelines within Chapter 3: Item-by-item-guidance. RGUs looking for guidance will see the examples for health and climate change related environmental issues and may choose to incorporate them. Specific recommendations to the EAW Guidelines[d] include the following:

- *Item 9: Land Use* should be re-written to read as follows: "The purpose of this question is to identify existing land uses, the community's plans for future land use as directed by plans and zoning, any incompatibility between the existing land use, plans or zoning, and proposed project, and mitigation measures for any incompatibilities. Proposed projects that are incompatible with nearby land uses may cause public nuisance[e] issues that have health impacts. A typical example would be a gravel operation proposed next to a residential area: dust and noise could cause significant conflicts with the residential land use. Many communities use land use plans, zoning, and special overlay districts to prevent the proximate siting of incompatible uses. Proposed projects that do not comply with local land use controls must provide reasoning for not complying and mitigation measures."
- *Item 14: Water-related land use management districts*, specifically the guidance for floodplains, should be retained and incorporated into *Item 11f: Floodplains* of the streamlined EAW. *Item* 14 was cut from the EAW during the 2010/2011 streamlining process. The specific language MDH recommends retaining is, "The local planning and zoning office should be contacted regarding

[d] Note: The EQB has not yet revised the EAW Guidelines to correspond to the streamlined EAW.
[e] The term *public nuisance* covers a wide variety of minor crimes that threaten the health, morals, safety, comfort, convenience, or welfare of a community.

local shoreland and flood plain ordinances that may apply. . . [F]lood plain . . . land use districts are protected by special zoning ordinances designed to protects the resources of such lands. The EAW should discuss whether the project fully complies with all these special zoning requirements." Additional language that MDH recommends the EQB to add to this item is as follows, "Future climate conditions are anticipated to result in increased frequency and intensity of floods. Construction within designated floodplains can reduce the effectiveness of these areas in containing flood water. Additionally, construction in these areas is more susceptible to impacts from flood events. Not only will the protected resources in this area be impacted, but people living in flood-plain areas will be at increased risk for flood-related human health impacts, such as injuries, drowning, and other health issues." If the EQB chooses not to add *Item 11f*, MDH recommends incorporating the specified language from *Item 14* stated above into *Item 9a – iii*.

- *Item 17: Water quality: surface water runoff*, MDH recommends that the correction made to this item in the 2010 Errata & Updates for EAW Guidelines be retained. The specific language MDH recommends retaining is, "The descriptions of stormwater management system elements in item 17a should not be limited to detention/retention basins; newer types of Best Management Practices, such as infiltration areas, should also be described and shown on site plans." MDH recommends including examples of additional Best Management Practices, such as ensuring stormwater pipes are designed for larger storm events, or that projects that impact municipal storm and sewer pipes should be aware of whether their storm and sewer pipes are connected for potential overflow and contamination concerns.
- *Item 17b*, MDH recommends specifically including groundwater as receiving waters, in addition to surface waters. The item uses lakes as an example, and should consider using an additional example of an aquifer or drinking water well.
- *Item 21: Traffic*, MDH recommends incorporating the original guidance language from *Item 21: Traffic* into *Item 18: Transportation* of the streamlined EAW, and recommends adding the following guidance language to *Item 18c*, "Discuss intersections or streets where pedestrian (or bicycle or vehicular) injury/collisions have occurred. Or identify where potential conflicts may occur after construction. Provide any measures the project is planning to mitigate these conflicts." The streamlined EAW combined "transportation" from *Item 28: Infrastructure and public services* and "traffic" from *Item 21: Traffic* into *Item 18: Transportation*. Additionally, MDH supports the addition of *Item 18a #5)* "availability of transit and/or other alternative transportation modes."
- *Item 29: Cumulative impacts*, (*Item 19* in the streamlined EAW) MDH recommends that the guidance make a more direct connection to climate change. MDH recognizes that several items in the EAW indirectly address potential impacts of climate change, such as, stormwater management, GHG emissions, and the availability of public transit or alternative modes of transportation. While individual projects themselves cannot calculate their direct impact on climate change, scientific

consensus holds that GHG emissions are the leading cause of anthropogenic climate change, and the project should describe any efforts it is taking to mitigate emissions or adapt to the potential impacts of climate change. For example, if the project is an infill development and proposes to increase the tree canopy – this would be a mitigation effort to reduce GHG as well as an adaption measure to increase infiltration to manage stormwater and reduce the urban heat island effect, especially during extreme heat events. MDH can provide resources to include in the guidance document for project proposers.

- *Guidance for certain types of projects – Residential development, subpart 19*, MDH recommends adding guidance for affordable housing best practices. Specifically, if the project proposes the demolition, removal or remodeling of housing and especially affordable housing, it should discuss how it plans to support the replacement of the housing.
- *Guidance for certain types of projects – Mixed residential and commercial-industrial projects, subpart 32*, MDH recommends adding the clustering of development as a best practice. Clustered development addresses accessibility, physical activity, reduced mobile emissions from vehicles, and preserves existing uses of land which is especially important if the project is being developed on farmland, forest, or other prime environmental resources.

Changes to EAW process

MDH provided initial recommendations to the EQB working group that streamlined the EAW. There were concerns about adding additional questions to the EAW to address health and climate change. A recommendation from the working group was that MDH use the EAW as a screening tool for an HIA, like the EQB uses the EAW as a screening tool for a potential EIS. Therefore, MDH recommends that an MDH staff person review all EAWs using an HIA screening tool, such as the Design for Health Screening tool used for the Divine Mercy Development HIA, to screen projects for an HIA, as resources permit. If a project triggers an HIA, the MDH staff person would then recommend to the RGU that they conduct a voluntary HIA on the project, focusing on the specific health issues that are most likely to be impacted by the project.

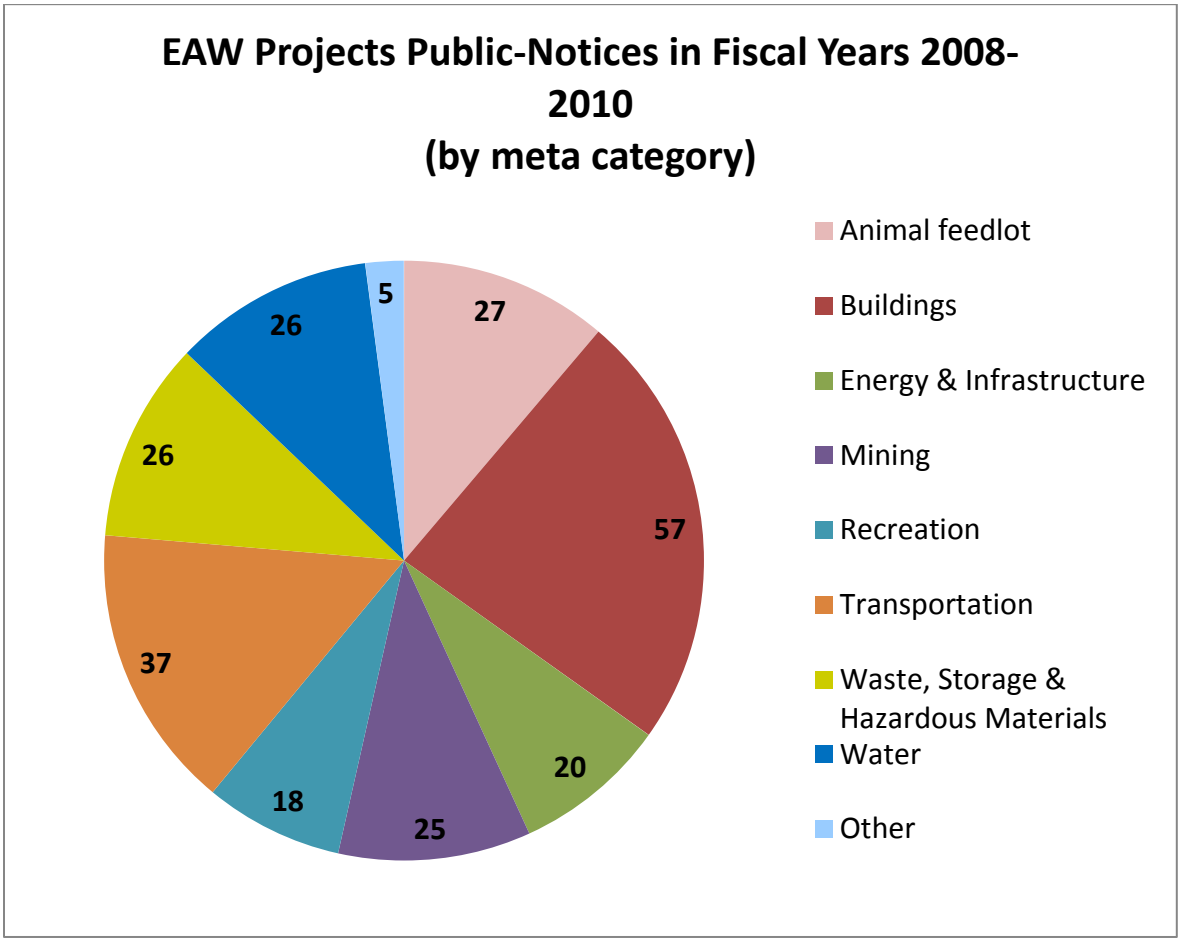
IX. Conclusion

The built environment impacts the health of the public and can also influence factors that affect climate change. NEPA and state environmental policy acts have been developed to determine whether proposed projects would significantly influence the environment. Additionally, MDH's review found that these statutes support the inclusion of public health and climate change considerations. Many states incorporate health and climate change considerations within their environmental review process. However, not all states have incorporated health and climate change, and none of the states have included the myriad of health considerations that may result from a proposed project, such as housing displacement, food security, and social determinants of health. This report concludes that HIA is one tool that can be used to more

comprehensively assess the health and climate change impacts of projects that go through the environmental review process.

Minnesota's EAW already addresses some health and climate change issues; however, several public health issues remain unaddressed or insufficiently addressed by the EAW. This report provides simple recommendations for modifying the streamlined EAW and EAW Guidelines and for incorporating HIA into the environmental review process to address some of the gaps and to enhance the promotion of public health and climate change adaptation and mitigation. These simple changes could have a broad impact on the health of Minnesota citizens.

Appendix A: EAW Projects 2008-2010



EAW Projects Public-Noticed in Fiscal Years 2008, 2009, & 2010 (by Category)			
Category	**FY08/09**	**FY10**	**Total**
Air pollution	1	-	1
Airport	5	-	5
Animal feedlot	25	2	27
Campground	7	3	10
Commercial	18	7	25
Communication tower	-	2	2
Fuel conversion	6	-	6
Highway	27	1	28
Historical places	1	3	4
Land use conversion	1	-	1
Landfill	5	2	7
Marina	3	1	4
Metallic mining	1	1	2

Mixed use	8	-	8
Natural areas	1	-	1
Nonmetallic mining	18	5	23
Other	2	-	2
Public waters	16	2	18
Recreational trail	5	2	7
Residential	18	2	20
Solid waste	1	1	2
Sports facility	1	-	1
Storage facilities	2	1	3
Streams & ditches	4	3	7
Transmission lines	8	3	11
Water appropriation	1	-	1
Wind farm	1	-	1
Wastewater treatment facilities	12	2	14
Total	198	43	241

Appendix B: Health and climate change in state environmental review

MDH reviewed the 17 mini-NEPAs and found that the health issues of air quality (including odor and air pollution emissions), noise, hazardous activities or waste, aesthetics and scenic vistas, active transit and recreational resources, economic and cultural welfare, and climate change issues related to GHGs have been incorporated into the environmental review process of some states. MDH reviewed five states in more detail because their environmental review process are comprehensive and include a worksheet similar to the Minnesota EAW. The five states are California, Massachusetts, New York, Washington, and Hawaii. Full review details are included below.

California

California projects that require permit approval must complete a preliminary checklist of potential environmental impacts. The checklist reviews projects for potential impacts of significance. If a project is determined to have significant impacts on the environment, a full environmental impact report (EIR) is required.

Public health

In California's preliminary environmental checklist, public health including a range of issues such as exposure to pollutants, noise and safety hazards, and the mental health effects of scenic vistas. The preliminary environmental checklist includes questions on the following health-related issues: air quality; aesthetics; geology and soils; hazards and hazardous materials; hydrology and water quality; noise; and transportation and traffic. Two of the indicators for air quality include the following: Would the project expose sensitive receptors to substantial pollutant concentrations? And, would the project create objectionable odors affecting a substantial number of people? Under noise pollution, California's preliminary checklist has six questions related to the negative exposure of people to excessive noise and ground-borne vibrations. One indirect public health impact that California's checklist addresses is the displacement of existing housing and people due to the development of a new project. Recent studies and health impact assessments have shown the health impact, especially mental health, experienced by displaced persons.[74] Overall, California's preliminary environmental review addresses many issues related to public health.

Public Health related language

Section I. Aesthetics. Would the project:

a) Have a substantial adverse effect on a scenic vista?

Section III. Air Quality. Would the project:

d) Expose *sensitive receptors* to substantial pollutant concentrations?

e) Create objectionable odors affecting a substantial number of people?

Section VI. Geology and Soils. Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving . . .

Section VIII. Hazards and Hazardous Materials. Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Section IX. Hydrology and Water Quality. Would the project:

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Section XII. Noise. Would the project result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

Section XVI. Transportation/Traffic. Would the project:

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Section XVIII. Mandatory Findings of Significance.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Climate change

In the preliminary checklist, California addresses climate change through GHG emissions. The section on GHG emissions asks the following: "Would the project: a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?", and/or "b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?" Possible responses to the question are 'potentially significant impact', 'less than significant with mitigation incorporated', 'less than significant impact', or 'no impact'. "If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project."[75]

Climate change related language
Section II. Agriculture and Forestry Resources. Would the project:
d) Result in the loss of forest land or conversion of forest land to non-forest use?
Section VII. Greenhouse Gas Emissions. Would the project:
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Massachusetts

The Massachusetts Environmental Policy Act requires that any project that exceeds a specific threshold[f] for which state agency action is required[g] must complete an environmental notification form (ENF) and may be required to complete an EIR.

Public health

The Massachusetts ENF addresses public health issues related to air quality, noise impacts, asbestos exposure, and other solid and hazardous waste impacts. A notable inclusion in the state's ENF is within the Traffic Impacts and Permits section. Subsection D asks, "How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?"[76] Massachusetts is one of the only states to reference physical activity and accessibility as key public health issues.

[f] "Examples of threshold activities include the following: alteration of 25 or more acres of land; alteration of designated significant habitat, and/or taking of endangered or threatened species or species of special concern; alteration of coastal dunes, barrier beaches, or coastal banks; alteration of 500 ft. of fish run or inland bank; alteration of 1,000 s.f. of salt marsh or outstanding resource waters; alteration of 5,000 s.f. of bordering or isolated vegetated wetlands; new or expanded fill or structure in a velocity zone or regulatory floodway; alteration of one-half acre of other wetlands; and projects proposed within an Area of Critical Environmental Concern (ACEC)." Source: MEPA, available online: http://www.mass.gov/czm/permitguide/regs/policyact.htm.
[g] "State agency action includes activities that are undertaken, permitted, and/or funded by agencies of the Commonwealth, and the transfer of lands owned or controlled by the Commonwealth." Source: MEPA, available online: http://www.mass.gov/czm/permitguide/regs/policyact.htm.

Public Health related language
Traffic Impacts and Permits Section
D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?
Air Quality Section
B. Describe the project's other impacts on air resources and air quality, including noise impacts
Solid and Hazardous Waste Section
D. If the project involves demolition, do any buildings to be demolished contain asbestos?
E. Describe the project's other solid and hazardous waste impacts (including indirect impacts)

Climate change

ENF sections on Solid & Hazardous Waste and Air Quality ask that project proposers describe anti-idling and other measures to limit emissions, but the major connection made to climate change is through the state's GHG policy. Specifically, the language states that "proponents for projects that are subject to the requirement to prepare a mandatory EIR should attempt to qualitatively identify sources and types of GHG emissions in the Environmental Notification Form (ENF) filing."[77]

Climate change related language
Solid and Hazardous Waste Section
Describe anti-idling and other measures to limit emissions from construction equipment
Air Quality Section
B. Describe the project's other impacts on air resources and air quality, including noise impacts
All projects requiring ENF/EIR must also comply with GHG policy (http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf)
Proponents for projects that are subject to the requirement to prepare a mandatory EIR should attempt to qualitatively identify sources and types of GHG emissions in the Environmental Notification Form (ENF) filing.

New York

New York State (NYS) requires that an environmental assessment form (EAF) be completed for qualifying projects under the State Environmental Quality Review (SEQR). Qualifying projects include most projects or activities proposed by a state agency or unit of local government, and all discretionary approvals (permits) from a NYS agency or unit of local government. On completing an EAF, the lead agency determines the significance of an action's environmental impacts. The agency then decides whether to require (or prepare) an EIS and whether to hold a public hearing on the proposed action.

Public health

NYS is unique in that it has a section within the EAF specifically called "Impact on Public Health". It asks, "Will proposed action affect public health and safety?" Topics of public health and safety include risk of explosion, emissions, burial of hazardous waste, storage of flammable liquids, and

excavation near hazardous waste. Other sections within the EAF also relate to public health such as affecting aesthetic resources, open space and recreation, noise and odor.

Public Health related language

Impact on Aesthetic Resources

11. Will Proposed Action affect aesthetic resources?

Examples that would apply:

- Proposed land uses, or project components visible to users of aesthetic resources which will eliminate or significantly reduce their enjoyment of the aesthetic qualities of that resource.

Impact on Open Space and Recreation

13. Will proposed Action affect the quantity or quality of existing or future open spaces or recreational opportunities?

Examples that would apply:

- The permanent foreclosure of a future recreational opportunity.
- A major reduction of an open space important to the community.

Noise and Odor Impact

17. Will there be objectionable odors, noise, or vibration as a result of the Proposed Action?

Examples that would apply:

- Blasting within 1,500 feet of a hospital, school or other sensitive facility.
- Odors will occur routinely (more than one hour per day).
- Proposed Action will produce operating noise exceeding the local ambient noise levels for noise outside of structures.
- Proposed Action will remove natural barriers that would act as a noise screen.

Impact on Public Health

18. Will Proposed Action affect public health and safety?

- Proposed Action may cause a risk of explosion or release of hazardous substances (i.e. oil, pesticides, chemicals, radiation, etc.) in the event of accident or upset conditions, or there may be a chronic low level discharge or emission.
- Proposed Action may result in the burial of "hazardous wastes" in any form (i.e. toxic, poisonous, highly reactive, radioactive, irritating, infectious, etc.)
- Storage facilities for one million or more gallons of liquefied natural gas or other flammable liquids.
- Proposed Action may result in the excavation or other disturbance within 2,000 feet of a site used for the disposal of solid or hazardous waste.

Climate change

NYS produced the "Guide for Assessing Energy Use and Greenhouse Gas Emissions" for staff reviewing EIS. Conducting the review of energy use and GHG emissions is viewed as being within the guidance of the original SEQR Act. State and local governments should "conduct their affairs with an awareness that they are stewards of the air, water, land, and living resources, and that they have an obligation to protect the environment for the use and enjoyment of this and all future generations."[78] The Guide states that projects are responsible for the climate change impacts enhanced by energy use and GHG emissions (i.e., mitigation) but that planning for climate change impacts on the project (i.e., adaptation) is not part of the requirement. The document includes

guidance on a number of specific requirements including the following: the exact emissions that require counting; the mathematical units (e.g., lbs of CO_2) in which to present the data; that both direct and indirect sources of emissions must be included (e.g., the direct source of a smokestack on a plant side versus the indirect emissions generated when equipment used in the plant were manufactured and shipped); and emissions mitigation measures such as carbon sinks.

Climate change related language
Impact on Air
7. Will Proposed Action affect air quality?
Examples that would apply:
- Proposed Action will induce 1,000 or more vehicle trips in any given hour.
- Emission rate of total contaminants will exceed 5 lbs. per hour or a heat source producing more than 10 million BTU's per hour.

Impact on Energy
16. Will Proposed Action affect the community's sources of fuel or energy supply?
Examples that would apply:
- Proposed Action would cause a greater than 5% increase in the use of any form of energy in the municipality.

Guide for Assessing Energy Use and Greenhouse Gas Emissions in an Environmental Impact Statement, provides instructions to DEC staff for reviewing an environmental impact statement (EIS) pursuant to the State Environmental Quality Review Act (SEQR) when the EIS includes a discussion of energy use or greenhouse gas (GHG) emissions. http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf

Washington

Washington's State Environmental Policy Act (SEPA) requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. To determine the environmental impacts of a project, the state provides an environmental checklist to evaluate the significance of a project and decide whether a full EIS must be completed.

Public health

Public health is most specifically addressed in the Washington environmental checklist within the section Environmental Health, but also has implications in Air Emissions and Recreation sections. The Environmental Health section asks what environmental health hazards exist and potential exposure to "toxic chemicals, risk of fire and explosion, spill, or hazardous waste." The Air Emissions section includes emissions during and post construction from automobile and stationary sources. The Recreation section concerns the loss of recreational uses.

Public Health related language
Subsection a. Air
a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.
c. Proposed measures to reduce or control emissions or other impacts to air, if any?
Section 7. Environmental health
a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.
Section 12. Recreation
b. Would the proposed project displace any existing recreational uses? If so, describe.

Climate change

In Washington the analysis of GHG emissions is currently voluntary. The Washington State Department of Ecology, which oversees state agency compliance of SEPA, wrote a working paper called *Greenhouse Gas Emissions and SEPA* and developed guidance for agencies completing EAWs on how to account for GHG emissions from project actions. Measures mentioned in the paper are addressed within the Air Emissions section of the environmental review. The guidance is similar to that provided by NYS; however, Washington requests the consideration of both GHG emissions and how the environment might be impacted by anticipated climate change resulting from GHG emissions.[79]

The Washington Department of Transportation (WSDOT) environmental review process requires that all state and federal transportation projects overseen by WSDOT calculate GHG emissions in three ways: Operational, Construction, and Embodied/Lifecycle.[80] Locally, King County drafted GHG Emissions Worksheet to assist in calculating the emissions generated by each project – including emissions associated with building energy use. At the local level only King County and the City of Seattle require addressing GHG emissions in SEPA documents.

Climate change related language

Subsection a. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

c. Proposed measures to reduce or control emissions or other impacts to air, if any?

Section 6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

Section 14. Transportation

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

c. How many parking spaces would the completed project have? How many would the project eliminate?

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

g. Proposed measures to reduce or control transportation impacts, if any.

Uses 'air emissions' section to analyze greenhouse gases which the lead agency uses to determine impact. SEPA Climate Change working paper: http://www.ecy.wa.gov/climatechange/docs/sepa/20110603_SEPA_GHGinternalguidance.pdf

Hawaii

Hawaii's environmental review law was modeled after NEPA. For any proposed project or activity, if one or more of nine conditions (called "triggers")[h] is present, then an environmental assessment (EA) or an EIS must be prepared and circulated to the public for review.

Public health

Hawaii does not have any specific questions on the impact of a project on public health. Instead the state uses "significant criteria" within its EA to evaluate health impacts. Hawaii considers a proposed action to have a significant effect on the environment if it causes loss or destruction of a natural or cultural resource; "substantially affects the economic welfare, social welfare, and cultural practices of the community or State"; "substantially affects public health"; or negatively affects air quality, water quality, noise levels, scenic vistas and viewplanes.[81]

[h] A list of the nine triggers can be found online here: http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0343/HRS_0343-0005.HTM

Public Health related language
Significance Criteria

B. In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
4. Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;
5. Substantially affects public health;
10. Detrimentally affects air or water quality or ambient noise levels;
12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies

Climate change

In 2010 Hawaii released the "Final Report on Hawaii Environmental Review System 2010," which acknowledged that Hawaii's environmental review laws do not explicitly address climate change, and it reviewed how climate change might be included in the environmental review process. The Report suggested adding a question about a project emitting substantial quantities of GHG to the significance criteria, or adding a question that addresses climate change hazards that increase the "scope or intensity of hazards to the public, such as increased coastal inundation, flooding, or erosion that may occur as a result of climate change anticipated during the life-time of the project." Finally, the Report includes a checklist for reviewing the effectiveness of the current EA for addressing climate change. One of the questions is whether the EA/EIS is an appropriate tool for addressing climate change in the first place. Hawaii's full discussion on climate change from the report is included following the box on climate change related languge.

Climate change related language
Significance Criteria

B. In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it:

13. Requires substantial energy consumption.

From the Final Report on Hawaii Environmental Review System 2010
CLIMATE CHANGE

Are climate changes issues adequately addressed in the current EIS system?
Uncertainty and lack of methodology prevent addressing climate change.

- No agreement exists on what the impacts will be.
- Research exists, but decision-makers do not use it.

- Standard indicators, baselines, and metrics are necessary to measure impacts.
- The precautionary principle should guide our actions when knowledge is insufficient.
- The State and Counties should establish a database of likely climate change impacts and make this available to EA/EIS preparers.

Climate change is addressed in the current system.

- The coastal zone management (CZM) process is effective.
- Experienced consultants understand the issue and address it appropriately.

The EIS is not the appropriate tool for addressing climate change.

- It will just be another barrier to prevent development.
- It would just add cost to the project.
- Do not add another layer. If there are no consequences for not doing it, why require it?
- The EIS process is too late. It should be addressed in master planning.
- Is it fair or practical to ask developers to evaluate these issues?
- This should be addressed through strategic environmental assessment (SEA).

How best can climate change impacts to Hawaii be incorporated into the EIS process?

The best way to address climate change is still undetermined.

- The science exists, but it is not widely accepted by the public.
- Change the rules to be more specific about what should be addressed.
- Approach the EIS through the lens of sustainability.
- The 2050 plan should be a template for addressing climate change.
- Address how a project will affect climate change; and how climate change will affect a project.
- California is currently addressing this. Hawaii should look there for guidance.

Climate change is a cumulative impact issue, which must be resolved first.

Climate change in Hawaii is best addressed another way, not through EIS.

- Assess climate change through established agency policies and guidelines.
- The State and local levels are too small scale. Leave this to NEPA to address.
- It should be addressed at the long-range planning level.

Comments and Concerns

- Should secondary and tertiary impacts be considered?
- Agencies, developers, and the public do not want to acknowledge it.
- Global warming will be a boilerplate statement stuck into the EA/EIS.

Appendix C

Divine Mercy Development HIA

Currently available online at: http://www.health.state.mn.us/divs/hia/reports.html

References

[1] Minnesota Environmental Protection Agency (MEPA). Environmental Review Website. Accessed online: http://www.pca.state.mn.us/index.php/topics/environmental-review/environmental-review.html. September 6, 2011.
[2] Minnesota Pollution Control Agency. 2009. Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input. Accessed online: http://www.pca.state.mn.us/index.php/view-document.html?gid=11253.
[3] Office of the Legislative Auditor (OLA). 2011. Evaluation Report: Environmental Review and Permitting. Accessed online: http://www.auditor.leg.state.mn.us/ped/2011/envir.htm
[4] Environmental Quality Board (EQB). 1998. Guide to Minnesota Environmental Rules.
[5] Minnesota Pollution Control Agency. 2009. Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input. Accessed online: http://www.pca.state.mn.us/index.php/view-document.html?gid=11253.
[6] *Ibid.*
[7] Environmental Protection Agency (EPA). National Environmental Policy Act (NEPA). Accessed online: http://www.epa.gov/compliance/basics/nepa.html. September 6, 2011.
[8] National Environmental Policy Act of 1969 (NEPA). Sec. 2 [42 USC § 4321] Accessed online: September 6, 2011 at http://ceq.hss.doe.gov/nepa/regs/nepa/nepaeqia.htm.
[9] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[10] Cohen, R. 2011. The Impacts of Affordable Housing on Health: A Research Summary. Center for Housing Policy. Insights from Housing Policy Research, Issue May 2011: 1-8.
[11] National Research Council, *Improving Health in the United States: The Role of Health Impact Assessment*, 2011.
[12] Harris P et al. 2009. Human health and wellbeing in environmental impact assessment in New South Wales, Australia: Auditing health impacts within environmental assessment of major projects. Environmental Impact Assessments Review, 29:310-318
[13] Farquhar, Doug. 2011. Personal communication. August 29, 2011.
[14] Minnesota House of Representatives. 2011. Minnesota Healthy Communities Act. Accessed online: https://www.revisor.mn.gov/bin/bldbill.php?bill=H2646.0.html&session=ls87
[15] Massachusetts Department of Transportation. 2012. Healthy Transportation Compact. Accessed online: http://www.massdot.state.ma.us/GreenDOT/HealthyTransportationCompact.aspx
[16] Bhatia R, Wernham A. 2008. Integrating Human Health into Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health and Justice. Environ Health Perspect 116:991-1000. http://dx.doi.org/10.1289/ehp.11132
[17] McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. Environmental Impact Assessment Review, 25: 737-746
[18] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[19] *Ibid.*
[20] Bhatia R, Wernham A. 2008. Integrating Human Health into Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health and Justice. Environ Health Perspect 116:991-1000. http://dx.doi.org/10.1289/ehp.11132
[21] *Ibid.*
[22] *Ibid.*
[23] Bond R et al. 2001. Integrated impact assessment for sustainable development: A case study approach. World Development, Vol. 29, No. 6: 1011-1024
[24] Bhatia R. 2007. Protecting Health Using an Environmental Impact Assessment: A Case Study of San Francisco Land Use Decisionmaking. Protecting the Public From Environmental Hazards. American Journal of Public Health, Vol 97, No 3.
[25] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[26] Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. Environmental Impact Assessment Review, 26: 410-424
[27] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[28] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf

[29] Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. Environmental Impact Assessment Review, 22: 633-653
[30] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[31] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[32] Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. Environmental Impact Assessment Review, 26: 410-424
[33] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[34] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[35] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[36] Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. Environmental Impact Assessment Review, 26: 410-424
[37] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[38] McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. Environmental Impact Assessment Review, 25: 737-746
[39] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[40] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[41] *Ibid.*
[42] Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. Environmental Impact Assessment Review, 26: 410-424
[43] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[44] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[45] Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. Environmental Impact Assessment Review, doi:10.1016/j.eiar.2010.01.005
[46] McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. Environmental Impact Assessment Review, 25: 737-746
[47] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[48] *Ibid.*
[49] Bond R et al. 2001. Integrated impact assessment for sustainable development: A case study approach. World Development, Vol. 29, No. 6: 1011-1024
[50] Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online:
http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
[51] World Health Organization (WHO). 1948. WHO definition of Health. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.
[52] National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
[53] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[54] Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. Environmental Impact Assessment Review, 26: 410-424
[55] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[56] *Ibid.*

[57] Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. Environmental Impact Assessment Review, 14: 311-319
[58] Dannenberg AL et al. 2008. Use of Health Impact Assessment in the U.S.: 27 Case Studies, 1999-2007. American Journal of Preventative Medicine, 34 (3): 241-256
[59] McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. Environmental Impact Assessment Review, 25: 737-746
[60] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[61] Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. Environmental Impact Assessment Review, 14: 311-319
[62] Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. Environmental Impact Assessment Review, 22: 633-653
[63] Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online:
http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
[64] Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. Environmental Impact Assessment Review, 22: 633-653
[65] Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online:
http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
[66] Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. Environmental Impact Assessment Review, 25: 411-429
[67] Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online:
http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
[68] *Ibid.*
[69] Steinmann A. 2000. Rethinking human health impact assessment. Environmental Impact Assessment Review, 20; 627-645
[70] Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. Environmental Impact Assessment Review, doi:10.1016/j.eiar.2010.01.005
[71] Dannenberg AL et al. 2008. Use of Health Impact Assessment in the U.S.: 27 Case Studies, 1999-2007. American Journal of Preventative Medicine, 34 (3): 241-256
[72] Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. Environmental Impact Assessment Review, 14: 311-319
[73] Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. Environmental Impact Assessment Review, doi:10.1016/j.eiar.2010.01.005
[74] Cohen, R. 2011. The Impacts of Affordable Housing on Health: A Research Summary. Center for Housing Policy. Insights from Housing Policy Research, Issue May 2011: 1-8.
[75] 2011 California Environmental Quality Act (CEQA) Handbook. 2011. Section 15064.4 Determining the Significance of Impacts from Greenhouse Gas Emissions. p. 107 Accessed online:
http://www.califaep.org/docs/CEQA/CEQAHandbook2011.pdf
[76] Massachusetts Environmental Policy Act (MEPA) Office. 2011. Environmental Notification Form (ENF). Accessed online: http://www.env.state.ma.us/mepa/downloads.aspx
[77] Massachusetts Executive Office of Energy and Environmental Affairs. 2010. Revised MEPA Greenhouse Gas Emissions Policy and Protocol. Accessed online:
http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf
[78] New York State Department of Environmental Conservation. 2009. Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements. Accessed online:
http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf
[79] Washington Department of Ecology. 2011. Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews. Accessed online: http://www.ecy.wa.gov/climatechange/sepa.htm
[80] Washington State Department of Transportation. 2012. Guidance for Project-Level Greenhouse Gas and Climate Change Evaluations. Accessed online: http://www.wsdot.wa.gov/NR/rdonlyres/73ADB679-BDA6-4947-93CA-87C157862DD7/0/WSDOTprojectLevelGHG.pdf

[81] Hawaii Administrative Rules. 1996. Chapter 200 – Environmental Impacts Statement Rules. Accessed online: http://gen.doh.hawaii.gov/sites/har/AdmRules1/11-200.htm#sec_17