

MetroGIS

Peer Review Forum

Minnesota Land Cover Classification System

Final Revision
November 29, 1999
Turn-Around Document

Prepared by
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Peer Review Workgroup
October 19, 1999
Metro County Government Center
St. Paul, Minnesota

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Peer Review Workgroup Participants:

MetroGIS				
Minnesota Land Cover Classification System				
Date: October 19, 1999 Time: 9:00 a.m. - 11:30 a.m.				
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Name	Organization Name	Phone Number	E-mail Address	Role
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Bart Richardson	DNR - Metro	(651) 772-6150	Peter.leete@dnr.state.mn.us	Facilitator/ Organization
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Theresa Foster	MetroGIS Technical Coordinator	(651) 602-1572	theresa.foster@metc.state.mn.us	Recorder/ Organization

Opening Comments

At 9:15 a.m. Rick Gelbmann, Metropolitan Council, welcomed all the participants, on behalf of the MetroGIS stakeholders, and thanked them for agreeing to participate. Each participant introduced herself or himself. Gelbmann overviewed the agenda and explained the role of MetroGIS and their relevancy for hosting a peer review for the Minnesota Land Cover Classification System (MLCCS). Gelbmann focused his opening comments on the clear distinctions between Land Use vs. Land Cover. It is important to note that the value of Land Cover information is needed for planning tasks as well as natural resource information projects. The Land Cover Classification System was developed by the Minnesota Department of Natural Resources and opened its steering committee up to local, county, and regional entities during the development process. The goal of the peer review forum is to obtain consensus on the use and classification of land cover features. For future reference, Bart Richardson (BR), Peter Leete (PL), and Rick Gelbmann (RG) facilitated the process and their comments are recorded in this document in order to capture all the information obtained at the peer review workgroup.

Purpose and Process of the Land Cover Data Set

Peter Leete briefed the participants about the purpose of creating the MLCCS which entailed building a system to standardize natural and cultural land cover inventories. Catalysts for the system included the following: Cooperative Ecological Inventory of the St. Paul Mississippi River Valley, Mississippi National River Recreation Area, and the Pine Bend River Bluffs Greenways Grant. Many organizations helped steer and guide in the development of the system, they included the following: Great River Greening, Met Council, National Park Service, Dakota SWCD, USFWS, USACE, Friends of the Mississippi River, Ramsey County Parks and the DNR Metro Region.

Originally the MLCCS system was developed as a hybrid of the USGS Anderson system and the MnDNR Natural Heritage key to native communities.

Leete then discussed the existing classification systems that are in use today by many organizations. They are as follows:

- USGS “Land Use and Land Cover Classification System for Use with Remote Sensor Data,” Anderson, et.al.
- USGS Upper Midwest Gap Analysis Program (GAP)
- US National Vegetation Classification Standard (NVCS)
- MnDNR, Minnesota’s Native Vegetation, A Key to Natural Communities, Aaseng et.al.

- National Wetlands Inventory (NWI), “Classification of Wetlands and Deepwaters Habitats of the United States,” Cowardin, et.al.
- Generalized Land Use for the Twin Cities Metropolitan Area, Metropolitan Council
- Food and Agriculture Organization (FAO) Land Cover Classification System: Classification Concepts and User Manual, Antonio DiGregorio, et.al.
- Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data (WISCLAND), Land Cover of Wisconsin

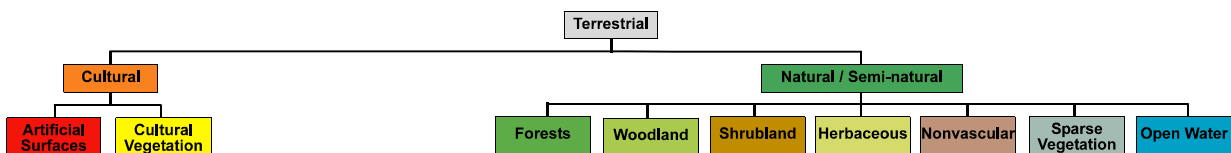
Leete then concluded the overall development discussion by commenting on the use of the National Vegetation Classification System as a model. He identified the following as important parameters in the development of the MLCCS using the NVCS as a model:

- Hierarchical system
- Federally mandated for federal projects
- Compliant with MnDNR’s Natural Heritage communities
- Incorporates NWI classifications
- Can bridge many of the existing systems

Process of the MLCCS

Leete then began explaining the MLCCS coding and development process. He explained the hierarchical classification system and identified the following as key to understanding the process and included are schematic diagrams to compliment the discussion:

Overview of the MLCCS:



- Supersystem - Terrestrial
- System - Cultural or Natural/Semi-natural
- Five level system beginning with vegetation type
- Modifiers for adding information for specific polygons

Hybrid of NVCS and DNR Heritage:

Cultural Levels

Level 1 - Artificial surfaces or cultivated vegetation

Level 2 - Vegetation structure

Level 3 - Vegetation growth-form characteristics or artificial surface type

Level 4 - Percent of impervious surfaces or soil conditions

Level 5 - Plant genus, plant communities, management practices, or surface type

Natural / Semi-natural Levels

Level 1 - Vegetation structure

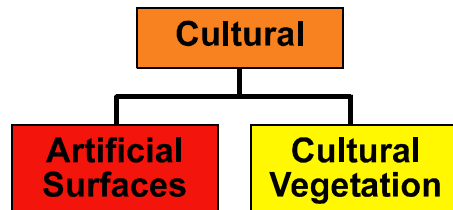
Level 2 - Vegetation growth-form characteristics

Level 3 - Vegetation physiognomy refinement or hydrological regime (NWI)

Level 4 - Vegetation natural community types (MN Natural Heritage)

Level 5 - Vegetation natural community subtypes (MN Natural Heritage)

Defining Cultural Land Cover:



Level 1 - Artificial surfaces or cultivated vegetation

- Artificial surfaces and associated areas is defined as areas with less than 96% vegetation due to direct human alteration.
- Cultural vegetation is defined as areas where natural vegetation has been removed or modified and replaced by different type. All vegetation that is intended for harvest is included in this class.

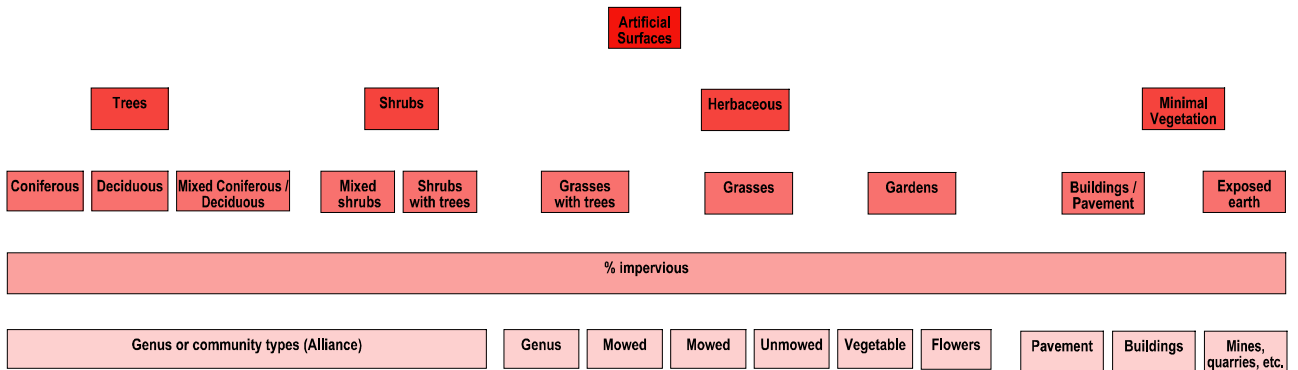
Leete then went on to discuss the benefits of identifying cultural features in land cover terms. The following are significant points within his discussion:

- Percent impervious for hydrological modeling will aid in watershed management
- Calculate true cover changes over time
- Vegetation biased in developed areas
- Planning
 - ☐ Early review of ecology of a site

- ⇒ Identify potential greenways
- ⇒ Assists in comprehensive planning and zoning

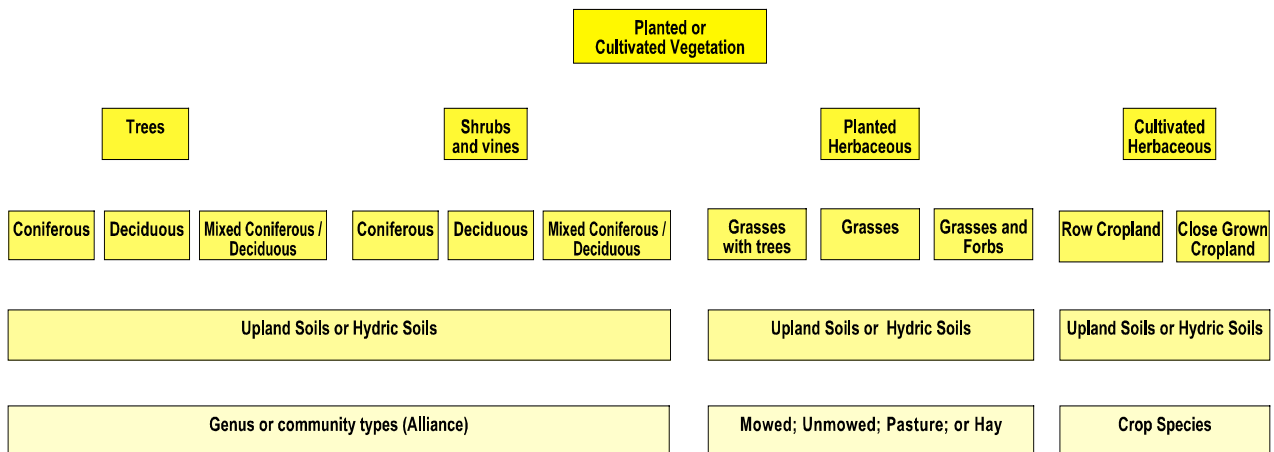
Leete then went on to discuss the branch of the MLCCS Artificial Surfaces, Planted or Cultivated Vegetation, and the Natural and Semi-natural classifications. The following illustrations define the level and classifications description used.

MLCCS Artificial Surfaces:



- Level 1 - Artificial surfaces
- Level 2 - Vegetation type
- Level 3 - Vegetation growth-form characteristics or artificial surface type
- Level 4 - Percent of impervious surfaces
- Level 5 - Plant genus, plant communities, management practices, or surface type

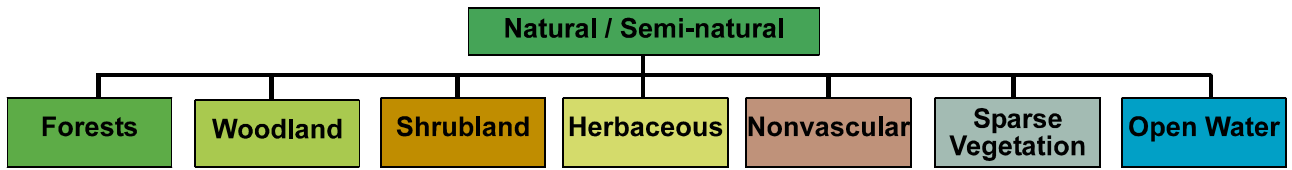
MLCCS Planted or Cultivated Vegetation:



- Level 1 - Planted / Cultivated
- Level 2 - Vegetation type
- Level 3 - Vegetation growth-form characteristics
- Level 4 - Soil conditions
- Level 5 - Plant genus, plant communities, management practices

Bart Richardson went on to explain the natural and Semi-Natural coding and development process.

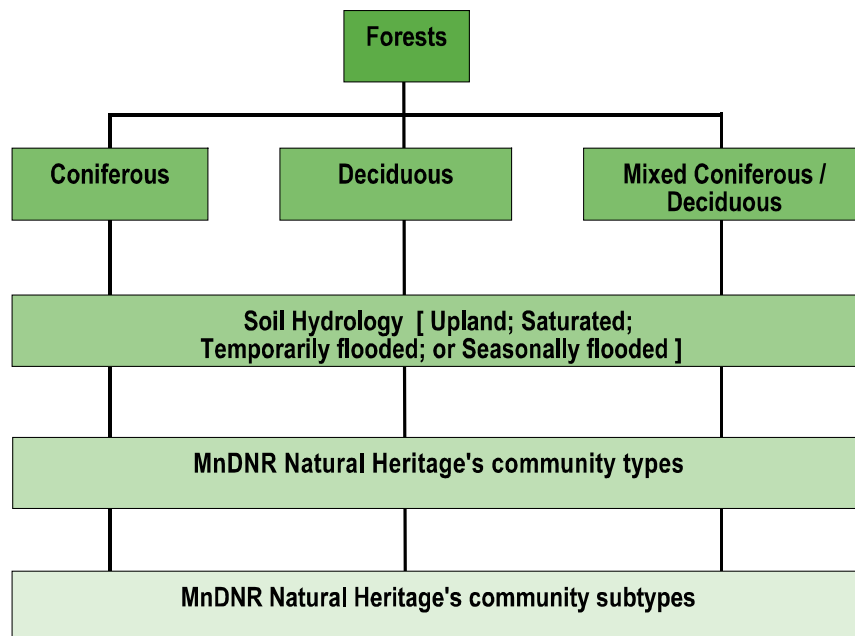
MLCSS Natural and Semi-natural System:



Natural / Semi-natural - plant communities that appear to be unmodified, or only marginally impacted by human activities.

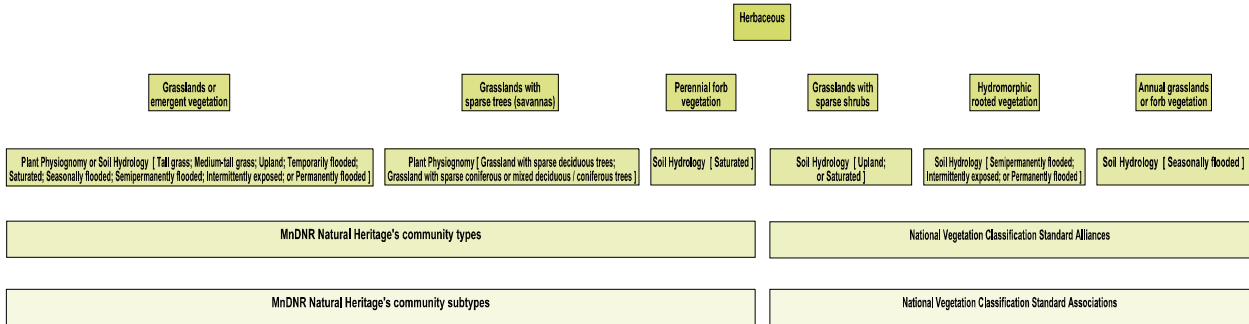
- Level 1 - Vegetation structure
 - Density of trees, amount of canopy closure
 - Height of plants
 - Type of plants
 - Absence of plants
 - Presence of standing water

Example: Forests



- Level 1 - Vegetation structure
- Level 2 - Vegetation growth-form characteristics
- Level 3 - Vegetation physiognomy refinement or hydrological regime
- Level 4 - Vegetation natural community types
- Level 5 - Vegetation natural community subtypes

Example: Herbaceous



- Level 1 - Vegetation structure
- Level 2 - Vegetation growth-form characteristics
- Level 3 - Vegetation physiognomy refinement or hydrological regime
- Level 4 - Vegetation natural community types
- Level 5 - Vegetation natural community subtypes

Methodology

Richardson then discussed the methodology in which to develop a MLCCS Data Set.

Sources:

- MnDNR Natural Heritage County Biological Survey natural communities (To determine community types (i.e. NCVS Woodland 96 is interpreted as a forest in the MLCCS system.)
- National Wetland Inventory (Level 3 Classification)
- Infrared Aerial Photographs (DNR 1994 Forestry Aerial Photos)
- Digital Orthophoto Quadrangles (Met Council 1997 DOQ's)
- Soil maps

Discussion of Advantages and Limitations

Bart Richardson (BR) discussed advantages and limitations of using the MN Land Cover Classification System.

Advantages

The following benefits for using the MN Land Cover Classification System are used when identifying cultural feature in land cover terms.

Benefits of identifying cultural features in land cover terms:

- Percent impervious for hydrological modeling will aid in watershed management
- Calculate true cover changes over time
- Vegetation biased in developed areas
- Planning
 - Early review of ecology of a site
 - Identify potential greenways
 - Assists in comprehensive planning and zoning

Benefits of using the MLCCS for identifying natural features:

- Hierarchical system allows for a variety of scales
- Integrates MnDNR's Natural Heritage communities
- Compliant with the federally mandated National Vegetation Classification Standard
- Incorporates NWI classifications

Comparison between Metropolitan Council's Land Use and MLCCS:

<u>MLCCS</u>	<u>Met Council's Land Use</u>
➤ True land cover	➤ Generalized land use
➤ Equal attention to both cultural and natural area	➤ Emphasis on cultural areas
➤ Vegetation biased	➤ Planning and zoning biased
➤ 617 classification codes	➤ 13 classification codes

Comparison between Gap Analysis Program (GAP) and MLCCS:

MLCCS

- Natural community oriented
- Vegetation biased in both cultural and natural areas
- 617 classification codes

GAP

- Forest canopy oriented
- Land use biased in cultural areas
- 84 classification codes

Limitations

- Cost - as high as \$300/square mile
- No funding beyond the pilot projects
- Quality assurance and quality control issues
- Aerial photo interpretation
- Field interpretation
- Digitizing and attributing
- Data management
- Ground truthing on private property
- Updating procedures

Future Enhancements

Bart Richardson (BR) discussed that the first version of the manual will contain supporting documents such as MLCCS development information and a schematics. There will also be a dichotomous key to aid in code use during photo interpretations and field checking.

1. Published manual with methodology and protocols
2. Training workshops for the MLCCS
3. Web access to the manual
4. Web access to the completed data
5. Explore the application of various spatial analysis models

Questions and Answers

For recording purposes the question and answer comments have been categorized into general comments about the development of the system (ex. financing, usage), specific questions about the classification (ex. parameters) and then a group discussion if MetroGIS should adopt the land cover classification system for their own stakeholders. Questions will be grouped in order of participant and a response, if one is needed from the facilitators.

General Questions and Comments Received from Participants

MK: Overall the classification system looks good. Everyone has their own data development methodology, cultural especially, what are the feelings on that?

PL: Classification system is currently being used with a minimal mapping unit between 1-2 acres. The MLCCS could be used at a finer detail study.

PL: Part of the MLCCS methodology is to overlay other layers to get more information about the area (ex. soils layer, streets etc.).

CA: Use of the data is important for land cover corridor or general planning, general urban development and to determine impervious surfaces. We don't use land cover to do runoff analysis. We don't need land cover for hydro modeling we use land use, especially for small scale - 20-acre sub-watersheds.

MK: Runoff in neighborhood modeling would be a good example for using land cover.

JDH: Are there other pilot projects in development?

PL: We would like to complete the Metro Region; however, we are funded only for the MNRRA Corridor and the Minnesota River Valley.

JR: Dakota County just funded a pilot study ~ 40 sq. miles, and we are in the process of doing another 300 sq. miles.

JS: Along the Big River there is ~ 600 sq. miles to be complete.

PL: ~240 Acres are complete along the Mississippi and Minnesota Rivers.

BR: Greenways grants are encouraging the use of the system for inventories.

PL: For larger areas in SWCD's the LCMR has funding available, they have previously funded MNRRA, Dakota County, and the Big Rivers Project.

RG: There is a natural advantage of using this system.

CA: We should gain access early on in the funding cycle for inventory grants.

DT: What does the greenway grants future look like?

PL: Metro greenways grants are here to stay. DNR and the legislature along with other entities are pushing smart growth partnerships. Opportunities should be expanding through the legislative process.

JHM: What is the definition of smart growth?

PL: Smart Growth is a new term used to describe efforts to counteract negative aspects of urban sprawl development. Smart Growth is a proactive approach to the diminishing natural resources associated with development.

DT: Are there chances for communities to be funded via grants?

PL: Yes, funding exists through Greenways, Planning grants, and the LCMR.

BR: Jay Riggs, Dakota County, is applying portions of several grants.

JR: Dakota County's grant was a Greenway grant for \$5,000, we also used part of a BWSR watershed plan grant and some money was received by LCMR. So we are looking at 2/3 of the county being inventoried in a year from now.

DT: What are the application deadlines?

CA: Greenways cycle is done in the spring time, talked about every 6 months (semi-annual or annual).

JM: Merging grants works well (LCMR, Greenways etc).

CA: Works well in a planning element.

CA: Does the cost figure of \$300/sq. feet cover everything?

PL: Costs stated are estimates and cover only technical support. Aerial photos and indirect costs are not factored in.

BR: The cost is based on a rate of completion of approximately 2 sq. miles a day.

CA: Assuming no field checking, what would the cost be?

PL: We did not compute that figure, we will get back to you on that assumption.

DP: How does your system deal with time? How do you classify during one time vs. another time (consistency on how it is classified)?

PL: We recognize artificial surfaces over time may return to a naturally functioning system. Each inventory is a snapshot in time.

BR: Changes will be tracked by the creation dates.

MK: I appreciate all the time put into this project and the development of the classification system.

Specific Questions and Comments about the Minnesota Land Cover Classification System Received from Participants

BR: At this time we will start taking specific question related to the classification system and categories. We'll start out the conversation by asking you what you think about the breaks in impervious surface levels? The breaks are 10/25/50/75/90. The issue is whether these breaks are correct for hydro modeling efforts.

CA: I wouldn't use this system for hydrological modeling. For small areas, we will digitize every street section/driveway/home, but not for larger areas.

BR: Have you digitized every impervious surface in the watershed?

CA: No, only for small watershed studeies (Land Use is the driving force on larger scale studies).

DP: In hydrologic modeling %impervious vs % pervious is based upon soil type.

BR: Is soil type your driving force for hydrologic modeling? Soil information will be helpful to determine that right?

DP: Yes, very much.

JHM: It will be good to have standard breaks for impervious studies. There isn't any now and everyone tends to do it differently.

CS: I foresee small-scale problems with other datasets and the I-35W coalition use for the data. Data related to policy, funding and program work at a different scale and classification system. Problem: Metro level policy vs local level application. Errors in using smaller scale from past experiences.

DP: What is the nature of these errors?

CS: Parcels of land being mis-coded (ex. city hall coded as residential).

KL: If we are trying to evaluate for a sq. mile then to a community of 3-4 sq. miles; the data blows everything out of whack. Who is the primary audience for this information?

BR: Currently Greenway planners, neighborhood wild groups that are identifying natural pockets (irregularities in property boundaries and use), natural resources orientation and future comprehensive planning groups and smart growth studies.

CS: Smart Growth strategies are now looking at coming from the bottom up and there isn't the funding to look at the small areas. It would be nice for the data to match up.

RG: What would help you do that?

CS: Scale - if there is a metro wide scale that data is collected.

JM: Neighborhood analysis is important. Different use for upland areas defined as well as riverbank corridor, test to include information.

KL: When look at the examples of drawing polygons around forest - this starts making sense. Along the river you will find distinct differences. For example, in residential areas it becomes harder to determine at a city level.

JR: At the provided scale you can identify land ownership. Primary goal is to find natural areas to enhance the greenway corridor. In heavy developed areas you increase land cover polygons.

KL: Maybe there needs to be some mechanism to deal with scale for certain/specific areas.

JR: The system allows for/flexible enough for different levels of details.

CS: We need guidance on how to interpret and to see significant changes.

CA: There is a need to apply this to different scales - so you can have a more refined data set for different areas.

JS: The greenways group did that for 1acre to 5 acre sections.

CA: Was this a neighborhood landscape scale? Question: How do you determine between 3 to 6 percent impervious?

CA: This would definitely add to the cost.

DP: Two comments: Based on Carol's zoning question, land use classification could be used first and then use land cover to find certain corridors. Parcels and ground truthing will still need to be done.

CS: Interesting system to track. Parcel information could be used to trigger MLCCS update needs. I don't think we need to wait till the next flight to identify strategies to update the process.

KL: I-35W is struggling with all the info out there and how do we get the process in getting the data then updating the data. Data usability and scale are real issues - we need to be able to use the information. Keep the process visual for usefulness, and have the system able to overlay and connect to other data. Are there ways to connect to other databases out there (different groups collecting information different ways coming up with different conclusions?)

CS: Consultants? Tie back to consulting issues; Municipalities done by corridor at a small scale; aggregate the impact for sources.

KL: In the 7-county metro, the communities are updating their storm water management plans - is there a way we could use this information? Access the database?

BR: MLCSS will be public data.

BR: Modifiers are used for small-scale projects (eg: TR-55 Model for Urban Hydrology and Small Watersheds). We envisioned up to 3 modifiers (Imperviousness, Land Use, Natural Communities).

JM: Modifiers for community and industrial look the same to me. There should be more definition of the modifiers. Is there a way we can simplify the 3 page modifiers? Are there standards that the Met Council uses?

RG: Land use modifiers are tied to the MLCCS, not specifically tied to the impact of land use, concerned if you are using the code for that impact.

MK: Breakdowns on imperviousness - somewhere determine your breakdowns and write it up in the metadata. It is not clear when you put the exact %'s of modifiers on codes.

BR: In the modifier codes 0-100 is used for %impervious.

BS: If someone is doing a small project and they use the modifiers and then their neighbors do a project without the modifier - how is that going to help me?

BR: The data will be publicly accessible and strict methodology and procedures will hopefully prevent inconsistent use of the MLCCS.

RG: How is it going to come together? Establishing a standard. Will it end up in a mosaic modifier part? I view the modifier to help clarify the main part of the data that we have. The list has some purpose on helping what the main classification says. Does that help?

BS: Lets say that I commonly use a modifier that the others don't and I am doing that regularly (how does that work?).

RG: What percentage have modifiers attached?

JS: 95% of all polygons have modifiers.

JM: Is it the technical person that attaches modifiers or the field person?

JS: Predominantly field checking determines.

BR: We had a lot of redundancies in the earlier versions of the system and Robert Maki suggested using the modifiers to reduce the duplication.

RG: Metro wide the 2nd level will be adequate enough to delineate to, but along riverine areas the 5th level will be needed, I believe this is flexible for resource management.

BR: People on the development team needed to know differences between native or planted prairie and the modifiers could do that. We stressed the significance of modifiers to be as important as the code.

DP: Do you know if anyone has given any effort in modeling/predicting imperviousness?

RG: No specific plans to do that, it's useful information to know there is a need for impervious surface data.

MetroGIS Adoption of the Minnesota Land Cover Classification System

CA: Great classification system and should be adopted.

JHM: Seems to be consistent with national standards.

CA: Training sessions on how to use the classification systems are important and should be developed.

JM: Training development should be consistent across the region. Last week at the steering committee meeting, we discussed training for this system. There was a suggestion to have a certificate to show proof they have completed training before their data will be accepted.

CS: You should write it into the RFP Process.

MK: Is there any work on using this as a standard?

BR: Greenways has been using this system to be a soft mandate.

PL: The Manual will be published in January with training conducted this winter.

JR: There needs to be a QA/QC (quality assurance/quality control) protocol with central coordination developed.

Next Steps

Gelbmann explained what were the next steps for the peer review participants.

A turnaround document for the peer review workgroup will be mailed or e-mailed the week of November 8th; feedback from participants about their comments will be taken until the 22nd of November. Participants will be mailed the final document and the document will be posted on the MetroGIS Web page when comments and final documentation is finished.

Adoption of the Land Cover Classification System will start on December 7th at the next Technical Advisory Team and then on to Coordinating Committee and Policy Board for endorsement. Access to the classification system will also be provided for on Datafinder.

Process Questionnaire

Gelbmann explained that the goal of this activity is to collect feedback from participants and to make adjustments for future peer review workgroup sessions. Each peer review workgroup participant was asked to complete the evaluation form before they departed the workgroup meeting.

Question:	Pre-session Contact and Information	Explanation of Desired Outcomes	Question 1. Purpose of the Minnesota Land Cover System clearly communicated?	Question 2. Was the process for the Land Cover Data Set clearly communicated?	Question 3. Advantages and limitations clearly communicated?	useful to meet you need of Land Cover information ?	Question 5. Did the organization team provide you the necessary next steps?	Encourage Diverse Viewpoint	Obtain Consensus	Manage Time	Address Your Goals and Needs	Adequacy of Facilities	Usefulness of Peer Review Workgroup Session	
Participant														
1	3	3	4	4	4	4	4	4	4	4	4	3	4	3.77
2	4	4	3	3	3	3	3	4	4	4	4	4	4	3.62
3	4	4	3	3	3	4	4	3	3	3	3	4	4	3.46
4	3	3	2	4	3	4	3	3	3	3	3	4	3	3.15
5	3	3	3	3	4	3	3	3	3	3	3	3	4	3.15
6	3	2	2	3	3	2	*	3	3	3	3	3	3	2.75
7	3	2	3	3	3	2	2	3	2	3	2	3	3	2.62
8	2	2	3	3	3	3	2	3	3	3	3	3	4	2.85
9	2	3	3	3	1	4	2	4	4	4	4	4	4	3.23
10	2	2	3	3	3	2	3	3	3	3	3	3	3	2.77
11	3	3	2	3	3	3	3	4	3	4	3	4	4	3.23
12	3	3	4	4	4	3	3	4	4	4	4	4	3	3.62
13	3	3	2	4	4	2	3	*	*	*	*	4	4	3.22
14	3	3	4	4	4	4	3	3	2	3	3	3	3	3.23
Avg	2.93	2.86	2.93	3.36	3.21	3.07	2.92	3.38	3.15	3.38	3.23	3.50	3.57	3.19

* No Rating Submitted by Participant
All 14 Participants filled out a questionnaire.

MetroGIS Land Cover Peer Review Comments

1. Said you had a couple of questions you wanted answered (ex. impervious surface) - maybe would've laid them all out initially so we could've discussed them all.
2. Pertinent questions, good answers; good opportunity to network and encourage adoption of this model to promote standardization.
3. Kudos to DNR - Centralized QA/QC procedure is CRITICAL. Land Cover Certification should be mandatory to do projects that receive state funds.
4. More time for specific questions, less formal presentation time would be good.

Adjournment

At 11:36 a.m., Gelbmann thanked the participants for coming and putting in a solid two and a half hours worth of work. Meeting adjourned.