I. Comments on LUWG Workplan

Jeff White, Maryland Department of the Environment

Spatial resolution:
Cost out options (And methods?) for filling gaps in LULC data.

Why solely "remotely sensed imagery"? Data gaps can be filled with a combination of remotely sensed imagery and ancillary datasets (i.e., methods applied to the Modified Chesapeake Bay Land-Cover Dataset and CBP P532 land-use, which incorporated a wide range of ancillary datasets).

How about including something more general here such as "develop methods for incorporating local data"? The implication seems to be that the only method of incorporating local land-use/impervious data is to resample the data to a coarser resolution, then use it to reclassify the initial Landsat imagery classification. However, there are other methods for incorporating local data that could be applied as well, which may not necessarily involve either a) dumbing down the data, or b) a direct reclassification the initial Landsat imagery classification.

Temporal resolution:
Not just backcasting, but forecasting as well. Assuming 2011 is going to be the baseline imagery year (i.e., as 2006 was the baseline imagery year for p532), some forecasting will need to occur as well, since most local data (land-use and impervious), at least in terms of those datasets MDE currently has access to, is from the mid-2000's. MDE would also recommend that to the extent possible, in the final model land-use, per model simulation year for which the locals have impervious surface data, the final model impervious acres should exactly match the local data.

Categorical resolution:
Shouldn't this also include "developing methods for delineating new LULC classifications"?

What is this criteria referring to? Data quality and accuracy? Both spatial and attribute? It seems as though any relevant spatial dataset, as long as its quality and accuracy have been deemed acceptable and its has been properly QA/QC'd, could be incorporated or applied (or at last an attempt made at doing so) in some fashion to inform the new land use.

Local LULC for ground-truthing CBP LULC:
It is important to note here that this does not mean local impervious surface data will not be applied in developing the actual impervious coefficients. If understood correctly, this means that the final model impervious acres, which ideally will be calculated using coefficients derived from local data, will be compared to the impervious acres associated with the county's raw impervious surface data for QA/QC purposes. This would also provide a QA/QC measure for areas where local data was not available, assuming the coefficients derived from areas where local data was available were still applied.

Loading Rates:
Is this referring to the "current" model loading rates?
Criteria relative to what? Or for what?
Why (is the LUWG evaluating data and feasibility of assigning differential loads to LULC classes)? This does not make any sense. This is not the expertise of this group. The expertise of this group is in mapping different land types with different runoff characteristics and tracking these land types. The feasability of whether or not loading rates can be developed for newly created land types should fall to those groups who deal with these particular issues (i.e, the USWG, the WTWG, the AGWG).

“Incorporate into CBLCM, Scenario Builder, etc…”. This is specifically referring to the incorporation of LULC info., right?

"Review CBLCM, Scenario Builder, and Watershed Model…" This is specifically referring to output LULC acres, right?
"Level of Effort for Lead and Supporting Partners…" How were these levels of effort determined? BPJ?
MDE can assure the LUWG that assisting in refining the land-use for the 2017 model revision is a top priority.

Beverly Quinlan- VA DCR Geoinformatics Specialist

I have a number of reservations regarding the workplan. I think we can and should find out what local scale land use data currently exists and attempt to create a high resolution land use data set(s). What's less clear to me is how this information should be used. This workplan makes the foregone conclusion that the local scale land use will be incorporated into the current regional scale model. This seems like an attempt to only make regional model outputs appear more valid at local scales rather than a true examination of how this local information should be used. A brief mention was made at the kickoff meeting of local tools beyond the regional model. We can't turn a regional scale model into a local scale model by simply tossing local scale land use at it.

I am also concerned about the membership of the land use workgroup. I strongly believe there is inadequate membership in this group by individuals knowledgeable and interested in agricultural and forest lands. Without additional participants, this group will only be able to adequately address urban land uses.

Stephanie Martins, MDP AICP

This general work plan seems fine to us. It seemed like there was an interest at our last meeting in exploring the possibility of incorporating separate land use and land cover datasets. I know it came up in the context of MDP's classification scheme particularly in the very low density residential categories. I think that this discussion is embedded in what you sent, but it might be worth emphasizing in the work plan.

Steve Stewart, Baltimore County, Dept. of Environ. Prot. & Sustainability Watershed Management and Monitoring Section

The workplan looks fine to me.

Bryan Hall, DNREC, OMB

Upon review, I feel that you have accurately captured the thoughts that were expressed in early meetings and upon my notes we were to do the following:

- Inventory our resources.
- Evaluate the quality of those resources and ease of access.
- Determine how these resources could be used to refine the model Implement improvements to model based upon local data upon determination that resources are usable and provide quality data.

So if you have said that in these three pages; however, it is in Bay Program speak, then I have no objections to the Draft as presented.

Laura Muhs, CIV NAVFAC HQ

LUWG Workplan- No comments.

Pat Buckley, CBP Coordinator, PA DEP
PA DEP has the following comments:

- It should not be assumed that the Land Use Workgroup supports the use of a 2025 land use for the Phase 3 WIPs. PA supports use of a 2017 land use in the Phase 3 WIP, as it will be more accurate to initiate planning efforts in 2017 than a 2025 projection. Use of 2017 land use is consistent with PA position for the Phase 1 & 2 WIPs, which were based on the current 2010 land use. Furthermore, the WQGIT has not fully discussed this issue or made a determination on it.
- DEP staff will meet with DEP management to determine what state level data DEP can provide, and whether staff is authorized to work with partners (DCED & county planning directors) to provide local land use data.

II. Comments on Initial Land Use

Bryan Hall, DNREC, OMB

Developed lands: Two key elements, one further definition or clarification of density in the various elements (aka what is high density 6, 10, 12 units) to allow for ease of transition from work done in DE to the larger Bay model. In addition I would add back the Medium Density classification as in the case of DE, even what we call High Density for our location would clearly be Medium or Low to other States. Finally, I would suggest also adding the fallow classification back to the list as in certain case for larger planned developments that have no construction occurring at this time, the approvals restrict Ag practices so these are in fact reverting to meadows and early succession forests.

Forests (in general): As we discussed from the other day, the need to use local data would be beneficial as this data has been revised several times at the local level.

Leslie Grunden, Caroline County, MD

Under 'households on septic', the item 'distinguish between different types of systems', will any consideration be given to distinguishing septic systems with shallow drain fields? 95%-99% of the septic systems in caroline county have drainfields with depths of 18" or less. We have been working with our dept. of environmental health on septic strategies for the P2 WIP, they tell us that MDE has documented that those shallow systems discharge about 25% less nitrogen to groundwater than systems with deeper drainfields. I think a large percentage of septics in the mid-shore area are similarly shallow, has anybody discussed this?
Response from Ning Zhou (VA Tech):
Yes, the Septic Expert Panel is reviewing the septic BMP efficiencies, which include these different dispersal types.

Laura Muhs, CIV NAVFAC HQ

1. Land Use/Land Cover Data -

a) I think the land use/land cover categories listed on 'Initial Land Use and Wastewater Classification for 2017 Midpoint Assessment' are generally complete. I compared them to the Anderson LULC Classification System categories, and we seem to be missing some of the Level II classes, specifically beaches, dry salt flats, sandy areas other than beaches, and bare exposed rock, within the Barren Land category. The category, Extractive, should be become a subcategory to a new category, Barren.

Was the intent to capture Rangeland under Agriculture? I agree with the idea of decoupling the agricultural management systems from the crop types. Wouldn't that information be incorporated indirectly when loads are calculated per land use type anyways?

Under Natural-Upland Forests, Floodplain forests and riparian forests should be here. These are lowland land cover types. Could Rangeland classes be incorporated as another subcategory under Natural? Where do we account for open grasslands, etc?

Jeff White, MDE

Not only storm drains but drainage ditches should also be considered "connected" (i.e., rural areas could still be "connected" to waterway via drainage ditch preventing sheet flow and infiltration).

Additional definitions for connected vs. disconnected that may be worthwhile tossing into this classification schema: Connected - curb and gutter, drainage ditches (i.e., rural roads); Disconnected - sheet flow (i.e., runoff from impervious surfaces in rural areas to pervious surfaces/turf grass, which results in greater infiltration).

Not all MS4. Instead of "inside MS4", more accurate description is "NPDES Stormwater Permit"

Why are commercial, industrial, and institutional one classification?

Why is woodland included here (in Pervious developed)? How is this defined? Tree canopy with turf grass below?

What about also including either "very low density residential" or "rural residential"? MDE believes this to be an important distinction in terms of drainage properties.

Is there a planned distinction between urban tree canopy based on surface below the canopy (i.e., turf grass or impervious)?

What is the distinction between rural woodlands and forest? Is there a difference at all? Is it size? Is it based on land-cover below the canopy (i.e., turf, impervious, or managed under-story)?

(Urban, suburban and rural road distinctions should be) based on drainage characteristics. May be beneficial to specify this.

Reclaimed mines should be picked by the Landsat imagery classification as forest/natural, since according to our Bureau of Mines, reclaimed implies that the former site has now been fully revegetated.

MDE has permitted CAFO locations along with the flocks per year and number of animals per flock. This data should be used to calculate the number of CAFO/AFO acres in the model.

Denny Puko, Planning Program Manager, PA DCED

I'm sending this though it repeats input previously provided.

Pennsylvania does not have comprehensive and detailed land use and land cover data of the nature outlined in the draft classification paper. PAMAP (funded principally through the PA Department of Conservation and Natural Resources) has produced seamless, high resolution digital aerial imagery, detailed elevation data, and some basic digital data layers and general land cover for the entire state. Beyond that, some counties and municipalities have produced more data layers of varying levels of detail depending on the capacity of the county. What was shown by Lancaster County at the last land use workgroup meeting is at the high end of what some counties have produced.

It would take a large amount of work and associated resources to generate data of the nature outlined in the draft classifications, even if only generated for a certain set of counties or regions of higher priority. And it would take a large amount of administrative oversight and coordination to see it through, again even if only for certain regions.

In terms of DCED's capacity, at this time and for the foreseeable future, DCED has neither the staff nor funding resources to be instrumental in this endeavor.

Kirk Stoner, AICP, Cumberland County, PA

I would concur with what Denny said. In our region we did a detailed Anderson Land Use cover analysis that had very specific land use categories at the sub-parcel level. At the end of the day, the effort took a very long time to complete and by the time it was done, the data was likely outdated as land use patterns had changed since the data was interpreted from 2008 aerial photography.

For this effort, I would keep things at the parcel level. Every county through its tax assessment office could provide a map of the predominant land uses on a parcel of land. When we get to the sub-parcel level, the time and effort to collect and maintain the data increases drastically. With the multi-state scope of this project, data at that level seems to me to be impractical to collect/maintain and would result in an inconsistent data layer.

Pat Buckley, CBP Coordinator, PA DEP

Please note that PA DEP does not support singling out Shale gas pads and infrastructure as a separate Extractive land use. Since this is a temporary disturbance, a Construction/Urban land use would likely be more representative of the activity.

Ted Tessler, PA DEP

1. Developed:
   A) Impervious: Connected vs. Dis-connected storm-drains;
   Not sure that we have the data necessary to delineate these systems. Is the model going to be able to accurately establish Disconnected loads? SW loading rates are already highly variable.
   B) Pervious:
   How would residential density change turf practices? Not necessary?
   C) Roads;
   iii – too much data? Will this be truly usable?
   D) Construction;
   Important that we get this correct relative to state E&S control requirements.
2. Extractive: C) Shale Gas Pads and Infrastructure
   PA DEP does not support singling out Shale gas pads and infrastructure as a separate Extractive land use. Since this is a temporary disturbance, a Construction/Urban land use would likely be more representative of the activity.
3. Natural: Species differentiation may be difficult/not worth effort?
4. Agriculture: Consistency with NASS crop reporting standards is a good idea.
5. Wastewater: B) Household Septic - Doubt that this information is available.

Beverly Quinlan- VA DCR Geoinformatics Specialist

Land Use Classification

- It's not clear to me if the intent of this list is to capture what land uses will be modeled or the land uses that we will attempt to capture as a spatial layer (if those are indeed different).
- Animal feeding operations don't transition well to a spatially explicit layer when the acreage is determined by "animal density assumptions". In Virginia, my confidence for spatially explicit

regulated vs. unregulated AFOs is low (the data from the regulating agency has missing/bad coordinates for many facilities).

- While I could do a fair job generally locating (but by points, not polygons) AFOs without distinguishing between regulated and unregulated in Virginia, I do not see a reasonable way to develop a spatial dataset of degraded riparian pasture that approaches the accuracy level desired by this workgroup for local "buy-in" (i.e. along particular reaches of streams).
- Construction has high spatial and temporal variation that isn't actually captured (in Virginia permits at least) with enough information to know that spatial/temporal variation.
- Extractive GIS data I've obtained from the VA Department of Mines, Minerals and Energy is not state-wide and includes the entire permitted area (not just what is actively being mined). I'm not sure if there is record of disturbed permitted acreage, but it certainly isn't geolocated.
- I'm confused by why floodplains would be limited to the "Natural" land use when **all** other land uses can occur within floodplains. Additionally, I'm not convinced that the FEMA National Flood Insurance Program floodplains and/or SSURGO Flooding Frequency Class is extensive or accurate enough to support this "local resolution" land use. This information will be least accurate in the forested areas where it is proposed for use.
- Harvested Forests is another land use that has high spatial and temporal variation. The Virginia Department of Forestry records harvested acres by locality by year, but I'm unclear how a spatially explicit layer would be developed.
- It's unclear to me how Riparian forests will be defined particularly when this category is separate from Floodplain forests. Is this some arbitrary buffer around streams? what about when a stand of Floodplain forests exists between the stream and the riparian forests?
- Unavailable data in so many of these categories is a good reason why this local land use should not be directly tied to the regional CB watershed model. Too much of what is needed cannot be developed as spatially explicit information. We need to consider how the local scale land use data that can be collected should be used, and I believe that use is in local tools, not a regional model.

Matthew Pennington, Eastern Panhandle Regional Planning and Development Council

In response to a request from the Chesapeake Bay Program Land Use Work Group, the Region 9 Coordinator conducted research on current LULC data sets and upcoming projects. An interview with GIS Specialist Matthew Mullenax, who serves on the West Virginia Association of Geospatial Professionals, provided information on the National Land Cover Data (NLCD) set. He also recommended contacting GIS professionals Frank Rogers, Executive Director of Cacapon Institute and Todd Fagan, Jefferson County GIS Director, to discuss projects they may have previously worked on or are planning. Below is a table of the findings:

Data Holdings	NLCD	Jefferson Urban Tree Canopy	Berkeley County Karst Region Land Cover
Classification Scheme	Modified Anderson Level 2	tree canopy, (2) grass/shrub, (3) bare earth, (4) water, (5) buildings, (6) roads, and (7) other paved surfaces	(1) trees, (2) green, (3) bare soil/sand, (4) water, (5) building, (6) roads/rails, and (7) other
Dates Available	1992, 2001, 2006	2007	2010

Spatial Resolution	30 meter : 30 meter	16 square meter	1 meter
Methodology	Landsat 7; Supervised & Unsupervised	• Object-based image analysis • 2007 NAIP orthophotos • 2005 LiDAR surface models. • Ancillary data: road and driveway centerlines, building polygons, and hydrology polygons provided by the	assessment based on NLCD
Accuracy	Available Online	No accuracy assessment was conducted. Dataset was subject to a thorough manual quality	assessment based on NLCD
Notes		http://www.uvm.edu/~joneildu/GM/JeffersonCounty/LandCover/	Available December '12 Cacapon Institute

Comments on LUWG Local Data Request

Mary Gattis-Schell, Senior Countywide Planner, Lancaster, PA

Data informing current conditions:

- Stormwater regulated areas – MS4 regulated areas are defined as the census Urbanized Areas and other areas as designated by the state. Wouldn't it be better to get this directly from the states? What is the purpose of having storm drain networks?

Data informing future conditions:

- Zoning - Beware that this could be extremely complex in PA. We developed a lexicon that grouped the approximately 500 different municipal zoning classifications (each of the 60 municipalities has its own zoning classifications) into approximately 26 categories, which is still very complex. I'm not sure what the solution is to this …
- Priority Funding Areas – Perhaps Priority Reinvestment/Growth Areas is a better title. I believe what you're calling "urban demarcation lines" are referred to as Designated Growth Areas in our state planning code. You might want to add this term.
- Planned and/or permitted developments – you could get development that was approved but approval has expired. Perhaps putting a timeframe, e.g. permitted/approved since X date would ensure you don't get expired plans.
- Protected lands – include lands with a perpetual conservation/preservation easement in the description. May need to distinguish between those that are already protected and the Conservation Priority Areas category, which I presume is "planned for conservation."
- You might want to ask again for Future Water and/or Sewer Service Areas.

I agree with the strategy to obtain data. In PA you might rely on the County Planning Directors Association rather than the County Commissioners to request the data. The CPDA has a Chesapeake Bay Task Force which may be able to help encourage a response. Kirk Stoner is also involved with the Association and may be able to tell you whether this would be a better resource than the County Commissioners Association.

Beverly Quinlan- VA DCR Geoinformatics Specialist

Local Data:

- For data informing current conditions, in addition to requesting keys to interpret codes of land use categories, I think it's important to request any detailed descriptions of those categories that may be available as well as the method used to develop the data. Even the NLCD has a short and long description of categories (e.g. 22 Developed, Low Intensity - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units).
- For data informing future conditions, from the presentation under "special environmental protection areas", it seems important to note that not all VA localities under the VA CB Preservation Act have the Chesapeake Bay Preservation Areas in their localities in a GIS format. In addition, it seems unlikely that any locality will have "flood zones" beyond those provided to them by FEMA as part of the National Flood Insurance Program. FEMA only maps flood zones in areas where structures would be at risk, it's more of an insurance risk layer than a natural resource layer.
- As far as the strategy for obtaining data, I do not support the suggestion that the focus be only on high growth counties. I'd like to reference my previous assertion (attached email) that this

workgroup is focused too heavily on urban land use with little consideration for agricultural land uses.

- I think it's fine if CBPO take delivery of the local data sets, but state agencies involved, like my own, should be forwarded all original material that CBPO receives from the request. The requests would probably be best received via existing structures (PDCs in VA).

Jeff White, Maryland Department of the Environment

This data request is going to ag. stakeholders as well, correct? The data focus seems to be for the urban sector. Even though most of the planned data inputs for ag. are at the federal/regional scale, there could still be some local data available for ag. lands.

Recommend making impervious surfaces their own bullet, since many local jurisdictions have data layers that solely depict impervious cover.

What about data layers for parks, roads, and zoning? Even though MDP use distinctions are based off county zoning data (merely aggregated up), it would still be beneficial to acquire this original zoning data. This data could also be used in defining urban, suburban, and rural demarcations.

Need to add a general bullet requesting any additional data that may be useful in developing historic, current, or future LULC datasets. Also make sure to specify that metadata should be included for any and all data files sent (most important for timeframe of the data).

MDE would actually recommend not including delineations of regulated areas at the current moment in time. The definition of what is and is not considered regulated stormwater areas, at least in terms of jurisdictional MS4s, just changed as per recent MS4 permitting developments. Until the local jurisdiction's update their delineations to reflect this policy change, MDE has its own delineation, which can be applied.

What about state lands? Data request is going to the states too, right?
Rural legacy zones/areas?