ESD Workplan Implementation Report

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Submitted to:
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Submitted By
Metropolitan Washington Council of Governments
Under a Grant with the Chesapeake Bay Program Office

Grant # CB-98393501-0
Chesapeake Bay ESD Development, Redevelopment, and Revitalization- Demonstration

1.0 Purpose of Implementation Report

The Implementation Report serves to provide a detailed status of the schedule of adoption for the individual workplan recommendations for both Arlington and Fairfax County, Virginia. It was acknowledged that changing codes and other time intensive recommendations would not be realistic to achieve within the short duration of this project (i.e., 12-18 months). This Implementation Report will be used as a means to give the status at the end of the grant, as well as be used to insert information 1-2 years and longer after the project grant has expired.

2.0 Project Background and Objectives

Environmentally sensitive design (ESD), also known as Low Impact Development (LID) is a set of practices and approach to stormwater management (SWM) that uses a combination of conservation design, multiple 'distributed source control' stormwater management practices, and pollution prevention to protect and maintain watershed functions and ecological integrity. LID/ESD maintains the hydrological features of a site over the course of development (pre and post development) and infiltrate as much stormwater on site as possible. LID/ESD is quite different than conventional end-of-pipe or underground approaches, which are often one dimensional and concerned about moving stormwater off of a site quickly and safely (i.e., volume control).

LID/ESD is thought of as a new and innovative measure to change the way SWM is achieved, but many institutional practices are entrenched into the regulatory systems as safeguards developed to protect the environment and ensure the safety of the general public (e.g., flood control and property damage). Even in today's electronic world-building codes, zoning, permitting, and maintenance requirements are difficult to revise and are not changed overnight. These barriers are often formidable impediments to LID/ESD implementation. These barriers alone can halt the possibility of doing something new or different like LID/ESD. Actions to address these barriers require a concerted effort from multiple parties (i.e., 'top-down' and 'bottom-up' management approaches) to accelerate change.

"Infill/Redevelopment" is a term used to describe a type of development with special outside incentives over traditional development. Typically Infill and Redevelopment sites are located in the older areas of an urban core which may or may not have been previously developed. These sites are ideal to use because they can leverage off the existing infrastructure and amenities that are readily available in these established areas. Infill/Redevelopment has been championed as a way to reduce urban sprawl and Brownfield's development is used as one example of an infill/redevelopment opportunity.

2.1 Project Objective for Redevelopment, and Revitalization – Demonstration Project

As earlier in this section, LID/ESD's primary barriers for greater implementation are site design methodology, existing building codes, and jurisdictional ordinances. These barriers represent an initial hurdle that developers and design engineers must overcome if they are to use LID/ESD for a particular site and for future sites. The primary objective of this Chesapeake Bay Program grant is to set the wheels in motion and future framework for lowering barriers and modifying the prohibitive codes and ordinances that preclude the use of LID/ESD and to do so in an Infill and Redevelopment application.

2.2 Project Summary

For this project the Metropolitan Washington Council of Governments (COG) originally worked with three jurisdictions in the Chesapeake Bay (CB) Region: Fairfax County, Arlington County, and the City of Alexandria. The City of Alexandria withdrew from this project after its workplan was in a draft stage. Alexandria's Chesapeake Bay Preservation Ordinance update and the city-wide stream assessment project were priority areas that Alexandria was required to address so they decided to discontinue their involvement in the grant in order to focus on these areas.

All three jurisdictions have well-established urban centers and are interested in using smart growth to reduce urban sprawl and the associated anthropogenic pollution that goes along with sprawl development. Alexandria and Arlington have a higher percentage of developed land within their borders compared to most counties in the Chesapeake Bay (CB) watershed. Fairfax has been one of the fastest growing counties within the CB watershed for the last 25 years. Due to their advanced stage of development and older urban cores, all three target Infill/Redevelopment projects for future growth.

These jurisdictions have begun to implement the LID/ESD concepts on a small scale and are making efforts to implement LID/ESD objectives similar to the ones addressed in this Chesapeake Bay Program (CBP) Grant. They bring common problems and experiences, but differing perspectives on how to successfully implement LID/ESD into their codes and regulations.

This CBP Grant called for a "demonstration project," but this project was not what one would think of as a traditional demonstration project, which is often a one-time snapshot of performing a new or innovative application of a process or technology and documenting the results. These demonstration projects, one for each jurisdiction, were (and will continue to be) ongoing efforts to affect change in the way codes and ordinances are set that restrict the use of innovative techniques for stormwater management.

In COG's role as the primary facilitator and data collection resource for this grant project, COG's involvement was:

- **transfer information** between the jurisdictions,
- **identify common LID/ESD issues** to each jurisdiction,
- **promote leveraging of efforts or lessons learned** from one jurisdiction to another, and
- develop an **LID/ESD Workplan** for each jurisdiction and **Final Status Report** for the CBP and outside jurisdictions.

Bringing individuals together to share and **transfer information** on demonstration projects helps to build a common base and maximize the value of the results for each individual entity. **Identifying common LID/ESD issues** creates a framework for the other jurisdictions' LID/ESD Workplans. **Promoting the leveraging of efforts or lessons learned** from county programs and other related activities help to develop direct collaboration efforts between such programs (i.e., departments) in the future. It also helps to shorten the learning curve for other jurisdictions outside of this grant that wish to implement LID/ESD. The project dialogue and creation of the **LID/ESD Work Plans** enable COG to create the **final status report (this Implementation Report)** and publicize the information to other jurisdictions.

COG initially reviewed the legal municipal code and ordinances for each jurisdiction (See Section 2.1). COG convened meetings with the appropriate jurisdiction personnel. The purpose of the interviews was to conduct a consensus building process as well as identify codes and ordinances that impede LID/ESD. From these meetings COG began to develop the individual Workplans and through a series of follow up meetings with each jurisdiction- the workplans were commented on with local staff and a final version with an implementation schedule was completed for Arlington and Fairfax County. The recommendation section was the foundation of the individual Workplans and is included in this report for each jurisdiction, i.e., Arlington and Fairfax County.

The Workplans were created and co-developed with each jurisdiction and are included in the appendix of this report. These workplans were the primary tools for the jurisdiction to follow to implement changes in the way they promote LID/ESD in codes and other areas. The workplans had a section that described the code and institutional barriers to LID/ESD as well as a recommendation section with a schedule to reduce or remove these barriers.

3.0 Implementation Status for Arlington County and Fairfax ESD Work Plans-

From the initial grant proposal, revising the county codes and various regulations seemed to be the most logical option to see swift change in SWM practices toward the use of LID/ESD. Even if every code was changed to promote LID/ESD it would still take time and effort with questionable results, meaning LID/ESD still might not happen (i.e., other options such as wet ponds and the alternative fee would still be available). Also, the jurisdictions had all revised and recently updated their Chesapeake Bay Preservation Ordinance (CBPO), as mandated by the State of Virginia. All three jurisdictions had added text encouraging LID in their latest CBPO revision.

A major underlying problem is that LID/ESD is still considered new and is not the preferred method of SWM by most developers, planners, and engineers in both the private sector and various county departments (e.g., Planning and Public Works). LID is a paradigm change and will need many more successful applications before it becomes common place and mainstream.

3.1 Arlington County LID/ESD Recommendations and Implementation Status

It should be noted that because Arlington is such an established urban area, the true LID concept of mimicking the predevelopment hydrology is not realistic in most redevelopment scenarios. Arlington County has very few open tracts of land to develop, the infiltration rates of in-situ soils are often low, and the existing infrastructure dates back to the mid 20th century. For the most part LID implementation in Arlington County is more restricted to LID *measures* (i.e., BMPs such as bioretention/filtration, vegetated roofs, rainwater capture/reuse, etc.) applied to infill/redevelopment projects on relatively small parcels (e.g., 0.1 acres to 5 acres).

Given the focus on LID *measures* in an urban area like Arlington, there were five (5) major recommendations proposed for Arlington County's LID/ESD Work Plan. They and the implementation status for each are detailed below.

1. *Develop the detailed guidance and engineering standards and methodology needed to implement the LID/ESD practices required by the CBPO. Consider an incentive-based approach to implement this requirement in conjunction with the stormwater quality framework of the ordinance. Also coordinate this effort with the stormwater components of the County's existing Green Building incentive program.*

   Status as of this Implementation Report: This is an ongoing effort started in 2005. Arlington County's goal it is to have something in a draft form by the end of 2005 and available for comment.

2. *Account for a broader range of LID/ESD measures in the calculation procedures for the County's stormwater management ordinances (CBPO and Stormwater Detention). Coordinate this effort with the revision of State Stormwater Management Regulations and the Northern Virginia BMP Handbook.*

   Status as of this Implementation Report: The schedule to implement this recommendation is dependent upon State regulatory schedule as well as schedule to update Northern Virginia (NOVA) BMP Handbook. Revision of NOVA BMP Handbook is not likely to be completed until at least 2006. In the interim, certain key LID measures appropriate for urban areas have been given credit in Arlington County, including vegetated roofs, permeable paving, and bioretention. At the Leesburg meetings, the Bay Program agreed to champion a greater effort to provide the framework for this recommendation- applied across the Bay watershed.

3. *Using the new authority provided by the revisions to Virginia's Stormwater Management Act to regulate individual residential development, develop performance standards, calculation procedures, and LID measures that are appropriate to address increases in runoff as a result of relatively large increases in impervious cover on relatively small lots.*

   Status as of this Implementation Report: The schedule for this recommendation is dependent upon State regulatory implementation schedule. Revision of local ordinances likely not required until sometime in 2006. This recommendation stems from Arlington County's growth in the "lot level" individual home expansions and how little control County agencies have to limit the amount of impervious area (e.g., expanded roof area) for such expansions.

   Virginia Department of Conservation (DCR) took control of the entire state Stormwater regulations and program in January 2005. The regulatory "authority" for this recommendation will most likely not occur until the next administration in 2006.

4. *Provide recommendations from an LID/ESD perspective to the citizen/staff committee evaluating the County's Zoning Ordinance residential coverage requirements.*

   Status as of this Implementation Report: This is an ongoing recommendation related to the process to change local coverage requirements. The Arlington County Board is scheduled to vote on new lot coverage proposal in June 2005. If approved, lot coverage will be reduced in all Zoning Districts. Therefore, a primary LID/ESD objective of minimizing impervious cover will be achieved. If new lot coverage

limits are not approved, the focus of the County's efforts to deal with the stormwater impacts of infill will be under Recommendation 3.

5. *Evaluate County standards for street width and design to incorporate LID/ESD measures as much as possible, both for new street construction as well as retrofits of streets with curb/gutter, sidewalks, traffic calming, etc.*

   Status as of this Implementation Report: This is an ongoing recommendation. The update of the County's Stormwater Master Plan, scheduled to begin during FY 2006, will address this issue.

3.2 Fairfax County LID/ESD Recommendations and Implementation Status

There are three (3) major recommendations proposed for Fairfax County's LID/ESD Workplan. They are as follows:

1. *Adjust the Public Facilities Manual (PFM) to allow for underground detention on residential sites and include a detailed listing of various LID techniques (green roofs, bioretention, etc.) approved for use with design details. Furthermore, revise Section 6-0301, General Policy, 6-0301.2(31-90-PFM) where it states, "it also is the intent of this policy to encourage a regional approach in the implementation of Stormwater detention, rather than numerous small, less effective individual on-site ponds." This position is not supportive to using smaller decentralized SWM systems such as LID/ESD and it should be revised.*

   Status as of this Implementation Report: This by far is the most substantial recommendation for the entire project. Fairfax County PFM is the primary reference material used by developers and the construction industry to build and develop in Fairfax County. The PFM revision will be the first recommendation to be fulfilled for this grant. COG staff met with Fairfax County's LID taskforce at the second independent meeting and was part of a larger County effort to revise the PFM to incorporate LID. Over 25 different LID measures were ranked and the top 5-7 LID practices were to be incorporated into the revised PFM pending the Fairfax County Board of Supervisors approval.

   The LID measures that were agreed to be added to the PFM are the following:

   1. ***Bioretention basins and cells***
   2. ***Bioretention swales and water quality swales***
   3. ***Afforestation and reforestation***
   4. ***Permeable pavers***
   5. ***Tree Planters***
   6. ***Green Roofs***

The tentative schedule for amending the PFM is the following:

Board of Supervisors Development process Committee – May 2005
Engineering Standards Review Committee – June 2005
Planning Commission public hearing – September 2005
Board of Supervisors public hearing – September 2005

Amending the PFM is a first step in ensuring the codes, ordinances and policies governing land development in Fairfax County encourage the use of LID.

2. *Revise particular codes, ordinances, and plans to reference LID/ESD as an option of SWM in the county, and especially in infill/redevelopment projects. Specifically, rewrite the Comprehensive Plan's chapters on Revitalization and Economic Development to include references to using innovative stormwater options and LID/ESD.*

   Status as of this Implementation Report: Originally this was an agreed to recommendation, but as the project proceeded the Fairfax County's Inter-Agency LID taskforce requested that the Comprehensive Plan not be revised in this manner. The LID Taskforce is a group of inter-county agency staff that all impact the use of stormwater management options in the county. The taskforce felt that efforts are being initiated to revise codes and ordinances to be "more encouraging" to using LID. An example of this was cited as the "letter to industry" promoting LID to the construction industry. For the most part this recommendation is an ongoing effort, but the PFM revision (recommendation #1) is viewed as the primary objective of Fairfax County's Workplan.

3. *Use incentive based opportunities for implementing LID/ESD in Fairfax County and expand upon the Commercial Revitalization District Overview to facilitate such opportunities in an infill/redevelopment projects. Incentive based opportunities include introducing special "zoning overlay" for LID/ESD and reduce development fees (e.g., permit fees, impact fees and proffers) to the county for developers that implement LID techniques. These overlays would need to be encouraged and designed by Department of Planning and Zoning (DPZ).*

   Status as of this Implementation Report: Recommendation was to begin during middle 2005. It was noted by Fairfax County staff that this recommendation will be an auxiliary effort and that the PFM revision recommendation (see recommendation #1) is viewed as the primary mechanism that Fairfax County will pursue for its Workplan.

4.0 Additional Observations and Recommendations for End of Grant

Observation: As this project has progressed, a lot of information and efforts in other jurisdictions have progressed as well.
Recommendation: A useful tool for jurisdictions to have would be to access a packaged body of model ordinances from jurisdictions that have moved to implementation of LID (e.g., Stafford County and the City of Warsaw, Virginia, etc.). This would be especially useful for other smaller and less developed jurisdictions. No one size fits all will work, but if jurisdictions see different types of revisions, they should be able to pick the best one that works for their locale. As noted in the individual workplans- all three jurisdictions had a slightly different structure of codes and ordinances and other methods (PFM, no PFM) to promote LID.

Observation: As noted earlier in the Implementation Report is that one of the most pressing needs is for design calculations and engineering standards for LID measures. Ironically, this was one of the primary recommendations that also came out of the EPA's Chesapeake Bay Program Office's Urban Stormwater Summit, held in Leesburg, Virginia, May 11-12, 2005. Jurisdictions as far away as West Virginia and New York State echoed the same need for formal standards that allow designers to directly compare LID to traditional practices to make a fair comparison to using LID for a project. These standards are needed for practitioners to utilize when looking to incorporate LID BMPs. A level playing field for comparisons is needed to lower the lead time and possible intimidation factor in utilizing LID measures on a site. Developers and designers all agreed if easy to use design information and standards was made available, less guess work would be involved and the barrier of rejection "do to insufficient information" for a submitted a plan with LID would be reduced.
Recommendation: Create an EPA Bay Program effort to standardize LID methods across the Bay watershed.

Observation: Jurisdictions that have fee in lieu of Stormwater management BMPs need to find a high enough fee to make it a more equal (or difficult) choice between installing a SWM BMP or paying the fee. The point being- if everyone is paying the fee and not installing BMPs, the fee probably should be raised to create a more equitable split.
Recommendation: Study the rate of fee payment versus installed BMP in Arlington County over 3-5 years, question the developers, and revisit the fee structure after the agreed to time period.

Observation: Having an independent reference document for recommended practices to implement at the jurisdictional level is an idea method for future revisions (e.g. Fairfax County's PFM is independent of its codes and is easier to revise than the actual County Code.).
Recommendation: This structure should be a model for other jurisdictions to follow.

Final Observation: Time and a defensible body of evidence are two of the primary barriers to using LID/ESD. Most jurisdictions didn't incorporate any SWM prior to the 1970s. They were handling flooding or water quantity issues in the 1970s and 1980s and really only looked to water quality SWM in the mid to late 1990s. It is really remarkable the stir that LID/ESD has created in a relatively short period of time (~ 8-10 years). That being said, there is still a long way to go to make LID implementation commonplace and proven, but the efforts in jurisdictions such as Fairfax and Arlington County show that substantial success can be achieved in a relatively short time period.

Appendix

Jurisdictional Workplans
(Alexandria, Arlington, and Fairfax)

City of Alexandria LID/ESD Draft Work Plan

Date April 21, 2004

Submitted to:

City of Alexandria
Transportation and Environmental Services
Division of Environmental Quality
City Hall, Suite 3900
City of Alexandria, VA

Submitted By
Metropolitan Washington Council of Governments
Under a Grant with the Chesapeake Bay Program Office

Grant # CB-98393501-0
Chesapeake Bay ESD Development, Redevelopment, and Revitalization- Demonstration

1.0 Project Background and Objectives

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LID/ESD is thought of as a new and innovative measure to change the way SWM is achieved, but many institutional practices are entrenched into the regulatory systems as safeguards developed to protect the environment and ensure the safety of the general public (e.g., flood control and property damage). Even in today's electronic world-building codes, zoning, permitting, and maintenance requirements are difficult to revise and are not changed overnight. These barriers are often formidable impediments to LID/ESD implementation. These barriers alone can halt the possibility of doing something new or different like LID/ESD. Actions to address these barriers require a concerted effort from multiple parties (i.e., 'top-down' and 'bottom-up' management approaches) to accelerate change.

"Infill/Redevelopment" is a term used to describe a type of development with special outside incentives over traditional development. Typically Infill and Redevelopment sites are located in the older areas of an urban core which may or may not have been previously developed. These sites are ideal to use because they can leverage off the existing infrastructure and amenities that are readily available in these established areas. Infill/Redevelopment has been championed as a way to reduce urban sprawl and Brownfield's development is used as one example of an infill/redevelopment opportunity.

1.1 Project Objective for Redevelopment, and Revitalization – Demonstration Project

As stated above, LID/ESD's primary barriers for greater implementation are site design methodology, existing building codes, and jurisdictional ordinances. These barriers represent an initial hurdle that developers and design engineers must overcome if they are to use LID/ESD for a particular site and for future sites. The primary objective of this jurisdictional demonstration project is to set the wheels in motion and future framework for lowering barriers and modifying the prohibitive codes and ordinances that preclude the use of LID/ESD and to do so in an Infill and Redevelopment application.

1.2 Project Plan

For this project the Metropolitan Washington Council of Governments (COG) worked with three jurisdictions in the Chesapeake Bay (CB) Region: Fairfax County, Arlington County, and the City of Alexandria.

COG is an independent, nonprofit association that is a regional organization of Washington area local governments. COG is composed of 17 local governments surrounding our nation's capital, plus area members of the Maryland and Virginia legislatures, the U.S. Senate, and the U.S. House of Representatives. The three jurisdictions involved with this project are active members of COG.

All three jurisdictions have well-established urban centers and are interested in using smart growth to reduce urban sprawl and the associated anthropogenic pollution that goes along with sprawl development. Alexandria and Arlington have a higher percentage of developed land within their borders compared to most counties in the Chesapeake Bay (CB) watershed. Fairfax has been one of the fastest growing counties within the CB watershed for the last 25 years. Due to their advanced stage of development and older urban cores, all three target Infill/Redevelopment projects for future growth.

These jurisdictions have begun to implement the LID/ESD concepts on a small scale and are making efforts to implement LID/ESD objectives similar to the ones addressed in this Chesapeake Bay Program (CBP) Grant. They bring common problems and experiences, but differing perspectives on how to successfully implement LID/ESD into their codes and regulations.

This CBP Grant called for a “demonstration project,” but this work plan is not what one would think of as a traditional demonstration project, which is often a one-time snapshot of performing a new or innovative application of a process or technology and documenting the results. These demonstration projects, one for each jurisdiction, are ongoing efforts to effect change in the way codes and ordinances are set that restrict the use of innovative techniques for stormwater management.

In COG’s role as the primary facilitator and data collection resource for this project, COG’s involvement was:

- **transfer information** between the jurisdictions,
- **identify common LID/ESD issues** to each jurisdiction,
- **promote leveraging of efforts or lessons learned** from one jurisdiction to another, and
- develop an **LID/ESD Work plan** for each jurisdiction and **Final Status Report** for the CBP and outside jurisdictions.

Bringing individuals together to share and **transfer information** on demonstration projects helps to build a common base and maximize the value of the results for each

individual entity. **Identifying common LID/ESD issues** creates a framework for the other jurisdictions' LID/ESD Work plans. **Promoting the leveraging of efforts or lessons learned** from county programs and other related activities help to develop direct collaboration efforts between such programs (i.e., departments) in the future. It also helps to shorten the learning curve for other jurisdictions outside of this Grant that wish to implement LID/ESD. The project dialogue and creation of the **LID/ESD Work plans** enable COG to create the **final status report** and publicize the information to other jurisdictions.

COG initially reviewed the legal municipal code and ordinances for each jurisdiction (See Section 2.1). COG convened meetings with the appropriate jurisdiction personal. The purpose of the interviews was to conduct a consensus building process as well as identify codes and ordinances that impede LID/ESD. The initial information-gathering period was to be three months, but lasted approximately four and a half months. Information was gleaned from this interview and review process and is presented in Section 2. The recommendation section (Section 2.3) is the foundation of the individual "demonstration" LID/ESD Work plans.

COG, with the help of each jurisdiction will continue to refine each of these individual LID/ESD Work plans. Once final, these work plans will have a set schedule for implementation.

2.0 City of Alexandria LID/ESD Work Plan-

2.1 City of Alexandria Summary

The City of Alexandria is located close to Washington, DC, and neighbors the Potomac River, Fairfax County and the Arlington County. It is approximately 16 square miles in size and is one of the more urban jurisdictions in the state of Virginia. Approximately one hundred and thirty-eight thousand people (138,000) live in the city limits(2004 estimate). Alexandria is basically defined as an urban community with little agriculture and a light to medium industry sector. Unlike some of the other northern Virginia jurisdictions, Alexandria did have a significant industrial past. Most of this has changed over to commercial in the last 30 years, but the city has a legacy of "brownfield" type of properties which are being redeveloped. Alexandria has 3 major watersheds (Four Mile Run, Cameron Run, and the Waterfront Area), all of which drain to the Potomac River and Chesapeake Bay.

Presently, land use data estimates that Alexandria is approximately 46% impervious (Chesapeake Bay Program 2002 Landsat Data), which is considered very high for a jurisdiction and classifies the jurisdiction as ultra-urban. Apart from preserved and protected city parkland, there is little open space for new development, approximately 466 acres (Water Quality Management Supplement, January 2001) is termed 'vacant' and remains available for development. For development considerations, the City of Alexandria is considered to be in a redevelopment/infill stage. The last two redevelopment projects of considerable size where the Potomac Yard site along Route 1, and the Cameron Station Army Installation along Duke Street.

2.2 City of Alexandria Code and Regulation Analysis

The following is a listing of the major Alexandria documents reviewed for this LID/ESD Work plan.

Alexandria's Municipal Code reviewed for this Grant include the following:

- *Title 1 General Provisions*
- *Title 4 Public Safety*
- *Title 5 Transportation and Environmental Services*
- *Title 7 Planning and Development*
- *Title 8 Building Code Regulations*
- *Title 10 Motor Vehicles and Traffic*
- *Title 11 Health, Environmental and Sanitary Regulations*
- *Appendix C Ordinances Authorizing Encroachments upon Streets and Sidewalks*
- *Appendix F Miscellaneous Ordinances not Codified or Otherwise Listed*

Alexandria's Zoning Ordinance articles of interest were the following:

- *Article 1 General Regulations*

- *Article VI Special and Overlay Zones*
- *Article X Historic Districts and Buildings*
- *Article XI Development Approvals and Procedures*
- *Article XIII Environmental Management*

The City of Alexandria's Erosion and Sediment control handbook

Alexandria Supplement to the Northern Virginia BMP Handbook (February 1992)

Most jurisdictional codes limit the use of LID by means such as: minimum street widths, the need for curb and gutter, the amount of frontage and various setbacks needed, BMP ownership restrictions, Stormwater Management (SWM) detention requirements, etc. For the purposes of this Work Plan, the City of Alexandria officials should decide whether it more appropriate to revise their current codes and ordinances or look to create new and alternative measures and codes to promote LID/ESD. Creating a new code section might be easier to achieve on a faster time period, but it could also be viewed negatively as just another regulation or city code.

The City of Alexandria is unique to many jurisdictions in the Chesapeake Bay watershed. The city has high land values for development and the level of impervious area is high as seen in the amount of existing infrastructure (roads, sidewalks, piped storm systems, etc.). Open space land is at a premium in the city. All these factors limit the number of LID/ESD techniques that could be implemented even if the codes and ordinance barriers were in place.

Alexandria does have various sections in their jurisdictional codes and zoning ordinances where LID/ESD could be incorporated. For the purposes of this project it was concluded that efforts to promote and encourage LID should focus on areas of the codes and ordinances that give the developer an advantage both in terms of cost and time to using LID. This incentive based approach will be the primary focus for the task at hand.

Upon review of the City Code it was realized that the real opportunities for LID/ESD and change are contained in the Zoning Ordinance.

The Zoning Ordinance references problems associated with flooding. If drainage from one site is found to cause damage to another adjacent site, the owner can be held liable for the damage. A concern with using LID could be increased groundwater levels caused by LID infiltration and subsequent flooding of nearby properties. For example, an owner's LID installation could flood another owner's basement. (i.e., this would create a concern with promoting such things as downspout disconnections). Also, areas with Marine Clay soil types may not be well suited for infiltration LID BMPs. The City has identified areas with poor soil types, and these areas would be limited to the amount or type of LID BMPs implemented.

Within Zoning Code, Article X – Historic District and Building (i.e., close to the Potomac Waterfront and traditionally called Old Town Alexandria) has an architectural review process that could preclude the use of some LID type of measures (especially Green Roofs) that differ greatly from the existing "look" of the Historic District.

The Chesapeake Bay Preservation Ordinance (CBPO) is contained within the Zoning Code, under Article XIII Environmental Management. Alexandria's Zoning code has a direct reference to infiltration within the section on Environmental Management. It references the following- "to fulfill this policy, these regulations are adopted to minimize potential pollution from stormwater runoff, minimize potential erosion and sedimentation, reduce the introduction of harmful nutrients and toxins into state waters, **maximize rainwater infiltration** while protecting groundwater, and ensure the long-term performance of the measures employed to accomplish the statutory purpose."

Similar to Arlington and Fairfax County all redevelopment and revitalization (R&R) projects in the City of Alexandria require a non point source (NPS) pollution reduction of 10% over the existing level of treatment (see CBPO). This requirement is meant to improve SWM and correct for the "sins of past development," and reduce the non-point source pollution load. Alexandria does provide an extra incentive to developers through the "Targets of Opportunity Stormwater Retrofit Program." If during the course of redevelopment, the developer removes 20% of the existing impervious area, than the 10% pollution reduction is waived. The program is voluntary and allows city staff to identify opportunities of Stormwater BMP retrofitting and link up with developers during the plan review process to encourage retrofits. The program has been highly successful and has retrofitted 1,007 acres since 1992 (Alexandria is approximately 10,080 total acres, 4,600 of them have impervious land cover).

2.3 City of Alexandria LID/ESD Recommendations and Timeline Schedule

It should be noted that because Alexandria is such an established urban area, the true LID concept of mimicking the predevelopment hydrology is not realistic. The City of Alexandria has very few open tracks of land to develop, and the existing infrastructure dates back several hundred years in some cases. For the most part LID in Alexandria is more restricted to LID-BMP projects in small parcels of infill/redevelopment.

From the initial grant proposal, revising the county codes and various regulations seemed to be the most logical option to see swift change in SWM practices toward the use of LID/ESD. Even if every code was changed to promote LID/ESD it would still take time and effort with questionable results, meaning LID/ESD still might not happen (i.e., other options such as wet ponds would still be available). LID/ESD is still in its infancy and is not the preferred method of SWM by most developers, planners, and engineers in both the private sector and various city departments.

LID is a paradigm change and will need many more successful applications before it becomes common place and mainstream. Perhaps in time LID will become as common as the wet detention pond best management practice (BMP).

There are three (3) major recommendations proposed for the City of Alexandria's LID/ESD Work plan.

6. *Revise particular codes, ordinances, and plans to reference LID/ESD as an option of SWM in the county, and especially in infill/redevelopment projects*
7. *Use incentive based opportunities for implementing LID/ESD in Alexandria for developers and expand upon revitalization efforts in infill/redevelopment projects in the city*
8. *Make LID the SWM method of choice for both the "Targets of Opportunity Retrofit Program" and other Redevelopment Applications. Accept no other form of SWM unless the developer can show that LID can not work at a given site.*

Recommendation #1 – *Revise particular codes, ordinances, and plans to reference LID/ESD as an option of SWM in the county, and especially in infill/redevelopment projects.*

Amend or rewrite Title 5 Transportation and Environmental Services to promote LID/ESD as the preferred method of SWM for the Alexandria. Amend Zoning Article XIII- Environment Management (Chesapeake Bay Ordinance) to promote LID/ESD in both the RMAs and RPAs as the preferred method of redevelopment in those areas.

Schedule to implement Recommendation #1- To be determined by Alexandria City officials whether this is a viable option, and to propose a schedule to complete the recommendation.

Recommendation #2 – *Use incentive based opportunities for implementing LID/ESD in Alexandria for developers and expand upon revitalization efforts in infill/redevelopment projects in the city*

The recommendation includes creating a new section of the Zoning Code or to revise/expand the existing Zoning ordinance, *Article VI- Special and Overlay Zones*. Any revision or new code should be written to provide the developer with an incentive to get their project approved in a more timely fashion by using LID as the primary means of SWM. *Article XI – Development Approval and Procedures* is section of the Zoning code that could be a modified to streamline permits for getting LID friendly plans approved. Stakeholders from the Department of Planning and Community Development and the Department of Transportation and Environmental Services should collaborate on how to best revise or create this code.

Future study should be conducted to see if LID types of SWM are being introduced in overlay areas, in Redevelopment Applications of Intensely Developed Areas or in the Small Area Plan (SAP) sections of Alexandria. The SAP identifies areas of the city to redevelop. These SAPs should also encourage LID in the land use planning process. If

LID is not being advanced in these areas, than special attention should be given to see how it can be better promoted. Perhaps officials from the Economic Development Program, the Department of Planning and Community Development, and the Department of Transportation and Environmental Services should create a "facilitated review team," like Fairfax County to make a special effort to promote LID to the developer early on in the review period for an infill/redevelopment project.

Reduced development fees (e.g., permit fees, impact fees and proffers) to the city for developers that implement LID techniques might be another area to explore for incentivizing LID/ESD.

Impediments to LID and ESD, a Chesapeake Bay Program STAC Publication 02-003, recommends pre-qualifying consultants and developers with LID/ESD knowledge for special consideration on development projects. A pool of pre-qualified firms could offer developers a faster and less costly approval route for obtaining their building permits and the ultimate completion of their project. It should be noted that consideration would need to be made as to what qualifies as LID and what percentage of the total site must be using these LID techniques to be considered for this special review and approval process. Any incentive based or special review process could lead to being misused. For example, one ¼ acre Bioretention system on a 20 acre redevelopment site might not be the fast track incentive approach.

Schedule to implement Recommendation #2- To be determined by Alexandria officials whether these are viable options, and to propose a schedule to complete the recommendation.

Recommendation #3 – Make LID the SWM method of choice for both the "Targets of Opportunity Retrofit Program" and other Redevelopment Applications. Accept no other form of SWM unless the developer can show that LID can not work at a given site.

This recommendation involves implementing Recommendations #1 and #2 with extreme vigor and strengthening the language in all the previous recommendations to mandate LID/ESD as the first choice for the Targets of Opportunity Retrofit Program. It would be a holistic approach and one that should not exclude other avenues of SWM. The approach would have to have commitments from the planning, development, design and maintenance teams within the city government.

It should be noted that this is an extreme example, and the city might want to consider some land-intensive forms of LID that might not work in Alexandria (i.e., Bioretention in poor soils might cause basement flooding problems, etc., while biofiltration would be less likely to cause problems). Additionally, green roofs could be a LID BMP example that could gain greater use without few to any potential soil and flooding impacts.

Schedule to implement Recommendation #3- To be determined by Alexandria City officials whether this is a viable option, and to propose a schedule to complete the recommendation.

Arlington County LID/ESD Work Plan

Date April 13, 2004
Revised August 10, 2004
Final January 12, 2005

Submitted to:
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Submitted By
Metropolitan Washington Council of Governments
Under a Grant with the Chesapeake Bay Program Office

Grant # CB-98393501-0
Chesapeake Bay ESD Development, Redevelopment, and Revitalization- Demonstration

1.0 Project Background and Objectives

Environmentally sensitive design (ESD), also known as Low Impact Development (LID) is a set of practices and approach to stormwater management (SWM) that uses a combination of conservation design, multiple 'distributed source control' stormwater management practices, and pollution prevention to protect and maintain watershed functions and ecological integrity. LID/ESD maintains the hydrological features of a site over the course of development (pre and post development) and infiltrate as much stormwater on site as possible. LID/ESD is quite different than conventional end-of-pipe or underground approaches, which are often one dimensional and concerned about moving stormwater off of a site quickly and safely (i.e., volume control).

LID/ESD is thought of as a new and innovative measure to change the way SWM is achieved, but many institutional practices are entrenched into the regulatory systems as safeguards developed to protect the environment and ensure the safety of the general public (e.g., flood control and property damage). Even in today's electronic world-building codes, zoning, permitting, and maintenance requirements are difficult to revise and are not changed overnight. These barriers are often formidable impediments to LID/ESD implementation. These barriers alone can halt the possibility of doing something new or different like LID/ESD. Actions to address these barriers require a concerted effort from multiple parties (i.e., 'top-down' and 'bottom-up' management approaches) to accelerate change.

"Infill/Redevelopment" is a term used to describe a type of development with special outside incentives over traditional development. Typically Infill and Redevelopment sites are located in the older areas of an urban core which may or may not have been previously developed. These sites are ideal to use because they can leverage off the existing infrastructure and amenities that are readily available in these established areas. Infill/Redevelopment has been championed as a way to reduce urban sprawl and Brownfield's development is used as one example of an infill/redevelopment opportunity.

1.2 Project Objective for Redevelopment, and Revitalization – Demonstration Project

As stated above, LID/ESD's primary barriers for greater implementation are site design methodology, existing building codes, and jurisdictional ordinances. These barriers represent an initial hurdle that developers and design engineers must overcome if they are to use LID/ESD for a particular site and for future sites. The primary objective of this jurisdictional demonstration project is to set the wheels in motion and future framework for lowering barriers and modifying the prohibitive codes and ordinances that preclude the use of LID/ESD and to do so in an Infill and Redevelopment application.

1.2 Project Plan

For this project the Metropolitan Washington Council of Governments (COG) worked with three jurisdictions in the Chesapeake Bay (CB) Region: Fairfax County, Arlington County, and the City of Alexandria.

COG is an independent, nonprofit association that is a regional organization of Washington area local governments. COG is composed of 17 local governments surrounding our nation's capital, plus area members of the Maryland and Virginia legislatures, the U.S. Senate, and the U.S. House of Representatives. The three jurisdictions involved with this project are active members of COG.

All three jurisdictions have well-established urban centers and are interested in using smart growth to reduce urban sprawl and the associated anthropogenic pollution that goes along with sprawl development. Alexandria and Arlington have a higher percentage of developed land within their borders compared to most counties in the Chesapeake Bay (CB) watershed. Fairfax has been one of the fastest growing counties within the CB watershed for the last 25 years. Due to their advanced stage of development and older urban cores, all three target Infill/Redevelopment projects for future growth.

These jurisdictions have begun to implement the LID/ESD concepts on a small scale and are making efforts to implement LID/ESD objectives similar to the ones addressed in this Chesapeake Bay Program (CBP) Grant. They bring common problems and experiences, but differing perspectives on how to successfully implement LID/ESD into their codes and regulations.

This CBP Grant called for a “demonstration project,” but this work plan is not what one would think of as a traditional demonstration project, which is often a one-time snapshot of performing a new or innovative application of a process or technology and documenting the results. These demonstration projects, one for each jurisdiction, are ongoing efforts to affect change in the way codes and ordinances are set that restrict the use of innovative techniques for stormwater management.

In COG’s role as the primary facilitator and data collection resource for this project, COG’s involvement was:

- **transfer information** between the jurisdictions,
- **identify common LID/ESD issues** to each jurisdiction,
- **promote leveraging of efforts or lessons learned** from one jurisdiction to another, and
- develop an **LID/ESD Work Plan** for each jurisdiction and **Final Status Report** for the CBP and outside jurisdictions.

Bringing individuals together to share and **transfer information** on demonstration projects helps to build a common base and maximize the value of the results for each

individual entity. **Identifying common LID/ESD issues** creates a framework for the other jurisdictions' LID/ESD Work Plans. **Promoting the leveraging of efforts or lessons learned** from county programs and other related activities help to develop direct collaboration efforts between such programs (i.e., departments) in the future. It also helps to shorten the learning curve for other jurisdictions outside of this Grant that wish to implement LID/ESD. The project dialogue and creation of the **LID/ESD Work Plans** enable COG to create the **final status report** and publicize the information to other jurisdictions.

COG initially reviewed the legal municipal code and ordinances for each jurisdiction (See Section 2.1). COG convened meetings with the appropriate jurisdiction personal. The purpose of the interviews was to conduct a consensus building process as well as identify codes and ordinances that impede LID/ESD. The initial information-gathering period was to be three months, but lasted approximately four and a half months. Information was gleaned from this interview and review process and is presented in Section 2. The recommendation section (Section 2.3) is the foundation of the individual "demonstration" LID/ESD Work Plans.

COG, with the help of each jurisdiction will continue to refine each of these individual LID/ESD Work Plans. Once final, these work Plans will have a set schedule for implementation.

2.0 Arlington County ESD Work Plan-

2.1 Arlington County Summary

Arlington County is located close to Washington, DC, and neighbors the Potomac River, Fairfax County and the City of Alexandria. It is approximately 26 square miles in size and is one of the more urban jurisdictions in the state of Virginia. Approximately two hundred thousand people live in the county (2004 estimate). The county is defined as urban with no agriculture and with a light industry sector. The County has 19 watersheds, all of which drain to the Potomac River and Chesapeake Bay.

Presently, land use data estimates that the County is approximately 41% impervious, which is considered very high for a jurisdiction and classifies the jurisdiction as ultra-urban. Apart from preserved and protected county parkland, there is little open space for new development- approximately 3.7% remains for development in the County according to most recent estimates (Watershed Management Plan, January 2001). For development considerations, Arlington County is considered to be in a redevelopment/infill stage.

2.2 Arlington County Code and Document(s) Analysis

The following is a listing of the major Arlington County documents reviewed for this LID/ESD Work Plan.

Arlington County's Code investigated chapters include the following:

- *Chapter 2 Building Code*
- *Chapter 8 Fire Prevention Code*
- *Chapter 14.2 Motor Vehicles and Traffic*
- *Chapter 22 Street Development and Construction*
- *Chapter 23 Subdivisions*
- *Chapter 27 Miscellaneous Ordinances*
- *Chapter 48 Floodplain Management*
- *Chapter 57 Erosion and Sediment Control*
- *Chapter 60 Stormwater Detention*
- *Chapter 61 Chesapeake Bay Preservation Ordinance*
- *Chapter 66 Technology Zones*
- *Chapter 67 Trees and Shrubs*

Arlington County's Zoning Ordinance sections of interest were the following:

- *Section 1 Definitions*
- *Section 2 General Regulations*
- *Section 3 "S-3A" Special Districts*
- *Section 4 "S-D" Special Development Districts*
- *Section 27 "C-3" General Commercial Districts*
- *Section 27A "C-R" Commercial Redevelopment Districts*
- *Section 31 Special Provisions*

- *Section 31A Historic Preservation Districts*
- *Section 32A Landscaping*
- *Section 33 Automobile Parking, Standing and Loading Space*
- *Section 35 Nonconforming Buildings and Uses*

Storm Water Master Plan, (September 1996)

Arlington County Comprehensive Plan, Chesapeake Bay Preservation Plan, (February 2001)

Brochures for Green Building Guide for Residents and Developers

Watershed Management Plan, (January 2001)

Most jurisdictional codes limit the use of LID by means such as: minimum street widths, the need for curb and gutter, the amount of frontage and various setbacks needed, BMP ownership restrictions, Stormwater Management (SWM) detention requirements, etc. For the purposes of this Work Plan, Arlington County officials should decide whether it more appropriate to revise their current codes and ordinances or look to create new and alternative measures and codes to promote LID/ESD. Creating a new code section might be easier to achieve on a faster time period, but it could also be viewed negatively as just another regulation or county code.

Arlington County is unique to many jurisdictions in the Chesapeake Bay watershed. The county has high land values for development and the level of impervious area is high as seen in the amount of existing infrastructure (roads, sidewalks, piped storm systems, etc.). Open space land is at a premium in the county. All these factors limit the number of LID/ESD techniques that could be implemented even if the codes and ordinance barriers were not in place.

Within Arlington County's *Chesapeake Bay Preservation Plan*, it is acknowledged that if present land use plans continue, the maximum any one watershed would increase in impervious area would be 3.3%. While this does not seem to be excessive, it is an increase in an already highly urban jurisdiction. The document goes on to concede that "ordinances are powerful tools to protect natural resources, but that do not prohibit 'inappropriate land uses' that have the potential to adversely affect sensitive natural resources." Well thought out land use planning is highlighted as a means to insure a protected watershed. The county's General Land Use Plan is sited as an appropriate way to make sure that these "inappropriate land uses" are not planned for areas that would impact sensitive natural resources.

Arlington County does have various sections in their jurisdictional codes and zoning ordinances where LID/ESD could be incorporated. For the purposes of this project it was concluded that efforts to promote and encourage LID should focus on areas of the codes and ordinances that give the developer an advantage both in terms of cost and time to using LID. This incentive based approach will be the primary focus for the task at hand.

Zoning Ordinance and Coverage
Arlington's Zoning Ordinance is very similar to Fairfax County. Most of the zoning types had a maximum impervious area for a given site. Fifty-six (56) percent impervious area is the upper limit of development on a site. Arlington County is experiencing an increase in impervious area in the residential zoning due to increased sizing of a house's footprint (i.e., more roof area). The term "McMansions" is used for this occurrence, and, the cumulative effect of doubling and often tripling impervious cover on a lot-by-lot basis will be significant in the long-term for Arlington's watersheds. Although this effect is gradual, it is also something that at this time is very difficult to limit and control or stop. Arlington County is currently in the process of evaluating its Zoning Ordinance residential coverage limits for a number of reasons that range from aesthetics/urban form to tree protection and stormwater runoff issues. Also, the recent revision of Virginia's Stormwater Management Act now provides authority to regulate individual residential lots. The outcome of this coverage evaluation as well as this legislative change could have important implications for the implementation of LID/ESD techniques at the residential lot level.

Flooding
Like Alexandria, flooding is an area of special concern in Arlington and is handled in a similar manner. The County's Stormwater Detention Ordinance (Chapter 60) is a traditional flooding prevention ordinance that focuses on two key objectives: maintaining the capacity of the County's storm sewer system and maintaining the capacity of a U.S. Army Corps of Engineers flood control channel in the lower portion of Four Mile Run. LID/ESD measures incorporated into a project's design could help reduce a site's detention requirements. For example, depending on its design, a vegetated roof would be credited as pervious cover under the ordinance (as has been the case for two County facility projects that are incorporating vegetated roofs). And, certain LID/ESD features that involved reduced impervious cover directly reduce detention requirements. Overall, however, at this time, the calculation procedures for the ordinance do not explicitly or easily account for the broader range of LID/ESD measures.

At the lot level, if concentrated drainage from one site is found to cause damage to another adjacent site, the owner can be held liable for the damage. However, at this time, the ability to regulate increases in runoff volume from individual properties that increase sheet flow to adjacent properties is limited in Virginia (although new stormwater regulations promulgated at the State level appear to provide more authority to address these situations). A concern with using LID could be increased groundwater levels caused by LID infiltration and subsequent flooding of nearby properties. For example, an owner's LID installation could flood other owner's basement. (i.e., this would create a concern with promoting such things as downspout disconnections).

Also, a concern that is somewhat unique to Arlington County arises from the fact that more than 20,000 homes in the County have foundation drains connected to the sanitary sewer system. These connections result in significant hydraulic loading to the County's wastewater treatment plant, and a major plant upgrade and expansion underway includes two new multi-million gallon storage tanks to hold this inflow for treatment. As a result,

practices that increase infiltration at the lot level would have to be evaluated carefully to ensure that subsurface flow into adjacent sanitary sewer-connected foundation drains is minimized.

LID in Arlington

Low Impact Development was referenced and promoted in various reports, studies, and ordinances reviewed for Arlington County. The *Watershed Management Plan (January 2001)* does recommend LID/ESD types of techniques such as green roof vegetation and bioretention, but does not go into detail about implementation. The Chesapeake Bay Preservation Ordinance (CBPO), the key ordinance that regulates the stormwater and land disturbance impacts of development in the County, contains a number of key general performance standards in Section 61-10 that support the concept of LID/ESD, including: limiting land disturbance and impervious cover (consistent with the proposed use/development) and preserving trees/vegetation to the maximum extent practicable. These performance standards apply to all CBPO jurisdictions, including Alexandria and Fairfax County.

However, implementation of these performance standards by CBPO jurisdictions, given the 'consistent with the proposed use' caveat, has proven challenging. The comprehensive revisions to Arlington's CBPO adopted in February 2003 include two new requirements intended to significantly improve consistency with the intent of these standards. The first change most relevant to this LID/ESD analysis considerably increases the pollutant removal requirements applied to a given project as well as establishes a new stormwater compliance framework[1]. This framework requires on-site infiltration or filtration BMPs to treat runoff from vehicular-related pavement and provides applicants with the option to contribute to the County's Watershed Management Fund to comply with treatment requirements for non-vehicular areas. The intent of this hybrid on-site BMP/fee-in-lieu program is to recognize that most of the watershed impacts in Arlington County today are due to the existing development already in the County, most of it constructed without any stormwater controls. The Watershed Management Fund is therefore used for larger-scale watershed protection projects to address these existing impacts, ranging from stream restoration, regional BMP retrofits, monitoring, and outreach and education. At the same time, the framework requires that the worst stormwater impacts from a given development project be addressed. The contribution rate to the fund is set to reflect the opportunity cost of BMP design, installation, and maintenance, but with a discount intended to reflect the increased cost-effectiveness of watershed-scale solutions and the regional water quality benefits in the Potomac and Bay watersheds from infill development in urban areas like Arlington.

From an LID/ESD perspective, this hybrid framework could be viewed as somewhat problematic. On the one hand, faster progress towards watershed restoration can be made

[1] Similar to Fairfax County, Arlington's CBPO requires that, at a minimum, redevelopment and revitalization (R&R) projects in the County reduce (NPS) pollution by 10% over the existing level of pollution. This requirement is meant to improve SWM and correct for the "sins of past development," and reduce the non-point source pollution load. Depending on the specific pre- and post-development impervious cover, significantly more than 10% reduction may be required.

in a built-out jurisdiction like Arlington by using the collected revenue for regional-scale projects, rather than depending on the incremental progress resulting from LID/ESD techniques applied to individual infill/redevelopment projects as they occur. And, the fee itself serves as an incentive to reduce impervious cover. On the other hand, under this approach, opportunities can be missed to implement LID/ESD techniques as each site is redeveloped and to realize the cumulative benefits of doing so over the long-term.

To that end, the second key change in Arlington's revised CBPO is the following requirement in Section 61-10: "All development shall incorporate site design standards recognized by the County Manager as a means of minimizing impervious cover, stormwater runoff, and nonpoint source pollution and protecting or improving indigenous vegetation and habitat." At this time, the County is in the process of developing more detailed guidance and standards for implementing this requirement. In the interim, all permit applicants subject to the Plan of Development requirements of Section 61-13 of the ordinance are required to complete a site design standards worksheet. The worksheet lists a number of LID/ESD features, the general measurement criteria associated with each standard, and specific documentation needed to help evaluate the benefits of each standard. The wide variety of standards included on the worksheet are intended to accommodate the full range of development types in the County, from single-family homes to high-rise commercial buildings. The purpose of the worksheet is to: 1.) encourage permit applicants to incorporate LID/ESD features with their projects; 2.) allow staff to point out opportunities for projects to incorporate LID/ESD features; and 3.) to provide staff with critical data to be used in the effort to develop an effective LID/ESD program for an urban jurisdiction like Arlington County.

Green Building Program

Another important element of the County's environmental protection programs is the County's Green Building Incentive Program as well as the County's own commitment to build its facilities 'green.' These programs rely on the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. The LEED rating system awards points for a project in a number of categories, ranging from siting, layout, and stormwater management to energy efficiency, indoor air quality, and building materials. Because stormwater management is already required in Arlington, the public and private projects in the County that have participated in this program have incorporated a number of LID/ESD features to obtain the LEED stormwater credits, which tend to be fairly stringent. These features have included vegetated roofs, stormwater cisterns for water reuse, permeable paving, and bioretention filters.

Subdivisons

Although Arlington is mostly built-out, there remain a number of large 'estate' parcels in the County where redevelopment occurs through the subdivision process. In order to promote subdivisions that blend in better with existing residential areas, Arlington County's subdivision ordinance contains a special use permit option referred to as the 'Unified Residential Development' process. Under this option, a developer can design a site to reduce street widths, preserve open/green space, and reduce lot sizes and/or alter lot configurations compared with what the Zoning Ordinance requires 'by-right.' In

exchange for reduced clearing and grading and infrastructure costs, the developer agrees to a submit the project to the community and County Board for review and approval. A number of subdivisions built in the County over the past few years have followed the URD process. There is also a cluster option that has a similar process and benefits.

2.3 Arlington County LID/ESD Recommendations and Timeline Schedule

It should be noted that because Arlington is such an established urban area, the true LID concept of mimicking the predevelopment hydrology is not realistic in most redevelopment scenarios. Arlington County has very few open tracts of land to develop, the infiltration rates of in-situ soils are often low, and the existing infrastructure dates back to the mid 20th century. For the most part LID implementation in Arlington County is more restricted to LID *measures* (i.e., BMPs such as bioretention/filtration, vegetated roofs, rainwater capture/reuse, etc.) applied to infill/redevelopment projects on relatively small parcels (e.g., 0.1 acres to 5 acres).

From the initial grant proposal, revising the county codes and various regulations seemed to be the most logical option to see swift change in SWM practices toward the use of LID/ESD. Even if every code was changed to promote LID/ESD it would still take time and effort with questionable results, meaning LID/ESD still might not happen (i.e., other options such as wet ponds and the alternative fee would still be available).

LID/ESD is still considered new and is not the preferred method of SWM by most developers, planners, and engineers in both the private sector and various county departments. LID is a paradigm change and will need many more successful applications before it becomes common place and mainstream.

Given the focus on LID *measures* in an urban area like Arlington, there are five (5) major recommendations proposed for the County's LID/ESD Work Plan.

9. *Develop the detailed guidance and standards needed to implement the LID/ESD standards required by the CBPO. Consider an incentive-based approach to implement this requirement in conjunction with the stormwater quality framework of the ordinance. Also coordinate this effort with the stormwater components of the County's existing Green Building incentive program.*

   Schedule to Implement: Begin during 2005

10. *Account for a broader range of LID/ESD measures in the calculation procedures for the County's stormwater management ordinances (CBPO and Stormwater Detention).*[2] *Coordinate this effort with the revision of State Stormwater Management Regulations and the Northern Virginia BMP Handbook.*

    Schedule to Implement: Schedule dependent upon State regulatory implementation schedule as well as schedule to update NOVA BMP Handbook. Revision of local ordinances likely not required until sometime in 2006. Revision of NOVA BMP Handbook not likely to be completed until at least 2006. In the interim, certain key LID measures appropriate for urban areas are already credited in Arlington, including vegetated roofs, permeable paving, and bioretention.

11. *Using the new authority provided by the revisions to Virginia's Stormwater Management Act to regulate individual residential development, develop performance standards, calculation procedures, and LID measures that are appropriate to address increases in runoff as a result of relatively large increases in impervious cover on relatively small lots.*

    Schedule to Implement: Schedule dependent upon State regulatory implementation schedule. Revision of local ordinances likely not required until sometime in 2006.

12. *Provide recommendations from an LID/ESD perspective to the citizen/staff committee evaluating the County's Zoning Ordinance residential coverage requirements.*

    Schedule to Implement: Winter/spring/summer 2005 as process to change local coverage requirements proceeds.

13. *Evaluate County standards for street width and design to incorporate LID/ESD measures as much as possible, both for new street construction as well as retrofits of streets with curb/gutter, sidewalks, traffic calming, etc.*

    Schedule to Implement: Begin evaluation during 2005

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[2] It should be noted that the Virginia Department of Conservation and Recreation (DCR) recently revised the State Stormwater Management Act. Among a number of key changes and additions, the revised stormwater legislation includes a requirement to encourage and implement LID as much as practicable. Arlington County, which currently is not required to implement the act, is now required to do so. DCR will promulgate new Stormwater Management regulations over the coming year and local governments will then be required to develop ordinances. How the LID and other provisions of the revised legislation get translated into regulatory standards will dictate how Arlington County revises its stormwater management ordinances.

Fairfax County LID/ESD Work Plan

Date April 13, 2004
Revised December 28, 2004
Final January 12, 2005

Submitted to:
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Submitted By
Metropolitan Washington Council of Governments
Under a Grant with the Chesapeake Bay Program Office

Grant # CB-98393501-0
Chesapeake Bay ESD Development, Redevelopment, and Revitalization- Demonstration

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1.3 Project Objective for Redevelopment, and Revitalization – Demonstration Project

As stated above, LID/ESD's primary barriers for greater implementation are site design methodology, existing building codes, and jurisdictional ordinances. These barriers represent an initial hurdle that developers and design engineers must overcome if they are to use LID/ESD for a particular site and for future sites. The primary objective of this jurisdictional demonstration project is to set the wheels in motion and future framework for lowering barriers and modifying the prohibitive codes and ordinances that preclude the use of LID/ESD and to do so in an Infill and Redevelopment application.

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- develop an **LID/ESD Workplan** for each jurisdiction and **Final Status Report** for the CBP and outside jurisdictions.

Bringing individuals together to share and **transfer information** on demonstration projects helps to build a common base and maximize the value of the results for each

individual entity. **Identifying common LID/ESD issues** creates a framework for the other jurisdictions' LID/ESD Workplans. **Promoting the leveraging of efforts or lessons learned** from county programs and other related activities help to develop direct collaboration efforts between such programs (i.e., departments) in the future. It also helps to shorten the learning curve for other jurisdictions outside of this Grant that wish to implement LID/ESD. The project dialogue and creation of the **LID/ESD Workplans** enable COG to create the **final status report** and publicize the information to other jurisdictions.

COG initially reviewed the legal municipal code and ordinances for each jurisdiction (See Section 2.1). COG convened meetings with the appropriate jurisdiction personal. The purpose of the interviews was to conduct a consensus building process as well as identify codes and ordinances that impede LID/ESD. The initial information-gathering period was to be three months, but lasted approximately four and a half months. Information was gleaned from this interview and review process and is presented in Section 2. The recommendation section (Section 2.3) is the foundation of the individual "demonstration" LID/ESD Workplans.

COG, with the help of each county will continue to refine each of these individual LID/ESD Workplans. Once final, these workplans will have a set schedule for implementation.

2.0 Fairfax County LID/ESD Work Plan-

2.1 Fairfax County Summary

Fairfax County is located close to Washington, DC, and neighbors the Potomac River, Arlington County and the City of Alexandria to the north, Loudoun County to the west, and Prince William County to the south. It is approximately 400 square miles in size and is the most populous jurisdiction in the state of Virginia. Slightly over one million people live in the county (2004 estimate). Fairfax County is defined as urban/suburban with little agriculture and with light to medium industry sectors. The county has 30 watersheds, all of which drain to the Potomac River and Chesapeake Bay. For the past 25 years Fairfax County has experienced rapid growth and development.

Present land use data estimate the county land cover to be approximately 18% impervious, which is considered high for a jurisdiction and classifies the jurisdiction as urban. Apart from preserved and protected county parkland, there is little open space for new development. There are approximately 370,000 housing units in the county and total build-out will be approximately 405,000 units. For residential units, the county is at 92% of utilization and will be entering into a redevelopment/infill stage within the next 10-15 years. The Commercial sector is experiencing a similar build-out status.

2.2 Fairfax County Code and Regulation Analysis

The following is a listing of the major Fairfax County documents reviewed for this ESD Workplan.

Fairfax County's Code investigated chapters include the following:

- *Chapter 62 Fire Protection*
- *Chapter 81 Emergency Ambulance and Rescue Services*
- *Chapter 101 Subdivision Ordinance*
- *Chapter 102 Streets and Sidewalks*
- *Chapter 104 Erosion and Sediment Control Ordinance*
- *Chapter 105 Pollution of State Waters*
- *Chapter 106 Storm Drainage*
- *Chapter 112 Zoning Ordinance*
- *Chapter 117 Expedited Land Development Review*
- *Chapter 118 Chesapeake Bay Preservation Ordinance*

Fairfax County's Comprehensive Plan chapters of interest were the following:

- *Environment Chapter*
- *Revitalization Chapter*
- *Economic Development Chapter*

Fairfax County's Infill & Residential Development Study, July 26, 2000 and the County Board of Supervisors' adopted text to the study.

An Overview of the Planning, Zoning & Development Review Process within Commercial Revitalization Districts and Areas, March 2004

Fairfax County's Public Facilities Manual (PFM) sections of interest reviewed included:

- *Amendments*
- *General Information*
- *2-0000 General Subdivision & Site Plan Information*
- *3-0000 Condominium Conservation Regulations*
- *6-0000 Storm Drainage*
- *7-0000 Streets, Parking & Driveways*
- *8-0000 Sidewalks, Trails & Recreation*
- *9-0000 Water & Fire Regulations*
- *11-0000 Erosion & Sediment Control*
- *12-0000 Vegetation Preservation & Planting*

Most jurisdictional codes limit the use of LID by means such as: minimum street widths, the need for curb and gutter, the amount of frontage and various setbacks needed, BMP ownership restrictions, Stormwater Management (SWM) detention requirements, etc. For the purposes of this Workplan, Fairfax County officials should decide whether it more appropriate to revise their current codes and ordinances or look to create new and alternative measures and codes to promote LID/ESD in both an infill/redevelopment application and a new development application. Creating a new code section might be easier to achieve on a faster time period, but it could also be viewed negatively as just another regulation or county code.

Fairfax County does have various sections in their jurisdictional codes and zoning ordinances where LID/ESD could be incorporated. For the purposes of this project it was concluded that efforts to promote and encourage LID should focus on areas of the codes and ordinances that give the developer an advantage both in terms of cost and time to using LID. This incentive based approach will be the primary focus for the task at hand.

Low Impact Development is referenced and promoted in various reports and studies reviewed. In Fairfax County's Comprehensive Plan, (2003 Edition, Environment Chapter, Objective 2, Policy K) for new development and redevelopment, it recommends the implementation of LID/ESD measures. It details various LID/ESD features that can be used but with the safeguard that they must be consistent with county and State requirements. For infill/redevelopment opportunities, the Comprehensive Plan has chapters on Revitalization and Economic Development, yet neither detail LID/ESD mandates or incentives. The chapters do reference providing more flexibility and creating incentives with regard to zoning regulations for redevelopment projects. These chapters represent an opportunity to promote LID/ESD in an infill/redevelopment application.

One of the advantages of the review of Fairfax County is that they have previously looked to address streamlining efforts and encouraging LID in infill/redevelopment

applications. The county generated the *Infill & Residential Development Study*, herein referred to as the Infill Study, and a special procedure for Revitalization Districts as noted in *An Overview of the Planning, Zoning & Development Review Process within Commercial Revitalization Districts and Areas*, March 2004.

The Infill Study discussed how SWM should be addressed on redevelopment sites. All redevelopment and revitalization (R&R) projects in Fairfax County require a non point source (NPS) pollution reduction of 10% over the existing level of treatment. This requirement is meant to improve SWM and correct for the "sins of past development." The majority of R&R projects are older (dating back to before the 1971 detention ordinance).

The Infill Study recommends "incorporating bioretention/biofiltration facilities (a.k.a. "rain gardens") into the PFM as an allowed privately maintained BMP for both residential and commercial projects." The study goes on to state that biofiltration is the preferred method since it allows for treatment of the runoff and does not have to rely on the soils infiltrate the runoff to the groundwater, thus it can be used on most any soil. Bioretention/biofiltration is only viewed as a water quality measure and does not meet the county's detention requirement- this distinction creates a barrier to its use. Also, even if it were considered detention, it would not be allowed in residential applications because the PFM does not allow underground detention in such areas. In Fairfax County one of the major forms of LID, bioretention/biofiltration is not allowed in residential applications. Changing the PFM as suggested in the Infill Study would represent an opportunity to promote LID/ESD in a residential setting. The case could be made for allowing LID in an infill/redevelopment 'residential' application because typically no SWM exists in or around the redevelopment area and the added treatment, whether it be infiltration or filtration, would be beneficial.

The Infill Study went on to highlight that the Department of Planning and Zoning (DPZ) does not have the Stormwater expertise to evaluate complex SWM options, that expertise is housed within the Department of Public Works and Environmental Services (DPWES). The study states that DPWES should be involved earlier in the planning review process to make recommendations for alternative innovative stormwater measures, such as LID. It was pointed out that presently, "no single point of contact has been identified within DPWES" for such coordination with DPZ and review of site plans. The Infill Study also stated that there is a shortage of qualified reviewers (i.e., staff resources) in the planning and zoning stage of a development project. In an infill/redevelopment application, the county document dealing with Commercial Revitalization Districts seems to have addressed this concern by setting up a special review team made up of various county departments charged with reviewing a development plan.

A major obstacle for LID with development and redevelopment in Fairfax County is that builders and developers follow the Public Facility Manual (PFM) to build most everything in the county. The county Code defers to the PFM as the principle technical reference for development and construction and the PFM does not reference LID as an approved BMPs or a preferred SWM method of development or redevelopment. The

PFM does allow for innovative or alternative means for SWM but it shifts the burden onto the developer to prove that the new system will provide the adequate level of treatment. This constraint provides little incentive for a developer to install a SWM technique not listed in the PFM. Developers tend to follow the path of least resistance and shortest time in approval for a given project.

In Fairfax County LID/ESD is talked about as a method to aspire to when developing a site, but somewhere in all the codes, ordinances, county plans and reports it becomes lost. Also, the additional time and effort to a developer who proposes using it, acts as a deterrent to them proposing it in future applications.

2.3 Fairfax County LID/ESD Recommendations and Timeline Schedule

From the initial grant proposal, revising the county codes and various regulations seemed to be the most logical option to see swift change in SWM practices toward the use of LID/ESD. Even if every code was changed to promote LID/ESD it would still take time and effort with questionable results, meaning LID/ESD still might not happen (i.e., other options such as wet ponds would still be available). LID/ESD is still in its infancy and is not the preferred method of SWM by most developers, planners, and engineers in both the private sector and various county departments.

LID is a paradigm change and will need many more successful applications before it becomes common place and mainstream. Perhaps in time LID will become as common as the wet detention pond best management practice (BMP).

There are three (3) major recommendations proposed for Fairfax County's LID/ESD Workplan.

14. *Revise particular codes, ordinances, and plans to reference LID/ESD as an option of SWM in the county, and especially in infill/redevelopment projects. Specifically, rewrite the Comprehensive Plan's chapters on Revitalization and Economic Development to include references to using innovative stormwater options and LID/ESD.*

    Schedule to Implement: Begin during 2005

15. *Use incentive based opportunities for implementing LID/ESD in Fairfax County and expand upon the Commercial Revitalization District Overview to facilitate such opportunities in an infill/redevelopment projects. Incentive based opportunities include introducing special "zoning overlay" for LID/ESD and reduce development fees (e.g., permit fees, impact fees and proffers) to the county for developers that implement LID techniques. These overlays would need to be encouraged and designed by Department of Planning and Zoning (DPZ).*

    Schedule to Implement: Begin during mid 2005

16. *Adjust the PFM to allow for underground detention on residential sites and include a detailed listing of various LID techniques (green roofs, bioretention, etc.) approved for use with design details. Furthermore, revise Section 6-0301, General Policy, 6-0301.2(31-90-PFM) where it states, "it also is the intent of this policy to encourage a regional approach in the implementation of Stormwater detention, rather than numerous small, less effective individual on-site ponds." This position is not supportive to using smaller decentralized SWM systems such as LID/ESD and it should be revised.*

Schedule to Implement: Begin and complete by mid 2005.