Low Impact Development Literature Review Summary (Task 2)

Methodology

In May and June 2018, Cascadia Consulting Group conducted a literature review regarding barriers, motivators, and opportunities to increase developer adoption of Low Impact Development (LID) best management practices (BMPs). This research will inform the development of a social marketing study that will research the barriers and motivators by using the COM-B behavior change interventions model. The literature review findings will guide development of a recruitment and interview guide for one-on-one interviews with 20 to 25 developers to test these hypotheses and uncover additional insights. Key findings from the literature review will also be incorporated into the study results and in proposed guidance to local governments for increasing developer adoption of LID.

To conduct the literature review, the project team reviewed an initial list of materials provided by the Department of Commerce. We submitted the list to Herrera Environmental Consultants, who added some additional source materials. We also identified additional source materials in the course of the literature review research and added these to the study.

We developed a **document summary template** (included in Attachment 1) to capture key information in summarizing each source document. We have completed a **document summary sheet** for each of the 15 sources reviewed (included at links found in the bibliography).

This document presents key findings on barriers, opportunities, and incentives related to LID adoption across five distinct themes, as well as example incentive programs used in other jurisdictions.

Following the summary of key findings, the **bibliography** of works cited contains links to the original source files and to the project summary documents.

Key Findings from Literature Review

The following summarizes common threads in the reviewed literature that were emphasized in one or more documents. The numbers listed in parentheses following findings refer to the numbered items in the bibliography. The bibliography of sources and document summaries are included later in the document.

Theme 1: Developers are motivated to build what customers want

"Consumer demand and market conditions matter to developers above all other factors." [5]

Several sources stated that developers are motivated to provide what the market demands, especially if it decreases time to sale, increases sale price, or reduces costs while helping developers adhere to stronger stormwater controls.

BARRIER #1: LACK OF CUSTOMER AWARENESS OR APPRECIATION FOR LID IN PRIVATE SECTOR

- The public may not appreciate aesthetics of LID. [4]
- "Lack of awareness or appreciation of LID by potential buyers can deter builders from using the technology." [10]

BARRIER #2: LACK OF FUNDING FOR LID IN PUBLIC SECTOR PROJECTS

- "It can be difficult to develop, increase, and enforce stormwater fees that can serve as revenue to implement green infrastructure." [4]
- "Local jurisdictions do not have the staff or funding to develop, revise, and enforce new codes or regulations, or to educate builders and developers on LID techniques." [7]

OPPORTUNITIES

- "Provide developers and the public "brochures, pamphlets, mailings illustrating the benefits provided by LID, the uses of LID, and the types of LID." [3]
- "Fund and provide developer technical assistance for demonstration projects. "Share information about nearby demonstration projects." [3]
- "Identify local champions (e.g. developers, contractors, consultants, planners) of LID techniques and use them in seminars to familiarize builders, the public, and community officials on LID techniques and encourage demonstration projects." [7]
- "Educate the public that land use is directly linked to Puget Sound health. Promoting greater densities in urban areas to reduce sprawl is good LID. These messages could be shared in printed education materials, on the internet, or in workshops." [3]
- "Creating an easier application process, lengthening grant cycle time, and reducing potential for funding gaps would be helpful." [6]
- "Stormwater grants should be continued and expanded. Municipalities rely heavily on these grants to go above and beyond permit requirements." [6]

INCENTIVES

- Incentives referenced in the literature that can increase both customer demand and developer revenue included:
  - Rewards and recognition
  - Density bonuses
  - Zoning variances
  - Grants for demonstration projects

Theme 2: Developers are motivated to minimize costs and uncertainty while meeting stormwater standards

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"Developers are supportive of incentives that offset costs and ease the transition to stronger stormwater standards." [5]

While developers are motivated to meet stronger stormwater controls, several sources cited developer costs and uncertainty around items such as cost, approvals, or performance as a primary barrier for adoption of LID BMPs. Barriers and corresponding opportunities relating to this theme are outlined in the below sections.

BARRIER #3: INCREASED DEVELOPER COSTS

- "Of the four cost categories typically found in a developer pro forma, soft (design, permitting) and hard (construction) costs are most likely to be impacted by stronger stormwater controls." [5]
- "Construction materials for LID can be more expensive (transportation costs of pervious pavement, for example, especially in more rural areas with fewer suppliers in proximity)." [3]
- "In general, stronger stormwater standards increase the costs of implementing stormwater controls…however…using LID controls has helped offset some of the increased cost, compared to using conventional controls." [5]
- "Financial barriers include increase maintenance cost, need for professional training or educational development cost (Roy et al. 2008), and lack of funding incentives (La Badie, 2007; Clean Water Alliance America 2011). A recent survey conducted in Alberta by AUMA stated that financial barriers become the highest primary barrier of LID adoption (AUMA 2012)." [8]

- "Construction costs for LID technologies are site specific…Assessing a site and designing LID technologies that will function on the site may also increase a builder's design costs." [10]

BARRIER #4: INCREASED DEVELOPER UNCERTAINTY

- "Professional engineers struggle with signing off on plans including LID because LID is not as tested and proven as conventional stormwater management methods." [3]
- "Skepticism regarding the ability or consistency with which practices deliver the level of benefits expected, and uncertainty that investing in green infrastructure will deliver better returns than more traditional practices." [4]

OPPORTUNITIES

Other than financial incentives, the most commonly cited opportunity to reduce developer costs and uncertainty is providing greater access to technical resources, including performance and cost data. Examples of LID technical resources include the following:

- "Create a database for costs of various LID practices, materials, and elements by region to allow for better costing of LID and promotion of the cost-savings. Increasing the awareness and knowledge of developers and permit review staff regarding LID to decrease the cost (or the perception of higher cost) of LID. This effort would streamline the permit review process and make it cheaper." [3]
- "Do more to advertise regional achievements and lessons learned from mistakes. Specify methods, successes, and lessons learned for each project as well as contacts for more information. This online tool could utilize GIS and have photographs and other information. This resource could be used by governments, elected officials, developers, and the public to learn what has and has not worked for LID. An example LID Inventory in Rhode Island is accessible at the following website: http://www.uri.edu/ce/wq/RESOURCES/STORMWATER/LID_tour.htm." [3]
- Provide a "developer toolkit with 'off the shelf' LID designs, ready-to-use in a design and to submit for permit review. Provide tutorial on sizing, type, and applicability of different LID methods; developers could use in order to implement LID without an engineer. Could have set of methods for water quality and water quantity, or both." [3]
- Create a "central repository of best management practices, designs, and specifications would be helpful to provide manuals and design standards for local developers, planners, and engineers. Without [these]…local design professionals and engineers are less likely to deviate from familiar approaches involving gray infrastructure." [4]
- Conduct "a study of the effectiveness of on-the-ground LID/GSI projects after 5, 10, and 15 years would be a useful resource." [6]
- "Identify the LID options that work best given local soil permeability, slope, aspect, and other factors. Limiting the range of LID options to those that work best under local

conditions will also help reduce some of the uncertainty that developers face when designing projects." [10]

INCENTIVES

- The majority of incentives referenced in the literature are designed to offset or reduce developer costs, including:
  - Construction grants, subsidies, cost shares, and rebates
  - Stormwater fee discounts
  - Tax credits and exemptions

Theme 3: Lack of technical knowledge across stakeholder groups leads to inefficiencies and costs

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"Planning department counter staff, permit reviewers, inspectors, and enforcement staff lack adequate training to provide guidance, review permit applications, and inspect LID facilities." [2]

Several sources attributed cumbersome approval processes to a lack of sufficient knowledge of LID across stakeholder groups.

BARRIER #5: LACK OF GENERAL KNOWLEDGE

- "General public and elected officials lack working knowledge of LID." [3]
- "This lack of education occur [sic] not only in the public sector but also in the local utility staff, the development, and consulting industries (Clean Water American Alliance, 2011; Katherine, 2010)." [8]

BARRIER #6: APPROVAL PROCESSES CAN BE CUMBERSOME

- "Developers that are more knowledgeable produce better products for review (during permit review process)." [3]
- "Technical impediments to instituting LID practices included a basic unfamiliarity with low impact techniques and designs, and a difficulty in shepherding these designs through the local government approval processes." [7]
- "Regulators unfamiliar with LID must be convinced of the effectiveness of these techniques, increasing a builder's design and regulatory costs." [10]

OPPORTUNITIES

- "Educate other involved parties such as civil and site development engineers, contractors, municipal permit application plan reviewers, municipal field staff, municipal managers, and council members or commissioners." "[P]rovide funding or technical assistance to local governments to conduct their own education programs. This could be 'incentive-based,' in that technical assistance and funding is given to those who demonstrate interest and capability to conduct the education programs." [2]
- "Provide developer LID design training to increase quality of permit applications." [3]
- "Process to help developers navigate the permitting process more efficiently if they propose to implement LID beyond what current regulations require." [5]
- "Establish a known, streamlined process for approving LID designs." [7]

INCENTIVES

- The primary incentive cited for alleviating cumbersome approval processes was expedited permitting, which "may require reorganization of jurisdiction or have some initial upfront costs, but most of the benefits will be realized very quickly. Building permitting bodies must have knowledgeable, trained professionals at all levels of review. These permitting professionals should be trained in LEED and/or other green rating systems used in the community." [1]

Theme 4: Outdated and conflicting codes are a barrier

"Municipal codes and ordinances often favor gray over green infrastructure." [4]

BARRIER #7: CODES ARE NOT ALWAYS ALIGNED WITH LID

- "LID is difficult to implement via land use codes; separate LID from land use codes and instead make LID a stormwater issue that is best addressed through clear and simple stormwater requirements (more engineering than planning)." [3]
- "At the state level, water and land use policies and property rights can be complicating factors. For example, downstream water rights may be impacted if upstream water management practices reduce the quantity of water to downstream users." [4]
- "Staff pointed out that the rules are primarily oriented towards new development, not redevelopment." [6]
- "Some cities are in the process of updating their code to include maximum impervious coverage. At this time [2016] a number of cities do not have maximum impervious surface

limits in their codes. We did not investigate current code limits but the lowest limit we learned about was a maximum of 20% impervious lot coverage." [6]

- "Most codes emphasize conventional methods of managing stormwater. In many cases, developers interested in using LID must file for variances from established building codes. Such a process may require additional design and engineering studies, take more time, which increases the developer's uncertainty and interest charges, and include the risk that the variance will not be granted. In some cases, LID approval depends on also installing conventional controls, thus defeating the purpose of filing for the variance." [17]

OPPORTUNITIES

- "Conduct a study of how well stormwater, zoning, and building codes are working on redevelopment." [6]
- "Encourage consistent codes, standards, and enforcement among adjacent jurisdictions, e.g., street and highway design." [7]
- "Develop LID-friendly building codes and inspection standards." [10]

INCENTIVES

- No incentives specifically related to revising outdated codes were cited in the literature.

Incentive Strategies

Below is a list of incentive strategies cited in the literature, including example programs. Unless otherwise specified in the sections below, the literature did not comment on the relative effectiveness of different types of incentives.

Direct Financing

HOW IT WORKS

- "Some municipalities offer **rebates or financing for installation of specific practices**. The types of financing help may include grants, matching funds, low-interest loans, tax credits, or reimbursements." [4]

EXAMPLE PROGRAMS

- Santa Monica, CA, offers rebates on rain barrels and redirecting rain gutter downspouts to permeable surfaces, such as landscaped areas. Other cities that offer financing or rebates for

rain barrels and rain gardens include Palo Alto, CA; Rock Island, IL; Chicago; and Minneapolis." [4]

- "The City of Lake Forest Park [WA] provides 50% reimbursement through mini-grants with a simple application: up to $500 for single-family non-rain garden projects, up to $1,500 for community organizations or multiple property owner non-rain garden projects, up to $1,000 for single-family rain garden installations, up to $2,000 for community organization rain garden, installations. The program can be used for installation of permeable pavement patios." [6]
- "Some cities pay builders a direct monetary subsidy when they install a green roof:
  - Portland, OR: $5.00/SF
  - Washington, D.C.: $3.00/SF (pilot project)
  - Chicago, IL: $5,000 grant
  - Toronto, ON: $5.00/SF" [11]
- "New York's Green Improvement Fund provides grant funding to commercial properties that install green infrastructure practices in specific sewer districts. The program is part of a larger CSO abatement program that seeks to eliminate 946,353 m3 (250 million gal) of CSOs by 2018." [14]

Expedited Permitting

HOW IT WORKS

- "Streamlining the permitting process for building, plan, and site permits can save green developers substantial time and money. This may require the reorganization of municipal staff or initially cost the jurisdiction in other indirect ways, but, overall, such a program can result in great cost savings to both the jurisdiction and the architects and developers involved in a project." [1]

EXAMPLE PROGRAMS

- "Santa Monica Ordinance 8.108.050 provides an expedited permitting process for new buildings and major renovations (more than 50 percent) that receive LEED certification." [1]
- "Chicago Green Permit Program reduces the permitting process for developers and owners who build green to less than 30 business days and, in some cases, less than 15 days. The length is determined by the number of green building elements, the LEED certification level, and the project complexity." [1] [4]
- "King County, WA provides a dedicated "Green Track" for LID projects, assigned to permitting staff with expertise in LID." [11]

- "Ashburnham, MA has created a simplified permit process for residential projects using LID." [11]

EFFECTIVENESS

- "The development community has expressed a concern that many communities need to enhance and augment their permitting staff in order for these programs to work at their full potential. In order for expedited permitting programs to be successful, staff should also have a comprehensive understanding of the green rating systems utilized within a city/county. Building permitting bodies must have knowledgeable, trained professionals at all levels of review. These permitting professionals should be trained in LEED and/or other green rating systems used in the community. Unfortunately, one of the problems faced by many smaller permitting agencies is that they do not have the time or money to adequately staff their existing responsibilities, let alone additional requirements, and therefore solutions need to be found." [1]
- "Developers generally responded favorably to these efforts and said that they took advantage of them. Developers responded favorably to incentives that reduce the uncertainty associated with the permitting, to the extent that these incentives reduce the time (and associated costs) of getting approval to implement LID. Developers identified these techniques that help with the permitting process: streamlined or fast-track permitting, guaranteed permit review times, and access to permitting staff for collaborative problem solving early in the process." [5]
- "Philadelphia guarantees plan review for redevelopment projects that disconnect 95 percent of impervious area and don't increase the burden on public infrastructure within 5 business days. Developers expressed mixed opinions about how well these fast-track processes actually work in practice." [5]
- "According to one staff person with experience in Snohomish County, expedited review there is worth a lot to developers. Time is money, and faster permitting can be very motivating for the developer. In small cities, however, "there is no such thing as expedited review. We need city staff trained in LID/GSI to have expedited review." [6]

Capacity Charges

HOW IT WORKS

- Some municipalities collect development fees according to the amount of impervious service on a project. [6]

EXAMPLE PROGRAMS

- "The City of Sammamish collects [in 2016] surface water system development charges: $1,491 for new residential dwelling units or commercial buildings with ≤2,500 sq. ft. impervious coverage, $149.10 for other structures or additions with ≤250 sq. ft. impervious coverage, $149.10 for each additional 250 sq. ft. impervious coverage in both categories." [6]

EFFECTIVENESS

- "These general capacity charges motivate developers to minimize impervious surface." [6]

Fee Discounts and Rebates

HOW IT WORKS

- "Many communities that charge stormwater fees also offer a fee discount or credit if a property owner decreases the site's impervious cover or adds other green infrastructure practices to reduce the amount of stormwater runoff that leaves the property. The concept underlying such arrangements is that private businesses, institutions, and homeowners will experience financial benefits sufficient to support on-site green infrastructure." [4]
- "Municipalities might offer to waive or reduce permit fees, expedite the permit process, allow higher density development, or provide exemptions from local stormwater permitting requirements." [4]

EXAMPLE PROGRAMS

- "Philadelphia's stormwater utility fee system offers fee discounts to commercial property owners who reduce impervious area or otherwise manage runoff onsite. The incentive to property owners comes in the form of a credit against future stormwater fees for properties that install stormwater retrofits. Under the credit structure, the property owner receives a reduction in the monthly stormwater fee proportional to the amount of impervious area from which the entire first inch of runoff is managed onsite, up to 100% of the fee for management or retention of the first inch of stormwater over 100% of the impervious area of the site (a monthly minimum charge prevents stormwater fees from being reduced entirely). The plan provides that once a stormwater fee credit is approved by the Philadelphia Water Department, the fee reduction is fixed for a four-year period, at which point the property owner may reapply for the credit, based on a showing that the retrofit has been properly inspected and maintained and remains fully functional." [4]
- "Developers we interviewed who work in Philadelphia indicated they were aware of these incentives and, in some cases, they had taken advantage of them. Many interviewees expressed their support of stormwater credit and off-site mitigation programs to address the

reality that on-site stormwater retention may not be physically possible in every project and may not be economically feasible in some projects." [5]

- Knox County, Tennessee, offers a credit to developers when impervious areas are disconnected from the stormwater control system via filtration/infiltration zones that are designed to receive runoff." [4]
- "The City of Shoreline's *Soak It Up* rebate program provides funding for LID/GSI retrofits including rain gardens and native vegetation landscaping on private property. Rebates are $2 per square foot of contributing area treated and/or hard surface converted, minimum 400 square feet and maximum. 800 square feet, up to $1,600 per property. Requirements to receive a rebate include: initial site visit, design and installation criteria compliance, signed covenant, final inspection." [6]
- "The City of Kirkland, in an effort to reduce runoff from single-family homes, offers an incentive program for homeowners. Selected homeowners receive a free site visit that measures how much runoff a property produces, recommendations for reducing runoff, and sizing/location guidance for potential LID/GSI. Homeowners that receive a site visit are eligible for a retrofit rebate for installation of these approved practices (recommended by the site visit for the specific site): downspout disconnection, tree planting, soil amendments, pavement removal, conservation landscaping, permeable pavers, cisterns, rain garden. [6]
- "The City of Seattle's RainWise rebate program provides education materials for homeowners as well as rebates averaging $4,000 for rain gardens or cisterns in targeted sewer overflow basins." [6]

EFFECTIVENESS

- "Developers and engineers in Philadelphia indicated that the City's fee reduction program was becoming a useful tool to get buy-in from customers on including BMPs that would quality for the credit." [5]

Insurance

HOW IT WORKS

- "Insurers can play a powerful role in communicating the benefits of green buildings and homes that deliver energy and environmental efficiency, are more resilient to storm damage, and are safer and healthier for their occupants." [1]

EXAMPLE PROGRAMS

- "Fireman's Fund Insurance Company's Green-Gard suite of commercial building coverages provides tangible incentives including:

- Green Upgrade Coverages cover costs to rebuild and replace standard buildings that have a loss with specified green alternatives
- Green Certified Building Coverages to protect investments in a vegetated roof, alternative water system, or green power generating equipment in the case of a loss. The coverage also covers the cost to hire a Leadership in Energy and Environmental Design (LEED®)-accredited professional to oversee the repairs, and even reimburses loss of income incurred through the use of alternative power generating equipment.
- Building Commissioning Coverages that cover the cost to hire a commissioning engineer to ensure that building systems (HVAC, electric and plumbing) operate at peak performance and in alignment with one another." [1]

Loans

HOW IT WORKS

- "States and municipalities can establish a loan fund to be used specifically for green improvements. This type of program requires an initial investment and start-up costs, but generally these incentives have proven profitable in the long run." [1]

EXAMPLE PROGRAMS

- "The New York State Energy Research and Development Authority Program provides low interest loans (four percent below market rates) for energy efficiency measures and building materials that meet New York green building standards." [1]
- "Harvard University's Green Campus Loan Fund provides capital for high performance campus design, operations, maintenance, and occupant behavior projects. Basic project eligibility guidelines state that projects must reduce the University's environmental impacts and have a payback period of 5-10 years or less." [1]

Tax Credits and Abatements

HOW IT WORKS

- "Tax incentives are one of the most robust and widely used forms of incentives to promote beneficial practices. They are particularly suited to green building projects because they can be offered for specific levels of green certification and for both short- and long-term goals. These incentives can be offered in any of the following areas:
  - Corporate Tax (tax levied on the profits made by companies or associations)

- Gross Receipts Tax (tax levied on the total gross revenues of a company – charged to the seller of goods)
- Income Tax (tax levied on the financial income of persons, corporations, or other legal entities)
- Property Tax/Ad Valorem Tax (tax levied on the value of property)
- Sales Tax (tax levied on goods and services – charged at the point of purchase)
- Local Tax (tax levied from cities and counties)" [1]

EXAMPLE PROGRAMS

- "Income Tax: Maryland Tax-General Code Ann. §10-722. An income tax credit provided to owners or tenants of green buildings and green building components. The credit equals eight percent of the allowable costs ($120 per square foot of the base building/$60 per square foot of the tenant space) for green buildings. It provides that the Administration shall adopt standards for a building to qualify as a green building that are consistent with the criteria set forth by the USGBC." [1]
- "Property Tax: Cincinnati Tax Abatement. Any homeowner in Cincinnati may be eligible for property tax abatement if they have renovated their home or purchased a newly constructed home that was built to LEED® standards. Multi-unit housing (four or more units), mixed-use development, and commercial development, both rehabilitation and new construction, are subject to program criteria such as gap analysis, cost/benefit analysis, and relation to other city subsidy." [1]
- "Property Tax: Honolulu Temporary Tax Exemption. This bill provides a one-year real property tax exemption for commercial, industrial, and resort development that earns LEED certification." [1]
- "Multipurpose Tax: New York State CLS Tax § 19. This is a tax credit for owners/tenants of buildings that meet certain green standards. The tax can be applied against corporate taxes, personal income taxes, insurance corporation taxes, and banking corporation taxes. New buildings receiving the credit must not exceed 65 percent of the permitted energy usage (75 percent for rehabilitated buildings)." [1]
- "Other Tax: Oregon Business Energy Tax Credit ORS § 469.185. This tax credit is designed to offset the cost to businesses that build sustainable commercial buildings meeting the LEED Silver rating. The credit is refunded from the Oregon Department of Energy and is based on the square footage of the entire building." [1]
- "County Tax Exemption: Chatham County, Georgia, Ordinance. The exemption provides a five-year full property state and county tax abatement for commercial buildings that receive LEED Gold certification. It also provides a reduced abatement for the next five years (a reduction of 20 percent each year)." [1]

- "City Tax Exemption: Cincinnati, Ohio, Ordinance. A 100 percent tax exemption for LEED certified buildings, not to exceed $500,000 over 15 years for new buildings and over 10 years for renovations, is offered by the city. If the building receives LEED certification, there is no maximum exemption." [1]

EFFECTIVENESS

- "It is important to remember that many developers/owners have different priorities depending on whether they are small developers, large developers, short-term investors, developers who want to maintain several properties, building owners, corporate building tenants, or residential building tenants. These parties have divergent interests and needs, and tax incentives should be available to entice each group." [1]
- "On the whole, tax credit programs work as a positive incentive for green development. However, some programs remain complicated in nature, and builders and owners often find the effort to complete the application process for these programs to be time consuming and, as a result, not cost-effective. Streamlining the application process will ensure that the credits are used more and thus more effective." [1]

Density Bonuses and Other Code Incentives

HOW IT WORKS

- "Jurisdictions have implemented height bonuses, floor/area ratio (FAR) bonuses, reductions in landscaping requirements, and the counting of green roof space as landscaping/open space in return for achieving levels of green building ratings." [1]

EXAMPLE PROGRAMS

- Portland, Oregon's, Floor Area Ratio Bonus increases a building's allowable area in exchange for adding a green roof on 60% of roof. Builders may add 3 square feet of floor area per 1 square foot of greenroof. [4] [11]
- "The City of Auburn's current code lays out a point-based incentive program for alternative development techniques to encourage developers to go "above and beyond" the requirements. LID/GSI are each worth 5 points, and water quality, habitat, and natural vegetation also provide points. Development projects that have 100 points can have:
  - Alternate lot dimensions (required setbacks, frontages)
  - Alternate parking lot landscaping
  - Alternate engineering design
  - Expedited permitting process
  - Increased density

  - Other bonuses including increased impervious and increased maximum height." [6]
- Sammamish, WA Density Bonus: "LID techniques earn points that builders can use to increase site development density or building height." [11]

EFFECTIVENESS

- "These programs can be particularly attractive to developers and owners in cities and counties that have capacity shortfalls. Additional space allowances increase profits for developers and building owners and reductions in transfer costs can translate into incentives for the buyer. Bonus density programs are valuable because developers want to increase floor space on projects in order to enhance profitability. In order for these programs to be effective, bonus density must maintain comprehensive green requirements and therefore preserve the exclusivity of the incentive. As green building becomes more commonplace, municipalities may need to reexamine the stringency of the requirements for density bonuses and increase them concordantly." [1]
- "In 2008, one city updated zoning code for mixed use and residential use. A new section provided opportunities for flexible alternatives, including LID/GSI for developers using incentives. LID/GSI Incentives included expedited processing and density bonuses. To date [2016], no one has taken advantage of this LID/GSI incentive [density bonuses]. Staff felt that that the incentive program was not successful and perhaps it didn't make sense to developers." [6]

Fee-In-Lieu

HOW IT WORKS

- "Many developers mentioned that a fee-in-lieu or credit-offset program for stormwater would be an effective way for dealing with exceptionally difficult sites where LID is physically impossible or too costly. Such programs may serve a useful role in a LID regulatory scheme, but they would have to be designed carefully to maximize the environmental benefits that are achievable on-site and collect a payment that is sufficient to actually implement controls off-site that can address the remaining stormwater-related effects." [5]

EXAMPLE PROGRAMS

- "Philadelphia has a fee-in-lieu program. Permitting officials suggested that this fee-in-lieu program is designed as a useful way to force developers to take a harder look at their site when considering the feasibility of implementing stormwater controls." [5]

EFFECTIVENESS

- "Permitting officials said that it is rarely used, because the fee is set such that it is usually cheaper for developers to implement stormwater controls on-site." [5]

Bibliography of Literature Review Sources

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Attachment 1. Document Summary Template

Bibliographical Information

Title	
Author & organization	
Contact information	
Date	
Pages	
URL	
FileName on SharePoint	
Full Citation	

Abstract

Audiences

Geographic Scope	
Community Type(s)	☐ Urban ☐ Suburban ☐ Exurban ☐ Rural ☐ Other/Not Specified (ONS)
Project Type(s)	☐ Single-family residential ☐ Multifamily residential ☐ Commercial ☐ ONS
Development Type	☐ New development ☐ Redevelopment ☐ ONS
Audience(s) Addressed	

Data Sources or Methods

Results

CURRENT PRACTICES RELATED TO LID

Key Points	Notes	Pages

BARRIERS TO USING LID

Key Points	Notes	Pages
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BENEFITS OF USING LID

Key Points	Notes	Pages
	•	

INCENTIVES OR MOTIVATORS FOR USING LID

Key Points	Notes	Pages
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OPPORTUNITIES OR RECOMMENDATIONS

Key Points	Notes	Pages
	•	

SPECIFIC SUCCESS STORIES FROM EFFECTIVE MODEL PROGRAMS OR PRACTICES

Key Points	Notes	Pages
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LESSONS LEARNED FROM LESS SUCCESSFUL PROGRAMS AND PRACTICES

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LID TOOLS AND RESOURCES

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Key Figures

Key References to Other Documents