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TECHNICAL MEMORANDUM

TO: **Juliet Sinisterra, CEO, University District**

FROM: **Greene Economics**

DATE: **JUNE 26, 2023**

SUBJECT: **Annotated Bibliography and Synthesis of Information Collected to Date**

The University District Public Development Administration (UDPDA) is a key partner in the development of an innovative life sciences and energy district in Spokane. As such, the UDPDA seeks to develop design standards that sustain and improve the baseline ecological assets in the District, improve the long-term health of the entire ecosystem and support future development as a "living lab" for the institutions who will call the University District (UD) home. In support of this vision, the UD Ecological Asset and Performance Standards Study (the Study) is a science-based, data-driven initiative to investigate, model, prioritize, and quantify nature-informed best practices to support the development of design standards around an urban ecological framework, leading to performance standards that will sustain, improve, and restore the District's baseline ecological assets.

The UDPDA has retained Greene Economics to lead the Study. Task 1 of the project was a Kickoff Meeting and tour of the UD, which occurred in May 2023. This memorandum summarizes the findings from Task 2 of the project, Data Collection/Bibliography. This task involves the initial gathering of available data, reports, and planning information into a bibliography with a synthesis identifying themes and data gaps, as well as recommendations for how to develop essential data collection activities going forward. This memorandum identifies themes and gaps and recommendations, as well as describes the organization of a companion Excel-based annotated bibliographic database titled "UDPDA Resource Database." The project team (which includes landscape architects, urban planners, urban stormwater engineers, ecologists, biologists, and economists) has reviewed and synthesized over 50 resources ranging from global best practices and design standards to Spokane-specific development plans and assessments. These materials will inform our review and recommendations for potential ecosystem assets and services (Task 3) as well as the development of recommendations for design standards and associated metrics.

The team will continue to identify and review resources that will be added to the annotated bibliography as the project progresses. As part of the selection process, the team will recommend strategies for essential data collection activities as they relate to candidate ecosystem assets and services identified during the completion of Task 3.

The remainder of this memorandum lays out common themes found within the bibliographical references and identifies data gaps in the research conducted thus far. The results are categorized in the following sections – Reference Themes, Data Gaps, and Recommendations for Developing Data Collection Activities. The annotated can be found under separate cover.

Reference Themes

Over fifty sources related to the University District (UD) and the Ecological Asset and Performance Standards Study (EAPS) were reviewed by the team. Each reference has been assigned a unique identifying number within the database, which corresponds to when the resource was received (Column B). Sources are further classified by bibliographic citation (Column D). Each source offers unique insights into one of the many facets of the study, and when reviewed collectively some larger themes began to emerge. The following core themes and subcategories have been used to categorize the references contained in the database:

- Spokane Planning, Management, and Vision
  - Transit-Oriented Development Plans
- Design Standards
  - Stormwater/Hydrology
- Ecosystems in Spokane
- Ecosystem Services and Metrics
  - Spokane specific Ecosystem Services and Metrics
- Nature-Based/Eco-Centric Designs and Landscaping

For easy visual reference, the team developed a color-coding system within the Resource Database to categorize the references under their respective themes. Cells in Column B of the database are color coded according to the key below. Where more than one theme is present, the reference is coded to the primary theme.

	Spokane Planning, Management, and Vision
	Transit-Oriented Development Plans
	Design Standards
	Stormwater/Hydrology
	Ecosystems in Spokane
	Ecosystems Services and Metrics
	Spokane Specific Ecosystem Services and Metrics
	Nature Based/Eco-Centric Designs and Landscaping

In the remainder of this memo, sources are identified by their reference number in the database.

Spokane Planning, Management, and Vision

The team gathered and reviewed seventeen references regarding Spokane, or specifically the UD, vision for future development and management. Included in this list are the UD Strategic Master Plan Update (#4), Spokane Sustainability Action Plan (#7), South UD Subarea Plan (#8), and many other references guiding future development in the area.

Project Relevance

These plans will directly inform the teams work in Task 3: "Align Ecosystem Assets with Planning and Development." As the team proposes strategies for preserving and/or enhancing ecosystem services, we will factor in their alignment with or potential conflict with features included in the various development plans. Doing so will allow us to develop a list of recommendations and challenges for each strategy as they relate to future development plans.

Some of the planning documents also illustrate broader implications for the study. For example, the UD Strategic Master Plan Update (#4) emphasizes the area's need for affordable housing (pages 35-43), visions to incorporate green spaces (page 59) and highlights some environmental barriers like soil contamination along with zoning and marketing issues that could impact development. When suggesting ecosystem service enhancement strategies, the team will need to consider how these might impact affordable housing efforts and how urban ecosystem expansion could work in tandem with development expansion to solve zoning and other environmental issues. The Master Plan also references the design and sustainability choices made on the Catalyst project, which could influence our design standard recommendations in later tasks.

Other planning documents like the Main Avenue Visioning Study (#6), Urban Amenities Study for the South UD (#9), Spokane Bicycle Master Plan (#49), and Spokane Pedestrian Master Plan (#50) have narrow implications for a specific aspect or area of future development. For example, our ecosystem preservation strategies could work in tandem with pedestrian and bicycle trail expansion plans, and the street trees and proposed planters in the Main Avenue Visioning Study could be incorporated into the standard design recommendations.

Spokane's Sustainability Action Plan (#7) includes action goals across seven topics: buildings and energy, transportation and land use, waste diversion and material conservation, water resources, economic prosperity, natural environment, and health and well-being to help the city mitigate the impacts of climate change and become more resilient. It will be important to compare how and where our strategies align or conflict with the proposed actions and goals in this highly pertinent planning document.

Transit-Oriented Development Plans 

Included in the Spokane planning documents are four references specific to transit-oriented development (TOD) plans in the UD and surrounding area. The city is pushing for TOD, where land use and transportation are integrated with a transit route at its core with a mix of housing, commercial businesses, jobs, and services concentrated along walkable and bikeable streets within a quarter mile of the transit route. There are efforts to pursue TOD along the City Line Bus Rapid Transport in the South Logan neighborhood.

Project Relevance

It is important for our team to understand Spokane's commitment to TOD and how this will affect future development if the TOD alternative is chosen among the South Logan TOD Draft EIS alternatives. The South Logan TOD Draft EIS (#2) also includes the environmental impact each development alternative will have on the existing ecosystems found in the study area, which could inform our baseline ecosystem understanding and development of strategies to enhance/preserve ecosystem services around this development. The TOD plan will also inform the team of potential zoning changes and the types of structures planned for the area.

Design Standards 

The team has gathered and reviewed seven references centered on design standards thus far. Of particular note is the City of Spokane Design Standards document (#5). It was updated in 2021 and touches on stormwater management design, street lighting, roadside planting, parklets, low-impact development storm drains, bioretention facilities, permeable pavement, and planter box regulations. Additionally, many of the planning documents mentioned in the Spokane Planning, Management and Vision theme include design suggestions for streetscapes, stormwater management, and other design choices that have created lively districts that serve their communities.

Project Relevance

While the City of Spokane Design Standards (#5) will serve as a reference for the basic requirements and guidance on the development topics included within, the guidance is clear in that it is not meant to limit innovative efforts that could result in higher quality and/or lower cost efforts. However, any proposed departure from these standards will be judged on the likelihood that such variance produces a comparable result, so our understanding of these standards and expected results will be essential when developing draft design standards under Task 7. The other, less strict guidance proposed in the Spokane planning documents will also inform our design standards and understanding of what types of development can be expected in the future.

Stormwater/Hydrology 

Of the seven design standard documents reviewed, six refer specifically to stormwater and hydrology design standards from the federal to city level. Included in this list is the Water System Design Manual (#13), WSDOT Design Manual (#11), and the Spokane Regional Stormwater Manual (#14).

Project Relevance

The capture, storage, and management of stormwater and stormwater runoff is important not only for overall water quality indicators and ecosystem health but also in terms of water management in the face of climate change. These technical references will inform our stormwater and hydrology-related draft design standards.

Ecosystems in Spokane

The team reviewed four references that allude to the ecosystems found in Spokane. The references are the Approved Street Tree List for Spokane (#41), the Native and Drought Tolerant Plant List (#43), Washington Bumble Bees in Home Yards and Gardens (#44), and Native Trees and Plants You Will See Everywhere in Spokane (#46). Each one touches on the wildlife and plant species native to the area.

Project Relevance

These references will be essential for Task 4: Evaluate Opportunities to Increase and Preserve Ecosystem Services, as they highlight what ecosystems and species are present in the city to begin with. From this, we can determine the ecosystem services already provided in the UD and develop plans to preserve and enhance these services. The Approved Street Tree List (#41) and Native and Drought Tolerant Plant List (#43) will also impact the species we recommend planting in our design standard development. The Washington Bumble Bee reference (#44) also provides habitat recommendations for commonly found pollinators in the state. Pollination is a considerable ecosystem service, so incorporating bumble bee-friendly habitats in design standards and understanding what pollinators are critical to the region are important considerations for this project.

Ecosystem Services and Metrics

Nineteen references reviewed by the team centered on ecosystem services and metrics used to measure these services in cities around the world. Studies across the globe have created frameworks to identify, measure and quantify ecosystem services in urban areas. The City Biodiversity Index (#30) is a handbook launched by Singapore to help profile a city's biodiversity and establish a baseline and metrics to measure future progress. Defining Key concepts and Indicators to Measure Nature-based Solutions (#31) and the Urban Ecosystem Services Index for Sustainable Planning (#32) are other examples of international efforts to highlight and measure ecosystem benefits in urban settings. Other ecosystem service studies have been conducted within the United States, including the Urban Ecosystem Analysis conducted in Bellevue, WA (#25), the study on Urban Green Spaces and Fine Particulate Matter in Texas (#27), and Seattle's Forest Ecosystem Values report (#28). Each reference touches on urban ecosystem services, with some delving deeper into how to establish a baseline understanding of ecosystem services in an urban area, measure these services over time and quantify ecosystem services.

Project Relevance

These references will be essential for Tasks 3, and 4 where the team will create an initial list of potential Ecosystem Services as candidates for ongoing monitoring and metrics in the UD using the ecosystem services, as well as propose metrics, monitoring techniques and potential data sources supplied within these references. The ecosystem services referenced include everything from carbon sequestration to stormwater management to improved mental health to pollination and soil mineralization. The team may consider utilizing suggested data sources, like iTree, iNaturalist and eBird, within the monitoring and metrics designation as well.

Spokane Specific Ecosystem Services and Metrics

Five of the Ecosystem Services and Metrics references are specific to Spokane. Spokane Beat the Heat (#22), the SpoCanopy Planting Program (#38), and Resource Analysis of Inventoried Street Trees (#40) all reference work within Spokane to measure ecosystem benefits, or lack thereof, and bring these benefits to all areas of Spokane.

Project Relevance

The Resource Analysis of Inventoried Street Trees (#40) includes a list of the number of street trees, by health status and species, found in Spokane in 2012. The same report also quantifies the amount of money the trees save the city annually in reduced heating/cooling costs, carbon sequestration, air quality improvements, stormwater mitigation,

and beautification. This source has established urban tree-related ecosystem benefit metrics and provides a baseline for the number of trees in the city and their composition. The Spokane Beat the Heat Project (#22) and the Urban Tree Analysis (#42) highlight how disproportionately ecosystem benefits are distributed across the city. Low-income and vulnerable communities reap far fewer benefits, like cooler temperatures during a heat event, because there are far fewer trees in these areas. We will want to consider how to make the distribution of ecosystem benefits more equitable in future designs and potentially work in tandem with groups like SpoCanopy, who are working to ensure every person in every neighborhood in Spokane has access to trees and green space.

Nature-Based/Eco-centric Designs and Landscaping 

The team has thus far reviewed three references focused on eco-centric, sustainability, or nature-based designs. The references under this theme include Stormwater Ponds: A Guide for Pond Owners (#17), Nature-Based Solutions Roadmap (#18) and Drought Tolerant Landscaping for Washington State (#45).

Project Relevance

These sources will support Task 8, developing nature-informed design standards that prioritize sensitive landscapes and habitats within future development. The Stormwater Pond Guide (#17) includes stormwater pond requirements including the pond's required capacity, and structure. As a nature-based stormwater management tool, the team will consider how stormwater ponds might fit within the UD. The Drought Tolerant Landscaping guide (#45) will serve a similar purpose in that it will provide a reference with drought tolerant species, preferred soils, irrigation systems, and appropriate planting sites in dry climates. Since Spokane receives only 20 inches of rain a year, drought-tolerant landscaping is necessary and will match the native ecosystems that already exist in the dry climate. The Nature-Based Solutions Roadmap (18) includes principles to guide the design and implementation of nature-based solutions. Not only does it touch on design, but it includes an extensive list of benefits provided by nature-based solutions, ways to streamline nature-based development permitting and incorporate nature-based solutions into city policies and programs, and a list of federal funding resources. Though bigger picture, some suggested solutions like green roofs, planting pollinator habitats and increasing urban trees will act as inspiration for the team's design standards.

Data Gaps & Recommendations for Developing Data Collection Activities

The team has reviewed a strong list of initial references covering everything from UD development plans to stormwater pond design to the quantification of urban tree benefits. While the team believes we have ample information under several themes like Ecosystem Services and Metrics and Spokane Planning, Management and Vision, there are a few areas that require further research.

One noticeable data gap falls under the Nature-Based/Eco-centric Designs and Landscaping theme. It will be important for the team to develop a comprehensive list of nature-informed design practices and examples. Additional nature-informed design sources could include examples of other cities or places with eco-centric buildings and designs, examples of city plans that incorporate urban ecosystems into their designs and standards, and additional guidance on standardized designs for nature-based solutions like green roofs and pollinator habitat design. We anticipate drawing heavily on the expertise and resources provided by the urban planners and landscape architects on the team for these materials.

The team would also like to develop a better baseline understanding of the urban ecosystems found in the UD. This is important because our ecosystem service preservation strategies need to center on species and ecosystems already found in the UD. The bibliography lacks references that highlight important ecosystems and indicator species in the region and where these species currently exist in the UD. The team is currently engaging with science and research faculty at several universities in Spokane to access information and data that may not yet be published in searchable formats. The team is also engaging these faculty to explore existing data collection activities that may be candidates for metrics and data collection after performance standards have been developed.

There were few references mentioning the Spokane River, plans to restore its riverbanks, or development regulations near the riverbank. The Spokane River runs through the UD and is a focal point in the City of Spokane. Creating a waterfront that both celebrates the ecosystem and supports development plans is an approach that has successfully been adopted by several riverfront cities (Portland OR, and San Antonio TX). This will be an area of exploration and further analysis for the team.