

C-4. GSI Opportunity Analysis Technical Memorandum

TECHNICAL MEMORANDUM

GSI Opportunity Analysis

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TASK: 2.a Approach

Contents

GSI Opportunity Analysis 1
 Overview 1
 Methodology 2
 Opportunity Categories..... 3
 Intersection with Impervious Area 5
 GSI Strategy/Program Types 6
 Conclusions / Next Steps..... 6

Overview

Jacobs performed a desktop analysis in GIS to develop an opportunity layer to serve as a primary input for the green stormwater infrastructure and source control (GSI-SC) project identification process. At a high-level, the goal of the opportunity analysis was to identify land areas in the Combined Sewer System (CSS) with potential for green stormwater infrastructure (GSI) implementation. Opportunity areas for GSI implementation primarily focus on areas within public ownership, such as right-of-way (ROW), parks, schools, municipal facilities, and City-owned parcels. However, parcels in private ownership were also included in the opportunity analysis for the purposes of conducting a comprehensive characterization of the total land area. The analysis was piloted for the Chartiers planning basin and then repeated for the rest of the ALCOSAN service area. This memo provides an overview of the methodology and output from the Chartiers planning basin analysis. Table 1 lists the data sources used in the GIS desktop evaluation.

Table 1. Data Inputs used for Opportunity Analysis

Data Layer	Source	Date	Provider
Parcels	Allegheny County	December 2017	ALCOSAN
Assessment Data	Allegheny County	October 2017	ALCOSAN

Data Layer	Source	Date	Provider
CSS Boundaries (as developed for the overflow reduction efficiency (ORE) analysis)	Jacobs developed the GSI-ORE data layer based on the ALCOSAN "MasterMergedSheds_v6_2" GIS layer and the Existing Conditions SWMM input files	GSI-ORE data layer developed in 2018	ALCOSAN/ Jacobs
Parks	Allegheny County	Data is from 2000, downloaded Sept. 2017	Allegheny County

Methodology

The Allegheny County parcel database was provided by ALCOSAN to Jacobs in December 2017. As a first step, Jacobs clipped the Allegheny County parcel layer down to the relevant "study area," which for this analysis focused on the combined sewersheds (CSS) with a 200-ft buffer to account for immediately adjacent parcels that may be able to capture runoff from the CSS. The CSS boundary was determined by using the GSI-ORE GIS layer that Jacobs developed during the overflow reduction efficiency (ORE) analysis.

The parcels were then matched to the parcel assessment data based on a common parcel identification number (PIN) field. The assessment data contains important attribute information (Table 2) including Owner Name, Owner Description, Class Description, and Land Use Code Description that were reviewed to provide an efficient means to determine the relevant opportunity parcels within the study area.

It should be noted that as part of the analysis, Jacobs removed duplicate parcels that had the same geometry but different PINs.

Table 2. Summary of the primary parcel assessment data attributes used in the Opportunity Analysis

Field Description	Field Name	Definition
Owner Name	PROPERTYOWNER	Owner Name for the parcel
Owner Description	OWNERDESC	Descriptions for numeric owner codes, e.g. individuals ('REGULAR') vs municipalities and companies ('CORPORATION')
Class Description	CLASSDESC	Broad categories for describing the general use of a parcel: R - RESIDENTIAL U - UTILITIES I - INDUSTRIAL C - COMMERCIAL O - OTHER G - GOVERNMENT F - AGRICULTURAL.
Land Use Code Description	USEDESC	More detailed than Class Description, these categories further describe the primary use of the parcel. There are approximately 200 categories, such as Townhouse, Warehouse, Office/Retail, Car Wash, Country Club, Vacant Land, etc.

The parcel and assessment data were first analyzed by summarizing the number and total area of parcels by the Property Owner field to initially identify all parcels that were not privately-owned parcels. For example, any property with the words "Borough," "County," or "City" listed in the ownership field could quickly be classified as a public opportunity parcel, regardless of the more detailed land use code description. The data was also summarized and sorted using the Class Description attribute to generate a high-level assessment of the distribution of general land uses for the parcels in the study area. In reviewing the distribution of parcels based on the Class Description, initial opportunity categories were developed (Table 3).

Table 3. Assignment of each Class Description into initial Opportunity Categories

Class Description Code	Class Description	Opportunity Category (initial)
R	RESIDENTIAL	Private Residential
U	UTILITIES	Further investigation required
I	INDUSTRIAL	Private Non-Residential
C	COMMERCIAL	Private Non-Residential
O	OTHER	Further investigation required
G	GOVERNMENT	Public
F	AGRICULTURAL	Private Non-Residential

Jacobs then conducted a more detailed investigation of the land use code descriptions as they related to both class descriptions and ownership to further refine and finalize the opportunity categories. This was an iterative process that included the following:

- 1) Summarizing the number and total area of parcels by Owner and by Land Use Code to assess the range of owners and land use types in the study area and help determine the most appropriate opportunity category for different owners and land use types.
- 2) Assessing parcel ownership as a determining factor for assigning an opportunity category in some instances (e.g., anything owned by the City of Pittsburgh was classified as "City" regardless of class description and land use description)
- 3) Evaluating specific combinations of Class Descriptions and Land Use Code Descriptions (e.g., a "Residential" Class Description may have a "Vacant" Land Use Code Description and would therefore be categorized as Vacant)

Opportunity Categories

Based on the methodology described above, ten (10) opportunity (or ownership) categories were developed, as described below. Table 4 provides a summary of the number and area of opportunity categories for the Chartiers Creek basin CSS and Figure 1 is an example map of a portion of the Chartiers Creek basin.

- Right-of-Way (ROW): the non-parceled common area that typically includes roads, sidewalks and some adjacent land area. This includes both Municipal ROW and PENNDOT ROW. These areas were developed by combining the parcels in GIS with a closed boundary (areas not in a parcel are ROW).
- Private Non-Residential: privately owned, non-residential parcels that do not fit into any of the other categories.
- Private Residential: privately owned residential parcels.
- Municipal government: parcels owned by a municipal form of government, typically with the following selection set: OWNERDESC = 'CORPORATION' AND CLASSDESC = 'GOVERNMENT' AND USEDESC = 'MUNICIPAL GOVERNMENT'. This was spot checked and verified by reviewing the PROPERTYOWNER field name.
- City: parcels owned by the City of Pittsburgh and its related entities, regardless of the land use designation.
- Non-Municipal government: Non-municipal government entities like Federal, State, or County properties including ALCOSAN and the Port Authority. Fire Department/EMS and the US Postal Service were also included in this category.

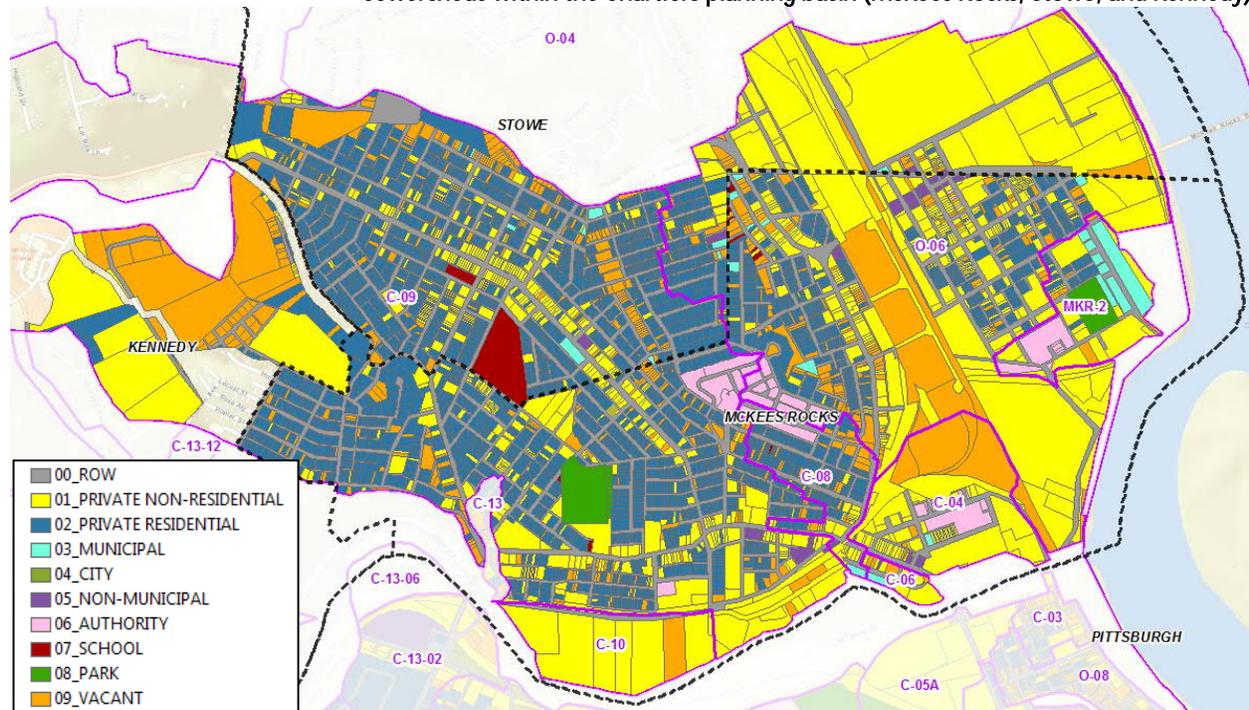
- Authority: parcels owned by the Housing Authority, Urban Redevelopment Authority, Water Authority, Flood Control Authority, etc.
- School: any public-school parcel with ownership category Board of Education, or USEDESC = OWNED BY BOARD OF EDUCATION
- Park: any parcel classified with USEDESC = PUBLIC PARK or parcels that were identified as parks in the separate Allegheny County Parks polygon layer which were merged into the master parcel layer. (Note that the Allegheny County Parks polygon layer did not have detailed ownership attribute data.)
- Vacant: the vacant category refers to all properties with USEDESC = Vacant Land. Note that this does not necessarily represent urban vacant/abandoned lots but includes some larger undeveloped parcels or those without buildings present.
- Not Assessed: several parcels were missing information and had no assessment information for use in this analysis. These areas were not included in any of the opportunity categories.

Table 4. Number and Area of Opportunity Categories in the Chartiers Creek CSS*

Opportunity Category	Number of Parcels	Total Area (Ac)
Right-Of-Way	0	1,082
Private Non-Residential	3,131	1,233
Private Residential	12,580	1,418
Municipal	86	32
City	645	108
Non-Municipal	147	69
Authority	126	55
School	35	65
Park	22	130
Vacant	2,372	406
Total	19,245	4,599

*Results are clipped to the combined sewershed boundary

Figure 1. An example of the distribution of opportunity parcels by ownership category in several of the combined sewersheds within the Chartiers planning basin (McKees Rocks, Stowe, and Kennedy)



Intersection with Impervious Area

Next, the categorized parcel layer was intersected with impervious area and summarized to determine the overall impervious area distribution within each opportunity category. Table 5 below shows the percent impervious, the total impervious area, and the average parcel size in each category. For Chartiers, the ROW category contains the most impervious area, followed by private non-residential and residential.

Table 5. Impervious Area for Opportunity Categories in the Chartiers Creek CSS

Opportunity Category	Number of Parcels	Total Area (Ac)	Total Impervious Area (Ac)	% Impervious	Average Parcel Size (Ac)
Right-Of-Way	0	1,082	492	45%	N/A
Private Non-Residential	3,131	1,233	438	35%	0.39
Private Residential	12,580	1,418	300	21%	0.11
Municipal	86	32	8	24%	0.37
City	645	108	4	4%	0.17
Non-Municipal	147	69	22	32%	0.47
Authority	126	55	13	23%	0.44
School	35	65	15	23%	1.84
Park	22	130	10	8%	5.91
Vacant	2,372	406	30	7%	0.17
Total	19,245	4,599	1,332	29%	0.24

GSI Strategy/Program Types

The final step in the process grouped the ownership/opportunity categories into several generic GSI Strategy or Program Types. This was done to enable an estimate of benefits and costs as part of subsequent analyses. For example, right of way was assigned a green streets GSI strategy. Table 6 provides a summary of the ownership/opportunity category and corresponding GSI Strategy.

Table 6. Example of Ownership Categories and corresponding GSI-SC Strategy/Program Types

Ownership Category	GSI Strategy/Program Type
Right-Of-Way	Green Streets
Private Non-Residential	Redevelopment / Retrofits (via code compliance or voluntary actions)
Private Residential	Rain Gardens / Downspout Disconnection
City/Municipal	Green Facilities
Non-Municipal	Green Facilities
Authority	Green Facilities
School	Green Schools
Park	Green Parks
Vacant	Vacant Lot Greening

Conclusions / Next Steps

The GSI opportunity analysis is one of the primary foundations of the GSI project identification process described in Section 4 of Controlling the Source (CtS). When combined with the results of the constraints analysis and the ORE analysis, specific project opportunities can be developed and then prioritized (see Sections 4 and 8 of CtS). This opportunities analysis can also be used in specific areas to evaluate GSI implementation levels and the potential impact those levels may have on proposed improvements in the Clean Water Plan.