APPENDIX 3: STORMWATER CALCULATION METHODOLOGY
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OVERVIEW
The site-specific shared GSI scenarios and related recommendations included in this report utilize the processes defined in DWSD Drainage Charge Documentation Guide as the basis of analysis. Shared GSI strategies also require additional assumptions and different applications of drainage charge calculations. The methodology and assumptions included here detail how this study has approached shared GSI scenarios and interpreted DWSD documentation. Several of the assumptions were directly informed by DWSD and all were approved in a context of this body of work as a means to investigate how shared and offsite GSI can work for DWSD and Detroit property owners alike.

METHODOLOGY
PRACTICE-BASED CREDIT CALCULATIONS
For adjacent shared GSI practices, practice performance is calculated using the process outlined in the Drainage Charge Documentation Guide: the equivalent rainfall depth method for volume and standard detention method for peak flow. For practice performance calculations, the delineation of impervious drainage area is constrained by the property lines of all participating properties combined, rather than each individual property separately. The site credit is then determined individually for each property owner within their own property lines as outlined in the Drainage Charge Documentation Guide. Shared Stormwater Practices example, included in the image below. Practice performance is determined for each practice based on it’s drainage area where all participating properties are treated as a single group. In other words, property owners will be billed based on parcel and not based on GSI drainage area.

OFFSITE PRACTICES
For offsite shared GSI practices, practice performance is calculated as described above, but the impervious drainage area used to calculate equivalent rainfall depth is the impervious area “onsite” that is not actually flowing into the GSI. Similarly for peak flow, the site impervious drainage area is “onsite” while the tributary area is “offsite.” The impervious drainage area used to calculate site credit is the offsite impervious drainage area of the GSI practice, and the total site impervious area is the “onsite” impervious area that the property owner is responsible for. The C-value used for the peak flow calculation is for the offsite tributary area actually running into the GSI practice.

ASSUMPTIONS
Below is a list of general assumptions that this project used to investigate different scenarios, informing legal analysis, financing, engineering and design:
» All soils are assumed to be Type D soils with 0.1 inches/hour infiltration rate.
» $661/impervious acre/month is the current drainage charge and the number that is used for all ROI calculations. It is subject to change.
» In shared GSI scenarios, each property owner is billed individually rather than as a group. In other words, property owners will be billed based on parcel and not based on GSI drainage area.
» For calculation purposes, drainage areas need to be defined based on participating properties, not based on real drainage areas to prevent oversizing. In other words, if the natural topography results in a rain garden’s drainage area extending over 5 parcels, all owned by different property owners, but only 2 of those property owners are participating in the credit allocation from that rain garden, then for the purpose of the credit calculations, the drainage area of the rain garden is defined only by where the total drainage area overlaps within the parcel lines of the participating property owners—with the exception of right of way water (see below).
» Where the naturally-occurring drainage area of a GSI practice includes rights of way, the impervious area within the drainage area within the right of way can be claimed by one or both of the participating property owners as long as total impervious drainage area claimed does not exceed total impervious area for each property owner. In this study, we have used “impervious drainage area claiming” for calculation purposes. See the following page for a diagram of this terminology, using the Brightmoor Artisans Collective site scenario.
» Property owners cannot receive credit for GSI installed on city-owned land subject to the drainage charge.
» Property owners cannot receive credit from runoff originating from impervious area on county or state road rights of way at this time, even if it enters their GSI.
» Property owners cannot receive credit from runoff originating from impervious area on other private property even if it enters their GSI.
» Practice performance can exceed 100% as long as site credit for volume and site credit for peak flow, respectively, do not exceed 40%.

Figure 4: Shared Ownership of Storm Water Practice

**PRACTICE-BASED CREDITS**

- **Site Impervious Drainage Area Claiming**
  - For Each Property
  - Total Site Impervious Area = 11,673 SF
  - Site Tributary Area = 12,411 SF

- **Volume Credit**
  - 86%

- **Volume Practice Credit**
  - 35%

- **Volume Site Credit for BAC**
  - 30%

- **Volume Site Credit for Liquor Store**
  - 24%

- **Peak Flow Credit**
  - 76%

- **Peak Flow Practice Credit**
  - 30%

- **Peak Flow Site Credit for BAC**
  - 26%

- **Peak Flow Site Credit for Liquor Store**
  - 21%

- **Total Site Credits for BAC**
  - 56%

- **Total Site Credits for Liquor Store**
  - 45%

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**Brightmoor Artisans Collective**

- **Rain Garden 1**
  - 788 sf

- **Rain Garden 2**
  - 788 sf

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**Detroit Collaborative Design Center**

- High and Low Density Shared GSI Study
- Brightmoor Artisans Collective - Option 1
- GSI Shared Credit Allocation Exhibit