*Prepared for*

ESCONDIDO
City of Choice

# City of Escondido Creeks Hydraulic Study

## Alternative Compliance and Water Quality Improvements

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# EXECUTIVE SUMMARY AND CONCLUSIONS

Michael Baker was hired by the City of Escondido to perform distinct planning-level tasks to assist with compliance with water quality requirements within the 2013 Regional MS4 NPDES Permit. These tasks include an alternative compliance projects assessment and evaluation of potential water quality benefits from removing the concrete channel base at two specific locations in Escondido Creek (El Caballo Park and Grape Day Park).

## *Alternative Compliance Projects Assessment*

The alternative compliance projects assessment produced a prioritized list of ten viable sites within the Carlsbad and San Dieguito Watershed Management Areas (WMAs) at which regional Best Management Practice (BMP) projects may reasonably be completed and funded, at least in part, through an Alternative Compliance Program (ACP). Identification of project sites was completed through desktop screening of publicly owned lands and right-of-way within the City of Escondido limits. Sites determined to be free of environmental constraints and in close proximity to conveyance of significant pollutant load within the MS4 were given the highest priority. To create the highest level of desirability, a number of City CIP sites within public right-of-way were considered using the screening process, several of which resulted in findings to substantiate inclusion within the top ten.

Each site is suitable for one or more BMP types and can serve to mitigate development at a "reference site" under a number of land use scenarios (i.e., residential, commercial, etc.). The "reference site" is the location where proposed development would occur, and its stormwater impacts mitigated offsite through an alternative compliance project. The ten sites yielded a total of 84 unique combinations of BMP type and reference site land use that were analyzed using draft environmental equivalency procedures currently under review by the San Diego Regional Water Quality Control Board (Regional Board).

The environmental equivalency analysis determined the earned stormwater pollutant control credit and equivalent development area for each scenario based on:

- the assumed BMP type,
- reference site land use, and
- any additional sizing that may be needed to satisfy hydromodification management standards.

This effort involved development of watershed-level hydrologic parameters and BMP design parameters, such as surface area and storage volume. Preliminary whole-life costs were developed and incorporated into a prioritization list. The prioritization list reflects overall cost effectiveness using the ratio of equivalent uniform annual cost (EUAC) to equivalent developable area (EDA). Those with the lowest ratio of EUAC to EDA were assumed to be the most desirable from the perspective of the City as well as private developers, and therefore given the highest implementation priority.

Capital cost for the ten-site alternative compliance program was estimated to range from $16.2 million to $37.7 million, depending upon the type of BMP assumed for construction. Construction of regional bioretention BMPs was clearly shown as the least expensive compared to the other BMP choices considered (underground retention and irrigation re-use). However, some sites are constrained, and construction as bioretention was determined infeasible or impractical. In return for this investment, the ACPs can collectively mitigate anywhere from 25.8 to 215 acres of equivalent development, depending upon the assumed reference site land use. Non-applicability of hydromodification management criteria would push the upward limit of this range to 796 acres and was found to significantly influence EDA. Using total BMP surface area of the ACPs as a guide for order of magnitude estimation, the ACP sites would allow for the development of *up to* 8.4 acres of land that otherwise would have been devoted to on-site BMPs, but instead can be developed by using ACP sites as offsite mitigation.

## *Water Quality Improvements Escondido Creek*

Michael Baker evaluated wet and dry weather water quality benefits that would be expected from removing the concrete channel base at two specific locations in Escondido Creek (El Caballo Park and Grape Day Park). To perform this task, continuous simulation modeling of wet and dry weather conditions was performed using EPA SWMM. The SWMM models incorporated both local rain gage data as well as limited dry weather flow rates from the jurisdictional monitoring program. Removal of the concrete base at these locations was found to result in significant reduction in dry weather pollutant load (100%), with only nominal wet weather benefit (approximately 5% pollutant load reduction). Locally accepted technical guidance for modeling infiltration processes is lacking; specifically when in-stream rehabilitation is used to achieve pollutant load reduction or compensate for hydromodification effects within the watershed. Variations in factors such as storm distribution, precipitation depth, site-specific variation in hydraulic conductivity, depression storage, and natural variability in evapotranspiration processes could significantly impact volume loss. *Consequently, the valuation of environmental benefit as an Alternative Compliance Project will be subject to interpretation and professional judgement until more specific technical guidance is available.* Our analysis estimated the project would provide mitigation for an equivalent development area ranging from 25 to 40 acres under a range of development scenarios – all of which assumed this portion of Escondido Creek would remain considered, from a regulatory perspective, as part of the City's MS4. However, it is likely that the concrete channel would be considered Waters of the US. Despite not being eligible to claim alternative compliance credits in a WOTUS the projects would be, at least, consistent with Regional Board's goals for water quality.

A new hydrology study was performed to quantify the 100-year flow rate. Removal of the concrete base and replacement with vegetation was also found to produce significant hydraulic impact during 100-year flood conditions at Grape Day Park. Channel widening would be required for certain vegetation conditions. Removing only a 10' portion of the channel would increase flow depths, but would remain within the freeboard limits of the channel. Flow depth and shear stress during a 100-year flood were determined to be of an extent that a turf reinforcement mat (TRM) or similar product would be necessary to prevent general scour within the project limits, even with vegetation of the highest retardance classification.

# SCOPE AND OBJECTIVE OF REPORT

Michael Baker was hired by the City of Escondido to perform distinct planning-level tasks to assist with compliance with water quality requirements within the 2013 Regional MS4 NPDES Permit. These tasks include an alternative compliance projects assessment and evaluation of potential water quality benefits from removing the concrete channel base at two specific locations in Escondido Creek (El Caballo Park and Grape Day Park). Hydraulic analyses contained within this study are computed using representative cross sections, but do not take into account other factors such as backwater effects from natural or structure-induced channel constrictions. Design-level computations are anticipated to be necessary for each project presented in this report as it moves from concept to the design phase.

## *Alternative Compliance Projects Assessment*

The alternative compliance projects assessment produced a prioritized list of ten viable sites at which regional Best Management Practice (BMP) projects may reasonably be completed and funded, at least in part, through an Alternative Compliance Program. The 2013 MS4 Permit includes a provision for Copermittees to allow offsite alternative compliance projects for Priority Development Projects to meet water quality and/or hydromodification management requirements in lieu of implementing on-site structural BMPs.

## *Water Quality Improvements Escondido Creek*

Michael Baker evaluated wet and dry weather water quality benefits that would be expected from removing the concrete channel base at two specific locations in Escondido Creek (El Caballo Park and Grape Day Park) and evaluated the environmental benefit that could be achieved by the project as an alternative compliance project.

# ALTERNATIVE COMPLIANCE PROJECTS ASSESSMENT

## DESKTOP SCREENING AND PROJECT SITE EVALUATION

The first step in the alternative compliance projects assessment was to perform a desktop review of potential sites within the City of Escondido limits. This desktop review was performed to preliminarily identify ten potential alternative compliance project (ACP) sites in the Carlsbad and San Dieguito River Watershed Management Areas (WMAs). Site selection was based primarily upon analysis of GIS data and the City's current capital improvement plan, with two sites having been previously identified during the project kickoff meeting on June 29th, 2015. Various criteria were evaluated to screen and select candidate sites within the City that may be appropriate to incorporate into a future alternative compliance program. GIS analysis for site selection evaluated the following:

- **Regional topography and drainage patterns** – Project sites in excessively steep terrain or incapable of accepting water from the MS4 were eliminated from consideration.
- **Proximity to major stormwater infrastructure locations** – Projects sites in close proximity (i.e., several hundred feet typically, or less) to concrete channels and large storm drain systems were given priority consideration. This approach is believed to provide an inherently high level of cost efficiency.
- **Hydrologic soil category** - Project sites with Type A and Type B soils were given prioritized consideration, since the intent is to use infiltration BMPs wherever possible.
- **Environmental constraints** (Multiple Species Conservation Program, Multi-Habitat Planning Areas, Environmentally Sensitive Areas, EPA 303d listed waters, floodplains, etc.) - Lands with environmental constraints such as endangered species or habitat conservation areas were eliminated from consideration because of the resource agency permitting implications.
- **Location of publically owned lands and easements** - Privately owned lands were eliminated from consideration.
- **The City's current capital improvement plan (CIP)** - Prioritized consideration was given to City capital improvement projects specifically identified by City staff, as well as those identified whose location and scope were consistent with the other criteria used in the initial screening process.

Based upon this criteria and subsequent coordination with City staff, ten sites and project types were identified as suitable for technical analysis. Three primary types of BMP projects were considered:

- Bioretention: a facility that filters runoff slowly through 18 inches of engineered soil, which removes most pollutants before the runoff seeps into the native soils, or discharges through a sub-drain system. Bioretention also helps to reduce pollutants and stormwater pollutants through adsorptive processes within planting and vegetation included as a part of the design. In certain applications a low-flow outlet can be utilized which restricts runoff to a trickle into the

receiving storm drain system; thereby reducing erosion from concentrated discharge. Generally, bioretention systems are the most efficient and cost effective at meeting pollutant and flow control criteria. However, bioretention can sometimes be incompatible with surrounding land uses.

- Irrigation/Reuse: a system that stores stormwater runoff underground allowing for onsite reuse through irrigation of surface landscaping. The system includes both lined underground storage in tanks, chambers, or rock, and a pump system that connects to the existing irrigation system. The size of storage volume is limited by the assumed irrigation demand. As most precipitation in Escondido occurs during the winter months during which irrigation demand is minimal, this type of facility is generally the least efficient at reducing total stormwater flows. However, implementation of these types of projects can have a real environmental benefit when applied at the appropriate scale, and in circumstances under which the inter-event demand is balanced with the harvested supply.

- Underground storage/Infiltration: a facility built below the existing surface to store and infiltrate stormwater runoff into the native soil. Pollutant load reduction is achieved due to reduction or elimination of stormwater discharge. The storage facility may be constructed of plastic or fiberglass chambers, pipes, drain rock, or a combination of the three. The volume of water to be stored is dependent on the native infiltration rate.

Conceptual site plans for each project can be found within Appendix A. Each project is described below.

**ACP Candidate Site 1**: This site is located at El Norte Parkway at the intersection with Rincon Villa Drive. This site has excess, undeveloped right-of-way that could be used as an ACP. The project would likely include bioretention or underground storage and infiltration.

**ACP Candidate Site 2**: This site at Mountain View Park provides opportunities for bioretention and/or underground storage within the area currently covered in grass, a former orchard, and an undeveloped area. Steep topography and planned future trails limit the use of a greater portion of the undeveloped area, but the site still provides more than two acres of potential BMP footprint within close proximity to a major storm drain system.

**ACP Candidate Site 3**: The Vineyard at Escondido Golf Course provides opportunities to treat and reuse water with the installation of a harvesting system comprised of underground arch pipes (or similar). The intent of this approach is reduce irrigation demands and achieve water conservation, while improving water quality on a sub-watershed level. The potential BMP footprint shown is assumed and very flexible given the open nature of the site. It can be enlarged or reduced to provide the most cost effective utilization of the golf course. The parcels are currently owned jointly by the City of Escondido and the City of San Diego, requiring coordination with the City of San Diego for BMP implementation.

**ACP Candidate Site 4**: Washington Park provides an opportunity for underground storage or irrigation reuse within the Park.

**ACP Candidate Site 5**: Orange Glen High School includes an existing concrete-lined channel. Flow from the concrete channel could be diverted into an adjacent landscaped area that could be used as bioretention or underground storage. BMP implementation will require approval from and close coordination with Escondido Union High School District.

**ACP Candidate Site 6**: This site proposes incorporation of a regional BMP as part of a CIP project previously developed for Spruce Street Channel. Options to divert flow from an existing storm drain pipe or the main channel are both considered.

**ACP Candidate Site 7**: This site proposes incorporation of a regional BMP as part of a CIP project previously developed for Reidy Creek Channel. The intent is to use the adjacent recreational field at Escondido High School, which is within close proximity to major stormwater infrastructure and the channel project site. BMP implementation will require approval from and close coordination with Escondido Union High School District.

**ACP Candidate Site 8**: This site is adjacent to a planned park site project and is next to the Hale Avenue Resource Recovery Facility (HARRF). The proposed BMP footprint provides opportunities for bioretention and/or underground storage and infiltration, given its close proximity to a major concrete channel. This site would most likely be developed in conjunction with the Citracado Parkway extension and/or a bicycle trail extension along Escondido Creek.

**ACP Candidate Site 9**: The Woodward parking area provides a large footprint for a potential storage and infiltration system. This system could be incorporated in addition to removing the concrete channel base in Escondido Creek at El Caballo Park and Grape Day Park.

**ACP Candidate Site 10**: Grape Day Park provides a potential for underground storage and reuse. Located adjacent to Site 9, this site provides further opportunity for treatment in addition to removing the concrete channel base in Escondido Creek at El Caballo Park and Grape Day Park.

# TECHNICAL ANALYSIS OF ALTERNATIVE COMPLIANCE SITES

The next step in evaluating ACP sites involved a technical analysis that applied the Regional Water Quality Equivalency (WQE) method. Results from the WQE were used to establish equivalent development areas associated with private development or capital improvements. Through the use of whole life cost information, a prioritized plan of implementation was established.

## Regional Water Quality Equivalency

The following is an overview of the water quality equivalency taken from the *Water Quality Equivalency Guidance Document Region 9, For Participation in Jurisdictional Offsite Alternative Compliance Program, Public Draft #1* (San Diego Regional Copermittees, July 2015):

> *"Water quality equivalency for stormwater pollutant control is established based on a metric of stormwater volume. The Permit requires that PDPs provide effective stormwater treatment through onsite retention (interception, storage, infiltration, evaporation, and*

> *evapotranspiration) of the DCV. Where full retention of the DCV is not technically feasible, biofiltration may be provided either through biofiltration of 1.50 times the remaining DCV, or biofiltration of the remaining DCV with a design that can accommodate at least 0.75 times the DCV within the pore spaces and pre-filter detention volume. Alternatively, if a jurisdiction has an offsite alternative compliance program in place, applicants may utilize onsite flow-thru treatment control BMPs that provide a medium to high pollutant removal efficiency to treat runoff leaving the site, and then also mitigate for the DCV not reliably retained onsite through participation in an offsite alternative compliance program.*
>
> *If a PDP applicant proposes to utilize offsite alternative compliance to satisfy onsite stormwater pollutant control requirements, they must demonstrate that the earned stormwater pollutant control volume from the ACP is greater than the deficit of effectively treated stormwater volume from the PDP. In other words, the sum of the stormwater pollutant control credits associated with an ACP must exceed the stormwater pollutant control debits generated by the PDP……Three fundamental steps must be performed to determine whether or not the Permit standard of greater overall water quality benefit has been achieved. First, the treatment required of and provided by the PDP must be characterized to define the remaining ACP treatment needs (deficit of effectively treated stormwater volume). Second, the treatment provided by the ACP is characterized (earned stormwater pollutant control volume). Finally, the volumes determined from the previous two steps are compared to determine if the Permit standard has been met."*

A spreadsheet accompanying the July 2015 Public Draft was used to compute "Land Use Factor" for each of the City's candidate sites. "Earned Stormwater Pollutant Control Volume" (ESPCV) was calculated using Equation 1:

*Equation 1: Earned Stormwater Pollutant Control Volume*

$$V_E = L\ (\Delta V + V_2B_2 - V_1B_1)$$

$V_E$ : Earned Stormwater Pollutant Control Volume ($ft^3$)

| | |
|---|---|
| L: Land Use Factor | $V_2$: Mitigated Condition Design Capture Volume for ACP |
| $\Delta V$: Change in Design Capture Volume ($V_1 - V_2$) | $B_1$: Impacted Condition BMP Efficacy Factor |
| $V_1$: Impacted Condition Design Capture Volume for ACP | $B_2$: Mitigated Condition BMP Efficacy Factor |

Appendix B presents the detailed application of Equation 1 to each site. Such application involved consideration of both watershed hydrology and typical BMP design parameters. Appendix D and Appendix E provide detailed information regarding watershed hydrology and BMP design parameters.

Once ESPCV was determined, it was correlated to an "Equivalent Development Area" by dividing by the water quality depth and assumed "C" factor. The results indicated how large of a particular project ("reference site") for which the ACP would provide equivalent pollutant control volume mitigation. Based upon the value chosen for the "C" factor, the result is specific to an assumed land use (i.e., residential,

commercial, industrial, etc.). The design volume of each regional BMP site was used to express how large of a reference site the ACP can mitigate for the impacts from hydromodification.

For planning purposes, the Regional Hydromodification Sizing Tables (Brown and Caldwell) provided convenient, conservative, and defensible volume factors as a basis to compute a "high" and "low" range of equivalent development areas specific to watershed, soil type, and topography. The range of values correspond to 0.5, 0.3, or 0.1 Q2 for Flat, Type B soil for the maximum value and 0.5, 0.3, or 0.1 Q2 for Steep, Type A soil for the minimum value. (During the design phase, the hydromodification requirement should be studied in more detail, which is typically done with a model such as San Diego Hydrology Model (SDHM), which will produce more refined results.)

Reference sites may require mitigation for pollutant control volume, hydromodification, or both.

The equivalent development area, in essence, can serve as the basis of a credit system for ACP sites to mitigate various types of private or public development. This approach is very flexible in that it considers the size and nature of the ACP; the size, location, and type of reference site; and, the site-specific mitigation needs. The types of land use designations for which equivalent development area can be calculated are as follows:

- Agriculture
- **Commercial**
- Education
- Industrial
- **Multi-Family Residential**
- Orchard
- Rural Residential
- **Single Family Residential**
- **Transportation**
- Vacant/Open Space
- Water

For the purposes of this study, only commercial, multifamily residential, single family residential, and transportation have been included in the example calculations as they represent the range of equivalent development areas that could be expected based on the land use of the proposed ACP tributary area. It is expected that when an ACP project is implemented, the calculations will be refined to reflect the specific land uses and other design details involved in the project.

Detailed calculations to develop equivalent development area for each ACP site can be found in Appendix B. The results are summarized in Table 1 . Each column of Table 1 is explained here:

**ACP Site #:** Alternative Compliance Project Site Number. Descriptions of the project are found on pages 5-6 and in Appendix A.

**WMA:** Watershed Management Area. ACPs within the City of Escondido are within either the Carlsbad WMA or the San Dieguito WMA.

**ACP Tributary Area (ac):** The area tributary to the Alternative Compliance Project. This determines that maximum volume of water available for treatment.

**Reference Land Use:** The type of future development that will use the ACP as offsite mitigation. Because different land use types generate different volumes and rates of runoff and pollutant loadings, 4 of the most common land use types are presented for each ACP alternative.

**Land Use Factor:** Computed by dividing the Relative Pollutant Concentrations by Land Use for the ACP Tributary area by the Relative Pollutant Concentration for the Reference Tributary area for each of the 7 pollutants of concern (TSS, TP, TN, Tcu, TPb, TZn, FC). The lowest computed land use factor controls the result and is reported here.

**ACP DCV (ft3):** ACP design capture volume that the BMP can detain

**BMP Surface Area (sf):** Surface area of the proposed ACP

**BMP Type:** Potential types of ACPs identified are Irrigation Reuse, Bioretention, and Underground Storage

**Earned Stormwater Pollutant Control Credit (ft3):** The pollutant treatment provided by the ACP for a given reference land use

**Equivalent Pollutant Control Development Area (ac):** The area of a given reference land use whose pollutant control treatment requirement can be offset by the ACP

**ACP Retention Volume (ft3):** The total volume that the given ACP retains for flow control purposes

**Minimum Equivalent Hyd. Flow Control Development Area (ac):** the minimum area of a given reference land use whose flow control criteria can be offset by the ACP (based on the Regional Hydromodification Sizing Tables)

**Maximum Equivalent Hyd. Flow Control Development Area (ac):** the maximum area of a given reference land use whose flow control criteria can be offset by the ACP (based on the Regional Hydromodification Sizing Tables)

**Minimum Governing Equivalent Development Area (ac):** the equivalent development area for an ACP that is designed to meet both pollutant control and flow control requirements of a reference site based on the most restrictive requirement. Flow control is almost always the controlling factor, limiting the area that can be developed using the ACP to meet its requirements.

## TABLE 1. EARNED STORMWATER POLLUTANT CONTROL CREDIT AND EQUIVALENT DEVELOPMENT AREA

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | Carlsbad | 130.27 | Commercial | 0.46 | 166,454 | 7,800 | Bioretention | 22,640 | 12.99 | 15,600 | 2.22 | 4.30 | 2.22 |
| 1A | Carlsbad | 130.27 | Multi Family | 1.23 | 166,454 | 7,800 | Bioretention | 60,537 | 34.74 | 15,600 | 2.96 | 5.74 | 2.96 |
| 1A | Carlsbad | 130.27 | Single Family | 0.64 | 166,454 | 7,800 | Bioretention | 31,499 | 18.08 | 15,600 | 4.44 | 8.61 | 4.44 |
| 1A | Carlsbad | 130.27 | Transportation | 0.89 | 166,454 | 7,800 | Bioretention | 43,803 | 25.14 | 15,600 | 1.97 | 3.83 | 1.97 |
| 1B | Carlsbad | 130.27 | Commercial | 0.46 | 166,454 | 14,000 | Underground Storage | 29,305 | 16.82 | 27,767 | 3.95 | 7.66 | 3.95 |
| 1B | Carlsbad | 130.27 | Multi Family | 1.23 | 166,454 | 14,000 | Underground Storage | 78,359 | 44.97 | 27,767 | 5.27 | 10.22 | 5.27 |
| 1B | Carlsbad | 130.27 | Single Family | 0.64 | 166,454 | 14,000 | Underground Storage | 40,772 | 23.40 | 27,767 | 7.91 | 15.32 | 7.91 |
| 1B | Carlsbad | 130.27 | Transportation | 0.89 | 166,454 | 14,000 | Underground Storage | 56,698 | 32.54 | 27,767 | 3.51 | 6.81 | 3.51 |
| 2A | Carlsbad | 126.34 | Commercial | 0.36 | 392,522 | 102,000 | Bioretention | 141,260 | 81.07 | 204,000 | 29.05 | 56.29 | 29.05 |
| 2A | Carlsbad | 126.34 | Multi Family | 1.15 | 392,522 | 102,000 | Bioretention | 451,246 | 258.98 | 204,000 | 38.74 | 75.05 | 38.74 |
| 2A | Carlsbad | 126.34 | Single Family | 0.49 | 392,522 | 102,000 | Bioretention | 192,270 | 110.35 | 204,000 | 58.10 | 112.58 | 58.10 |
| 2A | Carlsbad | 126.34 | Transportation | 1.19 | 392,522 | 102,000 | Bioretention | 466,941 | 267.99 | 204,000 | 25.82 | 50.03 | 25.82 |
| 2B | Carlsbad | 126.34 | Commercial | 0.36 | 392,522 | 119,000 | Underground Storage | 141,266 | 81.08 | 236,017 | 33.61 | 65.12 | 33.61 |
| 2B | Carlsbad | 126.34 | Multi Family | 1.15 | 392,522 | 119,000 | Underground Storage | 451,265 | 258.99 | 236,017 | 44.82 | 86.83 | 44.82 |
| 2B | Carlsbad | 126.34 | Single Family | 0.49 | 392,522 | 119,000 | Underground Storage | 192,278 | 110.35 | 236,017 | 67.22 | 130.25 | 67.22 |
| 2B | Carlsbad | 126.34 | Transportation | 1.19 | 392,522 | 119,000 | Underground Storage | 466,961 | 268.00 | 236,017 | 29.88 | 57.89 | 29.88 |

**TABLE 1, CONTINUED**

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2C | Carlsbad | 126.34 | Commercial | 0.36 | 392,522 | 4,000 | Irrigation Reuse | 4,535 | 2.60 | 4,200 | 0.60 | 1.16 | 0.60 |
| 2C | Carlsbad | 126.34 | Multi Family | 1.15 | 392,522 | 4,000 | Irrigation Reuse | 14,486 | 8.31 | 4,200 | 0.80 | 1.55 | 0.80 |
| 2C | Carlsbad | 126.34 | Single Family | 0.49 | 392,522 | 4,000 | Irrigation Reuse | 6,172 | 3.54 | 4,200 | 1.20 | 2.32 | 1.20 |
| 2C | Carlsbad | 126.34 | Transportation | 1.19 | 392,522 | 4,000 | Irrigation Reuse | 14,990 | 8.60 | 4,200 | 0.53 | 1.03 | 0.53 |
| 3 | San Dieguito | 289.05 | Commercial | 0.46 | 30,218 | 7,000 | Irrigation Reuse | 8,863 | 5.09 | 7,350 | 1.05 | 2.03 | 1.05 |
| 3 | San Dieguito | 289.05 | Multi Family | 1.09 | 30,218 | 7,000 | Irrigation Reuse | 21,002 | 12.05 | 7,350 | 1.40 | 2.70 | 1.40 |
| 3 | San Dieguito | 289.05 | Single Family | 0.63 | 30,218 | 7,000 | Irrigation Reuse | 12,139 | 6.97 | 7,350 | 2.09 | 4.06 | 2.09 |
| 3 | San Dieguito | 289.05 | Transportation | 1.06 | 30,218 | 7,000 | Irrigation Reuse | 20,424 | 11.72 | 7,350 | 0.93 | 1.80 | 0.93 |
| 4A | Carlsbad | 160.59 | Commercial | 0.47 | 251,830 | 70,000 | Underground Storage | 118,320 | 67.91 | 138,833 | 19.77 | 38.31 | 19.77 |
| 4A | Carlsbad | 160.59 | Multi Family | 1.05 | 251,830 | 70,000 | Underground Storage | 264,331 | 151.71 | 138,833 | 26.36 | 51.08 | 26.36 |
| 4A | Carlsbad | 160.59 | Single Family | 0.65 | 251,830 | 70,000 | Underground Storage | 163,633 | 93.91 | 138,833 | 39.54 | 76.61 | 39.54 |
| 4A | Carlsbad | 160.59 | Transportation | 0.85 | 251,830 | 70,000 | Underground Storage | 213,982 | 122.81 | 138,833 | 17.57 | 34.05 | 17.57 |
| 4B | Carlsbad | 160.59 | Commercial | 0.47 | 251,830 | 2,900 | Irrigation Reuse | 4,092 | 2.35 | 3,045 | 0.43 | 0.84 | 0.43 |
| 4B | Carlsbad | 160.59 | Multi Family | 1.05 | 251,830 | 2,900 | Irrigation Reuse | 9,142 | 5.25 | 3,045 | 0.58 | 1.12 | 0.58 |

**TABLE 1, CONTINUED**

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4B | Carlsbad | 160.59 | Single Family | 0.65 | 251,830 | 2,900 | Irrigation Reuse | 5,659 | 3.25 | 3,045 | 0.87 | 1.68 | 0.87 |
| 4B | Carlsbad | 160.59 | Transportation | 0.85 | 251,830 | 2,900 | Irrigation Reuse | 7,401 | 4.25 | 3,045 | 0.39 | 0.75 | 0.39 |
| 5A | San Dieguito | 533.17 | Commercial | 0.43 | 166,454 | 18,000 | Bioretention | 42,859 | 24.60 | 36,000 | 5.13 | 9.93 | 5.13 |
| 5A | San Dieguito | 533.17 | Multi Family | 1.12 | 166,454 | 18,000 | Bioretention | 111,633 | 64.07 | 36,000 | 6.84 | 13.24 | 6.84 |
| 5A | San Dieguito | 533.17 | Single Family | 0.59 | 166,454 | 18,000 | Bioretention | 58,807 | 33.75 | 36,000 | 10.25 | 19.87 | 10.25 |
| 5A | San Dieguito | 533.17 | Transportation | 0.92 | 166,454 | 18,000 | Bioretention | 91,699 | 52.63 | 36,000 | 4.56 | 8.83 | 4.56 |
| 5B | San Dieguito | 533.17 | Commercial | 0.43 | 619,330 | 22,000 | Underground Storage | 46,611 | 26.75 | 43,633 | 6.21 | 12.04 | 6.21 |
| 5B | San Dieguito | 533.17 | Multi Family | 1.12 | 619,330 | 22,000 | Underground Storage | 121,406 | 69.68 | 43,633 | 8.29 | 16.05 | 8.29 |
| 5B | San Dieguito | 533.17 | Single Family | 0.59 | 619,330 | 22,000 | Underground Storage | 63,955 | 36.70 | 43,633 | 12.43 | 24.08 | 12.43 |
| 5B | San Dieguito | 533.17 | Transportation | 0.92 | 619,330 | 22,000 | Underground Storage | 99,726 | 57.23 | 43,633 | 5.52 | 10.70 | 5.52 |
| 6A | Carlsbad | 783.32 | Commercial | 0.46 | 1,433,100 | 15,000 | Underground Storage | 33,901 | 19.46 | 29,750 | 4.24 | 8.21 | 4.24 |
| 6A | Carlsbad | 783.32 | Multi Family | 1.05 | 1,433,100 | 15,000 | Underground Storage | 77,383 | 44.41 | 29,750 | 5.65 | 10.94 | 5.65 |

**TABLE 1, CONTINUED**

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6A | Carlsbad | 783.32 | Single Family | 0.64 | 1,433,100 | 15,000 | Underground Storage | 47,167 | 27.07 | 29,750 | 8.47 | 16.42 | 8.47 |
| 6A | Carlsbad | 783.32 | Transportation | 0.84 | 1,433,100 | 15,000 | Underground Storage | 61,906 | 35.53 | 29,750 | 3.77 | 7.30 | 3.77 |
| 6B | Carlsbad | 73.45 | Commercial | 0.53 | 172,772 | 9,200 | Bioretention | 29,099 | 16.70 | 18,400 | 2.62 | 5.08 | 2.62 |
| 6B | Carlsbad | 73.45 | Multi Family | 1.07 | 172,772 | 9,200 | Bioretention | 58,747 | 33.72 | 18,400 | 3.49 | 6.77 | 3.49 |
| 6B | Carlsbad | 73.45 | Single Family | 0.73 | 172,772 | 9,200 | Bioretention | 40,080 | 23.00 | 18,400 | 5.24 | 10.15 | 5.24 |
| 6B | Carlsbad | 73.45 | Transportation | 0.81 | 172,772 | 9,200 | Bioretention | 44,472 | 25.52 | 18,400 | 2.33 | 4.51 | 2.33 |
| 6C | Carlsbad | 73.45 | Commercial | 0.53 | 172,772 | 16,000 | Underground Storage | 38,692 | 22.21 | 31,733 | 4.52 | 8.76 | 4.52 |
| 6C | Carlsbad | 73.45 | Multi Family | 1.07 | 172,772 | 16,000 | Underground Storage | 78,115 | 44.83 | 31,733 | 6.03 | 11.67 | 6.03 |
| 6C | Carlsbad | 73.45 | Single Family | 0.73 | 172,772 | 16,000 | Underground Storage | 53,293 | 30.59 | 31,733 | 9.04 | 17.51 | 9.04 |
| 6C | Carlsbad | 73.45 | Transportation | 0.81 | 172,772 | 16,000 | Underground Storage | 59,134 | 33.94 | 31,733 | 4.02 | 7.78 | 4.02 |
| 7A | Carlsbad | 30.64 | Commercial | 0.43 | 39,151 | 21,300 | Bioretention | 16,835 | 9.66 | 42,600 | 6.07 | 11.75 | 6.07 |
| 7A | Carlsbad | 30.64 | Multi Family | 1.03 | 39,151 | 21,300 | Bioretention | 40,325 | 23.14 | 42,600 | 8.09 | 15.67 | 8.09 |
| 7A | Carlsbad | 30.64 | Single Family | 0.60 | 39,151 | 21,300 | Bioretention | 23,491 | 13.48 | 42,600 | 12.13 | 23.51 | 12.13 |
| 7A | Carlsbad | 30.64 | Transportation | 0.84 | 39,151 | 21,300 | Bioretention | 32,887 | 18.87 | 42,600 | 5.39 | 10.45 | 5.39 |
| 7B | Carlsbad | 30.64 | Commercial | 0.43 | 39,151 | 22,900 | Underground Storage | 16,835 | 9.66 | 45,418 | 6.47 | 12.53 | 6.47 |
| 7B | Carlsbad | 30.64 | Multi Family | 1.03 | 39,151 | 22,900 | Underground Storage | 40,325 | 23.14 | 45,418 | 8.62 | 16.71 | 8.62 |

**TABLE 1, CONTINUED**

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7B | Carlsbad | 30.64 | Single Family | 0.60 | 39,151 | 22,900 | Underground Storage | 23,491 | 13.48 | 45,418 | 12.94 | 25.06 | 12.94 |
| 7B | Carlsbad | 30.64 | Transportation | 0.84 | 39,151 | 22,900 | Underground Storage | 32,887 | 18.87 | 45,418 | 5.75 | 11.14 | 5.75 |
| 7C | Carlsbad | 30.64 | Commercial | 0.43 | 39,151 | 4,500 | Irrigation Reuse | 5,753 | 3.30 | 4,725 | 0.67 | 1.30 | 0.67 |
| 7C | Carlsbad | 30.64 | Multi Family | 1.03 | 39,151 | 4,500 | Irrigation Reuse | 13,781 | 7.91 | 4,725 | 0.90 | 1.74 | 0.90 |
| 7C | Carlsbad | 30.64 | Single Family | 0.6 | 39,151 | 4,500 | Irrigation Reuse | 8,028 | 4.61 | 4,725 | 1.35 | 2.61 | 1.35 |
| 7C | Carlsbad | 30.64 | Transportation | 0.84 | 39,151 | 4,500 | Irrigation Reuse | 11,239 | 6.45 | 4,725 | 0.60 | 1.16 | 0.60 |
| 8A | Carlsbad | 525.89 | Commercial | 0.47 | 658,046 | 22,000 | Bioretention | 63,392 | 36.38 | 44,000 | 6.27 | 12.14 | 6.27 |
| 8A | Carlsbad | 525.89 | Multi Family | 1.05 | 658,046 | 22,000 | Bioretention | 141,619 | 81.28 | 44,000 | 8.35 | 16.19 | 8.35 |
| 8A | Carlsbad | 525.89 | Single Family | 0.65 | 658,046 | 22,000 | Bioretention | 87,669 | 50.32 | 44,000 | 12.53 | 24.28 | 12.53 |
| 8A | Carlsbad | 525.89 | Transportation | 0.85 | 658,046 | 22,000 | Bioretention | 114,644 | 65.80 | 44,000 | 5.57 | 10.79 | 5.57 |
| 8B | Carlsbad | 525.89 | Commercial | 0.47 | 658,046 | 30,000 | Underground Storage | 69,170 | 39.70 | 59,500 | 8.47 | 16.42 | 8.47 |
| 8B | Carlsbad | 525.89 | Multi Family | 1.05 | 658,046 | 30,000 | Underground Storage | 154,529 | 88.69 | 59,500 | 11.30 | 21.89 | 11.30 |
| 8B | Carlsbad | 525.89 | Single Family | 0.65 | 658,046 | 30,000 | Underground Storage | 95,661 | 54.90 | 59,500 | 16.95 | 32.83 | 16.95 |
| 8B | Carlsbad | 525.89 | Transportation | 0.85 | 658,046 | 30,000 | Underground Storage | 125,095 | 71.79 | 59,500 | 7.53 | 14.59 | 7.53 |
| 9 | Carlsbad | 25.08 | Commercial | 0.76 | 58,994 | 34,500 | Underground Storage | 44,835 | 25.73 | 68,425 | 9.74 | 18.88 | 9.74 |
| 9 | Carlsbad | 25.08 | Multi Family | 1.15 | 58,994 | 34,500 | Underground Storage | 67,843 | 38.94 | 68,425 | 12.99 | 37.76 | 12.99 |

**TABLE 1, CONTINUED**

| ACP Site # | WMA | ACP Tributary Area (ac) | Reference Land Use | Land Use Factor | ACP DCV (ft3) | BMP Surface Area (sf) | BMP Type | Earned Stormwater Pollutant Control Credit ($ft^3$) | Equivalent Pollutant Control Development Area (ac) | ACP Retention Volume (ft3) | Minimum Equivalent Hyd. Flow Control Development Area (ac) | Maximum Equivalent Hyd. Flow Control Development Area (ac) | Minimum Governing Equivalent Development Area (ac) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Carlsbad | 25.08 | Single Family | 0.92 | 58,994 | 34,500 | Underground Storage | 54,274 | 31.15 | 68,425 | 19.49 | 25.17 | 19.49 |
| 9 | Carlsbad | 25.08 | Transportation | 0.71 | 58,994 | 34,500 | Underground Storage | 41,886 | 24.04 | 68,425 | 8.66 | 16.78 | 8.66 |
| 10A | Carlsbad | 30.71 | Commercial | 0.69 | 83,705 | 48,500 | Underground Storage | 57,756 | 33.15 | 96,192 | 13.70 | 26.54 | 13.70 |
| 10A | Carlsbad | 30.71 | Multi Family | 1.12 | 83,705 | 48,500 | Underground Storage | 93,749 | 53.80 | 96,192 | 18.27 | 35.39 | 18.27 |
| 10A | Carlsbad | 30.71 | Single Family | 0.94 | 83,705 | 48,500 | Underground Storage | 78,682 | 45.16 | 96,192 | 27.40 | 53.08 | 27.40 |
| 10A | Carlsbad | 30.71 | Transportation | 0.74 | 83,705 | 48,500 | Underground Storage | 61,941 | 35.55 | 96,192 | 12.18 | 23.59 | 12.18 |
| 10B | Carlsbad | 30.71 | Commercial | 0.69 | 83,705 | 2,000 | Irrigation Reuse | 4,079 | 2.34 | 2,100 | 0.30 | 0.58 | 0.30 |
| 10B | Carlsbad | 30.71 | Multi Family | 1.12 | 83,705 | 2,000 | Irrigation Reuse | 6,621 | 3.80 | 2,100 | 0.40 | 0.77 | 0.40 |
| 10B | Carlsbad | 30.71 | Single Family | 0.94 | 83,705 | 2,000 | Irrigation Reuse | 5,557 | 3.19 | 2,100 | 0.60 | 1.16 | 0.60 |
| 10B | Carlsbad | 30.71 | Transportation | 0.74 | 83,705 | 2,000 | Irrigation Reuse | 4,374 | 2.51 | 2,100 | 0.27 | 0.52 | 0.27 |

## ACP Cost Evaluation and Implementation

Each candidate ACP site supports one or more potential BMP type. Using the BMP type and estimated sizing potential, a preliminary opinion of probable cost was developed for each capital improvement scenario. BMPs with heavy reliance on underground conduits and fabricated structures (such as underground retention and re-use systems) were assumed to conservatively provide a 50-year service life with relatively intense routine maintenance. More natural Low Impact Development (LID) BMPs, such as bioretention or partial bioretention, were assumed to provide an unlimited service life with relatively less intense maintenance. For analytical purposes they were assumed to provide a 100-year service life.

The average annual Consumer Price Index increase over the last 100 years is 4.1%. Using service life, present value of capital improvements, and an annual increase of 4.1%, consistent with historical averages of CPI, an equivalent uniform annual cost (EUAC) was computed to estimate whole life expenditures. A proposed priority for ACP implementation was created that favors those sites (design alternatives) with the lowest ratio of EUAC to land credit acreage. Maintenance costs are given on a "per site" basis. A summary of preliminary cost and prioritized ACP implementation is found below in Table 2. Detailed cost backup information is in Appendix C.

## TABLE 2. ACP PRELIMINARY COST AND PROJECT IMPLEMENTATION

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial Reference Land Use** | | | | | | | | | | | |
| 2A | Carlsbad | 102,000 | Bioretention | Commercial | 29.05 | $2,521,990 | 100 | $116,762 | $223,321 | $7,687 | 1 |
| 5A | San Dieguito | 18,000 | Bioretention | Commercial | 5.13 | $546,910 | 100 | $30,262 | $53,357 | $10,407 | 2 |
| 7A | Carlsbad | 21,300 | Bioretention | Commercial | 6.07 | $702,555 | 100 | $34,062 | $63,679 | $10,496 | 3 |
| 8A | Carlsbad | 22,000 | Bioretention | Commercial | 6.27 | $944,730 | 100 | $32,662 | $72,550 | $11,578 | 4 |
| 1A | Carlsbad | 7,800 | Bioretention | Commercial | 2.22 | $238,897 | 100 | $30,262 | $40,354 | $18,164 | 5 |
| 2B | Carlsbad | 119,000 | Underground Storage | Commercial | 33.61 | $10,933,467 | 50 | $126,262 | $651,639 | $19,387 | 6 |
| 6B | Carlsbad | 9,200 | Bioretention | Commercial | 2.62 | $463,618 | 100 | $31,562 | $51,059 | $19,485 | 7 |
| 4A | Carlsbad | 70,000 | Underground Storage | Commercial | 19.77 | $6,469,212 | 50 | $82,762 | $393,622 | $19,908 | 8 |
| 5B | San Dieguito | 22,000 | Underground Storage | Commercial | 6.21 | $2,188,032 | 50 | $52,162 | $157,217 | $25,301 | 9 |
| 10A | Carlsbad | 48,500 | Underground Storage | Commercial | 13.70 | $5,657,991 | 50 | $75,762 | $346,926 | $25,325 | 10 |
| 7B | Carlsbad | 22,900 | Underground Storage | Commercial | 6.47 | $2,347,151 | 50 | $52,162 | $164,800 | $25,479 | 11 |
| 8B | Carlsbad | 30,000 | Underground Storage | Commercial | 8.47 | $3,296,652 | 50 | $59,462 | $217,718 | $25,694 | 12 |
| 9 | Carlsbad | 34,500 | Underground Storage | Commercial | 9.74 | $4,126,341 | 50 | $63,562 | $261,333 | $26,818 | 13 |
| 1B | Carlsbad | 14,000 | Underground Storage | Commercial | 3.95 | $1,382,924 | 50 | $52,162 | $118,569 | $29,985 | 14 |
| 6C | Carlsbad | 16,000 | Underground Storage | Commercial | 4.52 | $1,776,547 | 50 | $53,662 | $138,827 | $30,719 | 15 |
| 6A | Carlsbad | 15,000 | Underground Storage | Commercial | 4.24 | $1,680,693 | 50 | $53,662 | $134,288 | $31,696 | 16 |

**TABLE 2, CONTINUED**

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | San Dieguito | 7,000 | Irrigation Reuse | Commercial | 1.05 | $1,089,882 | 50 | $49,862 | $102,218 | $97,655 | 17 |
| 7C | Carlsbad | 4,500 | Irrigation Reuse | Commercial | 0.67 | $582,668 | 50 | $48,062 | $76,044 | $113,009 | 18 |
| 2C | Carlsbad | 4,000 | Irrigation Reuse | Commercial | 0.60 | $502,123 | 50 | $49,862 | $73,981 | $123,688 | 19 |
| 4B | Carlsbad | 2,900 | Irrigation Reuse | Commercial | 0.43 | $386,954 | 50 | $49,562 | $68,150 | $157,155 | 20 |
| 10B | Carlsbad | 2,000 | Irrigation Reuse | Commercial | 0.30 | $314,764 | 50 | $45,562 | $60,657 | $202,823 | 21 |
| **Multi Family Reference Land Use** | | | | | | | | | | | |
| 2A | Carlsbad | 102,000 | Bioretention | Multi Family | 38.74 | $2,521,990 | 100 | $116,762 | $223,321 | $5,765 | 1 |
| 5A | San Dieguito | 18,000 | Bioretention | Multi Family | 6.84 | $546,910 | 100 | $30,262 | $53,357 | $7,806 | 2 |
| 7A | Carlsbad | 21,300 | Bioretention | Multi Family | 8.09 | $702,555 | 100 | $34,062 | $63,679 | $7,872 | 3 |
| 8A | Carlsbad | 22,000 | Bioretention | Multi Family | 8.35 | $944,730 | 100 | $32,662 | $72,550 | $8,684 | 4 |
| 1A | Carlsbad | 7,800 | Bioretention | Multi Family | 2.96 | $238,897 | 100 | $30,262 | $40,354 | $13,623 | 5 |
| 2B | Carlsbad | 119,000 | Underground Storage | Multi Family | 44.82 | $10,933,467 | 50 | $126,262 | $651,639 | $14,540 | 6 |
| 6B | Carlsbad | 9,200 | Bioretention | Multi Family | 3.49 | $463,618 | 100 | $31,562 | $51,059 | $14,614 | 7 |
| 4A | Carlsbad | 70,000 | Underground Storage | Multi Family | 26.36 | $6,469,212 | 50 | $82,762 | $393,622 | $14,931 | 8 |
| 5B | San Dieguito | 22,000 | Underground Storage | Multi Family | 8.29 | $2,188,032 | 50 | $52,162 | $157,217 | $18,976 | 9 |
| 10A | Carlsbad | 48,500 | Underground Storage | Multi Family | 18.27 | $5,657,991 | 50 | $75,762 | $346,926 | $18,994 | 10 |
| 7B | Carlsbad | 22,900 | Underground Storage | Multi Family | 8.62 | $2,347,151 | 50 | $52,162 | $164,800 | $19,109 | 11 |

**TABLE 2, CONTINUED**

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8B | Carlsbad | 30,000 | Underground Storage | Multi Family | 11.30 | $3,296,652 | 50 | $59,462 | $217,718 | $19,270 | 12 |
| 9 | Carlsbad | 34,500 | Underground Storage | Multi Family | 12.99 | $4,126,341 | 50 | $63,562 | $261,333 | $20,114 | 13 |
| 1B | Carlsbad | 14,000 | Underground Storage | Multi Family | 5.27 | $1,382,924 | 50 | $52,162 | $118,569 | $22,489 | 14 |
| 6C | Carlsbad | 16,000 | Underground Storage | Multi Family | 6.03 | $1,776,547 | 50 | $53,662 | $138,827 | $23,039 | 15 |
| 6A | Carlsbad | 15,000 | Underground Storage | Multi Family | 5.65 | $1,680,693 | 50 | $53,662 | $134,288 | $23,772 | 16 |
| 3 | San Dieguito | 7,000 | Irrigation Reuse | Multi Family | 1.40 | $1,089,882 | 50 | $49,862 | $102,218 | $73,241 | 17 |
| 7C | Carlsbad | 4,500 | Irrigation Reuse | Multi Family | 0.90 | $582,668 | 50 | $48,062 | $76,044 | $84,757 | 18 |
| 2C | Carlsbad | 4,000 | Irrigation Reuse | Multi Family | 0.80 | $502,123 | 50 | $49,862 | $73,981 | $92,766 | 19 |
| 4B | Carlsbad | 2,900 | Irrigation Reuse | Multi Family | 0.58 | $386,954 | 50 | $49,562 | $68,150 | $117,867 | 20 |
| 10B | Carlsbad | 2,000 | Irrigation Reuse | Multi Family | 0.40 | $314,764 | 50 | $45,562 | $60,657 | $152,117 | 21 |
| **Single Family Reference Land Use** | | | | | | | | | | | |
| 2A | Carlsbad | 102,000 | Bioretention | Single Family | 58.10 | $2,521,990 | 100 | $116,762 | $223,321 | $3,843 | 1 |
| 5A | San Dieguito | 18,000 | Bioretention | Single Family | 10.25 | $546,910 | 100 | $30,262 | $53,357 | $5,204 | 2 |
| 7A | Carlsbad | 21,300 | Bioretention | Single Family | 12.13 | $702,555 | 100 | $34,062 | $63,679 | $5,248 | 3 |
| 8A | Carlsbad | 22,000 | Bioretention | Single Family | 12.53 | $944,730 | 100 | $32,662 | $72,550 | $5,789 | 4 |
| 1A | Carlsbad | 7,800 | Bioretention | Single Family | 4.44 | $238,897 | 100 | $30,262 | $40,354 | $9,082 | 5 |
| 2B | Carlsbad | 119,000 | Underground Storage | Single Family | 67.22 | $10,933,467 | 50 | $126,262 | $651,639 | $9,694 | 6 |

**TABLE 2, CONTINUED**

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6B | Carlsbad | 9,200 | Bioretention | Single Family | 5.24 | $463,618 | 100 | $31,562 | $51,059 | $9,743 | 7 |
| 4A | Carlsbad | 70,000 | Underground Storage | Single Family | 39.54 | $6,469,212 | 50 | $82,762 | $393,622 | $9,954 | 8 |
| 5B | San Dieguito | 22,000 | Underground Storage | Single Family | 12.43 | $2,188,032 | 50 | $52,162 | $157,217 | $12,650 | 9 |
| 10A | Carlsbad | 48,500 | Underground Storage | Single Family | 27.40 | $5,657,991 | 50 | $75,762 | $346,926 | $12,663 | 10 |
| 7B | Carlsbad | 22,900 | Underground Storage | Single Family | 12.94 | $2,347,151 | 50 | $52,162 | $164,800 | $12,739 | 11 |
| 8B | Carlsbad | 30,000 | Underground Storage | Single Family | 16.95 | $3,296,652 | 50 | $59,462 | $217,718 | $12,847 | 12 |
| 9 | Carlsbad | 34,500 | Underground Storage | Single Family | 19.49 | $4,126,341 | 50 | $63,562 | $261,333 | $13,409 | 13 |
| 1B | Carlsbad | 14,000 | Underground Storage | Single Family | 7.91 | $1,382,924 | 50 | $52,162 | $118,569 | $14,992 | 14 |
| 6C | Carlsbad | 16,000 | Underground Storage | Single Family | 9.04 | $1,776,547 | 50 | $53,662 | $138,827 | $15,360 | 15 |
| 6A | Carlsbad | 15,000 | Underground Storage | Single Family | 8.47 | $1,680,693 | 50 | $53,662 | $134,288 | $15,848 | 16 |
| 3 | San Dieguito | 7,000 | Irrigation Reuse | Single Family | 2.09 | $1,089,882 | 50 | $49,862 | $102,218 | $48,827 | 17 |
| 7C | Carlsbad | 4,500 | Irrigation Reuse | Single Family | 1.35 | $582,668 | 50 | $48,062 | $76,044 | $56,505 | 18 |
| 2C | Carlsbad | 4,000 | Irrigation Reuse | Single Family | 1.20 | $502,123 | 50 | $49,862 | $73,981 | $61,844 | 19 |
| 4B | Carlsbad | 2,900 | Irrigation Reuse | Single Family | 0.87 | $386,954 | 50 | $49,562 | $68,150 | $78,578 | 20 |
| 10B | Carlsbad | 2,000 | Irrigation Reuse | Single Family | 0.60 | $314,764 | 50 | $45,562 | $60,657 | $101,411 | 21 |
| **Transportation Reference Land Use** | | | | | | | | | | | |
| 2A | Carlsbad | 102,000 | Bioretention | Transportation | 25.82 | $2,521,990 | 100 | $116,762 | $223,321 | $8,648 | 1 |

**TABLE 2, CONTINUED**

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5A | San Dieguito | 18,000 | Bioretention | Transportation | 4.56 | $546,910 | 100 | $30,262 | $53,357 | $11,708 | 2 |
| 7A | Carlsbad | 21,300 | Bioretention | Transportation | 5.39 | $702,555 | 100 | $34,062 | $63,679 | $11,808 | 3 |
| 8A | Carlsbad | 22,000 | Bioretention | Transportation | 5.57 | $944,730 | 100 | $32,662 | $72,550 | $13,025 | 4 |
| 1A | Carlsbad | 7,800 | Bioretention | Transportation | 1.97 | $238,897 | 100 | $30,262 | $40,354 | $20,435 | 5 |
| 2B | Carlsbad | 119,000 | Underground Storage | Transportation | 29.88 | $10,933,467 | 50 | $126,262 | $651,639 | $21,811 | 6 |
| 6B | Carlsbad | 9,200 | Bioretention | Transportation | 2.33 | $463,618 | 100 | $31,562 | $51,059 | $21,921 | 7 |
| 4A | Carlsbad | 70,000 | Underground Storage | Transportation | 17.57 | $6,469,212 | 50 | $82,762 | $393,622 | $22,397 | 8 |
| 5B | San Dieguito | 22,000 | Underground Storage | Transportation | 5.52 | $2,188,032 | 50 | $52,162 | $157,217 | $28,463 | 9 |
| 10A | Carlsbad | 48,500 | Underground Storage | Transportation | 12.18 | $5,657,991 | 50 | $75,762 | $346,926 | $28,491 | 10 |
| 7B | Carlsbad | 22,900 | Underground Storage | Transportation | 5.75 | $2,347,151 | 50 | $52,162 | $164,800 | $28,664 | 11 |
| 8B | Carlsbad | 30,000 | Underground Storage | Transportation | 7.53 | $3,296,652 | 50 | $59,462 | $217,718 | $28,906 | 12 |
| 9 | Carlsbad | 34,500 | Underground Storage | Transportation | 8.66 | $4,126,341 | 50 | $63,562 | $261,333 | $30,171 | 13 |
| 1B | Carlsbad | 14,000 | Underground Storage | Transportation | 3.51 | $1,382,924 | 50 | $52,162 | $118,569 | $33,733 | 14 |
| 6C | Carlsbad | 16,000 | Underground Storage | Transportation | 4.02 | $1,776,547 | 50 | $53,662 | $138,827 | $34,559 | 15 |
| 6A | Carlsbad | 15,000 | Underground Storage | Transportation | 3.77 | $1,680,693 | 50 | $53,662 | $134,288 | $35,658 | 16 |
| 3 | San Dieguito | 7,000 | Irrigation Reuse | Transportation | 0.93 | $1,089,882 | 50 | $49,862 | $102,218 | $109,862 | 17 |
| 7C | Carlsbad | 4,500 | Irrigation Reuse | Transportation | 0.60 | $582,668 | 50 | $48,062 | $76,044 | $127,135 | 18 |

**TABLE 2, CONTINUED**

| ACP Site # | WMA | BMP Surface Area (sf) | BMP Type | Reference Land Use | Governing Equivalent Development Area (ac) | Capital Cost | Assumed Design Life | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2C | Carlsbad | 4,000 | Irrigation Reuse | Transportation | 0.53 | $502,123 | 50 | $49,862 | $73,981 | $139,149 | 19 |
| 4B | Carlsbad | 2,900 | Irrigation Reuse | Transportation | 0.39 | $386,954 | 50 | $49,562 | $68,150 | $176,800 | 20 |
| 10B | Carlsbad | 2,000 | Irrigation Reuse | Transportation | 0.27 | $314,764 | 50 | $45,562 | $60,657 | $228,176 | 21 |

# WATER QUALITY IMPROVEMENTS ESCONDIDO CREEK

## GENERAL APPROACH

This task involved assessment of water quality benefits that would be expected from removing the concrete channel base (with or without alternative cross-sections) at two specific locations in Escondido Creek (El Caballo Park and Grape Day Park). This required hydrologic analysis of the contributing area to each study reach, as well as a physically based determination of volume loss from additional infiltration (in both wet weather and dry weather conditions.) It is also understood that these channel reaches would need to convey the 100-year flow, which required confirmation through separate hydrology and hydraulic computations. The general location of both sites is illustrated in Figure 1.

## LOCATION OF WORK

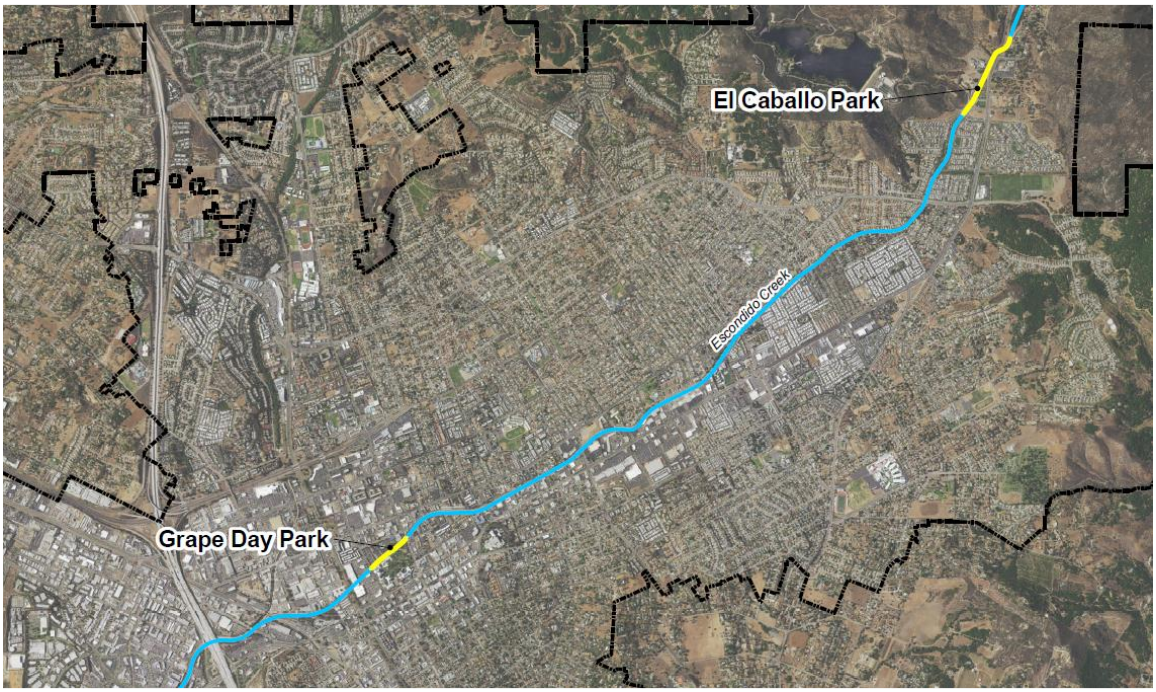
### El Caballo Park

El Caballo Park is located in northeastern Escondido near Dixon Lake. It is adjacent to the beginning of the concrete portion of Escondido Creek. Runoff to this location comes primarily from the hills to the north and the east. For the purpose of water quality benefit analysis, it is assumed that both Lake Wohlford and Dixon Lake will capture and store the tributary runoff to each reservoir (i.e., no discharge from lakes). The total direct tributary area to Escondido Creek, at El Caballo Park, is approximately 4,317 acres.

### Grape Day Park

Grape Day Park is located in central Escondido immediately north of City Hall. Escondido Creek traverses the northern portion of the park and is conveyed via a rectangular concrete channel. Grape Day Park is located downstream of El Caballo Park and receives another 6,716 acres of tributary drainage area, in addition to the area flowing to El Caballo Park (11,033 acres total). Unlike El Caballo Park, which receives runoff from the largely undeveloped hills, Grape Day Park receives flow from the densely developed city center.

FIGURE 1 VICINITY MAP WATER QUALITY IMPROVEMENTS ESCONDIDO CREEK




# WATER QUALITY BENEFIT HYDROLOGY

The hydrology for this analysis was computed using EPA SWMM. Wet weather precipitation was taken from the Escondido ALERT Station records (approximately 44 years of data) published on the Project Clean Water website as part of the regional Hydromodification Management Plan (HMP). Dry weather flow information was provided by the City of Escondido (approximately a one-month period in 2012). The dry weather flow data is assumed to be representative of typical flow rates throughout the year. Wet weather runoff was determined based on standard area-weighted Green and Ampt parameters for each of the two watersheds. The following values were used in the analysis:

## El Caballo Park

- Suction Head – 9.45 in.
- Conductivity – 0.02 in/hr.
- Initial Deficit – 0.321 (fraction)

## Grape Day Park

- Suction Head – 6.69 in.
- Conductivity – 0.26 in/hr.
- Initial Deficit – 0.284 (fraction)

Green and Ampt parameters were determined based on standard values provided in the EPA SWMM guidance documents, based on soil texture class. Soil texture class was approximated based on soil type and hydrologic soil group within the tributary area. SWMM input and output parameters are included in Appendix F.

# DESCRIPTION OF DESIGN ALTERNATIVES

## Alternative 1 – Replace Concrete Channel Bottom

This alternative would include removal of the flat bottom of the existing channel and replacement with vegetation. The vegetation in this alternative would be USDA NRCS vegetative retardance Class A (Manning's n-value of 0.3). Examples of native, drought-tolerant Class A vegetation include Sawgrass Sedge, Purple Needlegrass, and Deergrass. The vegetated channel bottom would allow for infiltration and would also reduce flow velocities in minor rain events and during periods of dry weather flow.

## Alternative 2 – Adjust Channel Effective Slope (Grade Control)

This alternative would include removal of the flat bottom of the existing channel and installation of grade control structures to reduce the effective longitudinal channel slope. A grade control structure would be a rock weir or similar type of structure that is at most a few feet high and extends across the width of the channel to reduce velocities and decrease the effective slope of the channel. Grade controls are assumed to reduce the effective slope to half of the existing slope (2' high, 300' apart for El Caballo Park and 1' high, 350' apart at Grape Day Park). The vegetation in this alternative would be USDA NRCS vegetative retardance Class B (Manning's n-value of 0.2). Examples of native, drought-tolerant Class B vegetation include Canyon Prince Wild Rye, California Gray Rush, Creeping Wild Rye, and San Diego Bentgrass. The reduced longitudinal slope would reduce flow velocities and allow for increased infiltration, particularly in periods of dry weather flow.

## Alternative 3 – Combination Concrete Channel Bottom Remove and Grade Control

This alternative is intended to have the highest volume reduction of any of the alternatives by combining the Class A vegetation from Alternative 1 with equivalent grade controls from Alternative 2.

## Alternative 4– Replace 10' strip of Concrete Channel Bottom

This alternative would include removal of a 10' wide strip of the flat bottom of the existing channel and replacement with vegetation. The vegetation in this alternative would be USDA NRCS vegetative retardance Class A. This alternative only applies to Grape Day Park as the bottom width of the trapezoidal channel at El Caballo Park is only 10 feet wide.

# POLLUTANT LOAD REDUCTION/ RUNOFF VOLUME LOSS

Pollutant and runoff volume reduction estimates are useful to have in the effort to meet the overall objective of the local Water Quality Improvement Plans (WQIPs). The average annual volume loss due to infiltration was calculated for each alternative channel retrofit concept using EPA SWMM. User input seepage loss rates were used for the conduit modeling elements that represent the improved channel section. The seepage loss rate was assumed to be 0.5 in/hr. Prior to final design, this rate should be

verified through site-specific geotechnical evaluation. The selected loss rate is consistent with the NRCS hydrologic soil type at both park locations, and allows for a good preliminary assessment of the potential volume loss, in the absence of the site-specific information. Volume loss for each alternative is summarized in Table 3.

It is important to note, that widely accepted computational models such as EPA SWMM that have the ability to model infiltration within site level, distributed BMPs, were not specifically developed to analyze performance when functioning on a watershed basis. It is also important to note that locally accepted technical guidance for modeling infiltration processes is lacking; specifically when in-stream rehabilitation is used to achieve pollutant load reduction or compensate for hydromodification effects within the watershed. Consequently, this effort requires the application of best professional judgment. It is helpful to compare computational results from models, wherever possible, with empirical data from pilot studies and research.

**TABLE 3. SUMMARY OF VOLUME LOSS RESULTS**

| Alternative # | Average Annual Volume Loss (ac-ft) Wet Weather | Average Annual Volume Loss (%) Wet Weather | Average Annual Volume Loss (%) Dry Weather |
|---|---|---|---|
| Alternative #1 | 110.9 | 5.19 | 100 |
| Alternative #2 | 110.8 | 5.18 | 100 |
| Alternative #3 | 111.5 | 5.22 | 100 |
| Alternative #4 | 36.7 | 1.71 | 69 |

The results in Table 3 indicate that the first three alternatives provide a similar amount of *long-term* volume loss through infiltration during wet weather periods (approximately 5%). Although the dry weather data was limited, the results of the modeling indicate that any of the first three alternatives is capable of infiltrating 100% of the dry weather flow. The fourth alternative does not completely eliminate the dry weather flow.

Quantitative research associated with stormwater volume loss (through evapotranspiration and infiltration) as a direct consequence of vegetated BMP retrofit is generally limited to a select list of programs conducted mostly by state transportation departments. The National Cooperative Highway Research Program (NCHRP) has published a report entitled *"Long Term Performance and Life Cycle Cost of Stormwater Best Management Practices (NCHRP Report 792)"* which includes some data that serves as a useful comparison to the results in Table 3. Section 2.2.2.3 of NCHRP Report 792 summarizes data from a 2011 study performed by Geosyntec Consultants and Wright Water Engineers, Inc., as well as a 2008 study by Professor A.P. Davis at the University of Maryland.

The Geosyntec/Wright Water study compiled data from the International Stormwater BMP Data Base (BMPDB) regarding relative observed volume reduction in several different BMP categories (see Table 4). The University of Maryland study focused on *lined* bioretention systems and found that, even with the liner, 18% of the 49 storms analyzed did not produce discharge.

**TABLE 4. RELATIVE OBSERVED VOLUME REDUCTION IN BMPDB DATA SET**

| BMP Category | No. of Monitoring Studies | 25th Percentile | Median | 75th Percentile | Average |
|---|---|---|---|---|---|
| Vegetated Strips | 16 | 18% | 34% | 54% | 38% |
| Vegetated Swales | 13 | 35% | 42% | 65% | 48% |
| Bioretention w/ Underdrain | 7 | 45% | 57% | 74% | 61% |
| Grass-lined Detention Basin | 11 | 26% | 33% | 43% | 33% |

The 16 studies referenced in Table 4 likely include BMPs that were designed to meet local water quality-based engineering requirements. The NCHRP report consistently shows average reductions of over 30%, which is promising, but not necessarily indicative of performance at either Grape Day Park or El Caballo Park. However, it is suggestive that the 5% estimate from SWMM is both conservative and highly defensible. Variations in factors such as storm distribution, precipitation depth, site-specific variation in hydraulic conductivity, depression storage, and natural variability in evapotranspiration processes (as discussed within the University of Maryland study) could produce significantly higher volume loss than predicted by SWMM. *Consequently, the valuation of environmental benefit as an Alternative Compliance Project will be subject to interpretation and professional judgement until more specific technical guidance is available.*

## HYDROLOGY FOR FLOOD CONTROL IMPACTS

The nearest FEMA FIS 100-year flow rate is 18,000 cfs at Harmony Grove Road (48.3 square mile drainage area. Based on the drainage areas in the FIS, it appears that the FEMA flow rates assume no discharge from Lake Wohlford or Dixon Lake in a 100-year event. However, the capacity of the channel would suggest that it was built based on a higher design flow (closer to 18,000 cfs), which could indicate that the design flow included discharge from Lake Wohlford and/or Dixon Lake.

To better understand the flood control implications of the two project locations, a new hydrologic analysis was performed using available soil, land use, elevation and gage data. Limited flow records are available for Escondido Creek, primarily collected for water quality monitoring. The period of record of the gage data is less than five years and does not support a flood frequency analysis performed according to USGS Bulletin 17B "Guidelines for Determining Flood Flow Frequency", which contains the standard procedure for extrapolating design flow rates using flow gage data. Instead, the available gage data was used to inform the creation of a new hydrology model.

A hydrology model was created using HEC-HMS following procedures outlined in the San Diego County Hydrology Manual (SD Hydrology Manual) for the 100-year 6-hour storm event. The methodology in the SD Hydrology Manual is similar to the NRCS hydrologic method and uses drainage area, precipitation, runoff curve number, and lag time to simulate the flows that occur during a design storm.

## Drainage Area

The Escondido Creek watershed was separated into an Upper Watershed that is tributary to El Caballo Park and a Lower Watershed that is tributary to Grape Day Park. The drainage area of Escondido Creek at Grape Day Park is 28.7 square miles while the drainage area to El Caballo Park is 18.5 square miles. A map of the drainage area is included in Appendix J.

Lake Wohlford and Dixon Lake are both in the Upper Watershed, tributary to Grape Day Park and El Caballo Park as shown on the drainage area map in Appendix J. The operating conditions of Lake Wohlford and Dixon Lake are unknown. It is likely that the reservoirs retain a significant amount of runoff volume and have little or no discharge during most storm events. Both lakes have the potential for discharge during large events. As a conservative approach to compute peak design flow rates, it was assumed that both Lake Wohlford and Dixon Lake are unregulated during the design event and do not store any runoff. The analysis assumes that the flow out of the reservoirs is essentially the same as the flow in. The analysis completed does not account for increase flows as a result of a dam breach, malfunction, or for storms that exceed a 100 year occurrence interval.

## Precipitation

The 100-year Precipitation depth was taken from the isopluvial maps found in Appendix B of the SD Hydrology Manual. For the 100-year, 6 hour storm event the point precipitation is 3.75 inches for the Upper Watershed and 3.5 inches for the Lower Watershed. Rainfall depth-area adjustment factors from Table 4-1 of the SD Hydrology Manual were applied to account for areal precipitation distribution. The depth-area adjusted precipitation depths are 3.61 inches and 3.33 inches, respectively. The nested 2/3, 1/3 rainfall distribution hyetograph from the SD Hydrology Manual was scaled based on the depth-area adjusted precipitation values to create precipitation hydrographs.

## Curve Numbers

Runoff curve numbers are used to represent the portion of rainfall the ends up as runoff. Individual curve numbers (CN) correspond to a unique land use/soil type relationship as listed in Table 4-2 of the SD County Hydrology Manual. Land use and soil type data was taken from SANGIS for the Escondido Creek watershed. All of the unique land use-soil type combinations were assigned a CN. Area-averaged composite curve numbers were computed as 80 for the upper watershed and 84 for the lower watershed. These composite curve numbers correspond to a PZN condition of 2.0. The Escondido Creek Watershed is located between Precipitation Zone Numbers (PZNs) 2.0 and 2.5, according to Figure C-1 of the SD Hydrology Manual. The PZN adjustment factor for the watershed for a 100-year storm event is 3.0. According to Table 4-10, the adjusted curve numbers for a PZN of 3 is 91 and 93, respectively, for the upper and lower watersheds.

## Watershed Lag Time

The lag time was computed according to Equations 4-17 and 4-21 of the SD Hydrology Manual, which uses the parameters of slope, length of the longest watercourse, average Manning's n-value, and length along the longest watercourse to the watershed centroid to compute lag time. The NRCS lag time was computed to be 200 minutes for the upper portion of the watershed and 215 minutes for the lower portion of the watershed.

### Channel Lag

Flow from the upper watershed was routed through the lower watershed by conservatively estimating the *average* channel velocity as about 5 feet per second and computing the lag. The lag was computed to be 132 minutes. The assumption regarding flow velocity was supported indirectly using flow gage data from smaller storm events obtained from an ALERT station in close proximity.

### Flow Results

The HEC-HMS model was created using these inputs described in this section. The results of the model produced flow hydrographs at El Caballo Park and Grape Day Park for the 100-year, 6-hour design storm event. Peak flows were computed to be about 6,300 cfs at El Caballo Park and 8,600 cfs at Grape Day Park.

The available water quality monitoring gage data was used to perform a rough validation of the curve numbers and lag times in the model. A gaged storm from December 12, 2014 measured a total depth of about 0.89 inches over 6 hours and a recorded peak flow rate of 695 cfs. The return period for this storm was between a 1-year and 2-year 6-hour event, based on the County's isopluvial maps. The precipitation data from this 6-hour gaged event was input as a precipitation hydrograph into the HEC-HMS model. The curve numbers and watershed lag time were adjusted so that the model output approximated the observed flow. The overall Escondido Creek watershed curve numbers and lag times that produced a peak flow and volume most closely matching the recorded data are about 91 and 180 minutes, respectively. When considering that the gaged event was part of a larger period of sustained rainfall that likely resulted in high antecedent moisture, the results indicated that the model can be used to realistically predict flow rates from larger storms. The model also indicates that the flow specified by the FIS at Harmony Grove (18,000 cfs) produces similar flows at Grape Day Park and at El Caballo Park when prorating by contributing area. Prorating by area would suggest a flow rate of about 10,500 at Grape Day Park and 7,000 at El Caballo Park.

## HYDRAULIC IMPACTS OF IN-CHANNEL WATER QUALITY IMPROVEMENTS

The impacts of the proposed Water Quality improvements were evaluated in Escondido Creek at Grape Day Park and at El Caballo Park. The impacts at each location are presented separately.

### Escondido Creek at Grape Day Park

The flow depth in Escondido Creek at Grape Day Park was referenced in the Washington Avenue Stormdrain Record Drawing from 1983. This record drawing indicates a 100-year water surface elevation of 648.0 feet, which corresponds to a depth of 9.5 feet. (The record drawing notes that the 100-year water surface profiles was done by Leeds, Hill, and Jewett, Inc. on July 21, 1964, but the flow rate is not known). The top of wall is shown as 653.8 feet. This indicates that a design freeboard of 5.8 feet.

The significance of the flood control impacts was determined for each of the alternatives by computing the flow depth in Escondido Creek for representative cross sections during the peak 100-year flow event of 8,600 cfs, based on the hydrology completed for this study. The flow depths, increases in flow depths, and freeboard to the top of wall in the channels based on the project alternatives at Grape Day Park and are shown in Table 5. (This table does not consider channel widening, which is presented in Table 6).

## TABLE 5. 100-YEAR FLOW DEPTHS IN ESCONDIDO CREEK AT GRAPE DAY PARK WITH VEGETATION IMPROVEMENT ALTERNATIVES BUT NO WIDENING

| Alternative | Description | 100-year Flow Depth (feet) | Increase in 100-year Flow Depth (feet) | 100-year Freeboard (feet) |
|---|---|---|---|---|
| Base | Existing Conditions | 9.8 | - | 5.5 |
| 1 | Class A or B vegetation entire bottom of channel | 19.8 | 10.0 | -4.5 |
| 2 | Grade Control structures | 17.4 | 6.6 | -2.1 |
| 3 | Class A or B vegetation and Grade Control Structures | 21.5 | 11.7 | -6.2 |
| 4 | 10' infiltration strip | 12.0 | 2.2 | 3.3 |

Note: Negative freeboard indicates that the existing wall is overtopped.

The existing condition 100-year flow depth based on revised hydrology has more than 5 feet of freeboard to the top of wall and matches very closely to the design 100-year water surface elevation as indicated in the record drawings. This adds further weight to the validity of the revised hydrology model.

Alternative 4 has a freeboard of 3.3 feet, indicating that it would not need to be widened to maintain sufficient capacity for the 100-year flow.

Alternatives 1, 2 and 3 cause flow depths that exceed the channel capacity. To implement any of these alternatives, channel widening or raised floodwalls in excess of 5 feet would be required.

The existing channel at Grape Day Park is a 35-foot wide rectangular concrete channel. Channel widening scenarios are presented in Table 6, including the necessary channel widths to maintain existing channel capacity and freeboard (Alternatives 1a, 2a, and 3a and 4a) and the necessary channel widths to have at least 1 foot of freeboard (Alternatives 1b, 2b, and 3b and 4b).

## TABLE 6. CHANNEL WIDENING SCENARIOS FOR 100-YEAR FLOW DEPTHS IN ESCONDIDO CREEK AT GRAPE DAY PARK

| Alternative | Description | Freeboard (feet) | Grape Day Park Increase in Channel Width (feet) | Grape Day Park Total Channel Width (feet) |
|---|---|---|---|---|
| 1a | Class A vegetation entire bottom of channel and Widening to Maintain the Same Channel Capacity | 5.5 | 50 | 85 |
| 1b | Class A vegetation entire bottom of channel and Widening to Achieve at Least 1 foot of Freeboard | 1.6 | 20 | 55 |
| 2a | Class B vegetation entire bottom of channel, grade control structure, and Widening to Maintain the Same Channel Capacity | 5.5 | 40 | 75 |
| 2b | Class B vegetation entire bottom of channel grade control structure, and Widening to Achieve at Least 1 foot of Freeboard | 1.1 | 10 | 45 |
| 3a | Class A vegetation entire bottom of channel grade control structure, and Widening to Maintain the Same Channel Capacity | 5.4 | 100 | 135 |
| 3b | Class A vegetation entire bottom of channel grade control structure, and Widening to Achieve at Least 1 foot of Freeboard | 1.1 | 22 | 67 |
| 4a | Class A or B vegetation with 10' Infiltration Strip and Widening to Maintain the Same Channel Capacity | 5.5 | 15 | 50 |
| 4b | Class A or B vegetation with 10' Infiltration Strip and No Widening | 3.3 | 0 | 35 |

It should be noted that the existing FEMA designation for Escondido Creek through the City is a '1% annual flood discharge contained within the channel.' If a change occurs (raising, lowering, widening, shrinking) to the area with the indicated flood zone designation, the CLOMR/LOMR process would be required. If there is no change, then the process would not be required. An engineering study would be necessary to determine how the proposed project would impact the flood zone and would likely trigger a CLOMR/LOMR review process through FEMA. If it can be demonstrated that a proposed project causes increases in flow depths, but is still fully contained within the channel with the applicable freeboard requirements (Alternative 4b), then a LOMR request would still be required to establish a flow rate based on updated hydrology and a more detailed hydraulic model, but the FEMA flood zone designation would not change.

Flood control calculations are included in Appendix G.

Manning's n-values for the vegetated channels are dependent on velocity and hydraulic radius (see Figure 8-20 of *Threshold Channel Stabilization* by the USDA). For low flows (i.e., two-year flows), Class A vegetation has a Manning's n-value of about 0.3 while the Class B vegetation is about 0.2. For higher flows,

roughness decreases as a function of velocity and hydraulic radius. For the 10-year and 100-year flows, the Manning's n-values of 0.06 and 0.04 were used for Class A and Class B vegetation, respectively.

### Escondido Creek at El Caballo Park

The existing channel at El Caballo Park is a trapezoidal channel with a 10-foot bottom width. The total depth of the channel is about 13 feet, based on an estimate from a field visit.

The significance of the flood control impacts was determined for each of the alternatives by computing the flow depth in Escondido Creek for representative cross sections during the peak 100-year flow event of 6,300 cfs, based on the hydrology completed for this study.

The flow depths, increases in flow depths, and freeboard to the top of wall in the channels based on the project alternatives at Grape Day Park and are shown in Table 7. Alternative 4 is only applicable to the channel at Grape Day Park as the bottom width of the trapezoidal channel at El Caballo Park is only 10 feet, so it is not included in the analysis. (This table does not include any widening or other channel modifications beyond what is listed in the Description).

**TABLE 7. 100-YEAR FLOW DEPTHS IN ESCONDIDO CREEK AT EL CABALLO PARK WITH VEGETATION IMPROVEMENT ALTERNATIVES BUT NO WIDENING**

| Alternative | Description | Approximate Freeboard (feet) | 100-year Flow Depth (feet) | Increase in 100-year Flow Depth (feet) |
|---|---|---|---|---|
| Base | Existing Conditions | 3.3 | 9.7 | - |
| 1 | Class A or B vegetation entire bottom of channel | 2 | 11 | 1.3 |
| 2 | Grade Control structures | 2.9 | 10.1 | 0.4 |
| 3 | Class A or B vegetation and Grade Control Structures | 1.5 | 11.5 | 1.8 |

Based on this analysis, the channel at El Caballo Park has capacity for any of the 3 alternatives without channel widening. Widening the channel by 10 feet would maintain the same channel capacity and freeboard for Alternative 1.

Other channel improvements, such as removing the concrete channel sides, reducing the side slopes, and adding additional vegetation in the flattened slope area are called for in the El Caballo Park Master Plan. These improvements would also need to be analyzed in more detail to verify that the proposed condition has sufficient capacity.

# ENVIRONMENTAL BENEFIT FOR ALTERNATIVE COMPLIANCE

A determination if the concrete portion of Escondido Creek is considered Waters of the US (WOTUS) or is part of the City's MS4 is beyond the scope of this analysis. If the concrete channel at Grape Day Park and El Caballo Park are considered to be a WOTUS, our interpretation of the Clean Water Act, and Regional MS4 Permit would preclude its use as a BMP – effectively eliminating for consideration as part of an "alternative compliance" program used to mitigate water quality impacts from new or redevelopment. However, in stream restoration is a strategy that is encouraged within the Regional MS4 Permit and proposed specifically within the Carlsbad WMA Water Quality Improvement Plan. By reducing or eliminating dry weather flow in Escondido Creek, in-channel improvements are consistent, at least in part, with the following strategies outlined in the Carlsbad WMA WQIP (June 2015) (from *Table 43: Escondido Creek Strategies* of the Carlsbad WMA WQIP):

- 7 – Irrigation Runoff Reduction Program
- 31—Program for Retrofitting Areas of Existing Development
- 32—Program for Stream, Channel, and/or Habitat Restoration in Areas of Existing Development

Even if alternative compliance benefit cannot be achieved from in-channel improvements, the City can demonstrate they are at a minimum consistent with the Regional Board's goals for water quality improvement. As of now, numeric goals within the Carlsbad WMA are based upon dry weather reduction measured at existing outfalls. For this reason, the strategy or channel restoration at Grape Day park does not lend itself to established quantitative goal. Therefore, to use this project as a means of pollutant credit towards the WQIP, the adaptive management process could be used to create quantitative goals that directly align with pollutant reduction within an existing channel,

If the concrete channel is determined to be part of the MS4, then the proposed project would be suitable as part of the alternative compliance program. Regardless of WOTUS determination pollutant reduction benefit is best predicted by using volume reduction as a proxy for all applicable urban pollutant loads. Continued in-stream monitoring should be used to validate the modeling predictions through the WQIP Annual Reporting process. A standardized methodology for determining environmental benefit for stream rehabilitation projects does not currently exist. In order to analyze the proposed channel retrofits at Grape Day Park and El Caballo Park as potential ACPs, infiltration volume through the channel retrofit sites was calculated using a water quality event-based EPA SWMM model (as opposed to the long-term continuous simulation model used to generate the results in Table 3). The conversion from volume to equivalent development area (EDA) was done in the same manner as the Alternative Compliance Projects Assessment described within this report (see discussion of "Regional Water Quality Equivalency" starting on page 6). The EPA SWMM report and Earned Stormwater Pollutant Control spreadsheets are included in Appendix H. The results are also summarized in Table 8.

A cost estimate was developed for each in-channel project alternative. Detailed cost estimate break downs are included in Appendix L. Land costs were included where channel widening would require existing park space to be devoted to the channel. The cost estimates assume that the channel will retain its rectangular nature. Channel widening may occur with sloped sides, but would require more land dedication to achieve the required flow capacity. The governing equivalent development area was defined for each alternative, similar to the approach developed for the ACP projects. In this case, only 1

reference land use (Commercial) was considered to provide a comparison tool. The hydromodification volume governs and produces the equivalent development area. The costs and benefits (with respect to pollution control and hydraulic flow control) of the in-channel projects is presented in Table 8.

At El Caballo Park, simpily removing the concrete bottom produces the lowest EUAC/Developable acre. At Grape Day Park, Alternative 4b (removing a 10' strip of concrete) produces the lowest EUAC/Developable acre.

## TABLE 8. EQUIVALENT DEVELOPMENT AREA, COSTS, AND IMPLEMENTATION PRIORITY FOR IN-CHANNEL IMPROVEMENTS

| Alternative | Reference Land Use | Governing Equivalent Development Area** (ac) | Capital Cost | Annual Maint. Cost | EUAC | EUAC/ Developable Acre | Implementation Priority |
|---|---|---|---|---|---|---|---|
| El Caballo Park - Alternative 1 | Commercial | 17.80 | $192,505 | $10,000 | $18,037 | $1,013 | 1 |
| El Caballo Park* - Alternative 2 | Commercial | 17.80 | $227,905 | $10,000 | $19,515 | $1,096 | 2 * |
| El Caballo Park - Alternative 3 | Commercial | 17.80 | $227,905 | $10,000 | $19,515 | $1,096 | 2 * |
| Grape Day Park - Alternative 4B | Commercial | 5.93 | $142,945 | $10,000 | $15,968 | $2,693 | 4 |
| Grape Day Park - Alternative 4A | Commercial | 8.47 | $2,233,375 | $10,000 | $103,246 | $12,190 | 5 |
| Grape Day Park - Alternative 3B | Commercial | 11.36 | $3,272,796 | $10,000 | $146,642 | $12,909 | 6 |
| Grape Day Park - Alternative 1B | Commercial | 9.32 | $2,774,643 | $10,000 | $125,844 | $13,503 | 7 |
| Grape Day Park - Alternative 2B | Commercial | 7.63 | $2,375,213 | $10,000 | $109,168 | $14,308 | 8 |
| Grape Day Park - Alternative 2A | Commercial | 12.71 | $4,619,116 | $10,000 | $202,853 | $15,960 | 9 |
| Grape Day Park - Alternative 1A | Commercial | 14.41 | $5,331,719 | $10,000 | $232,605 | $16,142 | 10 |
| Grape Day Park - Alternative 3A | Commercial | 22.88 | $9,107,080 | $10,000 | $390,230 | $17,055 | 11 |

*El Caballo Park's Alternative 2 and 3 are equal in priority.

**Note that Governing Equivalent Development Area would be part of an Alternative Compliance Program. However, it is likely that both the locations described in this table would be determined to be WOTUS and would not be eligible for BMP benefit as part of such a program. This table is included for informational and decision making to determine the most cost effective project.

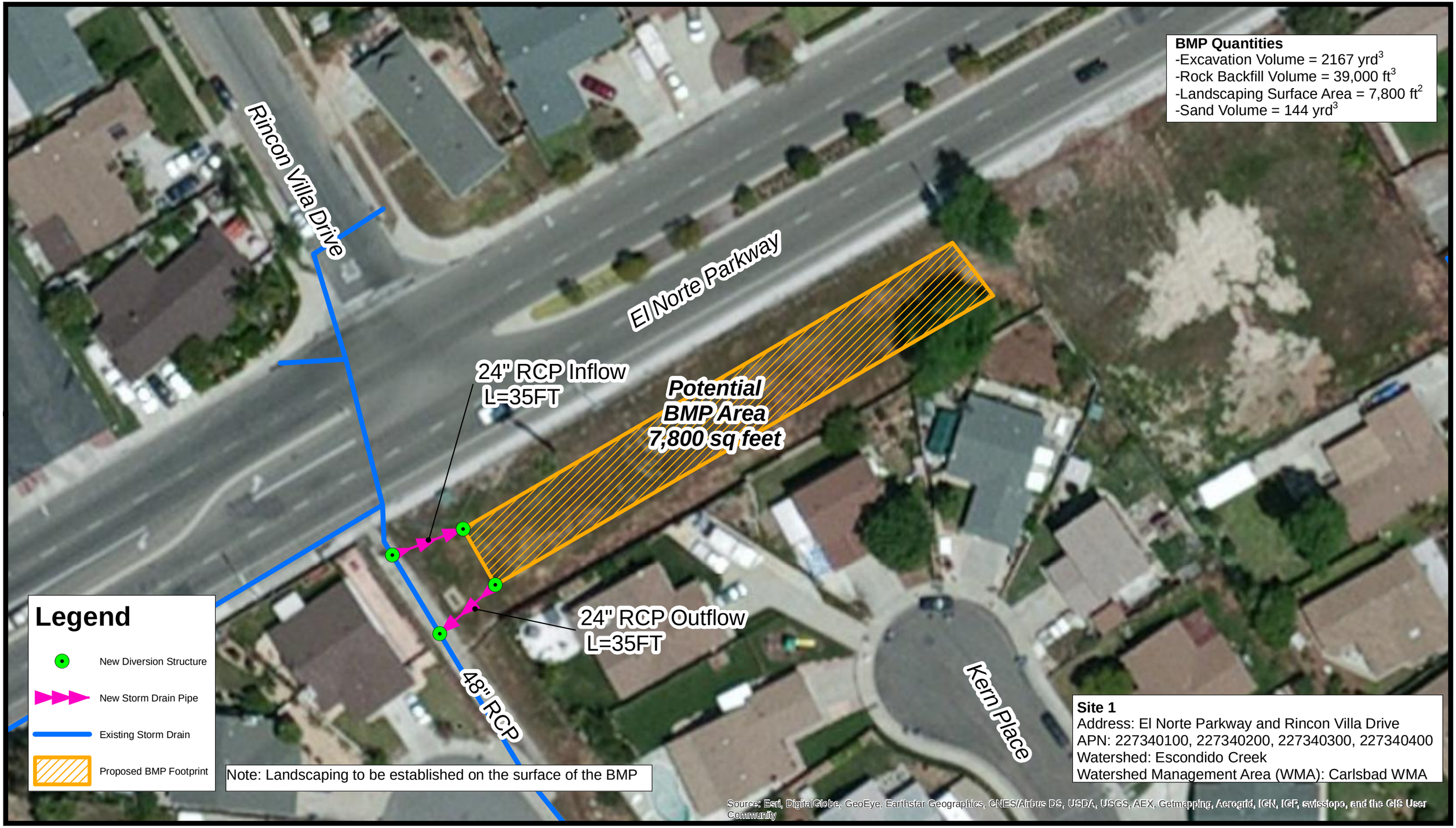
## OTHER CONSIDERATIONS

Even with the Class A vegetation, turf reinforcing mat (TRM) would be required to prevent erosion during high flows. Channel hydraulic calculations at Grape Day Park are included in Appendix G.

The vegetation and any potential grade control structures would need to be designed to avoid sedimentation issues that reduce channel capacity, create standing water, and cause vector control issues. A balance between shear stress, flow depth, and expected channel velocities would need careful consideration to not over-correct the issue of erosion and create additional problems. Based on the Manning's open channel calculations included in Appendix G, the proposed alternatives can maintain minimum channel velocities to avoid excessive sediment accumulation when flowing at 500 cfs (lower range of flow based on EPA SWMM modeling). The maintenance frequency would also need be considered with respect to the final vegetation and channel configuration.

Michael Baker
INTERNATIONAL

# Appendix A Alternative Compliance Conceptual Site Plans and Site Photos




Michael Baker INTERNATIONAL

0 20 40 80 Feet

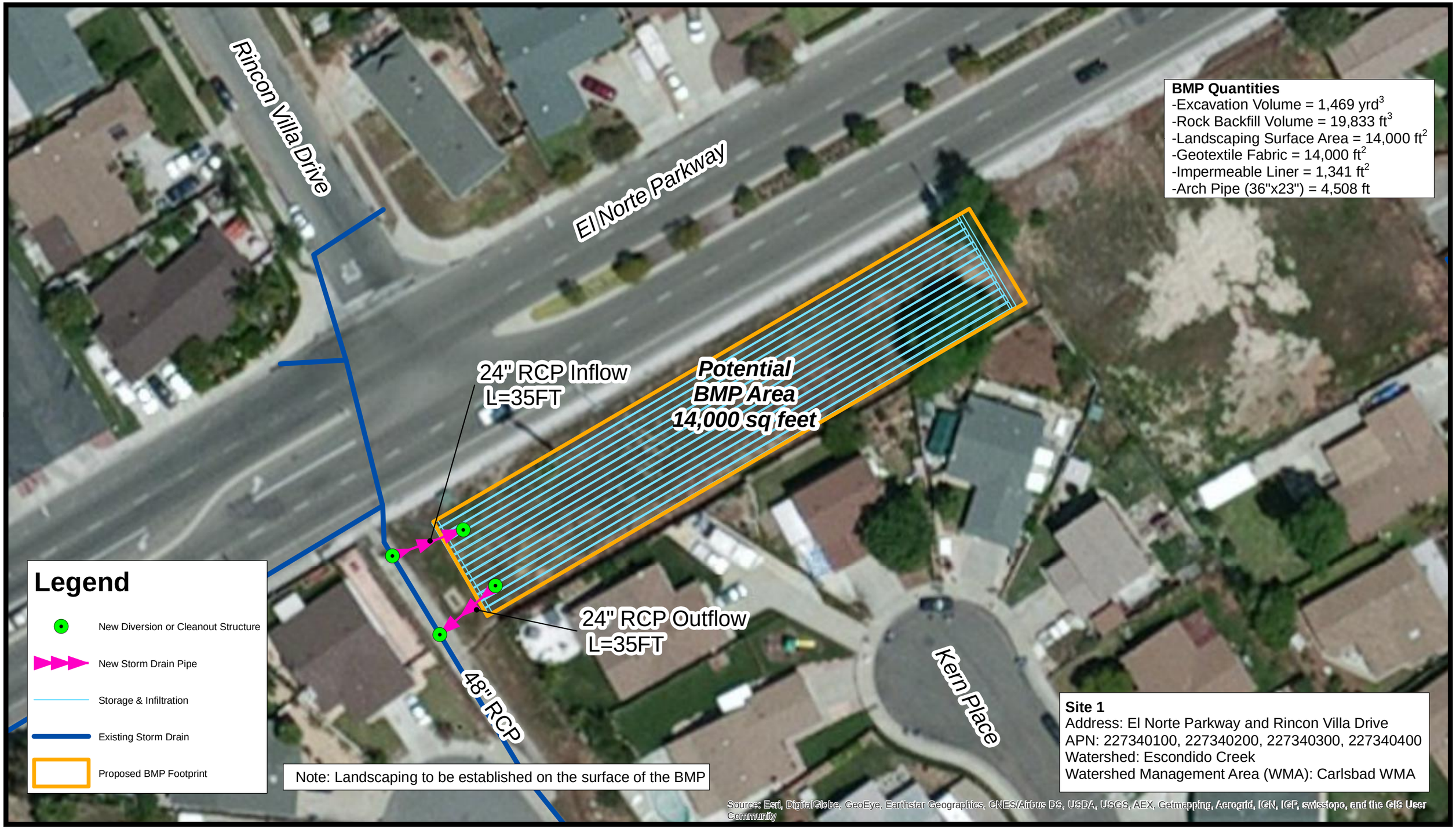
1 in = 40 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *El Norte Parkway and Rincon Villa Drive*

## *Site 1A - Bioretention*




Michael Baker INTERNATIONAL

0 20 40 80 Feet

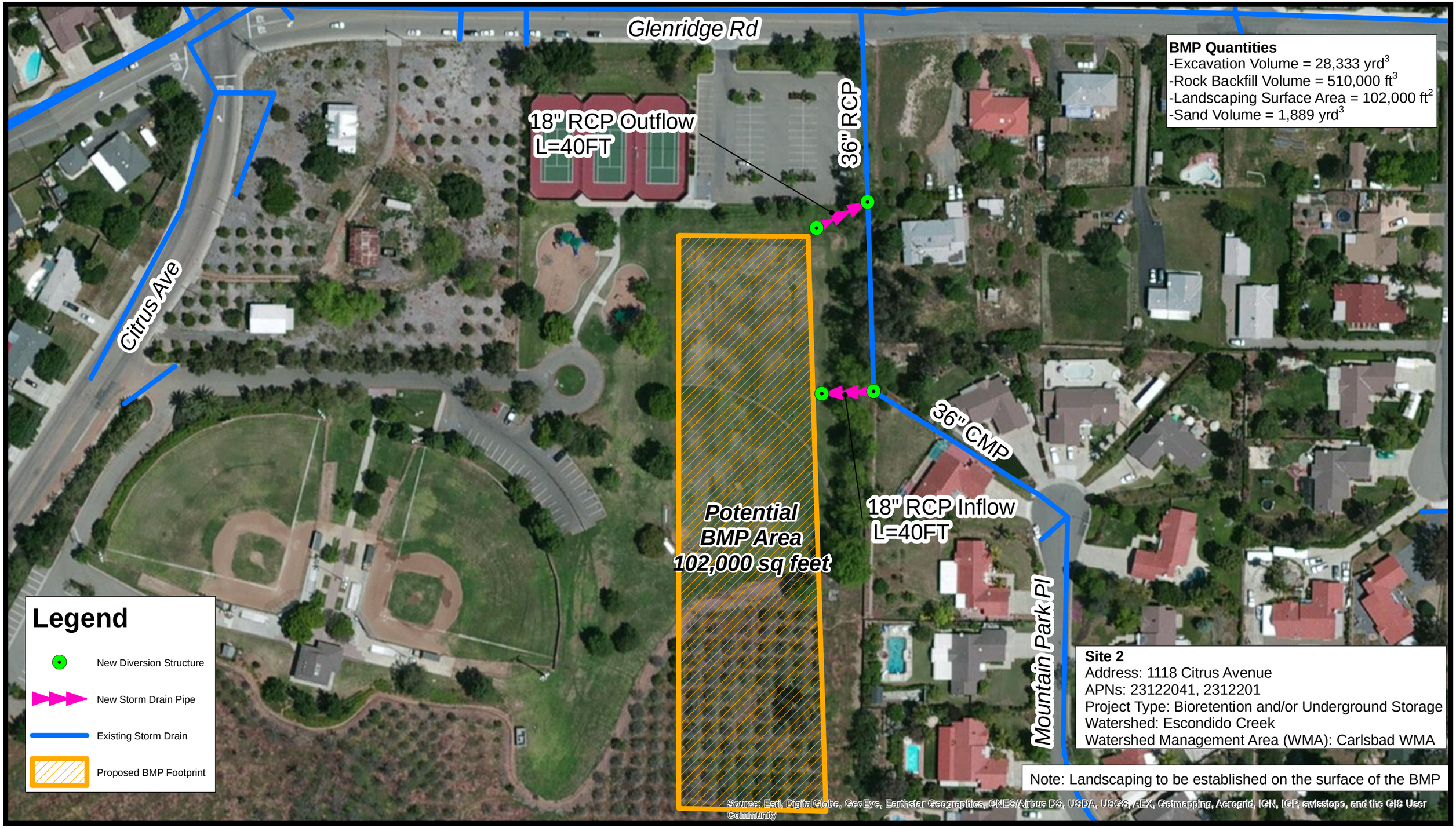
1 in = 40 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *El Norte Parkway and Rincon Villa Drive*

## *Site 1B - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

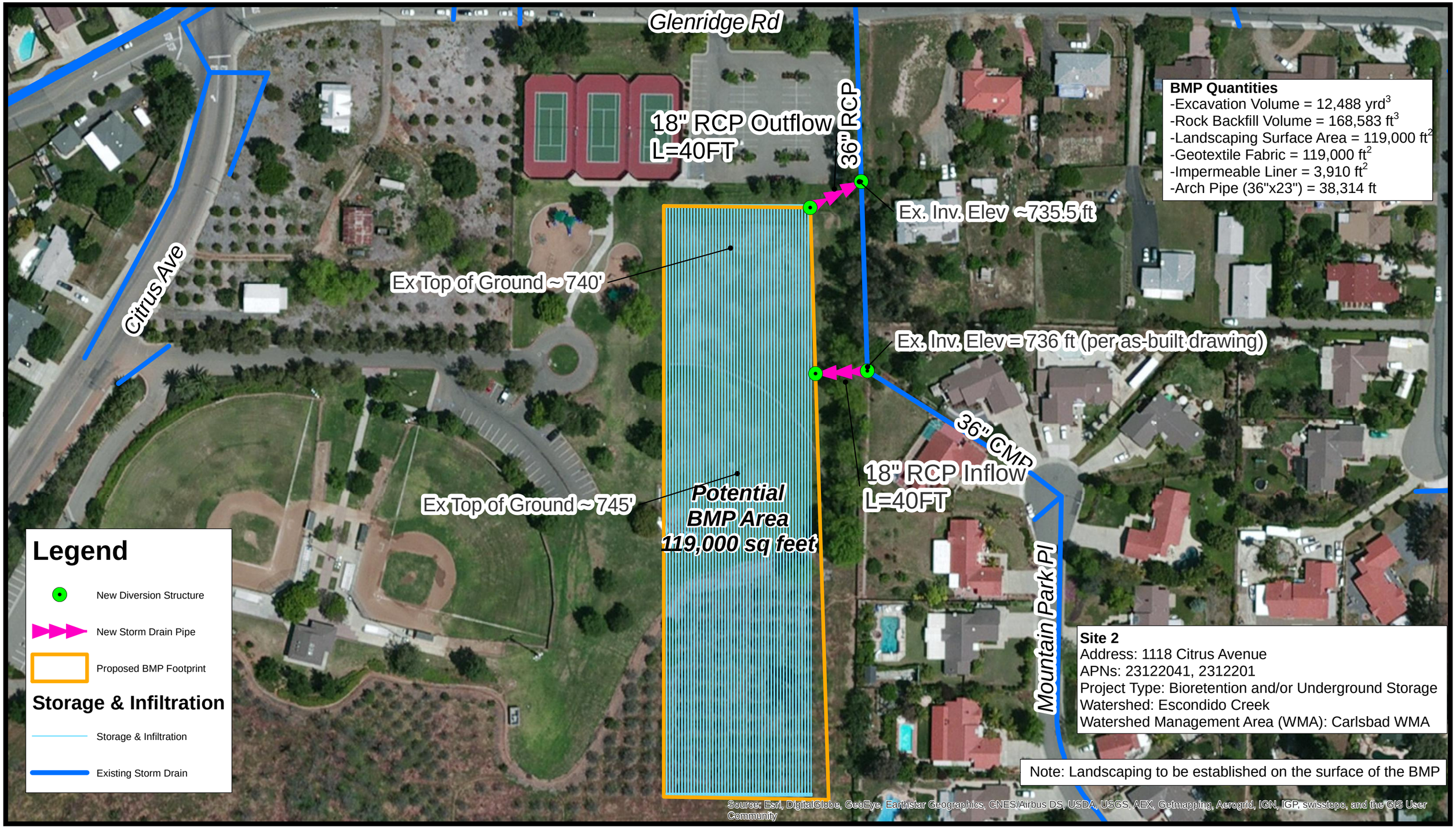
0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Mountain View Park*
## *Site 2A - Bioretention*




Michael Baker INTERNATIONAL

0 50 100 200 Feet

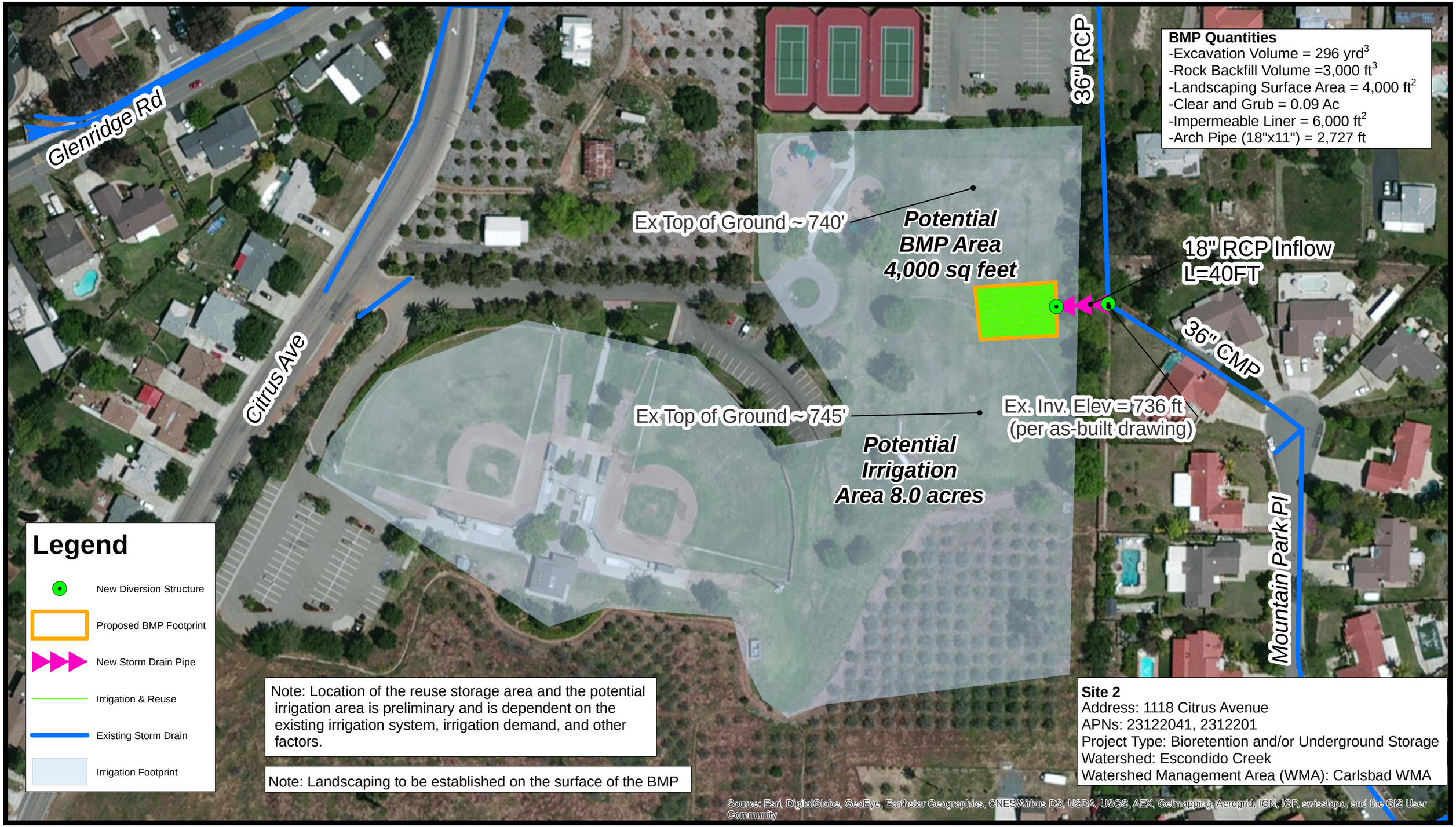
1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Mountain View Park*

## *Site 2B - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

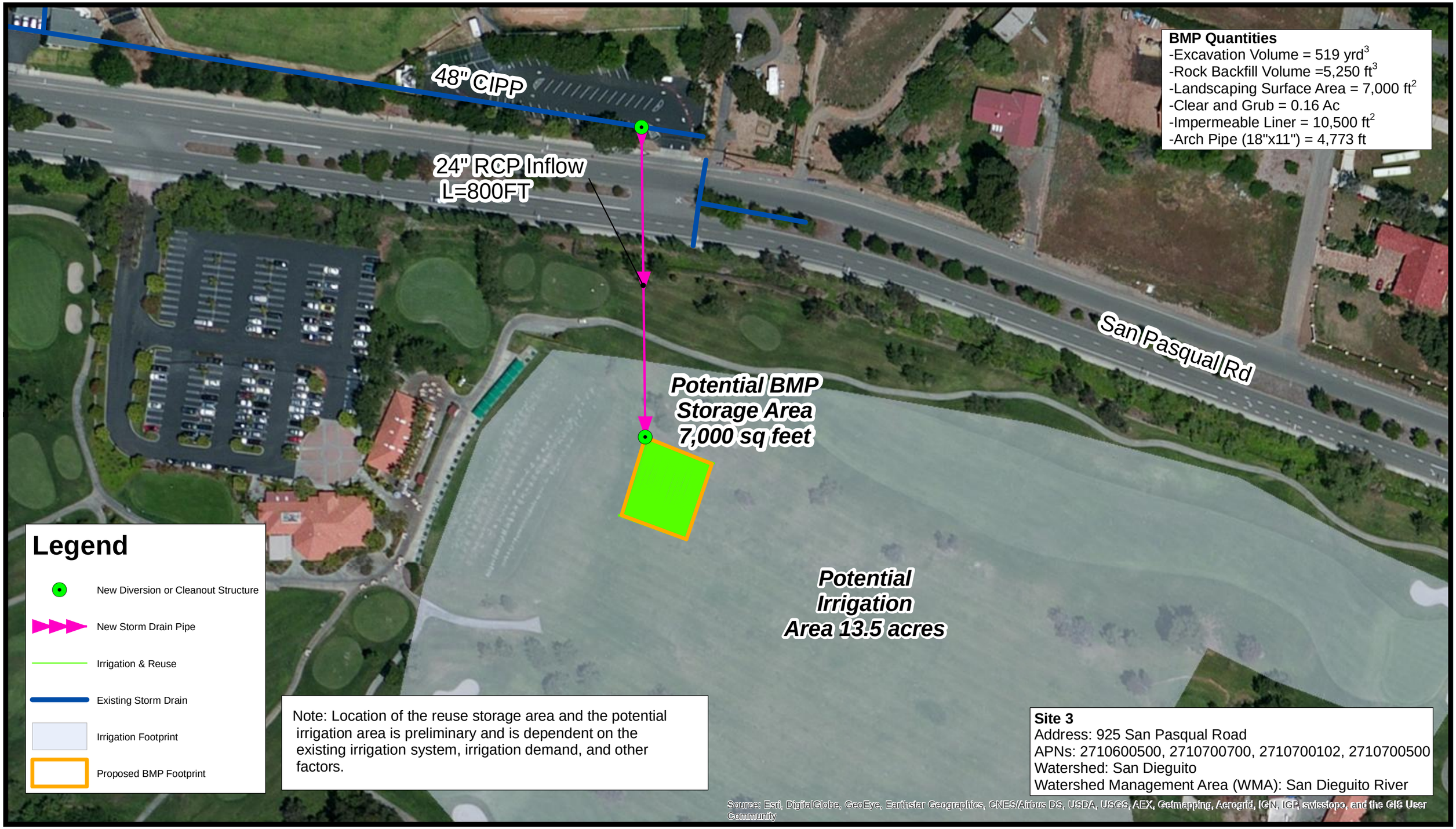
0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Mountain View Park*
## *Site 2C - Irrigation / Reuse*




Michael Baker INTERNATIONAL

0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

***The Vineyard at Escondido Golf Course***

***SITE 3 - Irrigation / Reuse***

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0 30 60 120 Feet

1 in = 60 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Washington Park*
## *Site 4A - Underground Storage / Infiltration*

**BMP Quantities**
-Excavation Volume = 215 $yrd^3$
-Rock Backfill Volume =2,175 $ft^3$
-Landscaping Surface Area = 2,900 $ft^2$
-Clear and Grub = 0.07 Ac
-Impermeable Liner = 4,350 $ft^2$
-Arch Pipe (18"x11") = 1,977 ft

**Site 4**
Address: 501 N Rose Street
APNs: 2301412000
Project Type: Underground Storage and Infiltration and/or Reuse
Watershed: Escondido Creek
Watershed Management Area (WMA): Carlsbad WMA

Note: Landscaping to be established on the surface of the BMP

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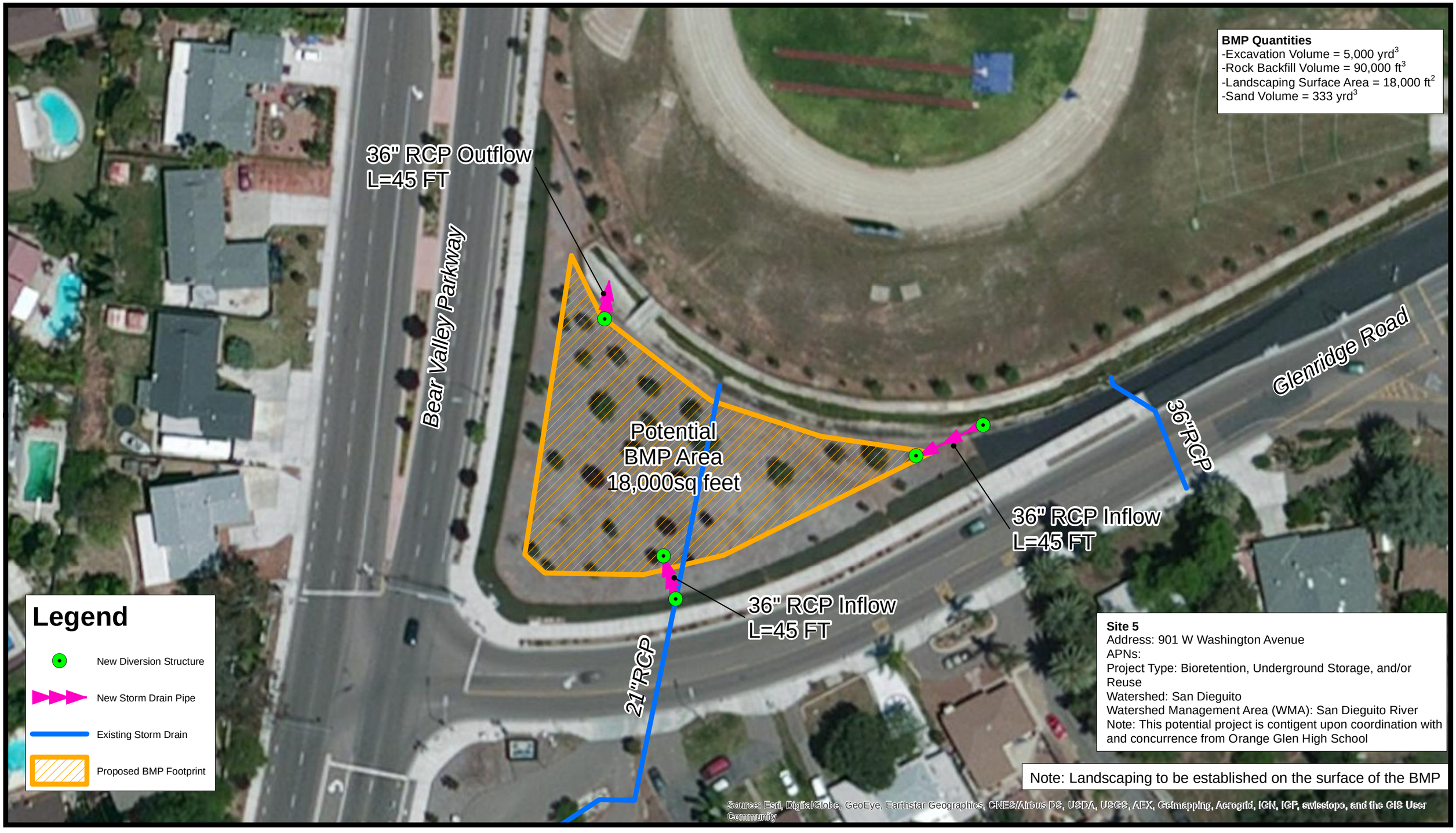
0 30 60 120 Feet

1 in = 60 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Washington Park*
## *Site 4B - Irrigation and Reuse*




Michael Baker INTERNATIONAL

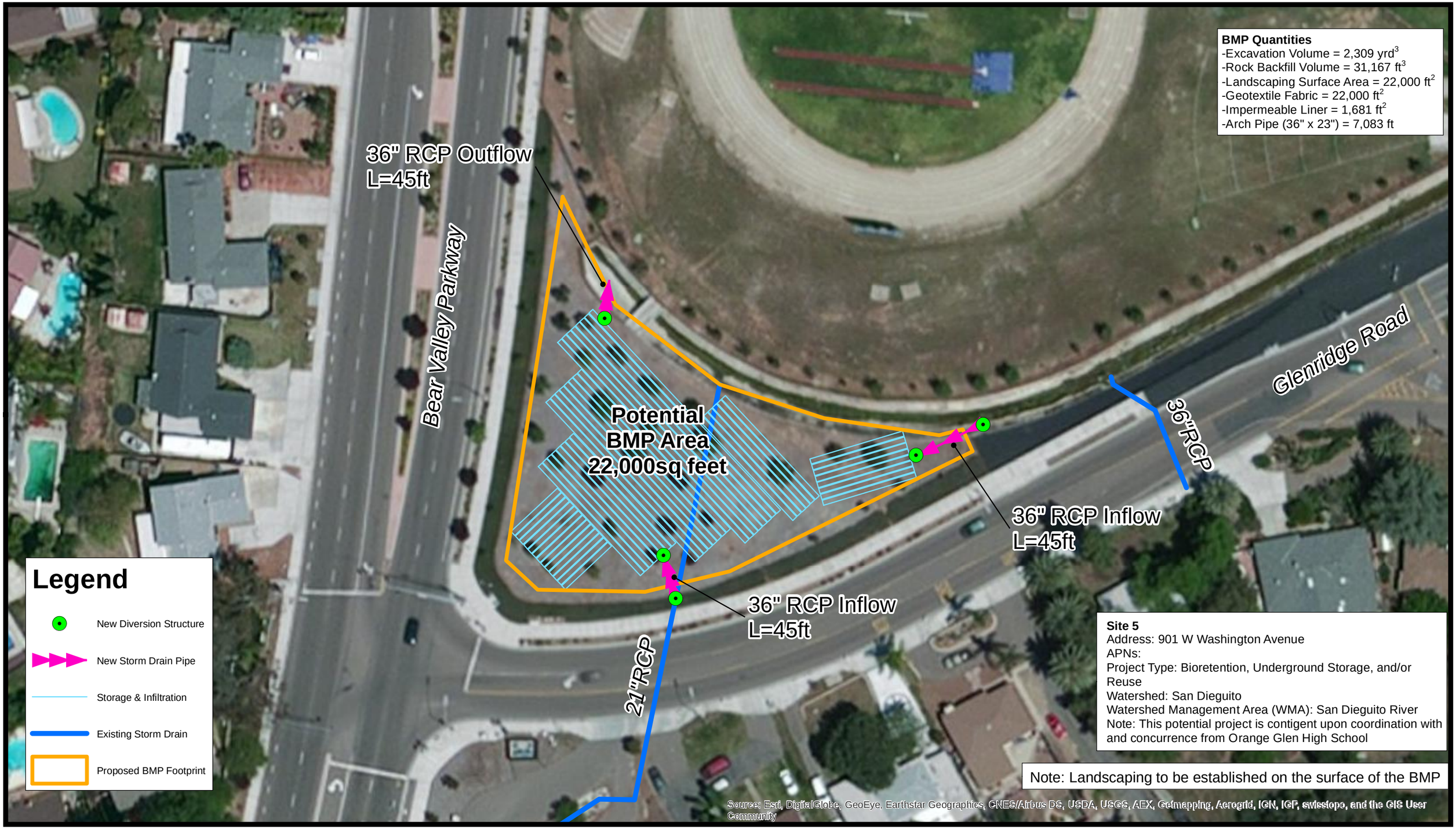
0 25 50 100 Feet

1 in = 50 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Orange Glen High School*
## *Site 5A - Bioretention*




Michael Baker INTERNATIONAL

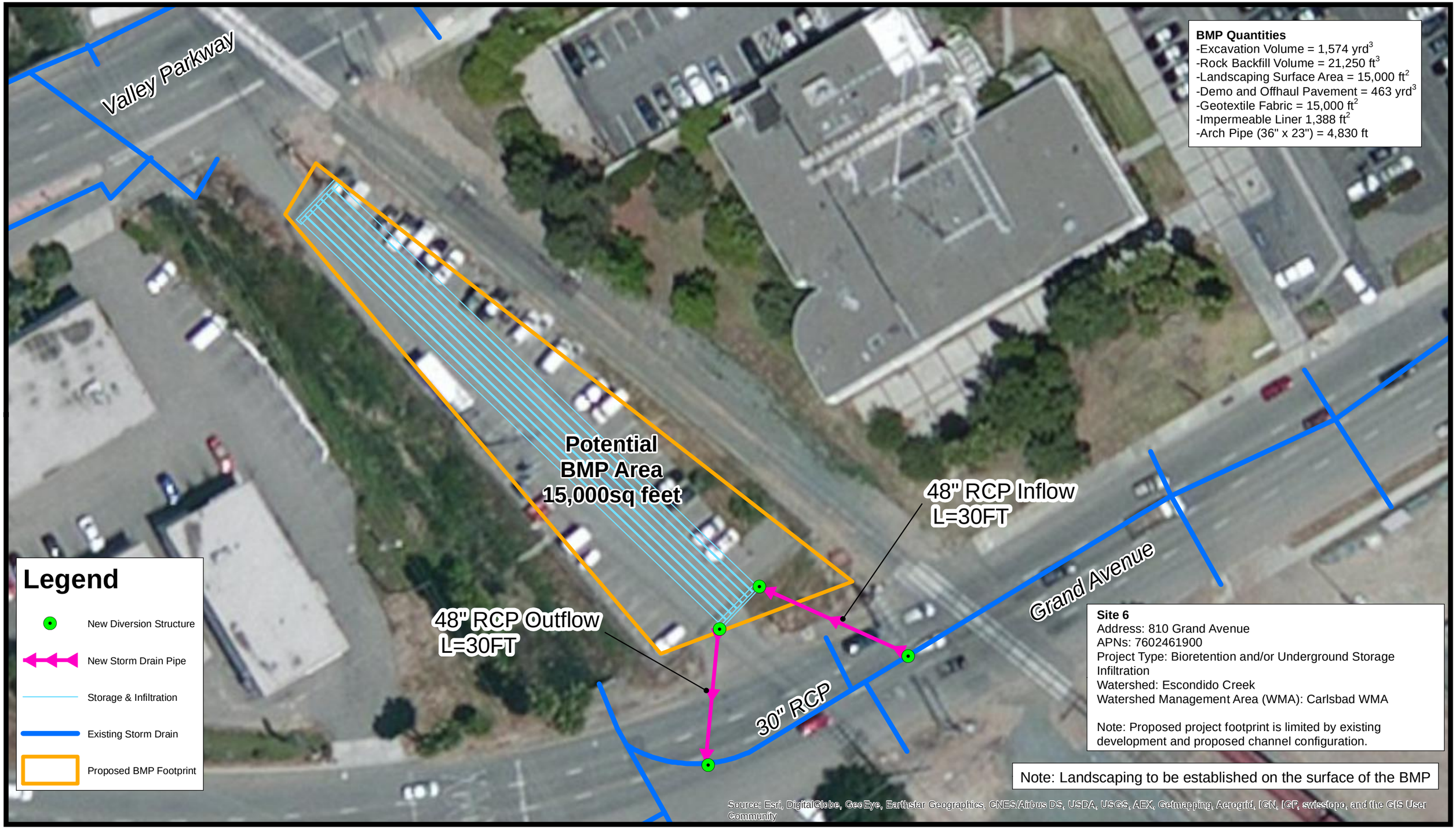
0 25 50 100 Feet

1 in = 50 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Orange Glen High School*
## *Site 5B - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

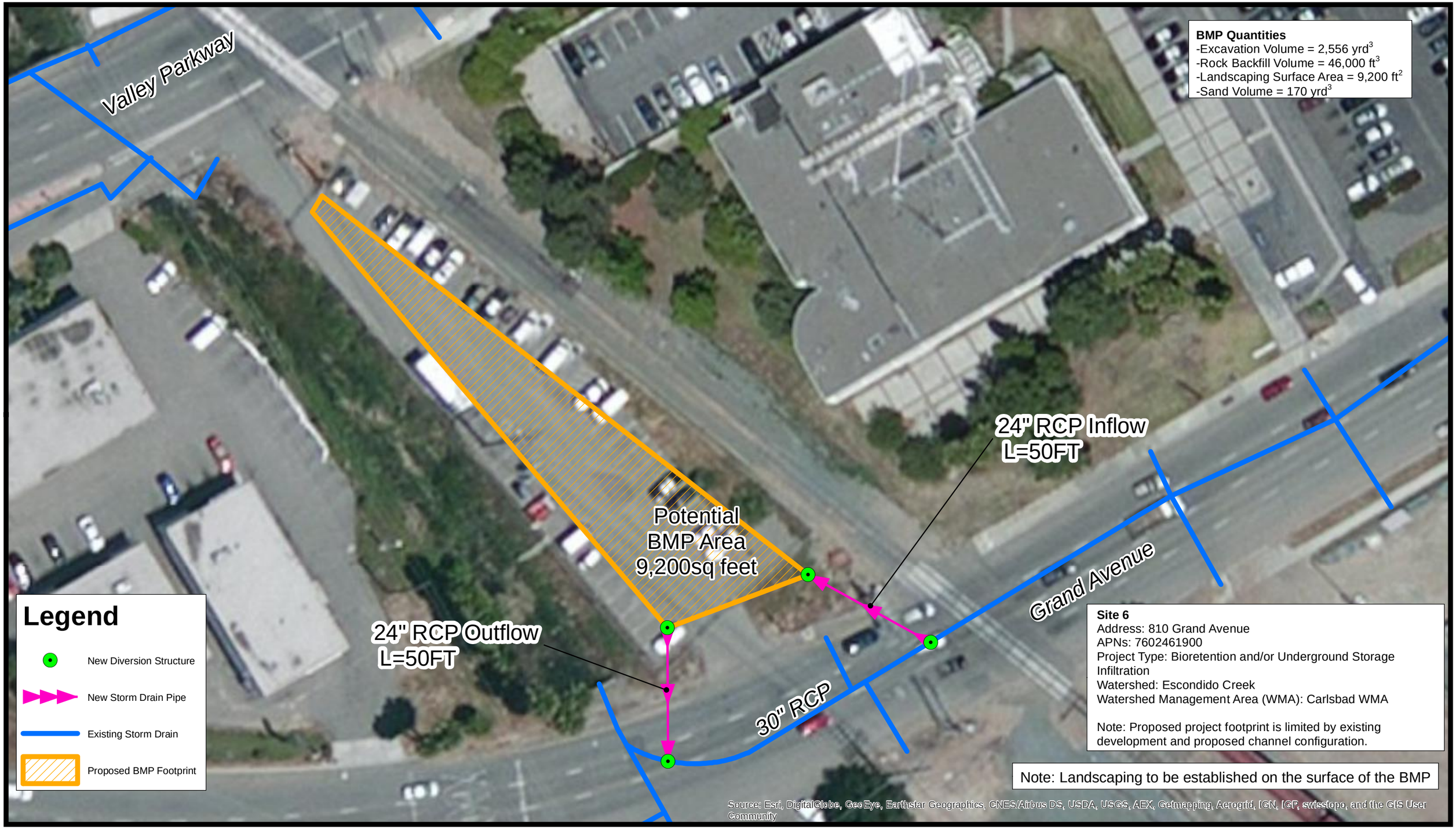
0 20 40 80 Feet

1 in = 40 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Spruce Street Channel Improvement Project*
## *Site 6A - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

0 20 40 80 Feet

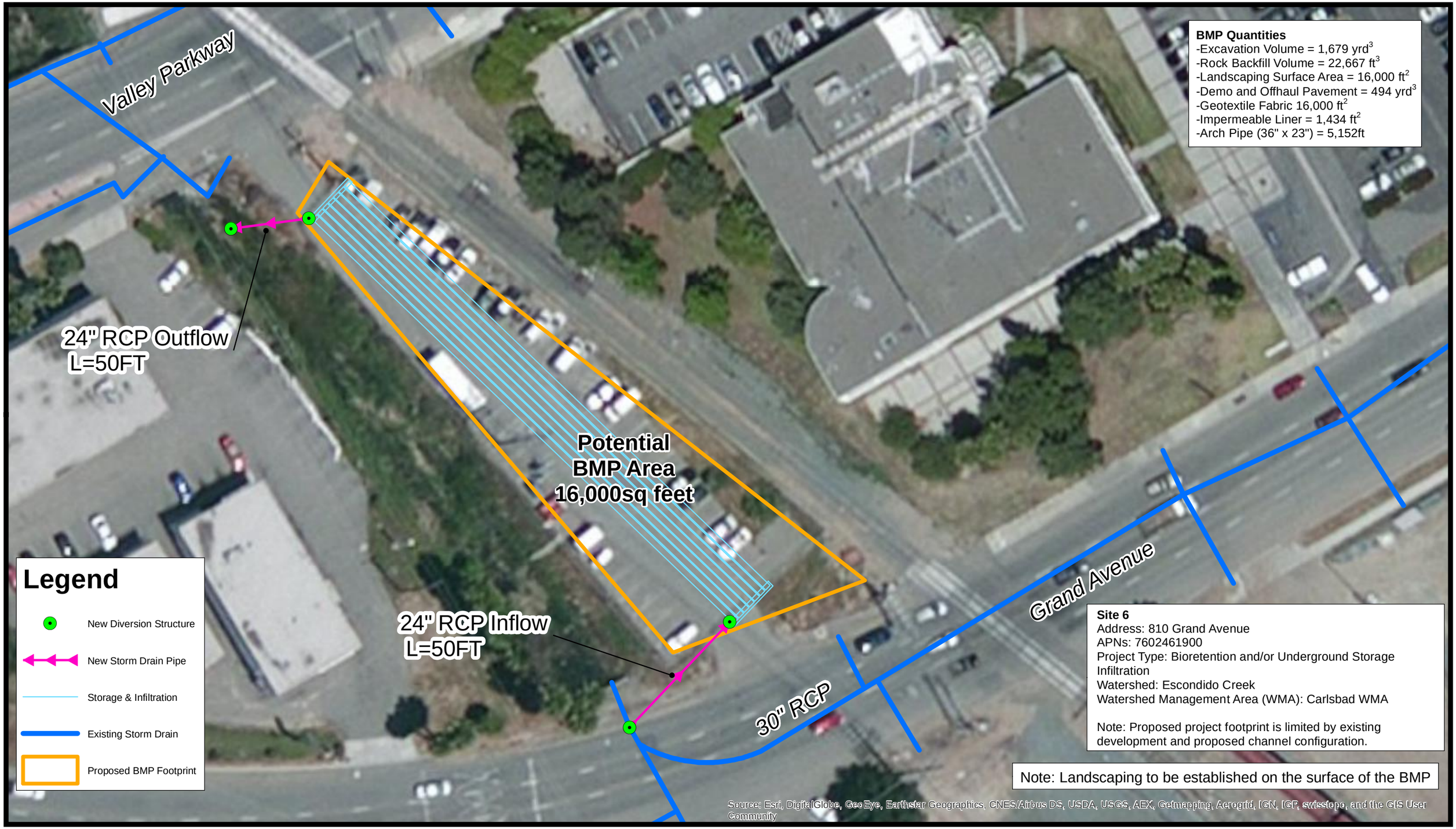
1 in = 40 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Spruce Street Channel Improvement Project*

## *Site 6B - Bioretention*




Michael Baker INTERNATIONAL

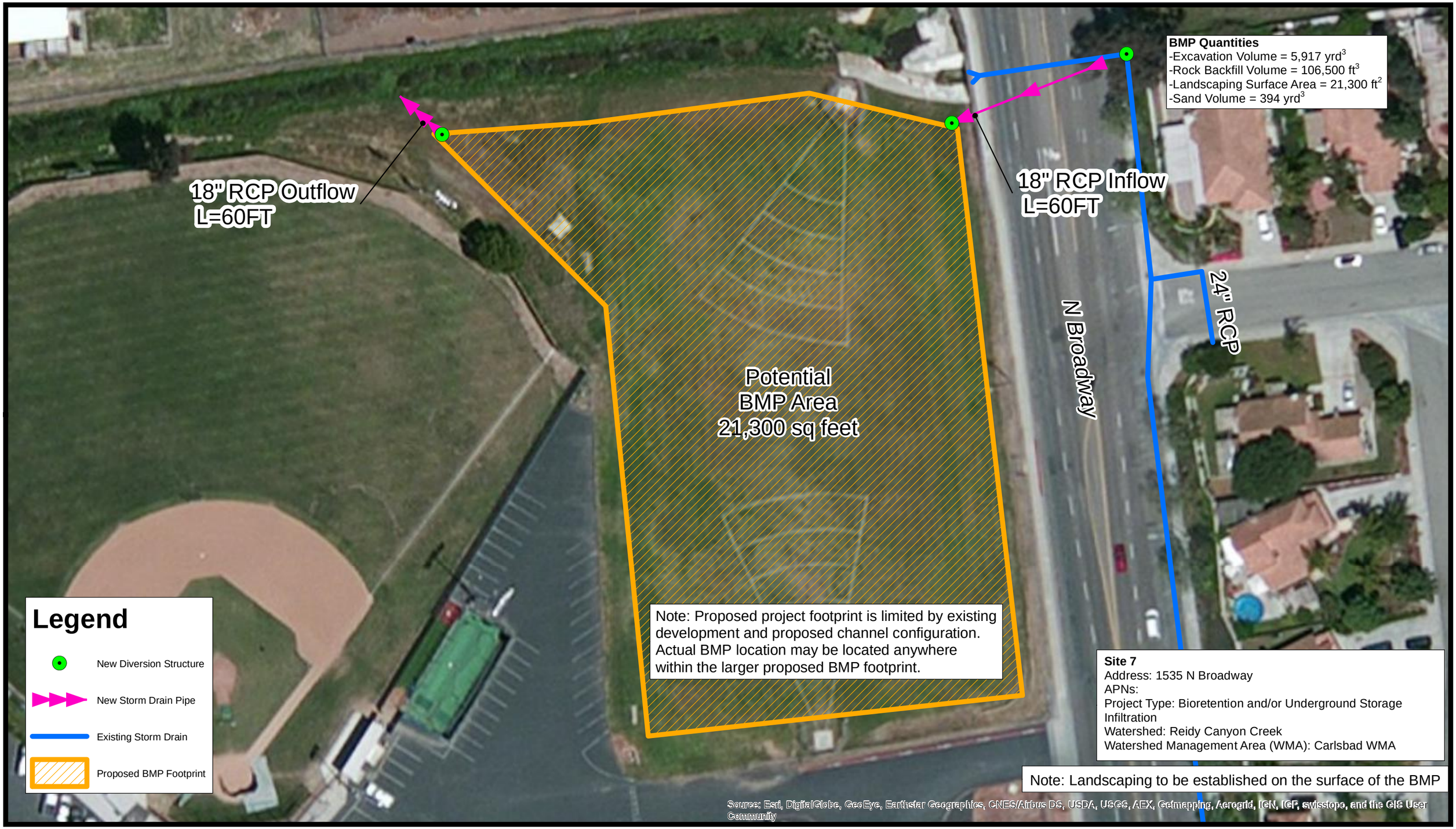
0 20 40 80 Feet

1 in = 40 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Spruce Street Channel Improvement Project*
## *Site 6C - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

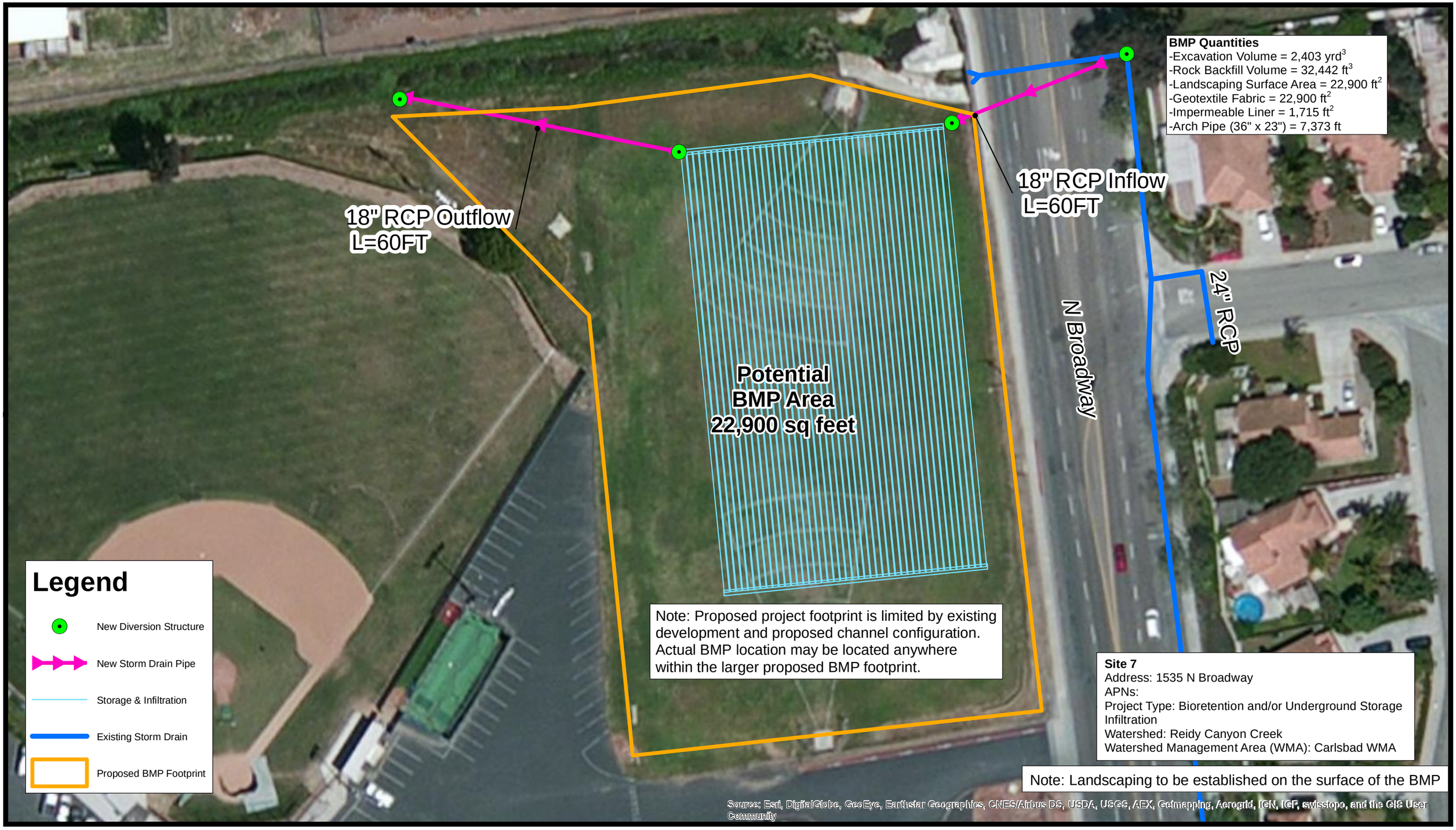
0 25 50 100 Feet

1 in = 50 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

***Reidy Canyon Creek Channel Improvements***
***Site 7A - Bioretention***




## Legend

- New Diversion Structure
- New Storm Drain Pipe
- Storage & Infiltration
- Existing Storm Drain
- Proposed BMP Footprint

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0 25 50 100 Feet

1 in = 50 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Reidy Canyon Creek Channel Improvements Site 7B - Underground Storage & Infiltration*

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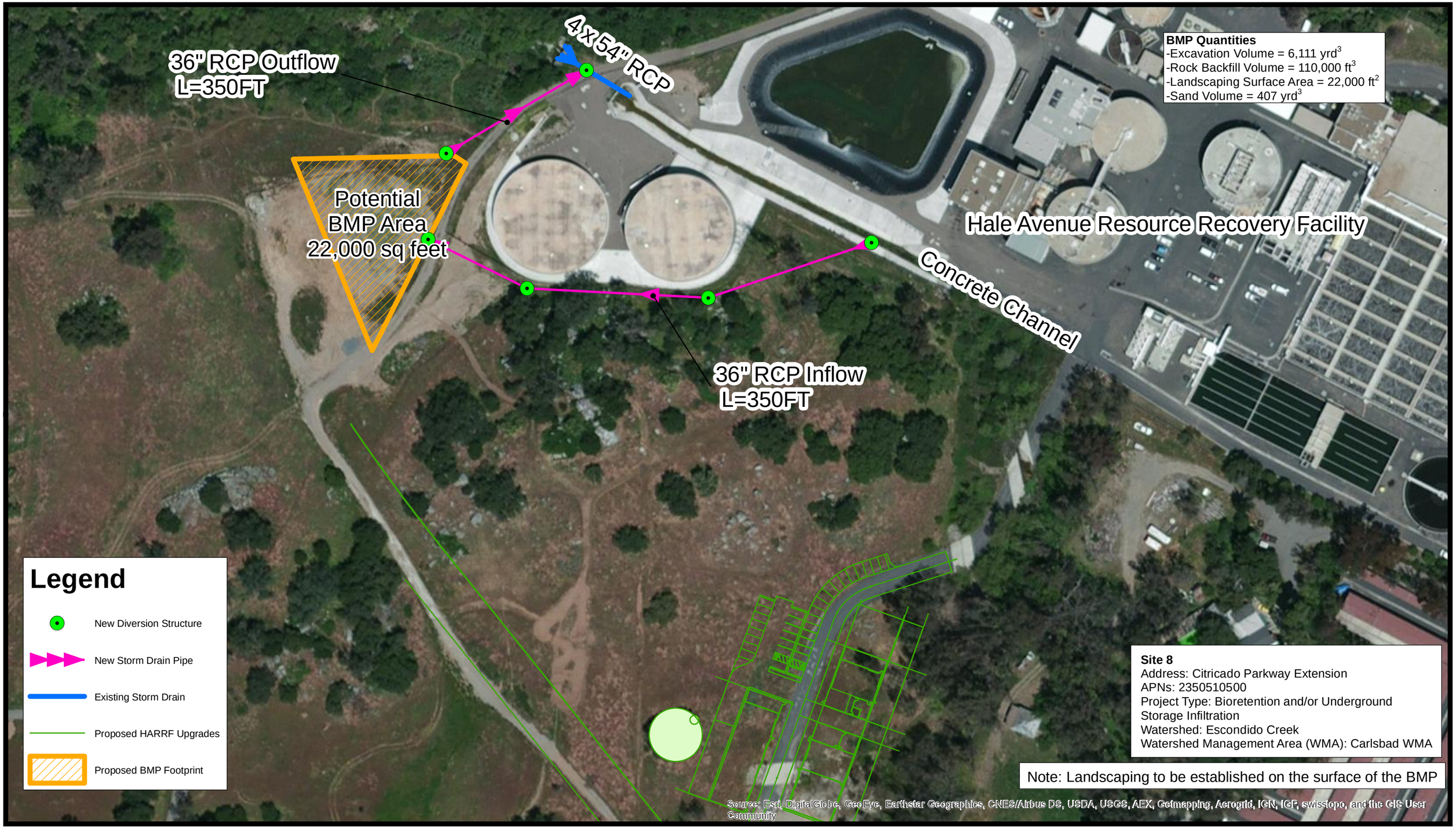
0 25 50 100 Feet

1 in = 50 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Reidy Canyon Creek Channel Improvements*
## *Site 7C - Irrigation and Reuse*




Michael Baker INTERNATIONAL

0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Avenida Del Diablo Park*
## *Site 8A - Bioretention*

36" RCP Outflow
L=350FT

4x54" RCP

Potential
BMP Area
30,000 sq feet

Hale Avenue Resource Recovery Facility

Concrete Channel

36" RCP Inflow
L=350FT

**BMP Quantities**
-Excavation Volume = 3,148 $yrd^3$
-Rock Backfill Volume = 42,500 $ft^3$
-Landscaping Surface Area = 30,000 $ft^2$
-Geotextile Fabric = 30,000 $ft^2$
-Impermeable Liner = 1,963 $ft^2$
-Arch Pipe (36" x 23") = 9,659 ft

## Legend

- New Diversion Structure
- New Storm Drain Pipe
- Storage & Infiltration
- Existing Storm Drain
- Proposed HARRF Upgrades
- Proposed BMP Footprint

**Site 8**
Address: Citricado Parkway Extension
APNs: 2350510500
Project Type: Bioretention and/or Underground Storage Infiltration
Watershed: Escondido Creek
Watershed Management Area (WMA): Carlsbad WMA

Note: Landscaping to be established on the surface of the BMP

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Avenida Del Diablo Park*
## *Site 8B - Underground Storage & Infiltration*

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0 30 60 120 Feet

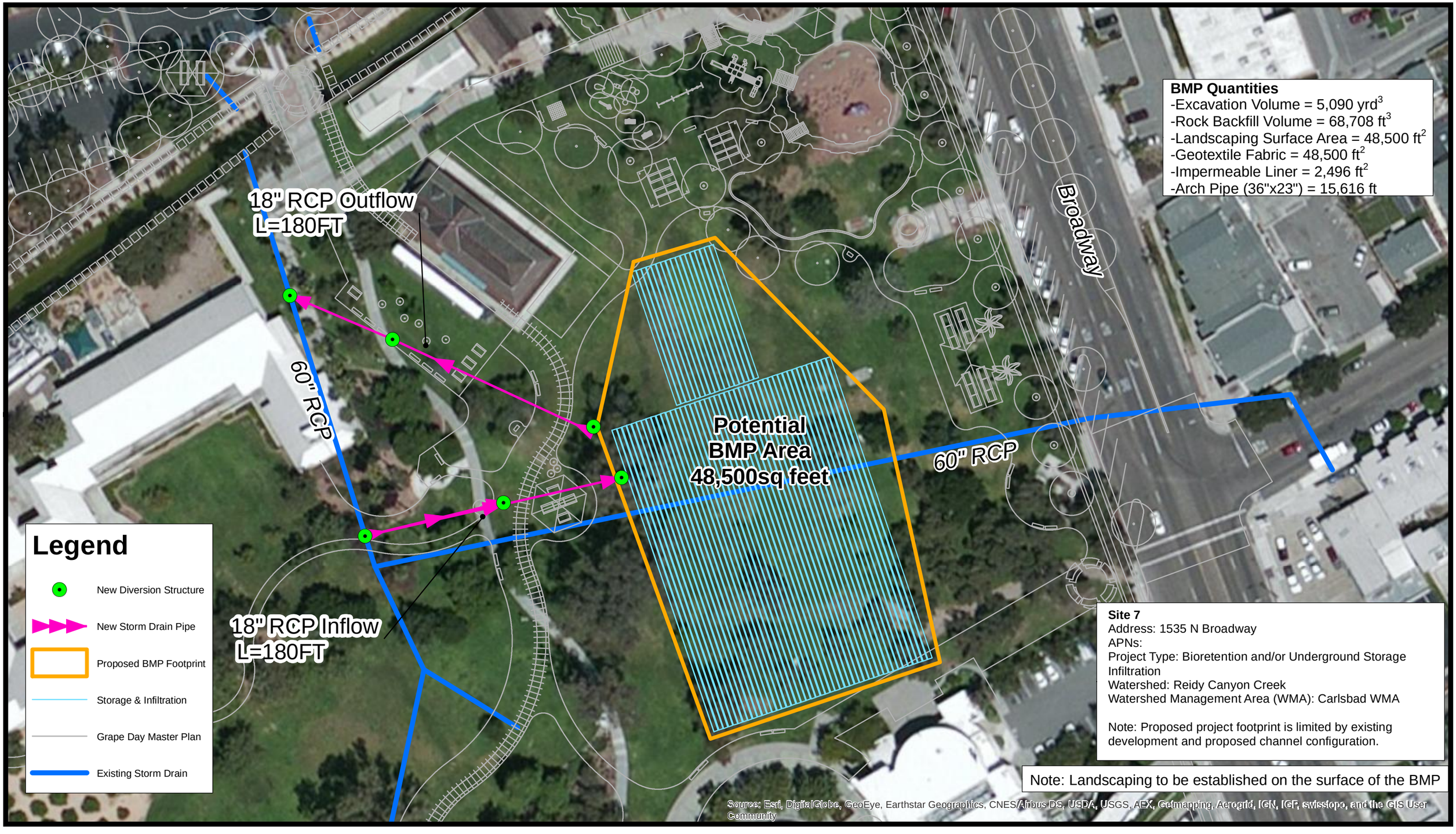
1 in = 60 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Woodward Parking Lot*

## *Site 9 - Underground Storage & Infiltration*




Michael Baker INTERNATIONAL

0 30 60 120 Feet

1 in = 60 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

## *Grape Day Park*
## *Site 10A - Underground Storage / Infiltration*

**BMP Quantities**
-Excavation Volume = 148 $yrd^3$
-Rock Backfill Volume =1,500 $ft^3$
-Landscaping Surface Area = 2,000 $ft^2$
-Clear and Grub = 0.05 Ac
-Impermeable Liner = 3,000 $ft^2$
-Arch Pipe (18"x11") = 1,364 ft

Potential
BMP Area
2,000 sq feet

60" RCP

60" RCP

Broadway

18" RCP Inflow
L=100FT

Potential
Irrigation Area
4.0 acres

## Legend

- New Diversion Structure
- New Storm Drain Pipe
- Irrigation & Reuse
- Grape Day Master Plan
- Existing Storm Drain
- Irrigation Footprint
- Proposed BMP Footprint

Note: Location of the reuse storage area and the potential irrigation area is preliminary and is dependent on the existing irrigation system, irrigation demand, and other factors.

**Site 10**
Address: 321 N Broadway
APN: 7602461500
Project Type: Underground Storage Infiltration and Reuse
Watershed: Escondido Creek
Watershed Management Area (WMA): Carlsbad WMA

Note: Landscaping to be established on the surface of the BMP

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Michael Baker INTERNATIONAL

0 40 80 160 Feet

1 in = 80 feet

*Escondido Creeks Hydraulic Study*

# Alternative Compliance Potential Projects Assessment

***Grape Day Park***
***Site 10B - Irrigation/Reuse***

# Site 1 – Rincon Valley Drive

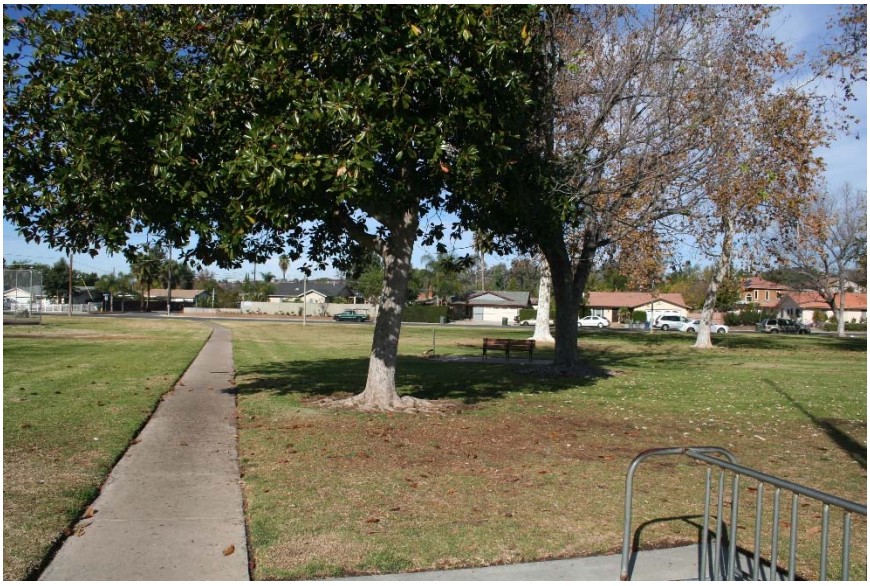
## Site 1 – Rincon Valley Drive

## Site 2 – Mountain View Park

## Site 2 – Mountain View Park

## Site 3 – Golf Course

## Site 4 – Washington Park



## Site 4 – Washington Park

## Site 5 – Orange Glen High

## Site 6 – Spruce Street Channel

## Site 6 – Spruce Street Channel

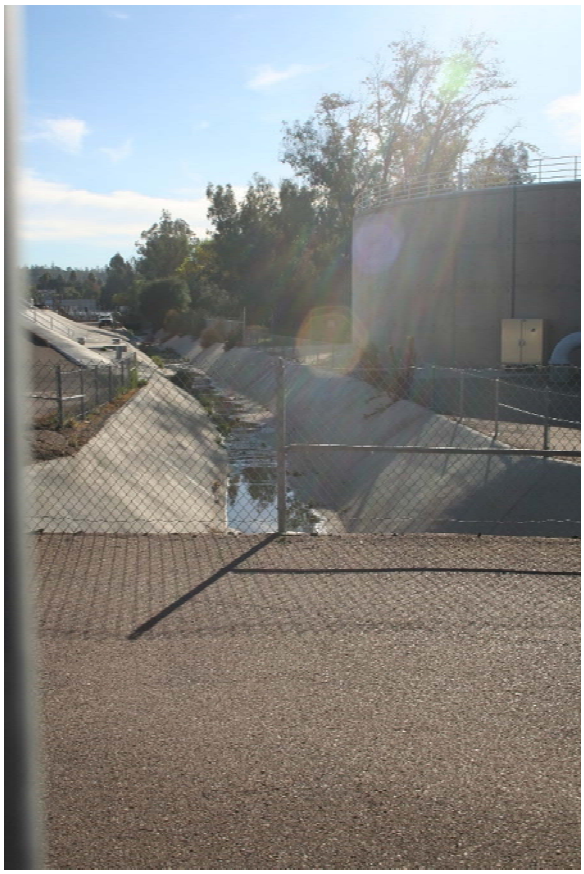
## Site 7 – Escondido High School

## Site 7 – Escondido High School

## Site 8 – Citracado Parkway

## Site 8 – Citracado Parkway

## Site 8 – Citracado Parkway



## Site 9 – Woodward Parking

## Site 10 – Grape Day Park

## Site 10 – Grape Day Park

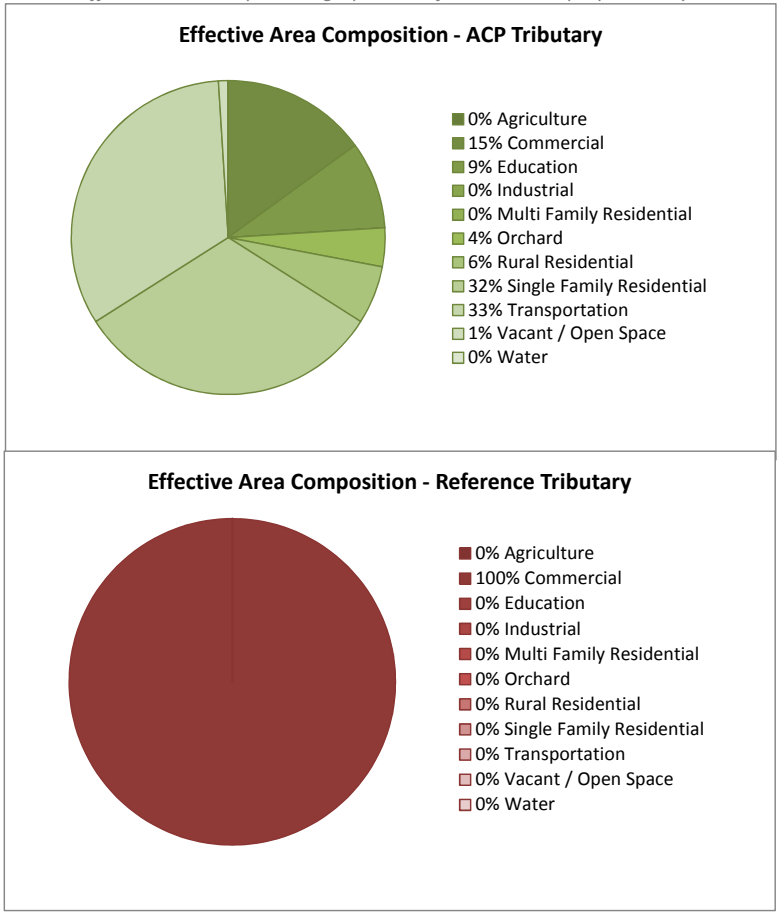
Michael Baker
INTERNATIONAL

# Appendix B Earned Stormwater Pollutant Control Volume for ACP Sites

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.40** | **1.44** | **1.00** | - | - | - | **0.46** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

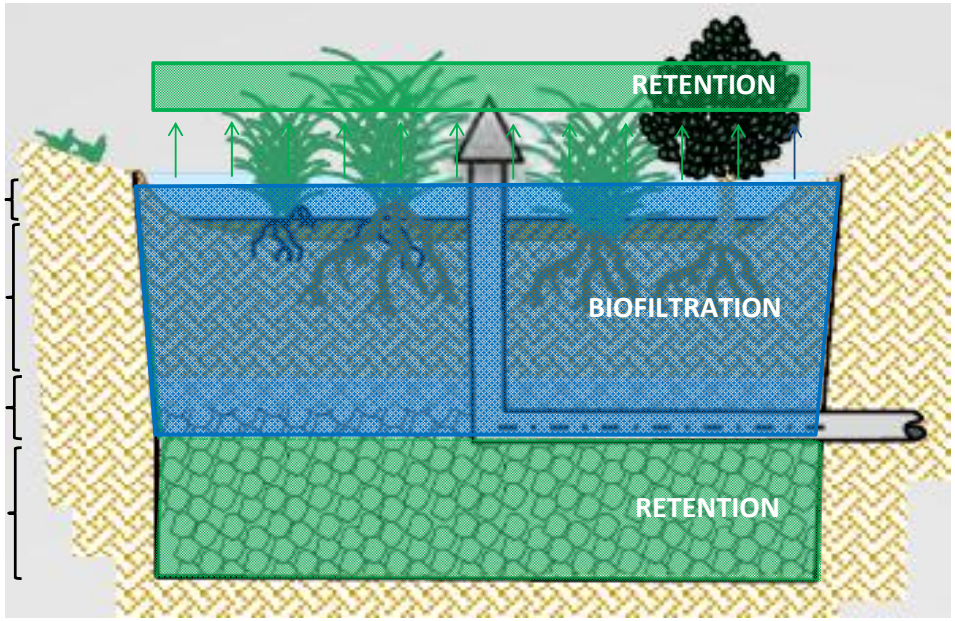
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,800 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 16,770 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.10 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.08 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 153,138 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 229,707 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 34,840 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 114,854 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 15,340 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.23 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.13 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.30** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 1170 cf |
| Surface Ponding Depth | 12.00 in. |
| Surface Ponding Volume | 7,800 cf |
| Soil Media Thickness | 18.00 in. |
| Soil Storage Volume | 2,340 cf |
| Gravel Depth Above IE | 20.00 in. |
| Gravel Storage Avove IE | 5,200 cf |
| Gravel Depth Below IE | 60.00 in. |
| Gravel Storage Below IE | 15,600 cf |
| **Volume Retained** | **16,770 cf** |
| **Opt 1. Volume Biofiltered** | **34,840 cf** |
| **Opt 2. Volume Stored** | **15,340 cf** |



Site 1A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 22,640 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 13.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 15,600 | | |
| **Equivalent Development Area** | 2.22 | 4.30 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **2.22** | **4.30** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

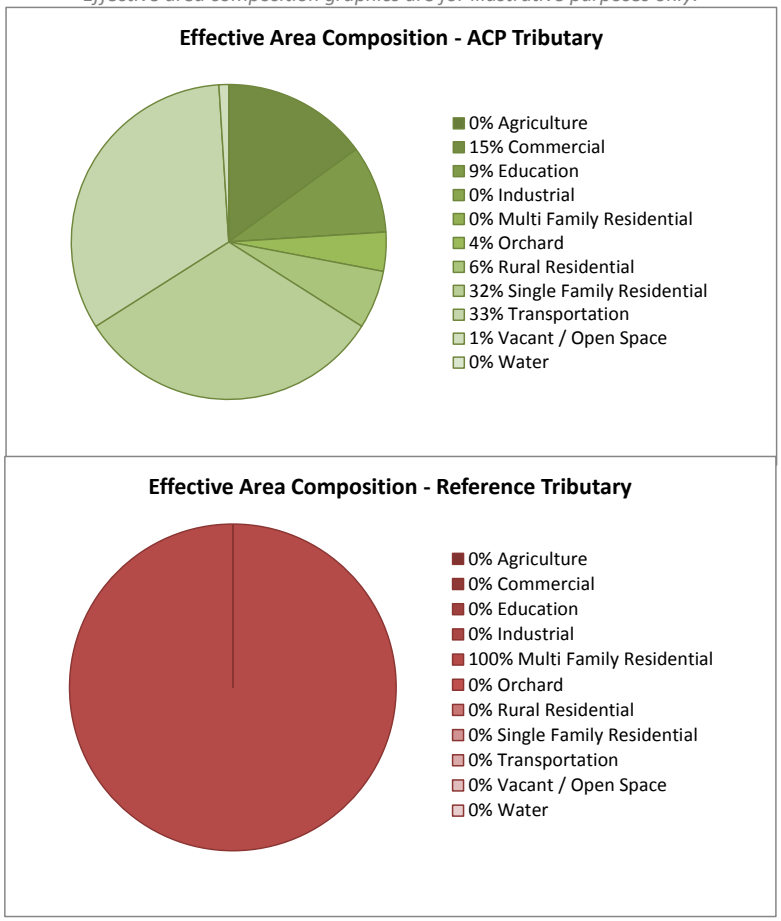
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.81** | **1.78** | **1.23** | **-** | **-** | **-** | **1.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

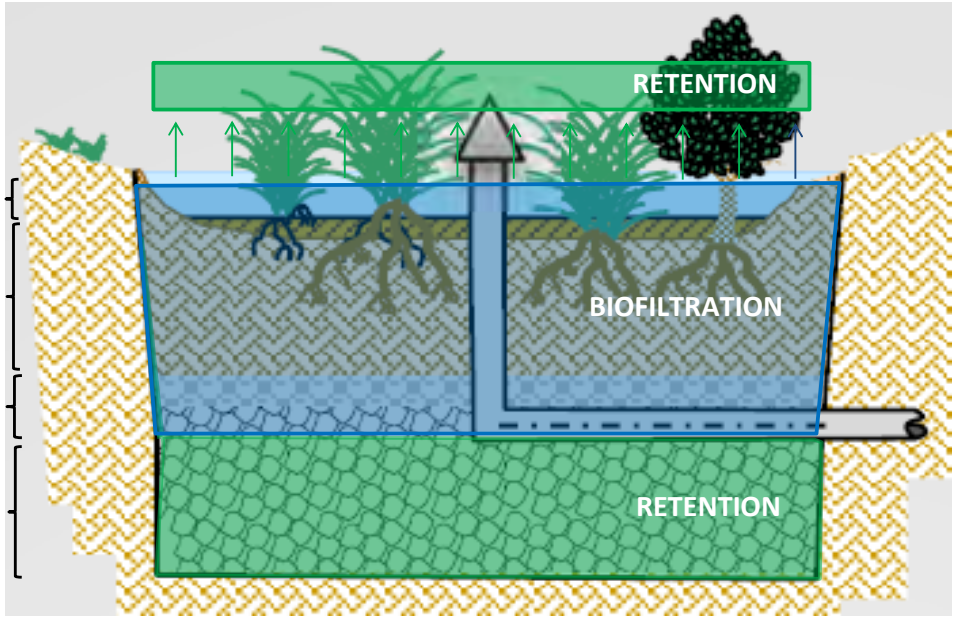
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,800 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 16,770 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.10 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.08 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 153,138 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 229,707 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 34,840 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 114,854 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 15,340 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.23 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.13 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.30** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1170 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 7,800 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,340 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 5,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 15,600 | cf |
| **Volume Retained** | **16,770** | **cf** |
| **Opt 1. Volume Biofiltered** | **34,840** | **cf** |
| **Opt 2. Volume Stored** | **15,340** | **cf** |



Site 1A Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 60,537 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 34.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 15,600 | | |
| **Equivalent Development Area** | 2.96 | 5.74 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **2.96** | **5.74** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

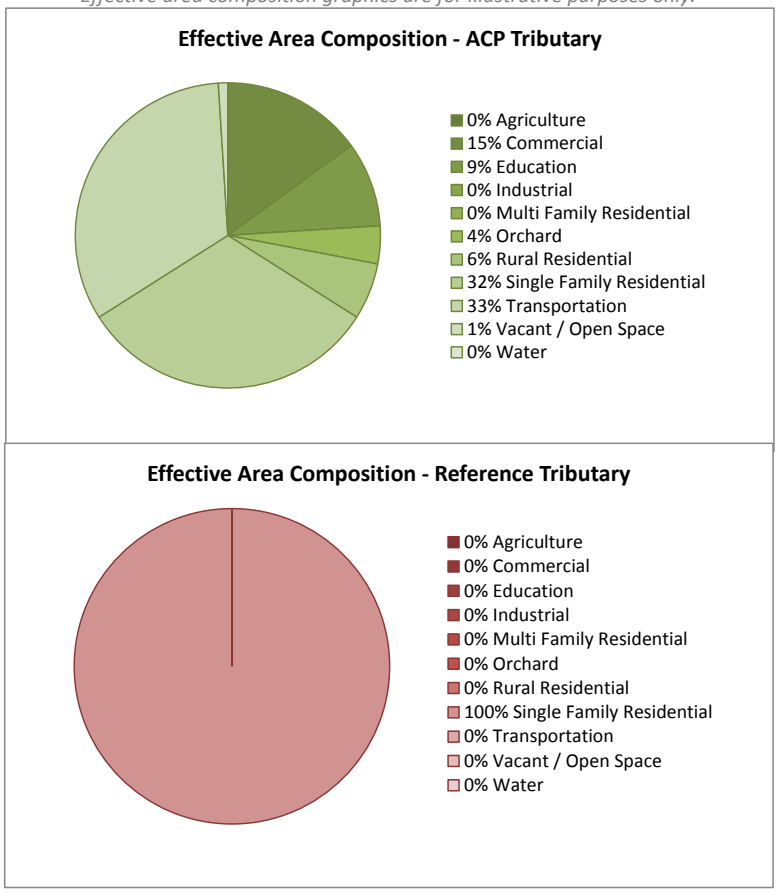
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.40** | **1.15** | **1.06** | **-** | **-** | **-** | **0.64** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

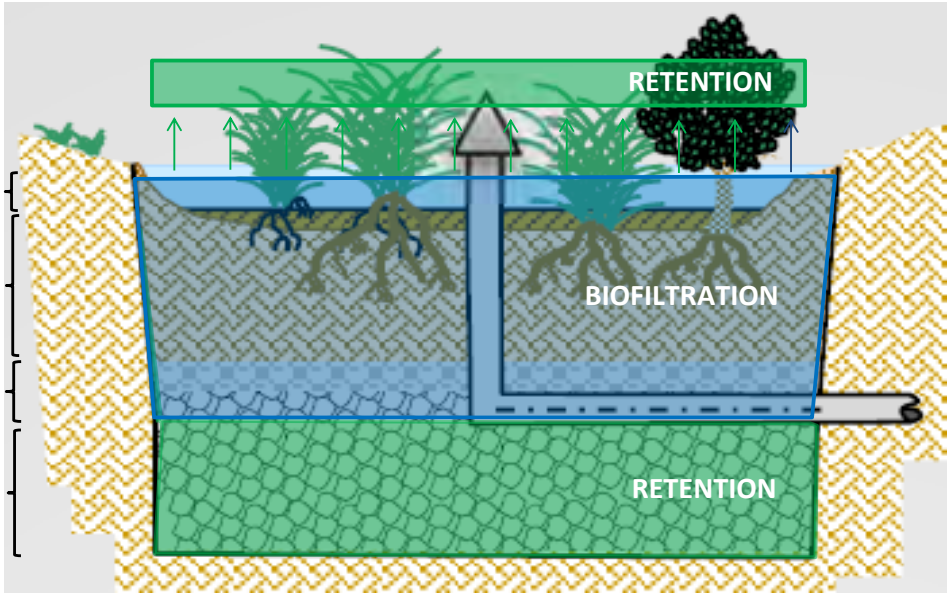
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,800 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 16,770 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.10 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.08 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 153,138 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 229,707 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 34,840 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 114,854 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 15,340 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.23 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.13 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.30** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1170 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 7,800 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,340 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 5,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 15,600 | cf |
| **Volume Retained** | **16,770** | **cf** |
| **Opt 1. Volume Biofiltered** | **34,840** | **cf** |
| **Opt 2. Volume Stored** | **15,340** | **cf** |



Site 1A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 31,499 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 18.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 15,600 | | |
| **Equivalent Development Area** | 4.44 | 8.61 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **4.44** | **8.61** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

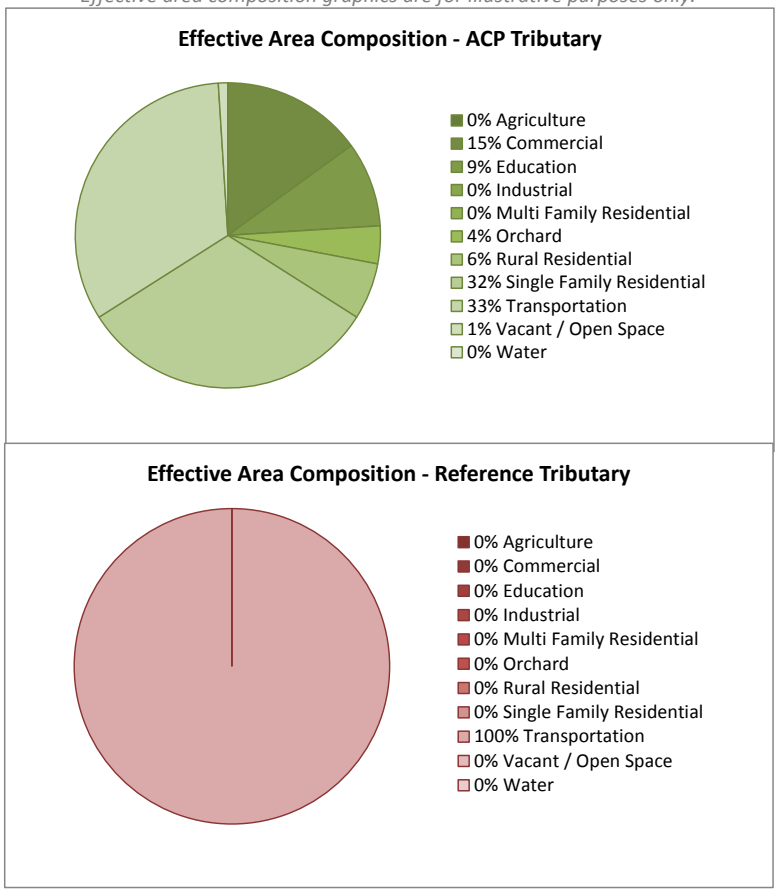
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.65** | **0.89** | **1.33** | **-** | **-** | **-** | **3.35** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

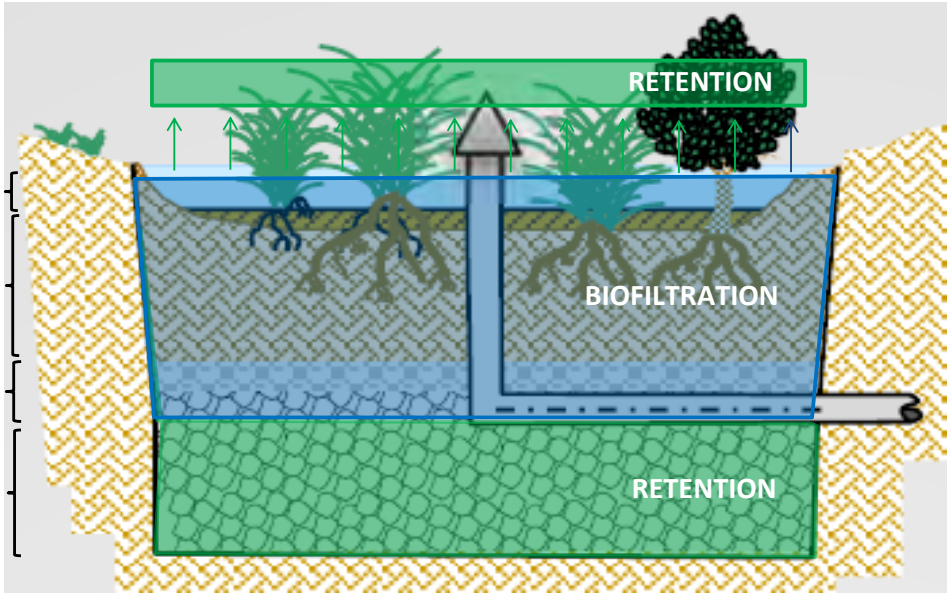
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,800 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 16,770 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.10 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.08 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 153,138 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 229,707 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 34,840 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 114,854 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 15,340 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.23 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.13 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.30** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1170 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 7,800 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,340 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 5,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 15,600 | cf |
| **Volume Retained** | **16,770** | **cf** |
| **Opt 1. Volume Biofiltered** | **34,840** | **cf** |
| **Opt 2. Volume Stored** | **15,340** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 43,803 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 25.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 15,600 | | |
| **Equivalent Development Area** | 1.97 | 3.83 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **1.97** | **3.83** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

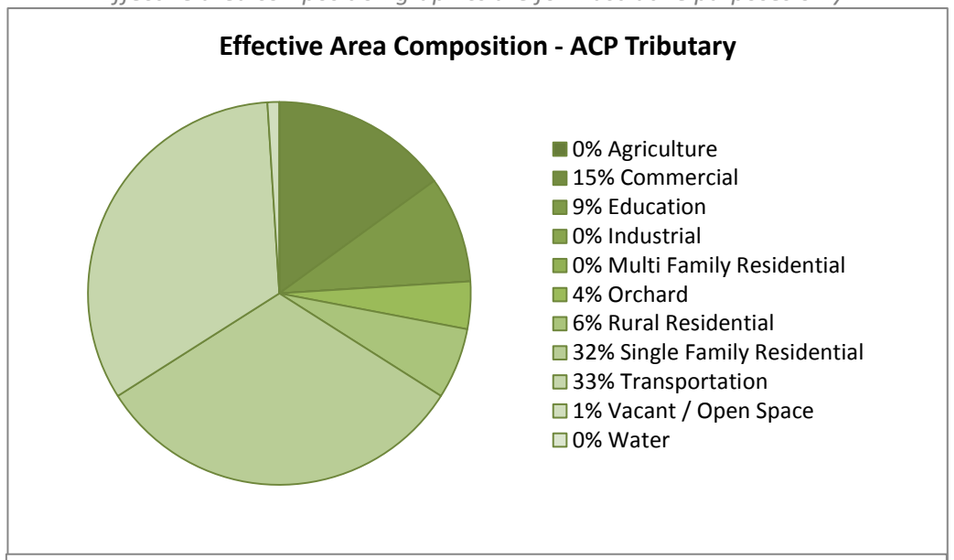
1) Only yellow cells are user input.

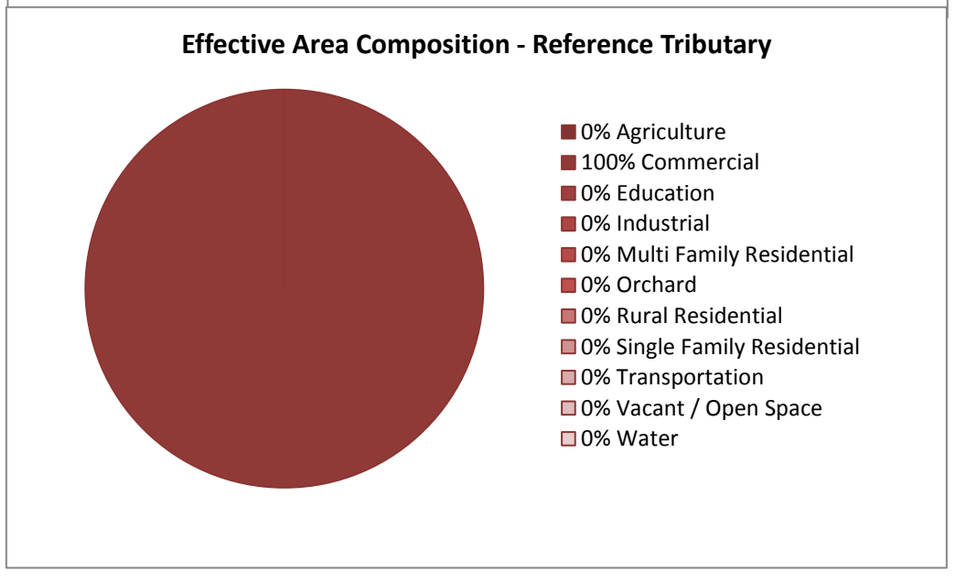
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | Carlsbad | | | | | | | | |
| | Hydrologic Unit | | Carlsbad (904.00) | | | | | | | | |
| | Land Use Factor [5] | | | | **1.40** | **1.44** | **1.00** | - | - | - | **0.46** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

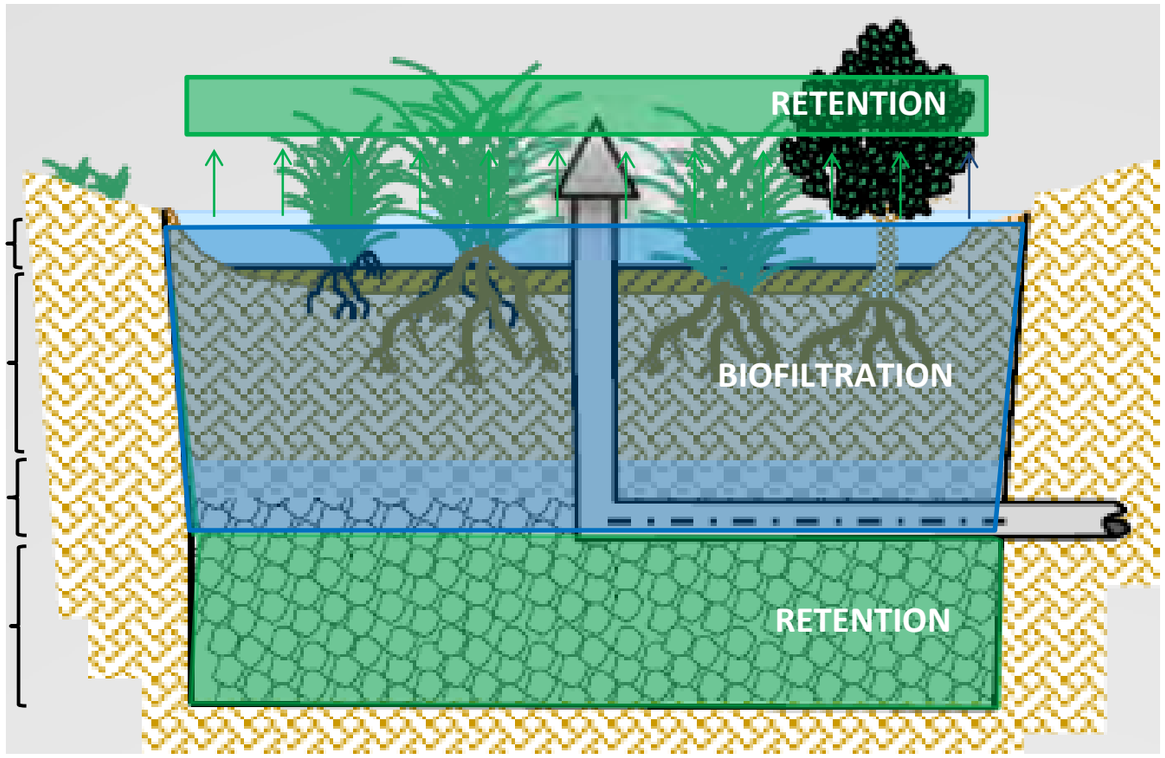
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 14,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 28,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.24 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.24 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.13 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 144,815 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 217,223 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 39,900 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 108,611 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 4,900 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.28 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.38** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 4,900 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 27,767 | cf |
| **Volume Retained** | **27,767** | **cf** |
| **Opt 1. Volume Biofiltered** | **39,900** | **cf** |
| **Opt 2. Volume Stored** | **4,900** | **cf** |



Site 1B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 29,305 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 16.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 27,767 | | |
| **Equivalent Development Area** | 3.95 | 7.66 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **3.95** | **7.66** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

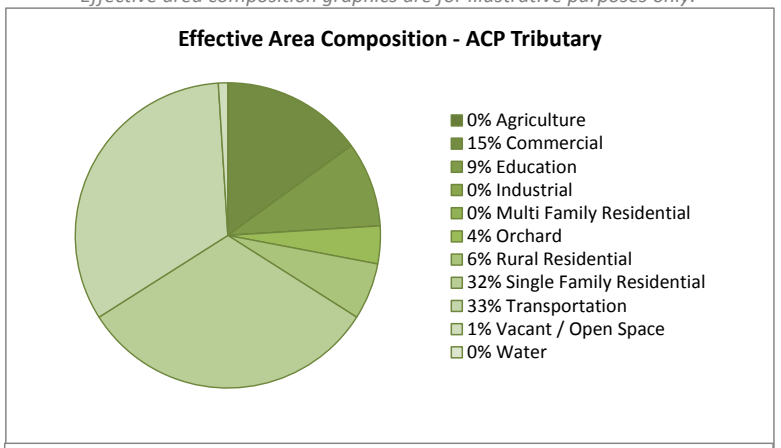
1) Only yellow cells are user input.

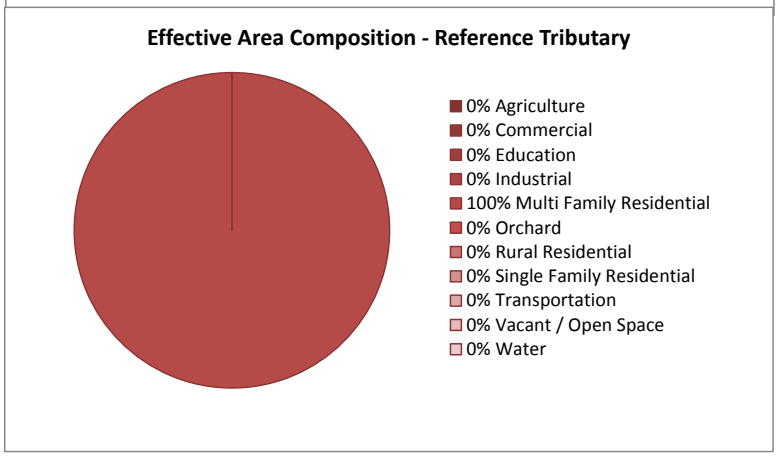
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.81** | **1.78** | **1.23** | **-** | **-** | **-** | **1.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

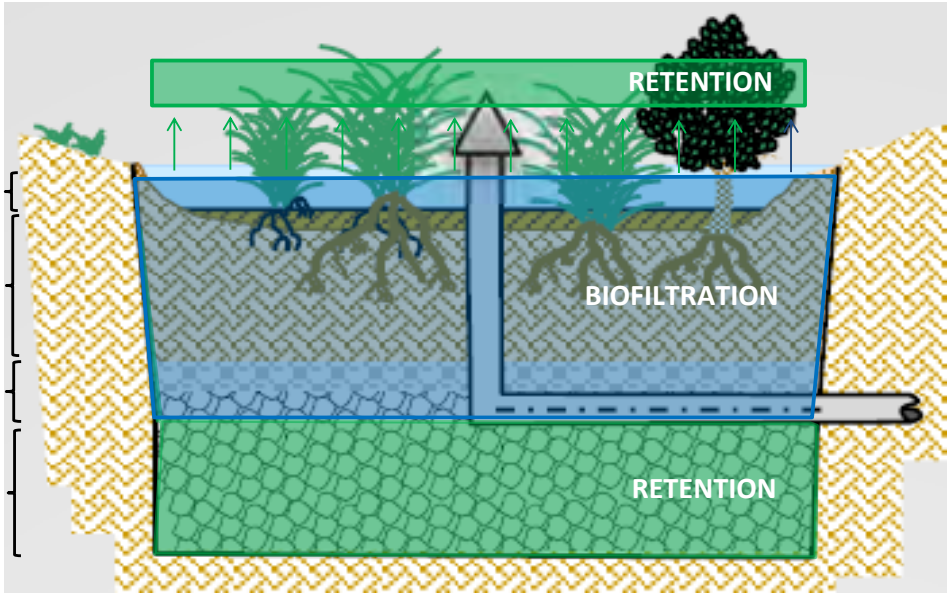
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 14,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 28,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.24 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.24 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.13 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 144,815 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 217,223 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 39,900 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 108,611 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 4,900 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.28 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.38** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 4,900 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 27,767 cf |
| **Volume Retained** | **27,767 cf** |
| **Opt 1. Volume Biofiltered** | **39,900 cf** |
| **Opt 2. Volume Stored** | **4,900 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 78,359 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 45.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 27,767 | | |
| **Equivalent Development Area** | 5.27 | 10.22 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.27** | **10.22** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

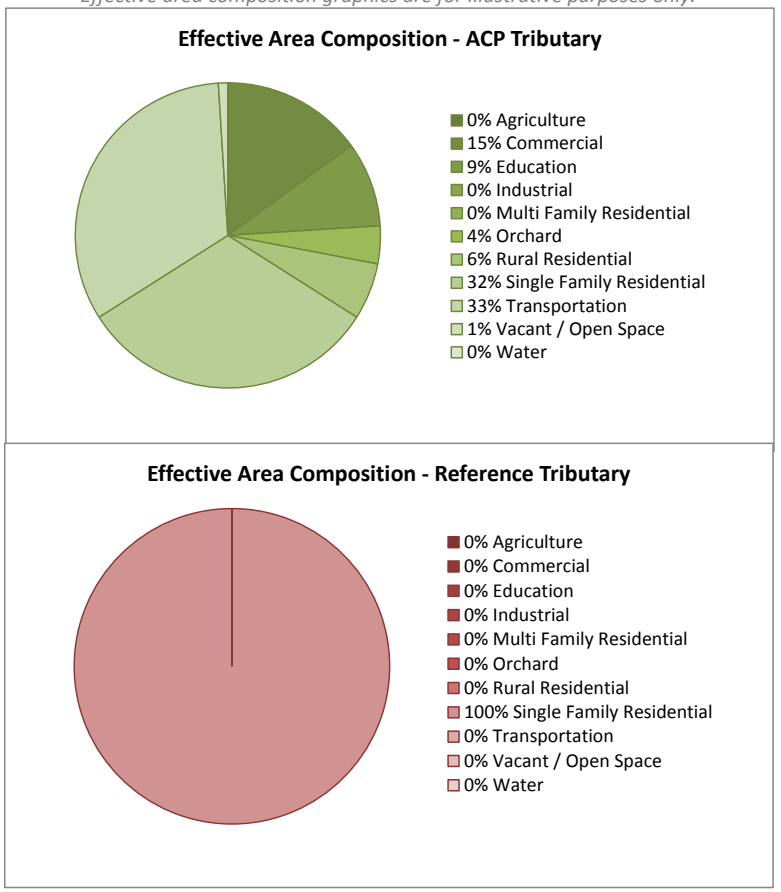
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.40** | **1.15** | **1.06** | **-** | **-** | **-** | **0.64** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

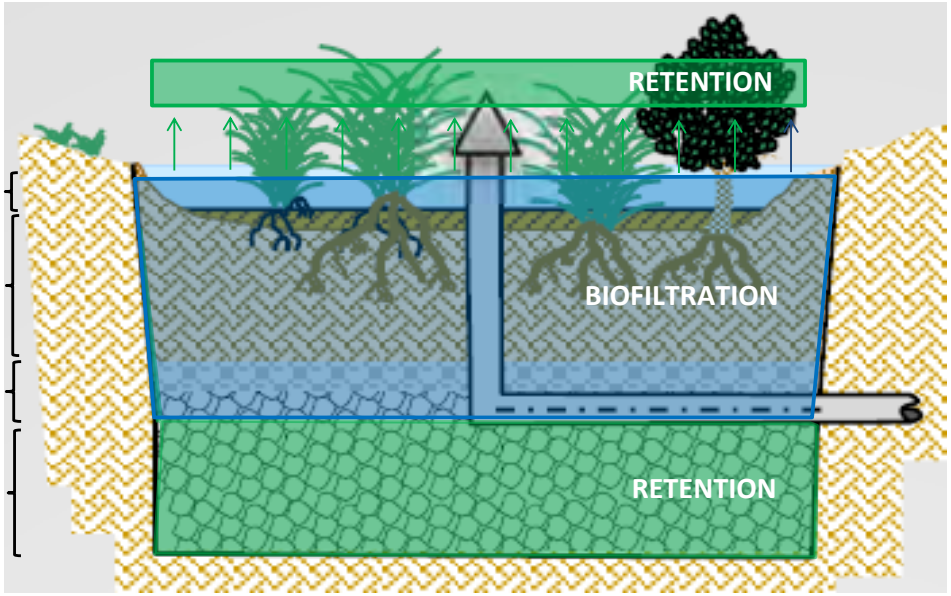
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 14,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 28,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.24 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.24 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.13 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 144,815 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 217,223 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 39,900 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 108,611 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 4,900 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.28 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.38** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 4,900 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 27,767 | cf |
| **Volume Retained** | **27,767** | **cf** |
| **Opt 1. Volume Biofiltered** | **39,900** | **cf** |
| **Opt 2. Volume Stored** | **4,900** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 40,772 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 23.4 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 27,767 | | |
| **Equivalent Development Area** | 7.91 | 15.32 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **7.91** | **15.32** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

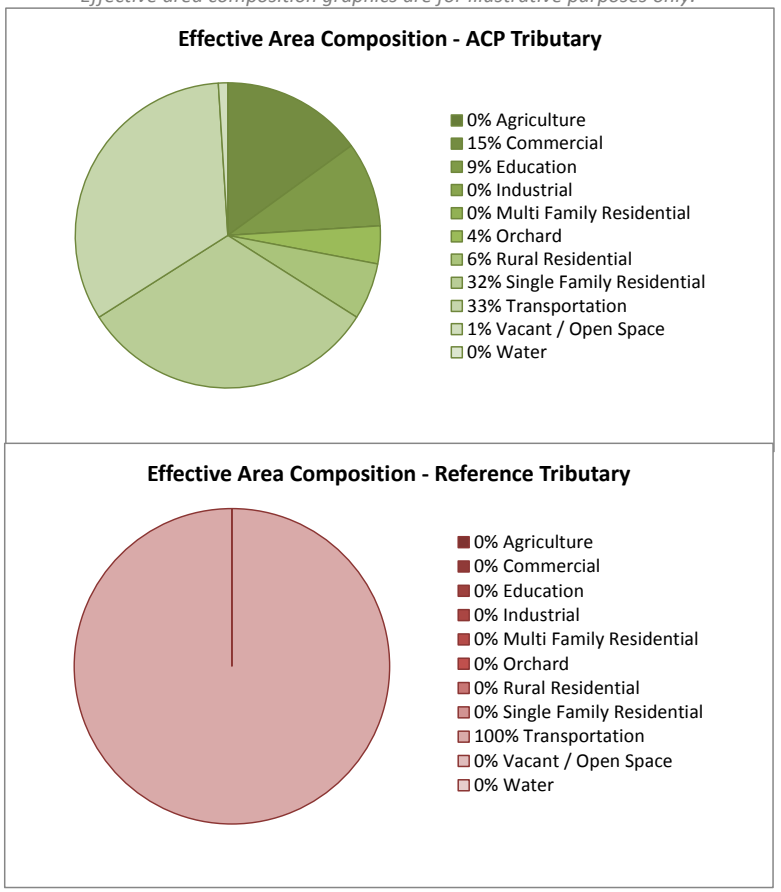
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.65** | **0.89** | **1.33** | **-** | **-** | **-** | **3.35** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

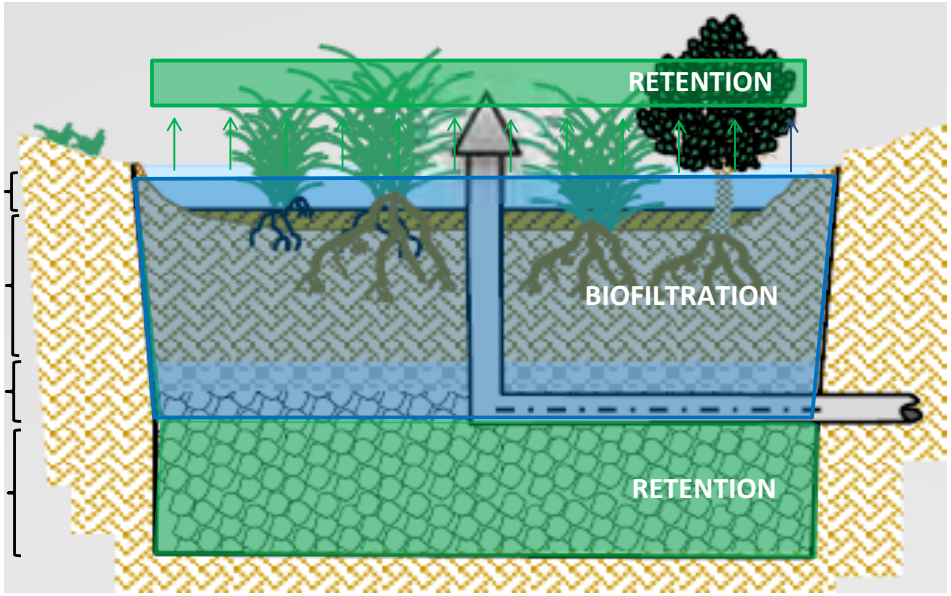
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 14,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 28,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.24 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.24 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.13 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 144,815 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 217,223 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 39,900 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 108,611 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 4,900 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.28 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.38** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 4,900 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 27,767 | cf |
| **Volume Retained** | **27,767** | **cf** |
| **Opt 1. Volume Biofiltered** | **39,900** | **cf** |
| **Opt 2. Volume Stored** | **4,900** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 56,698 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 32.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 27,767 | | |
| **Equivalent Development Area** | 3.51 | 6.81 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **3.51** | **6.81** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

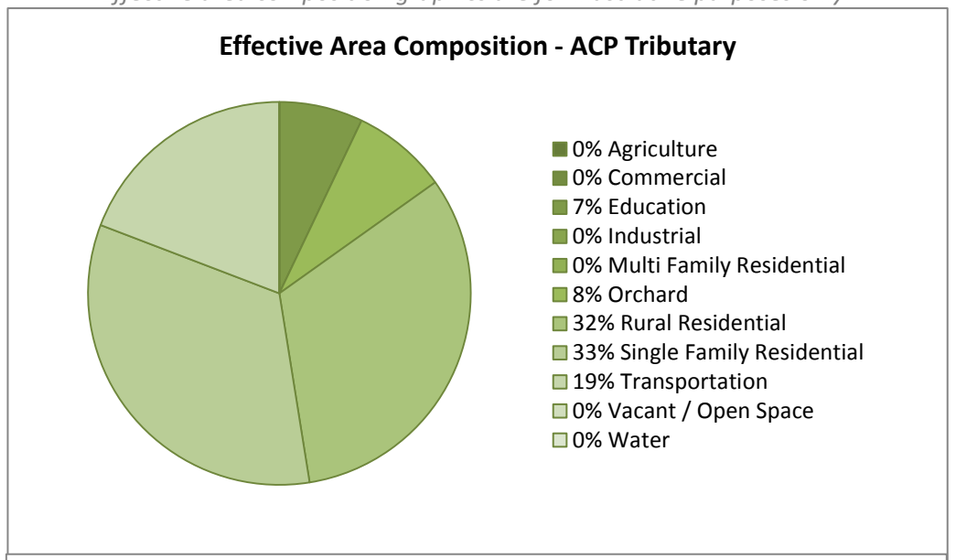
1) Only yellow cells are user input.

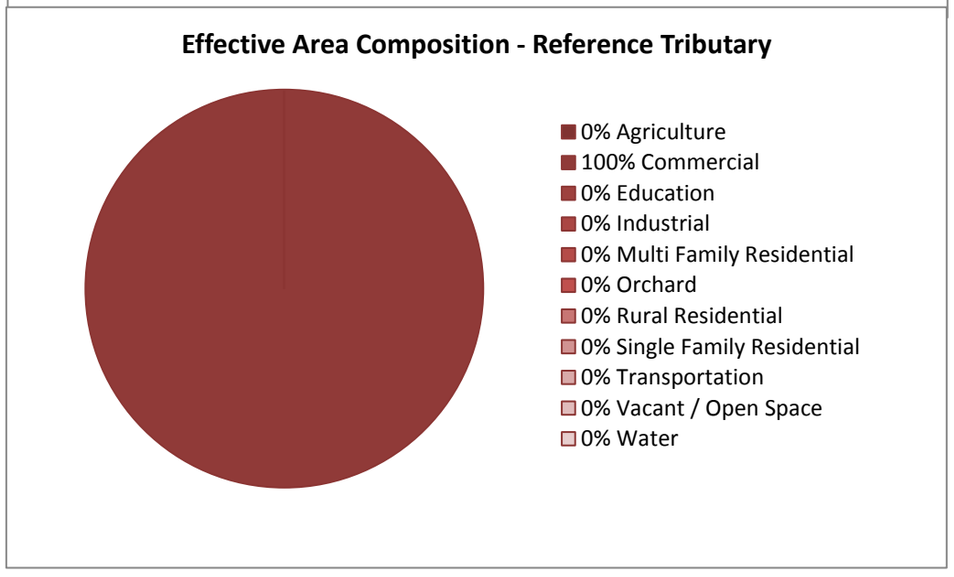
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.17** | **1.93** | **1.13** | - | - | - | **0.36** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

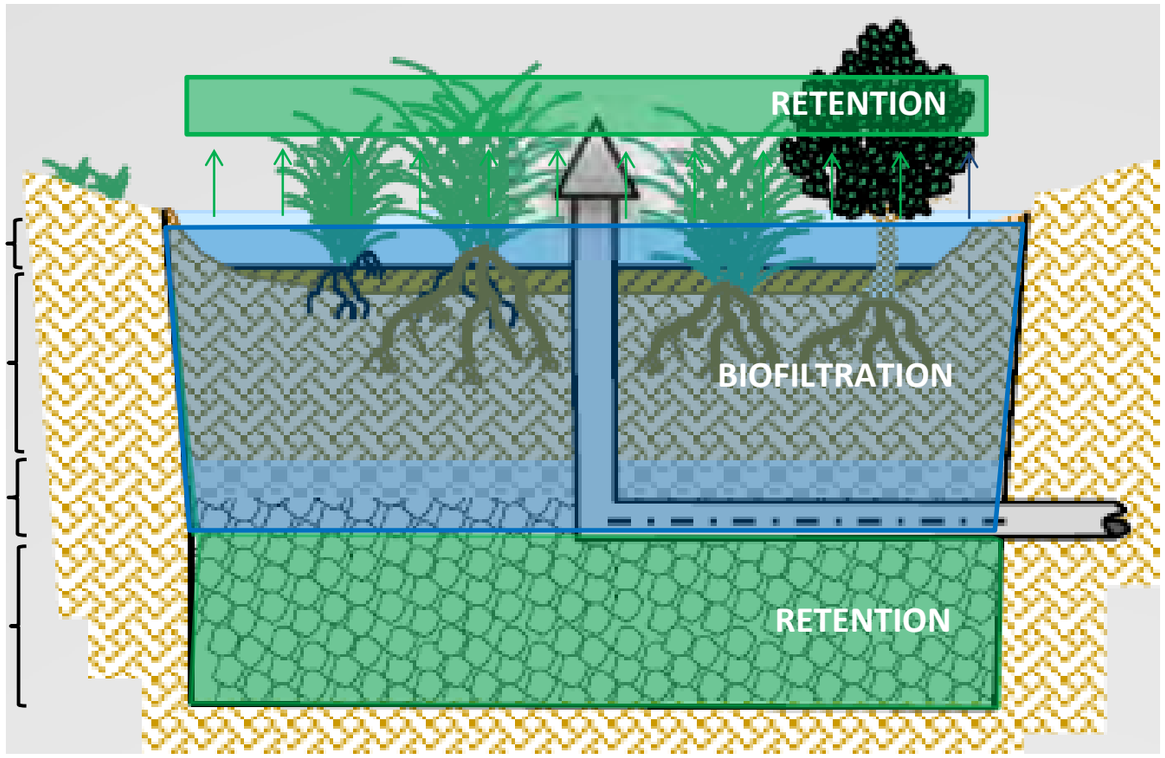
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 102,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 219,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 204,111 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 306,167 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 306,167 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 153,083 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 153,083 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 15300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 102,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 30,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 68,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 204,000 | cf |
| **Volume Retained** | **219,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **306,167** | **cf** |
| **Opt 2. Volume Stored** | **153,083** | **cf** |



Site 2A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 141,260 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 81.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 204,000 | | |
| **Equivalent Development Area** | 29.05 | 56.29 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **29.05** | **56.29** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

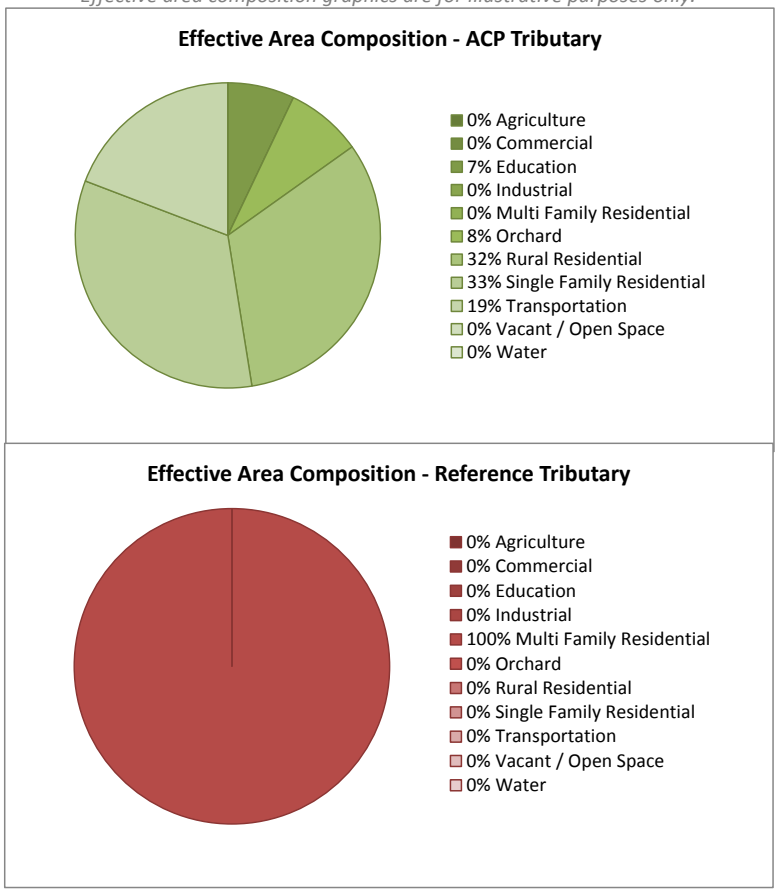
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **4.13** | **2.38** | **1.39** | **-** | **-** | **-** | **1.15** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

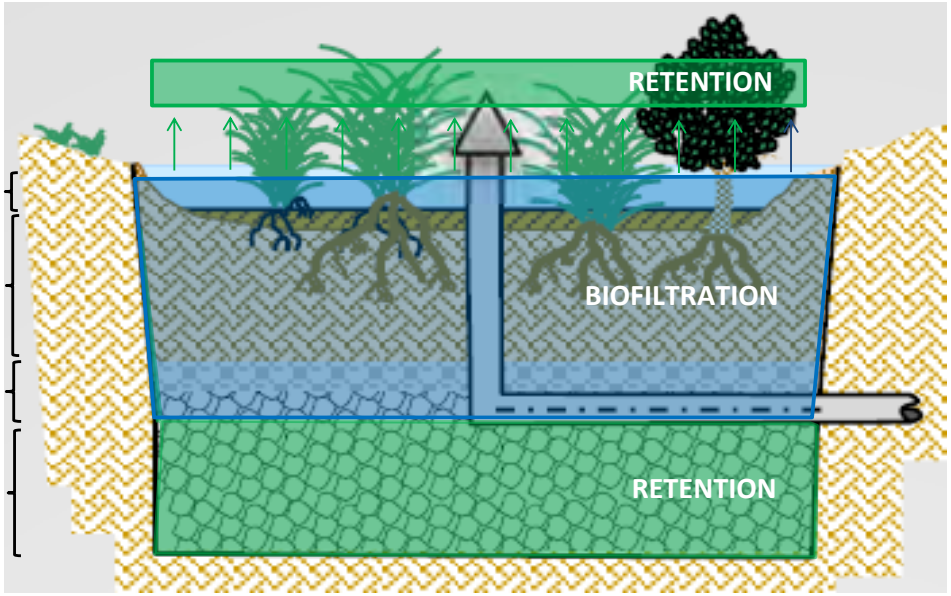
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 102,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 219,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 204,111 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 306,167 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 306,167 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 153,083 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 153,083 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 15300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 102,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 30,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 68,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 204,000 | cf |
| **Volume Retained** | **219,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **306,167** | **cf** |
| **Opt 2. Volume Stored** | **153,083** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 451,246 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 259.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 204,000 | | |
| **Equivalent Development Area** | 38.74 | 75.05 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **38.74** | **75.05** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

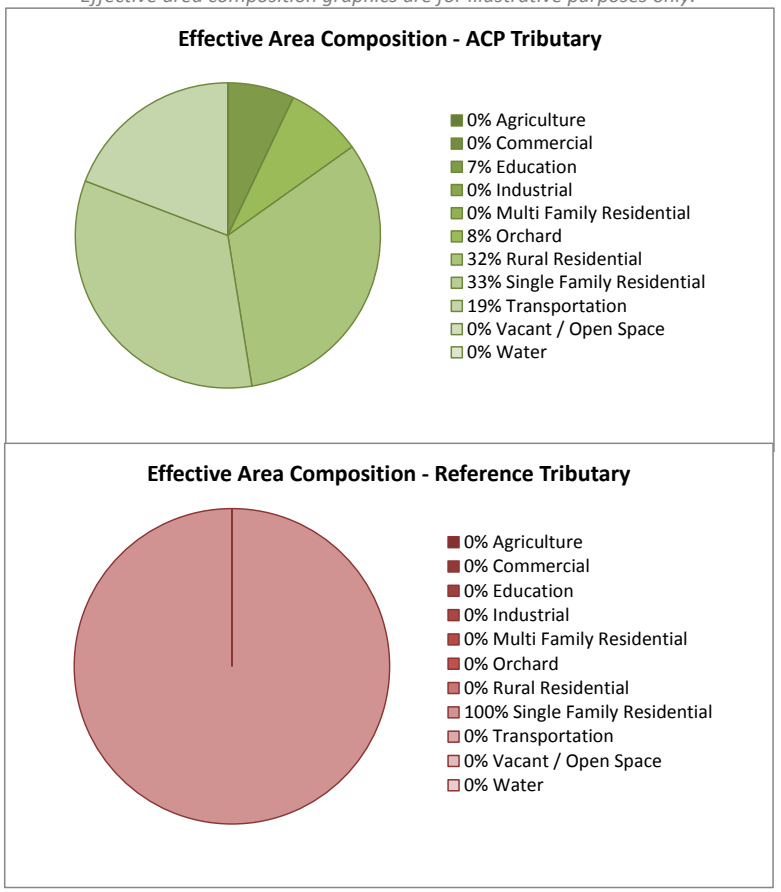
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.17** | **1.55** | **1.21** | **-** | **-** | **-** | **0.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

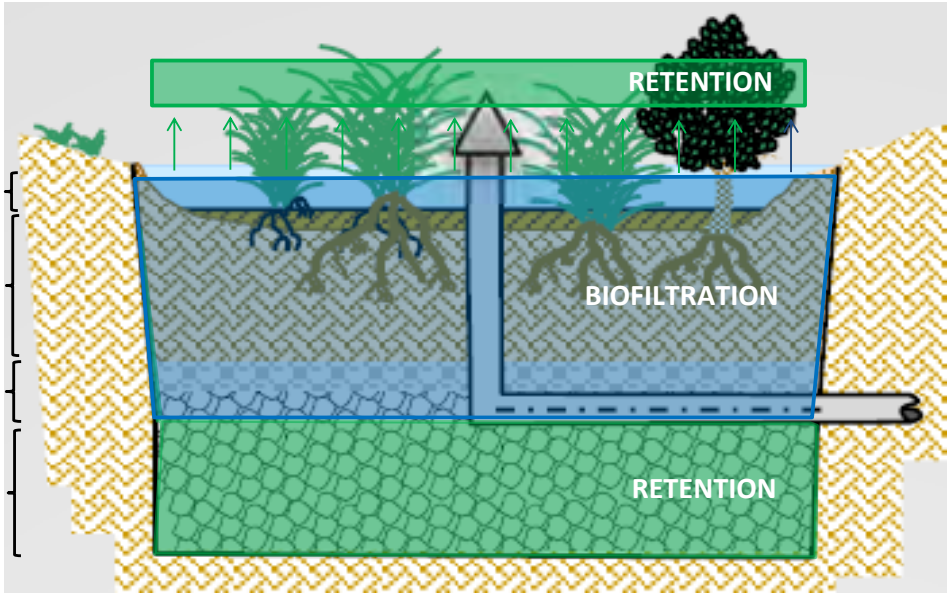
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 102,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 219,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 204,111 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 306,167 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 306,167 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 153,083 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 153,083 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 15300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 102,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 30,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 68,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 204,000 | cf |
| **Volume Retained** | **219,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **306,167** | **cf** |
| **Opt 2. Volume Stored** | **153,083** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 192,270 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 110.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 204,000 | | |
| **Equivalent Development Area** | 58.10 | 112.58 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **58.10** | **110.35** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

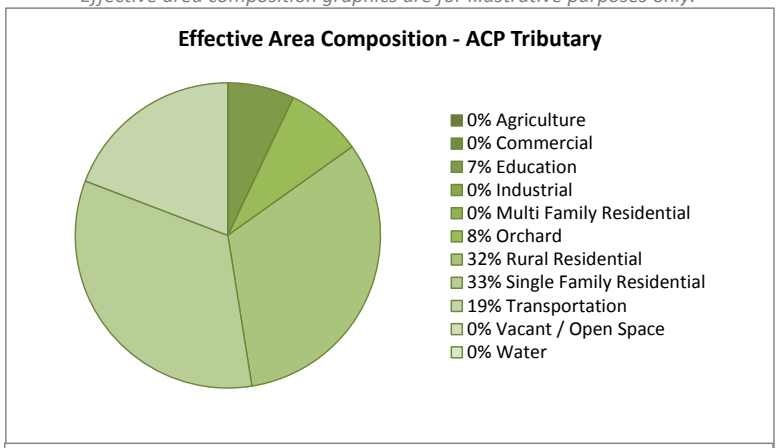
1) Only yellow cells are user input.

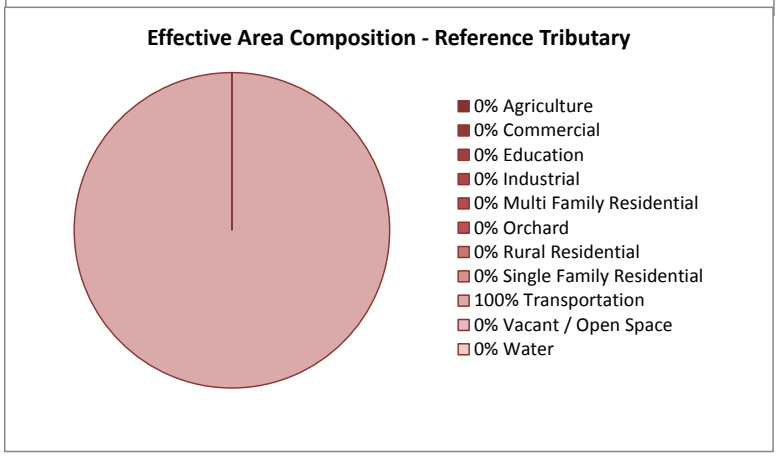
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.75** | **1.19** | **1.51** | **-** | **-** | **-** | **2.58** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

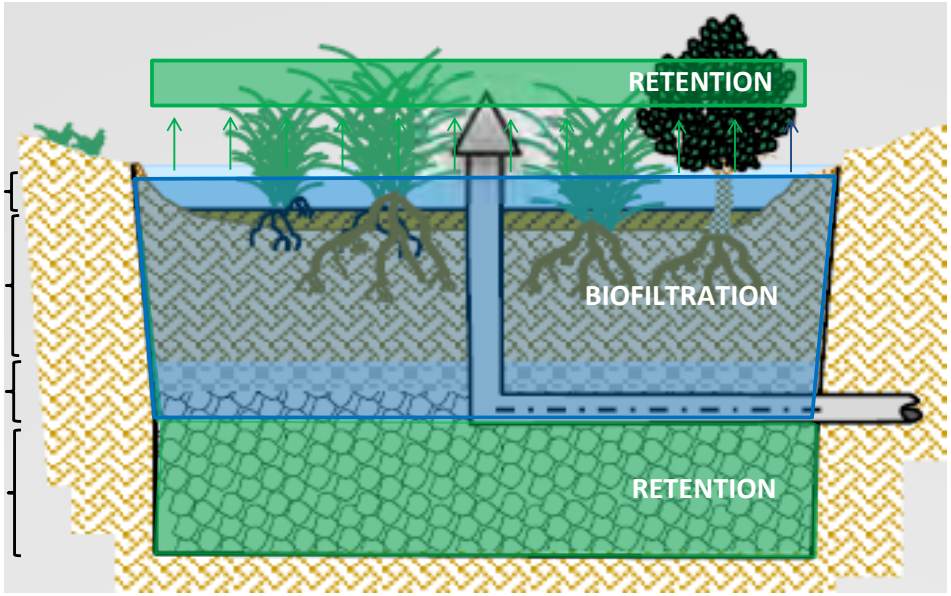
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 102,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 219,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 204,111 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 306,167 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 306,167 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 153,083 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 153,083 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 15300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 102,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 30,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 68,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 204,000 | cf |
| **Volume Retained** | **219,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **306,167** | **cf** |
| **Opt 2. Volume Stored** | **153,083** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 466,941 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 268.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 204,000 | | |
| **Equivalent Development Area** | 25.82 | 50.03 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **25.82** | **50.03** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

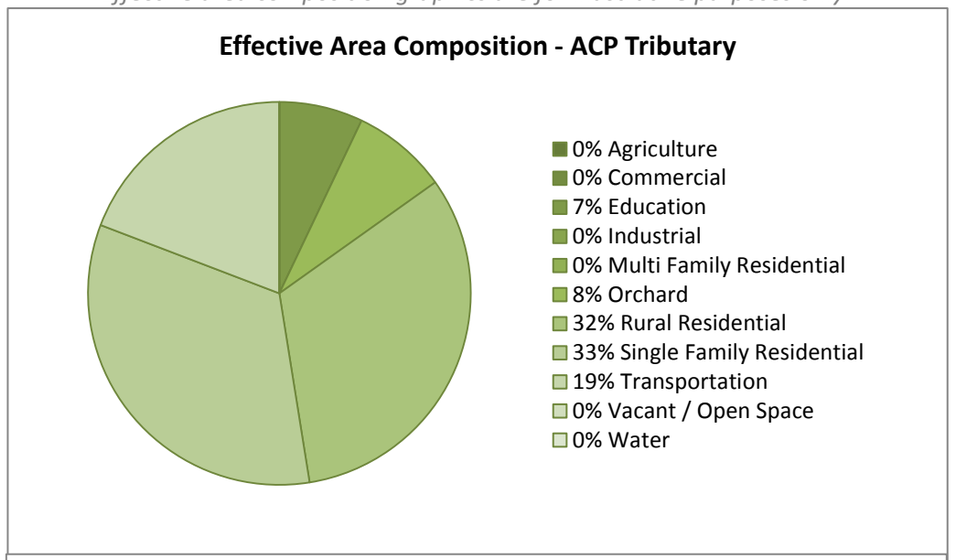
1) Only yellow cells are user input.

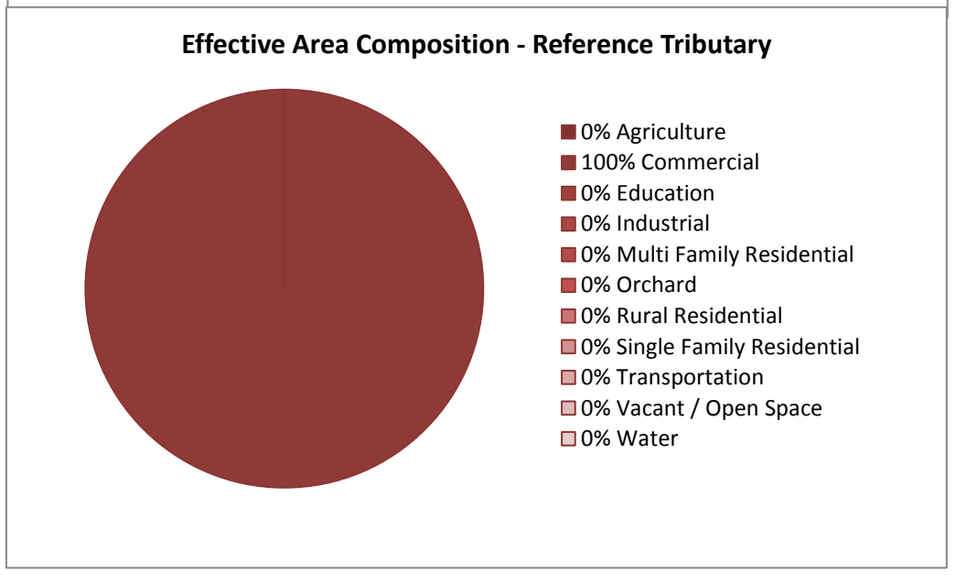
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **3.17** | **1.93** | **1.13** | - | - | - | **0.36** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

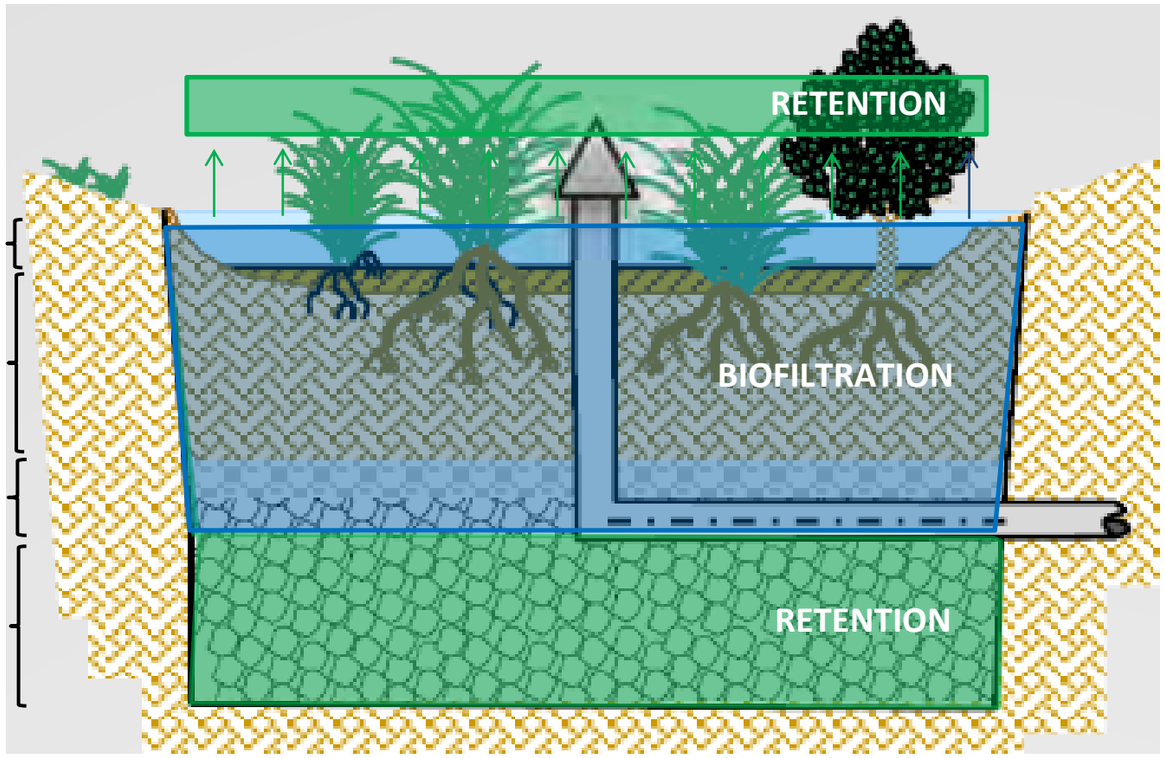
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 119,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 238,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.60 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.70 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.70 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.52 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 188,411 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 282,617 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 282,617 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 141,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 41,650 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.30 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 41,650 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 236,017 | cf |
| **Volume Retained** | **236,017** | **cf** |
| **Opt 1. Volume Biofiltered** | **282,617** | **cf** |
| **Opt 2. Volume Stored** | **41,650** | **cf** |



Site 2B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 141,266 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 81.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 236,017 | | |
| **Equivalent Development Area** | 33.61 | 65.12 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **33.61** | **65.12** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

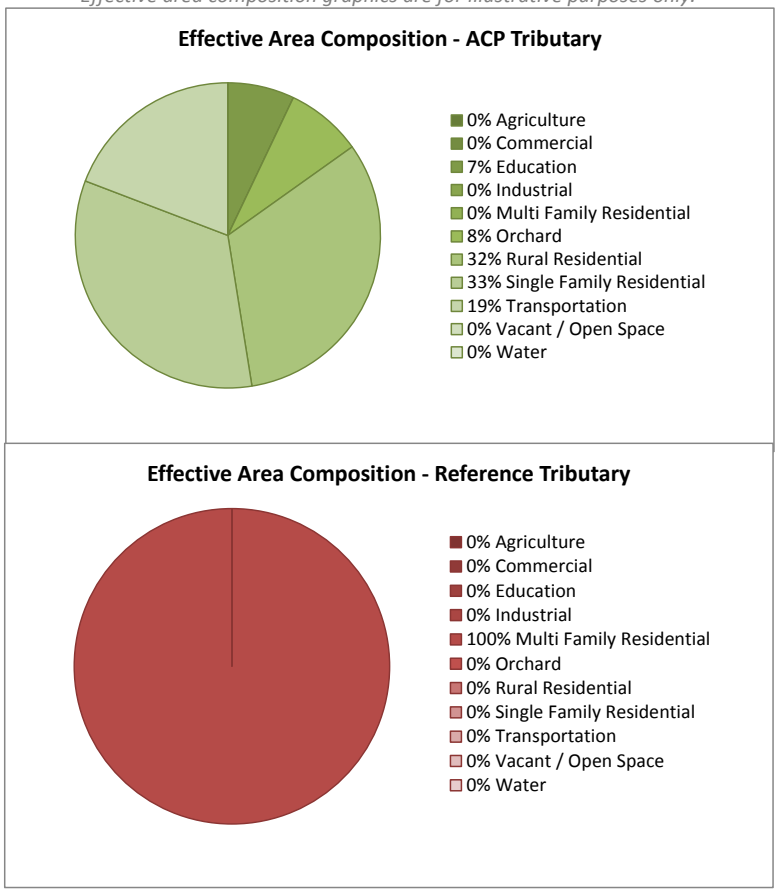
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **4.13** | **2.38** | **1.39** | **-** | **-** | **-** | **1.15** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

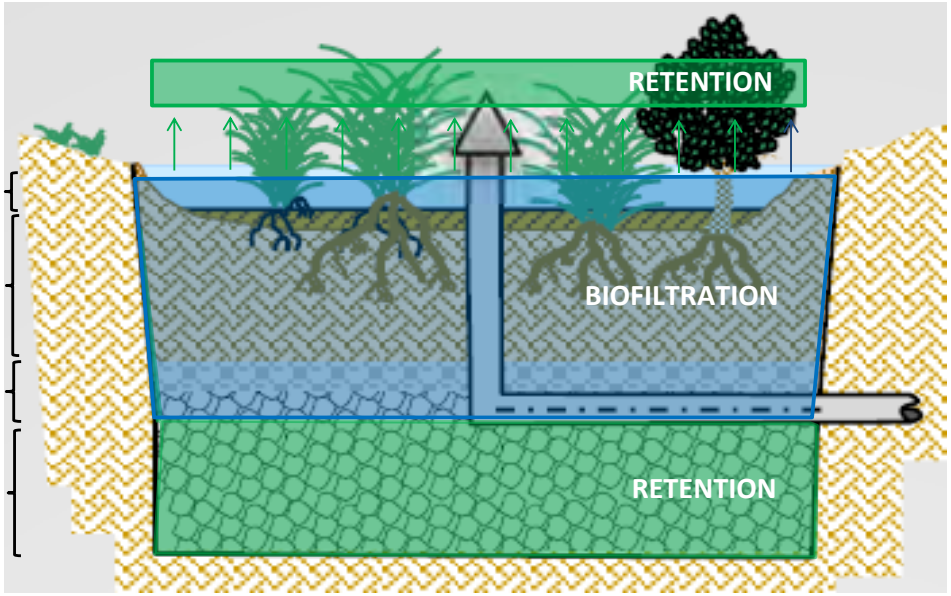
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 119,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 238,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.60 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.70 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.70 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.52 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 188,411 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 282,617 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 282,617 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 141,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 41,650 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.30 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 41,650 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 236,017 | cf |
| **Volume Retained** | **236,017** | **cf** |
| **Opt 1. Volume Biofiltered** | **282,617** | **cf** |
| **Opt 2. Volume Stored** | **41,650** | **cf** |



## Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 451,265 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 259.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 236,017 | | |
| **Equivalent Development Area** | 44.82 | 86.83 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **44.82** | **86.83** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

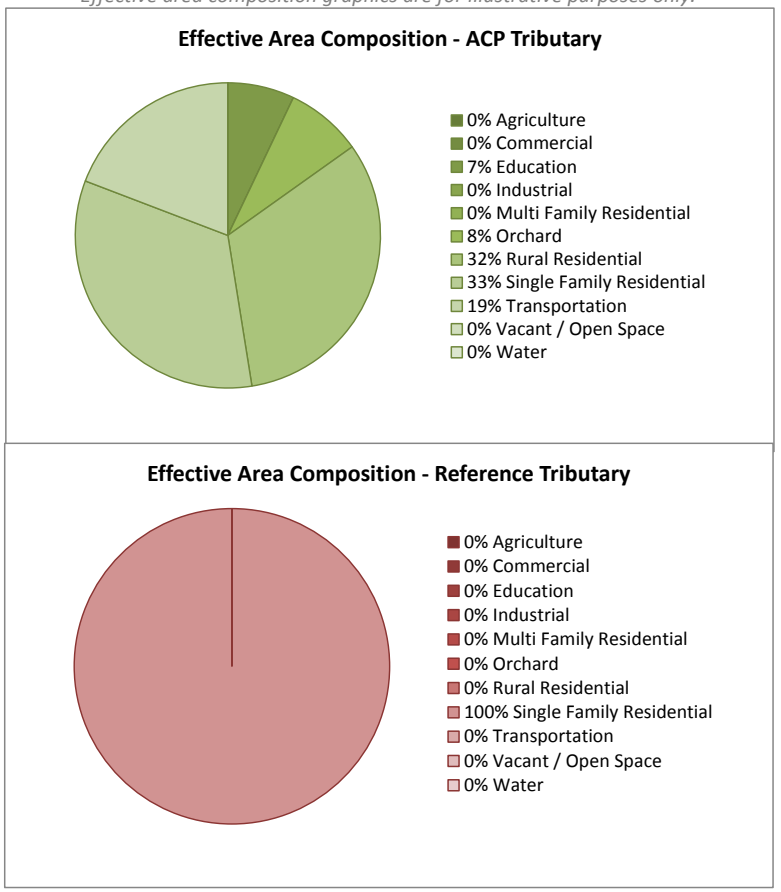
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.17** | **1.55** | **1.21** | **-** | **-** | **-** | **0.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

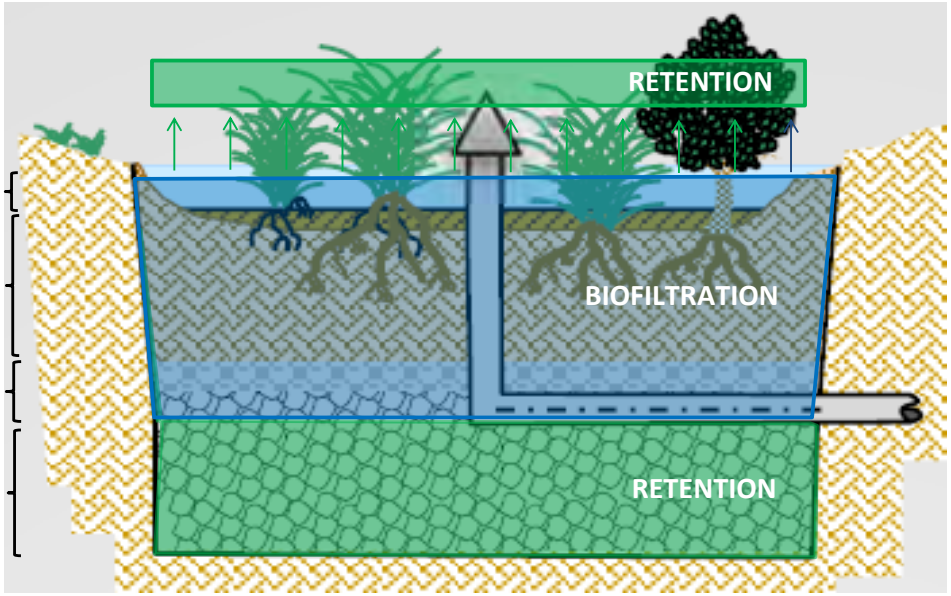
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 119,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 238,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.60 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.70 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.70 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.52 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 188,411 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 282,617 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 282,617 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 141,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 41,650 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.30 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 41,650 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 236,017 | cf |
| **Volume Retained** | **236,017** | **cf** |
| **Opt 1. Volume Biofiltered** | **282,617** | **cf** |
| **Opt 2. Volume Stored** | **41,650** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 192,278 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 110.4 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 236,017 | | |
| **Equivalent Development Area** | 67.22 | 130.25 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **67.22** | **110.35** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

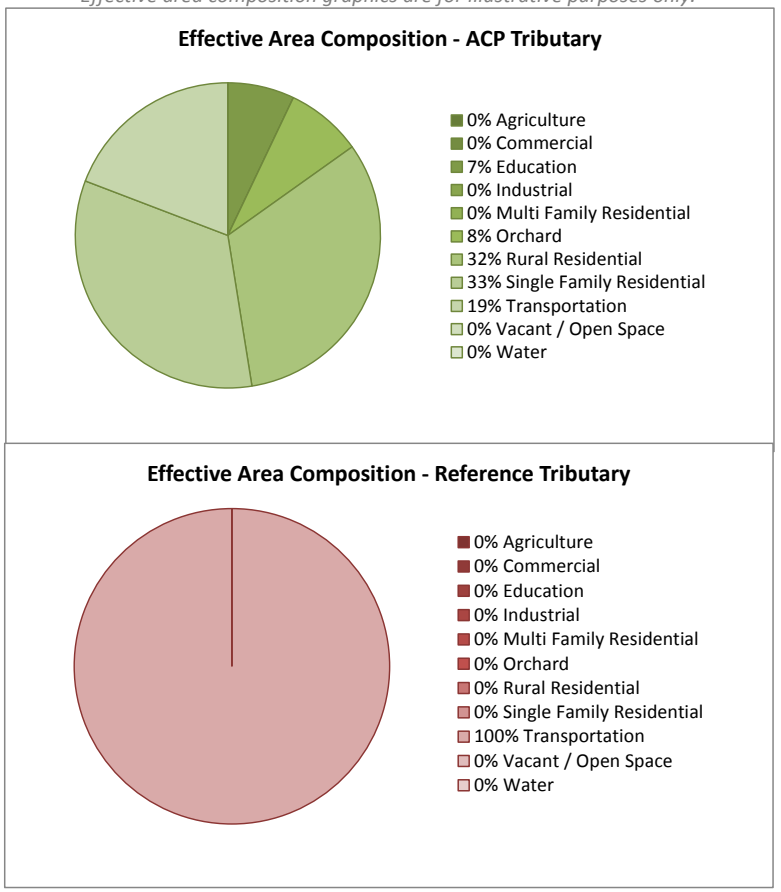
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.75** | **1.19** | **1.51** | **-** | **-** | **-** | **2.58** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

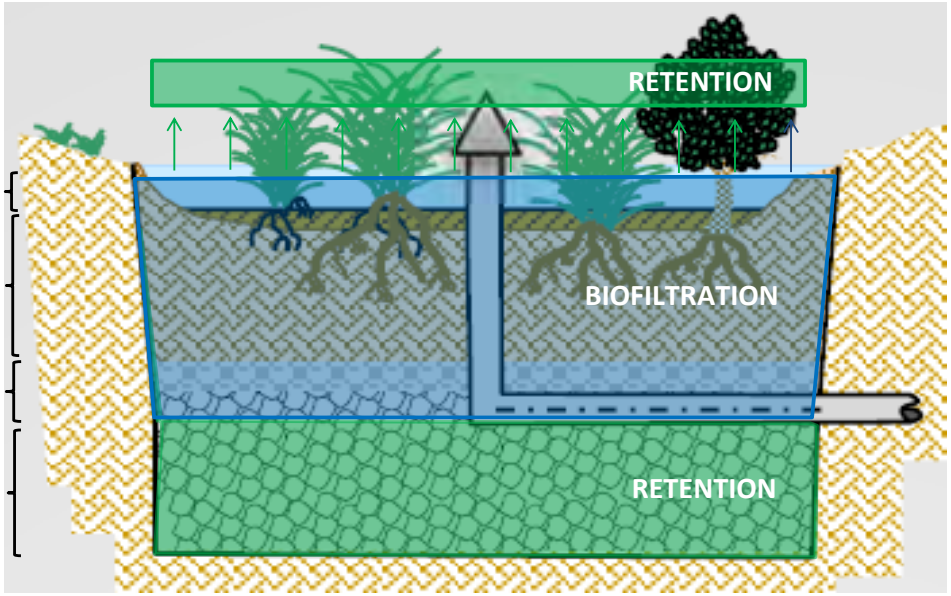
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 119,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 238,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.60 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.70 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.70 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.52 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 188,411 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 282,617 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 282,617 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 141,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 41,650 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.30 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 41,650 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 236,017 | cf |
| **Volume Retained** | **236,017** | **cf** |
| **Opt 1. Volume Biofiltered** | **282,617** | **cf** |
| **Opt 2. Volume Stored** | **41,650** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 466,961 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 268.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 236,017 | | |
| **Equivalent Development Area** | 29.88 | 57.89 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **29.88** | **57.89** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

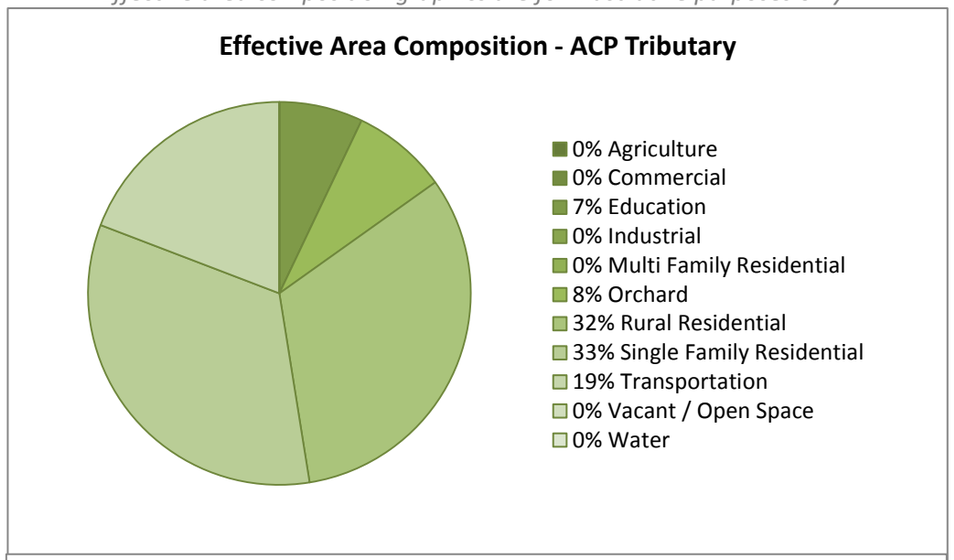
1) Only yellow cells are user input.

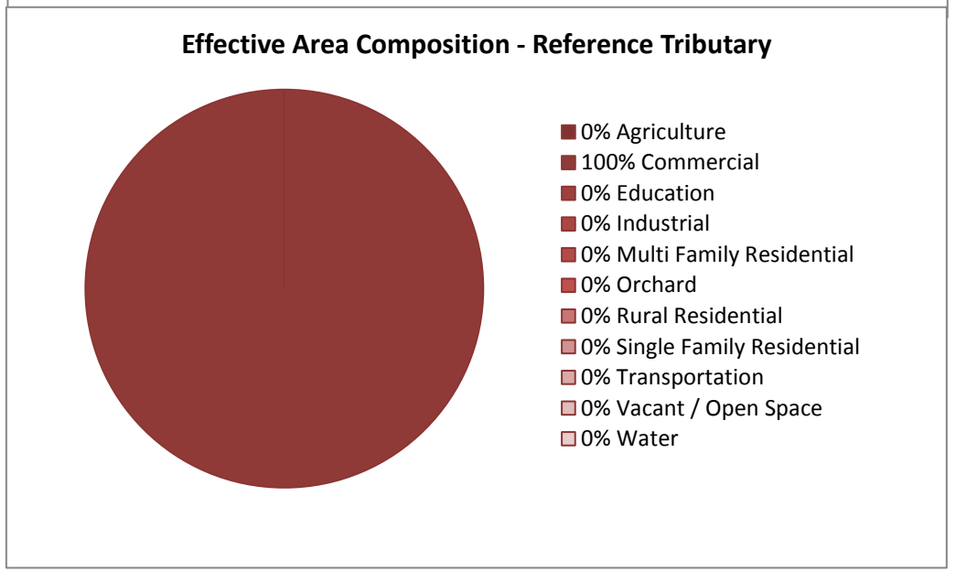
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **3.17** | **1.93** | **1.13** | - | - | - | **0.36** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

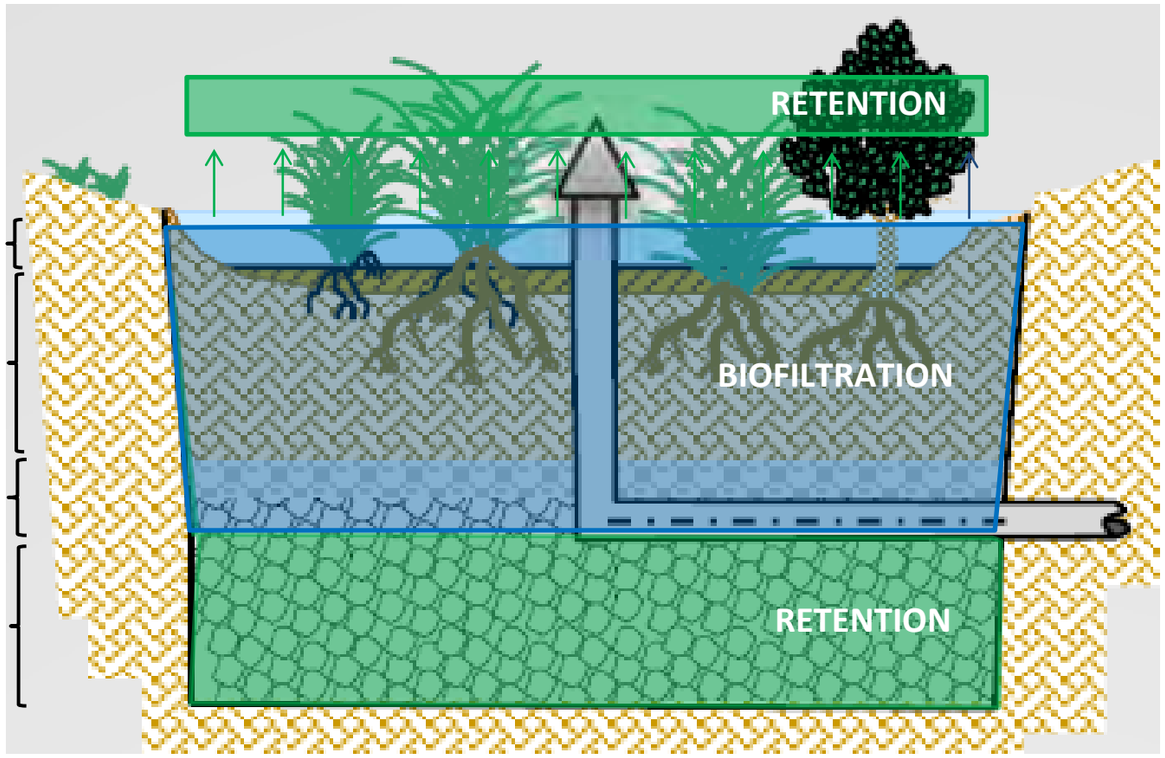
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,147 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392,522 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588,783 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 11,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294,392 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,400 | cf |
| Gravel Depth Below IE | 17.77 | in. |
| Gravel Storage Below IE | 4,200 | cf |
| **Volume Retained** | **4,200** | **cf** |
| **Opt 1. Volume Biofiltered** | **11,400** | **cf** |
| **Opt 2. Volume Stored** | **1,400** | **cf** |



Site 2C Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 4,535 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 2.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,200 | | |
| **Equivalent Development Area** | 0.60 | 1.16 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.60** | **1.16** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,149 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 517 | (GPM) |

***Notes:***

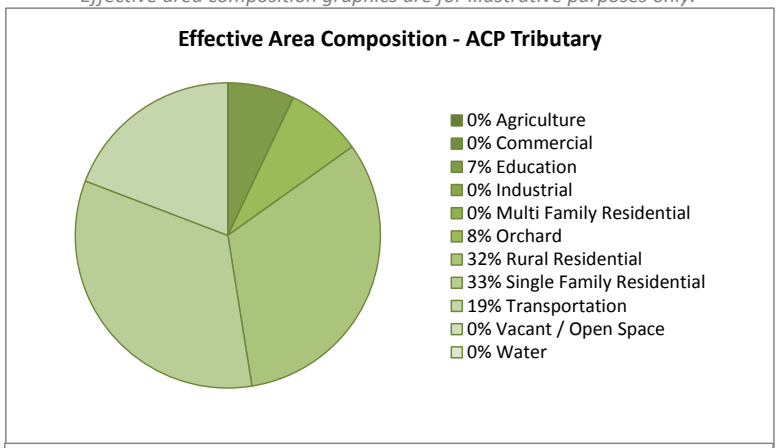
1) Only yellow cells are user input.

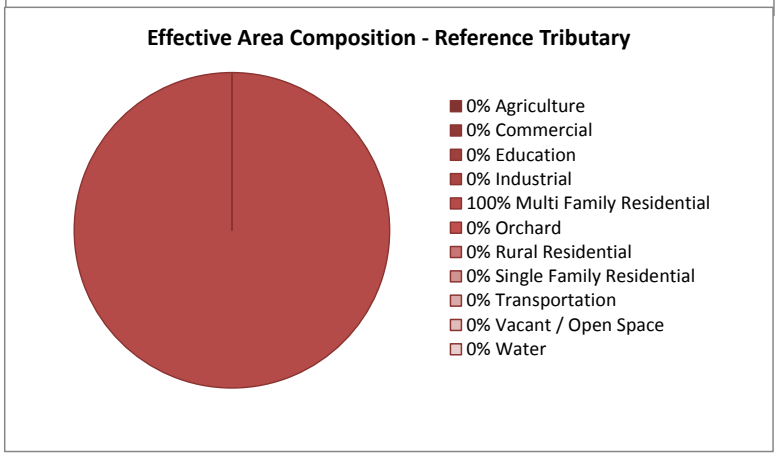
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **4.13** | **2.38** | **1.39** | **-** | **-** | **-** | **1.15** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

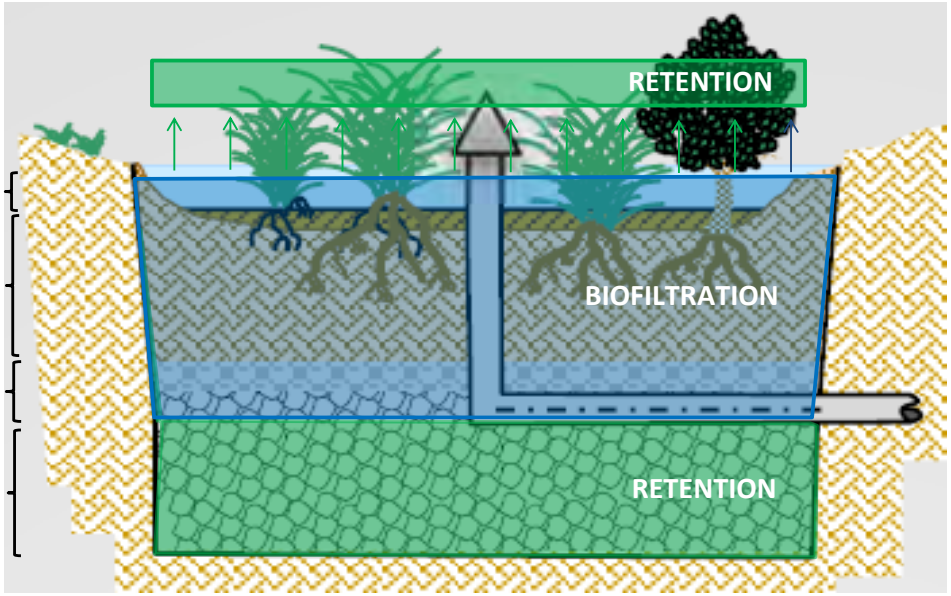
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,147 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392,522 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588,783 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 11,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294,392 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,400 | cf |
| Gravel Depth Below IE | 17.77 | in. |
| Gravel Storage Below IE | 4,200 | cf |
| **Volume Retained** | **4,200** | **cf** |
| **Opt 1. Volume Biofiltered** | **11,400** | **cf** |
| **Opt 2. Volume Stored** | **1,400** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 14,486 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 8.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,200 | | |
| **Equivalent Development Area** | 0.80 | 1.55 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.80** | **1.55** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,149 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 517 | (GPM) |

***Notes:***

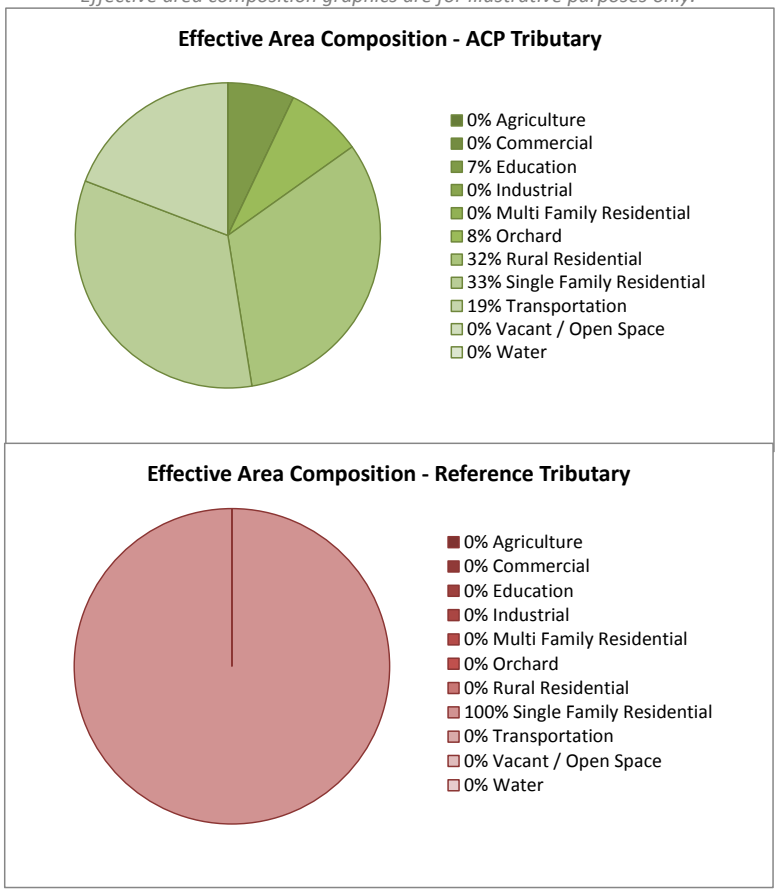
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.17** | **1.55** | **1.21** | **-** | **-** | **-** | **0.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

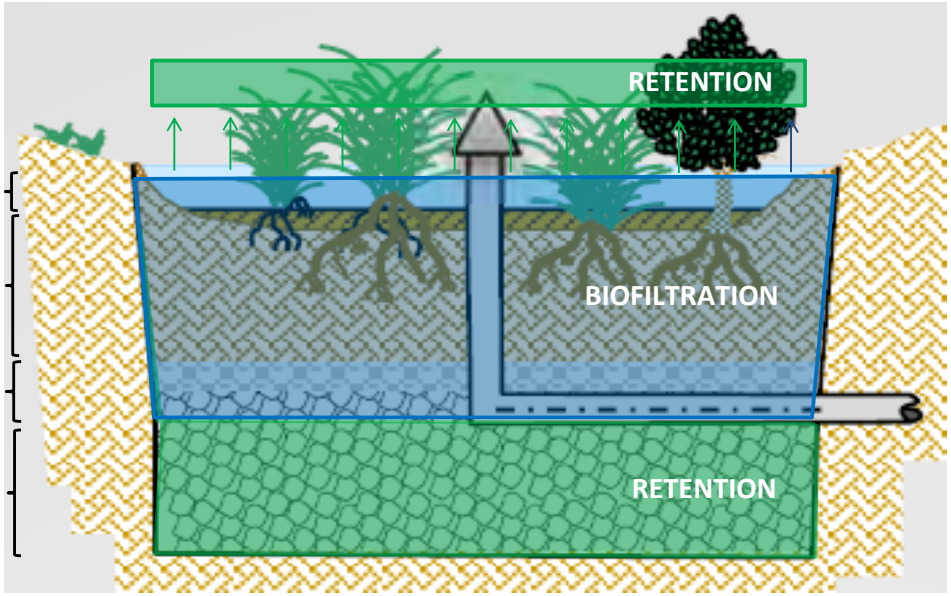
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,147 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392,522 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588,783 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 11,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294,392 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,400 | cf |
| Gravel Depth Below IE | 17.77 | in. |
| Gravel Storage Below IE | 4,200 | cf |
| **Volume Retained** | **4,200** | **cf** |
| **Opt 1. Volume Biofiltered** | **11,400** | **cf** |
| **Opt 2. Volume Stored** | **1,400** | **cf** |



Site 2C Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 6,172 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 3.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,200 | | |
| **Equivalent Development Area** | 1.20 | 2.32 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **1.20** | **2.32** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,149 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 517 | (GPM) |

***Notes:***

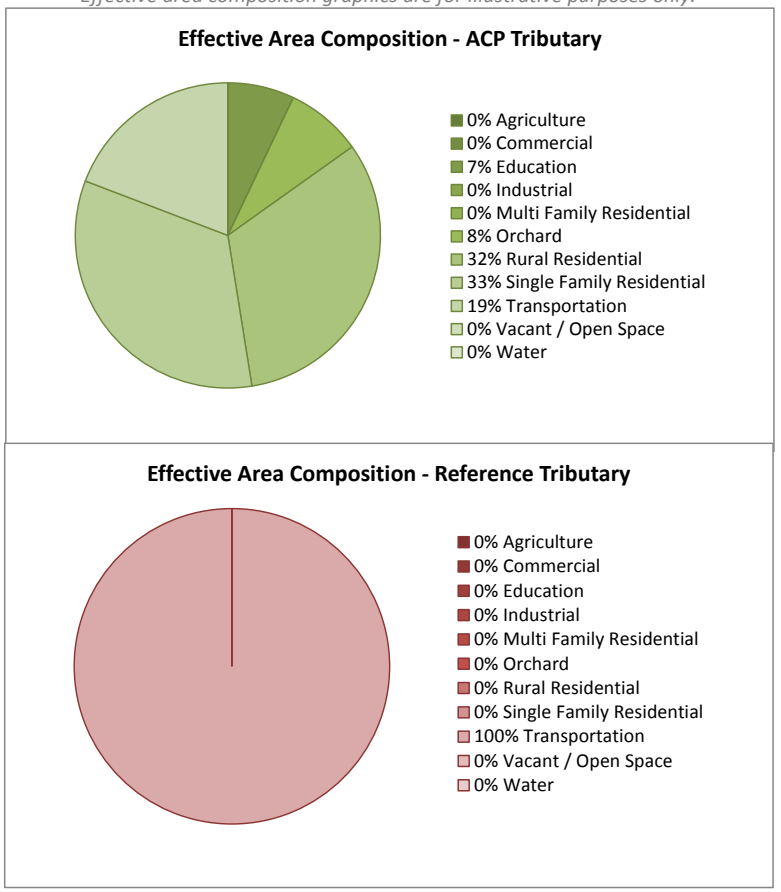
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 6.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 33.59 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 43.89 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 33.30 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 8.48 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 1.05 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 126.34 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.41 | 0.31 | 0.18 | 0.31 | 0.53 | 0.35 | 0.31 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.75** | **1.19** | **1.51** | **-** | **-** | **-** | **2.58** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

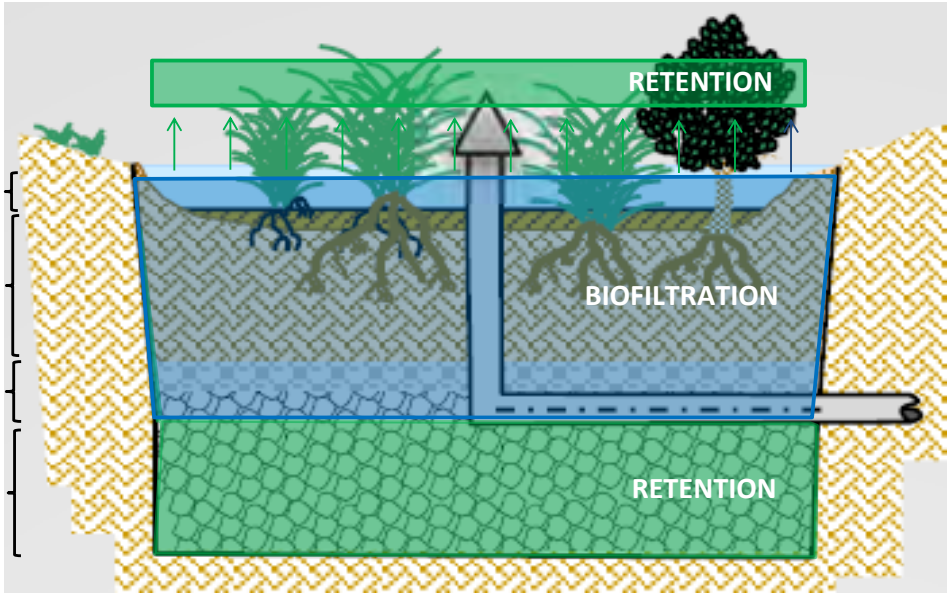
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 392,522 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,147 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392,522 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588,783 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 11,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294,392 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 1,400 cf |
| Gravel Depth Below IE | 17.77 in. |
| Gravel Storage Below IE | 4,200 cf |
| **Volume Retained** | **4,200 cf** |
| **Opt 1. Volume Biofiltered** | **11,400 cf** |
| **Opt 2. Volume Stored** | **1,400 cf** |



| | | | |
|---|---|---|---|
| **Ve** | 14,990 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.32 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 8.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,200 | | |
| **Equivalent Development Area** | 0.53 | 1.03 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.53** | **1.03** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,149 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 517 | (GPM) |

***Notes:***

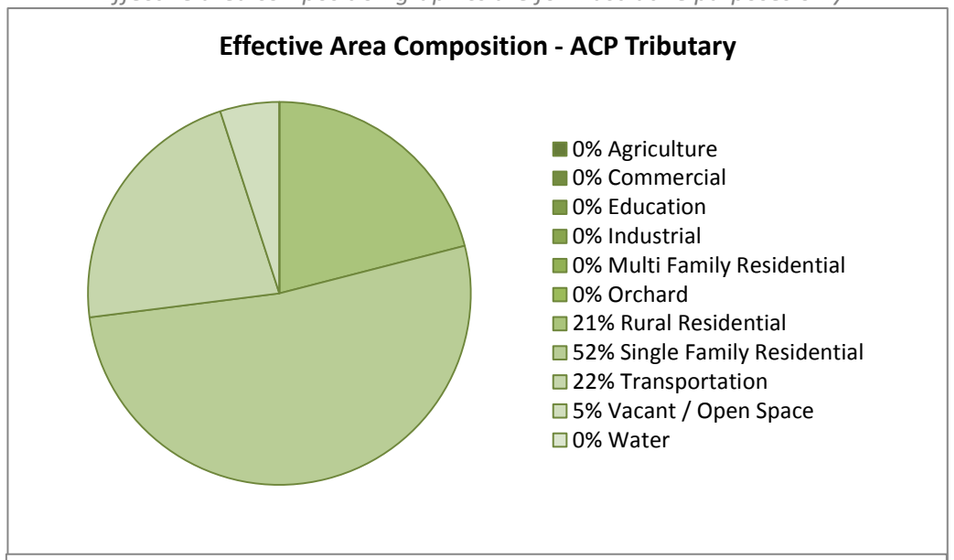
1) Only yellow cells are user input.

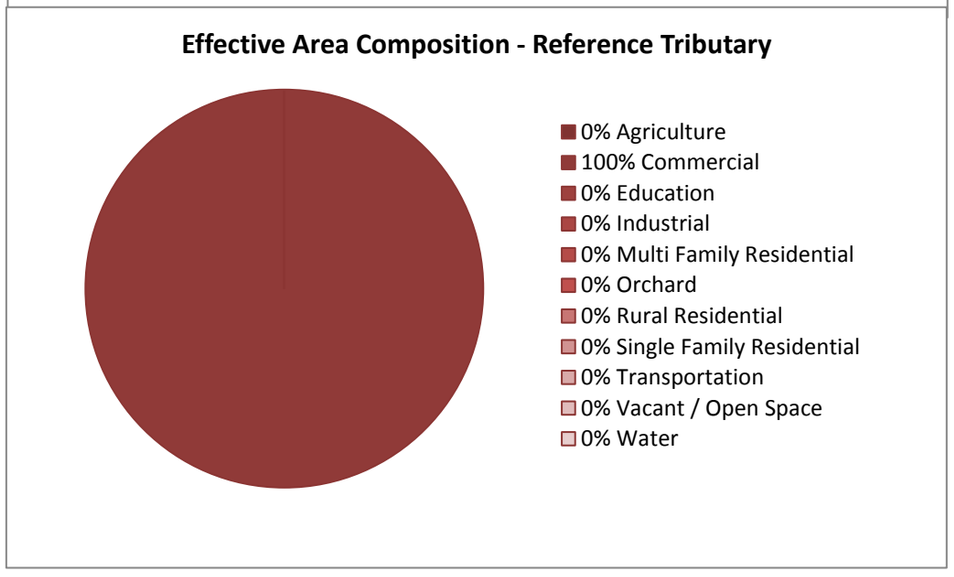
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | 2.77 | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 74.24 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 133.87 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 24.88 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 53.29 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 289.05 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.31 | 0.28 | 0.14 | 0.28 | 0.45 | 0.35 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **2.42** | **1.73** | **0.88** | - | - | - | **0.46** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

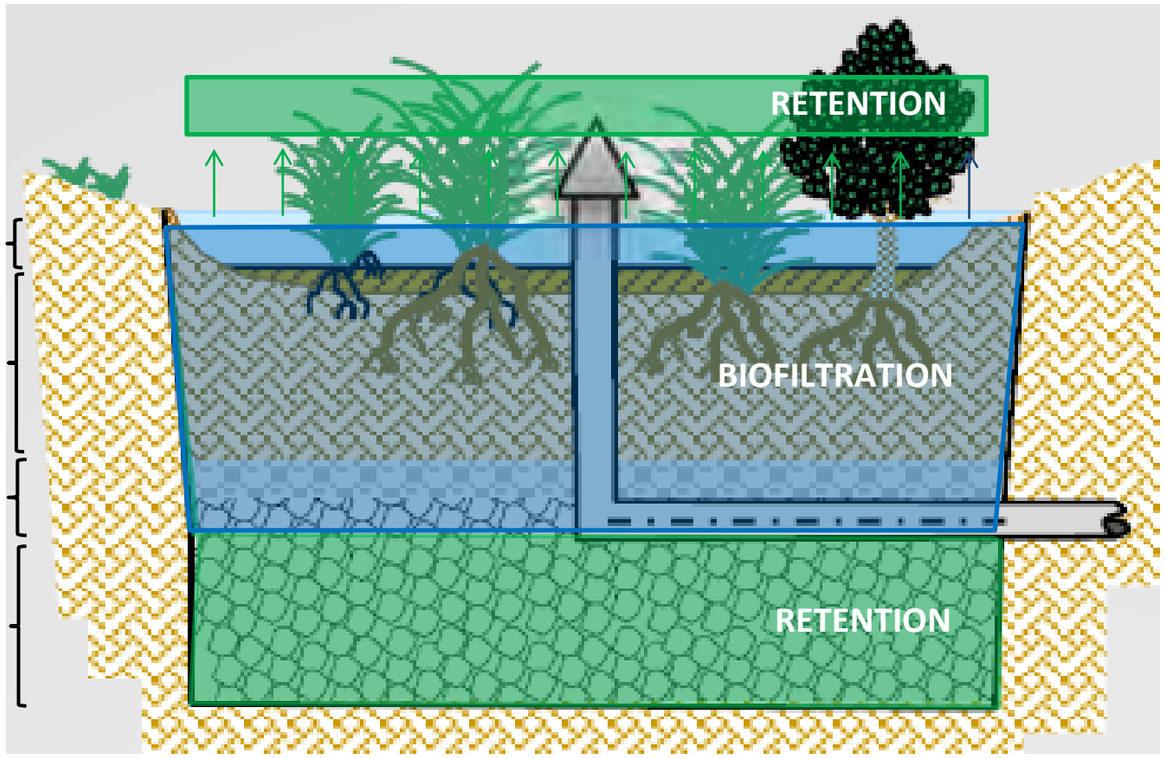
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 30,218 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.125 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.14 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 7,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.26 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.26 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.14 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 25,987 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 38,981 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 19,950 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 19,490 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 2,450 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.77 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.38 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.64** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 2,450 cf |
| Gravel Depth Below IE | 17.14 in. |
| Gravel Storage Below IE | 7,350 cf |
| **Volume Retained** | **7,350 cf** |
| **Opt 1. Volume Biofiltered** | **19,950 cf** |
| **Opt 2. Volume Stored** | **2,450 cf** |



Site 3 Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 8,863 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 5.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 7,350 | | |
| **Equivalent Development Area** | 1.05 | 2.03 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **1.05** | **2.03** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 13.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 7,001 | ($ft^3$) |
| Minimum Design Depth | 12.00 | (inches) |
| Effective Draw Down Rate | 0.1250 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 873 | (GPM) |

***Notes:***

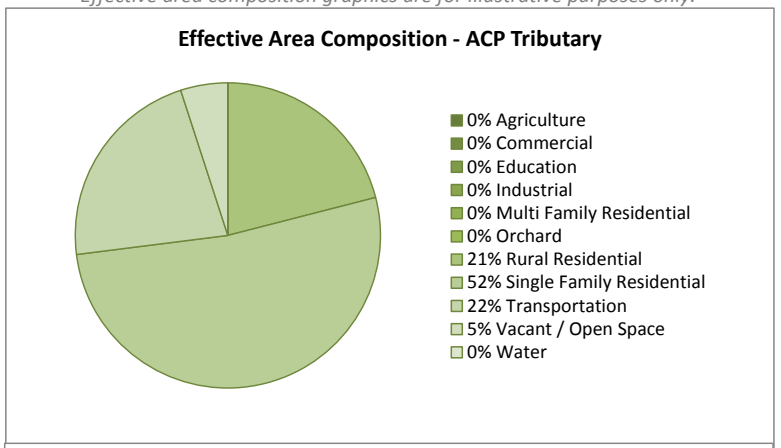
1) Only yellow cells are user input.

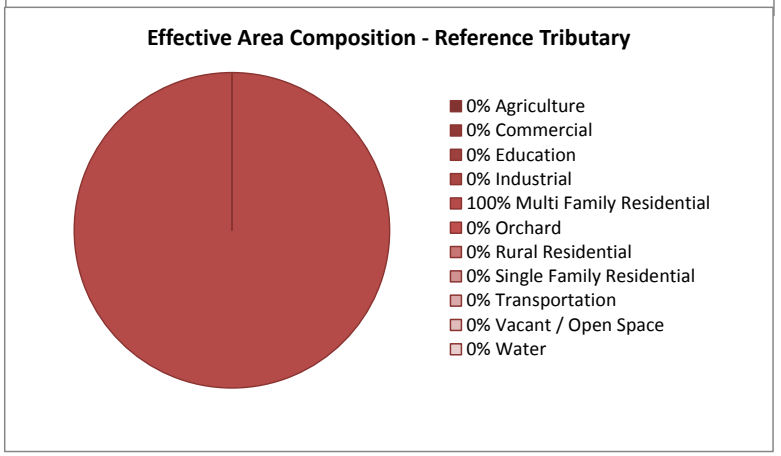
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | 2.77 | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 74.24 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 133.87 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 24.88 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 53.29 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 289.05 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.31 | 0.28 | 0.14 | 0.28 | 0.45 | 0.35 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **3.15** | **2.13** | **1.09** | **-** | **-** | **-** | **1.48** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

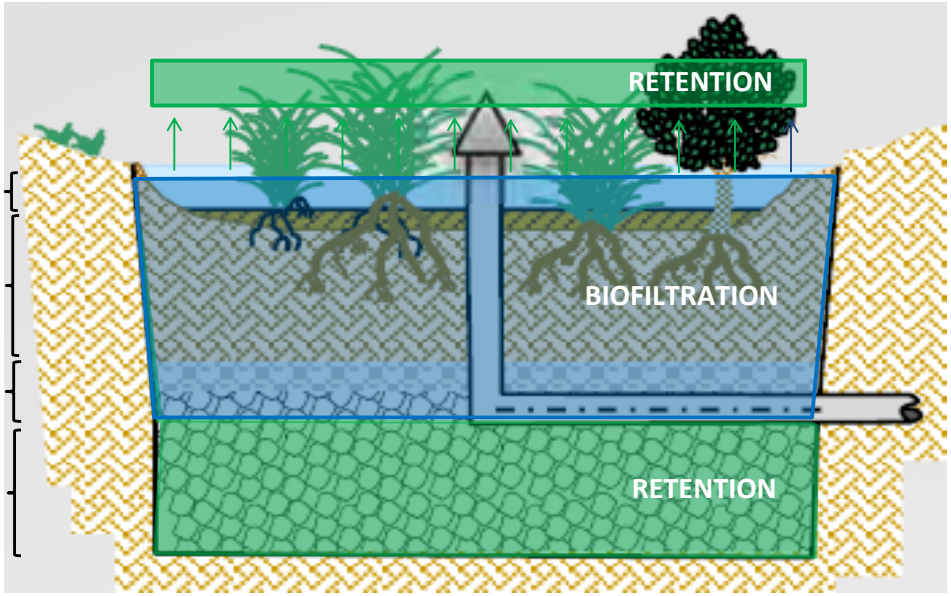
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 30,218 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.125 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.14 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 7,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.26 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.26 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.14 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 25,987 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 38,981 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 19,950 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 19,490 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 2,450 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.77 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.38 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.64** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 2,450 cf |
| Gravel Depth Below IE | 17.14 in. |
| Gravel Storage Below IE | 7,350 cf |
| **Volume Retained** | **7,350 cf** |
| **Opt 1. Volume Biofiltered** | **19,950 cf** |
| **Opt 2. Volume Stored** | **2,450 cf** |



| | | | |
|---|---|---|---|
| **Ve** | 21,002 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 12.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 7,350 | | |
| **Equivalent Development Area** | 1.40 | 2.70 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **1.40** | **2.70** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 13.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 7,001 | ($ft^3$) |
| Minimum Design Depth | 12.00 | (inches) |
| Effective Draw Down Rate | 0.1250 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 873 | (GPM) |

***Notes:***

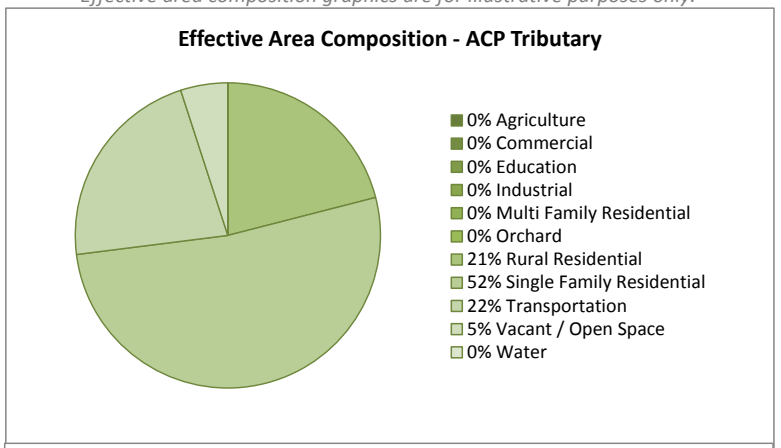
1) Only yellow cells are user input.

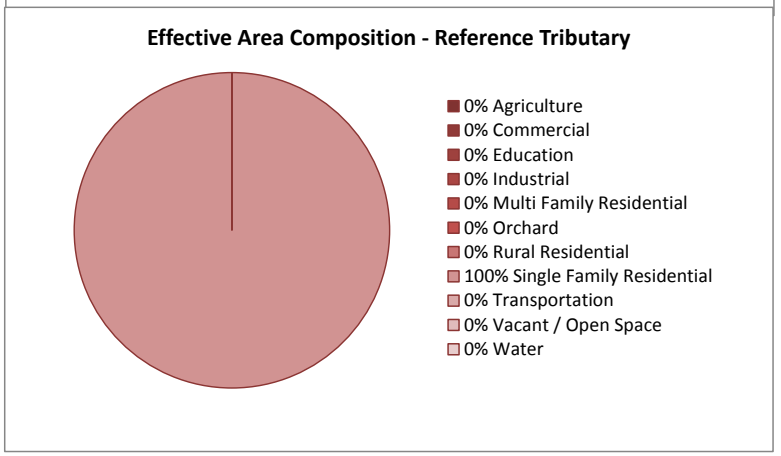
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | 2.77 | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 74.24 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 133.87 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 24.88 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 53.29 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 289.05 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.31 | 0.28 | 0.14 | 0.28 | 0.45 | 0.35 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **2.42** | **1.38** | **0.94** | **-** | **-** | **-** | **0.63** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

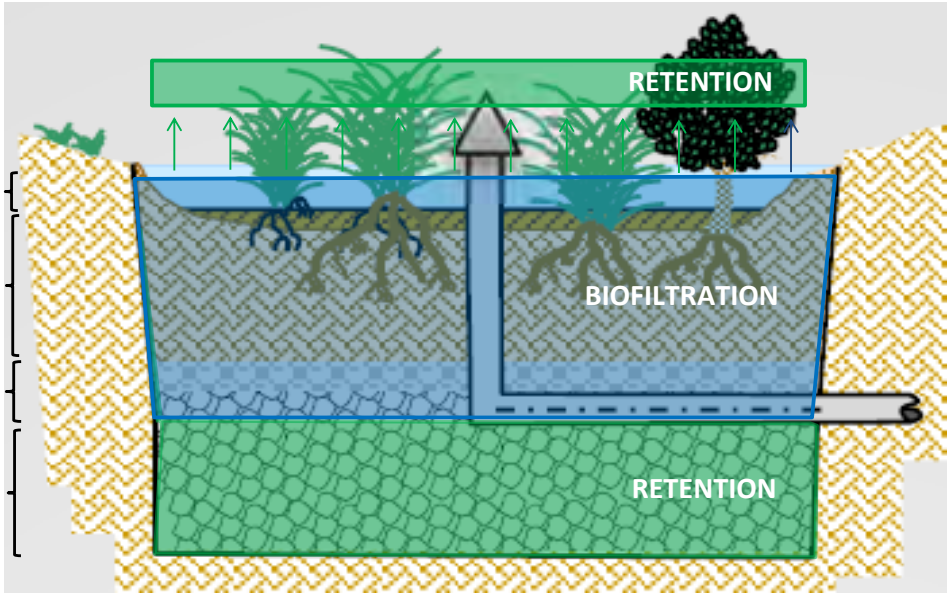
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 30,218 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.125 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.14 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 7,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.26 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.26 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.14 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 25,987 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 38,981 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 19,950 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 19,490 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 2,450 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.77 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.38 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.64** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 2,450 cf |
| Gravel Depth Below IE | 17.14 in. |
| Gravel Storage Below IE | 7,350 cf |
| **Volume Retained** | **7,350 cf** |
| **Opt 1. Volume Biofiltered** | **19,950 cf** |
| **Opt 2. Volume Stored** | **2,450 cf** |



## Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 12,139 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 7.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 7,350 | | |
| **Equivalent Development Area** | 2.09 | 4.06 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **2.09** | **4.06** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 13.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 7,001 | ($ft^3$) |
| Minimum Design Depth | 12.00 | (inches) |
| Effective Draw Down Rate | 0.1250 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 873 | (GPM) |

***Notes:***

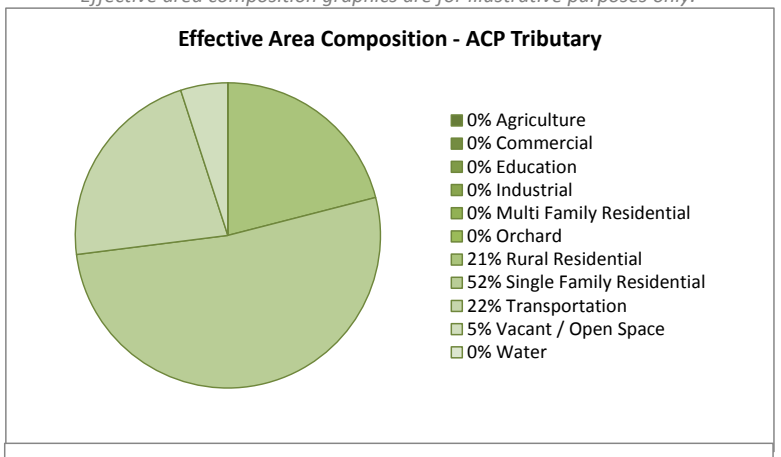
1) Only yellow cells are user input.

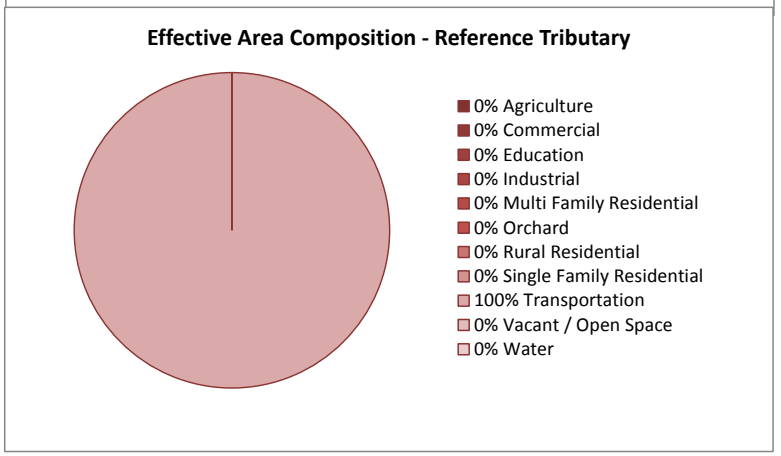
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | 2.77 | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 74.24 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 133.87 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 24.88 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 53.29 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 289.05 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.31 | 0.28 | 0.14 | 0.28 | 0.45 | 0.35 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **2.86** | **1.06** | **1.18** | **-** | **-** | **-** | **3.33** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

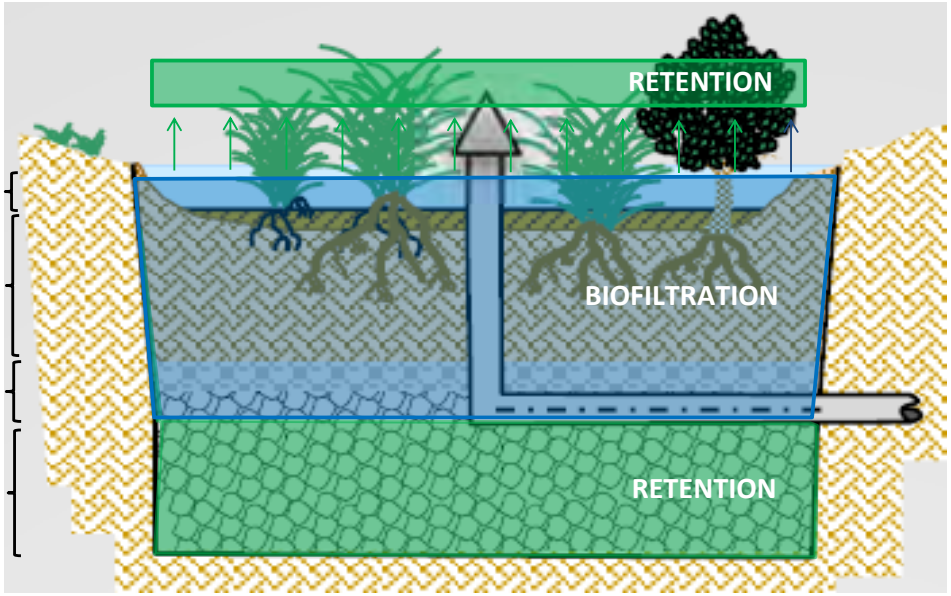
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 30,218 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 7,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.125 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.14 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 7,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.26 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.26 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.14 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 25,987 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 38,981 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 19,950 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 19,490 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 2,450 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.77 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.38 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.64** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 2,450 | cf |
| Gravel Depth Below IE | 17.14 | in. |
| Gravel Storage Below IE | 7,350 | cf |
| **Volume Retained** | **7,350** | **cf** |
| **Opt 1. Volume Biofiltered** | **19,950** | **cf** |
| **Opt 2. Volume Stored** | **2,450** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 20,424 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 11.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 7,350 | | |
| **Equivalent Development Area** | 0.93 | 1.80 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.93** | **1.80** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 13.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 7,001 | ($ft^3$) |
| Minimum Design Depth | 12.00 | (inches) |
| Effective Draw Down Rate | 0.1250 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 873 | (GPM) |

***Notes:***

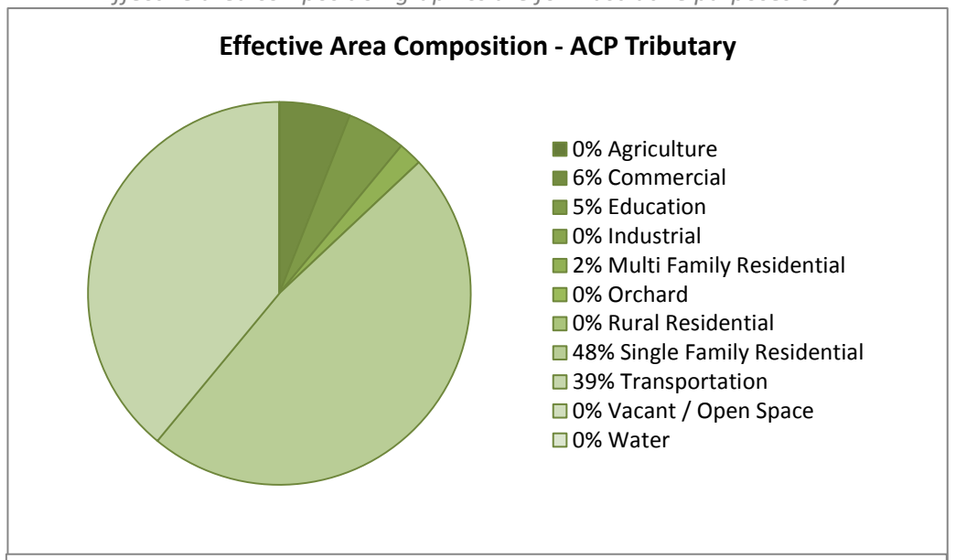
1) Only yellow cells are user input.

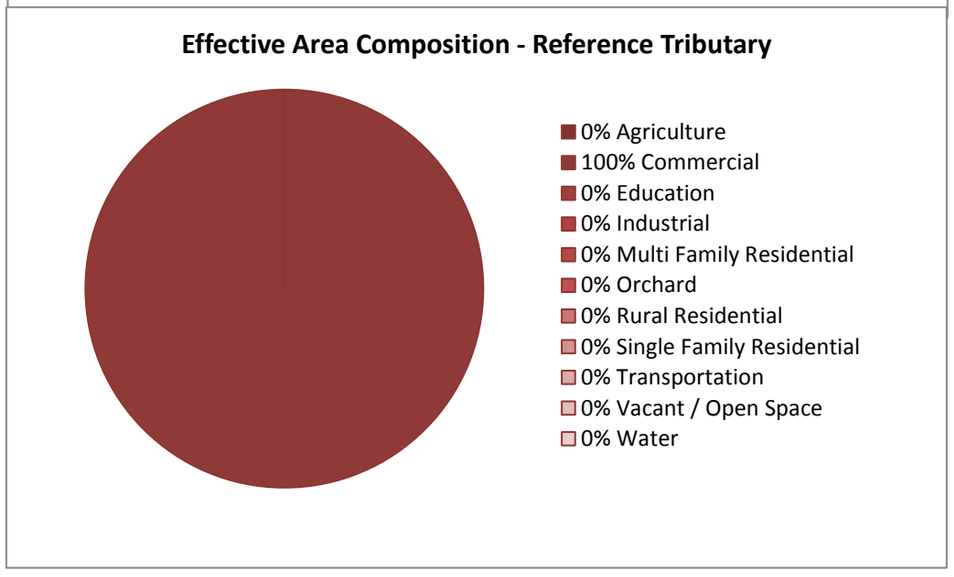
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.93** | **1.37** | **0.85** | - | - | - | **0.47** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

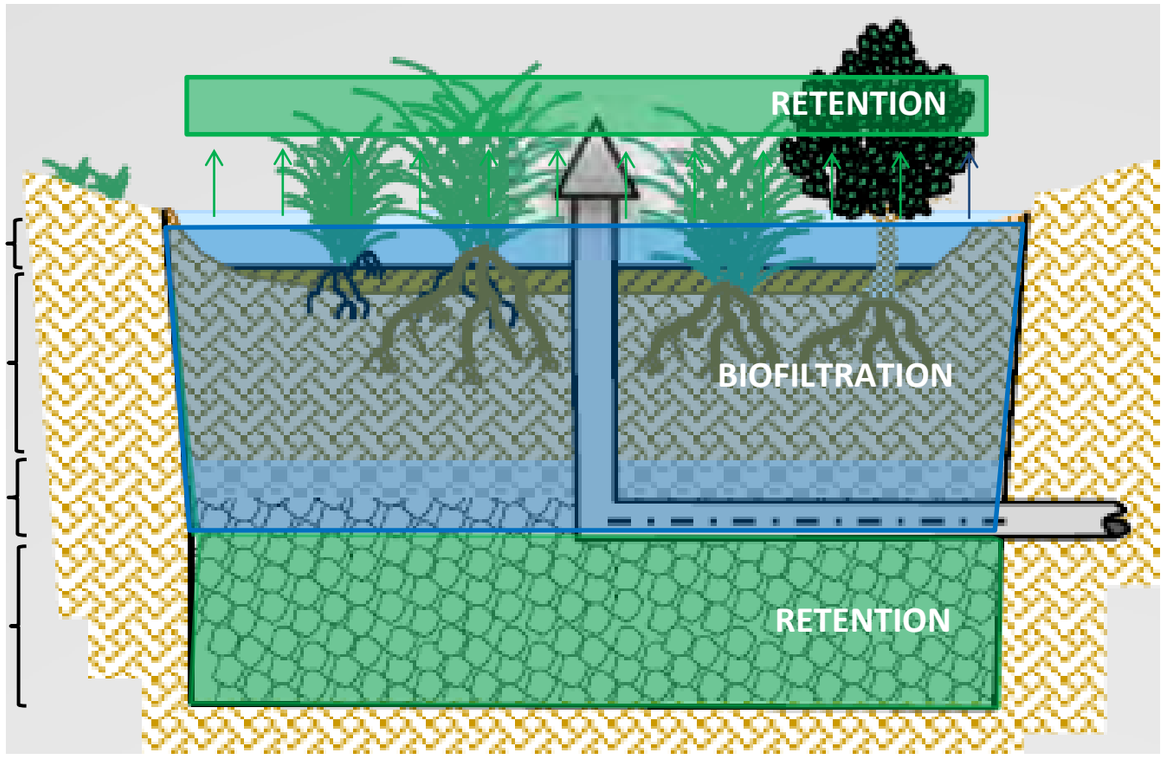
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 70,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 140,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 130,952 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 196,428 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 196,428 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 98,214 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 24,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 24,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 138,833 | cf |
| **Volume Retained** | **138,833** | **cf** |
| **Opt 1. Volume Biofiltered** | **196,428** | **cf** |
| **Opt 2. Volume Stored** | **24,500** | **cf** |



Site 4A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 118,320 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 67.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 138,833 | | |
| **Equivalent Development Area** | 19.77 | 38.31 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **19.77** | **38.31** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

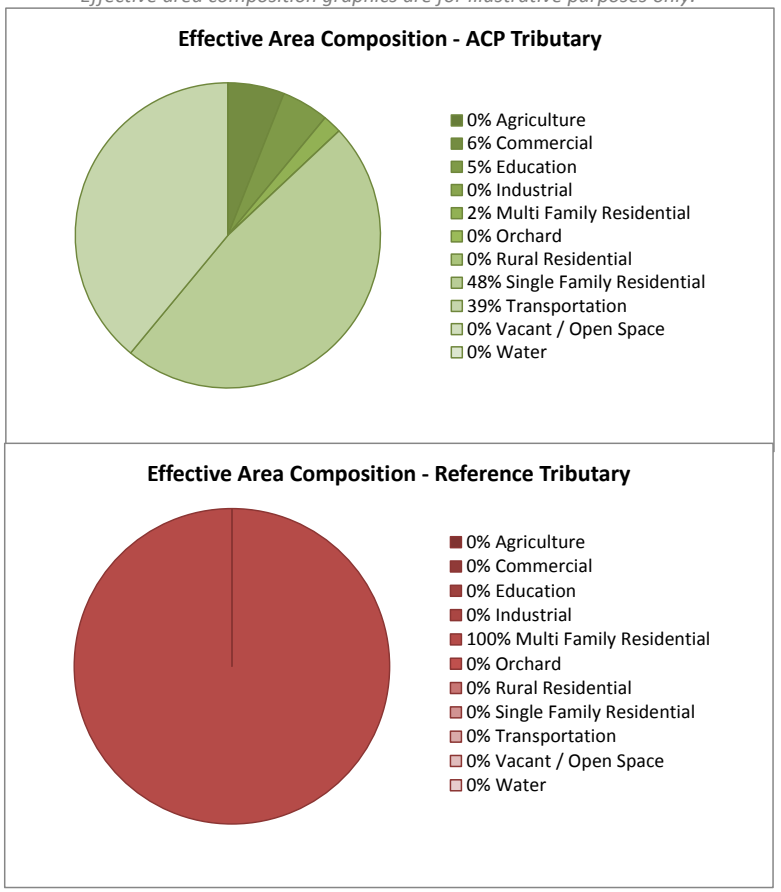
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.21** | **1.69** | **1.05** | **-** | **-** | **-** | **1.51** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

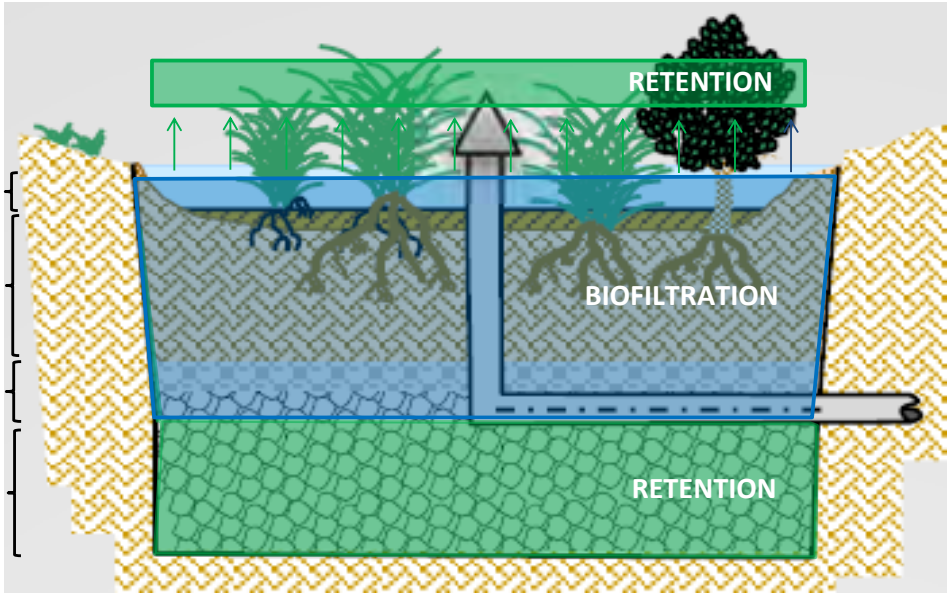
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 70,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 140,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 130,952 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 196,428 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 196,428 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 98,214 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 24,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 24,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 138,833 | cf |
| **Volume Retained** | **138,833** | **cf** |
| **Opt 1. Volume Biofiltered** | **196,428** | **cf** |
| **Opt 2. Volume Stored** | **24,500** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 264,331 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 151.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 138,833 | | |
| **Equivalent Development Area** | 26.36 | 51.08 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **26.36** | **51.08** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

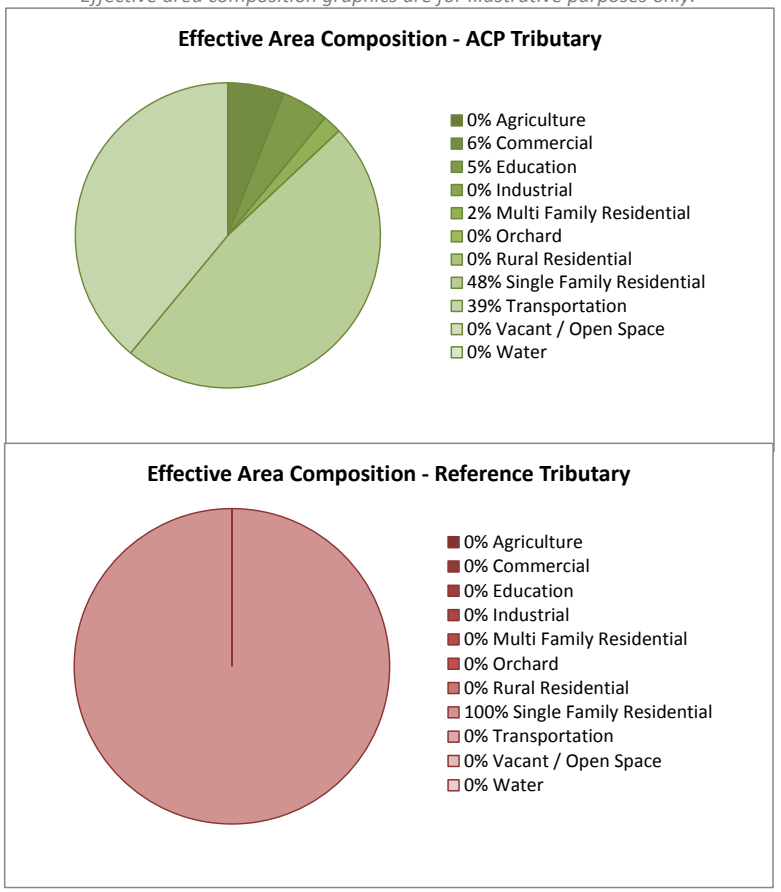
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.93** | **1.10** | **0.91** | **-** | **-** | **-** | **0.65** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

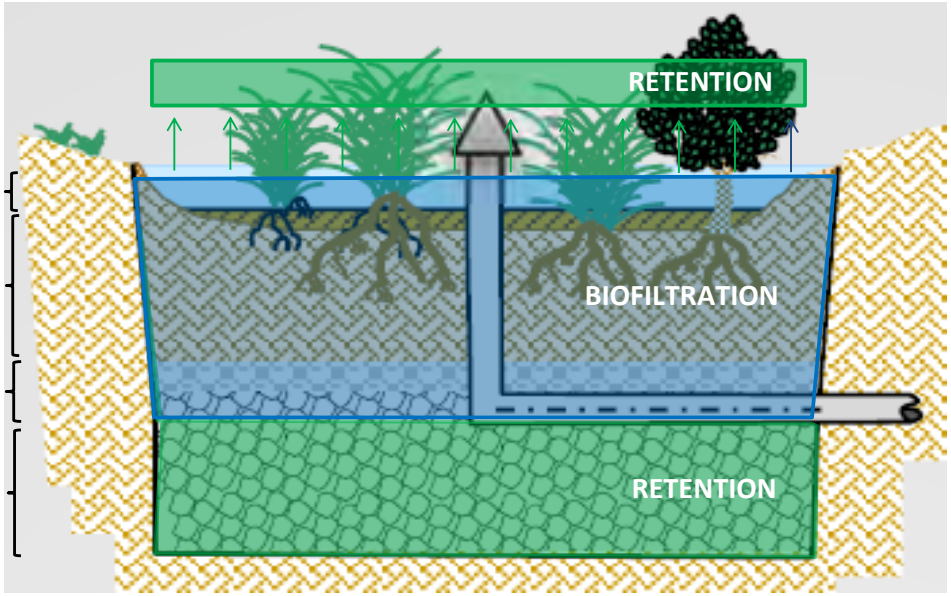
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 70,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 140,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 130,952 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 196,428 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 196,428 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 98,214 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 24,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 24,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 138,833 | cf |
| **Volume Retained** | **138,833** | **cf** |
| **Opt 1. Volume Biofiltered** | **196,428** | **cf** |
| **Opt 2. Volume Stored** | **24,500** | **cf** |



Site 4A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 163,633 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 93.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 138,833 | | |
| **Equivalent Development Area** | 39.54 | 76.61 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **39.54** | **76.61** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

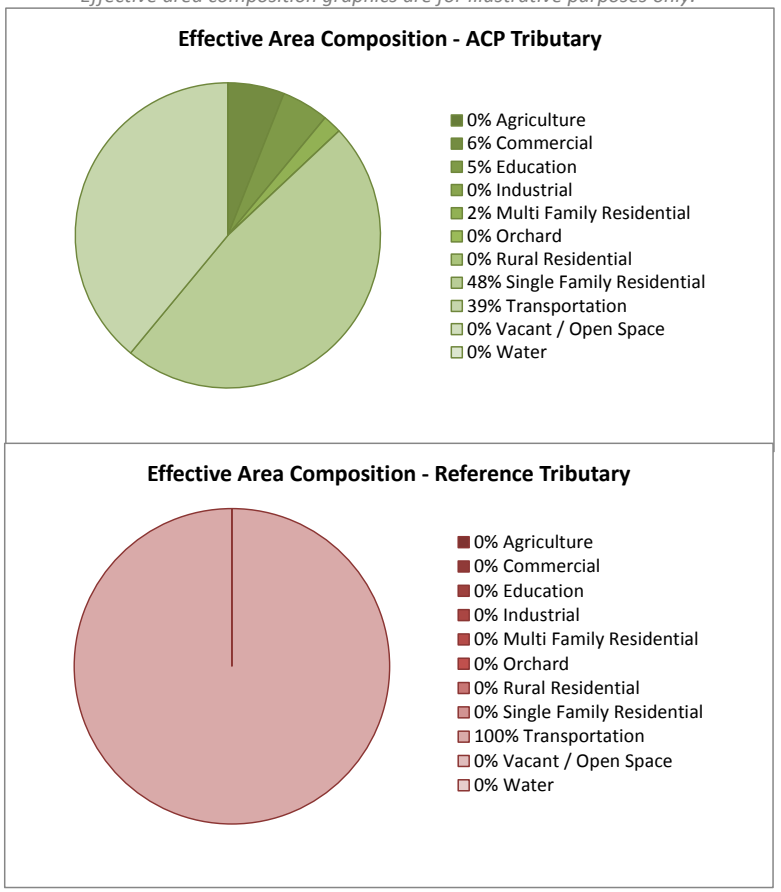
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.10** | **0.85** | **1.14** | **-** | **-** | **-** | **3.41** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

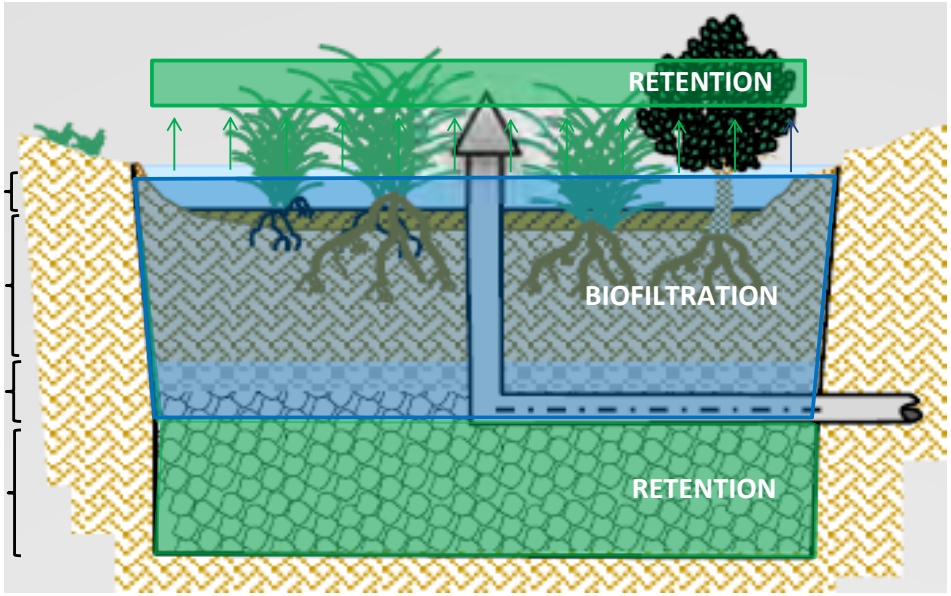
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 70,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 140,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.55 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.66 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.66 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.48 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 130,952 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 196,428 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 196,428 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 98,214 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 24,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.34 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 24,500 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 138,833 cf |
| **Volume Retained** | **138,833 cf** |
| **Opt 1. Volume Biofiltered** | **196,428 cf** |
| **Opt 2. Volume Stored** | **24,500 cf** |



| | | | |
|---|---|---|---|
| **Ve** | 213,982 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 122.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 138,833 | | |
| **Equivalent Development Area** | 17.57 | 34.05 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **17.57** | **34.05** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

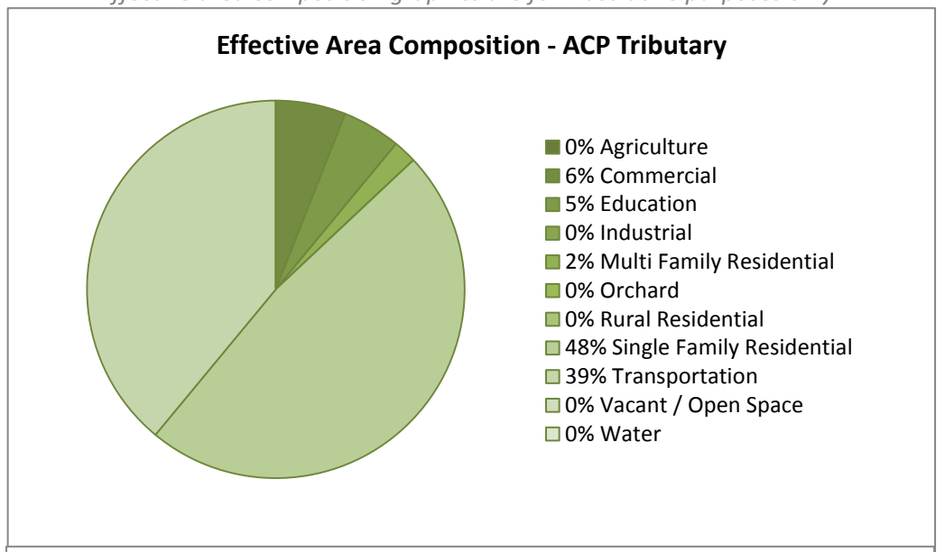
1) Only yellow cells are user input.

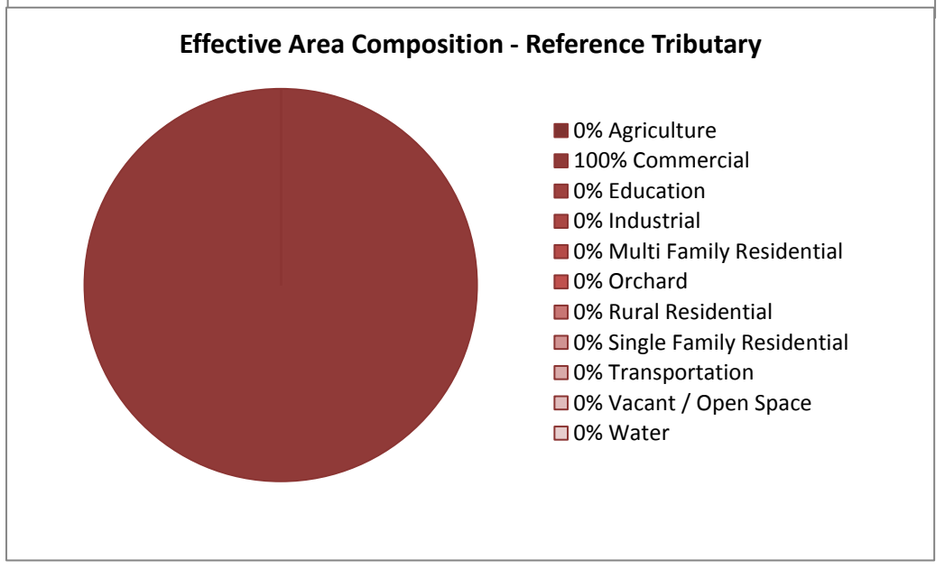
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **0.93** | **1.37** | **0.85** | - | - | - | **0.47** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

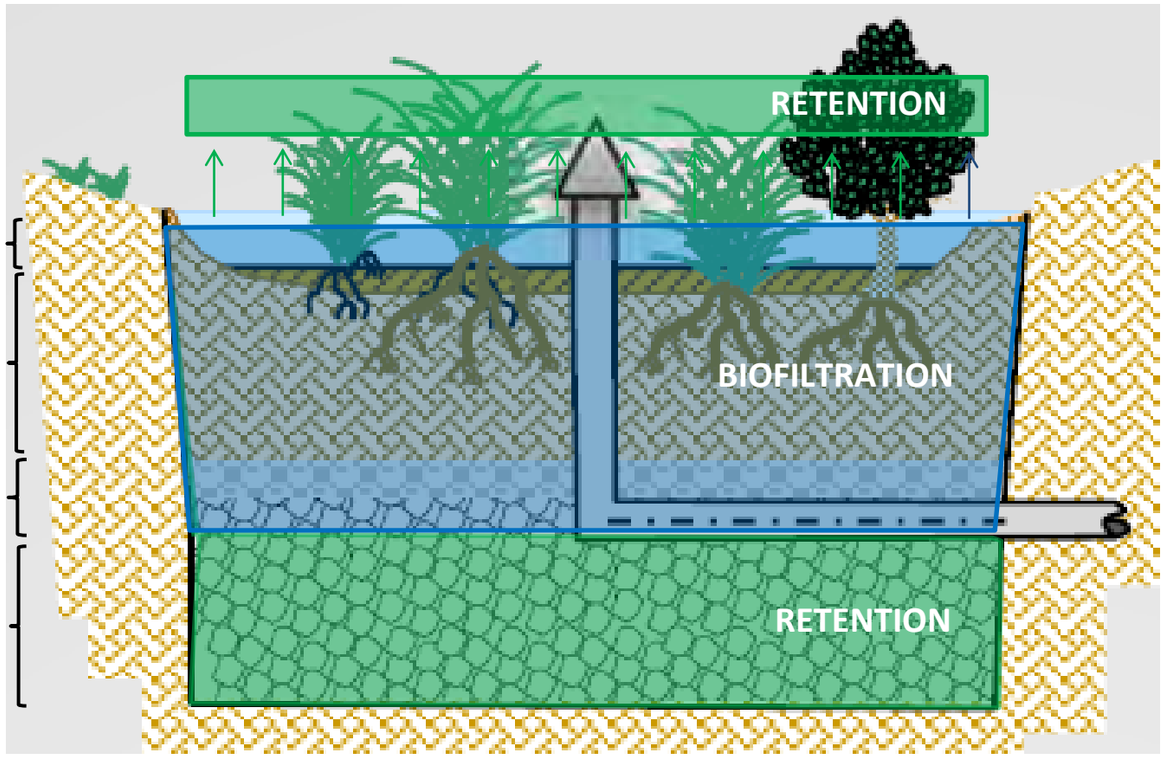
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1274 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.23 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.47 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,956 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 251,830 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 377,745 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 8,265 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 188,873 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,015 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 1,015 cf |
| Gravel Depth Below IE | 17.47 in. |
| Gravel Storage Below IE | 3,045 cf |
| **Volume Retained** | **3,045 cf** |
| **Opt 1. Volume Biofiltered** | **8,265 cf** |
| **Opt 2. Volume Stored** | **1,015 cf** |



Site 4B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 4,092 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 2.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 3,045 | | |
| **Equivalent Development Area** | 0.43 | 0.84 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.43** | **0.84** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 5.7 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,956 | ($ft^3$) |
| Minimum Design Depth | 12.23 | (inches) |
| Effective Draw Down Rate | 0.1274 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 369 | (GPM) |

***Notes:***

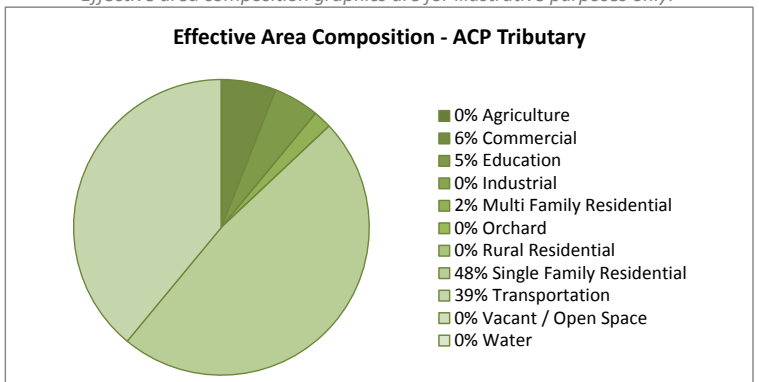
1) Only yellow cells are user input.

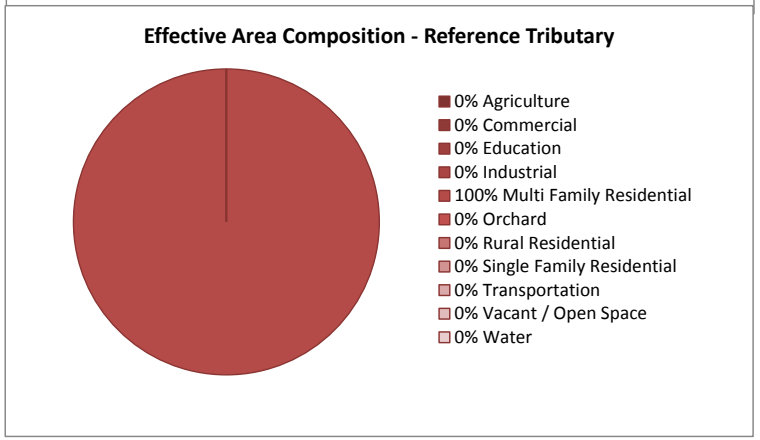
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.21** | **1.69** | **1.05** | **-** | **-** | **-** | **1.51** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

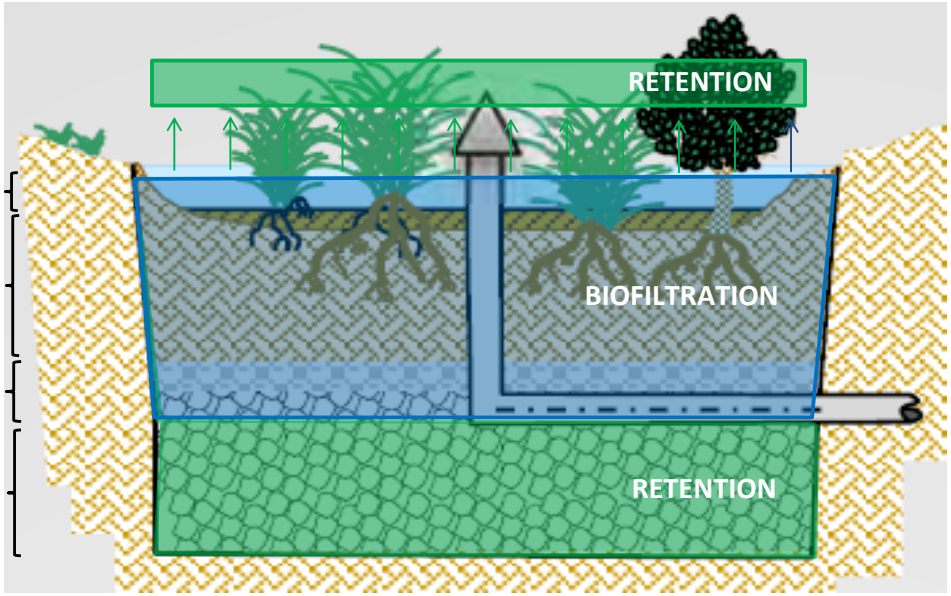
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1274 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.23 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.47 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,956 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 251,830 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 377,745 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 8,265 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 188,873 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,015 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,015 | cf |
| Gravel Depth Below IE | 17.47 | in. |
| Gravel Storage Below IE | 3,045 | cf |
| **Volume Retained** | **3,045** | **cf** |
| **Opt 1. Volume Biofiltered** | **8,265** | **cf** |
| **Opt 2. Volume Stored** | **1,015** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 9,142 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 5.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 3,045 | | |
| **Equivalent Development Area** | 0.58 | 1.12 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.58** | **1.12** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 5.7 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,956 | ($ft^3$) |
| Minimum Design Depth | 12.23 | (inches) |
| Effective Draw Down Rate | 0.1274 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 369 | (GPM) |

***Notes:***

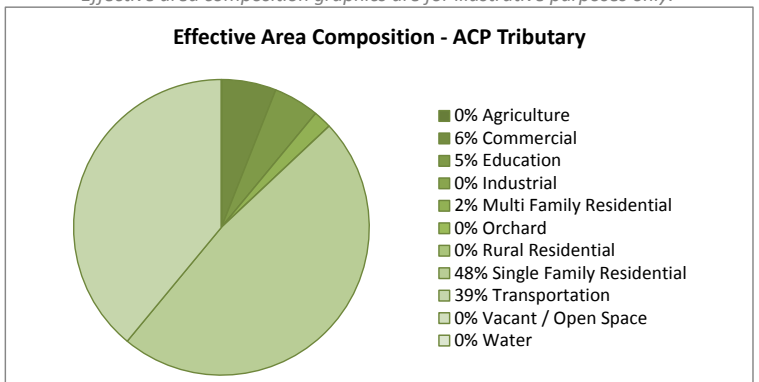
1) Only yellow cells are user input.

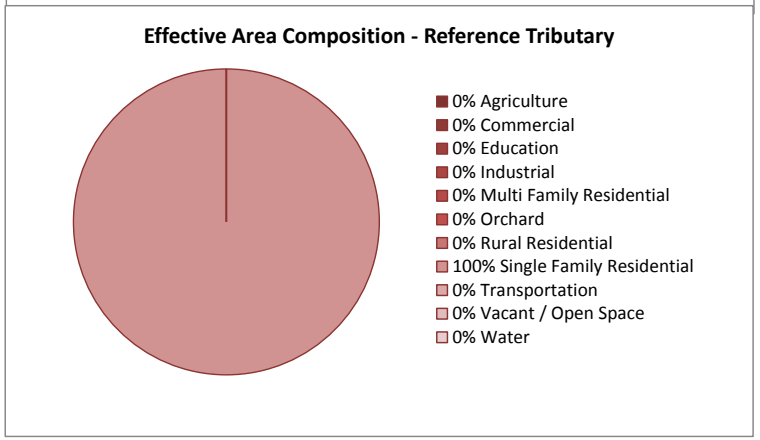
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **0.93** | **1.10** | **0.91** | - | - | - | 0.65 |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

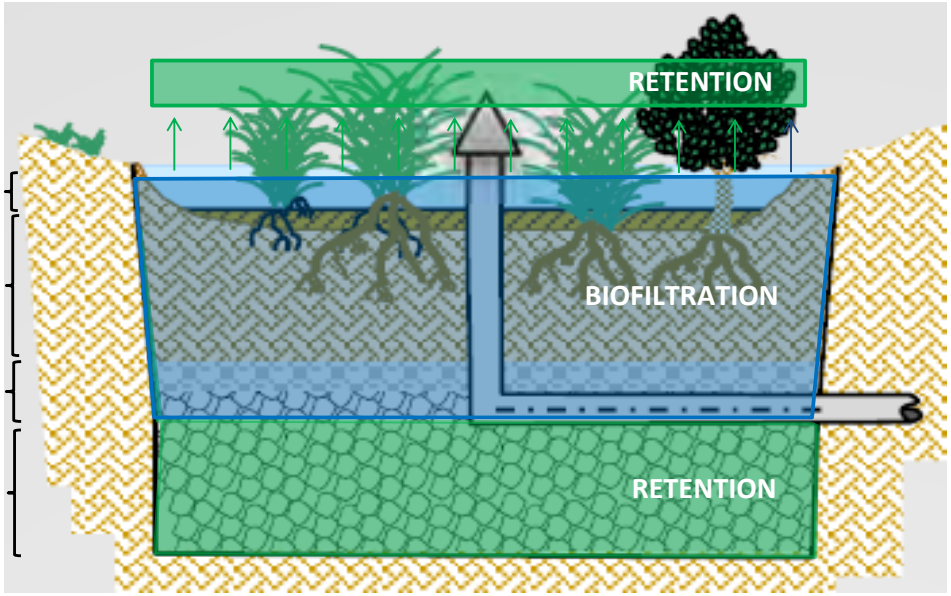
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1274 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.23 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.47 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,956 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 251,830 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 377,745 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 8,265 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 188,873 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,015 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,015 | cf |
| Gravel Depth Below IE | 17.47 | in. |
| Gravel Storage Below IE | 3,045 | cf |
| **Volume Retained** | **3,045** | **cf** |
| **Opt 1. Volume Biofiltered** | **8,265** | **cf** |
| **Opt 2. Volume Stored** | **1,015** | **cf** |



## Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 5,659 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 3.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 3,045 | | |
| **Equivalent Development Area** | 0.87 | 1.68 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.87** | **1.68** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 5.7 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,956 | ($ft^3$) |
| Minimum Design Depth | 12.23 | (inches) |
| Effective Draw Down Rate | 0.1274 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 369 | (GPM) |

***Notes:***

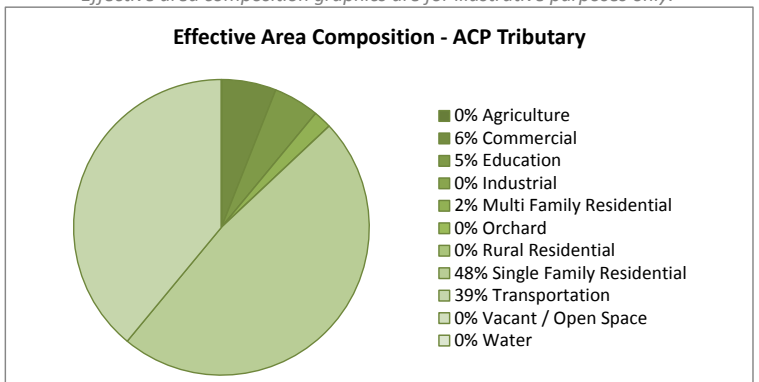
1) Only yellow cells are user input.

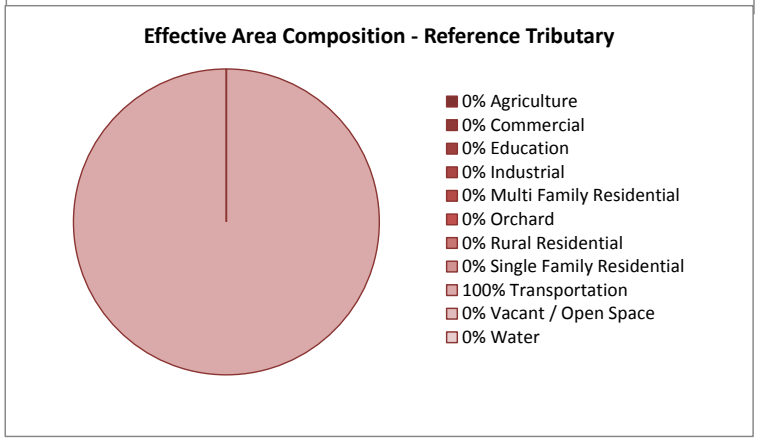
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 6.20 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 3.38 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 103.80 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 38.21 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 160.59 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.12 | 0.22 | 0.14 | 0.38 | 0.37 | 0.49 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.10** | **0.85** | **1.14** | **-** | **-** | **-** | **3.41** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

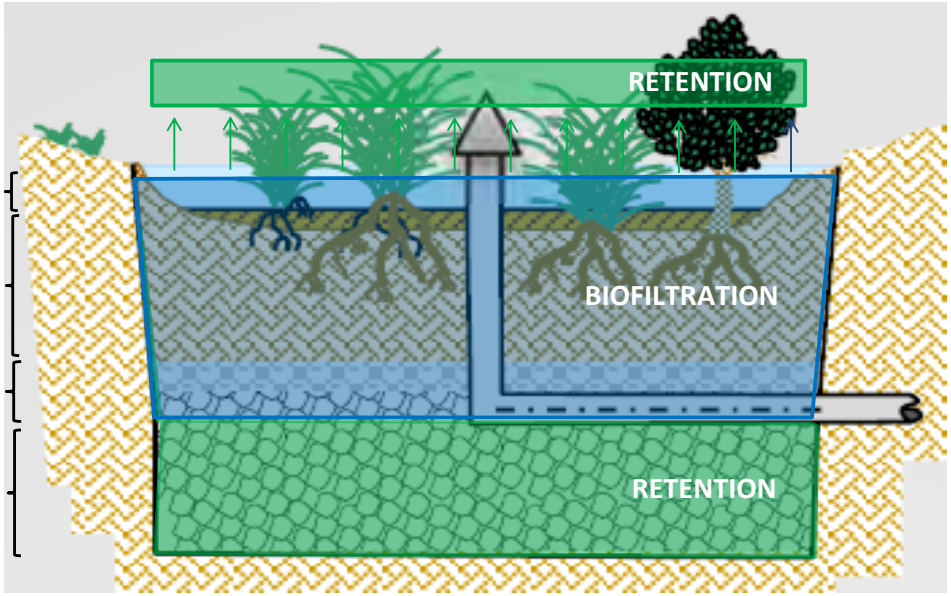
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 251,830 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1274 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.23 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.47 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,956 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.01 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.01 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.01 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.00 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 251,830 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 377,745 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 8,265 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 188,873 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,015 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.03** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,015 | cf |
| Gravel Depth Below IE | 17.47 | in. |
| Gravel Storage Below IE | 3,045 | cf |
| **Volume Retained** | **3,045** | **cf** |
| **Opt 1. Volume Biofiltered** | **8,265** | **cf** |
| **Opt 2. Volume Stored** | **1,015** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 7,401 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.54 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 4.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 3,045 | | |
| **Equivalent Development Area** | 0.39 | 0.75 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.39** | **0.75** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 5.7 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,956 | ($ft^3$) |
| Minimum Design Depth | 12.23 | (inches) |
| Effective Draw Down Rate | 0.1274 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 369 | (GPM) |

***Notes:***

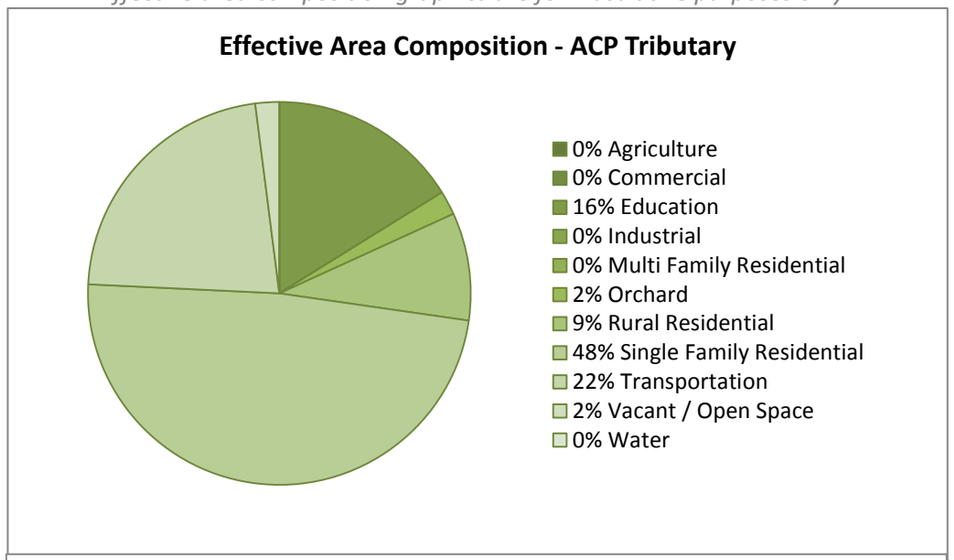
1) Only yellow cells are user input.

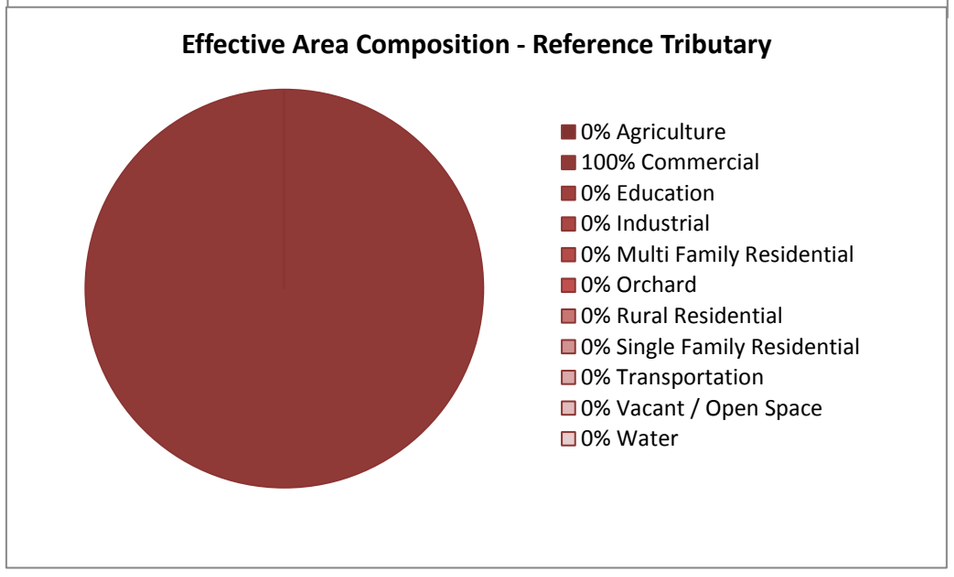
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.61** | **1.50** | **0.91** | - | - | - | **0.43** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

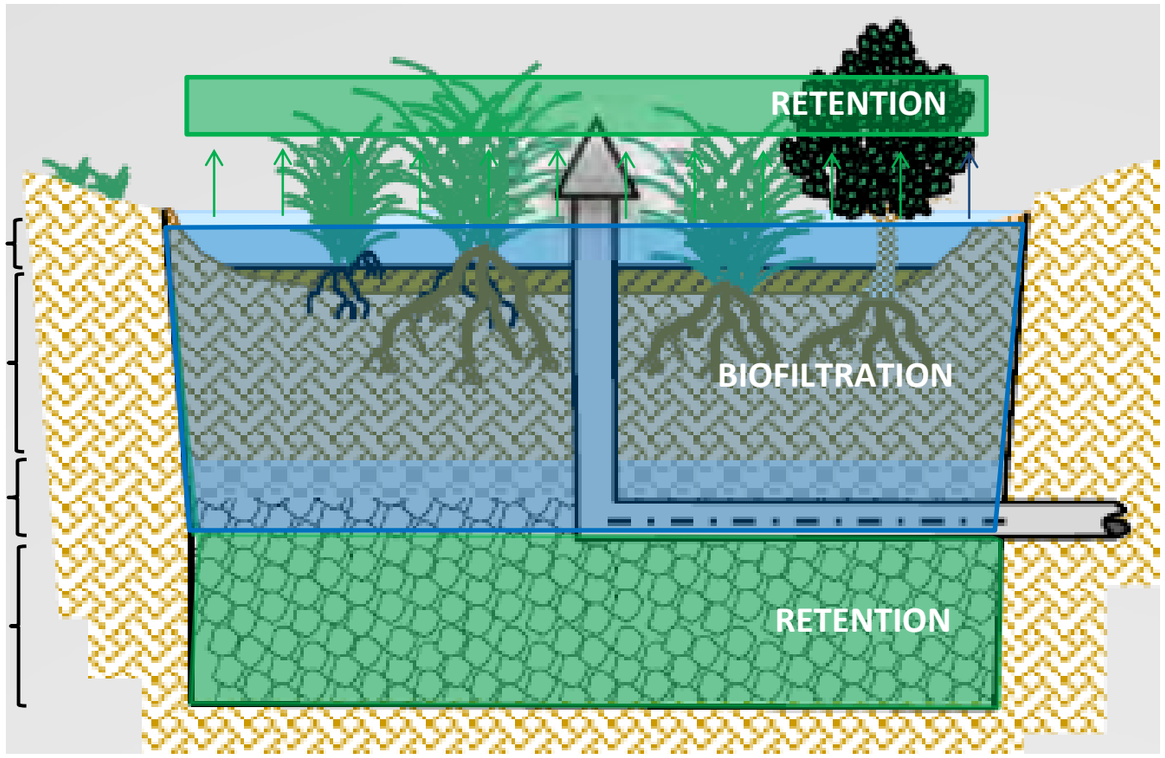
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 18,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 38,700 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.33 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.33 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.19 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 134,828 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 202,242 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 80,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 101,121 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 35,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.60 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.26 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.60** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 2700 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 18,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 5,400 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 12,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 36,000 | cf |
| **Volume Retained** | **38,700** | **cf** |
| **Opt 1. Volume Biofiltered** | **80,400** | **cf** |
| **Opt 2. Volume Stored** | **35,400** | **cf** |



Site 5A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 42,859 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 24.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 36,000 | | |
| **Equivalent Development Area** | 5.13 | 9.93 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.13** | **9.93** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

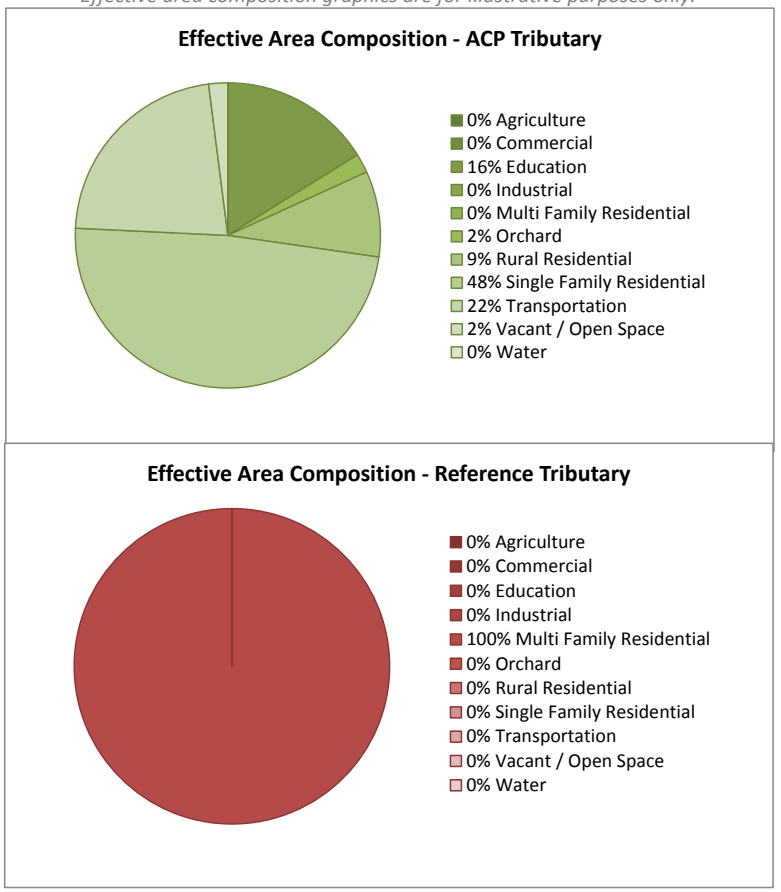
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **2.09** | **1.84** | **1.12** | **-** | **-** | **-** | **1.37** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

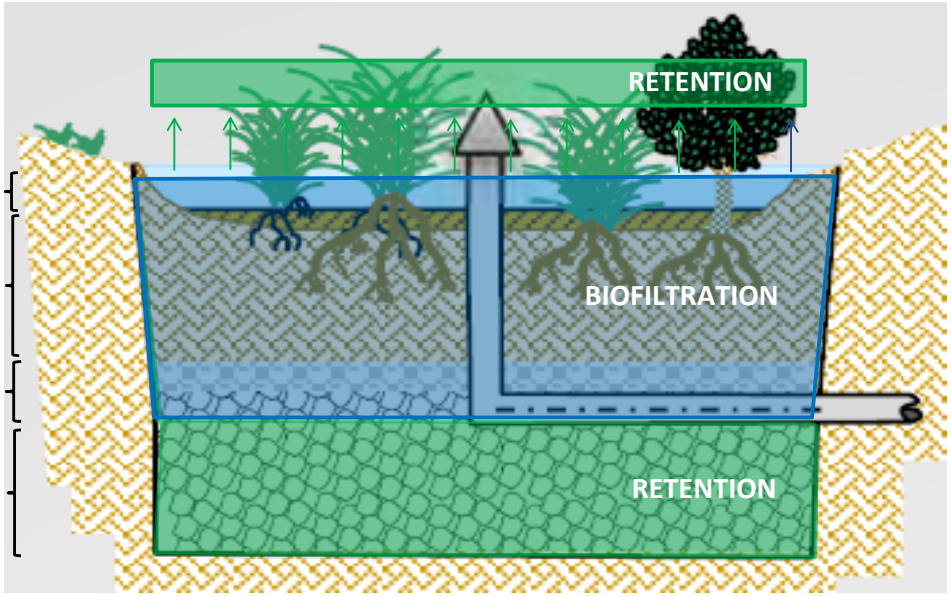
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 18,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 38,700 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.33 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.33 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.19 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 134,828 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 202,242 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 80,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 101,121 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 35,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.60 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.26 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.60** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 2700 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 18,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 5,400 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 12,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 36,000 | cf |
| **Volume Retained** | **38,700** | **cf** |
| **Opt 1. Volume Biofiltered** | **80,400** | **cf** |
| **Opt 2. Volume Stored** | **35,400** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 111,633 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 64.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 36,000 | | |
| **Equivalent Development Area** | 6.84 | 13.24 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.84** | **13.24** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

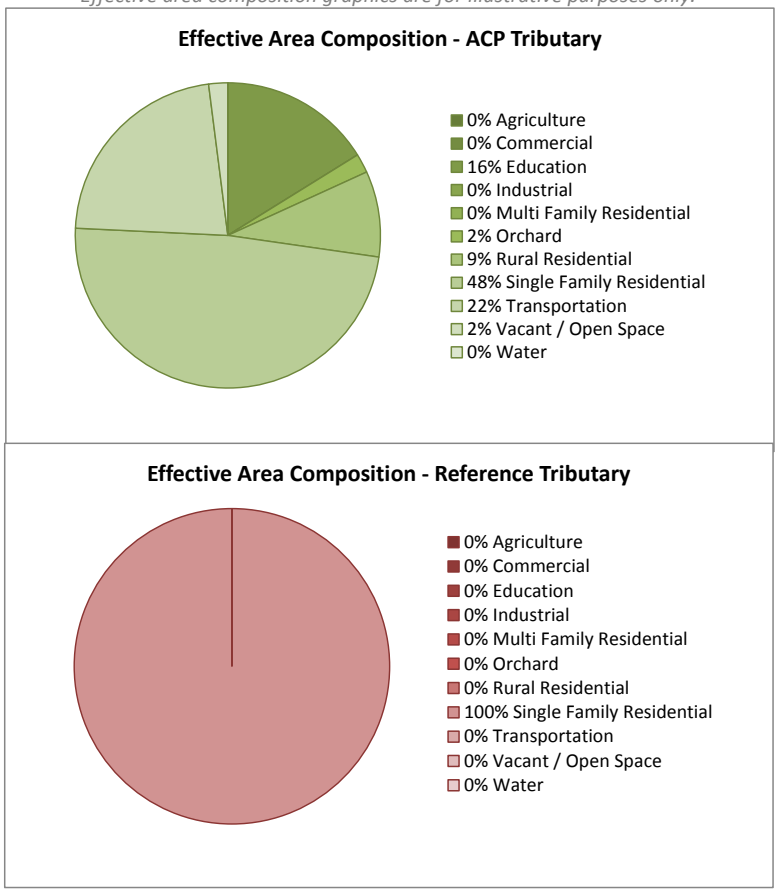
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.61** | **1.20** | **0.97** | **-** | **-** | **-** | **0.59** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

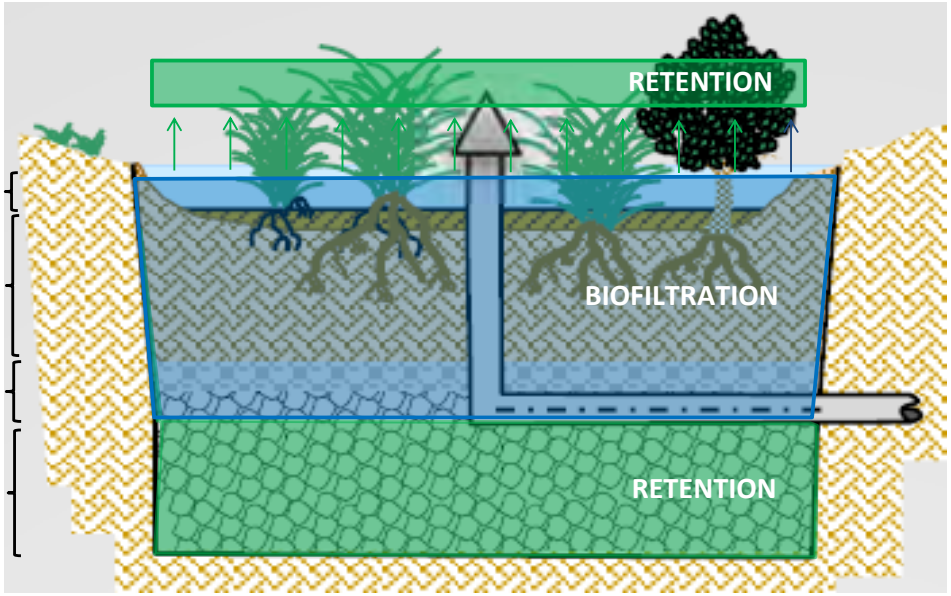
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 18,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 38,700 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.33 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.33 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.19 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 134,828 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 202,242 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 80,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 101,121 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 35,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.60 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.26 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.60** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 2700 cf |
| Surface Ponding Depth | 12.00 in. |
| Surface Ponding Volume | 18,000 cf |
| Soil Media Thickness | 18.00 in. |
| Soil Storage Volume | 5,400 cf |
| Gravel Depth Above IE | 20.00 in. |
| Gravel Storage Avove IE | 12,000 cf |
| Gravel Depth Below IE | 60.00 in. |
| Gravel Storage Below IE | 36,000 cf |
| **Volume Retained** | **38,700 cf** |
| **Opt 1. Volume Biofiltered** | **80,400 cf** |
| **Opt 2. Volume Stored** | **35,400 cf** |



Site 5A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 58,807 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 33.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 36,000 | | |
| **Equivalent Development Area** | 10.25 | 19.87 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **10.25** | **19.87** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.90** | **0.92** | **1.21** | **-** | **-** | **-** | **3.09** |

**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

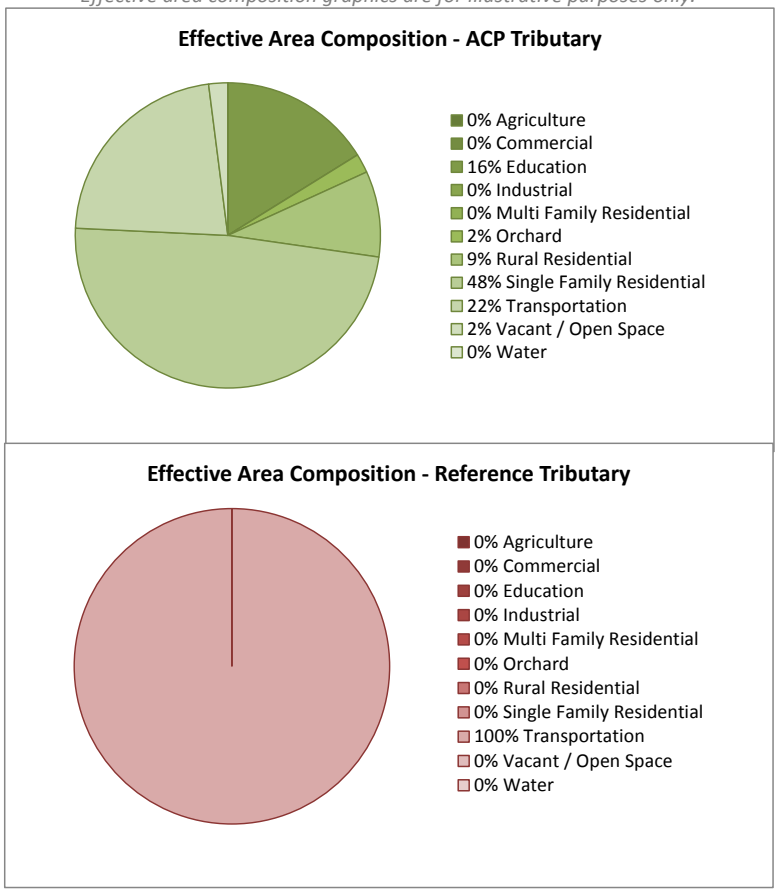
Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

*Effective area composition graphics are for illustrative purposes only.*



**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

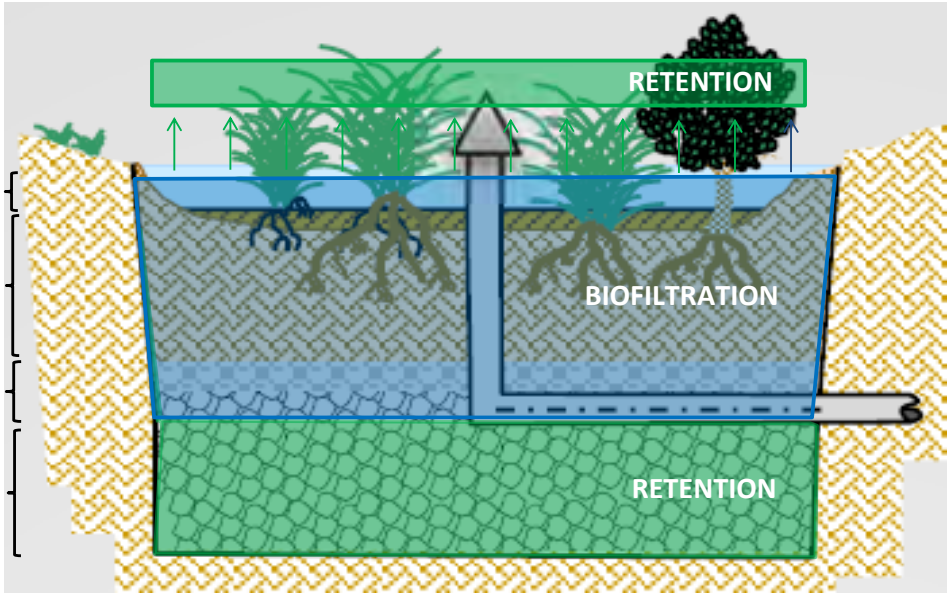
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 18,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 38,700 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.23 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.33 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.33 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.19 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 134,828 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 202,242 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 80,400 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 101,121 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 35,400 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.60 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.26 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.60** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 2700 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 18,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 5,400 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 12,000 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 36,000 | cf |
| **Volume Retained** | **38,700** | **cf** |
| **Opt 1. Volume Biofiltered** | **80,400** | **cf** |
| **Opt 2. Volume Stored** | **35,400** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 91,699 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 52.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 36,000 | | |
| **Equivalent Development Area** | 4.56 | 8.83 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **4.56** | **8.83** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

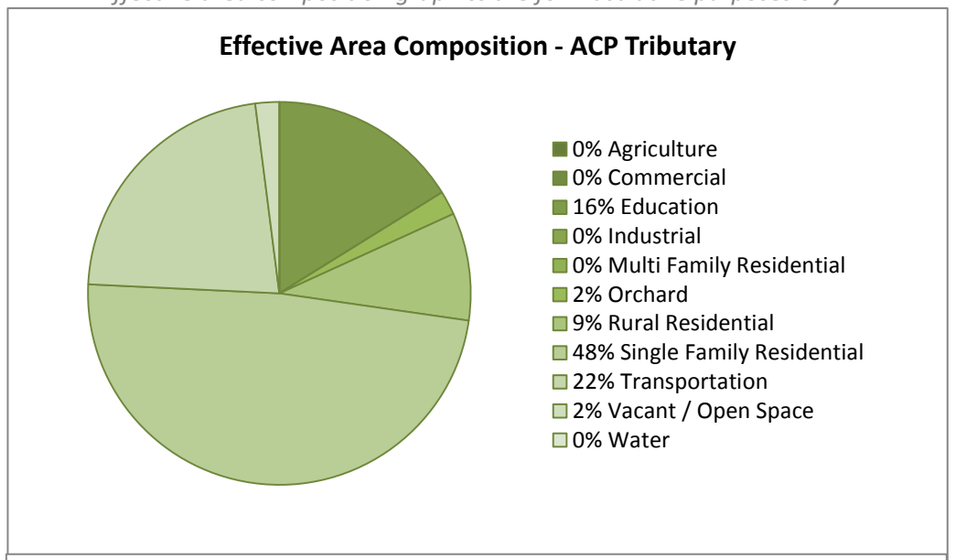
1) Only yellow cells are user input.

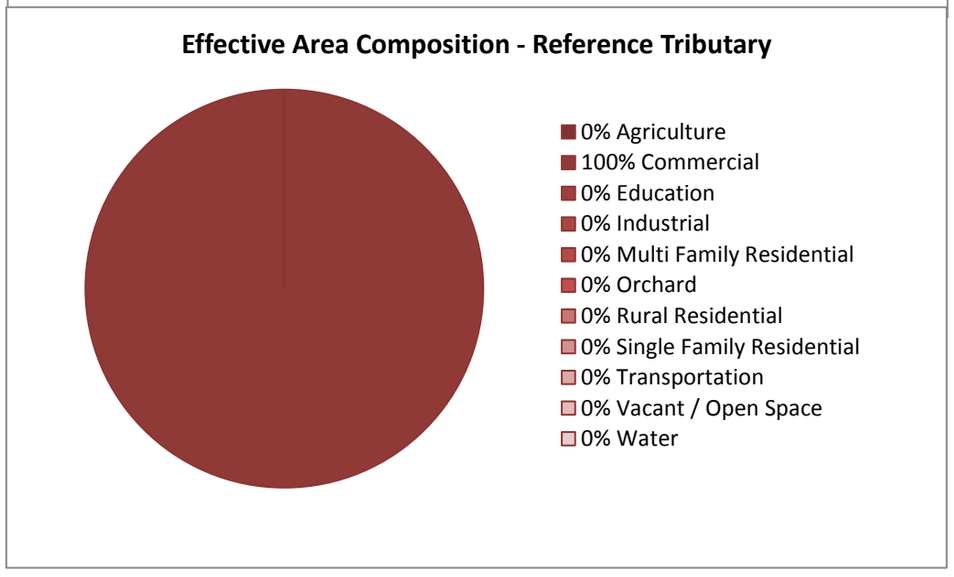
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.61** | **1.50** | **0.91** | - | - | - | **0.43** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

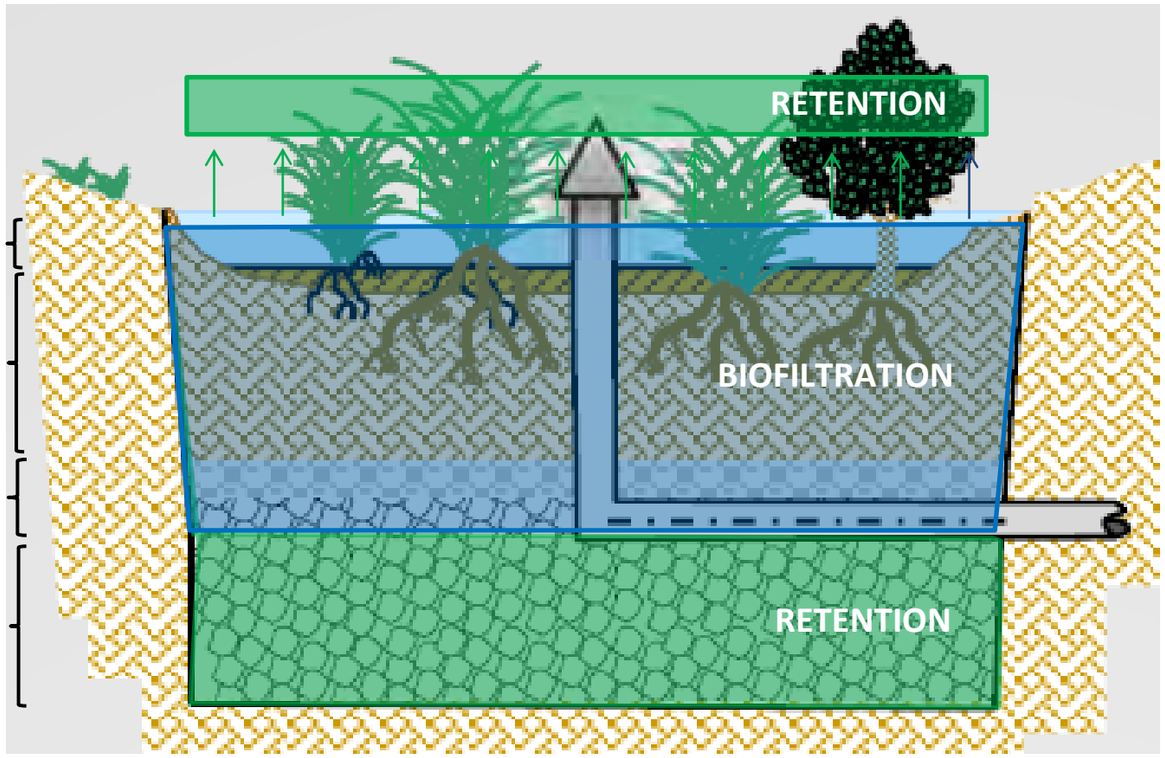
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 619,330 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 44,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 588,364 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 882,546 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 62,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 441,273 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 7,700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.11 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.06 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.18** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 7,700 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 43,633 | cf |
| **Volume Retained** | **43,633** | **cf** |
| **Opt 1. Volume Biofiltered** | **62,700** | **cf** |
| **Opt 2. Volume Stored** | **7,700** | **cf** |



Site 5B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 46,611 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 26.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 43,633 | | |
| **Equivalent Development Area** | 6.21 | 12.04 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.21** | **12.04** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

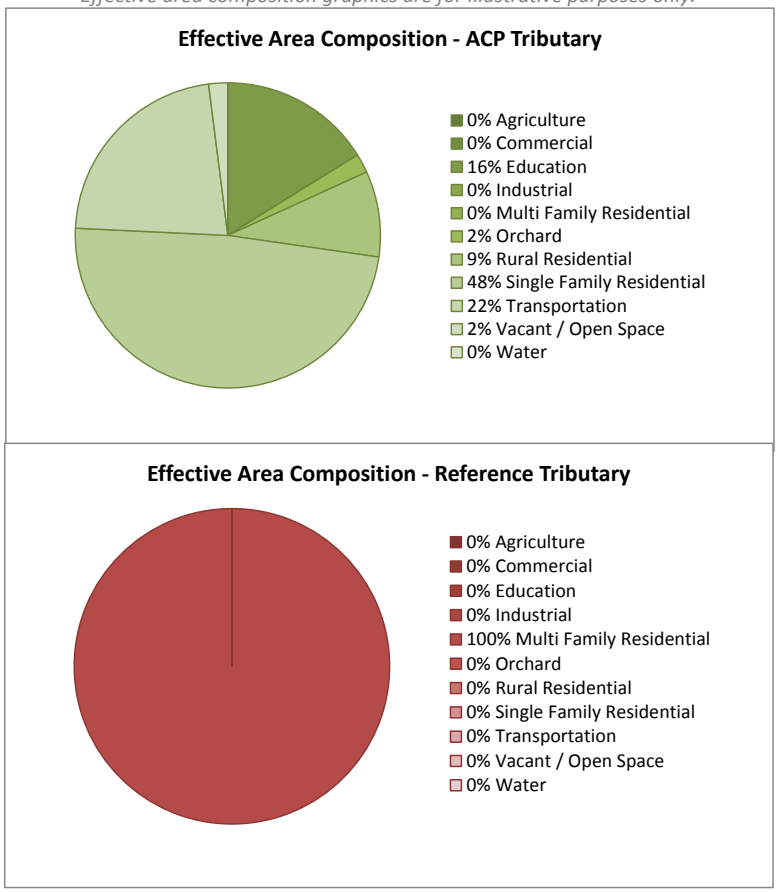
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **2.09** | **1.84** | **1.12** | **-** | **-** | **-** | **1.37** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

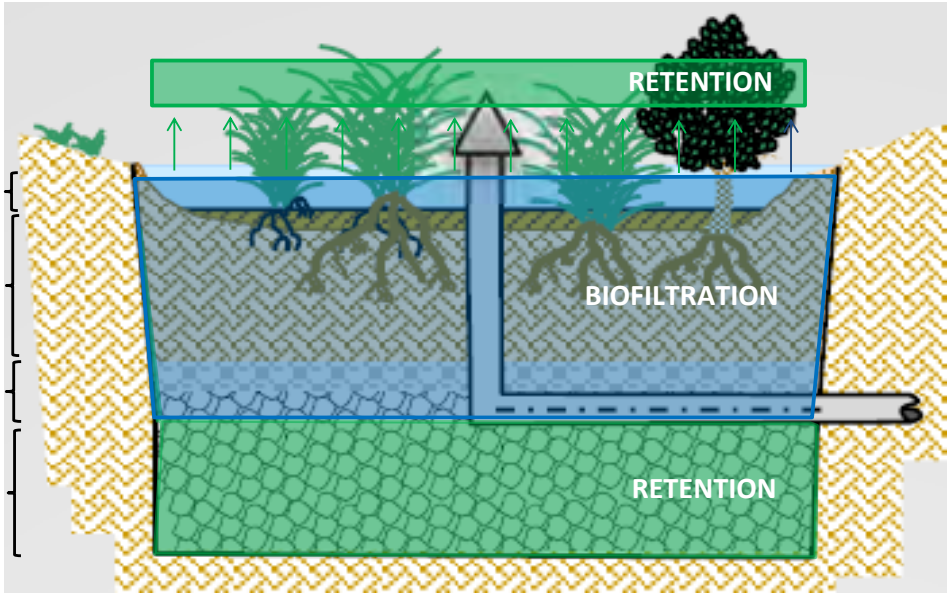
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 619,330 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 44,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 588,364 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 882,546 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 62,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 441,273 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 7,700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.11 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.06 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.18** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 7,700 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 43,633 cf |
| **Volume Retained** | **43,633 cf** |
| **Opt 1. Volume Biofiltered** | **62,700 cf** |
| **Opt 2. Volume Stored** | **7,700 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 121,406 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 69.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 43,633 | | |
| **Equivalent Development Area** | 8.29 | 16.05 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.29** | **16.05** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

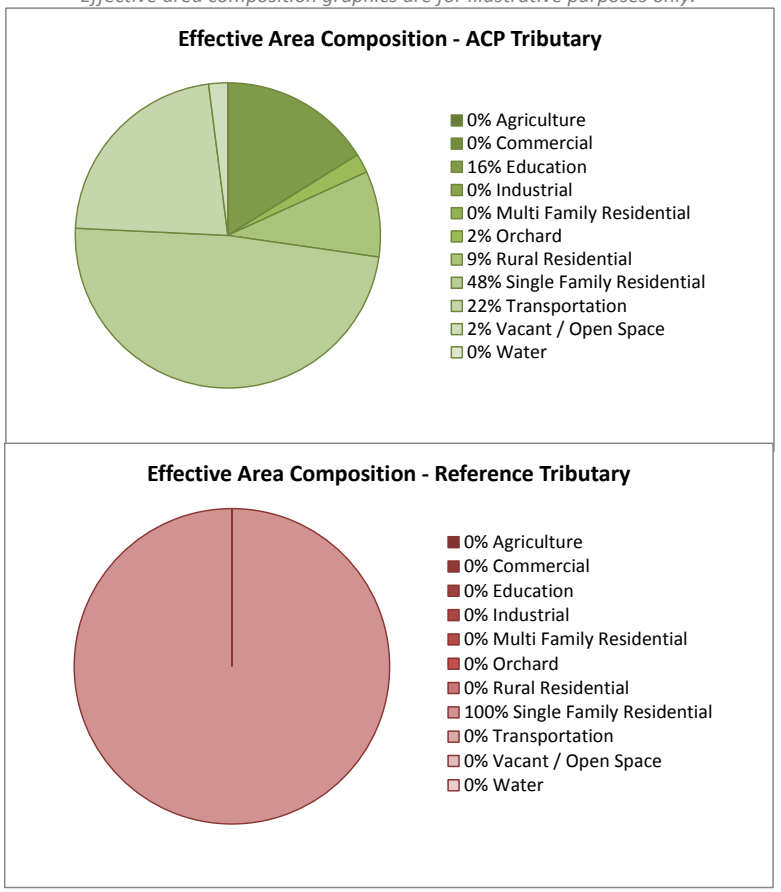
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.61** | **1.20** | **0.97** | **-** | **-** | **-** | **0.59** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

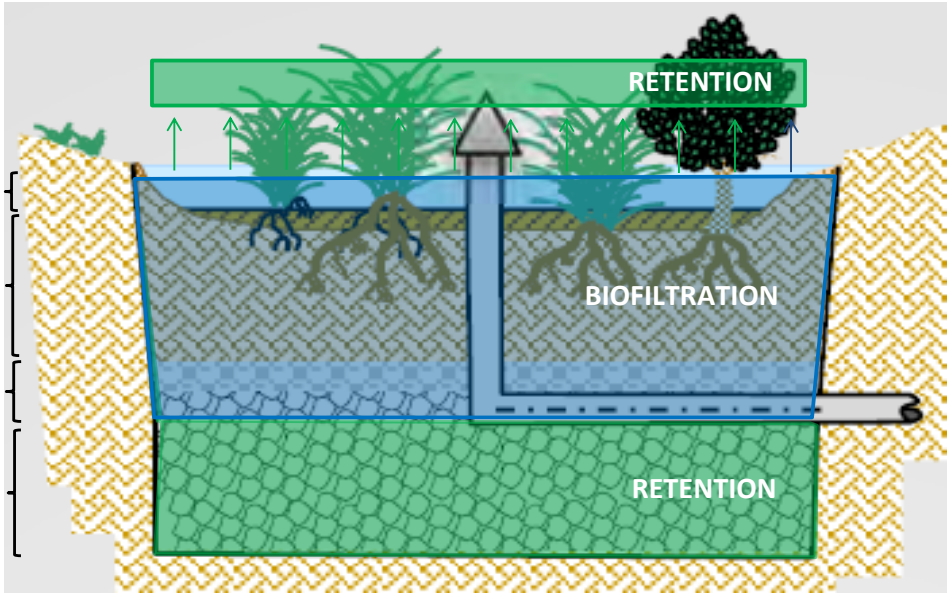
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 619,330 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 44,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 588,364 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 882,546 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 62,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 441,273 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 7,700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.11 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.06 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.18** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 7,700 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 43,633 cf |
| **Volume Retained** | **43,633 cf** |
| **Opt 1. Volume Biofiltered** | **62,700 cf** |
| **Opt 2. Volume Stored** | **7,700 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 63,955 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 36.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 43,633 | | |
| **Equivalent Development Area** | 12.43 | 24.08 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.43** | **24.08** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

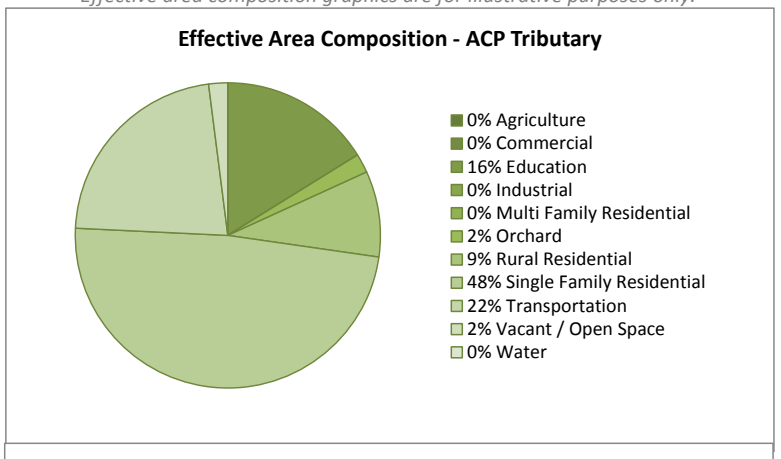
1) Only yellow cells are user input.

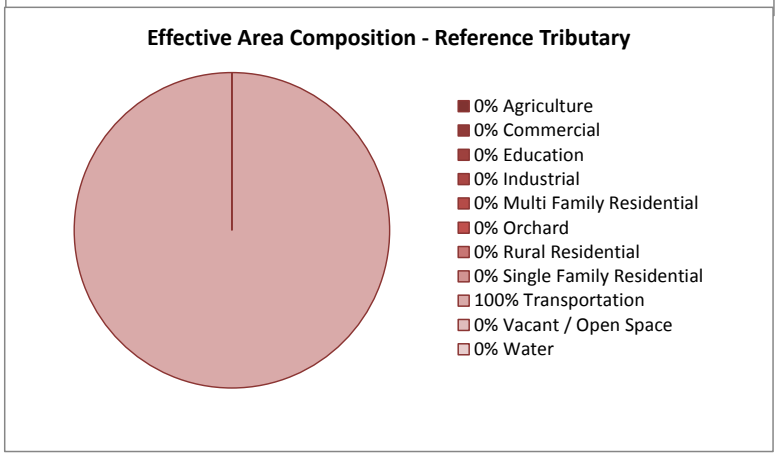
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 68.57 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 42.14 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 65.93 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 252.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 51.75 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 52.73 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 533.17 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.21 | 0.24 | 0.15 | 0.30 | 0.40 | 0.39 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.90** | **0.92** | **1.21** | **-** | **-** | **-** | **3.09** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

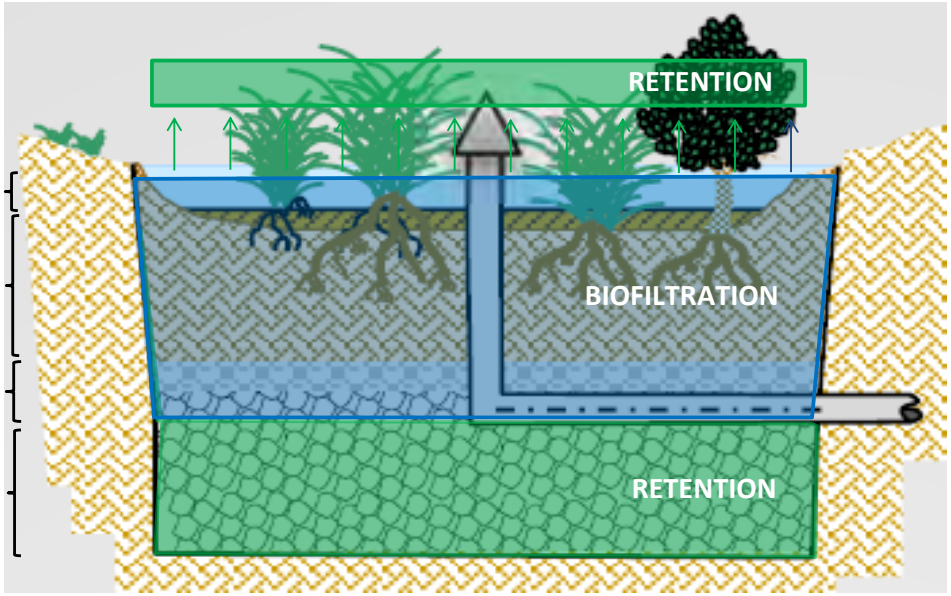
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 619,330 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 44,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 588,364 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 882,546 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 62,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 441,273 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 7,700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.11 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.06 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.18** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 7,700 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 43,633 | cf |
| **Volume Retained** | **43,633** | **cf** |
| **Opt 1. Volume Biofiltered** | **62,700** | **cf** |
| **Opt 2. Volume Stored** | **7,700** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 99,726 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.40 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 57.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 43,633 | | |
| **Equivalent Development Area** | 5.52 | 10.70 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.52** | **10.70** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

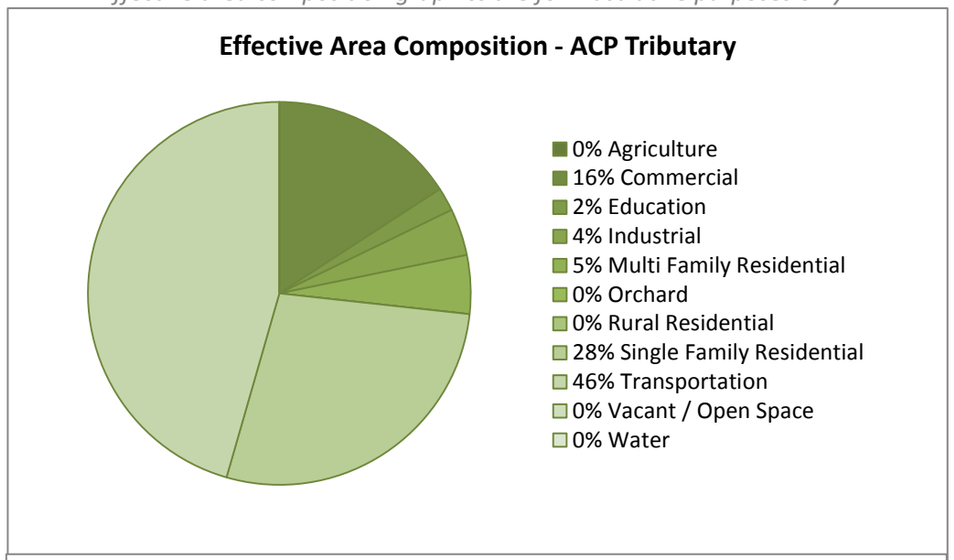
1) Only yellow cells are user input.

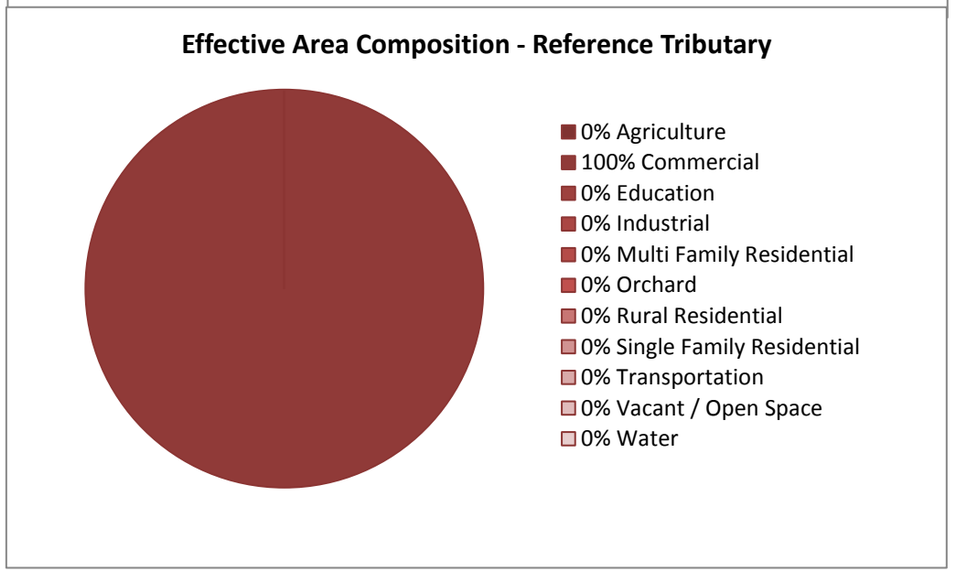
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 96.81 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 16.08 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 21.21 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 39.84 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 2.16 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 1.91 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 345.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 250.32 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 9.94 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 783.32 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.44 | 0.38 | 0.59 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.93** | **1.36** | **0.85** | - | - | - | **0.46** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

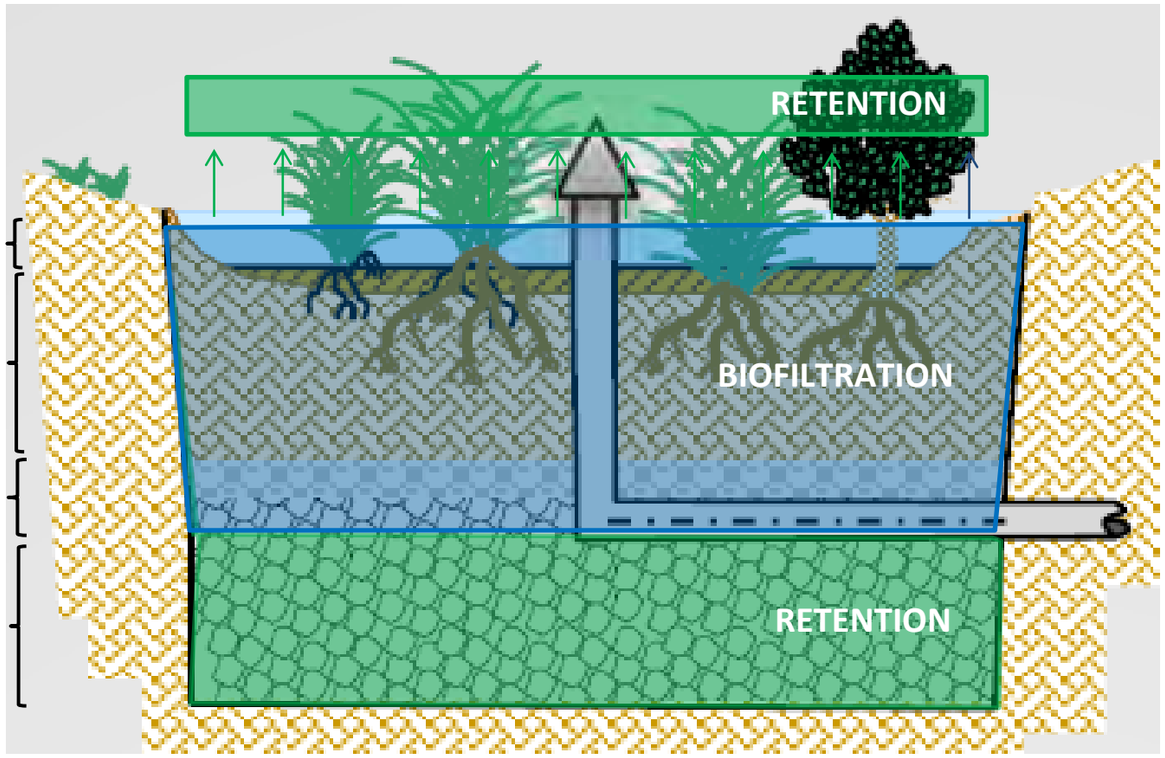
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 1,433,100 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 15,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 30,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,418,769 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,128,154 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 42,750 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,064,077 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,250 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.05** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,250 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 29,750 cf |
| **Volume Retained** | **29,750 cf** |
| **Opt 1. Volume Biofiltered** | **42,750 cf** |
| **Opt 2. Volume Stored** | **5,250 cf** |



Site 6A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 33,901 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.63 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 19.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 29,750 | | |
| **Equivalent Development Area** | 4.24 | 8.21 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **4.24** | **8.21** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

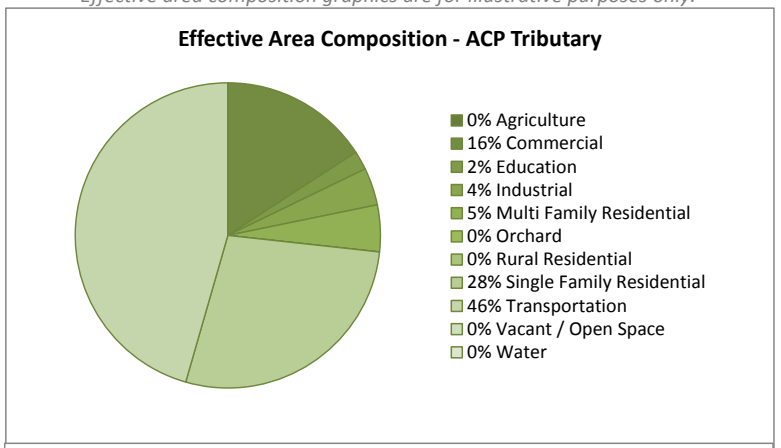
1) Only yellow cells are user input.

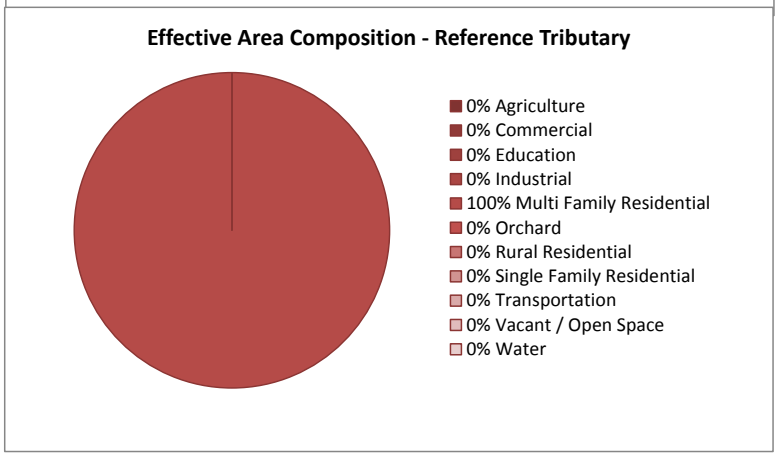
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 96.81 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 16.08 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 21.21 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 39.84 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 2.16 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 1.91 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 345.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 250.32 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 9.94 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 783.32 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.44 | 0.38 | 0.59 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.21** | **1.67** | **1.05** | **-** | **-** | **-** | **1.49** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

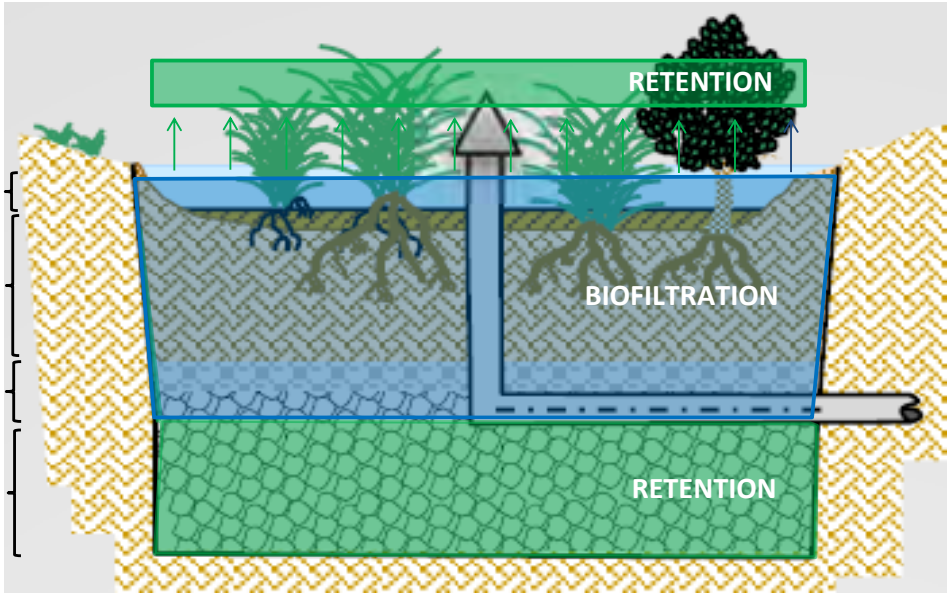
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 1,433,100 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 15,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 30,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,418,769 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,128,154 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 42,750 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,064,077 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,250 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.05** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,250 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 29,750 cf |
| **Volume Retained** | **29,750 cf** |
| **Opt 1. Volume Biofiltered** | **42,750 cf** |
| **Opt 2. Volume Stored** | **5,250 cf** |



Site 6A Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 77,383 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.63 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 44.4 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 29,750 | | |
| **Equivalent Development Area** | 5.65 | 10.94 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.65** | **10.94** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

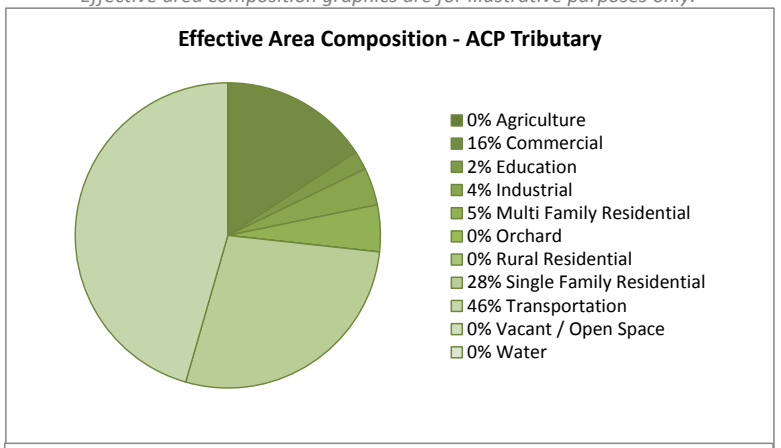
1) Only yellow cells are user input.

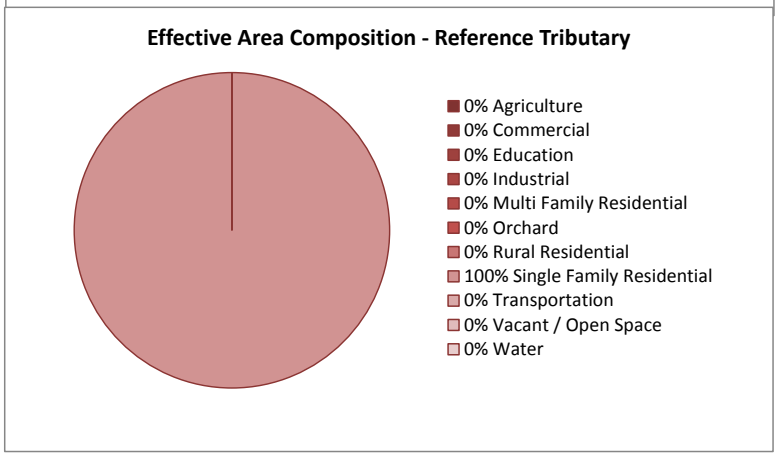
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 96.81 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 16.08 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 21.21 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 39.84 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 2.16 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 1.91 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 345.05 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 250.32 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 9.94 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 783.32 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.44 | 0.38 | 0.59 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.93** | **1.09** | **0.91** | **-** | **-** | **-** | **0.64** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

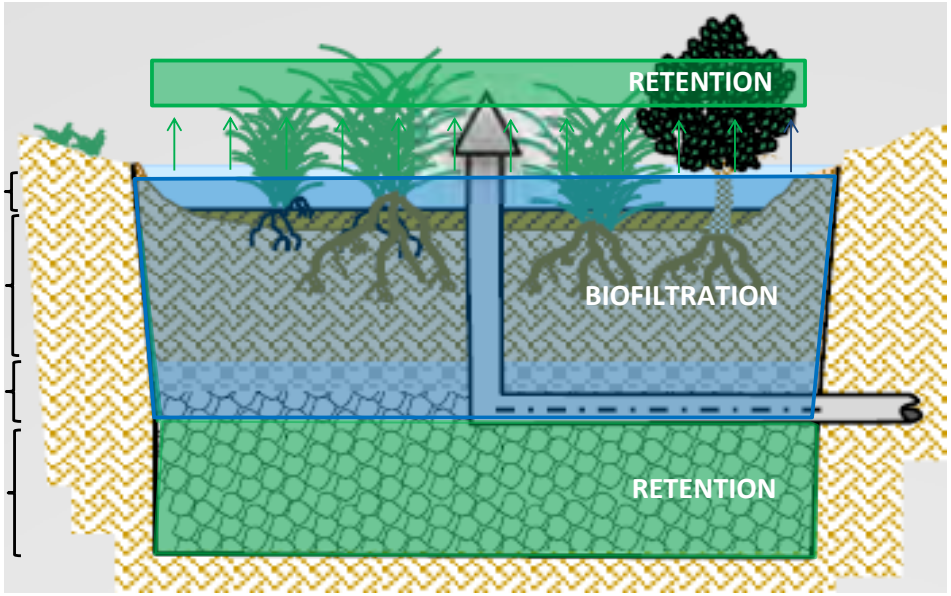
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 1,433,100 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 15,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 30,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,418,769 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,128,154 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 42,750 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,064,077 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,250 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.05** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,250 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 29,750 cf |
| **Volume Retained** | **29,750 cf** |
| **Opt 1. Volume Biofiltered** | **42,750 cf** |
| **Opt 2. Volume Stored** | **5,250 cf** |



Site 6A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 47,167 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.63 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 27.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 29,750 | | |
| **Equivalent Development Area** | 8.47 | 16.42 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.47** | **16.42** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

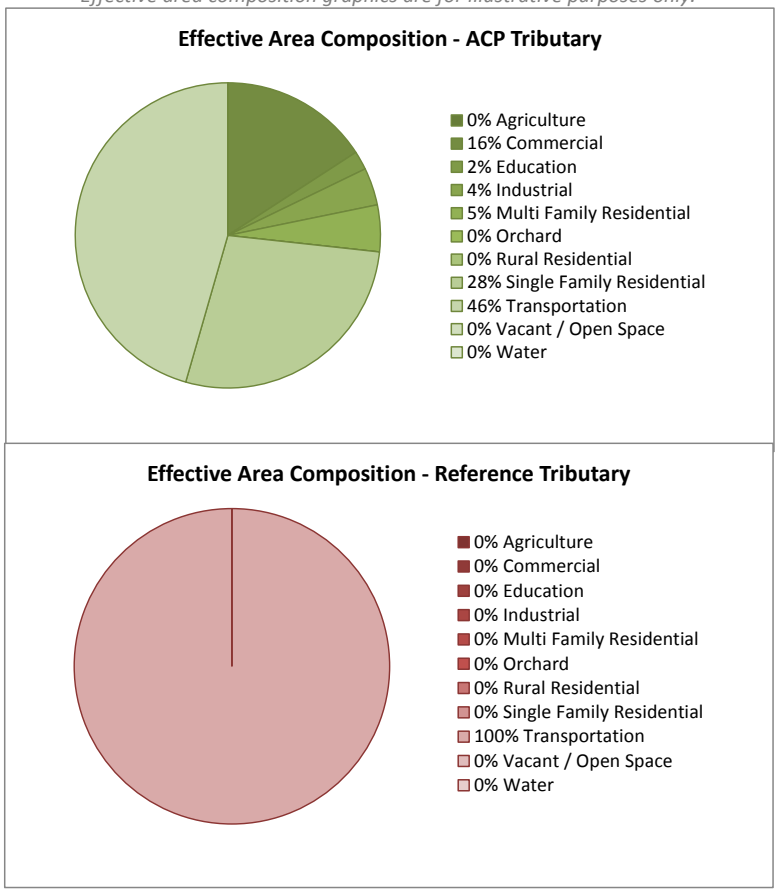
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 96.81 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 16.08 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 21.21 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 39.84 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 2.16 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 1.91 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 345.05 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 250.32 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 9.94 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 783.32 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.14 | 0.44 | 0.38 | 0.59 | 0.40 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.10** | **0.84** | **1.14** | **-** | **-** | **-** | **3.35** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

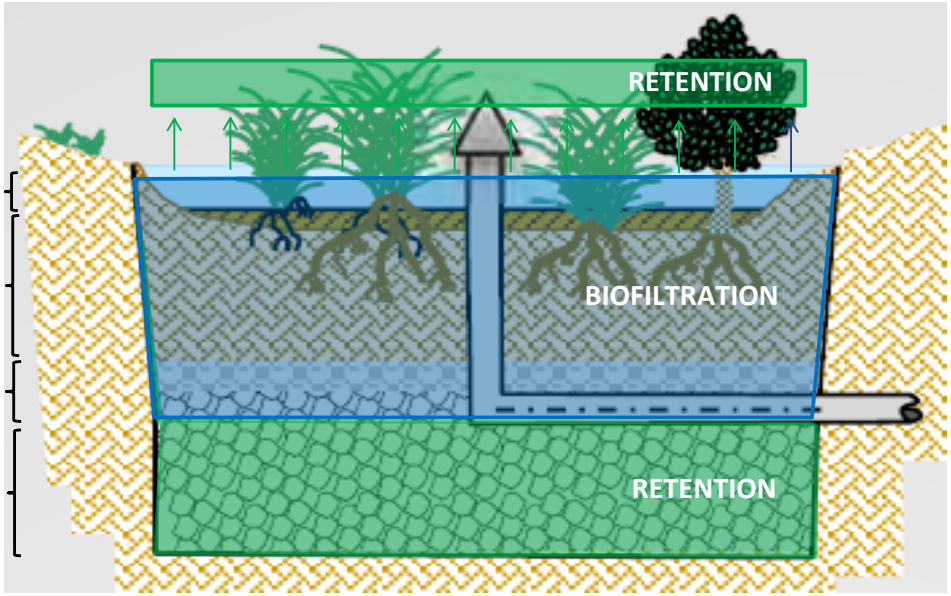
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 1,433,100 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 15,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 30,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,418,769 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,128,154 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 42,750 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,064,077 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,250 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.03 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.02 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.05** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,250 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 29,750 cf |
| **Volume Retained** | **29,750 cf** |
| **Opt 1. Volume Biofiltered** | **42,750 cf** |
| **Opt 2. Volume Stored** | **5,250 cf** |



| | | | |
|---|---|---|---|
| **Ve** | 61,906 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.63 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 35.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 29,750 | | |
| **Equivalent Development Area** | 3.77 | 7.30 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **3.77** | **7.30** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

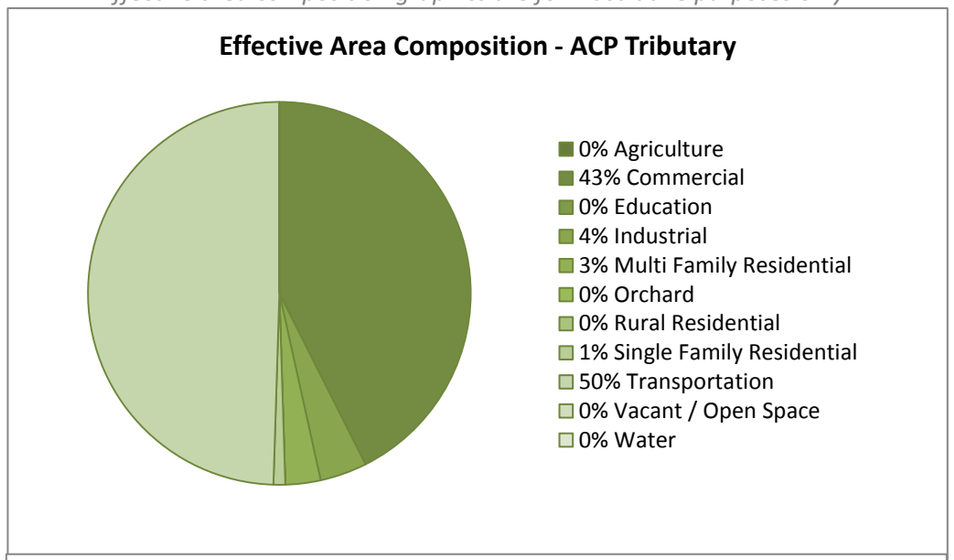
1) Only yellow cells are user input.

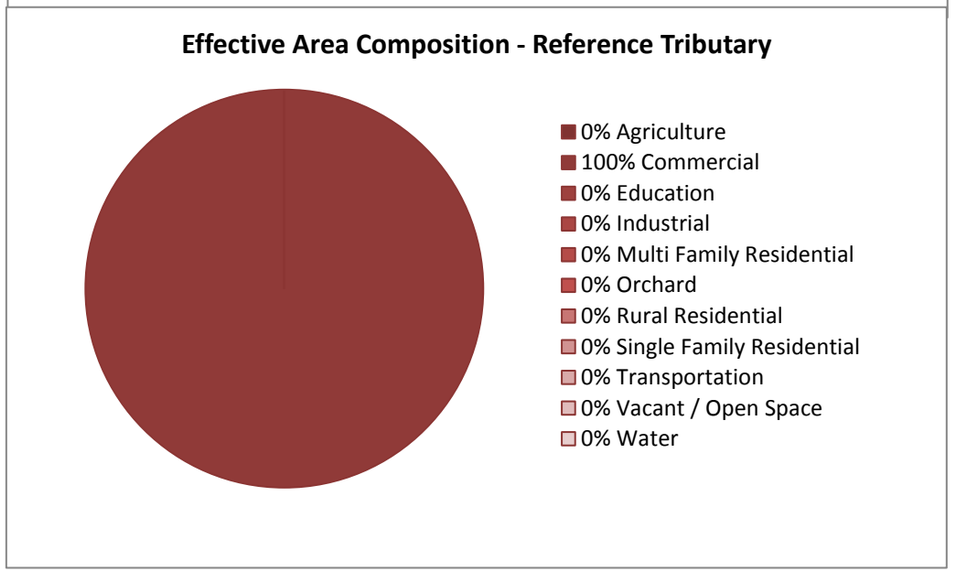
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.92** | **1.31** | **0.87** | - | - | - | **0.53** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

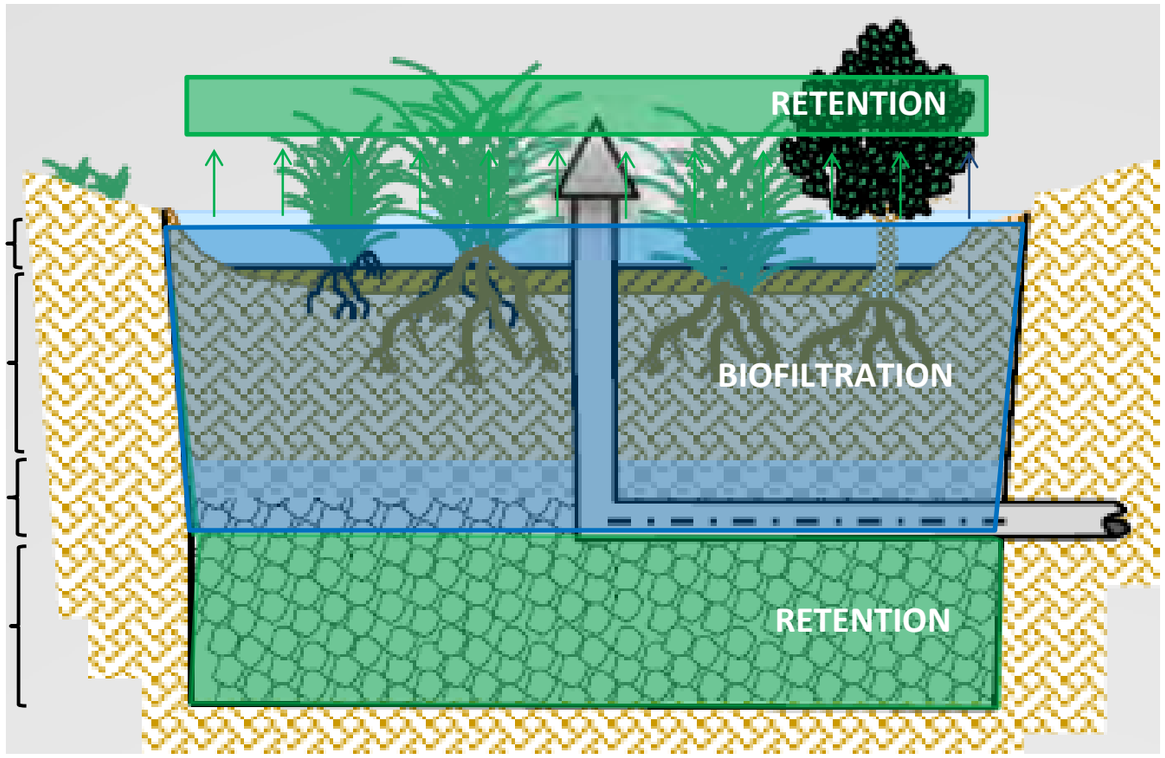
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 9,200 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 19,780 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.09 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 157,223 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 235,835 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 41,093 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 117,917 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 18,093 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.26 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.32** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1380 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 9,200 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,760 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 6,133 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 18,400 | cf |
| **Volume Retained** | **19,780** | **cf** |
| **Opt 1. Volume Biofiltered** | **41,093** | **cf** |
| **Opt 2. Volume Stored** | **18,093** | **cf** |



Site 6B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 29,099 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 16.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 18,400 | | |
| **Equivalent Development Area** | 2.62 | 5.08 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **2.62** | **5.08** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

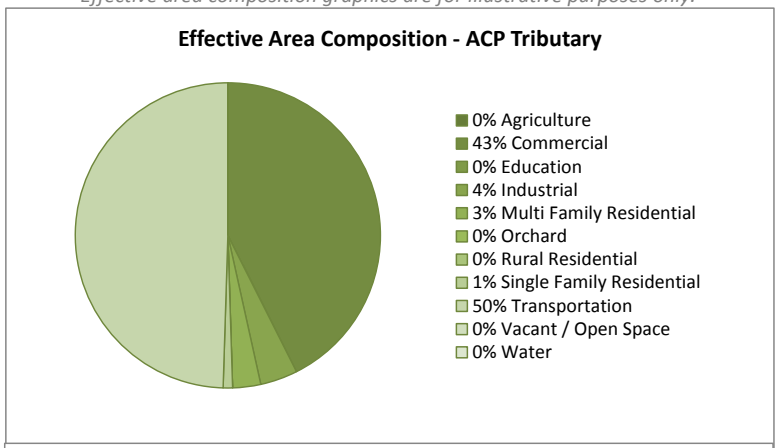
1) Only yellow cells are user input.

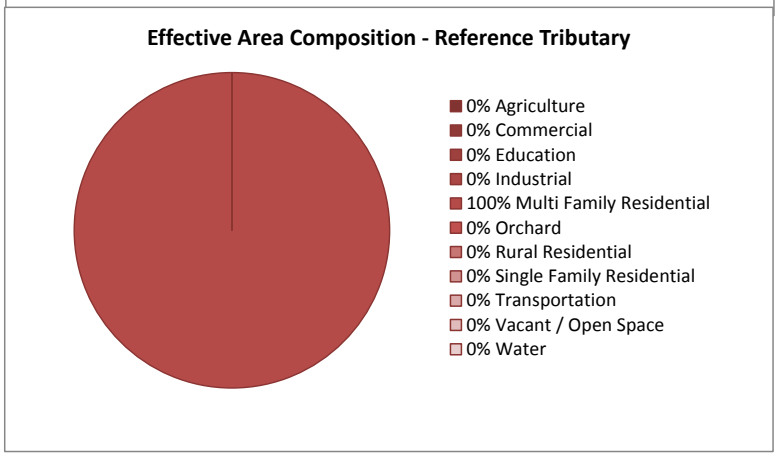
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.19** | **1.62** | **1.07** | **-** | **-** | **-** | **1.71** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

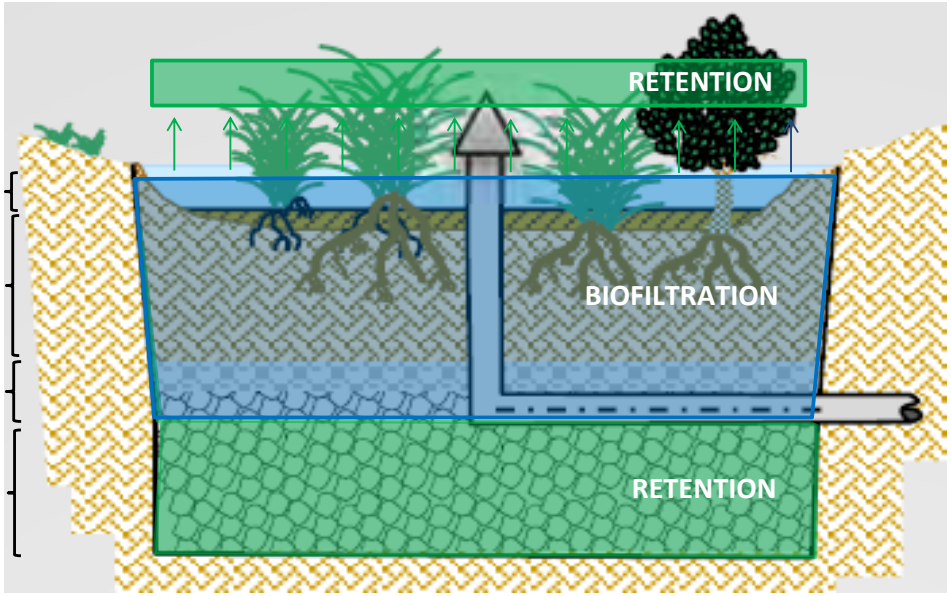
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 9,200 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 19,780 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.09 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 157,223 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 235,835 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 41,093 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 117,917 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 18,093 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.26 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.32** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1380 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 9,200 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,760 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 6,133 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 18,400 | cf |
| **Volume Retained** | **19,780** | **cf** |
| **Opt 1. Volume Biofiltered** | **41,093** | **cf** |
| **Opt 2. Volume Stored** | **18,093** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 58,747 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 33.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 18,400 | | |
| **Equivalent Development Area** | 3.49 | 6.77 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **3.49** | **6.77** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

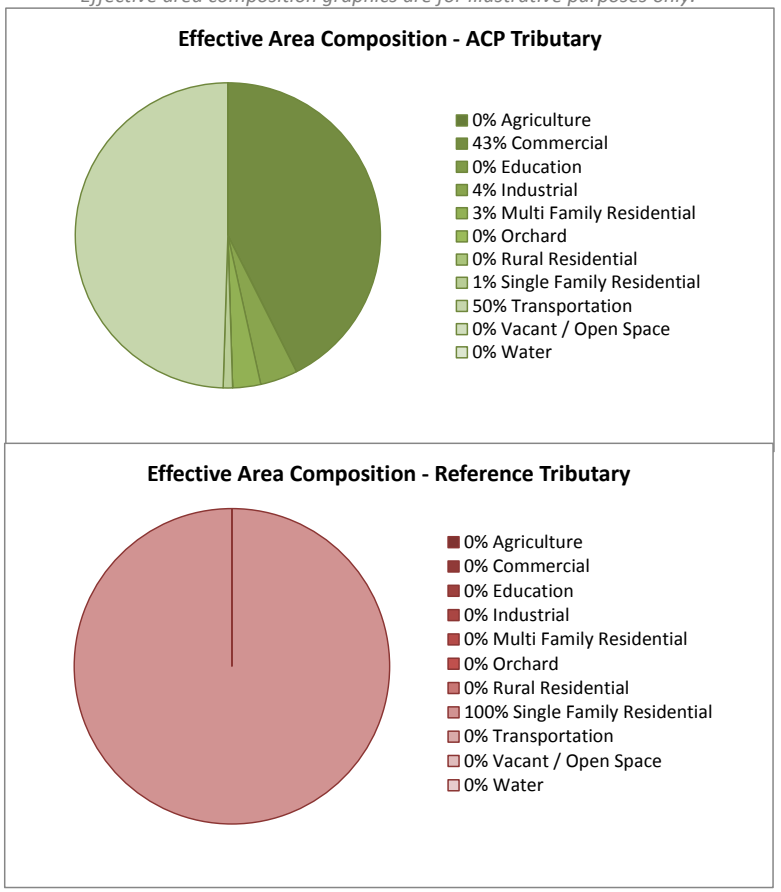
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.92** | **1.05** | **0.92** | **-** | **-** | **-** | **0.73** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

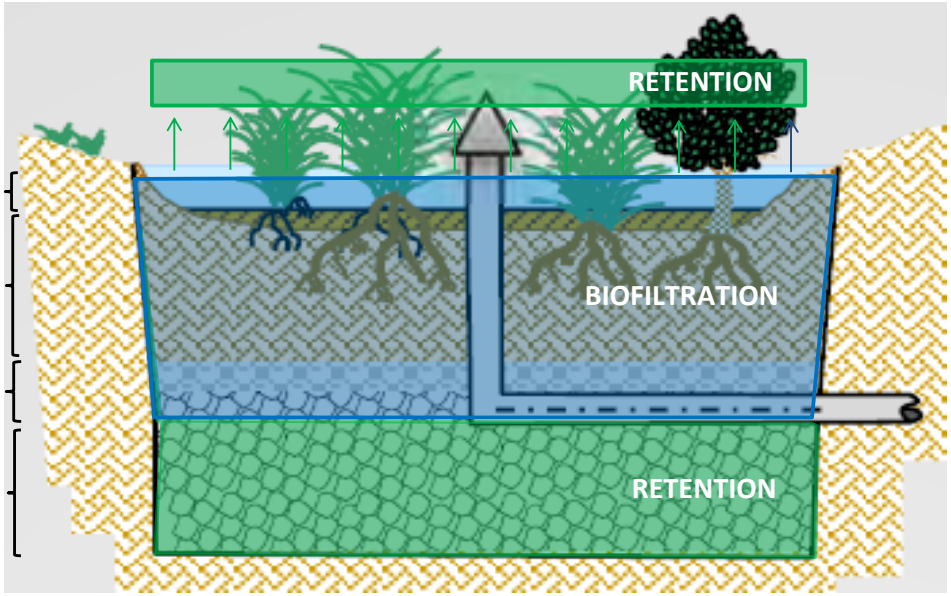
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 9,200 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 19,780 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.09 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 157,223 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 235,835 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 41,093 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 117,917 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 18,093 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.26 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.32** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1380 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 9,200 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,760 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 6,133 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 18,400 | cf |
| **Volume Retained** | **19,780** | **cf** |
| **Opt 1. Volume Biofiltered** | **41,093** | **cf** |
| **Opt 2. Volume Stored** | **18,093** | **cf** |



Site 6B Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 40,080 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 23.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 18,400 | | |
| **Equivalent Development Area** | 5.24 | 10.15 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.24** | **10.15** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

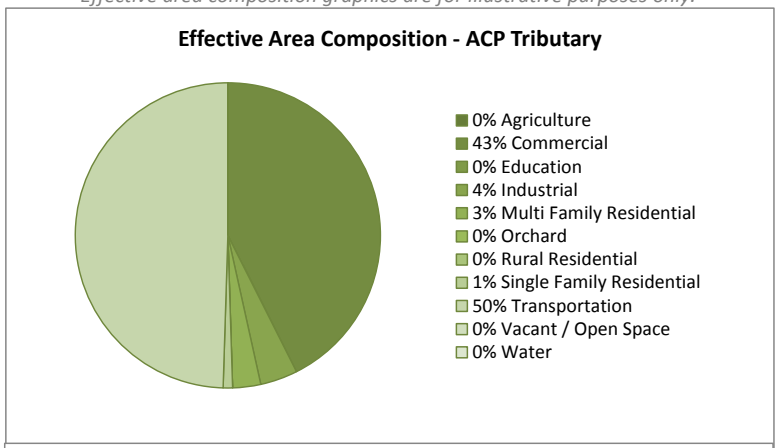
1) Only yellow cells are user input.

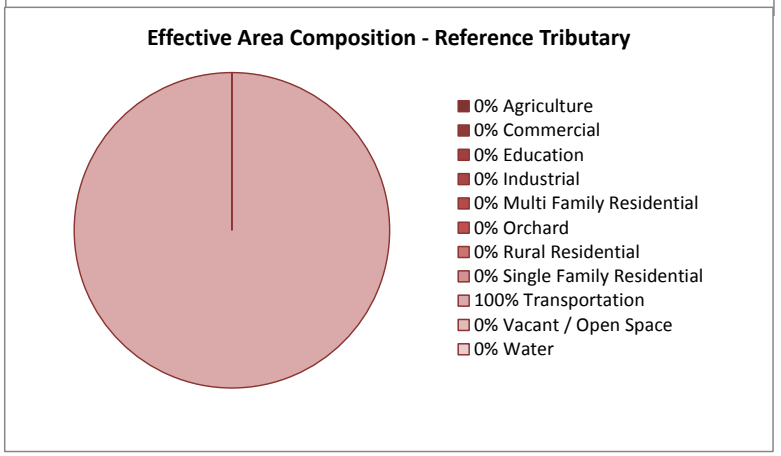
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.09** | **0.81** | **1.16** | **-** | **-** | **-** | **3.85** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

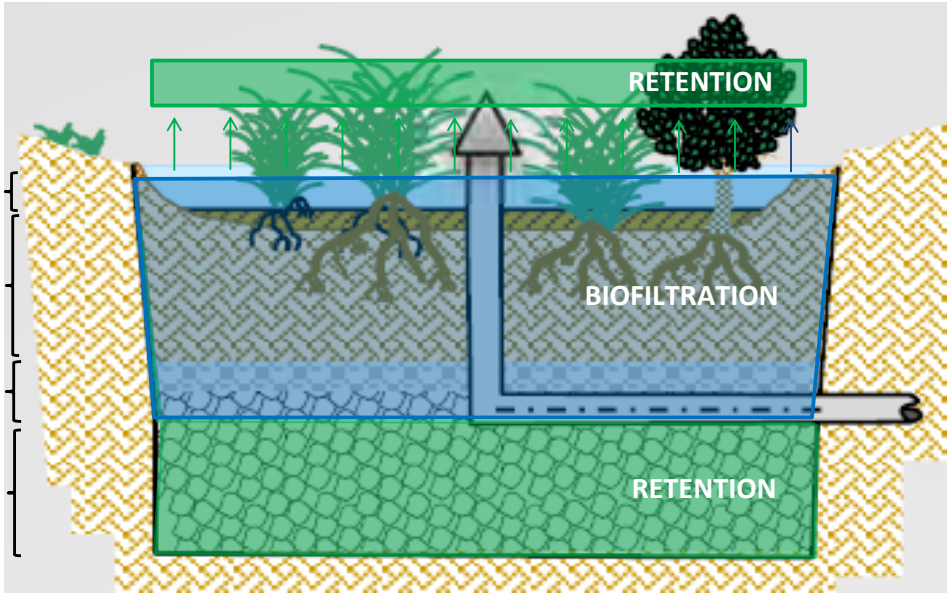
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 9,200 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 19,780 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.09 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 157,223 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 235,835 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 41,093 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 117,917 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 18,093 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.26 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.14 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.32** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 1380 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 9,200 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 2,760 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 6,133 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 18,400 | cf |
| **Volume Retained** | **19,780** | **cf** |
| **Opt 1. Volume Biofiltered** | **41,093** | **cf** |
| **Opt 2. Volume Stored** | **18,093** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 44,472 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 25.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 18,400 | | |
| **Equivalent Development Area** | 2.33 | 4.51 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **2.33** | **4.51** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

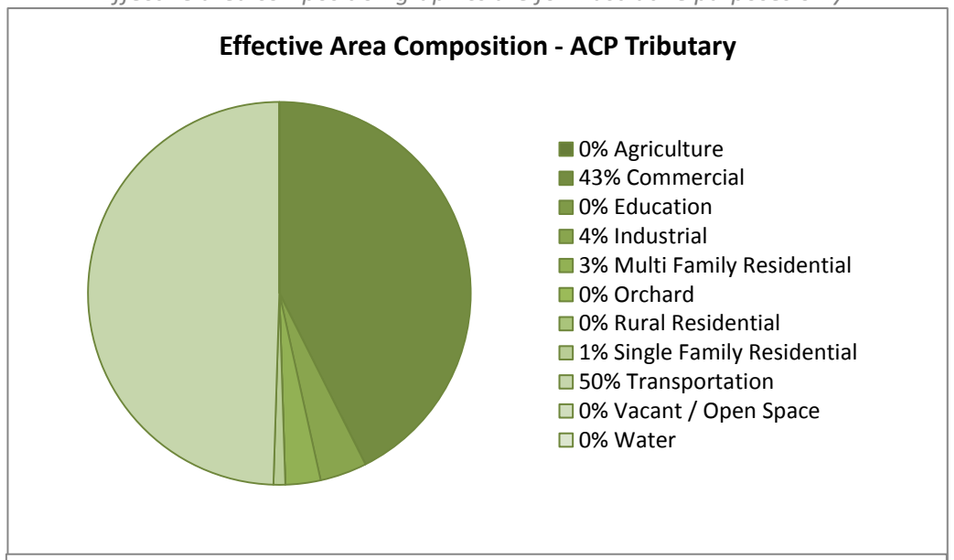
1) Only yellow cells are user input.

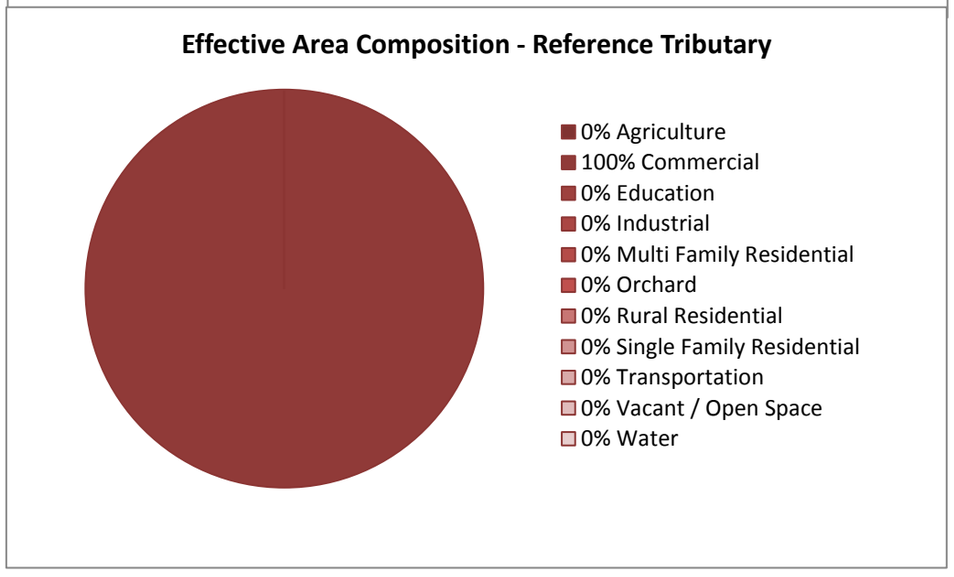
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.92** | **1.31** | **0.87** | - | - | - | **0.53** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

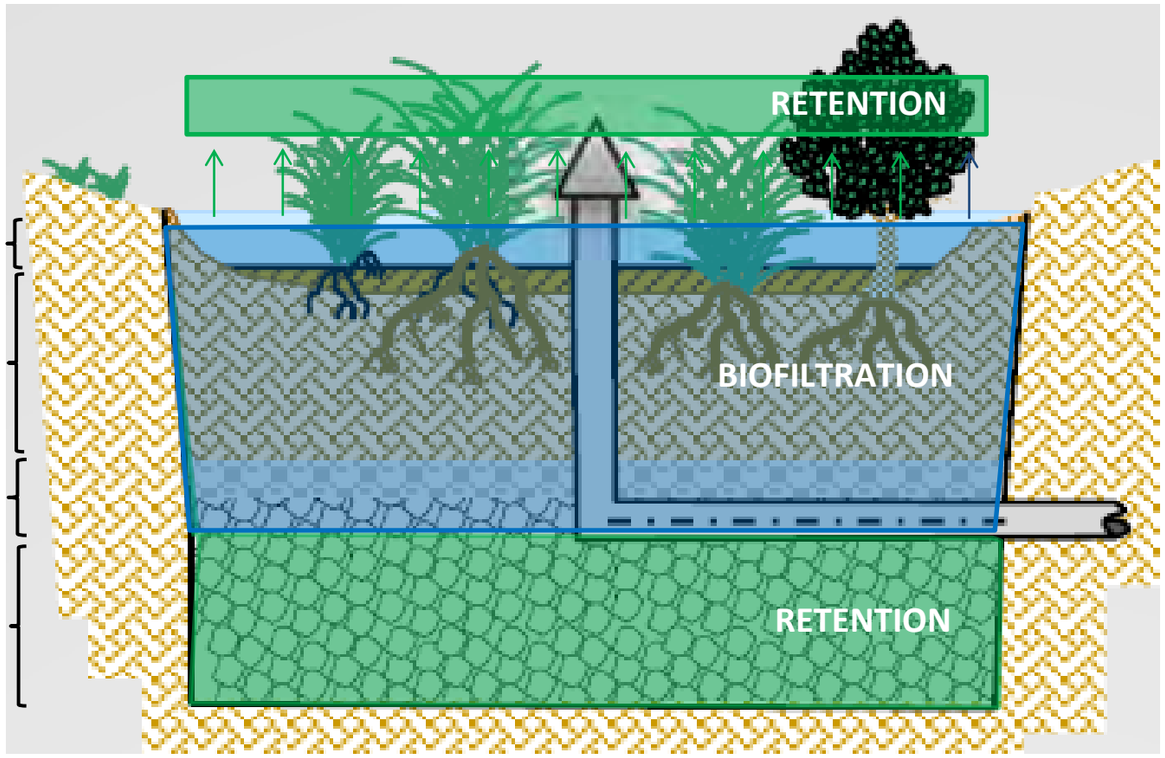
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 16,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 32,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.18 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.27 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.27 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.15 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 146,856 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 220,284 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 45,600 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 110,142 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,600 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.31 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.15 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.42** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 5,600 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 31,733 | cf |
| **Volume Retained** | **31,733** | **cf** |
| **Opt 1. Volume Biofiltered** | **45,600** | **cf** |
| **Opt 2. Volume Stored** | **5,600** | **cf** |



Site 6C Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 38,692 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 22.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 31,733 | | |
| **Equivalent Development Area** | 4.52 | 8.76 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **4.52** | **8.76** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

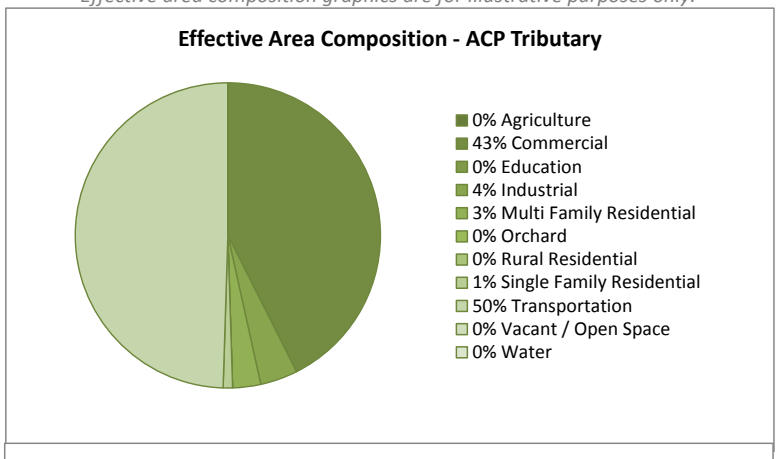
1) Only yellow cells are user input.

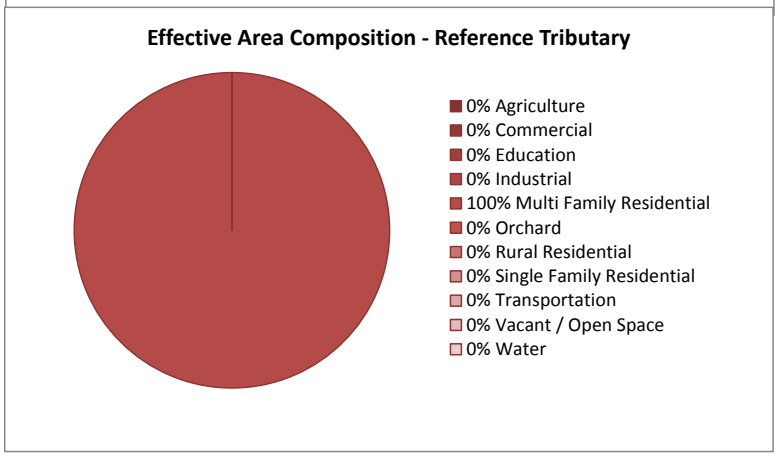
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.19** | **1.62** | **1.07** | **-** | **-** | **-** | **1.71** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

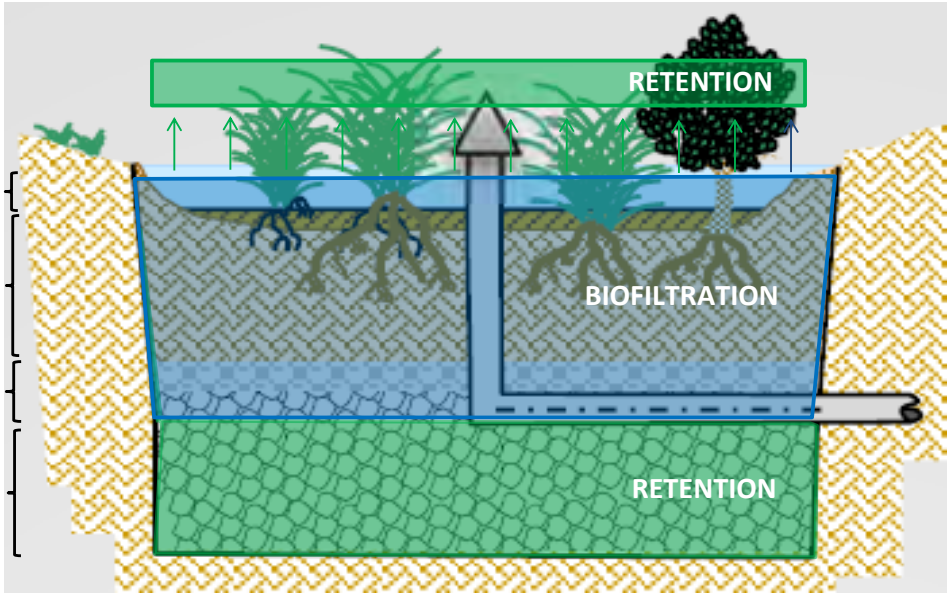
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 16,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 32,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.18 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.27 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.27 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.15 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 146,856 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 220,284 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 45,600 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 110,142 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,600 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.31 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.15 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.42** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,600 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 31,733 cf |
| **Volume Retained** | **31,733 cf** |
| **Opt 1. Volume Biofiltered** | **45,600 cf** |
| **Opt 2. Volume Stored** | **5,600 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 78,115 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 44.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 31,733 | | |
| **Equivalent Development Area** | 6.03 | 11.67 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.03** | **11.67** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

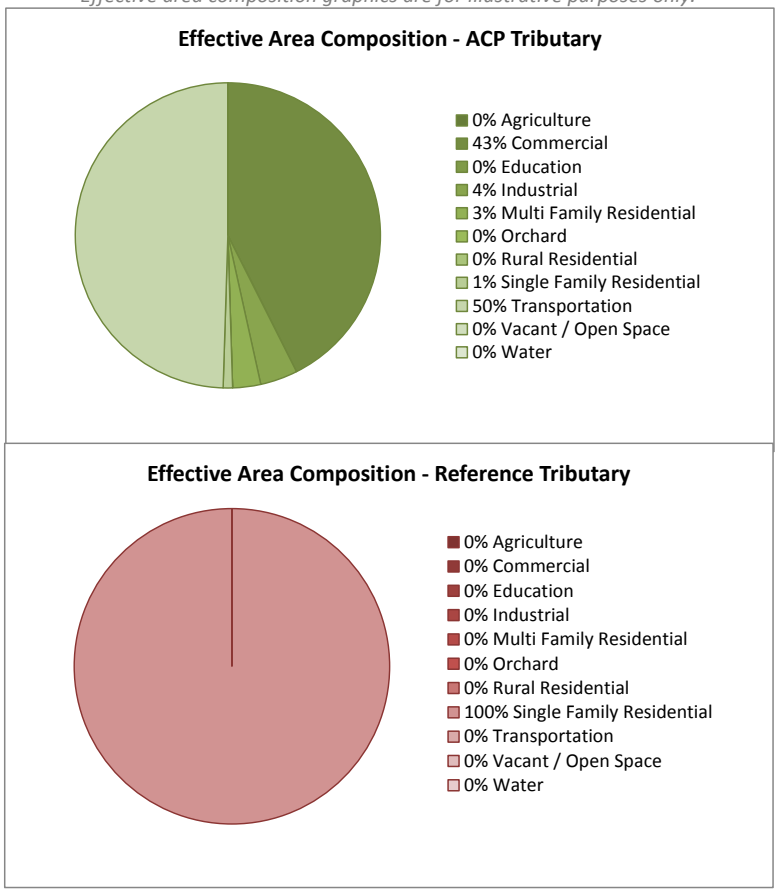
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.92** | **1.05** | **0.92** | **-** | **-** | **-** | **0.73** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

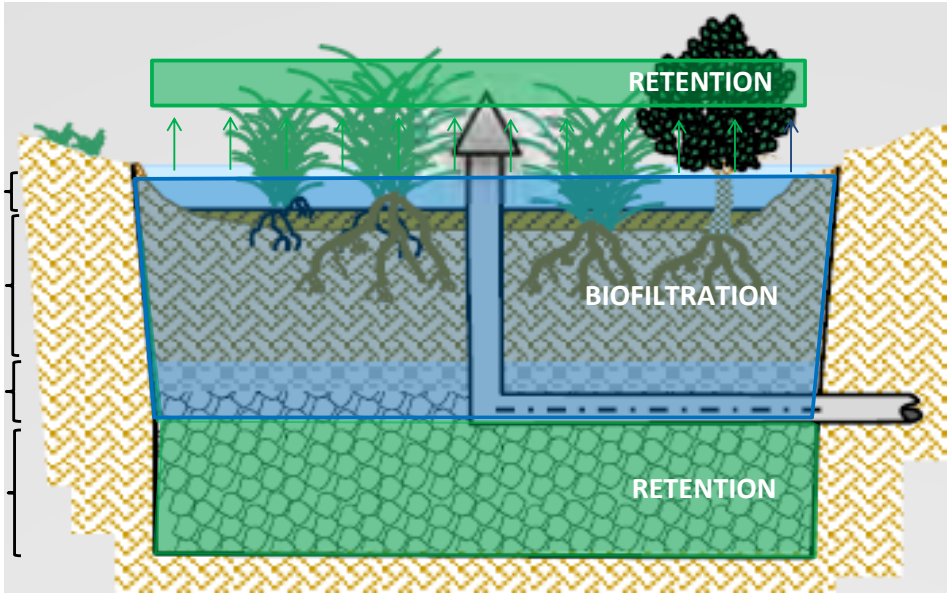
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 16,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 32,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.18 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.27 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.27 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.15 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 146,856 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 220,284 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 45,600 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 110,142 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,600 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.31 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.15 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.42** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 5,600 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 31,733 cf |
| **Volume Retained** | **31,733 cf** |
| **Opt 1. Volume Biofiltered** | **45,600 cf** |
| **Opt 2. Volume Stored** | **5,600 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 53,293 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 30.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 31,733 | | |
| **Equivalent Development Area** | 9.04 | 17.51 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **9.04** | **17.51** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

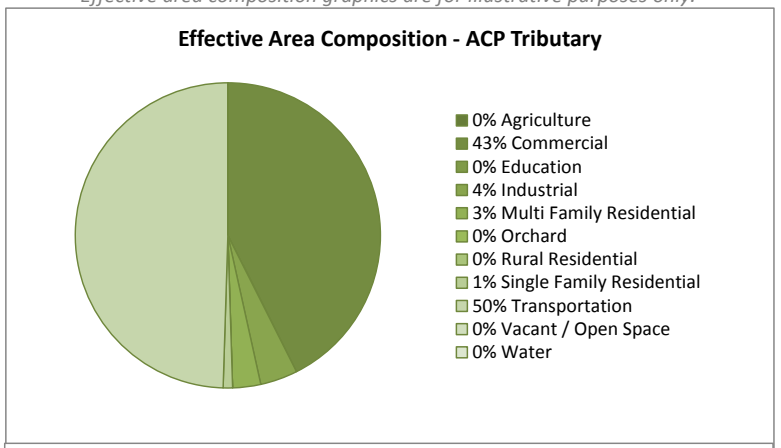
1) Only yellow cells are user input.

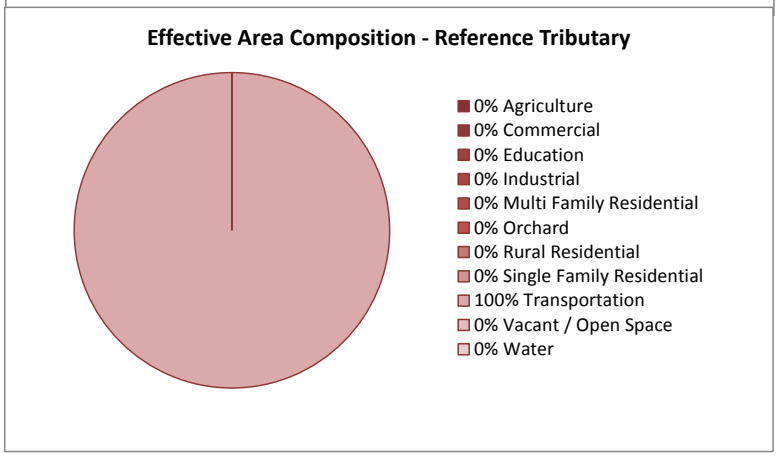
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 31.91 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 2.53 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 2.64 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 0.85 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 32.97 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 2.55 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 73.45 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.21 | 0.14 | 0.53 | 0.39 | 0.78 | 0.46 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.09** | **0.81** | **1.16** | **-** | **-** | **-** | **3.85** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

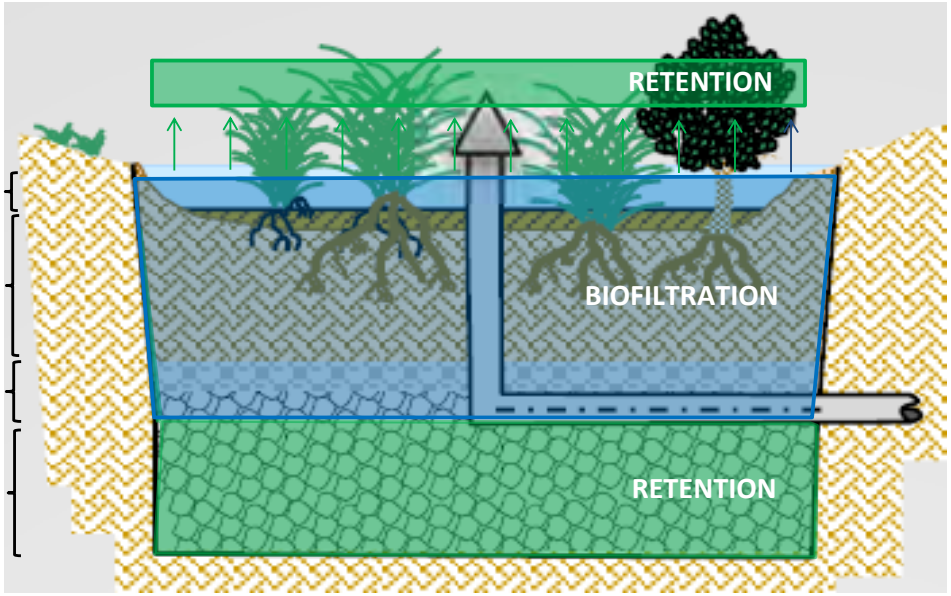
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 172,772 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 16,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 32,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.18 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.27 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.27 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.15 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 146,856 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 220,284 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 45,600 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 110,142 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 5,600 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.31 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.15 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.42** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 5,600 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 31,733 | cf |
| **Volume Retained** | **31,733** | **cf** |
| **Opt 1. Volume Biofiltered** | **45,600** | **cf** |
| **Opt 2. Volume Stored** | **5,600** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 59,134 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 33.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 31,733 | | |
| **Equivalent Development Area** | 4.02 | 7.78 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **4.02** | **7.78** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

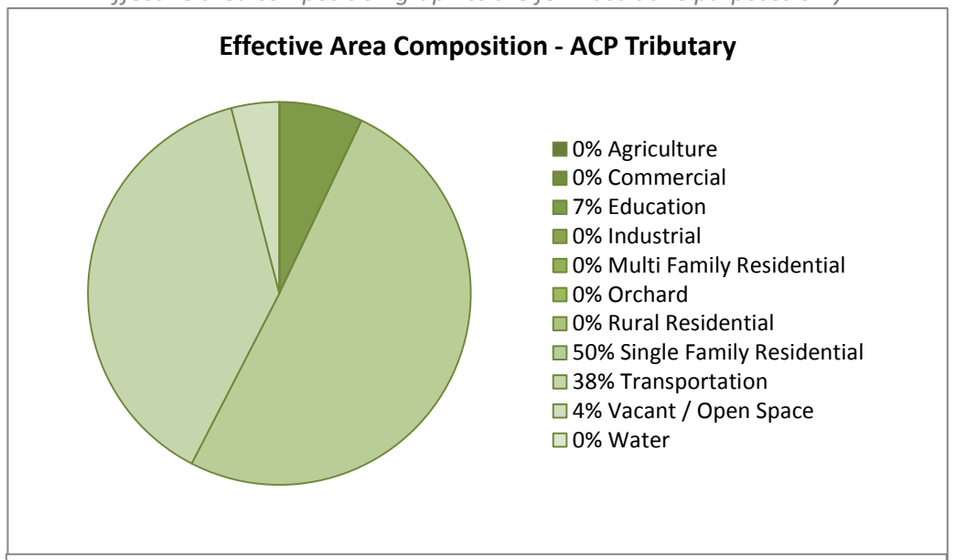
1) Only yellow cells are user input.

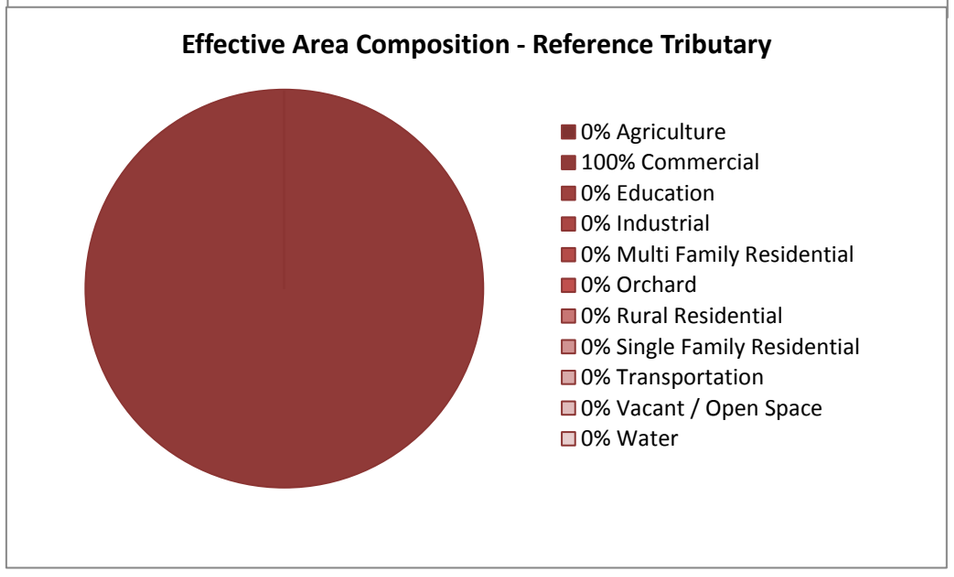
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.37** | **0.83** | - | - | - | **0.43** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

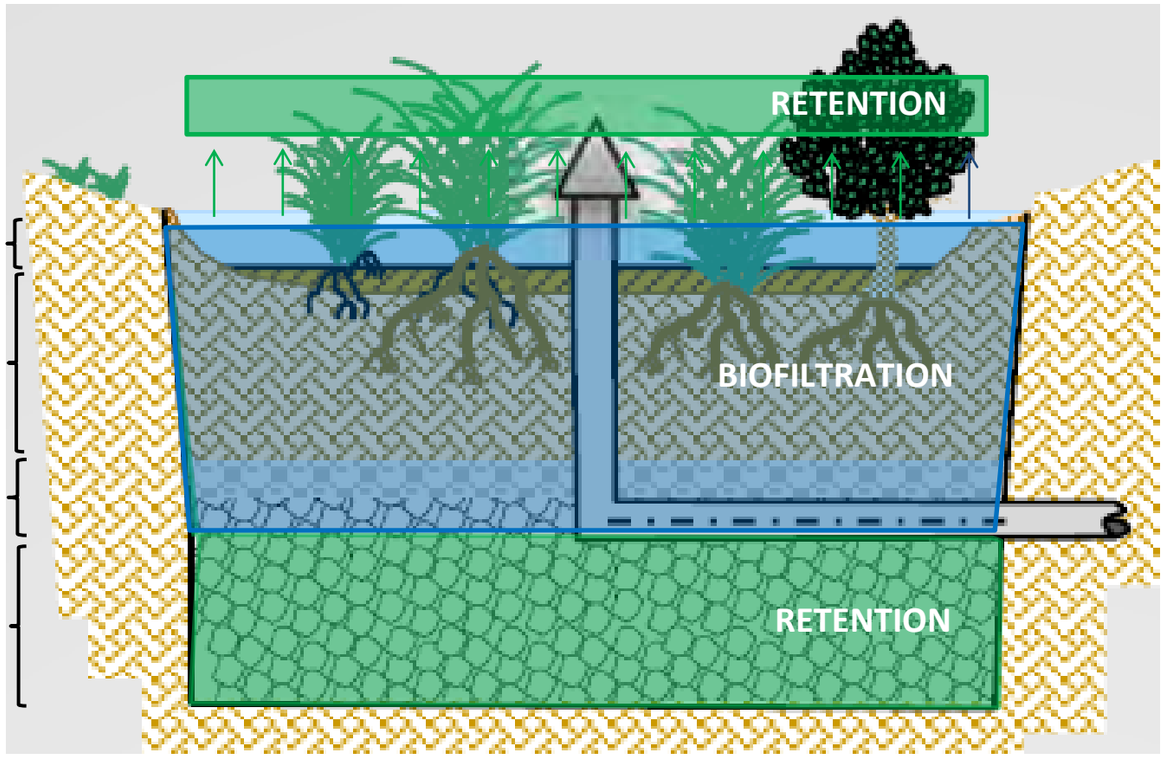
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 21,300 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,795 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3195 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 21,300 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,390 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 42,600 | cf |
| **Volume Retained** | **45,795** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



Site 7A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 16,835 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 9.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 42,600 | | |
| **Equivalent Development Area** | 6.07 | 11.75 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.07** | **9.66** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

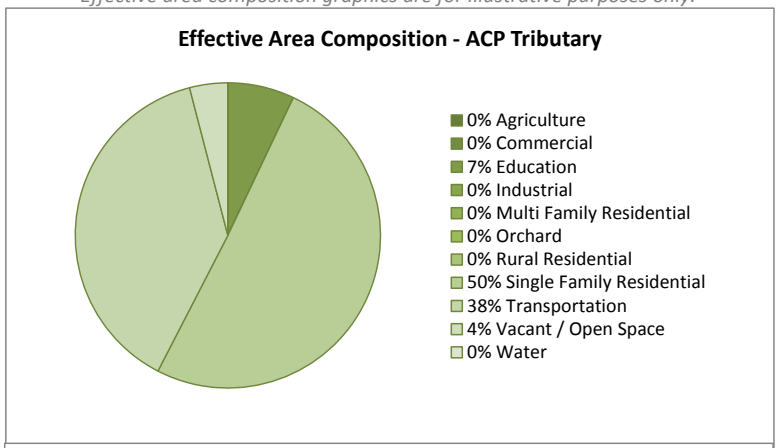
1) Only yellow cells are user input.

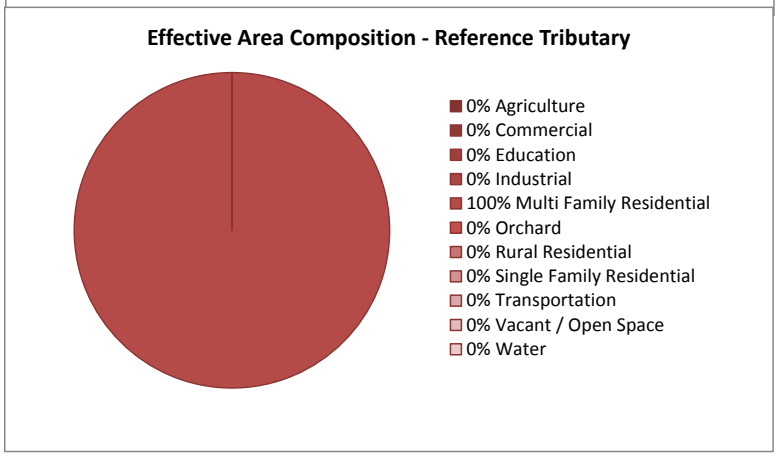
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.24** | **1.68** | **1.03** | **-** | **-** | **-** | **1.39** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

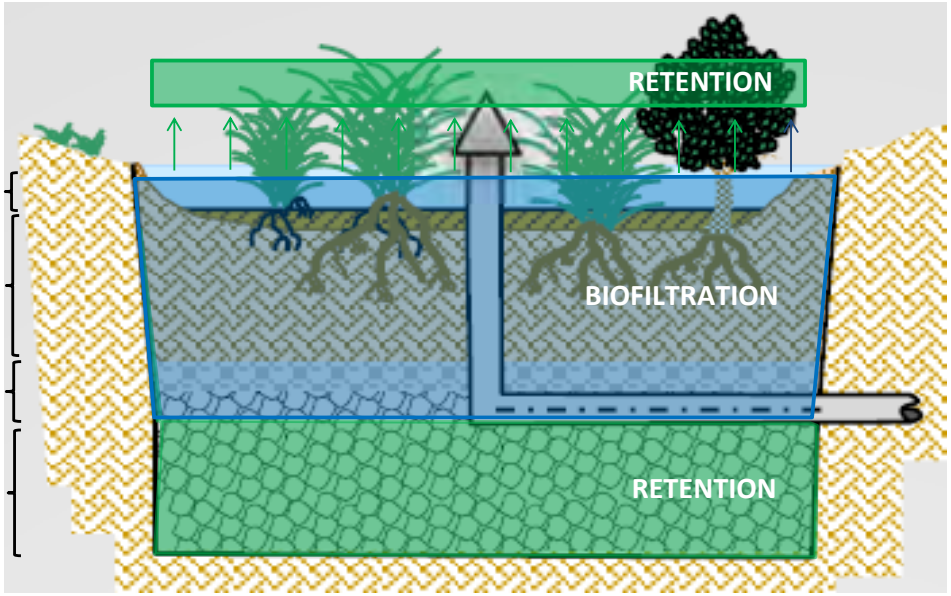
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 21,300 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,795 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3195 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 21,300 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,390 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 42,600 | cf |
| **Volume Retained** | **45,795** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 40,325 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 23.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 42,600 | | |
| **Equivalent Development Area** | 8.09 | 15.67 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.09** | **15.67** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

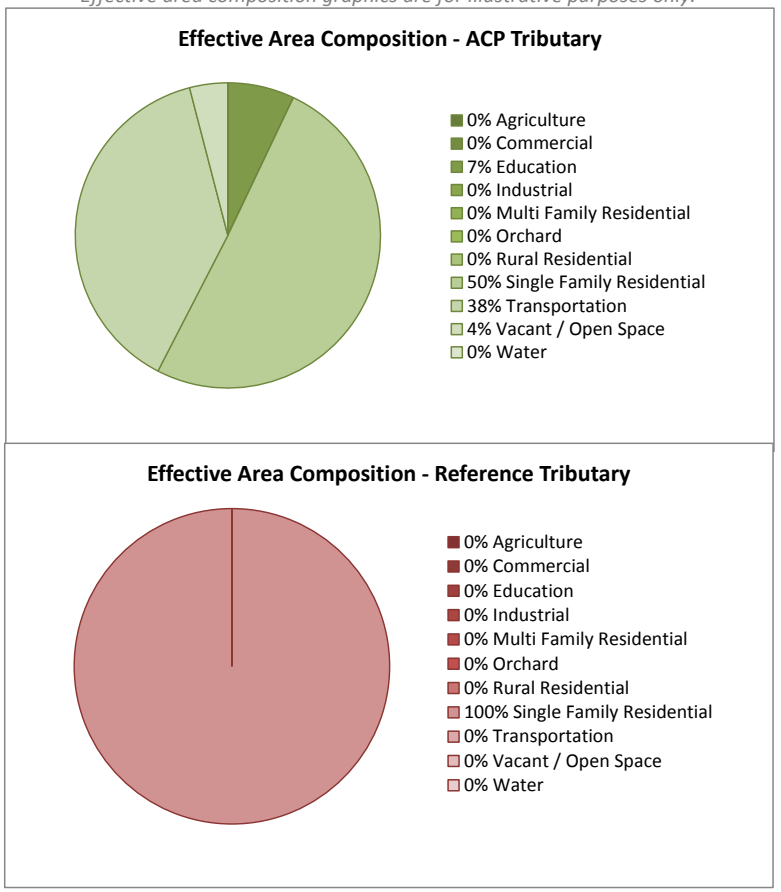
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.09** | **0.89** | **-** | **-** | **-** | **0.60** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

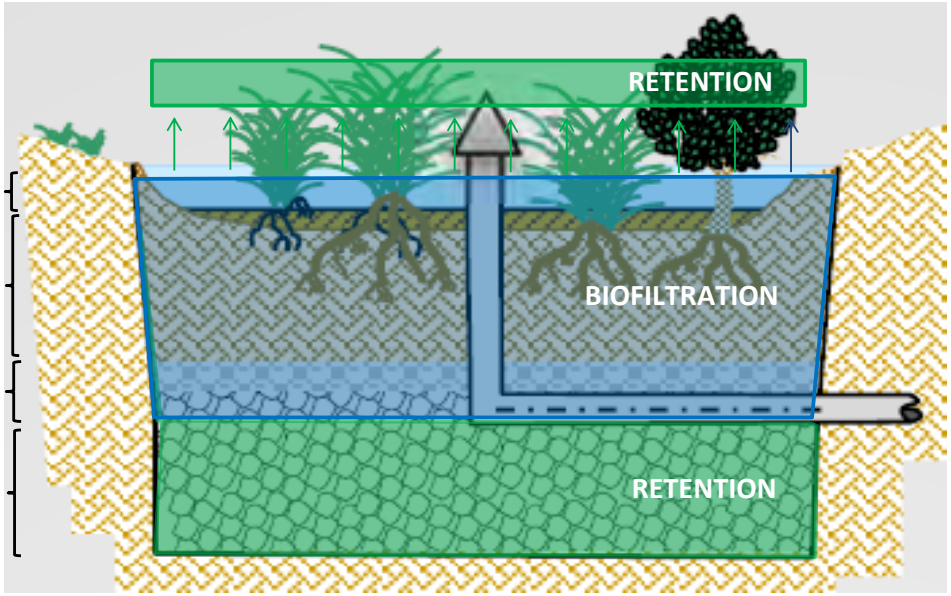
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 21,300 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,795 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3195 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 21,300 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,390 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 42,600 | cf |
| **Volume Retained** | **45,795** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



Site 7A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 23,491 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 13.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 42,600 | | |
| **Equivalent Development Area** | 12.13 | 23.51 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.13** | **13.48** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

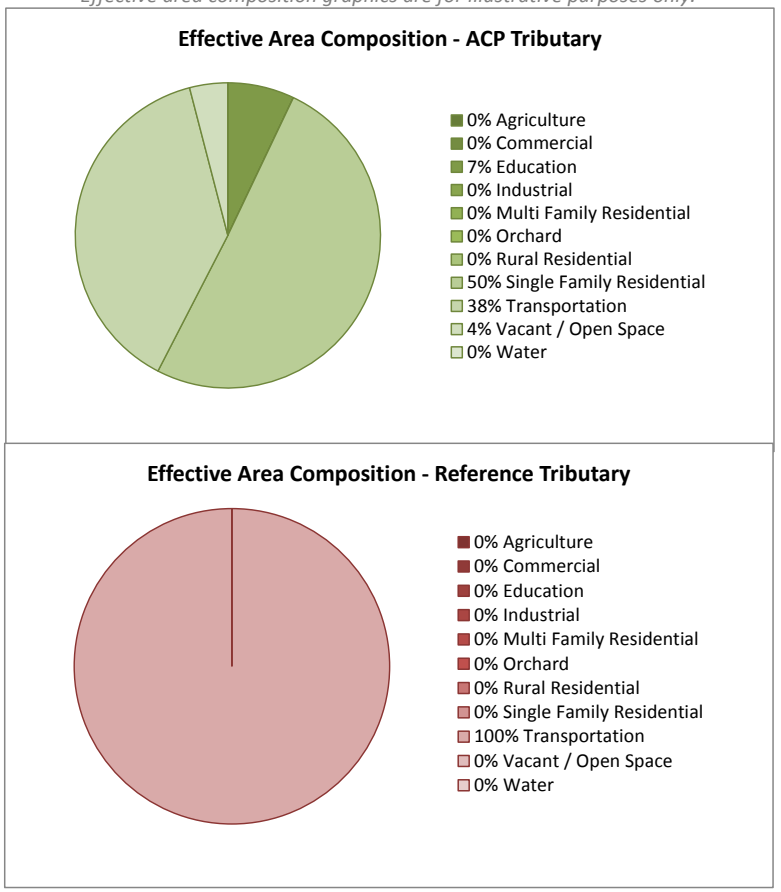
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.12** | **0.84** | **1.11** | **-** | **-** | **-** | **3.12** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

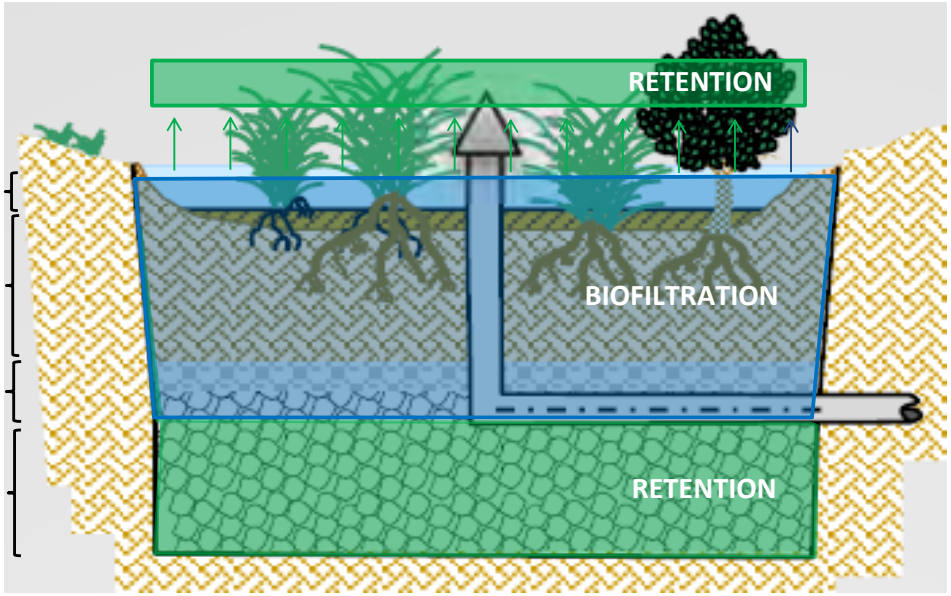
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 21,300 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,795 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3195 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 21,300 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,390 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,200 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 42,600 | cf |
| **Volume Retained** | **45,795** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 32,887 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 18.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 42,600 | | |
| **Equivalent Development Area** | 5.39 | 10.45 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.39** | **10.45** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

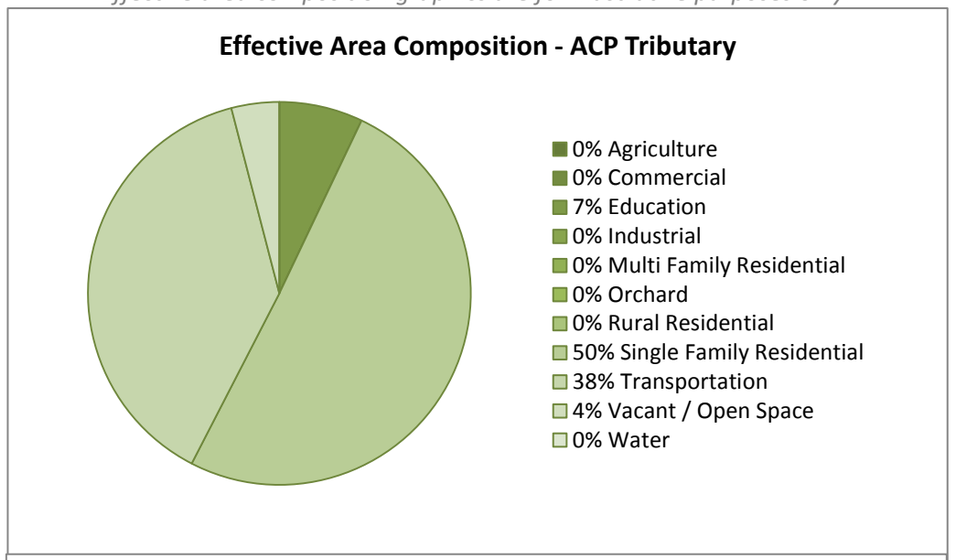
1) Only yellow cells are user input.

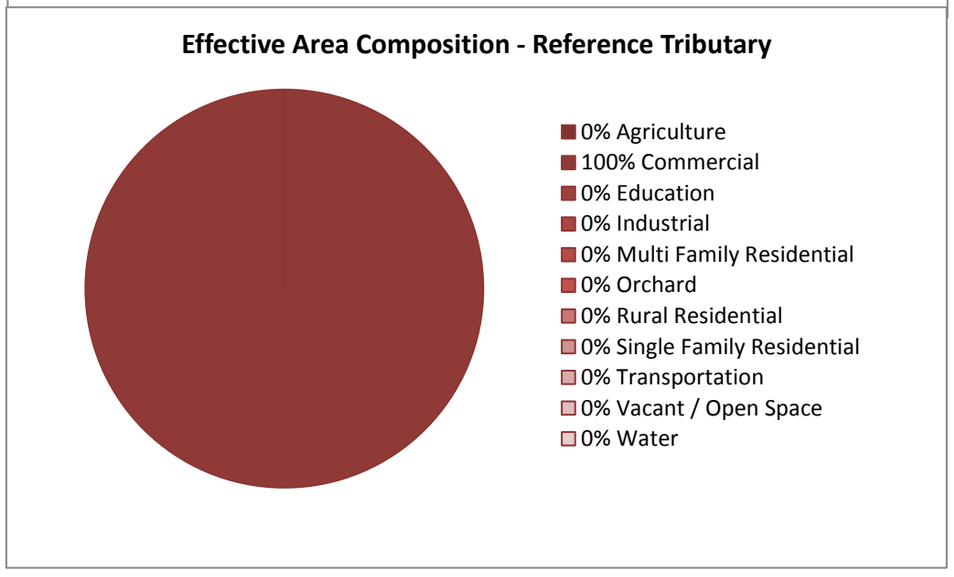
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.37** | **0.83** | - | - | - | **0.43** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

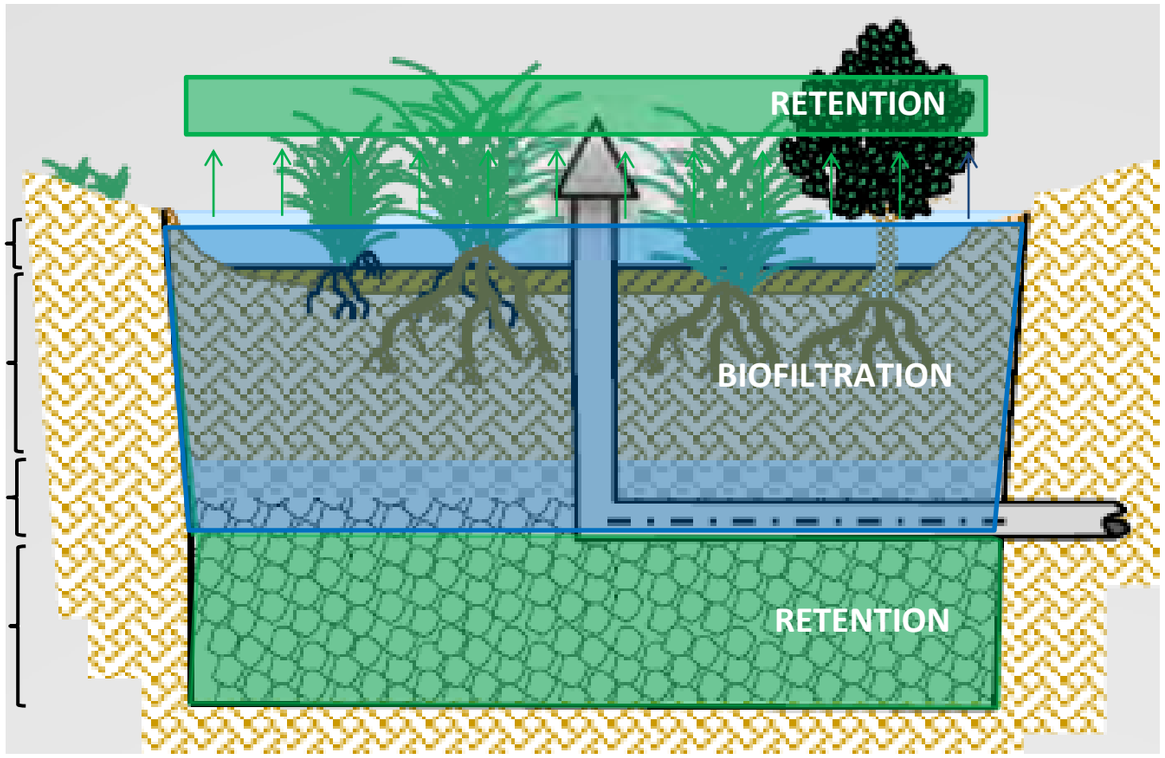
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,800 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 8,015 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 45,418 cf |
| **Volume Retained** | **45,418 cf** |
| **Opt 1. Volume Biofiltered** | **588 cf** |
| **Opt 2. Volume Stored** | **294 cf** |



Site 7B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 16,835 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 9.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 45,418 | | |
| **Equivalent Development Area** | 6.47 | 12.53 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.47** | **9.66** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

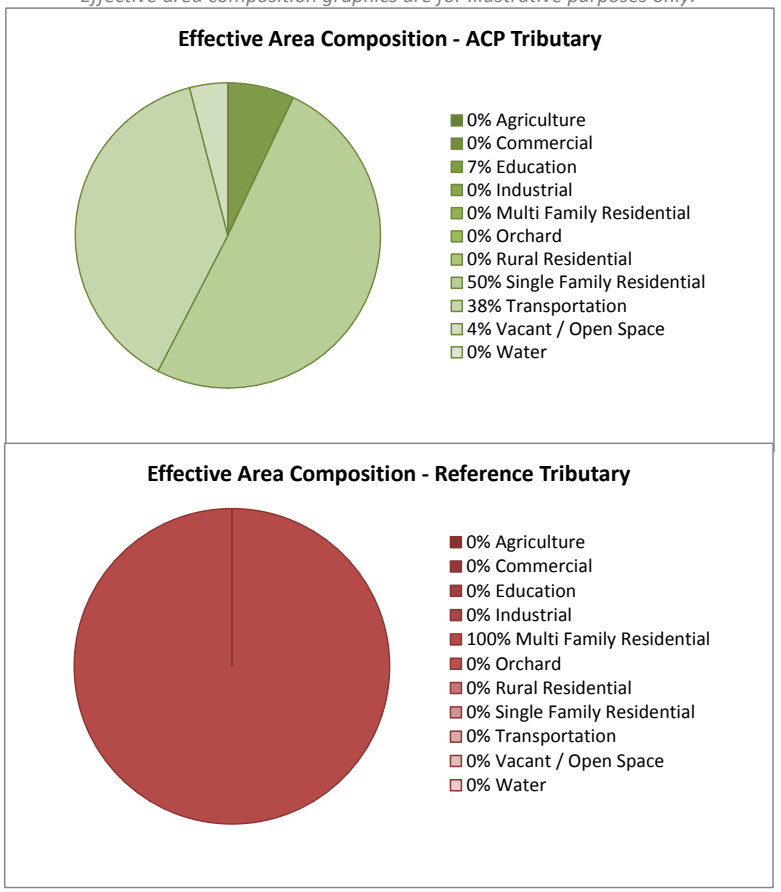
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.24** | **1.68** | **1.03** | **-** | **-** | **-** | **1.39** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

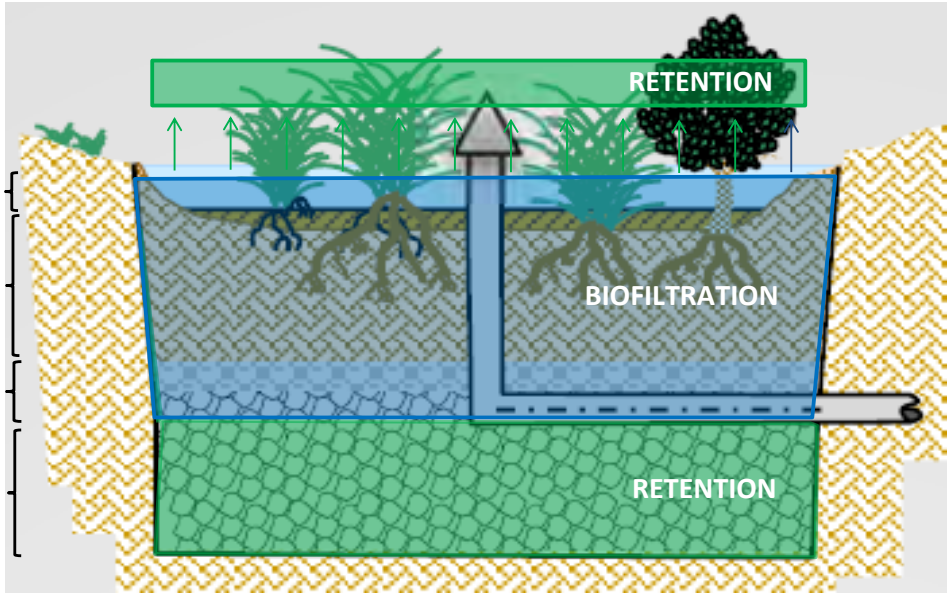
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,800 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 8,015 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 45,418 cf |
| **Volume Retained** | **45,418 cf** |
| **Opt 1. Volume Biofiltered** | **588 cf** |
| **Opt 2. Volume Stored** | **294 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 40,325 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 23.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 45,418 | | |
| **Equivalent Development Area** | 8.62 | 16.71 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.62** | **16.71** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

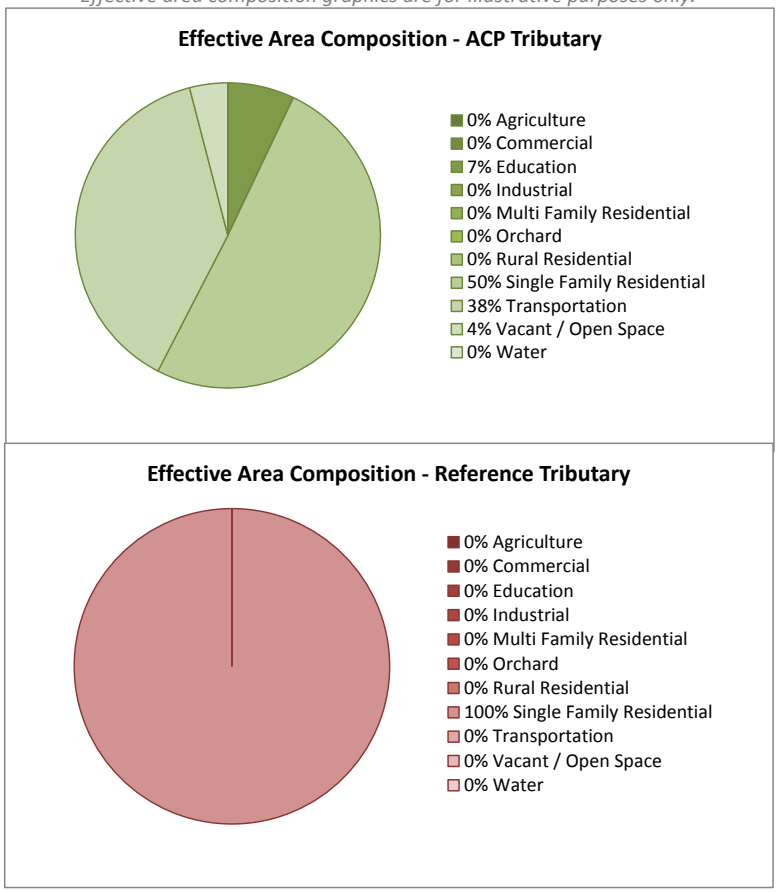
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.09** | **0.89** | **-** | **-** | **-** | **0.60** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

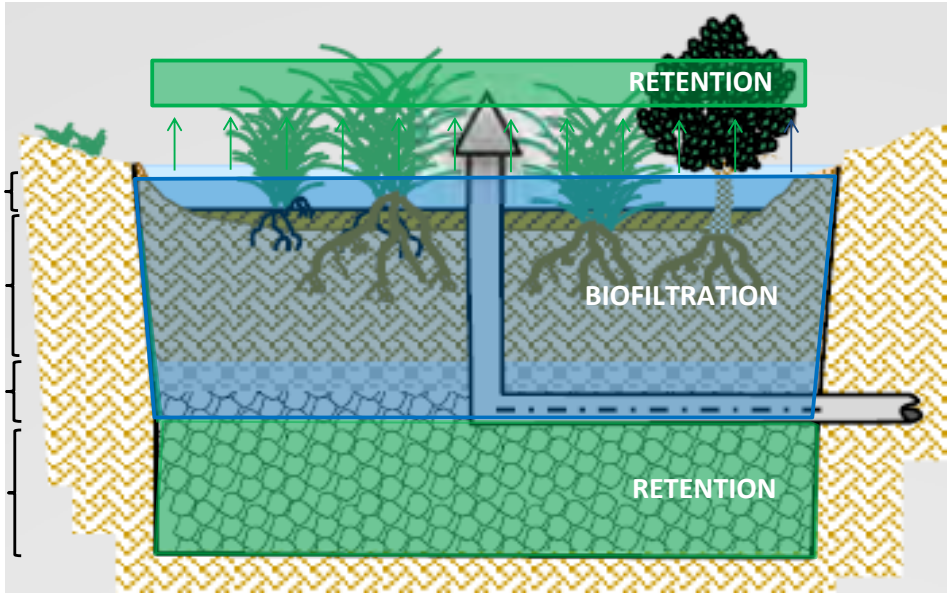
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,800 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 8,015 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 45,418 | cf |
| **Volume Retained** | **45,418** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



Site 7B Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 23,491 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 13.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 45,418 | | |
| **Equivalent Development Area** | 12.94 | 25.06 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.94** | **13.48** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

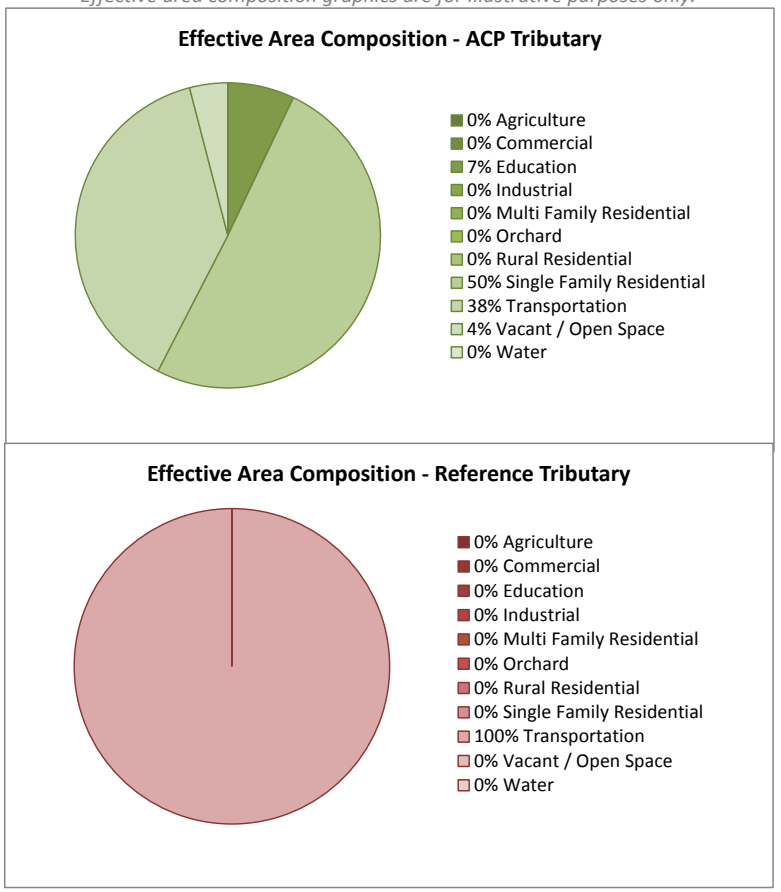
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.12** | **0.84** | **1.11** | **-** | **-** | **-** | **3.12** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

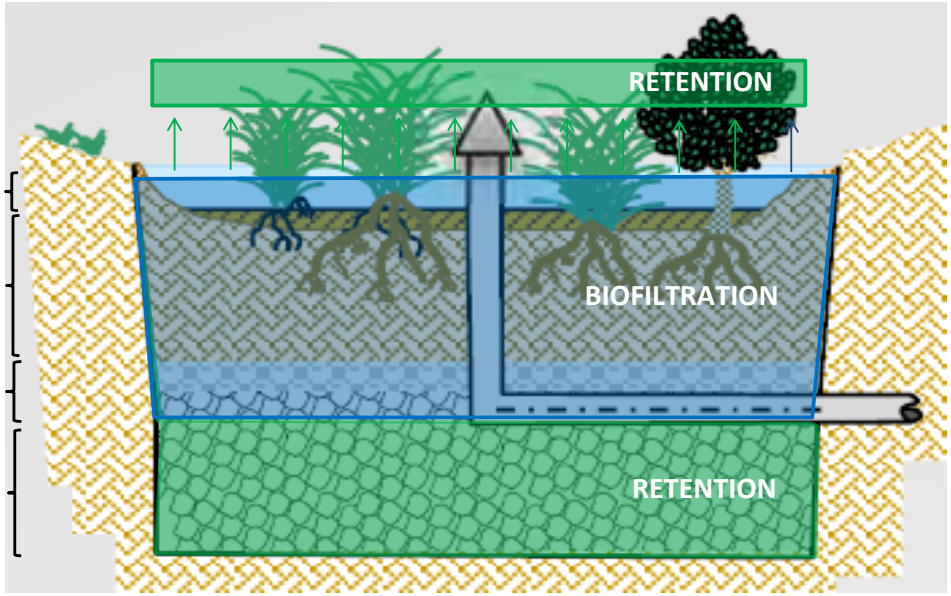
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,900 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 45,800 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 392 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 588 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 588 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 294 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 294 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 8,015 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 45,418 | cf |
| **Volume Retained** | **45,418** | **cf** |
| **Opt 1. Volume Biofiltered** | **588** | **cf** |
| **Opt 2. Volume Stored** | **294** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 32,887 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 18.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 45,418 | | |
| **Equivalent Development Area** | 5.75 | 11.14 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.75** | **11.14** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

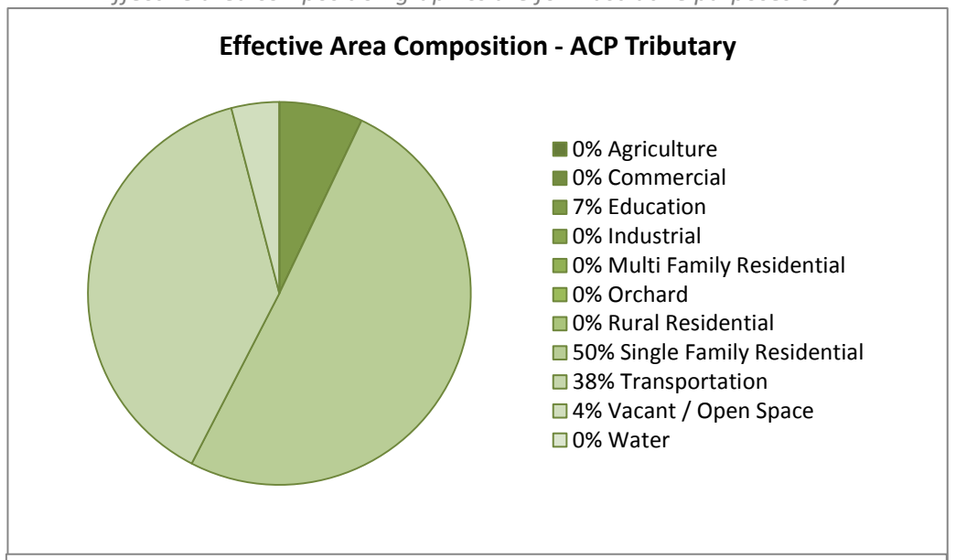
1) Only yellow cells are user input.

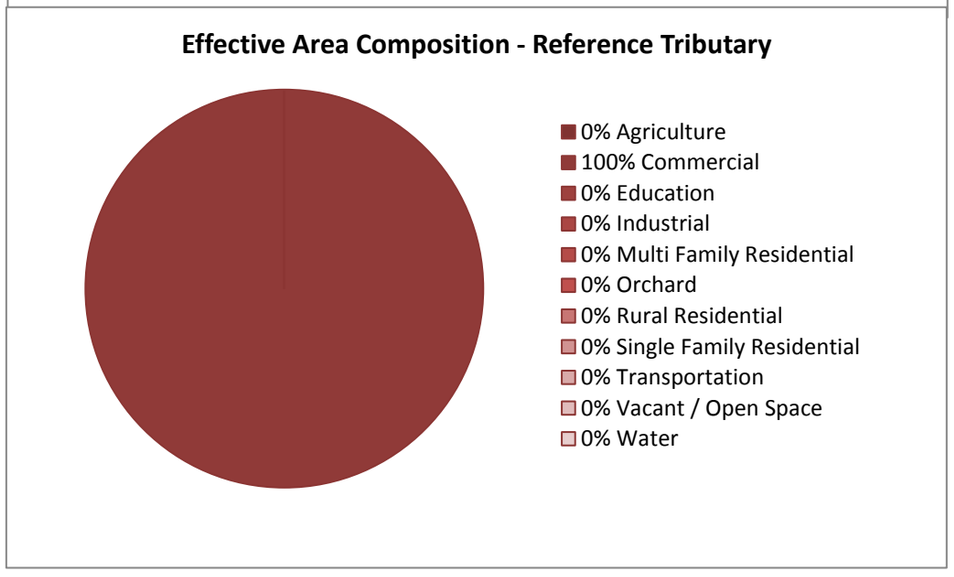
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.37** | **0.83** | - | - | - | **0.43** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

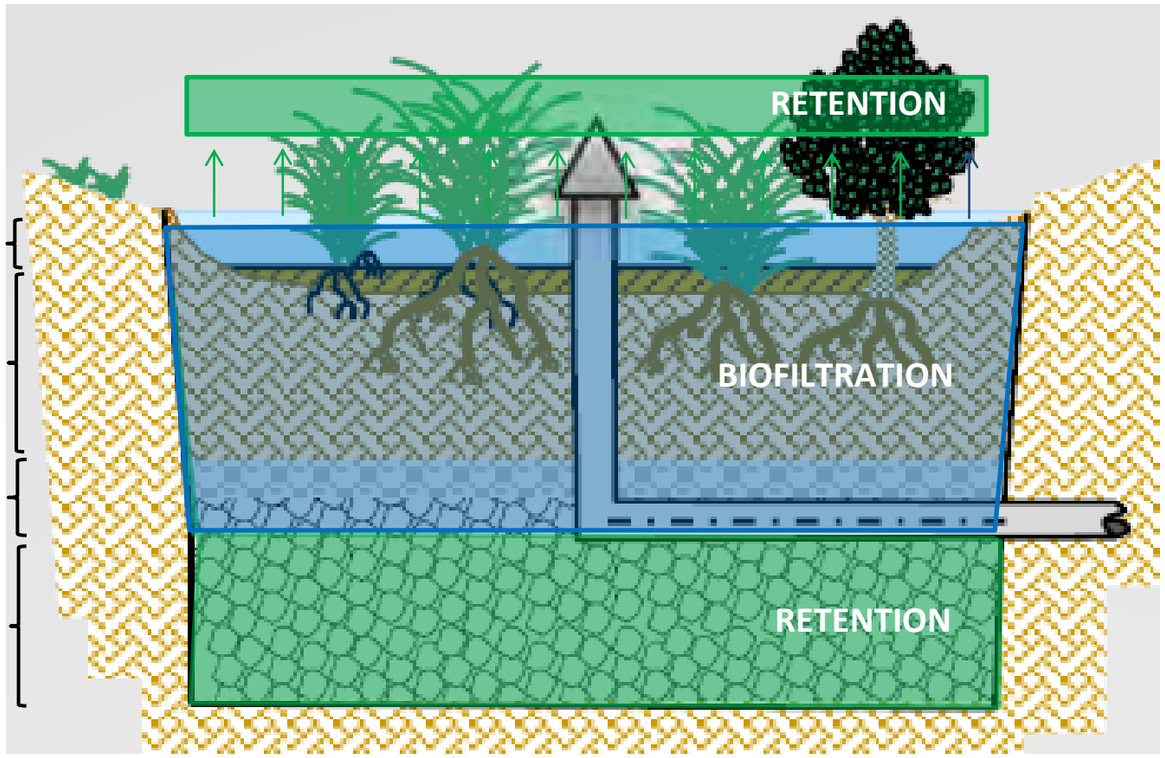
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1224 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 11.75 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 16.79 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,406 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 36,410 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 54,615 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 12,825 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 27,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,575 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.35 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.20 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.34** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,575 | cf |
| Gravel Depth Below IE | 16.79 | in. |
| Gravel Storage Below IE | 4,725 | cf |
| **Volume Retained** | **4,725** | **cf** |
| **Opt 1. Volume Biofiltered** | **12,825** | **cf** |
| **Opt 2. Volume Stored** | **1,575** | **cf** |



Site 7C Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 5,753 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 3.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,725 | | |
| **Equivalent Development Area** | 0.67 | 1.30 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.67** | **1.30** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,408 | ($ft^3$) |
| Minimum Design Depth | 11.75 | (inches) |
| Effective Draw Down Rate | 0.1224 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 550 | (GPM) |

***Notes:***

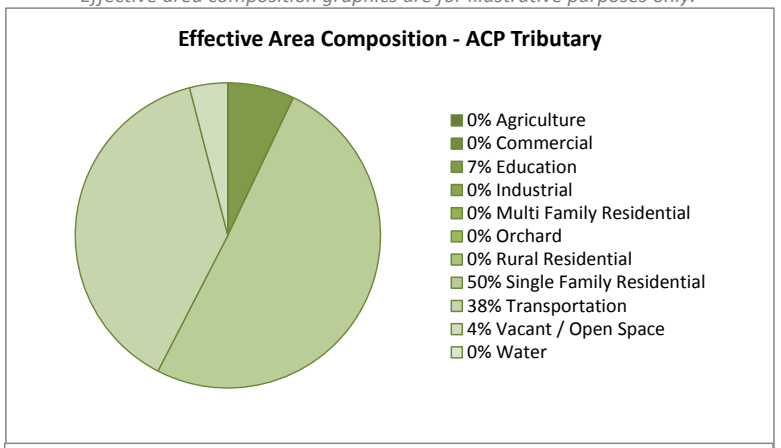
1) Only yellow cells are user input.

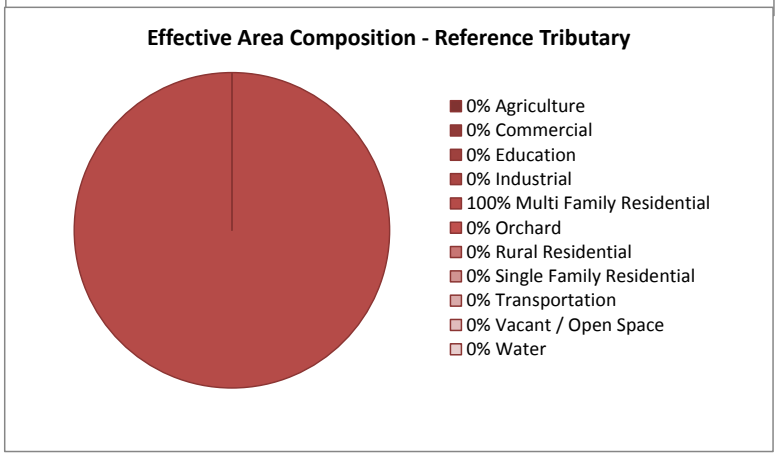
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.24** | **1.68** | **1.03** | **-** | **-** | **-** | **1.39** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

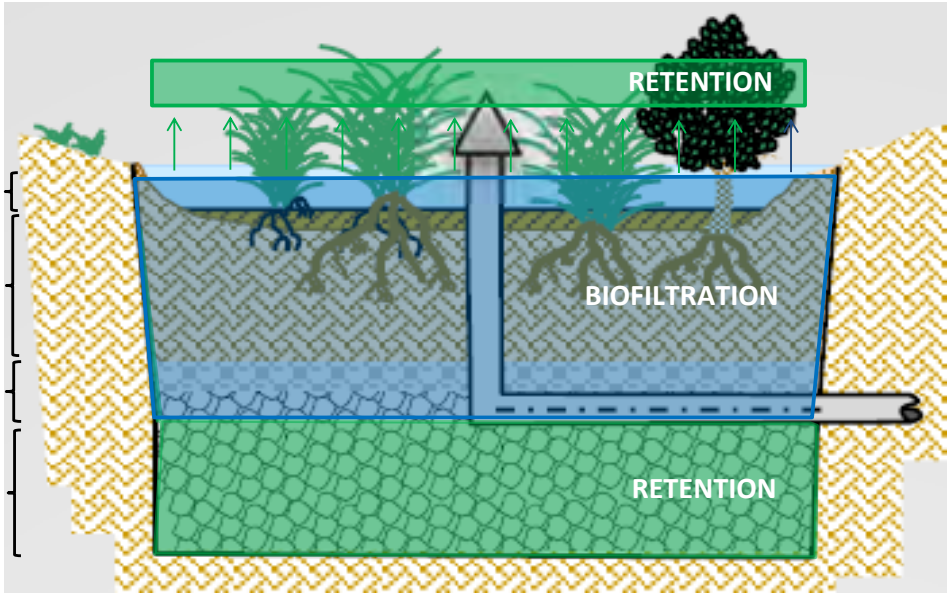
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1224 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 11.75 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 16.79 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,406 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 36,410 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 54,615 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 12,825 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 27,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,575 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.35 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.20 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.34** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 1,575 cf |
| Gravel Depth Below IE | 16.79 in. |
| Gravel Storage Below IE | 4,725 cf |
| **Volume Retained** | **4,725 cf** |
| **Opt 1. Volume Biofiltered** | **12,825 cf** |
| **Opt 2. Volume Stored** | **1,575 cf** |



Site 7C Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 13,781 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 7.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,725 | | |
| **Equivalent Development Area** | 0.90 | 1.74 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.90** | **1.74** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,408 | ($ft^3$) |
| Minimum Design Depth | 11.75 | (inches) |
| Effective Draw Down Rate | 0.1224 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 550 | (GPM) |

***Notes:***

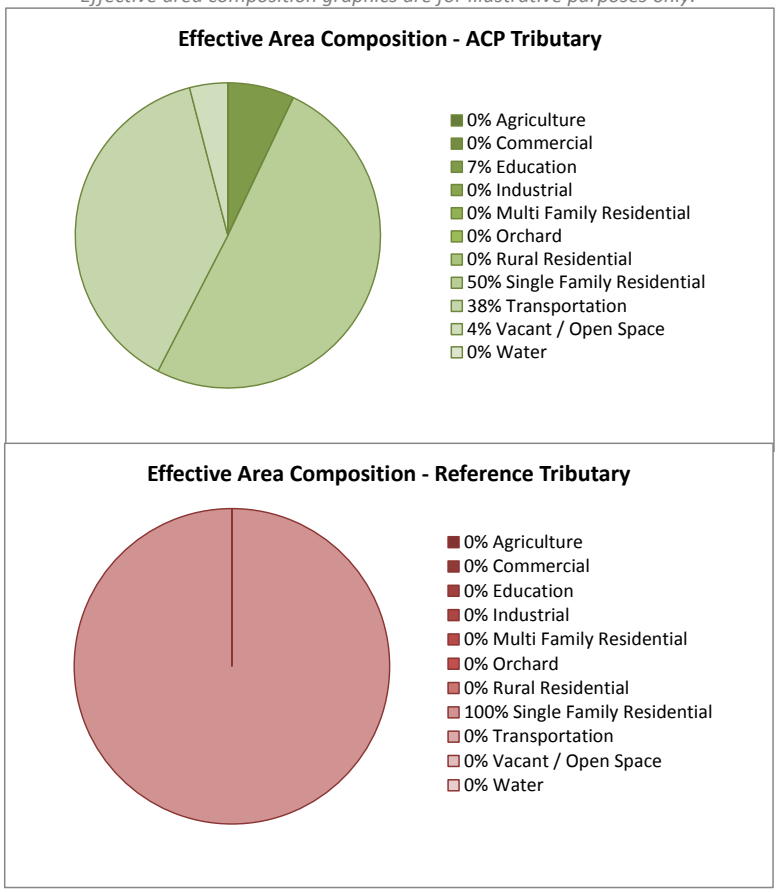
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.09** | **0.89** | **-** | **-** | **-** | **0.60** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

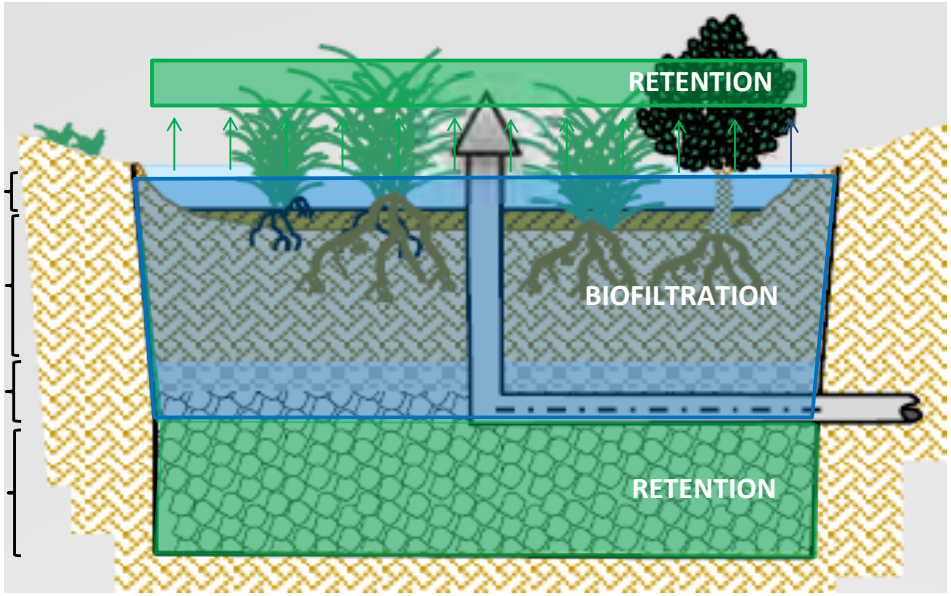
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1224 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 11.75 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 16.79 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,406 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 36,410 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 54,615 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 12,825 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 27,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,575 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.35 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.20 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.34** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,575 | cf |
| Gravel Depth Below IE | 16.79 | in. |
| Gravel Storage Below IE | 4,725 | cf |
| **Volume Retained** | **4,725** | **cf** |
| **Opt 1. Volume Biofiltered** | **12,825** | **cf** |
| **Opt 2. Volume Stored** | **1,575** | **cf** |



Site 7C Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 8,028 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 4.6 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,725 | | |
| **Equivalent Development Area** | 1.35 | 2.61 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **1.35** | **2.61** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,408 | ($ft^3$) |
| Minimum Design Depth | 11.75 | (inches) |
| Effective Draw Down Rate | 0.1224 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 550 | (GPM) |

***Notes:***

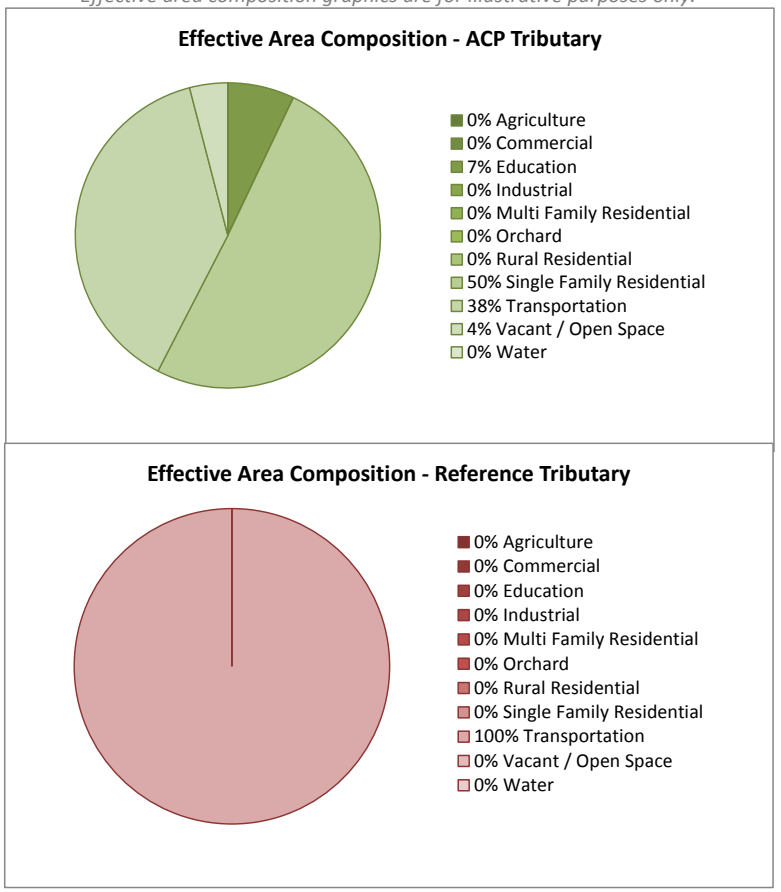
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 2.03 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 16.96 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.75 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.90 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.64 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.22 | 0.13 | 0.35 | 0.36 | 0.45 | 0.37 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.12** | **0.84** | **1.11** | **-** | **-** | **-** | **3.12** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

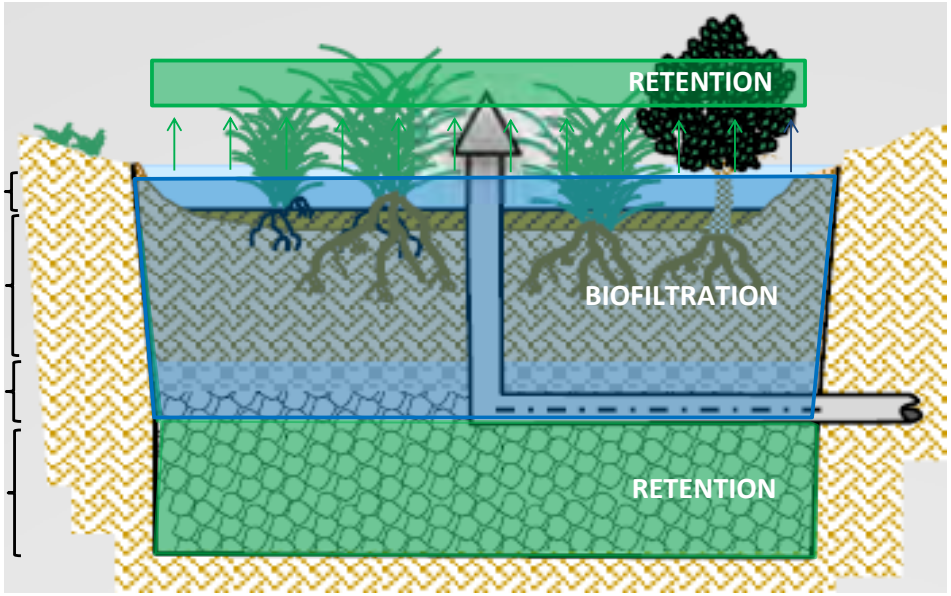
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 39,151 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 4,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1224 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 11.75 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 16.79 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 4,406 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.11 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 36,410 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 54,615 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 12,825 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 27,308 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,575 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.35 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.20 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.34** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 1,575 | cf |
| Gravel Depth Below IE | 16.79 | in. |
| Gravel Storage Below IE | 4,725 | cf |
| **Volume Retained** | **4,725** | **cf** |
| **Opt 1. Volume Biofiltered** | **12,825** | **cf** |
| **Opt 2. Volume Stored** | **1,575** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 11,239 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.44 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 6.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 4,725 | | |
| **Equivalent Development Area** | 0.60 | 1.16 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.60** | **1.16** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 8.5 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 4,408 | ($ft^3$) |
| Minimum Design Depth | 11.75 | (inches) |
| Effective Draw Down Rate | 0.1224 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 550 | (GPM) |

***Notes:***

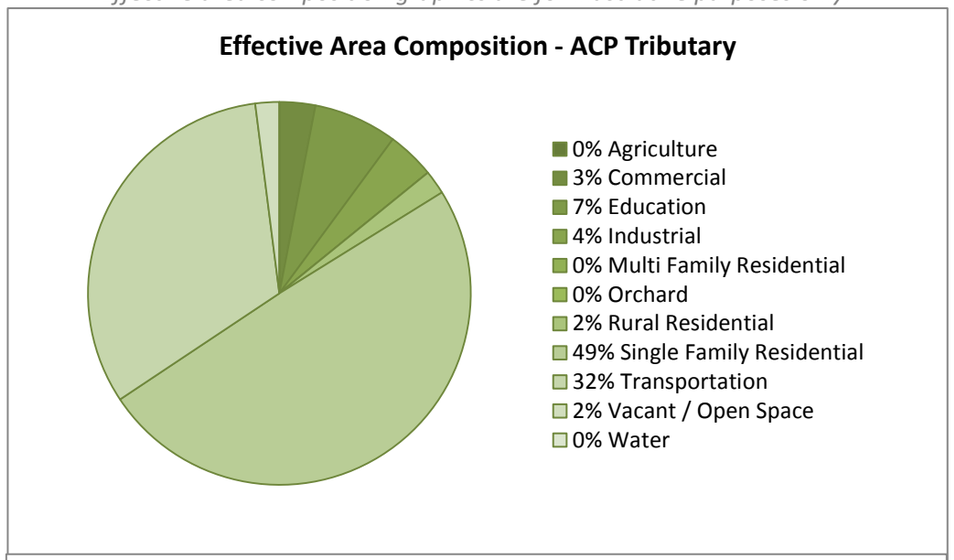
1) Only yellow cells are user input.

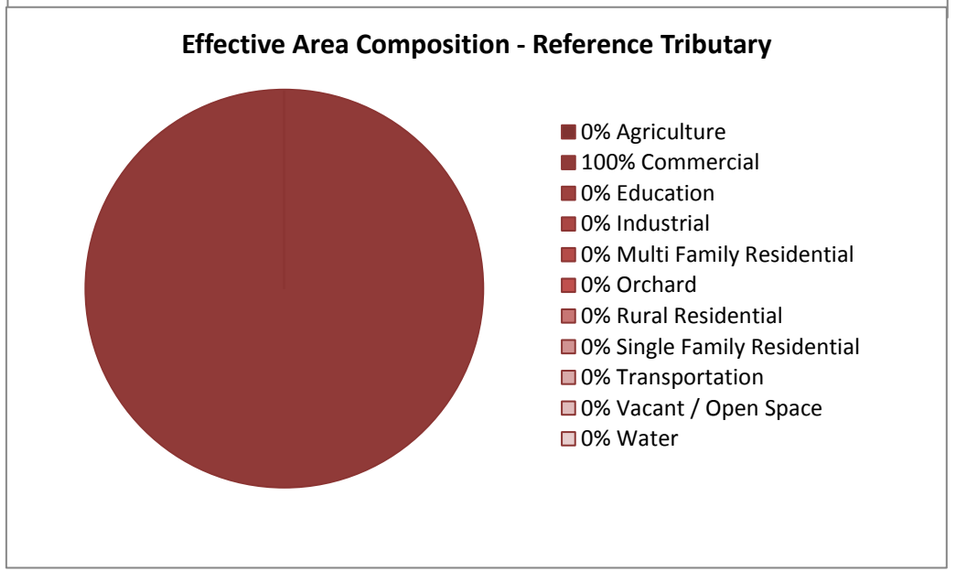
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.11** | **1.39** | **0.85** | - | - | - | **0.47** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

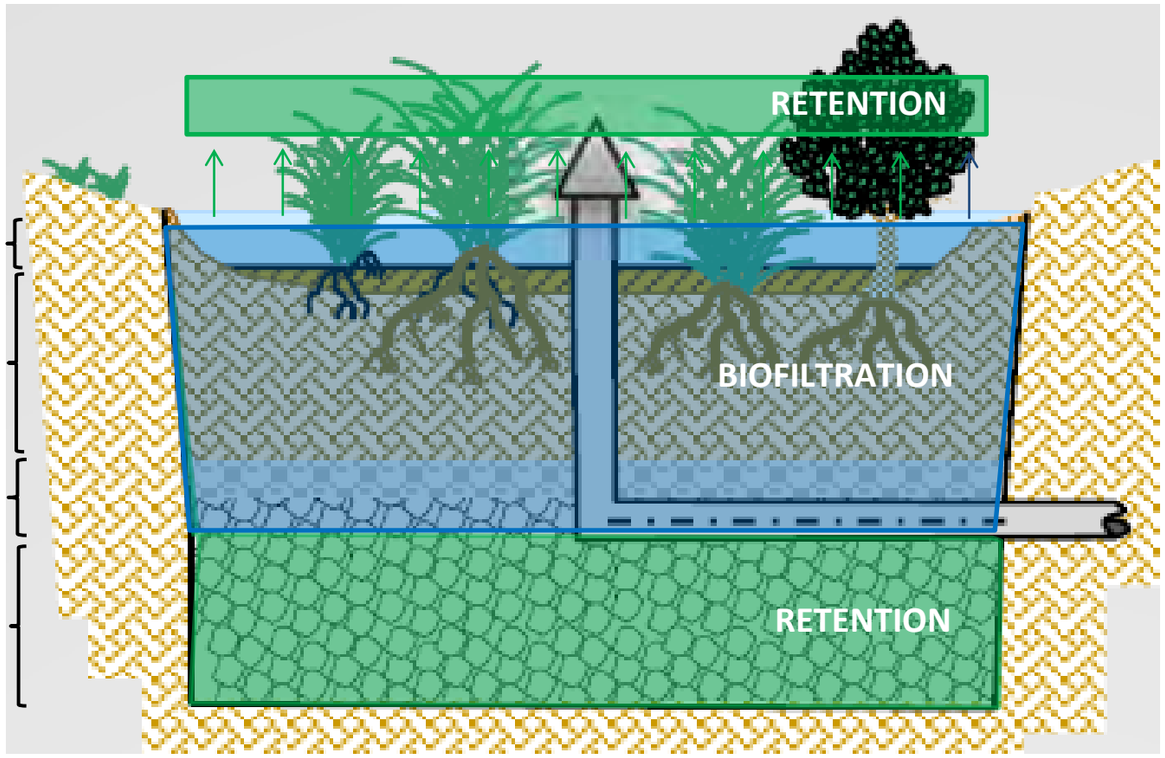
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 47,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 625,144 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 937,716 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 98,267 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 468,858 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 43,267 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.16 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.09 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.20** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 22,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,667 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 44,000 | cf |
| **Volume Retained** | **47,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **98,267** | **cf** |
| **Opt 2. Volume Stored** | **43,267** | **cf** |



Site 8A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 63,392 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 36.4 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 44,000 | | |
| **Equivalent Development Area** | 6.27 | 12.14 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **6.27** | **12.14** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

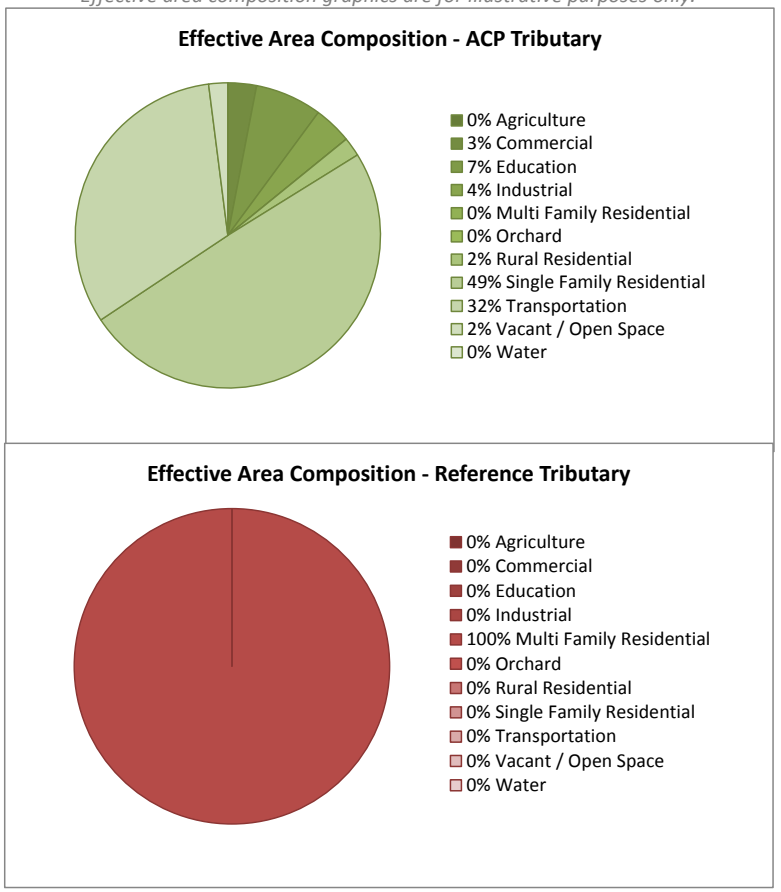
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.44** | **1.71** | **1.05** | **-** | **-** | **-** | **1.51** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

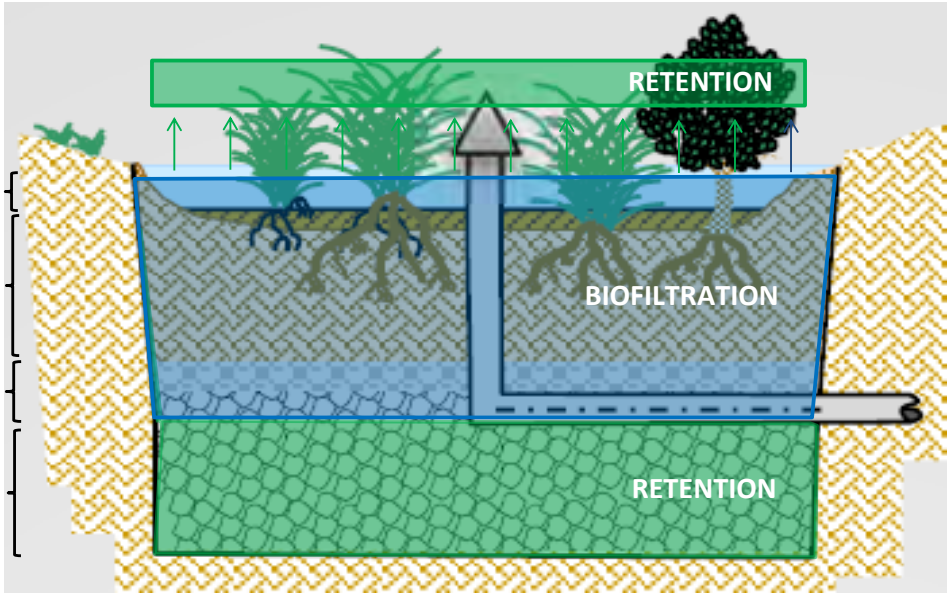
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 47,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 625,144 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 937,716 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 98,267 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 468,858 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 43,267 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.16 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.09 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.20** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 22,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,667 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 44,000 | cf |
| **Volume Retained** | **47,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **98,267** | **cf** |
| **Opt 2. Volume Stored** | **43,267** | **cf** |



Site 8A Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 141,619 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 81.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 44,000 | | |
| **Equivalent Development Area** | 8.35 | 16.19 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.35** | **16.19** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

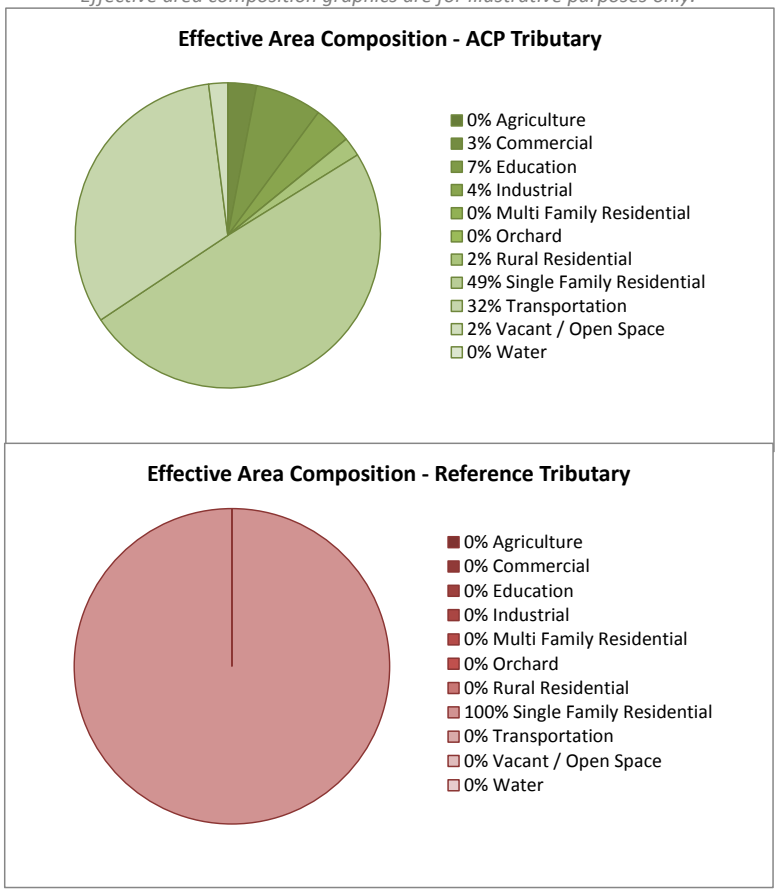
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.11** | **1.11** | **0.91** | **-** | **-** | **-** | **0.65** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

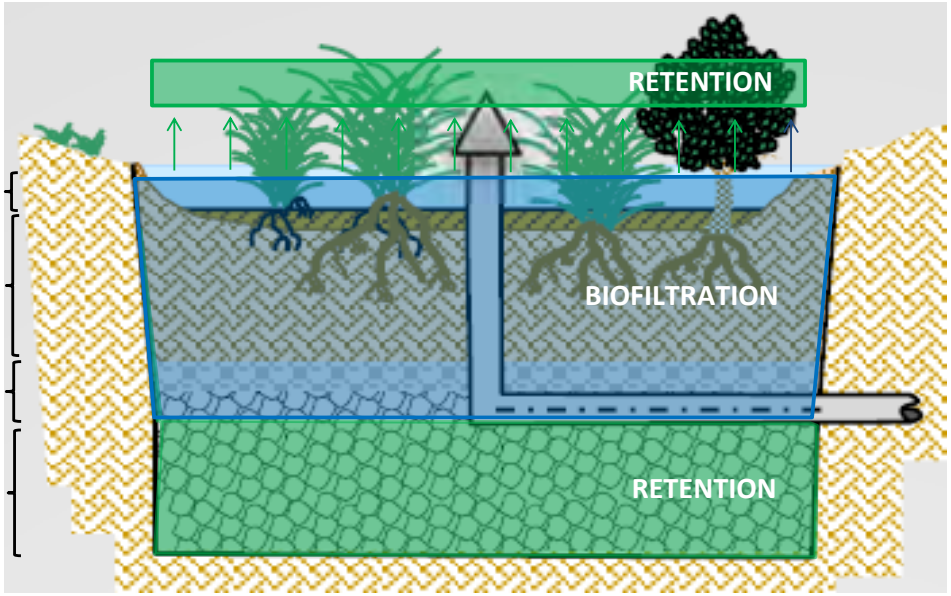
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 47,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 625,144 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 937,716 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 98,267 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 468,858 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 43,267 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.16 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.09 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.20** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 22,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,667 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 44,000 | cf |
| **Volume Retained** | **47,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **98,267** | **cf** |
| **Opt 2. Volume Stored** | **43,267** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 87,669 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 50.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 44,000 | | |
| **Equivalent Development Area** | 12.53 | 24.28 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.53** | **24.28** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

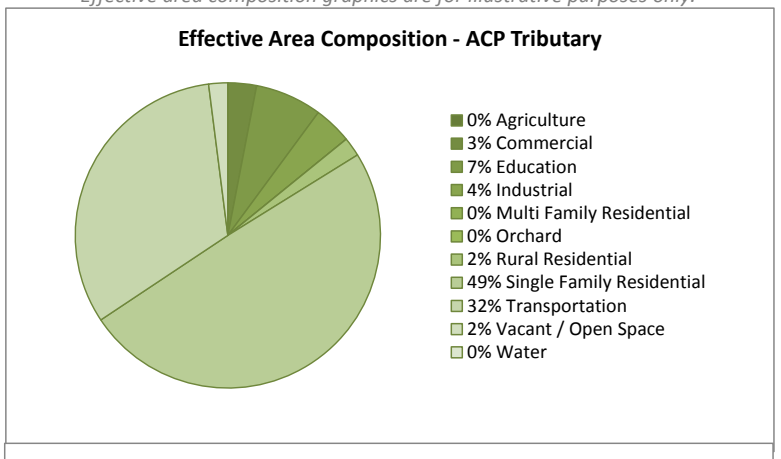
1) Only yellow cells are user input.

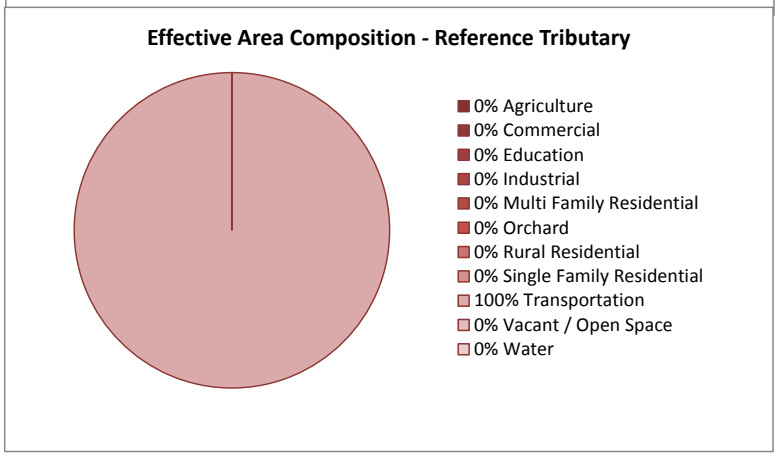
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.31** | **0.85** | **1.14** | **-** | **-** | **-** | **3.41** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

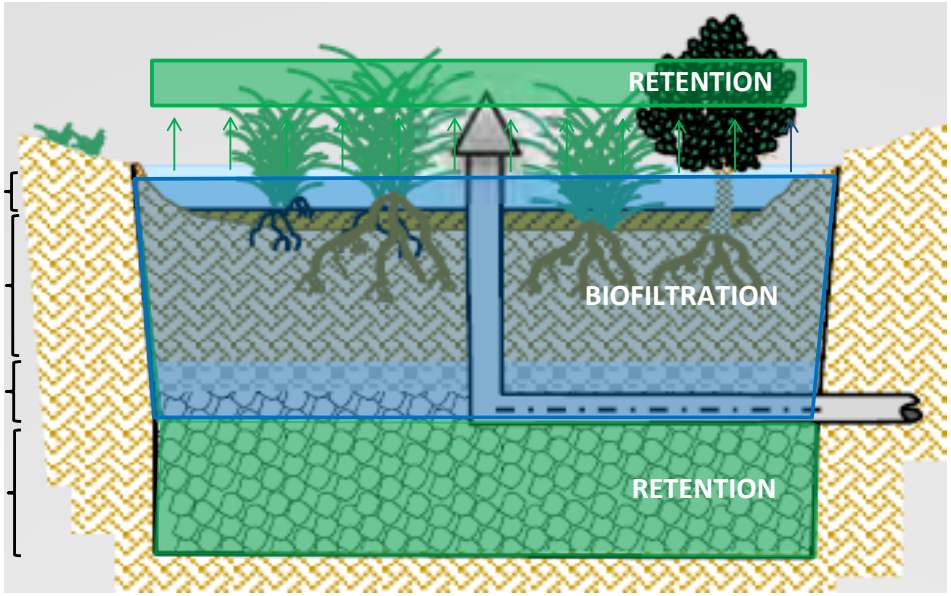
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 22,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 47,300 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.07 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.11 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.11 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.05 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 625,144 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 937,716 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 98,267 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 468,858 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 43,267 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.16 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.09 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.20** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 3300 | cf |
| Surface Ponding Depth | 12.00 | in. |
| Surface Ponding Volume | 22,000 | cf |
| Soil Media Thickness | 18.00 | in. |
| Soil Storage Volume | 6,600 | cf |
| Gravel Depth Above IE | 20.00 | in. |
| Gravel Storage Avove IE | 14,667 | cf |
| Gravel Depth Below IE | 60.00 | in. |
| Gravel Storage Below IE | 44,000 | cf |
| **Volume Retained** | **47,300** | **cf** |
| **Opt 1. Volume Biofiltered** | **98,267** | **cf** |
| **Opt 2. Volume Stored** | **43,267** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 114,644 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 65.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 44,000 | | |
| **Equivalent Development Area** | 5.57 | 10.79 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **5.57** | **10.79** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

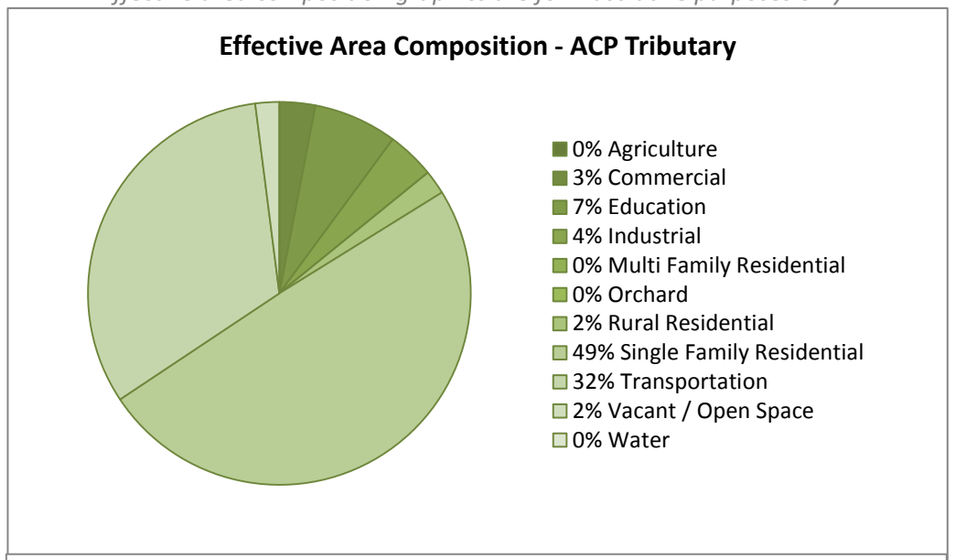
1) Only yellow cells are user input.

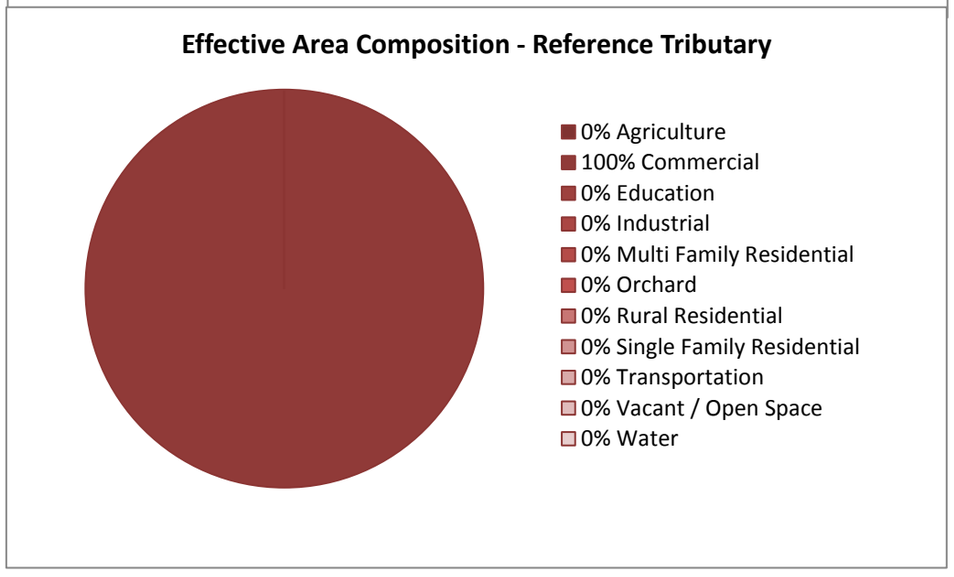
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.11** | **1.39** | **0.85** | - | - | - | **0.47** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

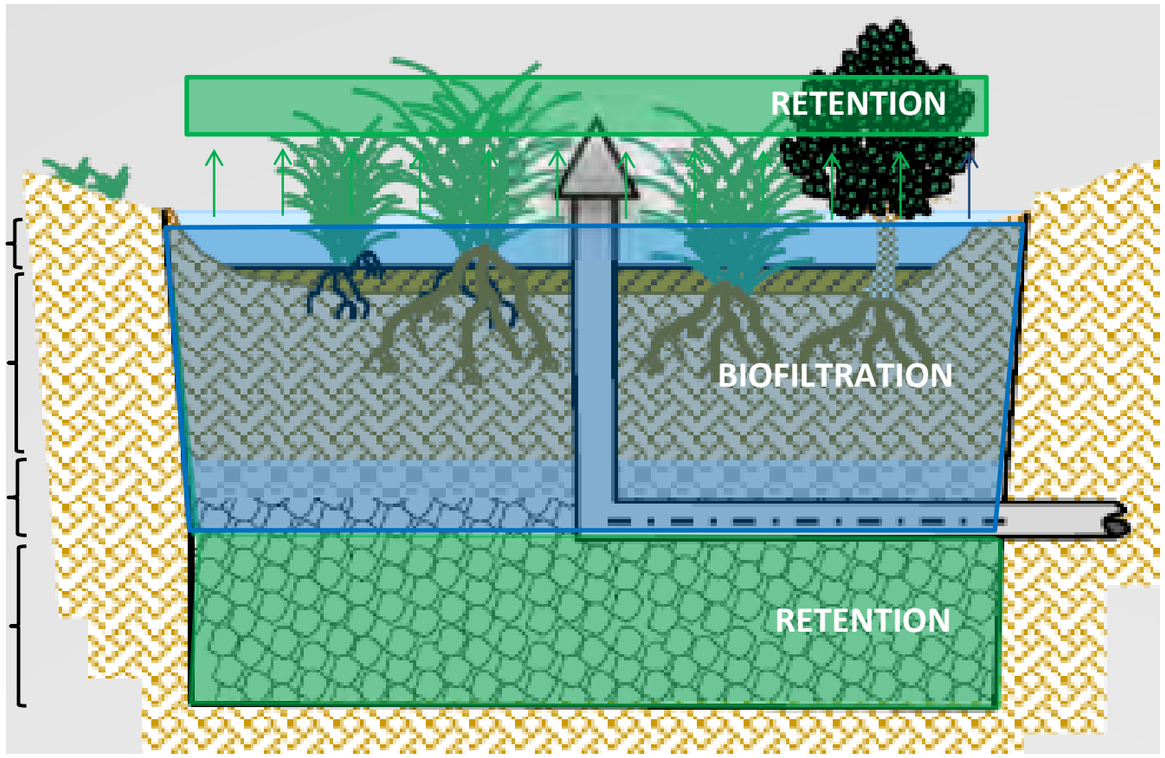
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 30,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 60,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.09 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 611,983 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 917,975 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 85,500 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 458,987 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 10,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.14 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.08 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.22** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 10,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 59,500 | cf |
| **Volume Retained** | **59,500** | **cf** |
| **Opt 1. Volume Biofiltered** | **85,500** | **cf** |
| **Opt 2. Volume Stored** | **10,500** | **cf** |



Site 8B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 69,170 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 39.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 59,500 | | |
| **Equivalent Development Area** | 8.47 | 16.42 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.47** | **16.42** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

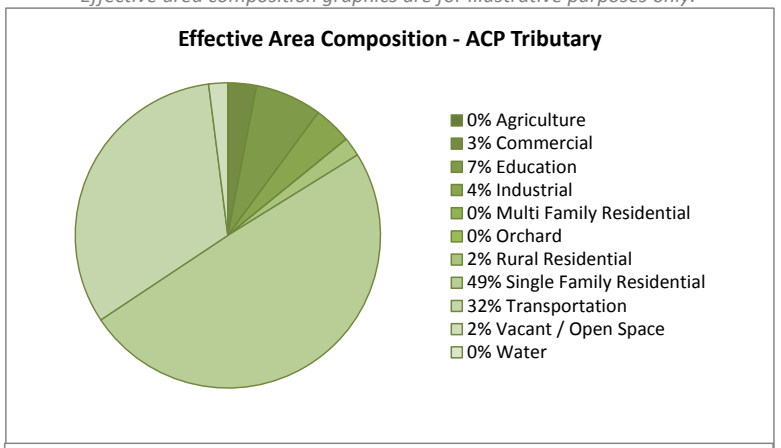
1) Only yellow cells are user input.

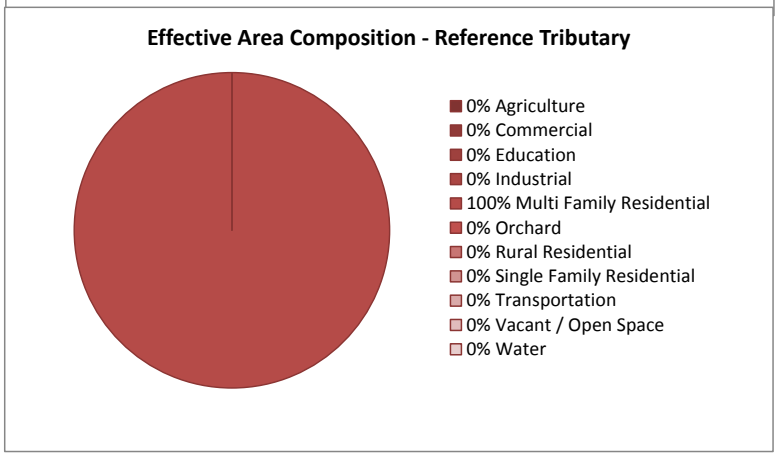
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.44** | **1.71** | **1.05** | **-** | **-** | **-** | **1.51** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

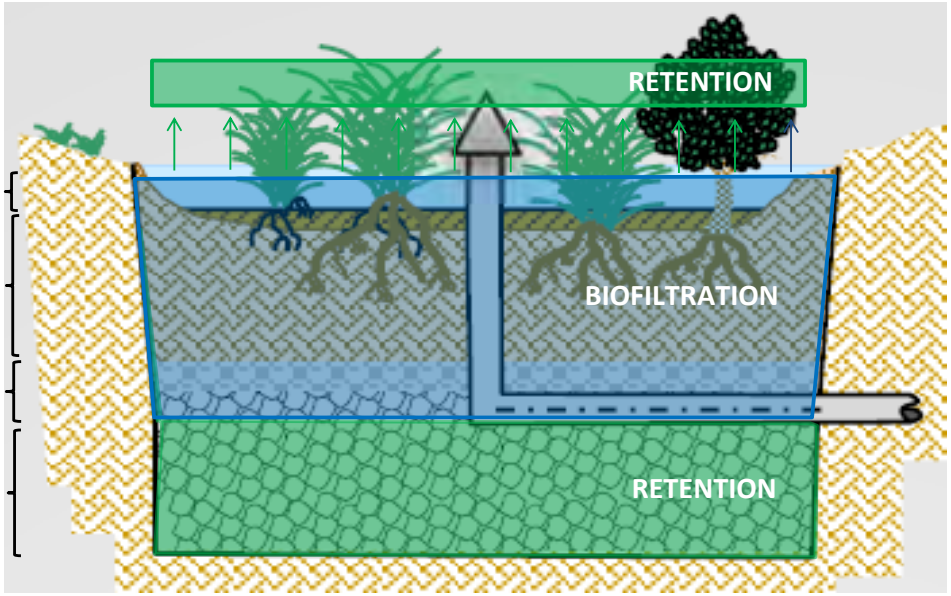
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 30,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 60,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.09 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 611,983 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 917,975 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 85,500 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 458,987 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 10,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.14 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.08 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.22** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 10,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 59,500 | cf |
| **Volume Retained** | **59,500** | **cf** |
| **Opt 1. Volume Biofiltered** | **85,500** | **cf** |
| **Opt 2. Volume Stored** | **10,500** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 154,529 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 88.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 59,500 | | |
| **Equivalent Development Area** | 11.30 | 21.89 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **11.30** | **21.89** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

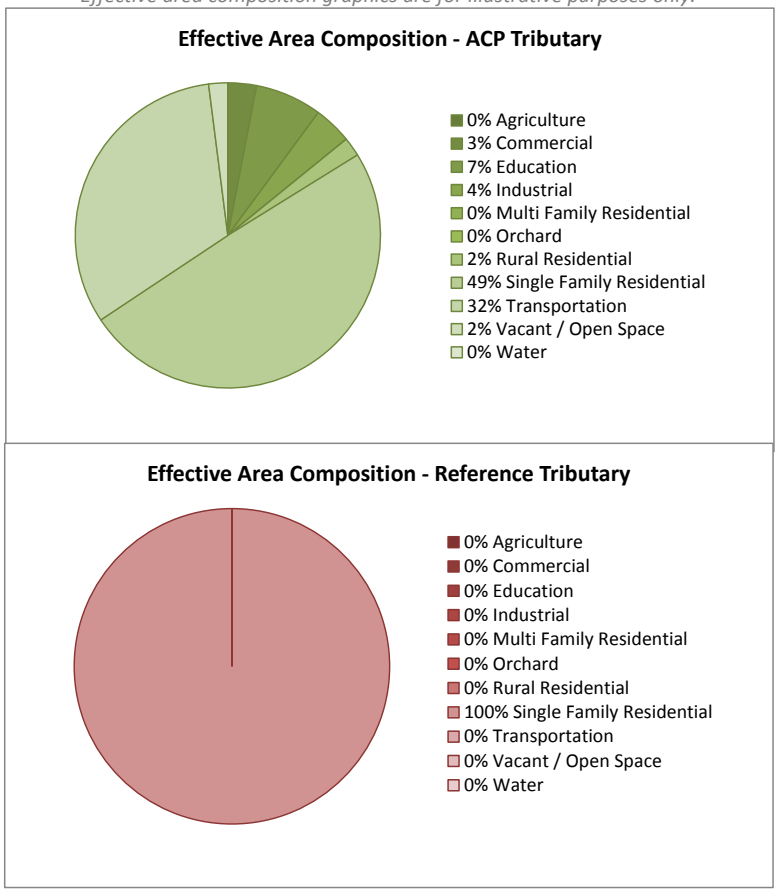
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.11** | **1.11** | **0.91** | **-** | **-** | **-** | **0.65** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

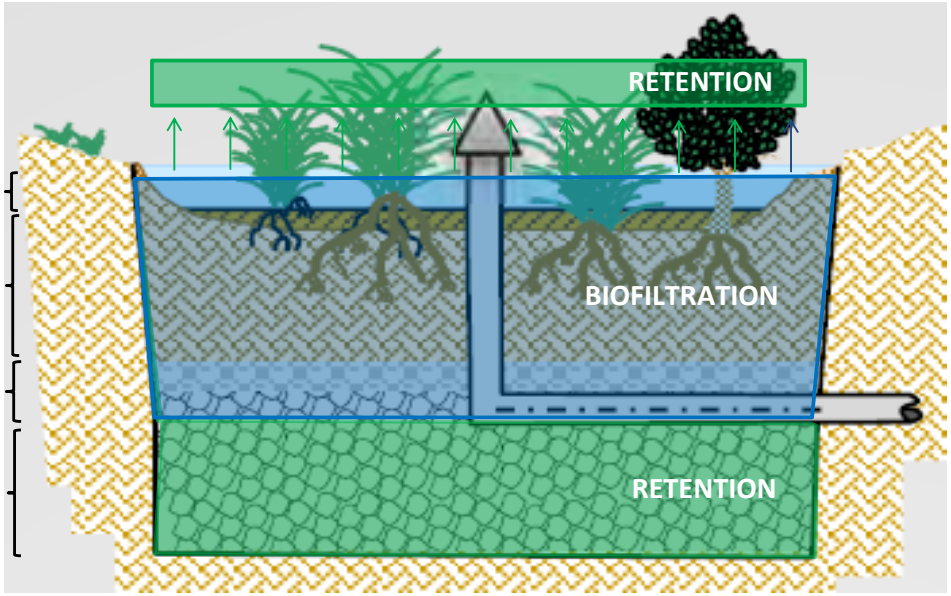
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 30,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 60,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.09 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 611,983 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 917,975 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 85,500 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 458,987 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 10,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.14 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.08 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.22** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 10,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 59,500 | cf |
| **Volume Retained** | **59,500** | **cf** |
| **Opt 1. Volume Biofiltered** | **85,500** | **cf** |
| **Opt 2. Volume Stored** | **10,500** | **cf** |



Site 8B Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 95,661 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 54.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 59,500 | | |
| **Equivalent Development Area** | 16.95 | 32.83 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **16.95** | **32.83** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

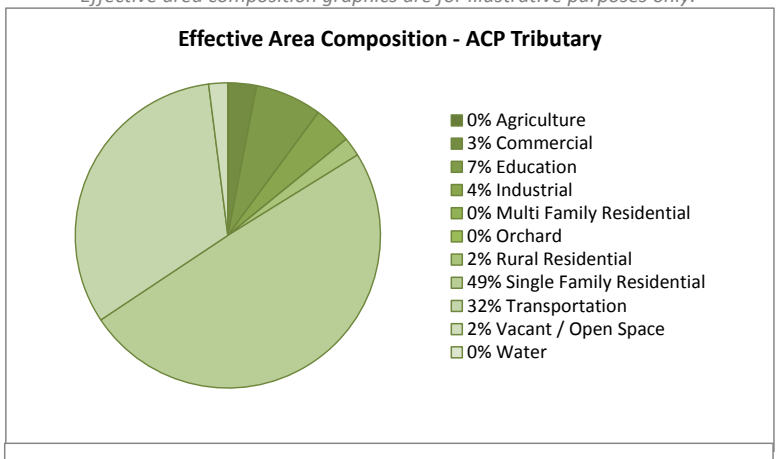
1) Only yellow cells are user input.

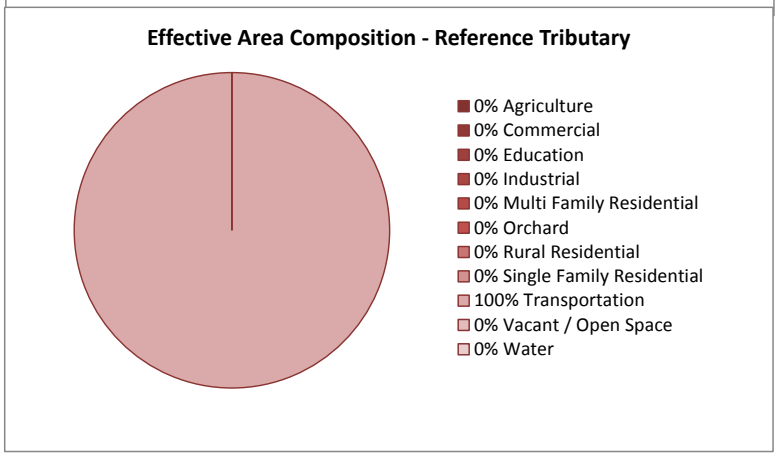
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 8.66 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 35.18 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 12.26 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 18.37 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 302.19 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 87.83 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 61.40 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 525.89 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.14 | 0.22 | 0.14 | 0.36 | 0.39 | 0.47 | 0.41 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.31** | **0.85** | **1.14** | **-** | **-** | **-** | **3.41** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

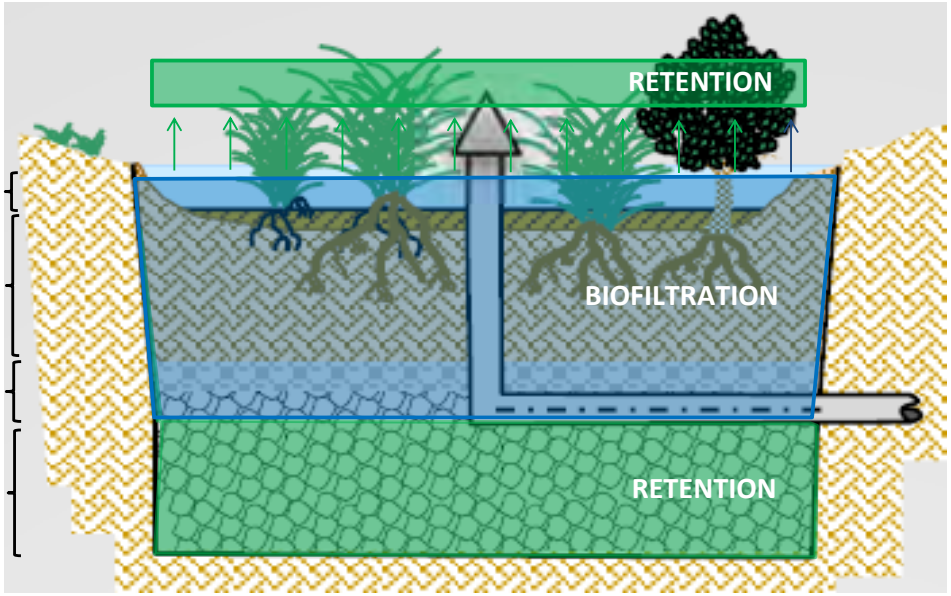
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 658,046 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 30,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 60,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.09 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.14 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.14 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.07 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 611,983 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 917,975 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 85,500 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 458,987 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 10,500 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.14 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.08 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.22** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 10,500 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 59,500 | cf |
| **Volume Retained** | **59,500** | **cf** |
| **Opt 1. Volume Biofiltered** | **85,500** | **cf** |
| **Opt 2. Volume Stored** | **10,500** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 125,095 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.47 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 71.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 59,500 | | |
| **Equivalent Development Area** | 7.53 | 14.59 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **7.53** | **14.59** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

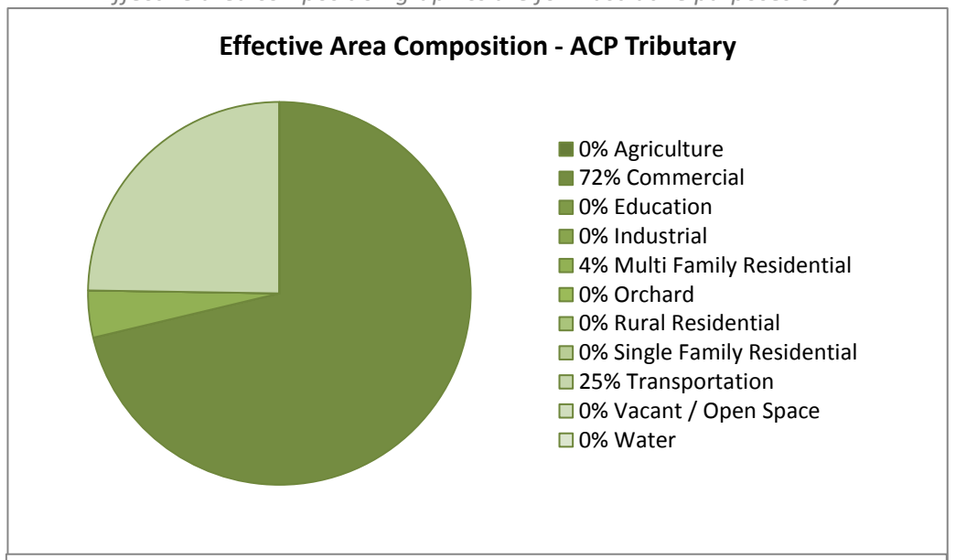
1) Only yellow cells are user input.

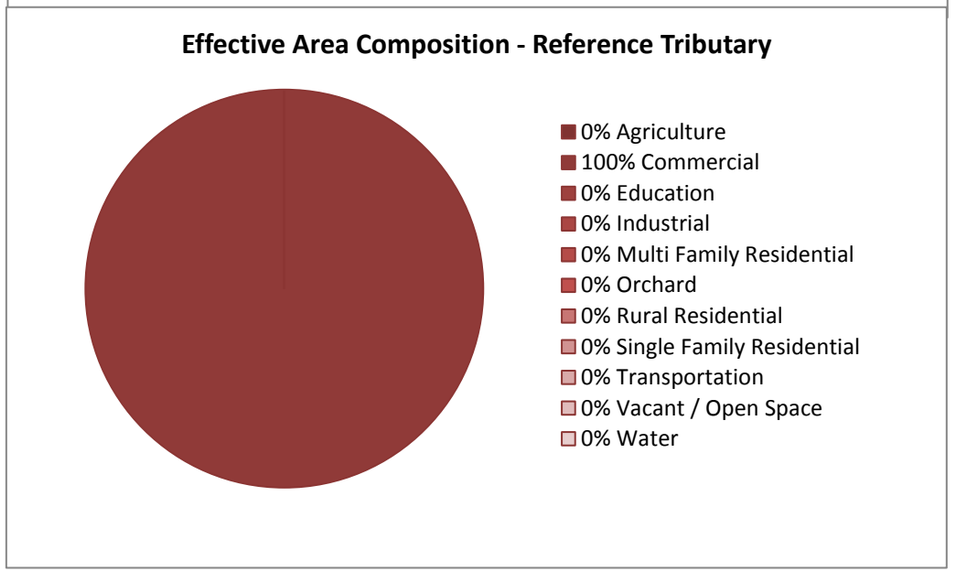
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 18.14 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.26 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.54 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 0.14 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 25.08 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.18 | 0.15 | 0.54 | 0.43 | 0.88 | 0.66 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **1.15** | **0.93** | - | - | - | **0.76** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

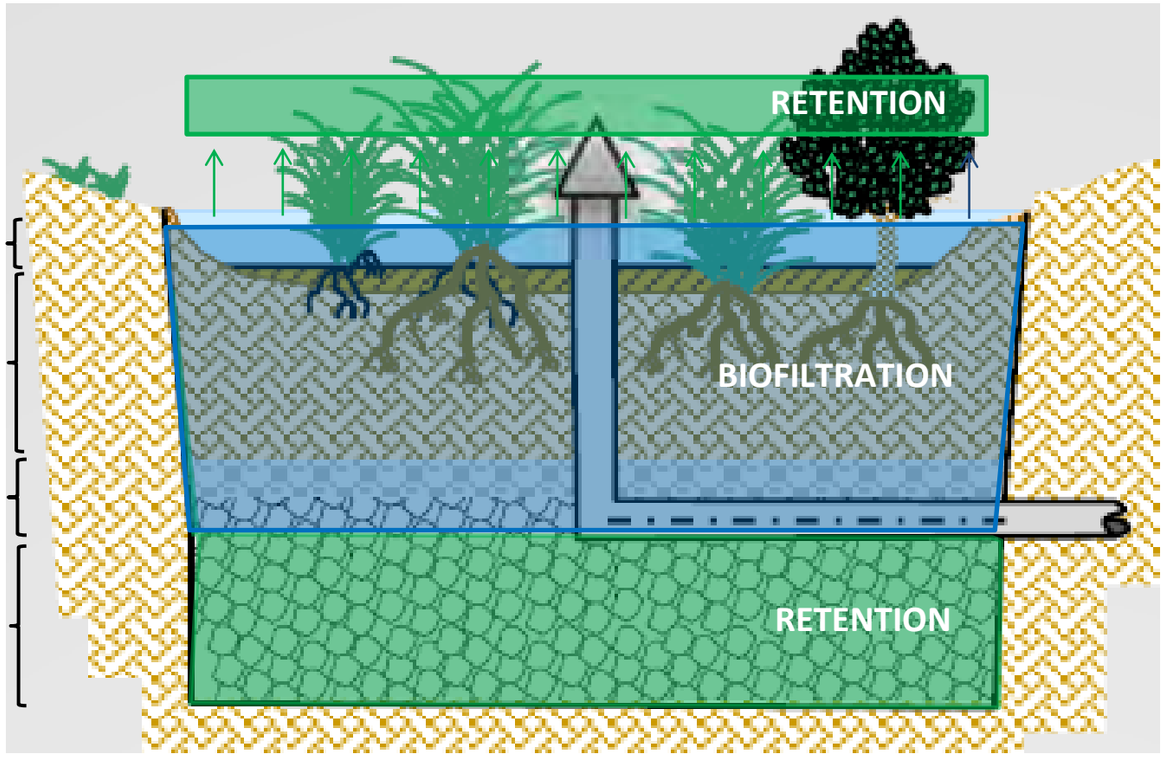
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 58,994 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 34,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 69,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 590 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 885 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 885 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 443 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 443 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 12,075 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 68,425 cf |
| **Volume Retained** | **68,425 cf** |
| **Opt 1. Volume Biofiltered** | **885 cf** |
| **Opt 2. Volume Stored** | **443 cf** |



Site 9 Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 44,835 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 25.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 68,425 | | |
| **Equivalent Development Area** | 9.74 | 18.88 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **9.74** | **18.88** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

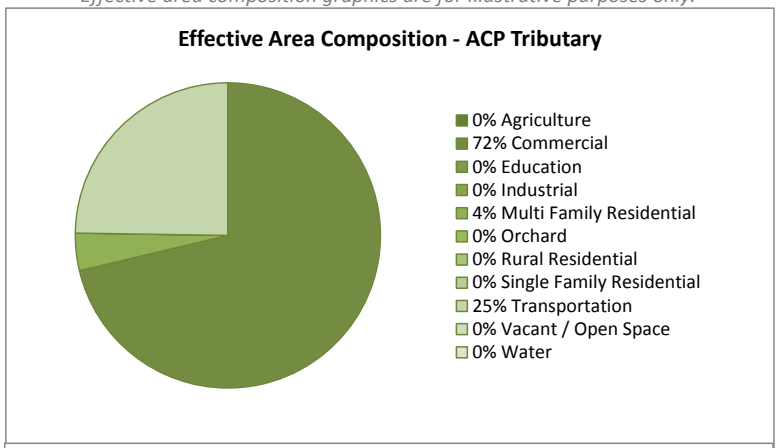
1) Only yellow cells are user input.

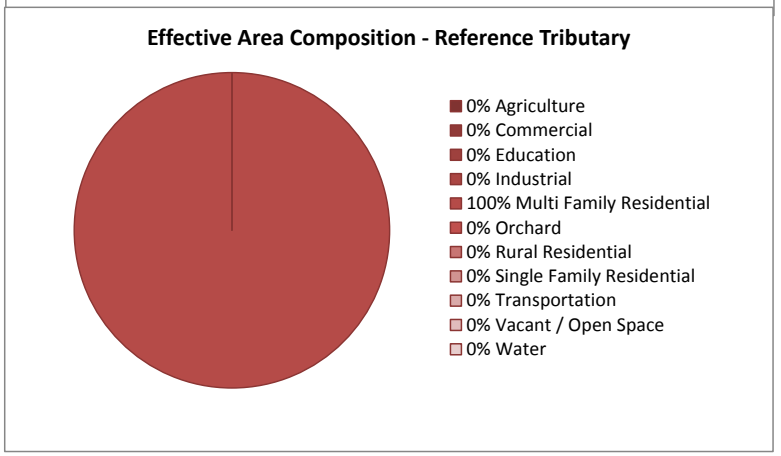
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 18.14 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.26 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.54 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 0.14 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 25.08 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.18 | 0.15 | 0.54 | 0.43 | 0.88 | 0.66 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.24** | **1.41** | **1.15** | **-** | **-** | **-** | **2.45** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

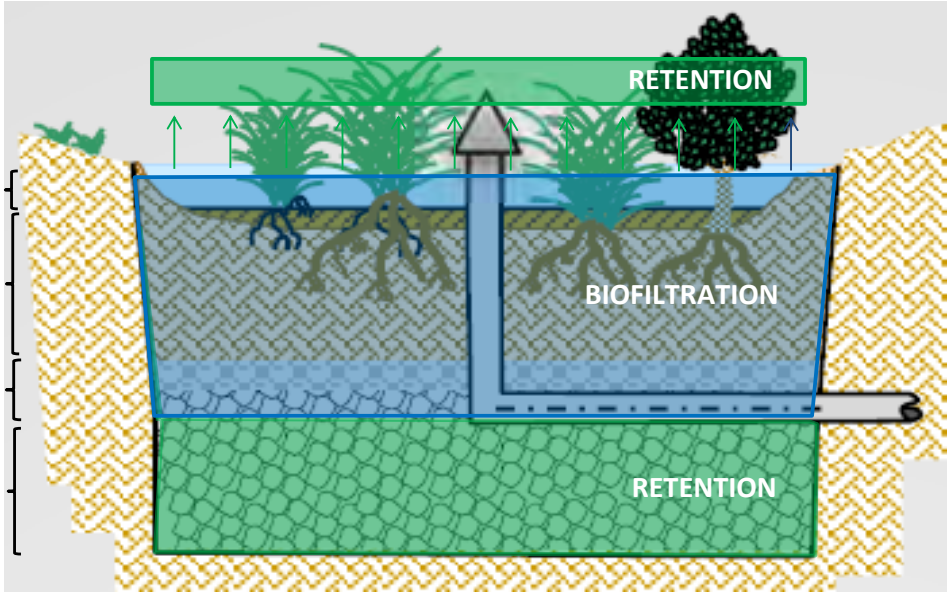
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 58,994 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 34,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 69,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 590 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 885 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 885 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 443 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 443 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 12,075 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 68,425 | cf |
| **Volume Retained** | **68,425** | **cf** |
| **Opt 1. Volume Biofiltered** | **885** | **cf** |
| **Opt 2. Volume Stored** | **443** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 67,843 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 38.9 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 68,425 | | |
| **Equivalent Development Area** | 12.99 | 25.17 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.99** | **25.17** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

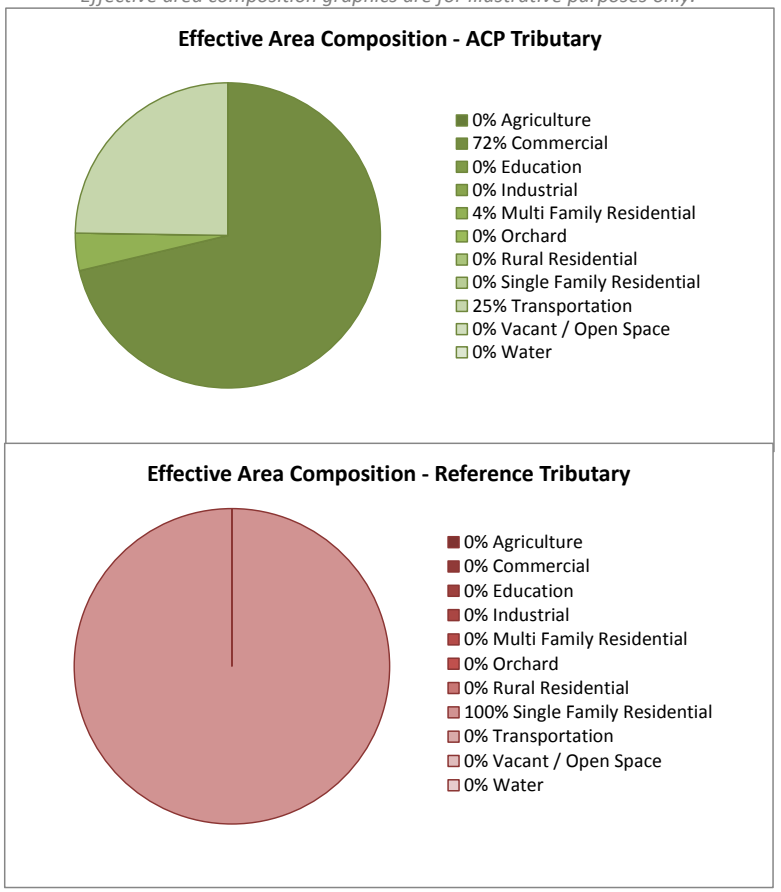
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 18.14 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.26 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.54 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 0.14 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 25.08 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.18 | 0.15 | 0.54 | 0.43 | 0.88 | 0.66 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.95** | **0.92** | **0.99** | **-** | **-** | **-** | **1.05** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

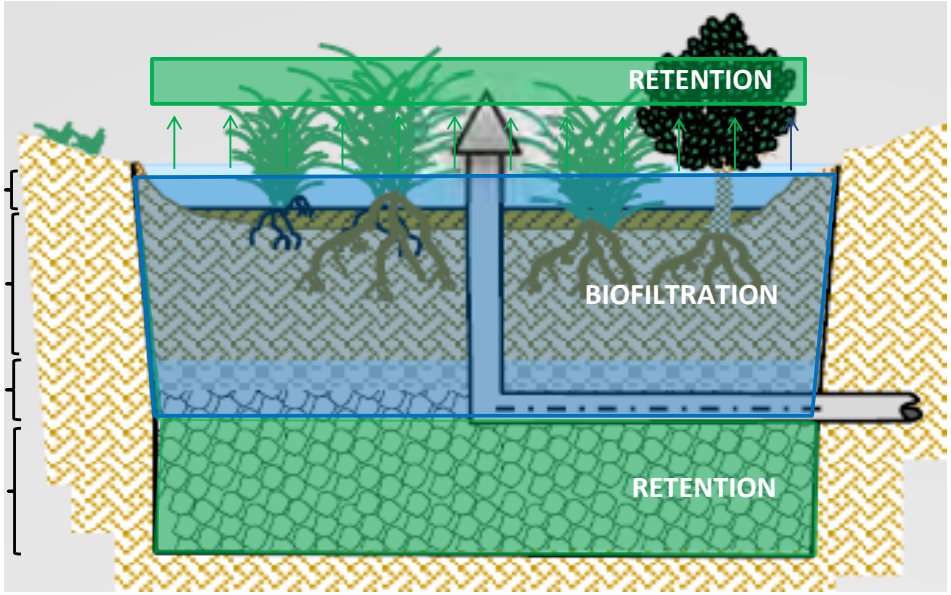
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 58,994 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 34,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 69,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 590 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 885 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 885 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 443 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 443 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 12,075 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 68,425 | cf |
| **Volume Retained** | **68,425** | **cf** |
| **Opt 1. Volume Biofiltered** | **885** | **cf** |
| **Opt 2. Volume Stored** | **443** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 54,274 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 31.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 68,425 | | |
| **Equivalent Development Area** | 19.49 | 37.76 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **19.49** | **31.15** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

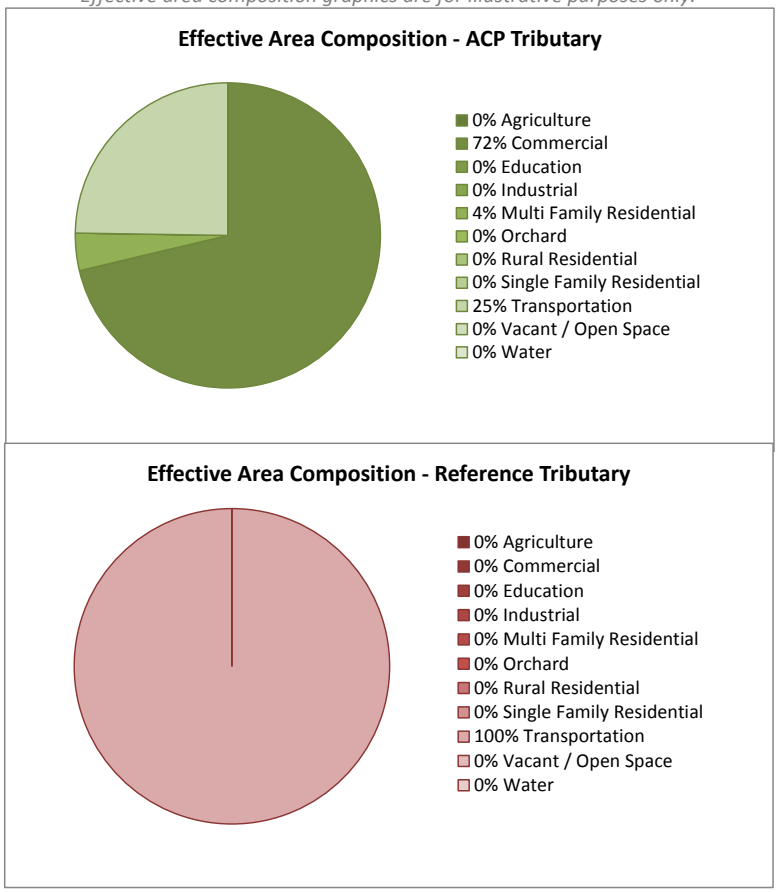
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 18.14 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.26 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 5.54 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 0.14 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 25.08 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.18 | 0.15 | 0.54 | 0.43 | 0.88 | 0.66 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.13** | **0.71** | **1.24** | **-** | **-** | **-** | **5.52** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

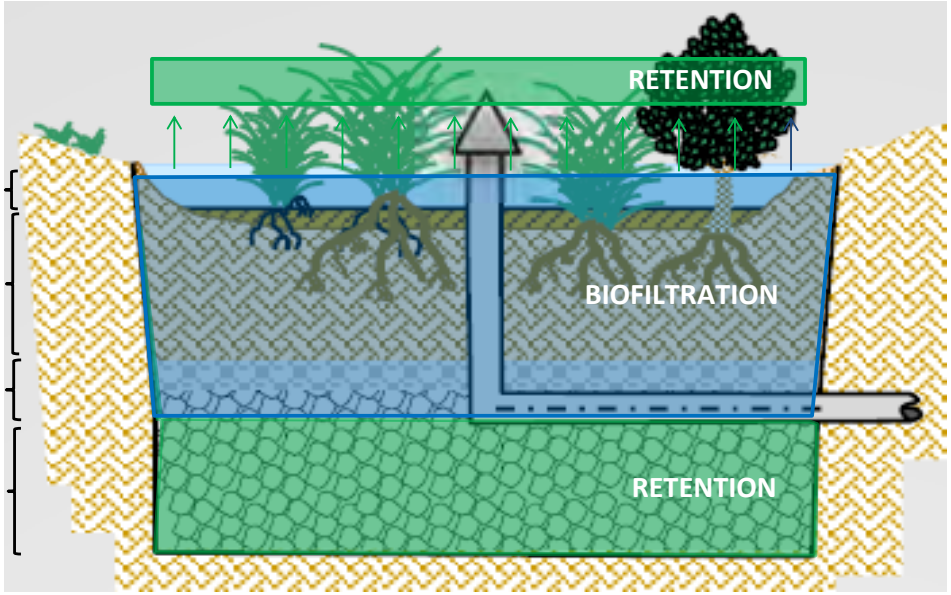
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 58,994 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 34,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 69,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.16 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 1.00 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 1.00 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.99 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 590 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 885 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 885 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 443 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 443 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.00 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| BMP Factor | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 12,075 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 68,425 | cf |
| **Volume Retained** | **68,425** | **cf** |
| **Opt 1. Volume Biofiltered** | **885** | **cf** |
| **Opt 2. Volume Stored** | **443** | **cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 41,886 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.81 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 24.0 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 68,425 | | |
| **Equivalent Development Area** | 8.66 | 16.78 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **8.66** | **16.78** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

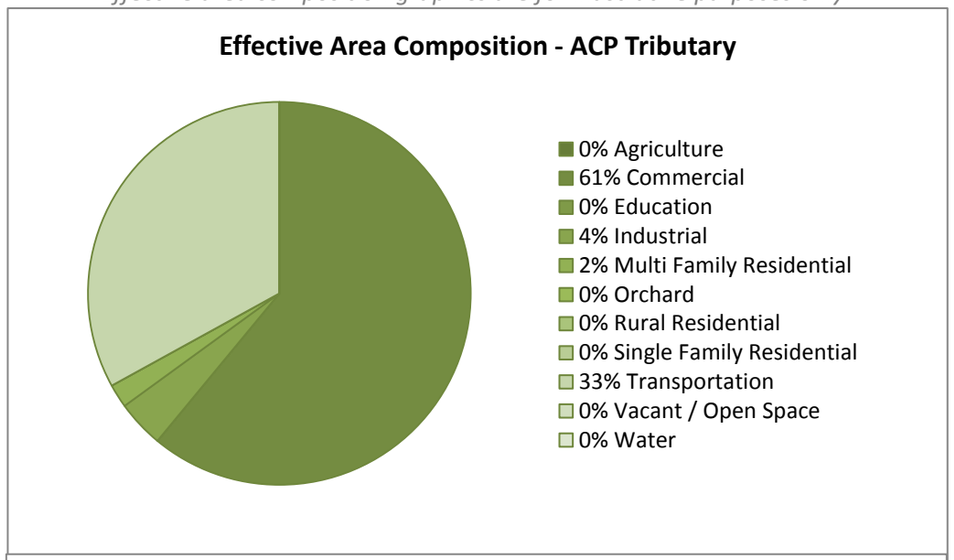
1) Only yellow cells are user input.

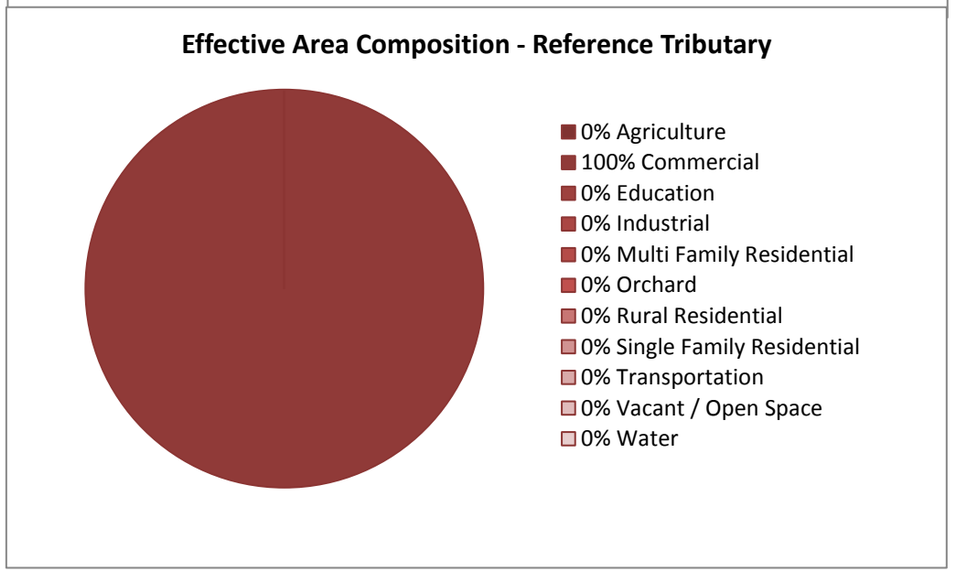
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.94** | **1.21** | **0.91** | - | - | - | **0.69** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

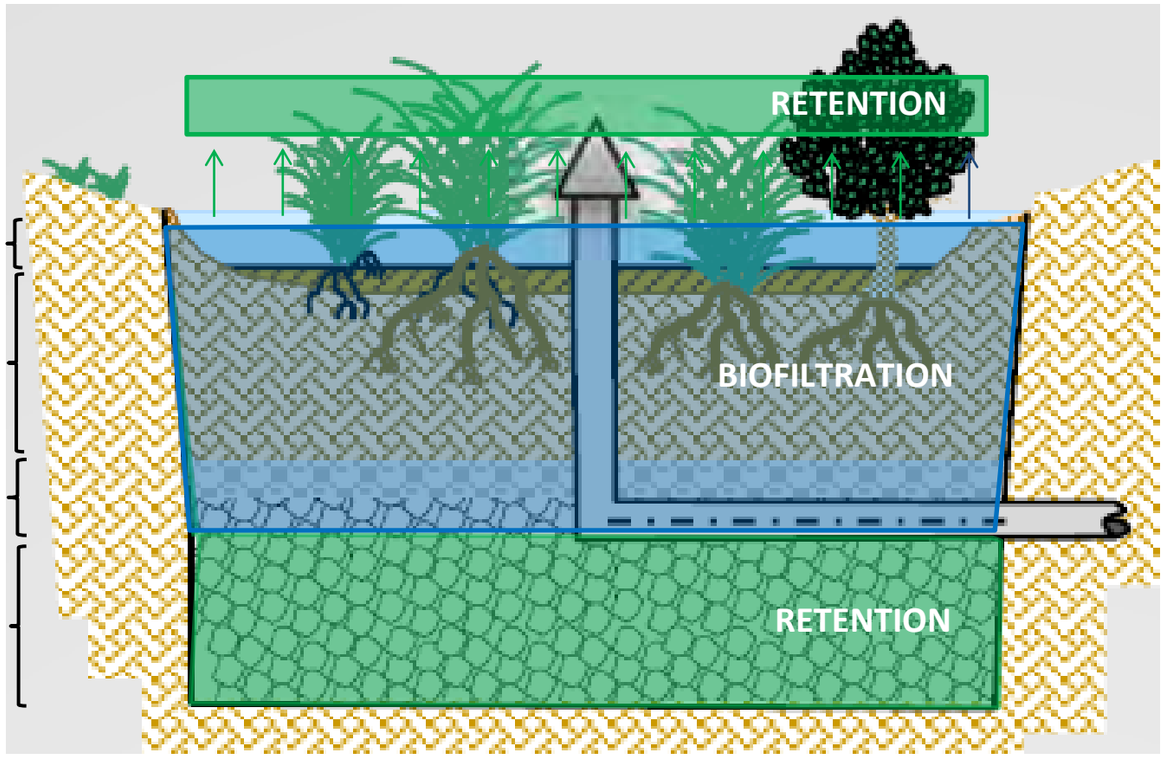
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 48,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 97,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.15 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.99 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.99 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.98 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,674 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,511 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 2,511 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,256 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,256 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.01 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 16,975 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 96,192 cf |
| **Volume Retained** | **96,192 cf** |
| **Opt 1. Volume Biofiltered** | **2,511 cf** |
| **Opt 2. Volume Stored** | **1,256 cf** |



Site 10A Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 57,756 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 33.1 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 96,192 | | |
| **Equivalent Development Area** | 13.70 | 26.54 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **13.70** | **26.54** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

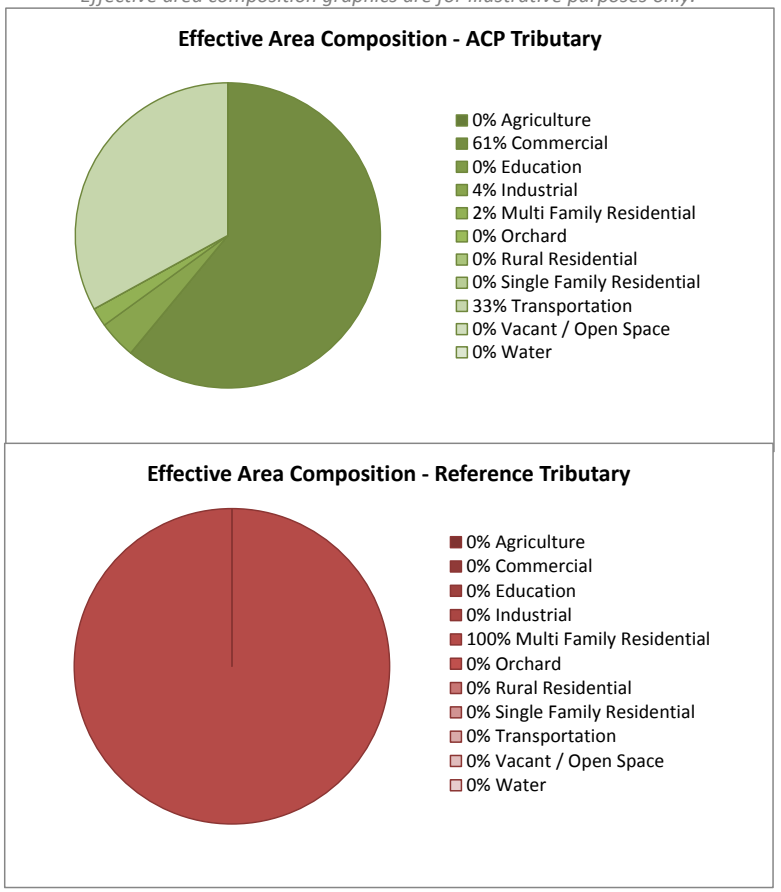
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.23** | **1.48** | **1.12** | **-** | **-** | **-** | **2.21** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

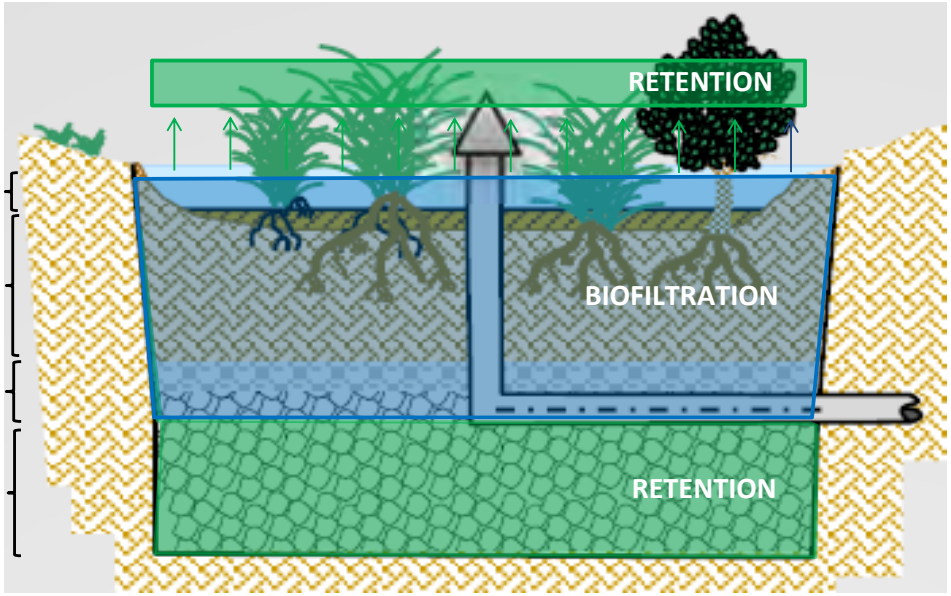
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 48,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 97,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.15 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.99 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.99 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.98 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,674 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,511 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 2,511 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,256 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,256 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.01 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 16,975 | cf |
| Gravel Depth Below IE | 34.29 | in. |
| Gravel Storage Below IE | 96,192 | cf |
| **Volume Retained** | **96,192** | **cf** |
| **Opt 1. Volume Biofiltered** | **2,511** | **cf** |
| **Opt 2. Volume Stored** | **1,256** | **cf** |



Site 10A Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 93,749 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 53.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 96,192 | | |
| **Equivalent Development Area** | 18.27 | 35.39 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **18.27** | **35.39** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

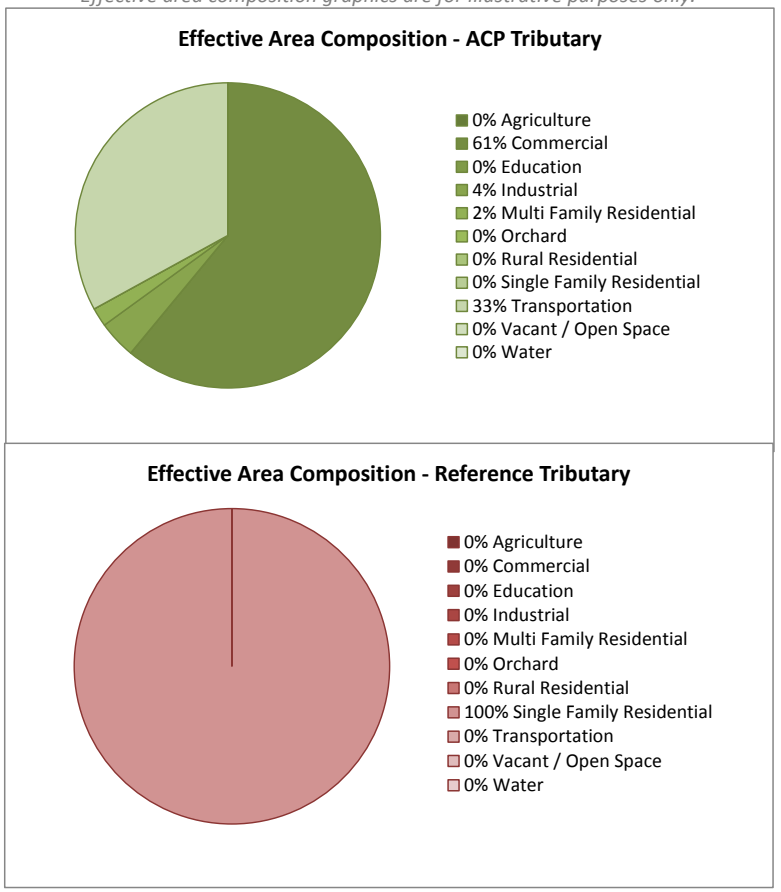
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.94** | **0.96** | **0.97** | - | - | - | **0.95** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

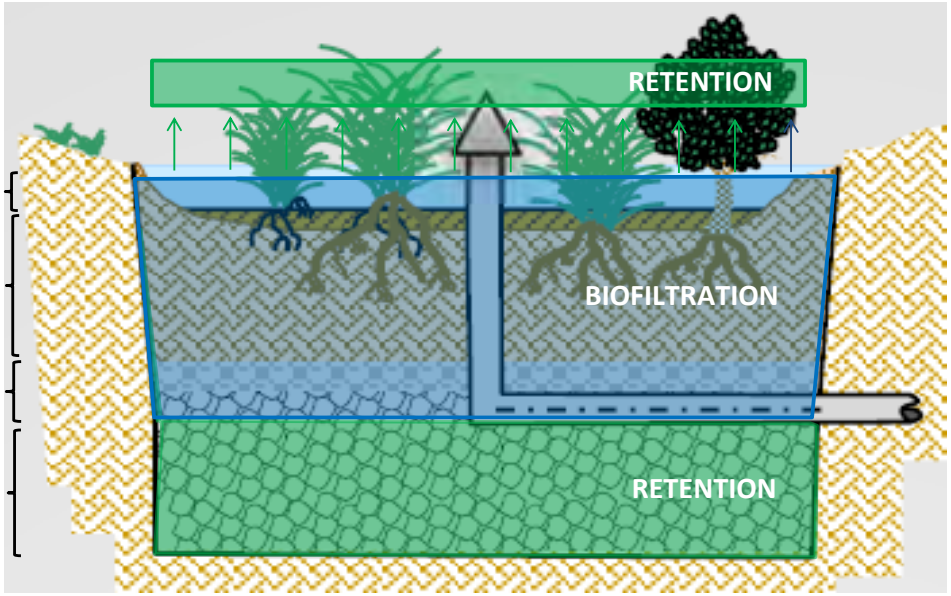
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 48,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 97,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.15 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.99 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.99 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.98 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,674 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,511 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 2,511 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,256 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,256 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.01 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 16,975 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 96,192 cf |
| **Volume Retained** | **96,192 cf** |
| **Opt 1. Volume Biofiltered** | **2,511 cf** |
| **Opt 2. Volume Stored** | **1,256 cf** |



Site 10A Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 78,682 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 45.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 96,192 | | |
| **Equivalent Development Area** | 27.40 | 53.08 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **27.40** | **45.16** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

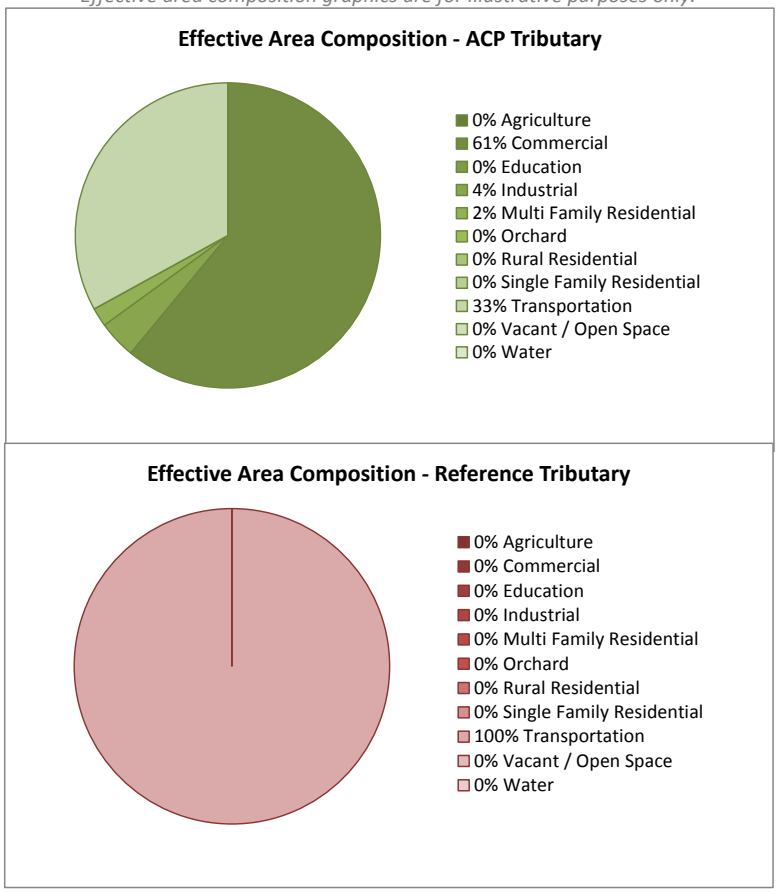
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.12** | **0.74** | **1.22** | **-** | **-** | **-** | **4.97** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

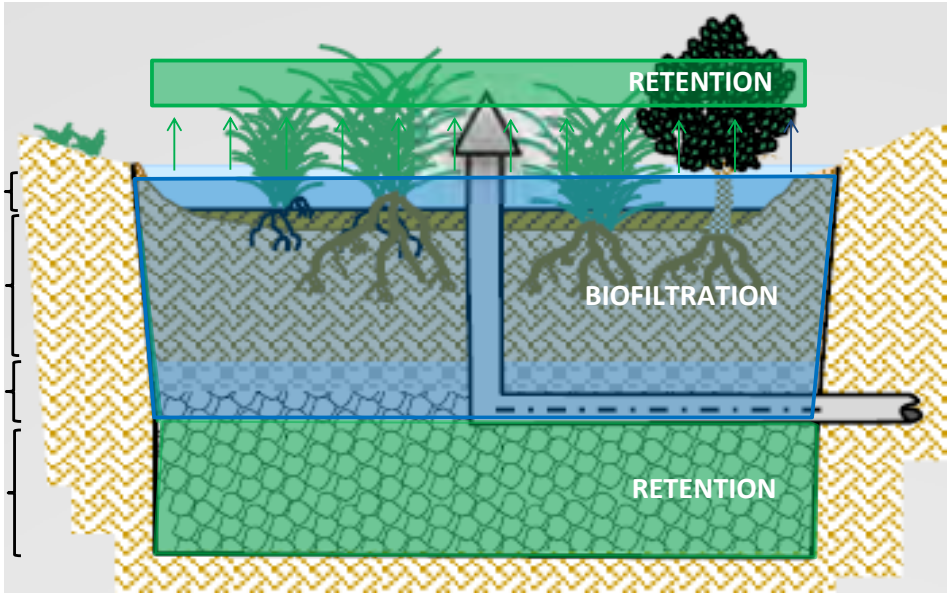
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 48,500 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 34 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 34.29 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 97,000 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 1.15 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.99 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.99 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.98 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 1,674 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 2,511 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 2,511 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 1,256 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 1,256 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 1.50 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.01 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **1.00** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 16,975 cf |
| Gravel Depth Below IE | 34.29 in. |
| Gravel Storage Below IE | 96,192 cf |
| **Volume Retained** | **96,192 cf** |
| **Opt 1. Volume Biofiltered** | **2,511 cf** |
| **Opt 2. Volume Stored** | **1,256 cf** |



Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 61,941 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 35.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 96,192 | | |
| **Equivalent Development Area** | 12.18 | 23.59 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **12.18** | **23.59** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

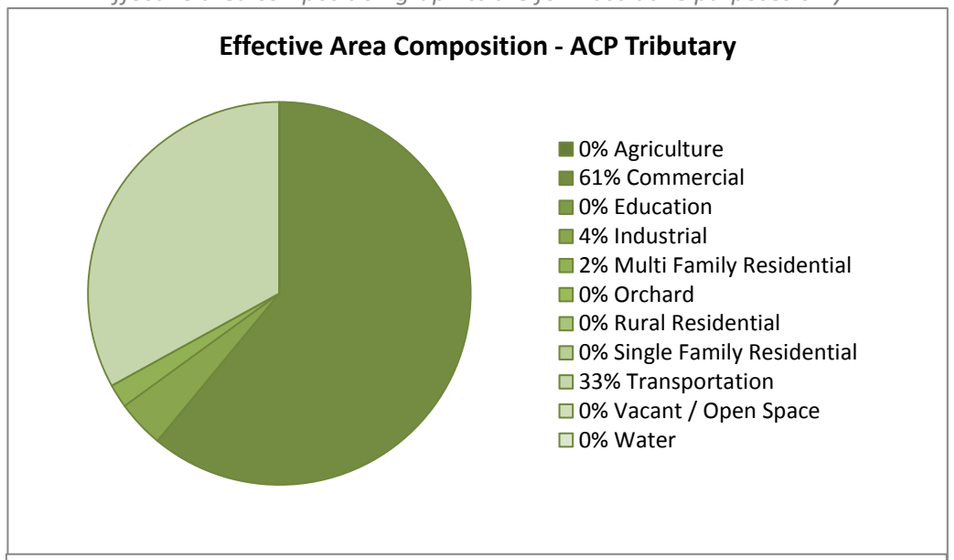
1) Only yellow cells are user input.

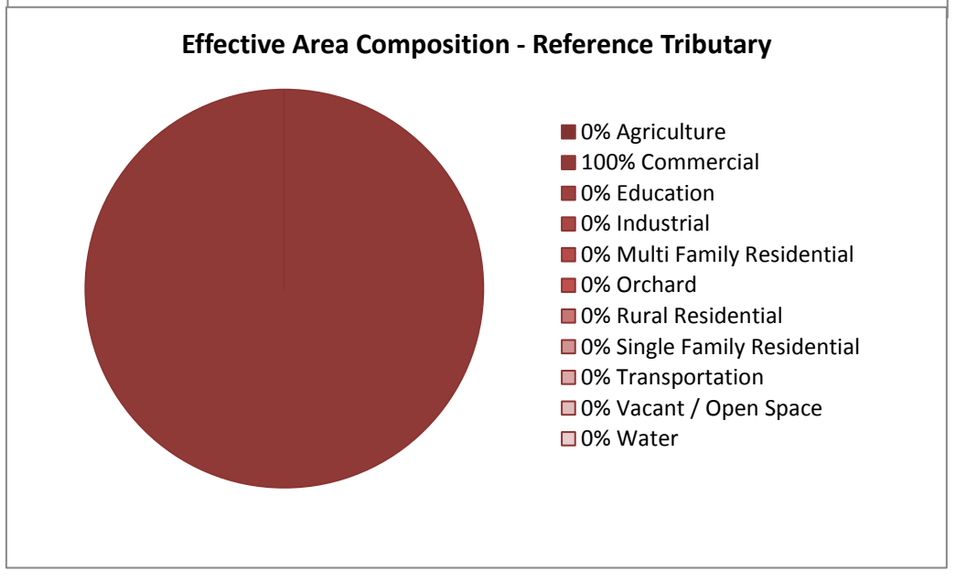
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.94** | **1.21** | **0.91** | - | - | - | **0.69** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

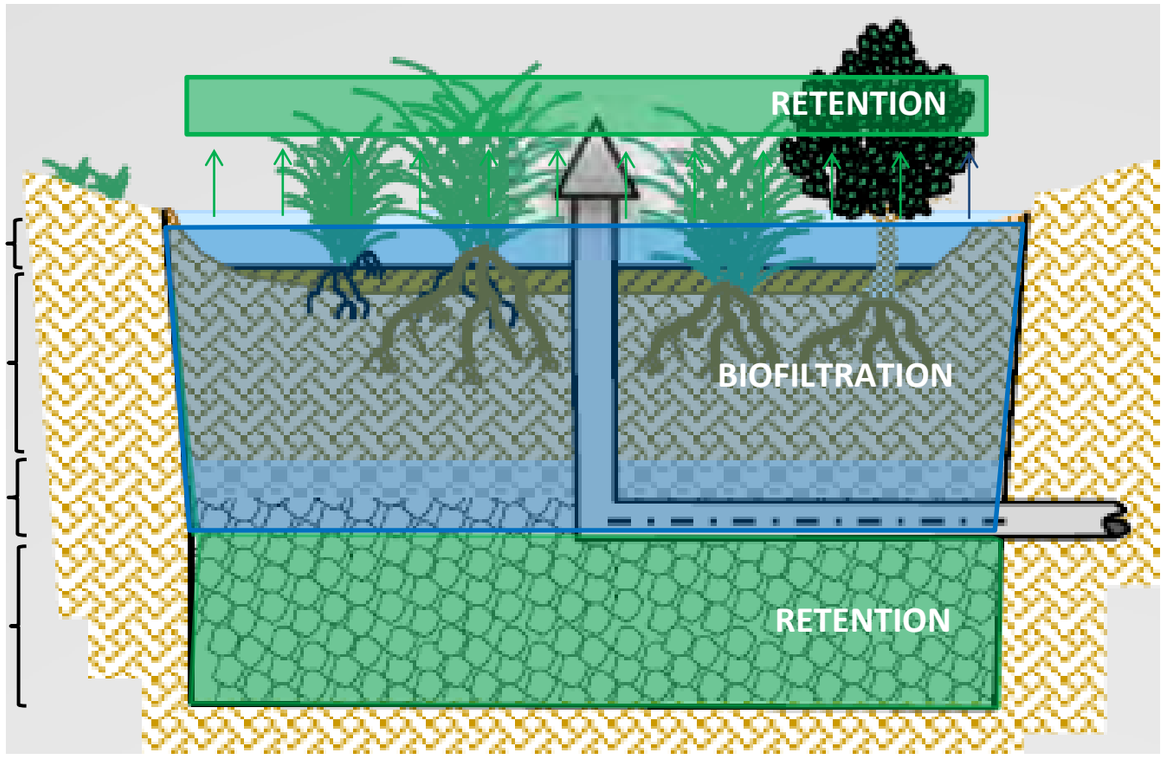
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,074 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 82,868 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 124,302 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 5,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 62,151 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.07 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.04 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.07** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 700 cf |
| Gravel Depth Below IE | 17.77 in. |
| Gravel Storage Below IE | 2,100 cf |
| **Volume Retained** | **2,100 cf** |
| **Opt 1. Volume Biofiltered** | **5,700 cf** |
| **Opt 2. Volume Stored** | **700 cf** |



Site 10B Commercial WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 4,079 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 2.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 2,100 | | |
| **Equivalent Development Area** | 0.30 | 0.58 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.30** | **0.58** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 4 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,074 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 259 | (GPM) |

***Notes:***

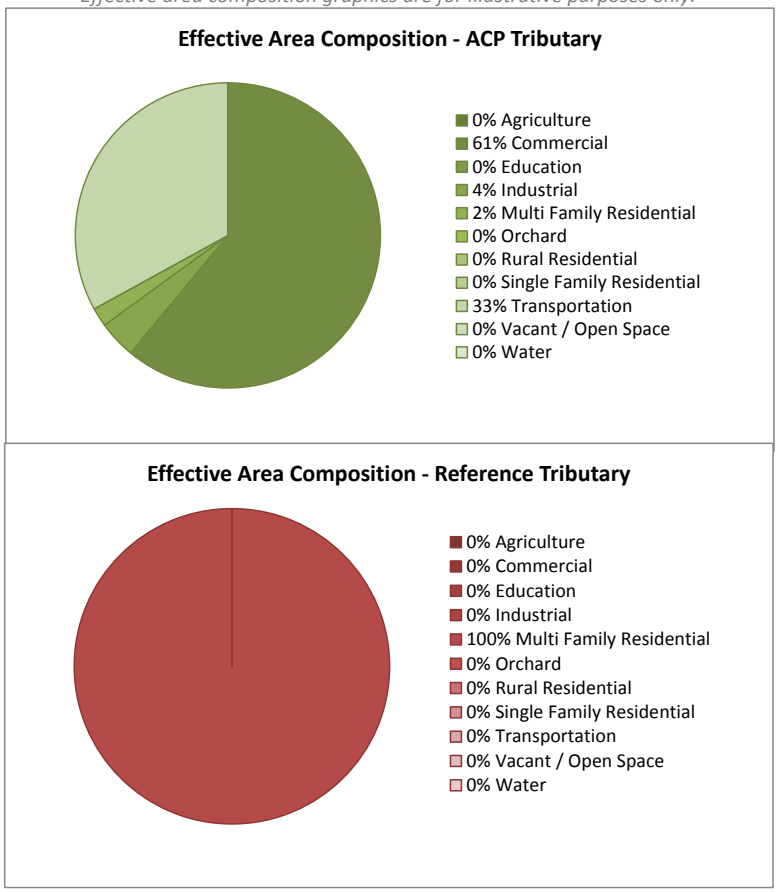
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.23** | **1.48** | **1.12** | **-** | **-** | **-** | **2.21** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

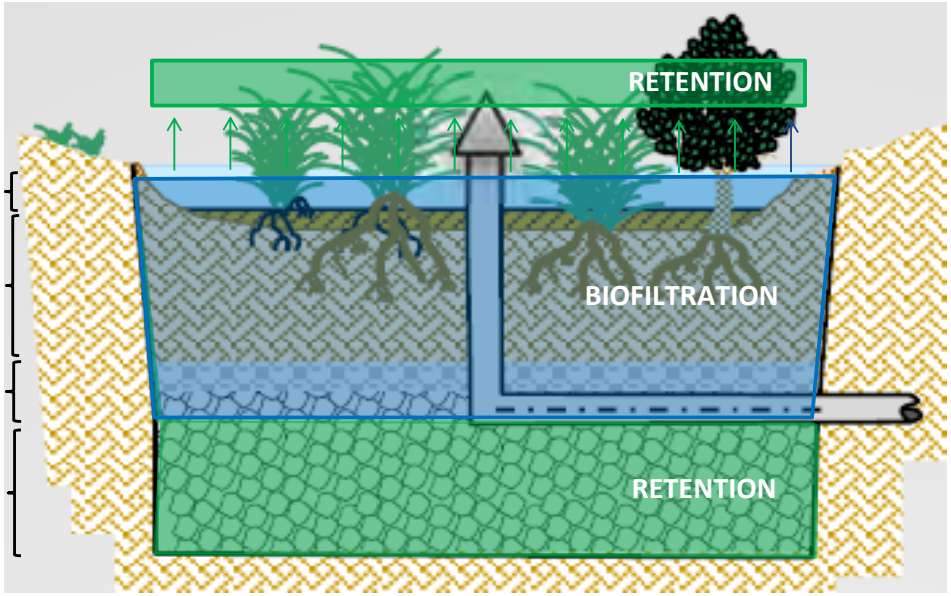
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,074 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 82,868 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 124,302 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 5,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 62,151 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.07 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.04 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.07** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 700 | cf |
| Gravel Depth Below IE | 17.77 | in. |
| Gravel Storage Below IE | 2,100 | cf |
| **Volume Retained** | **2,100** | **cf** |
| **Opt 1. Volume Biofiltered** | **5,700** | **cf** |
| **Opt 2. Volume Stored** | **700** | **cf** |



Site 10B Multi Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 6,621 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 3.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 2,100 | | |
| **Equivalent Development Area** | 0.40 | 0.77 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.40** | **0.77** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 4 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,074 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 259 | (GPM) |

***Notes:***

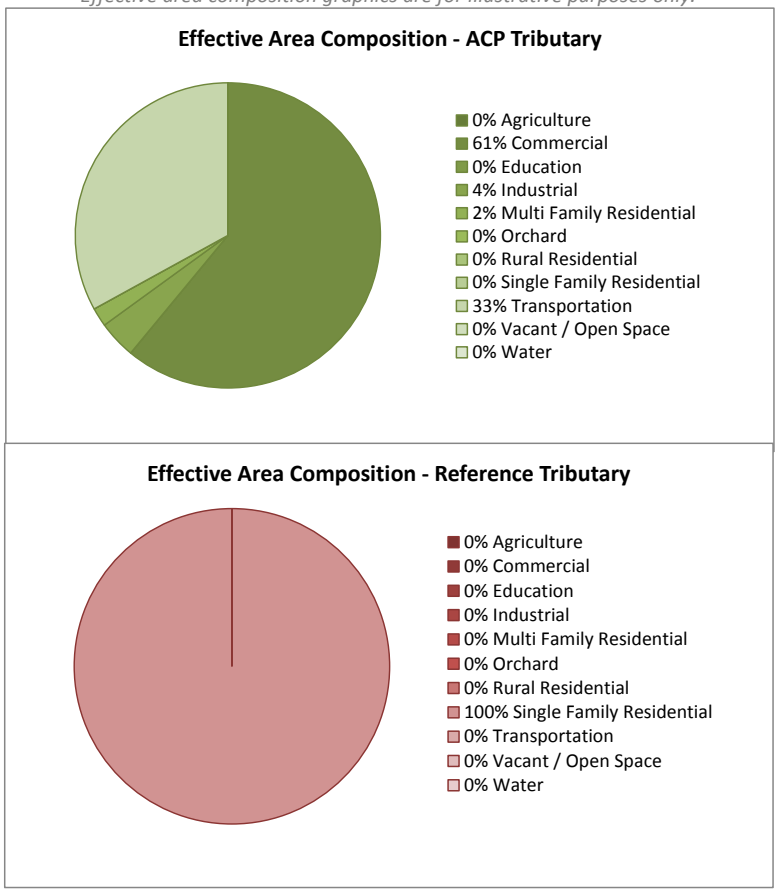
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **0.94** | **0.96** | **0.97** | **-** | **-** | **-** | **0.95** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

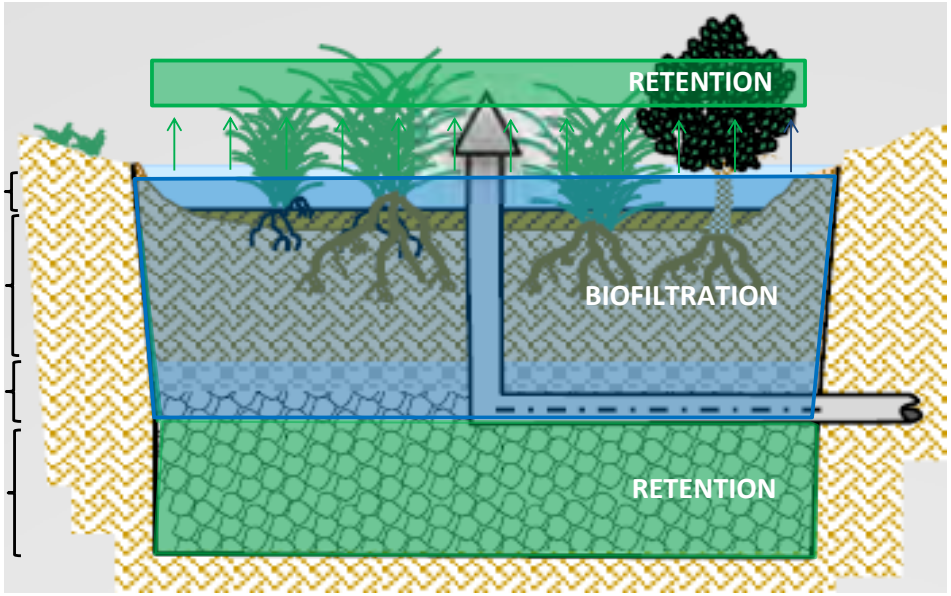
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,074 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 82,868 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 124,302 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 5,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 62,151 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.07 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.04 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.07** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | |
|---|---|
| Evapotransp. Volume | 0 cf |
| Surface Ponding Depth | 0.00 in. |
| Surface Ponding Volume | 0 cf |
| Soil Media Thickness | 0.00 in. |
| Soil Storage Volume | 0 cf |
| Gravel Depth Above IE | 6.00 in. |
| Gravel Storage Avove IE | 700 cf |
| Gravel Depth Below IE | 17.77 in. |
| Gravel Storage Below IE | 2,100 cf |
| **Volume Retained** | **2,100 cf** |
| **Opt 1. Volume Biofiltered** | **5,700 cf** |
| **Opt 2. Volume Stored** | **700 cf** |



Site 10B Single Family WQE Calculations.xlsx

Equivalent Land Use

| | | | |
|---|---|---|---|
| **Ve** | 5,557 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 3.2 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 2,100 | | |
| **Equivalent Development Area** | 0.60 | 1.16 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.60** | **1.16** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 4 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,074 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 259 | (GPM) |

***Notes:***

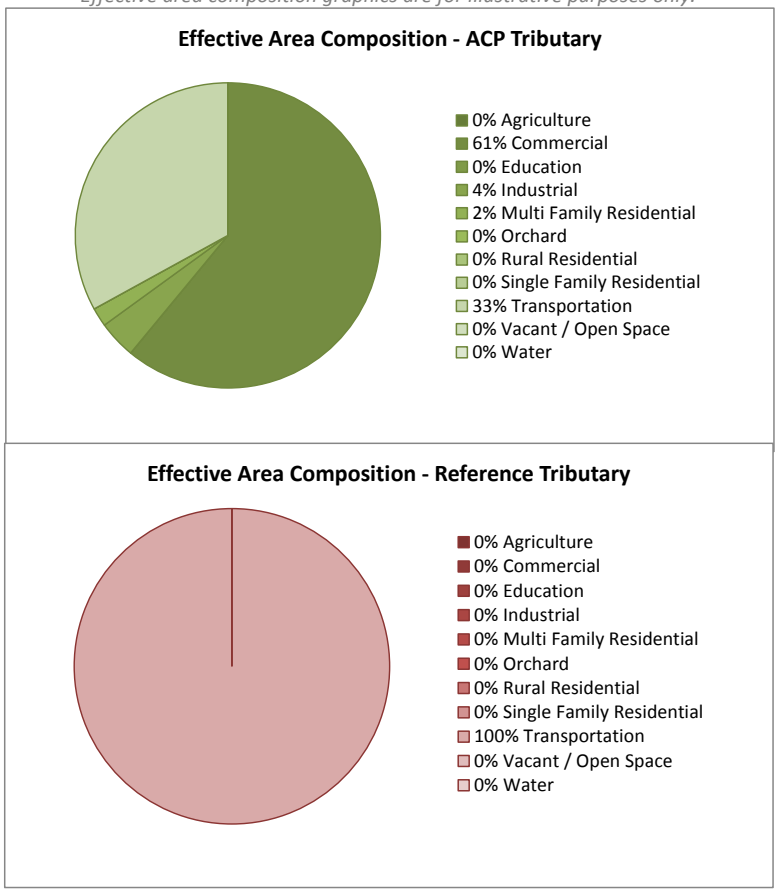
1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 19.44 | 0.80 | | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 1.03 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 1.05 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 9.19 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 30.71 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.12 | 0.19 | 0.15 | 0.54 | 0.42 | 0.85 | 0.60 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.12** | **0.74** | **1.22** | **-** | **-** | **-** | **4.97** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.

2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.

3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.

4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.

5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

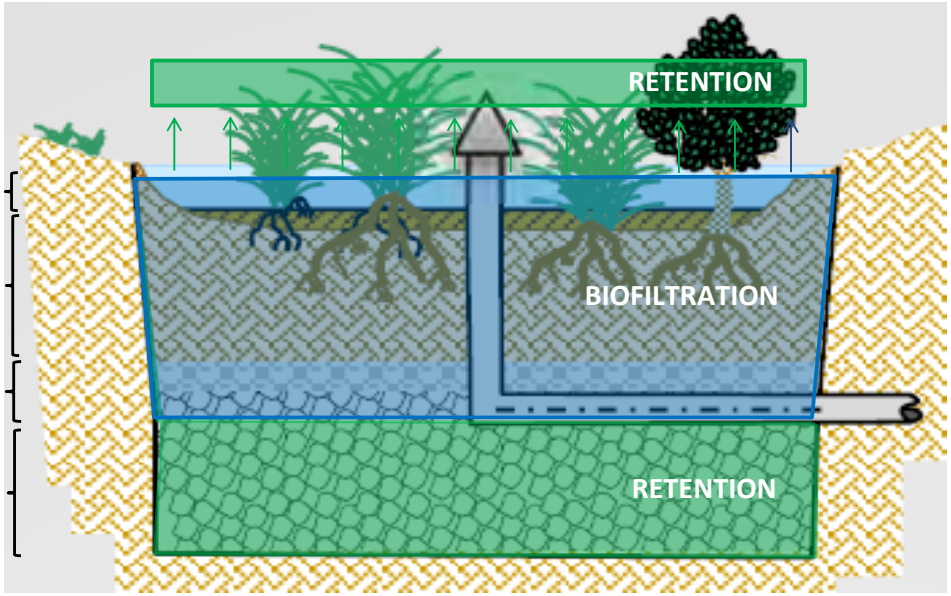
| Category | # | Description | Value | Units | Notes |
|---|---|---|---|---|---|
| BMP Inputs | 1 | Design Capture Volume Tributary to BMP | 83,705 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| | 2 | Provided BMP Surface Area | 2,000 | sq-ft | User Input |
| | 3 | Provided Surface Ponding Depth | 0 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| | 4 | Provided Soil Media Thickness | 0 | inches | 18 inches minimum |
| | 5 | Provided Depth of Gravel Above Underdrain Invert | 6 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| | 6 | Provided Depth of Gravel Below the Underdrain | 18 | inches | Must be greater than or equal to Line 11 |
| | 7 | Native Soil Infiltration Rate | 0.1296 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| | 8 | Provided Drawdown Time for Storage Below Underdrain | 96 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| Retention Calculations | 9 | Depth Infiltrated Over Specified Drawdown | 12.44 | inches | [Line 7 x Line 8] |
| | 10 | Gravel Pore Space | 0.70 | - | Default = 0.40 |
| | 11 | Required Depth of Gravel Below the Underdrain | 17.77 | inches | [Line 9/ Line 10] |
| | 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| | 13 | Volume Retained by BMP | 2,074 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| | 14 | Fraction of DCV Retained | 0.02 | ratio | [Line 13/Line 1] |
| | 15 | Provided Capture for Specified Retention BMP | 0.03 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| | 16 | Retention BMP Efficacy Factor | 0.03 | ratio | [Line 15 x 1.00] |
| | 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.01 | ratio | User Input from Retention Provided Capture Curves |
| | 18 | Design Capture Volume Remaining for Biofiltration | 82,868 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| Biofiltration Calculations | 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| | 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| | 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| | 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| | 23 | Effective Depth of Biofiltration Storage | 4.20 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| | 24 | Total Depth Biofiltered | 34.20 | inches | [Line 22 + Line 23] |
| | 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 124,302 | cubic-feet | [1.50 x Line 18] |
| | 26 | Option 1 - Provided Biofiltration Volume | 5,700 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| | 27 | Option 2 - Store 0.75 DCV: Target Volume | 62,151 | cubic-feet | [0.75 x Line 18] |
| | 28 | Option 2 - Provided Storage Volume | 700 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| | 29 | Provided Capture for Specified Biofiltration BMP | 0.07 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| | 30 | Downstream Biofiltration BMP Efficacy Factor | 0.04 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| **BMP Factor** | 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.07** | ratio | [Line 16 + Line 30] |

**Notes:**

1. Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
2. Refer to **Section 2.3.1.3** of the guidance document for additional discussion of BMP Efficacy Factors.

## Illustration of Partial Retention Characteristics

| | | |
|---|---|---|
| Evapotransp. Volume | 0 | cf |
| Surface Ponding Depth | 0.00 | in. |
| Surface Ponding Volume | 0 | cf |
| Soil Media Thickness | 0.00 | in. |
| Soil Storage Volume | 0 | cf |
| Gravel Depth Above IE | 6.00 | in. |
| Gravel Storage Avove IE | 700 | cf |
| Gravel Depth Below IE | 17.77 | in. |
| Gravel Storage Below IE | 2,100 | cf |
| **Volume Retained** | **2,100** | **cf** |
| **Opt 1. Volume Biofiltered** | **5,700** | **cf** |
| **Opt 2. Volume Stored** | **700** | **cf** |



| | | | |
|---|---|---|---|
| **Ve** | 4,374 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.83 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 2.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 2,100 | | |
| **Equivalent Development Area** | 0.27 | 0.52 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **0.27** | **0.52** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 4 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | 2,074 | ($ft^3$) |
| Minimum Design Depth | 12.45 | (inches) |
| Effective Draw Down Rate | 0.1296 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 259 | (GPM) |

***Notes:***

1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

Michael Baker
INTERNATIONAL

# Appendix C ACP Site Development Preliminary Cost Estimates

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,167 | $ 10.00 | $ 21,666.67 |
| Rock backfill | cubic feet | 39,000 | $ 1.45 | $ 56,550.00 |
| Native planting | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Sand import (6") | cubic yards | 144 | $ 10.00 | $ 1,444.44 |
| Contingency (20%) | lump sum | 1 | $ 21,592 | $ 21,592.22 |
| Land Cost | square feet | 16000 | $ 4.00 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 19,433 | $ 19,433.00 |
| Design (20% of Construction) | lump sum | 1 | $ 25,911 | $ 25,910.67 |
| | | | Total | $ 238,897.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 4,994.93 | $ 4,994.93 |
| | | | Total | $ 4,994.93 |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,974.19 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | 118.38 |
| Total EUAC | $ | 40,354.34 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,167 | $ 10.00 | $ 21,666.67 |
| Rock backfill | cubic feet | 39,000 | $ 1.45 | $ 56,550.00 |
| Native planting | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Sand import (6") | cubic yards | 144 | $ 10.00 | $ 1,444.44 |
| Contingency (20%) | lump sum | 1 | $ 21,592 | $ 21,592.22 |
| Land Cost | square feet | 16000 | $ 4.00 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 19,433 | $ 19,433.00 |
| Design (20% of Construction) | lump sum | 1 | $ 25,911 | $ 25,910.67 |
| | | | Total | $ 238,897.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 4,994.93 | $ 4,994.93 |
| | | | Total | $ 4,994.93 |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,974.19 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | 118.38 |
| Total EUAC | $ | 40,354.34 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,167 | $ 10.00 | $ 21,666.67 |
| Rock backfill | cubic feet | 39,000 | $ 1.45 | $ 56,550.00 |
| Native planting | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Sand import (6") | cubic yards | 144 | $ 10.00 | $ 1,444.44 |
| Contingency (20%) | lump sum | 1 | $ 21,592 | $ 21,592.22 |
| Land Cost | square feet | 16000 | $ 4.00 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 19,433 | $ 19,433.00 |
| Design (20% of Construction) | lump sum | 1 | $ 25,911 | $ 25,910.67 |
| | | | Total | $ 238,897.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 4,994.93 | $ 4,994.93 |
| | | | Total | $ 4,994.93 |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,974.19 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | 118.38 |
| Total EUAC | $ | 40,354.34 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,167 | $ 10.00 | $ 21,666.67 |
| Rock backfill | cubic feet | 39,000 | $ 1.45 | $ 56,550.00 |
| Native planting | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 7,800 | $ 0.50 | $ 3,900.00 |
| Sand import (6") | cubic yards | 144 | $ 10.00 | $ 1,444.44 |
| Contingency (20%) | lump sum | 1 | $ 21,592 | $ 21,592.22 |
| Land Cost | square feet | 16000 | $ 4.00 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 19,433 | $ 19,433.00 |
| Design (20% of Construction) | lump sum | 1 | $ 25,911 | $ 25,910.67 |
| | | | Total | $ 238,897.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 4,994.93 | $ 4,994.93 |
| | | | Total | $ 4,994.93 |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,974.19 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | 118.38 |
| Total EUAC | $ | 40,354.34 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 1,469 | $ 30.00 | $ 44,074.07 |
| Rock backfill | cubic feet | 19,833 | $ 1.45 | $ 28,758.33 |
| Arch pipe (36" x 23") | lineal feet | 4,508 | $ 150.00 | $ 676,136.36 |
| Geotextile fabric | square feet | 14,000 | $ 2.00 | $ 28,000.00 |
| Impermeable liner (sides) | square feet | 1,341 | $ 2.00 | $ 2,681.96 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 14,000 | $ 1.00 | $ 14,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 162,830 | $ 162,830.15 |
| Land Costs | square feet | 16,000 | $ 4 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 146,547 | $ 146,547.13 |
| Design (20% of Construction) | lump sum | 1 | $ 195,396 | $ 195,396.17 |
| | | | Total | $ 1,382,924.18 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 39,079.23 | $ 39,079.23 |
| | | | Total | $ 39,079.23 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 65,481.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 926.18 |
| Total EUAC | $ 118,569.41 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 1,469 | $ 30.00 | $ 44,074.07 |
| Rock backfill | cubic feet | 19,833 | $ 1.45 | $ 28,758.33 |
| Arch pipe (36" x 23") | lineal feet | 4,508 | $ 150.00 | $ 676,136.36 |
| Geotextile fabric | square feet | 14,000 | $ 2.00 | $ 28,000.00 |
| Impermeable liner (sides) | square feet | 1,341 | $ 2.00 | $ 2,681.96 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 14,000 | $ 1.00 | $ 14,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 162,830 | $ 162,830.15 |
| Land Costs | square feet | 16,000 | $ 4 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 146,547 | $ 146,547.13 |
| Design (20% of Construction) | lump sum | 1 | $ 195,396 | $ 195,396.17 |
| | | | Total | $ 1,382,924.18 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 39,079.23 | $ 39,079.23 |
| | | | Total | $ 39,079.23 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 65,481.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 926.18 |
| Total EUAC | $ 118,569.41 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 1,469 | $ 30.00 | $ 44,074.07 |
| Rock backfill | cubic feet | 19,833 | $ 1.45 | $ 28,758.33 |
| Arch pipe (36" x 23") | lineal feet | 4,508 | $ 150.00 | $ 676,136.36 |
| Geotextile fabric | square feet | 14,000 | $ 2.00 | $ 28,000.00 |
| Impermeable liner (sides) | square feet | 1,341 | $ 2.00 | $ 2,681.96 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 14,000 | $ 1.00 | $ 14,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 162,830 | $ 162,830.15 |
| Land Costs | square feet | 16,000 | $ 4 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 146,547 | $ 146,547.13 |
| Design (20% of Construction) | lump sum | 1 | $ 195,396 | $ 195,396.17 |
| | | | Total | $ 1,382,924.18 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 39,079.23 | $ 39,079.23 |
| | | | Total | $ 39,079.23 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 65,481.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 926.18 |
| Total EUAC | $ 118,569.41 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 1,469 | $ 30.00 | $ 44,074.07 |
| Rock backfill | cubic feet | 19,833 | $ 1.45 | $ 28,758.33 |
| Arch pipe (36" x 23") | lineal feet | 4,508 | $ 150.00 | $ 676,136.36 |
| Geotextile fabric | square feet | 14,000 | $ 2.00 | $ 28,000.00 |
| Impermeable liner (sides) | square feet | 1,341 | $ 2.00 | $ 2,681.96 |
| Inflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 35 | $ 150.00 | $ 5,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 14,000 | $ 1.00 | $ 14,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 162,830 | $ 162,830.15 |
| Land Costs | square feet | 16,000 | $ 4 | $ 64,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 146,547 | $ 146,547.13 |
| Design (20% of Construction) | lump sum | 1 | $ 195,396 | $ 195,396.17 |
| | | | Total | $ 1,382,924.18 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 39,079.23 | $ 39,079.23 |
| | | | Total | $ 39,079.23 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 65,481.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 926.18 |
| Total EUAC | $ 118,569.41 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 28,333 | $ 10.00 | $ 283,333.33 |
| Rock backfill | cubic feet | 510,000 | $ 1.45 | $ 739,500.00 |
| Native planting | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Sand import (6") | cubic yards | 1,889 | $ 10.00 | $ 18,888.89 |
| Contingency (20%) | lump sum | 1 | $ 232,344 | $ 232,344.44 |
| Land Cost | square feet | 160000 | $ 4.00 | $ 640,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 209,110 | $ 209,110.00 |
| Design (20% of Construction) | lump sum | 1 | $ 278,813 | $ 278,813.33 |
| | | | Total | $ 2,521,990.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 116,761.78 | $ 116,761.78 |
| | | | Total | $ 116,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 53,314.67 | $ 53,314.67 |
| | | | Total | $ 53,314.67 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 105,295.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,263.56 |
| Total EUAC | $ 223,320.94 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 28,333 | $ 10.00 | $ 283,333.33 |
| Rock backfill | cubic feet | 510,000 | $ 1.45 | $ 739,500.00 |
| Native planting | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Sand import (6") | cubic yards | 1,889 | $ 10.00 | $ 18,888.89 |
| Contingency (20%) | lump sum | 1 | $ 232,344 | $ 232,344.44 |
| Land Cost | square feet | 160000 | $ 4.00 | $ 640,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 209,110 | $ 209,110.00 |
| Design (20% of Construction) | lump sum | 1 | $ 278,813 | $ 278,813.33 |
| | | | Total | $ 2,521,990.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 116,761.78 | $ 116,761.78 |
| | | | Total | $ 116,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 53,314.67 | $ 53,314.67 |
| | | | Total | $ 53,314.67 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 105,295.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,263.56 |
| Total EUAC | $ 223,320.94 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 28,333 | $ 10.00 | $ 283,333.33 |
| Rock backfill | cubic feet | 510,000 | $ 1.45 | $ 739,500.00 |
| Native planting | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Sand import (6") | cubic yards | 1,889 | $ 10.00 | $ 18,888.89 |
| Contingency (20%) | lump sum | 1 | $ 232,344 | $ 232,344.44 |
| Land Cost | square feet | 160000 | $ 4.00 | $ 640,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 209,110 | $ 209,110.00 |
| Design (20% of Construction) | lump sum | 1 | $ 278,813 | $ 278,813.33 |
| | | | Total | $ 2,521,990.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 116,761.78 | $ 116,761.78 |
| | | | Total | $ 116,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 53,314.67 | $ 53,314.67 |
| | | | Total | $ 53,314.67 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 105,295.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,263.56 |
| Total EUAC | $ 223,320.94 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 28,333 | $ 10.00 | $ 283,333.33 |
| Rock backfill | cubic feet | 510,000 | $ 1.45 | $ 739,500.00 |
| Native planting | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 102,000 | $ 0.50 | $ 51,000.00 |
| Sand import (6") | cubic yards | 1,889 | $ 10.00 | $ 18,888.89 |
| Contingency (20%) | lump sum | 1 | $ 232,344 | $ 232,344.44 |
| Land Cost | square feet | 160000 | $ 4.00 | $ 640,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 209,110 | $ 209,110.00 |
| Design (20% of Construction) | lump sum | 1 | $ 278,813 | $ 278,813.33 |
| | | | Total | $ 2,521,990.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 116,761.78 | $ 116,761.78 |
| | | | Total | $ 116,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 53,314.67 | $ 53,314.67 |
| | | | Total | $ 53,314.67 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 105,295.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,263.56 |
| Total EUAC | $ 223,320.94 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 12,488 | $ 30.00 | $ 374,629.63 |
| Rock backfill | cubic feet | 168,583 | $ 1.45 | $ 244,445.83 |
| Arch pipe (36" x 23") | lineal feet | 38,314 | $ 150.00 | $ 5,747,159.09 |
| Geotextile fabric | square feet | 119,000 | $ 2.00 | $ 238,000.00 |
| Impermeable liner | square feet | 3,910 | $ 2.00 | $ 7,819.18 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 119,000 | $ 1.00 | $ 119,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 1,349,811 | $ 1,349,810.75 |
| Land Costs | square feet | 160,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 1,214,830 | $ 1,214,829.67 |
| Design (20% of Construction) | lump sum | 1 | $ 1,619,773 | $ 1,619,772.90 |
| | | | Total | $ 10,933,467.05 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $126,261.78 | $ 126,261.78 |
| | | | Total | $ 126,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $323,954.58 | $ 323,954.58 |
| | | | Total | $ 323,954.58 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 517,699.66 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 7,677.72 |
| Total EUAC | $ 651,639.16 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 12,488 | $ 30.00 | $ 374,629.63 |
| Rock backfill | cubic feet | 168,583 | $ 1.45 | $ 244,445.83 |
| Arch pipe (36" x 23") | lineal feet | 38,314 | $ 150.00 | $ 5,747,159.09 |
| Geotextile fabric | square feet | 119,000 | $ 2.00 | $ 238,000.00 |
| Impermeable liner | square feet | 3,910 | $ 2.00 | $ 7,819.18 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 119,000 | $ 1.00 | $ 119,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 1,349,811 | $ 1,349,810.75 |
| Land Costs | square feet | 160,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 1,214,830 | $ 1,214,829.67 |
| Design (20% of Construction) | lump sum | 1 | $ 1,619,773 | $ 1,619,772.90 |
| | | | Total | $ 10,933,467.05 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 126,261.78 | $ 126,261.78 |
| | | | Total | $ 126,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 323,954.58 | $ 323,954.58 |
| | | | Total | $ 323,954.58 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 517,699.66 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 7,677.72 |
| Total EUAC | $ 651,639.16 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 12,488 | $ 30.00 | $ 374,629.63 |
| Rock backfill | cubic feet | 168,583 | $ 1.45 | $ 244,445.83 |
| Arch pipe (36" x 23") | lineal feet | 38,314 | $ 150.00 | $ 5,747,159.09 |
| Geotextile fabric | square feet | 119,000 | $ 2.00 | $ 238,000.00 |
| Impermeable liner | square feet | 3,910 | $ 2.00 | $ 7,819.18 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 119,000 | $ 1.00 | $ 119,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 1,349,811 | $ 1,349,810.75 |
| Land Costs | square feet | 160,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 1,214,830 | $ 1,214,829.67 |
| Design (20% of Construction) | lump sum | 1 | $ 1,619,773 | $ 1,619,772.90 |
| | | | Total | $ 10,933,467.05 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 126,261.78 | $ 126,261.78 |
| | | | Total | $ 126,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 323,954.58 | $ 323,954.58 |
| | | | Total | $ 323,954.58 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 517,699.66 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 7,677.72 |
| Total EUAC | $ 651,639.16 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 12,488 | $ 30.00 | $ 374,629.63 |
| Rock backfill | cubic feet | 168,583 | $ 1.45 | $ 244,445.83 |
| Arch pipe (36" x 23") | lineal feet | 38,314 | $ 150.00 | $ 5,747,159.09 |
| Geotextile fabric | square feet | 119,000 | $ 2.00 | $ 238,000.00 |
| Impermeable liner | square feet | 3,910 | $ 2.00 | $ 7,819.18 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 119,000 | $ 1.00 | $ 119,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 1,349,811 | $ 1,349,810.75 |
| Land Costs | square feet | 160,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 1,214,830 | $ 1,214,829.67 |
| Design (20% of Construction) | lump sum | 1 | $ 1,619,773 | $ 1,619,772.90 |
| | | | Total | $ 10,933,467.05 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 126,261.78 | $ 126,261.78 |
| | | | Total | $ 126,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 323,954.58 | $ 323,954.58 |
| | | | Total | $ 323,954.58 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 517,699.66 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 7,677.72 |
| Total EUAC | $ 651,639.16 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.09 | $ 20,000.00 | $ 1,836.55 |
| Excavate & offhaul | cubic yards | 296 | $ 30.00 | $ 8,888.89 |
| Impermeable liner | square feet | 6,000 | $ 2.00 | $ 12,000.00 |
| Rock backfill | cubic feet | 3,000 | $ 1.45 | $ 4,350.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 2,727 | $ 75.00 | $ 204,545.45 |
| Landscaping | square feet | 4,000 | $ 1.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 50,424.18 | $ 50,424.18 |
| Contingency (20%) | lump sum | 1 | $ 60,509 | $ 60,509.01 |
| Land Costs | square feet | 4,000 | $ 3 | $ 12,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 54,458 | $ 54,458.11 |
| Design (20% of Construction) | lump sum | 1 | $ 72,611 | $ 72,610.82 |
| | | | Total | $ 502,123.01 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 14,522.16 | $ 14,522.16 |
| | | | Total | $ 14,522.16 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 23,775.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 344.18 |
| Total EUAC | $ 73,981.48 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.09 | $ 20,000.00 | $ 1,836.55 |
| Excavate & offhaul | cubic yards | 296 | $ 30.00 | $ 8,888.89 |
| Impermeable liner | square feet | 6,000 | $ 2.00 | $ 12,000.00 |
| Rock backfill | cubic feet | 3,000 | $ 1.45 | $ 4,350.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 2,727 | $ 75.00 | $ 204,545.45 |
| Landscaping | square feet | 4,000 | $ 1.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 50,424.18 | $ 50,424.18 |
| Contingency (20%) | lump sum | 1 | $ 60,509 | $ 60,509.01 |
| Land Costs | square feet | 4,000 | $ 3 | $ 12,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 54,458 | $ 54,458.11 |
| Design (20% of Construction) | lump sum | 1 | $ 72,611 | $ 72,610.82 |
| | | | Total | $ 502,123.01 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 14,522.16 | $ 14,522.16 |
| | | | Total | $ 14,522.16 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 23,775.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 344.18 |
| Total EUAC | $ 73,981.48 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.09 | $ 20,000.00 | $ 1,836.55 |
| Excavate & offhaul | cubic yards | 296 | $ 30.00 | $ 8,888.89 |
| Impermeable liner | square feet | 6,000 | $ 2.00 | $ 12,000.00 |
| Rock backfill | cubic feet | 3,000 | $ 1.45 | $ 4,350.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 2,727 | $ 75.00 | $ 204,545.45 |
| Landscaping | square feet | 4,000 | $ 1.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 50,424.18 | $ 50,424.18 |
| Contingency (20%) | lump sum | 1 | $ 60,509 | $ 60,509.01 |
| Land Costs | square feet | 4,000 | $ 3 | $ 12,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 54,458 | $ 54,458.11 |
| Design (20% of Construction) | lump sum | 1 | $ 72,611 | $ 72,610.82 |
| | | | Total | $ 502,123.01 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 14,522.16 | $ 14,522.16 |
| | | | Total | $ 14,522.16 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 23,775.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 344.18 |
| Total EUAC | $ 73,981.48 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.09 | $ 20,000.00 | $ 1,836.55 |
| Excavate & offhaul | cubic yards | 296 | $ 30.00 | $ 8,888.89 |
| Impermeable liner | square feet | 6,000 | $ 2.00 | $ 12,000.00 |
| Rock backfill | cubic feet | 3,000 | $ 1.45 | $ 4,350.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 2,727 | $ 75.00 | $ 204,545.45 |
| Landscaping | square feet | 4,000 | $ 1.00 | $ 4,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 40 | $ 100.00 | $ 4,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 50,424.18 | $ 50,424.18 |
| Contingency (20%) | lump sum | 1 | $ 60,509 | $ 60,509.01 |
| Land Costs | square feet | 4,000 | $ 3 | $ 12,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 54,458 | $ 54,458.11 |
| Design (20% of Construction) | lump sum | 1 | $ 72,611 | $ 72,610.82 |
| | | | Total | $ 502,123.01 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 14,522.16 | $ 14,522.16 |
| | | | Total | $ 14,522.16 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 23,775.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 344.18 |
| Total EUAC | $ 73,981.48 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.16 | $ 20,000.00 | $ 3,213.96 |
| Excavate & offhaul | cubic yards | 519 | $ 30.00 | $ 15,555.56 |
| Impermeable liner | square feet | 10,500 | $ 2.00 | $ 21,000.00 |
| Rock backfill | cubic feet | 5,250 | $ 1.45 | $ 7,612.50 |
| Perf. Arch pipes (18" x 11") | lineal feet | 4,773 | $ 75.00 | $ 357,954.55 |
| Landscaping | square feet | 7,000 | $ 1.00 | $ 7,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 800 | $ 150.00 | $ 120,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 109,967.31 | $ 109,967.31 |
| Contingency (20%) | lump sum | 1 | $ 131,961 | $ 131,960.77 |
| Land Costs | square feet | 7,000 | $ 3 | $ 21,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 118,765 | $ 118,764.70 |
| Design (20% of Construction) | lump sum | 1 | $ 158,353 | $ 158,352.93 |
| | | | Total | $ 1,089,882.27 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 31,670.59 | $ 31,670.59 |
| | | | Total | $ 31,670.59 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 51,605.93 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 750.59 |
| Total EUAC | ######### |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.16 | $ 20,000.00 | $ 3,213.96 |
| Excavate & offhaul | cubic yards | 519 | $ 30.00 | $ 15,555.56 |
| Impermeable liner | square feet | 10,500 | $ 2.00 | $ 21,000.00 |
| Rock backfill | cubic feet | 5,250 | $ 1.45 | $ 7,612.50 |
| Perf. Arch pipes (18" x 11") | lineal feet | 4,773 | $ 75.00 | $ 357,954.55 |
| Landscaping | square feet | 7,000 | $ 1.00 | $ 7,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 800 | $ 150.00 | $ 120,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 109,967.31 | $ 109,967.31 |
| Contingency (20%) | lump sum | 1 | $ 131,961 | $ 131,960.77 |
| Land Costs | square feet | 7,000 | $ 3 | $ 21,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 118,765 | $ 118,764.70 |
| Design (20% of Construction) | lump sum | 1 | $ 158,353 | $ 158,352.93 |
| | | | Total | $ 1,089,882.27 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 31,670.59 | $ 31,670.59 |
| | | | Total | $ 31,670.59 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 51,605.93 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 750.59 |
| Total EUAC | ######### |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.16 | $ 20,000.00 | $ 3,213.96 |
| Excavate & offhaul | cubic yards | 519 | $ 30.00 | $ 15,555.56 |
| Impermeable liner | square feet | 10,500 | $ 2.00 | $ 21,000.00 |
| Rock backfill | cubic feet | 5,250 | $ 1.45 | $ 7,612.50 |
| Perf. Arch pipes (18" x 11") | lineal feet | 4,773 | $ 75.00 | $ 357,954.55 |
| Landscaping | square feet | 7,000 | $ 1.00 | $ 7,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 800 | $ 150.00 | $ 120,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 109,967.31 | $ 109,967.31 |
| Contingency (20%) | lump sum | 1 | $ 131,961 | $ 131,960.77 |
| Land Costs | square feet | 7,000 | $ 3 | $ 21,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 118,765 | $ 118,764.70 |
| Design (20% of Construction) | lump sum | 1 | $ 158,353 | $ 158,352.93 |
| | | | Total | $ 1,089,882.27 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 31,670.59 | $ 31,670.59 |
| | | | Total | $ 31,670.59 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 51,605.93 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 750.59 |
| Total EUAC | ######### |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.16 | $ 20,000.00 | $ 3,213.96 |
| Excavate & offhaul | cubic yards | 519 | $ 30.00 | $ 15,555.56 |
| Impermeable liner | square feet | 10,500 | $ 2.00 | $ 21,000.00 |
| Rock backfill | cubic feet | 5,250 | $ 1.45 | $ 7,612.50 |
| Perf. Arch pipes (18" x 11") | lineal feet | 4,773 | $ 75.00 | $ 357,954.55 |
| Landscaping | square feet | 7,000 | $ 1.00 | $ 7,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 800 | $ 150.00 | $ 120,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 109,967.31 | $ 109,967.31 |
| Contingency (20%) | lump sum | 1 | $ 131,961 | $ 131,960.77 |
| Land Costs | square feet | 7,000 | $ 3 | $ 21,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 118,765 | $ 118,764.70 |
| Design (20% of Construction) | lump sum | 1 | $ 158,353 | $ 158,352.93 |
| | | | Total | $ 1,089,882.27 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,861.78 | $ 49,861.78 |
| | | | Total | $ 49,861.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 31,670.59 | $ 31,670.59 |
| | | | Total | $ 31,670.59 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 51,605.93 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 750.59 |
| Total EUAC | ######### |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 7,346 | $ 30.00 | $ 220,370.37 |
| Rock backfill | cubic feet | 99,167 | $ 1.45 | $ 143,791.67 |
| Arch pipe (36" x 23") | lineal feet | 22,538 | $ 150.00 | $ 3,380,681.82 |
| Geotextile fabric | square feet | 70,000 | $ 2.00 | $ 140,000.00 |
| Impermeable liner | square feet | 2,999 | $ 2.00 | $ 5,997.04 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 70,000 | $ 1.00 | $ 70,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 798,668 | $ 798,668.18 |
| Land Costs | square feet | 70,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 718,801 | $ 718,801.36 |
| Design (20% of Construction) | lump sum | 1 | $ 958,402 | $ 958,401.81 |
| | | | Total | $ 6,469,212.24 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 82,761.78 | $ 82,761.78 |
| | | | Total | $ 82,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 191,680.36 | $ 191,680.36 |
| | | | Total | $ 191,680.36 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 306,317.20 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 4,542.82 |
| Total EUAC | $ 393,621.80 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 7,346 | $ 30.00 | $ 220,370.37 |
| Rock backfill | cubic feet | 99,167 | $ 1.45 | $ 143,791.67 |
| Arch pipe (36" x 23") | lineal feet | 22,538 | $ 150.00 | $ 3,380,681.82 |
| Geotextile fabric | square feet | 70,000 | $ 2.00 | $ 140,000.00 |
| Impermeable liner | square feet | 2,999 | $ 2.00 | $ 5,997.04 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 70,000 | $ 1.00 | $ 70,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 798,668 | $ 798,668.18 |
| Land Costs | square feet | 70,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 718,801 | $ 718,801.36 |
| Design (20% of Construction) | lump sum | 1 | $ 958,402 | $ 958,401.81 |
| | | | Total | $ 6,469,212.24 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 82,761.78 | $ 82,761.78 |
| | | | Total | $ 82,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 191,680.36 | $ 191,680.36 |
| | | | Total | $ 191,680.36 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 306,317.20 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 4,542.82 |
| Total EUAC | $ 393,621.80 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 7,346 | $ 30.00 | $ 220,370.37 |
| Rock backfill | cubic feet | 99,167 | $ 1.45 | $ 143,791.67 |
| Arch pipe (36" x 23") | lineal feet | 22,538 | $ 150.00 | $ 3,380,681.82 |
| Geotextile fabric | square feet | 70,000 | $ 2.00 | $ 140,000.00 |
| Impermeable liner | square feet | 2,999 | $ 2.00 | $ 5,997.04 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 70,000 | $ 1.00 | $ 70,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 798,668 | $ 798,668.18 |
| Administration (15% of Construction) | lump sum | 1 | $ 718,801 | $ 718,801.36 |
| Design (20% of Construction) | lump sum | 1 | $ 958,402 | $ 958,401.81 |
| | | | Total | $ 6,469,212.24 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 82,761.78 | $ 82,761.78 |
| | | | Total | $ 82,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $191,680.36 | $ 191,680.36 |
| | | | Total | $ 191,680.36 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 306,317.20 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 4,542.82 |
| Total EUAC | $ 393,621.80 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 7,346 | $ 30.00 | $ 220,370.37 |
| Rock backfill | cubic feet | 99,167 | $ 1.45 | $ 143,791.67 |
| Arch pipe (36" x 23") | lineal feet | 22,538 | $ 150.00 | $ 3,380,681.82 |
| Geotextile fabric | square feet | 70,000 | $ 2.00 | $ 140,000.00 |
| Impermeable liner | square feet | 2,999 | $ 2.00 | $ 5,997.04 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Overflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 70,000 | $ 1.00 | $ 70,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 798,668 | $ 798,668.18 |
| Land Costs | square feet | 70,000 | $ - | $ - |
| Administration (15% of Construction) | lump sum | 1 | $ 718,801 | $ 718,801.36 |
| Design (20% of Construction) | lump sum | 1 | $ 958,402 | $ 958,401.81 |
| | | | Total | $ 6,469,212.24 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 82,761.78 | $ 82,761.78 |
| | | | Total | $ 82,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 191,680.36 | $ 191,680.36 |
| | | | Total | $ 191,680.36 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 306,317.20 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 4,542.82 |
| Total EUAC | $ 393,621.80 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.07 | $ 20,000.00 | $ 1,331.50 |
| Excavate & offhaul | cubic yards | 215 | $ 30.00 | $ 6,444.44 |
| Impermeable liner | square feet | 4,350 | $ 2.00 | $ 8,700.00 |
| Rock backfill | cubic feet | 2,175 | $ 1.45 | $ 3,153.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,977 | $ 75.00 | $ 148,295.45 |
| Landscaping | square feet | 2,900 | $ 1.00 | $ 2,900.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 38,915.03 | $ 38,915.03 |
| Contingency (20%) | lump sum | 1 | $ 46,698 | $ 46,698.03 |
| Land Costs | square feet | 2,900 | $ 3 | $ 8,700.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,028 | $ 42,028.23 |
| Design (20% of Construction) | lump sum | 1 | $ 56,038 | $ 56,037.64 |
| | | | Total | $ 386,954.08 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,561.78 | $ 49,561.78 |
| | | | Total | $ 49,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,207.53 | $ 11,207.53 |
| | | | Total | $ 11,207.53 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 18,322.28 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 265.62 |
| Total EUAC | $ 68,149.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.07 | $ 20,000.00 | $ 1,331.50 |
| Excavate & offhaul | cubic yards | 215 | $ 30.00 | $ 6,444.44 |
| Impermeable liner | square feet | 4,350 | $ 2.00 | $ 8,700.00 |
| Rock backfill | cubic feet | 2,175 | $ 1.45 | $ 3,153.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,977 | $ 75.00 | $ 148,295.45 |
| Landscaping | square feet | 2,900 | $ 1.00 | $ 2,900.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 38,915.03 | $ 38,915.03 |
| Contingency (20%) | lump sum | 1 | $ 46,698 | $ 46,698.03 |
| Land Costs | square feet | 2,900 | $ 3 | $ 8,700.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,028 | $ 42,028.23 |
| Design (20% of Construction) | lump sum | 1 | $ 56,038 | $ 56,037.64 |
| | | | Total | $ 386,954.08 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,561.78 | $ 49,561.78 |
| | | | Total | $ 49,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,207.53 | $ 11,207.53 |
| | | | Total | $ 11,207.53 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 18,322.28 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 265.62 |
| Total EUAC | $ 68,149.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.07 | $ 20,000.00 | $ 1,331.50 |
| Excavate & offhaul | cubic yards | 215 | $ 30.00 | $ 6,444.44 |
| Impermeable liner | square feet | 4,350 | $ 2.00 | $ 8,700.00 |
| Rock backfill | cubic feet | 2,175 | $ 1.45 | $ 3,153.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,977 | $ 75.00 | $ 148,295.45 |
| Landscaping | square feet | 2,900 | $ 1.00 | $ 2,900.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 38,915.03 | $ 38,915.03 |
| Contingency (20%) | lump sum | 1 | $ 46,698 | $ 46,698.03 |
| Land Costs | square feet | 2,900 | $ 3 | $ 8,700.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,028 | $ 42,028.23 |
| Design (20% of Construction) | lump sum | 1 | $ 56,038 | $ 56,037.64 |
| | | | Total | $ 386,954.08 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,561.78 | $ 49,561.78 |
| | | | Total | $ 49,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,207.53 | $ 11,207.53 |
| | | | Total | $ 11,207.53 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 18,322.28 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 265.62 |
| Total EUAC | $ 68,149.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.07 | $ 20,000.00 | $ 1,331.50 |
| Excavate & offhaul | cubic yards | 215 | $ 30.00 | $ 6,444.44 |
| Impermeable liner | square feet | 4,350 | $ 2.00 | $ 8,700.00 |
| Rock backfill | cubic feet | 2,175 | $ 1.45 | $ 3,153.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,977 | $ 75.00 | $ 148,295.45 |
| Landscaping | square feet | 2,900 | $ 1.00 | $ 2,900.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (24" RCP) | lineal feet | 75 | $ 150.00 | $ 11,250.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 38,915.03 | $ 38,915.03 |
| Contingency (20%) | lump sum | 1 | $ 46,698 | $ 46,698.03 |
| Land Costs | square feet | 2,900 | $ 3 | $ 8,700.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,028 | $ 42,028.23 |
| Design (20% of Construction) | lump sum | 1 | $ 56,038 | $ 56,037.64 |
| | | | Total | $ 386,954.08 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 49,561.78 | $ 49,561.78 |
| | | | Total | $ 49,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,207.53 | $ 11,207.53 |
| | | | Total | $ 11,207.53 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 18,322.28 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 265.62 |
| Total EUAC | $ 68,149.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,000 | $ 10.00 | $ 50,000.00 |
| Rock backfill | cubic feet | 90,000 | $ 1.45 | $ 130,500.00 |
| Native planting | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 200.00 | $ 18,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 200.00 | $ 9,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Sand import (6") | cubic yards | 333 | $ 10.00 | $ 3,333.33 |
| Contingency (20%) | lump sum | 1 | $ 47,767 | $ 47,766.67 |
| Land Cost | square feet | 40,000 | $ 4.00 | $ 160,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,990 | $ 42,990.00 |
| Design (20% of Construction) | lump sum | 1 | $ 57,320 | $ 57,320.00 |
| | | | Total | $ 546,910.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,032.00 | $ 11,032.00 |
| | | | Total | $ 11,032.00 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 22,834.04 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 261.46 |
| Total EUAC | $ 53,357.27 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,000 | $ 10.00 | $ 50,000.00 |
| Rock backfill | cubic feet | 90,000 | $ 1.45 | $ 130,500.00 |
| Native planting | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 200.00 | $ 18,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 200.00 | $ 9,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Sand import (6") | cubic yards | 333 | $ 10.00 | $ 3,333.33 |
| Contingency (20%) | lump sum | 1 | $ 47,767 | $ 47,766.67 |
| Land Cost | square feet | 40,000 | $ 4.00 | $ 160,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,990 | $ 42,990.00 |
| Design (20% of Construction) | lump sum | 1 | $ 57,320 | $ 57,320.00 |
| | | | Total | $ 546,910.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,032.00 | $ 11,032.00 |
| | | | Total | $ 11,032.00 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 22,834.04 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 261.46 |
| Total EUAC | $ 53,357.27 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,000 | $ 10.00 | $ 50,000.00 |
| Rock backfill | cubic feet | 90,000 | $ 1.45 | $ 130,500.00 |
| Native planting | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 200.00 | $ 18,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 200.00 | $ 9,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Sand import (6") | cubic yards | 333 | $ 10.00 | $ 3,333.33 |
| Contingency (20%) | lump sum | 1 | $ 47,767 | $ 47,766.67 |
| Land Cost | square feet | 40,000 | $ 4.00 | $ 160,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,990 | $ 42,990.00 |
| Design (20% of Construction) | lump sum | 1 | $ 57,320 | $ 57,320.00 |
| | | | Total | $ 546,910.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,032.00 | $ 11,032.00 |
| | | | Total | $ 11,032.00 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 22,834.04 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 261.46 |
| Total EUAC (3%) | $ 53,357.27 |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,000 | $ 10.00 | $ 50,000.00 |
| Rock backfill | cubic feet | 90,000 | $ 1.45 | $ 130,500.00 |
| Native planting | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 200.00 | $ 18,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 200.00 | $ 9,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 18,000 | $ 0.50 | $ 9,000.00 |
| Sand import (6") | cubic yards | 333 | $ 10.00 | $ 3,333.33 |
| Contingency (20%) | lump sum | 1 | $ 47,767 | $ 47,766.67 |
| Land Cost | square feet | 40,000 | $ 4.00 | $ 160,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 42,990 | $ 42,990.00 |
| Design (20% of Construction) | lump sum | 1 | $ 57,320 | $ 57,320.00 |
| | | | Total | $ 546,910.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 30,261.78 | $ 30,261.78 |
| | | | Total | $ 30,261.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 11,032.00 | $ 11,032.00 |
| | | | Total | $ 11,032.00 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 22,834.04 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 261.46 |
| Total EUAC | $ 53,357.27 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,309 | $ 30.00 | $ 69,259.26 |
| Rock backfill | cubic feet | 31,167 | $ 1.45 | $ 45,191.67 |
| Arch pipe (36" x 23") | lineal feet | 7,083 | $ 150.00 | $ 1,062,500.00 |
| Geotextile fabric | square feet | 22,000 | $ 2.00 | $ 44,000.00 |
| Impermeable liner | square feet | 1,681 | $ 2.00 | $ 3,362.01 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 150.00 | $ 13,500.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 150.00 | $ 6,750.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,000 | $ 1.00 | $ 22,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 255,313 | $ 255,312.59 |
| Land Cost | square feet | 40,000 | $ 3.00 | $ 120,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 229,781 | $ 229,781.33 |
| Design (20% of Construction) | lump sum | 1 | $ 306,375 | $ 306,375.10 |
| | | | Total | $ 2,188,031.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 61,275.02 | $ 61,275.02 |
| | | | Total | $ 61,275.02 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 103,603.31 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,452.22 |
| Total EUAC | $ 157,217.31 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,309 | $ 30.00 | $ 69,259.26 |
| Rock backfill | cubic feet | 31,167 | $ 1.45 | $ 45,191.67 |
| Arch pipe (36" x 23") | lineal feet | 7,083 | $ 150.00 | $ 1,062,500.00 |
| Geotextile fabric | square feet | 22,000 | $ 2.00 | $ 44,000.00 |
| Impermeable liner | square feet | 1,681 | $ 2.00 | $ 3,362.01 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 150.00 | $ 13,500.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 150.00 | $ 6,750.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,000 | $ 1.00 | $ 22,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 255,313 | $ 255,312.59 |
| Land Cost | square feet | 40,000 | $ 3.00 | $ 120,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 229,781 | $ 229,781.33 |
| Design (20% of Construction) | lump sum | 1 | $ 306,375 | $ 306,375.10 |
| | | | Total | $ 2,188,031.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 61,275.02 | $ 61,275.02 |
| | | | Total | $ 61,275.02 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 103,603.31 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,452.22 |
| Total EUAC | $ 157,217.31 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,309 | $ 30.00 | $ 69,259.26 |
| Rock backfill | cubic feet | 31,167 | $ 1.45 | $ 45,191.67 |
| Arch pipe (36" x 23") | lineal feet | 7,083 | $ 150.00 | $ 1,062,500.00 |
| Geotextile fabric | square feet | 22,000 | $ 2.00 | $ 44,000.00 |
| Impermeable liner | square feet | 1,681 | $ 2.00 | $ 3,362.01 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 150.00 | $ 13,500.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 150.00 | $ 6,750.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,000 | $ 1.00 | $ 22,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 255,313 | $ 255,312.59 |
| Land Cost | square feet | 40,000 | $ 3.00 | $ 120,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 229,781 | $ 229,781.33 |
| Design (20% of Construction) | lump sum | 1 | $ 306,375 | $ 306,375.10 |
| | | | Total | $ 2,188,031.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 61,275.02 | $ 61,275.02 |
| | | | Total | $ 61,275.02 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 103,603.31 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,452.22 |
| Total EUAC | $ 157,217.31 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,309 | $ 30.00 | $ 69,259.26 |
| Rock backfill | cubic feet | 31,167 | $ 1.45 | $ 45,191.67 |
| Arch pipe (36" x 23") | lineal feet | 7,083 | $ 150.00 | $ 1,062,500.00 |
| Geotextile fabric | square feet | 22,000 | $ 2.00 | $ 44,000.00 |
| Impermeable liner | square feet | 1,681 | $ 2.00 | $ 3,362.01 |
| Inflow pipe (36" RCP) | lineal feet | 90 | $ 150.00 | $ 13,500.00 |
| Overflow pipe (36" RCP) | lineal feet | 45 | $ 150.00 | $ 6,750.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,000 | $ 1.00 | $ 22,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 255,313 | $ 255,312.59 |
| Land Cost | square feet | 40,000 | $ 3.00 | $ 120,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 229,781 | $ 229,781.33 |
| Design (20% of Construction) | lump sum | 1 | $ 306,375 | $ 306,375.10 |
| | | | Total | $ 2,188,031.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 61,275.02 | $ 61,275.02 |
| | | | Total | $ 61,275.02 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 103,603.31 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,452.22 |
| Total EUAC | $ 157,217.31 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 463 | $ 35.00 | $ 16,203.70 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,574 | $ 30.00 | $ 47,222.22 |
| Rock backfill | cubic feet | 21,250 | $ 1.45 | $ 30,812.50 |
| Arch pipe (36" x 23") | lineal feet | 4,830 | $ 150.00 | $ 724,431.82 |
| Geotextile fabric | square feet | 15,000 | $ 2.00 | $ 30,000.00 |
| Impermeable liner | square feet | 1,388 | $ 2.00 | $ 2,776.09 |
| Inflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Overflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 15,000 | $ 2.50 | $ 37,500.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 183,789 | $ 183,789.27 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 165,410 | $ 165,410.34 |
| Design (20% of Construction) | lump sum | 1 | $ 220,547 | $ 220,547.12 |
| | | | Total | $ 1,680,693.06 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 79,580.82 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 134,287.99 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 463 | $ 35.00 | $ 16,203.70 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,574 | $ 30.00 | $ 47,222.22 |
| Rock backfill | cubic feet | 21,250 | $ 1.45 | $ 30,812.50 |
| Arch pipe (36" x 23") | lineal feet | 4,830 | $ 150.00 | $ 724,431.82 |
| Geotextile fabric | square feet | 15,000 | $ 2.00 | $ 30,000.00 |
| Impermeable liner | square feet | 1,388 | $ 2.00 | $ 2,776.09 |
| Inflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Overflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 15,000 | $ 2.50 | $ 37,500.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 183,789 | $ 183,789.27 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 165,410 | $ 165,410.34 |
| Design (20% of Construction) | lump sum | 1 | $ 220,547 | $ 220,547.12 |
| | | | Total | $ 1,680,693.06 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 79,580.82 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 134,287.99 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 463 | $ 35.00 | $ 16,203.70 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,574 | $ 30.00 | $ 47,222.22 |
| Rock backfill | cubic feet | 21,250 | $ 1.45 | $ 30,812.50 |
| Arch pipe (36" x 23") | lineal feet | 4,830 | $ 150.00 | $ 724,431.82 |
| Geotextile fabric | square feet | 15,000 | $ 2.00 | $ 30,000.00 |
| Impermeable liner | square feet | 1,388 | $ 2.00 | $ 2,776.09 |
| Inflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Overflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 15,000 | $ 2.50 | $ 37,500.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 183,789 | $ 183,789.27 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 165,410 | $ 165,410.34 |
| Design (20% of Construction) | lump sum | 1 | $ 220,547 | $ 220,547.12 |
| | | | Total | $ 1,680,693.06 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 79,580.82 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 134,287.99 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 463 | $ 35.00 | $ 16,203.70 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,574 | $ 30.00 | $ 47,222.22 |
| Rock backfill | cubic feet | 21,250 | $ 1.45 | $ 30,812.50 |
| Arch pipe (36" x 23") | lineal feet | 4,830 | $ 150.00 | $ 724,431.82 |
| Geotextile fabric | square feet | 15,000 | $ 2.00 | $ 30,000.00 |
| Impermeable liner | square feet | 1,388 | $ 2.00 | $ 2,776.09 |
| Inflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Overflow pipe (48" RCP) | lineal feet | 30 | $ 250.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 15,000 | $ 2.50 | $ 37,500.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 183,789 | $ 183,789.27 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 165,410 | $ 165,410.34 |
| Design (20% of Construction) | lump sum | 1 | $ 220,547 | $ 220,547.12 |
| | | | Total | $ 1,680,693.06 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 79,580.82 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 134,287.99 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,556 | $ 10.00 | $ 25,555.56 |
| Rock backfill | cubic feet | 46,000 | $ 1.45 | $ 66,700.00 |
| Native planting | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Sand import (6") | cubic yards | 170 | $ 10.00 | $ 1,703.70 |
| Contingency (20%) | lump sum | 1 | $ 25,632 | $ 25,631.85 |
| Land Cost | square feet | 16,000 | $ 16.00 | $ 256,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,069 | $ 23,068.67 |
| Design (20% of Construction) | lump sum | 1 | $ 30,758 | $ 30,758.22 |
| | | | Total | $ 463,618.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 31,561.78 | $ 31,561.78 |
| | | | Total | $ 31,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 5,930.84 | $ 5,930.84 |
| | | | Total | $ 5,930.84 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 19,356.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 140.56 |
| Total EUAC | $ 51,058.85 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,556 | $ 10.00 | $ 25,555.56 |
| Rock backfill | cubic feet | 46,000 | $ 1.45 | $ 66,700.00 |
| Native planting | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Sand import (6") | cubic yards | 170 | $ 10.00 | $ 1,703.70 |
| Contingency (20%) | lump sum | 1 | $ 25,632 | $ 25,631.85 |
| Land Cost | square feet | 16,000 | $ 16.00 | $ 256,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,069 | $ 23,068.67 |
| Design (20% of Construction) | lump sum | 1 | $ 30,758 | $ 30,758.22 |
| | | | Total | $ 463,618.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 31,561.78 | $ 31,561.78 |
| | | | Total | $ 31,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 5,930.84 | $ 5,930.84 |
| | | | Total | $ 5,930.84 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 19,356.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 140.56 |
| Total EUAC | $ 51,058.85 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,556 | $ 10.00 | $ 25,555.56 |
| Rock backfill | cubic feet | 46,000 | $ 1.45 | $ 66,700.00 |
| Native planting | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Sand import (6") | cubic yards | 170 | $ 10.00 | $ 1,703.70 |
| Contingency (20%) | lump sum | 1 | $ 25,632 | $ 25,631.85 |
| Land Cost | square feet | 16,000 | $ 16.00 | $ 256,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,069 | $ 23,068.67 |
| Design (20% of Construction) | lump sum | 1 | $ 30,758 | $ 30,758.22 |
| | | | Total | $ 463,618.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 31,561.78 | $ 31,561.78 |
| | | | Total | $ 31,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 5,930.84 | $ 5,930.84 |
| | | | Total | $ 5,930.84 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 19,356.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 140.56 |
| Total EUAC | $ 51,058.85 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 2,556 | $ 10.00 | $ 25,555.56 |
| Rock backfill | cubic feet | 46,000 | $ 1.45 | $ 66,700.00 |
| Native planting | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 9,200 | $ 0.50 | $ 4,600.00 |
| Sand import (6") | cubic yards | 170 | $ 10.00 | $ 1,703.70 |
| Contingency (20%) | lump sum | 1 | $ 25,632 | $ 25,631.85 |
| Land Cost | square feet | 16,000 | $ 16.00 | $ 256,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,069 | $ 23,068.67 |
| Design (20% of Construction) | lump sum | 1 | $ 30,758 | $ 30,758.22 |
| | | | Total | $ 463,618.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 31,561.78 | $ 31,561.78 |
| | | | Total | $ 31,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 5,930.84 | $ 5,930.84 |
| | | | Total | $ 5,930.84 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 19,356.52 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 140.56 |
| Total EUAC | $ 51,058.85 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 494 | $ 35.00 | $ 17,283.95 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,679 | $ 30.00 | $ 50,370.37 |
| Rock backfill | cubic feet | 22,667 | $ 1.45 | $ 32,866.67 |
| Arch pipe (36" x 23") | lineal feet | 5,152 | $ 150.00 | $ 772,727.27 |
| Geotextile fabric | square feet | 16,000 | $ 2.00 | $ 32,000.00 |
| Impermeable liner | square feet | 1,434 | $ 2.00 | $ 2,867.13 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 16,000 | $ 2.50 | $ 40,000.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 195,623 | $ 195,623.08 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 176,061 | $ 176,060.77 |
| Design (20% of Construction) | lump sum | 1 | $ 234,748 | $ 234,747.69 |
| | | | Total | $ 1,776,546.94 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 84,119.50 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 138,826.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 494 | $ 35.00 | $ 17,283.95 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,679 | $ 30.00 | $ 50,370.37 |
| Rock backfill | cubic feet | 22,667 | $ 1.45 | $ 32,866.67 |
| Arch pipe (36" x 23") | lineal feet | 5,152 | $ 150.00 | $ 772,727.27 |
| Geotextile fabric | square feet | 16,000 | $ 2.00 | $ 32,000.00 |
| Impermeable liner | square feet | 1,434 | $ 2.00 | $ 2,867.13 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 16,000 | $ 2.50 | $ 40,000.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 195,623 | $ 195,623.08 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 176,061 | $ 176,060.77 |
| Design (20% of Construction) | lump sum | 1 | $ 234,748 | $ 234,747.69 |
| | | | Total | $ 1,776,546.94 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 84,119.50 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 138,826.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 494 | $ 35.00 | $ 17,283.95 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,679 | $ 30.00 | $ 50,370.37 |
| Rock backfill | cubic feet | 22,667 | $ 1.45 | $ 32,866.67 |
| Arch pipe (36" x 23") | lineal feet | 5,152 | $ 150.00 | $ 772,727.27 |
| Geotextile fabric | square feet | 16,000 | $ 2.00 | $ 32,000.00 |
| Impermeable liner | square feet | 1,434 | $ 2.00 | $ 2,867.13 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 16,000 | $ 2.50 | $ 40,000.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 195,623 | $ 195,623.08 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 176,061 | $ 176,060.77 |
| Design (20% of Construction) | lump sum | 1 | $ 234,748 | $ 234,747.69 |
| | | | Total | $ 1,776,546.94 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 84,119.50 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 138,826.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 494 | $ 35.00 | $ 17,283.95 |
| Excavate & offhaul pavement subgrade area | cubic yards | 1,679 | $ 30.00 | $ 50,370.37 |
| Rock backfill | cubic feet | 22,667 | $ 1.45 | $ 32,866.67 |
| Arch pipe (36" x 23") | lineal feet | 5,152 | $ 150.00 | $ 772,727.27 |
| Geotextile fabric | square feet | 16,000 | $ 2.00 | $ 32,000.00 |
| Impermeable liner | square feet | 1,434 | $ 2.00 | $ 2,867.13 |
| Inflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Overflow pipe (24" RCP) | lineal feet | 50 | $ 150.00 | $ 7,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Pavement restoration/landscaping | square feet | 16,000 | $ 2.50 | $ 40,000.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 195,623 | $ 195,623.08 |
| Land Cost | square feet | 16,000 | $ 12.00 | $ 192,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 176,061 | $ 176,060.77 |
| Design (20% of Construction) | lump sum | 1 | $ 234,748 | $ 234,747.69 |
| | | | Total | $ 1,776,546.94 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 53,661.78 | $ 53,661.78 |
| | | | Total | $ 53,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 44,109.42 | $ 44,109.42 |
| | | | Total | $ 44,109.42 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 84,119.50 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,045.39 |
| Total EUAC | $ 138,826.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,917 | $ 10.00 | $ 59,166.67 |
| Rock backfill | cubic feet | 106,500 | $ 1.45 | $ 154,425.00 |
| Native planting | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Sand import (6") | cubic yards | 394 | $ 10.00 | $ 3,944.44 |
| Contingency (20%) | lump sum | 1 | $ 52,167 | $ 52,167.22 |
| Land Cost | square feet | 40,000 | $ 7.00 | $ 280,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 46,951 | $ 46,950.50 |
| Design (20% of Construction) | lump sum | 1 | $ 62,601 | $ 62,600.67 |
| | | | Total | $ 702,554.50 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 34,061.78 | $ 34,061.78 |
| | | | Total | $ 34,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 12,008.93 | $ 12,008.93 |
| | | | Total | $ 12,008.93 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 29,332.35 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 284.61 |
| Total EUAC | $ 63,678.74 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,917 | $ 10.00 | $ 59,166.67 |
| Rock backfill | cubic feet | 106,500 | $ 1.45 | $ 154,425.00 |
| Native planting | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Sand import (6") | cubic yards | 394 | $ 10.00 | $ 3,944.44 |
| Contingency (20%) | lump sum | 1 | $ 52,167 | $ 52,167.22 |
| Land Cost | square feet | 40000 | $ 7.00 | $ 280,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 46,951 | $ 46,950.50 |
| Design (20% of Construction) | lump sum | 1 | $ 62,601 | $ 62,600.67 |
| | | | Total | $ 702,554.50 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 34,061.78 | $ 34,061.78 |
| | | | Total | $ 34,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 12,008.93 | $ 12,008.93 |
| | | | Total | $ 12,008.93 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 29,332.35 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 284.61 |
| Total EUAC | $ 63,678.74 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,917 | $ 10.00 | $ 59,166.67 |
| Rock backfill | cubic feet | 106,500 | $ 1.45 | $ 154,425.00 |
| Native planting | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Sand import (6") | cubic yards | 394 | $ 10.00 | $ 3,944.44 |
| Contingency (20%) | lump sum | 1 | $ 52,167 | $ 52,167.22 |
| Land Cost | square feet | 40000 | $ 7.00 | $ 280,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 46,951 | $ 46,950.50 |
| Design (20% of Construction) | lump sum | 1 | $ 62,601 | $ 62,600.67 |
| | | | Total | $ 702,554.50 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 34,061.78 | $ 34,061.78 |
| | | | Total | $ 34,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 12,008.93 | $ 12,008.93 |
| | | | Total | $ 12,008.93 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 29,332.35 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 284.61 |
| Total EUAC | $ 63,678.74 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 5,917 | $ 10.00 | $ 59,166.67 |
| Rock backfill | cubic feet | 106,500 | $ 1.45 | $ 154,425.00 |
| Native planting | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Irrigation | square feet | 21,300 | $ 0.50 | $ 10,650.00 |
| Sand import (6") | cubic yards | 394 | $ 10.00 | $ 3,944.44 |
| Contingency (20%) | lump sum | 1 | $ 52,167 | $ 52,167.22 |
| Land Cost | square feet | 40000 | $ 7.00 | $ 280,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 46,951 | $ 46,950.50 |
| Design (20% of Construction) | lump sum | 1 | $ 62,601 | $ 62,600.67 |
| | | | Total | $ 702,554.50 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 34,061.78 | $ 34,061.78 |
| | | | Total | $ 34,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 12,008.93 | $ 12,008.93 |
| | | | Total | $ 12,008.93 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 29,332.35 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 284.61 |
| Total EUAC | $ 63,678.74 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,403 | $ 30.00 | $ 72,092.59 |
| Rock backfill | cubic feet | 32,442 | $ 1.45 | $ 47,040.42 |
| Arch pipe (36" x 23") | lineal feet | 7,373 | $ 150.00 | $ 1,105,965.91 |
| Geotextile fabric | square feet | 22,900 | $ 2.00 | $ 45,800.00 |
| Impermeable liner | square feet | 1,715 | $ 2.00 | $ 3,430.09 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,900 | $ 1.00 | $ 22,900.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 263,846 | $ 263,845.80 |
| Land Cost | square feet | 40,000 | $ 5.25 | $ 210,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 237,461 | $ 237,461.22 |
| Design (20% of Construction) | lump sum | 1 | $ 316,615 | $ 316,614.96 |
| | | | Total | $ 2,347,150.99 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 63,322.99 | $ 63,322.99 |
| | | | Total | $ 63,322.99 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 111,137.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,500.75 |
| Total EUAC | $ 164,800.13 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,403 | $ 30.00 | $ 72,092.59 |
| Rock backfill | cubic feet | 32,442 | $ 1.45 | $ 47,040.42 |
| Arch pipe (36" x 23") | lineal feet | 7,373 | $ 150.00 | $ 1,105,965.91 |
| Geotextile fabric | square feet | 22,900 | $ 2.00 | $ 45,800.00 |
| Impermeable liner | square feet | 1,715 | $ 2.00 | $ 3,430.09 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,900 | $ 1.00 | $ 22,900.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 263,846 | $ 263,845.80 |
| Land Cost | square feet | 40,000 | $ 5.25 | $ 210,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 237,461 | $ 237,461.22 |
| Design (20% of Construction) | lump sum | 1 | $ 316,615 | $ 316,614.96 |
| | | | Total | $ 2,347,150.99 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 63,322.99 | $ 63,322.99 |
| | | | Total | $ 63,322.99 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 111,137.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,500.75 |
| Total EUAC | $ 164,800.13 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,403 | $ 30.00 | $ 72,092.59 |
| Rock backfill | cubic feet | 32,442 | $ 1.45 | $ 47,040.42 |
| Arch pipe (36" x 23") | lineal feet | 7,373 | $ 150.00 | $ 1,105,965.91 |
| Geotextile fabric | square feet | 22,900 | $ 2.00 | $ 45,800.00 |
| Impermeable liner | square feet | 1,715 | $ 2.00 | $ 3,430.09 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,900 | $ 1.00 | $ 22,900.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 263,846 | $ 263,845.80 |
| Land Cost | square feet | 40,000 | $ 5.25 | $ 210,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 237,461 | $ 237,461.22 |
| Design (20% of Construction) | lump sum | 1 | $ 316,615 | $ 316,614.96 |
| | | | Total | $ 2,347,150.99 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 63,322.99 | $ 63,322.99 |
| | | | Total | $ 63,322.99 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 111,137.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,500.75 |
| Total EUAC | $ 164,800.13 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 2,403 | $ 30.00 | $ 72,092.59 |
| Rock backfill | cubic feet | 32,442 | $ 1.45 | $ 47,040.42 |
| Arch pipe (36" x 23") | lineal feet | 7,373 | $ 150.00 | $ 1,105,965.91 |
| Geotextile fabric | square feet | 22,900 | $ 2.00 | $ 45,800.00 |
| Impermeable liner | square feet | 1,715 | $ 2.00 | $ 3,430.09 |
| Inflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 60 | $ 100.00 | $ 6,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 22,900 | $ 1.00 | $ 22,900.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 263,846 | $ 263,845.80 |
| Land Cost | square feet | 40,000 | $ 5.25 | $ 210,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 237,461 | $ 237,461.22 |
| Design (20% of Construction) | lump sum | 1 | $ 316,615 | $ 316,614.96 |
| | | | Total | $ 2,347,150.99 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 52,161.78 | $ 52,161.78 |
| | | | Total | $ 52,161.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 63,322.99 | $ 63,322.99 |
| | | | Total | $ 63,322.99 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 111,137.60 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 1,500.75 |
| Total EUAC | $ 164,800.13 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.10 | $ 20,000.00 | $ 2,066.12 |
| Excavate & offhaul | cubic yards | 333 | $ 30.00 | $ 10,000.00 |
| Impermeable liner | square feet | 6,750 | $ 2.00 | $ 13,500.00 |
| Rock backfill | cubic feet | 3,375 | $ 1.45 | $ 4,893.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 3,068 | $ 75.00 | $ 230,113.64 |
| Landscaping | square feet | 4,500 | $ 1.00 | $ 4,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 57,514.70 | $ 57,514.70 |
| Contingency (20%) | lump sum | 1 | $ 69,018 | $ 69,017.64 |
| Land Cost | square feet | 4,500 | $ 5.25 | $ 23,625.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 62,116 | $ 62,115.88 |
| Design (20% of Construction) | lump sum | 1 | $ 82,821 | $ 82,821.17 |
| | | | Total | $ 582,667.89 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 48,061.78 | $ 48,061.78 |
| | | | Total | $ 48,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 16,564.23 | $ 16,564.23 |
| | | | Total | $ 16,564.23 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 27,589.32 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 392.57 |
| Total EUAC | $ 76,043.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.10 | $ 20,000.00 | $ 2,066.12 |
| Excavate & offhaul | cubic yards | 333 | $ 30.00 | $ 10,000.00 |
| Impermeable liner | square feet | 6,750 | $ 2.00 | $ 13,500.00 |
| Rock backfill | cubic feet | 3,375 | $ 1.45 | $ 4,893.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 3,068 | $ 75.00 | $ 230,113.64 |
| Landscaping | square feet | 4,500 | $ 1.00 | $ 4,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 57,514.70 | $ 57,514.70 |
| Contingency (20%) | lump sum | 1 | $ 69,018 | $ 69,017.64 |
| Land Cost | square feet | 4,500 | $ 5.25 | $ 23,625.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 62,116 | $ 62,115.88 |
| Design (20% of Construction) | lump sum | 1 | $ 82,821 | $ 82,821.17 |
| | | | Total | $ 582,667.89 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 48,061.78 | $ 48,061.78 |
| | | | Total | $ 48,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 16,564.23 | $ 16,564.23 |
| | | | Total | $ 16,564.23 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 27,589.32 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 392.57 |
| Total EUAC | $ 76,043.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.10 | $ 20,000.00 | $ 2,066.12 |
| Excavate & offhaul | cubic yards | 333 | $ 30.00 | $ 10,000.00 |
| Impermeable liner | square feet | 6,750 | $ 2.00 | $ 13,500.00 |
| Rock backfill | cubic feet | 3,375 | $ 1.45 | $ 4,893.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 3,068 | $ 75.00 | $ 230,113.64 |
| Landscaping | square feet | 4,500 | $ 1.00 | $ 4,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 57,514.70 | $ 57,514.70 |
| Contingency (20%) | lump sum | 1 | $ 69,018 | $ 69,017.64 |
| Land Cost | square feet | 4,500 | $ 5.25 | $ 23,625.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 62,116 | $ 62,115.88 |
| Design (20% of Construction) | lump sum | 1 | $ 82,821 | $ 82,821.17 |
| | | | Total | $ 582,667.89 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 48,061.78 | $ 48,061.78 |
| | | | Total | $ 48,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 16,564.23 | $ 16,564.23 |
| | | | Total | $ 16,564.23 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 27,589.32 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 392.57 |
| Total EUAC | $ 76,043.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.10 | $ 20,000.00 | $ 2,066.12 |
| Excavate & offhaul | cubic yards | 333 | $ 30.00 | $ 10,000.00 |
| Impermeable liner | square feet | 6,750 | $ 2.00 | $ 13,500.00 |
| Rock backfill | cubic feet | 3,375 | $ 1.45 | $ 4,893.75 |
| Perf. Arch pipes (18" x 11") | lineal feet | 3,068 | $ 75.00 | $ 230,113.64 |
| Landscaping | square feet | 4,500 | $ 1.00 | $ 4,500.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 57,514.70 | $ 57,514.70 |
| Contingency (20%) | lump sum | 1 | $ 69,018 | $ 69,017.64 |
| Land Cost | square feet | 4,500 | $ 5.25 | $ 23,625.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 62,116 | $ 62,115.88 |
| Design (20% of Construction) | lump sum | 1 | $ 82,821 | $ 82,821.17 |
| | | | Total | $ 582,667.89 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 48,061.78 | $ 48,061.78 |
| | | | Total | $ 48,061.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 16,564.23 | $ 16,564.23 |
| | | | Total | $ 16,564.23 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 27,589.32 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 392.57 |
| Total EUAC | $ 76,043.67 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 6,111 | $ 10.00 | $ 61,111.11 |
| Rock backfill | cubic feet | 110,000 | $ 1.45 | $ 159,500.00 |
| Native planting | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Irrigation | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Sand import (6") | cubic yards | 407 | $ 10.00 | $ 4,074.07 |
| Contingency (20%) | lump sum | 1 | $ 80,337 | $ 80,337.04 |
| Land Cost | square feet | 42,000 | $ 7.00 | $ 294,000.00 |
| Administration (15% of Construction) | lump sum | 1.00 | $ 72,303 | $ 72,303.33 |
| Design (20% of Construction) | lump sum | 1 | $ 96,404 | $ 96,404.44 |
| | | | Total | $ 944,730.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 32,661.78 | $ 32,661.78 |
| | | | Total | $ 32,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 18,752.89 | $ 18,752.89 |
| | | | Total | $ 18,752.89 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 39,443.42 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 444.44 |
| Total EUAC | $ 72,549.64 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 6,111 | $ 10.00 | $ 61,111.11 |
| Rock backfill | cubic feet | 110,000 | $ 1.45 | $ 159,500.00 |
| Native planting | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Irrigation | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Sand import (6") | cubic yards | 407 | $ 10.00 | $ 4,074.07 |
| Contingency (20%) | lump sum | 1 | $ 80,337 | $ 80,337.04 |
| Land Cost | square feet | 42,000 | $ 7.00 | $ 294,000.00 |
| Administration (15% of Construction) | lump sum | 1.00 | $ 72,303 | $ 72,303.33 |
| Design (20% of Construction) | lump sum | 1 | $ 96,404 | $ 96,404.44 |
| | | | Total | $ 944,730.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 32,661.78 | $ 32,661.78 |
| | | | Total | $ 32,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 18,752.89 | $ 18,752.89 |
| | | | Total | $ 18,752.89 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 39,443.42 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 444.44 |
| Total EUAC | $ 72,549.64 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 6,111 | $ 10.00 | $ 61,111.11 |
| Rock backfill | cubic feet | 110,000 | $ 1.45 | $ 159,500.00 |
| Native planting | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Irrigation | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Sand import (6") | cubic yards | 407 | $ 10.00 | $ 4,074.07 |
| Contingency (20%) | lump sum | 1 | $ 80,337 | $ 80,337.04 |
| Land Cost | square feet | 42,000 | $ 7.00 | $ 294,000.00 |
| Administration (15% of Construction) | lump sum | 1.00 | $ 72,303 | $ 72,303.33 |
| Design (20% of Construction) | lump sum | 1 | $ 96,404 | $ 96,404.44 |
| | | | Total | $ 944,730.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 32,661.78 | $ 32,661.78 |
| | | | Total | $ 32,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 18,752.89 | $ 18,752.89 |
| | | | Total | $ 18,752.89 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 39,443.42 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 444.44 |
| Total EUAC | $ 72,549.64 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Excavate & stockpile | cubic yards | 6,111 | $ 10.00 | $ 61,111.11 |
| Rock backfill | cubic feet | 110,000 | $ 1.45 | $ 159,500.00 |
| Native planting | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Irrigation | square feet | 22,000 | $ 0.50 | $ 11,000.00 |
| Sand import (6") | cubic yards | 407 | $ 10.00 | $ 4,074.07 |
| Contingency (20%) | lump sum | 1 | $ 80,337 | $ 80,337.04 |
| Land Cost | square feet | 42,000 | $ 7.00 | $ 294,000.00 |
| Administration (15% of Construction) | lump sum | 1.00 | $ 72,303 | $ 72,303.33 |
| Design (20% of Construction) | lump sum | 1 | $ 96,404 | $ 96,404.44 |
| | | | Total | $ 944,730.00 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 32,661.78 | $ 32,661.78 |
| | | | Total | $ 32,661.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 18,752.89 | $ 18,752.89 |
| | | | Total | $ 18,752.89 |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 39,443.42 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 444.44 |
| Total EUAC | $ 72,549.64 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 3,148 | $ 30.00 | $ 94,444.44 |
| Rock backfill | cubic feet | 42,500 | $ 1.45 | $ 61,625.00 |
| Arch pipe (36" x 23") | lineal feet | 9,659 | $ 150.00 | $ 1,448,863.64 |
| Geotextile fabric | square feet | 30,000 | $ 2.00 | $ 60,000.00 |
| Impermeable liner | square feet | 1,963 | $ 2.00 | $ 3,925.98 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Landscaping | square feet | 30,000 | $ 2.50 | $ 75,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 379,772 | $ 379,771.81 |
| Land Cost | square feet | 42,000 | $ 5.25 | $ 220,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 341,795 | $ 341,794.63 |
| Design (20% of Construction) | lump sum | 1 | $ 455,726 | $ 455,726.18 |
| | | | Total | $ 3,296,651.68 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 59,461.78 | $ 59,461.78 |
| | | | Total | $ 59,461.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 91,145.24 | $ 91,145.24 |
| | | | Total | $ 91,145.24 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 156,096.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,160.14 |
| Total EUAC | $ 217,718.38 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 3,148 | $ 30.00 | $ 94,444.44 |
| Rock backfill | cubic feet | 42,500 | $ 1.45 | $ 61,625.00 |
| Arch pipe (36" x 23") | lineal feet | 9,659 | $ 150.00 | $ 1,448,863.64 |
| Geotextile fabric | square feet | 30,000 | $ 2.00 | $ 60,000.00 |
| Impermeable liner | square feet | 1,963 | $ 2.00 | $ 3,925.98 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Landscaping | square feet | 30,000 | $ 2.50 | $ 75,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 379,772 | $ 379,771.81 |
| Land Cost | square feet | 42,000 | $ 5.25 | $ 220,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 341,795 | $ 341,794.63 |
| Design (20% of Construction) | lump sum | 1 | $ 455,726 | $ 455,726.18 |
| | | | Total | $ 3,296,651.68 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 59,461.78 | $ 59,461.78 |
| | | | Total | $ 59,461.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 91,145.24 | $ 91,145.24 |
| | | | Total | $ 91,145.24 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 156,096.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,160.14 |
| Total EUAC | $ 217,718.38 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 3,148 | $ 30.00 | $ 94,444.44 |
| Rock backfill | cubic feet | 42,500 | $ 1.45 | $ 61,625.00 |
| Arch pipe (36" x 23") | lineal feet | 9,659 | $ 150.00 | $ 1,448,863.64 |
| Geotextile fabric | square feet | 30,000 | $ 2.00 | $ 60,000.00 |
| Impermeable liner | square feet | 1,963 | $ 2.00 | $ 3,925.98 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Landscaping | square feet | 30,000 | $ 2.50 | $ 75,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 379,772 | $ 379,771.81 |
| Land Cost | square feet | 42,000 | $ 5.25 | $ 220,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 341,795 | $ 341,794.63 |
| Design (20% of Construction) | lump sum | 1 | $ 455,726 | $ 455,726.18 |
| | | | Total | $ 3,296,651.68 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 59,461.78 | $ 59,461.78 |
| | | | Total | $ 59,461.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 91,145.24 | $ 91,145.24 |
| | | | Total | $ 91,145.24 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 156,096.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,160.14 |
| Total EUAC | $ 217,718.38 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 3,148 | $ 30.00 | $ 94,444.44 |
| Rock backfill | cubic feet | 42,500 | $ 1.45 | $ 61,625.00 |
| Arch pipe (36" x 23") | lineal feet | 9,659 | $ 150.00 | $ 1,448,863.64 |
| Geotextile fabric | square feet | 30,000 | $ 2.00 | $ 60,000.00 |
| Impermeable liner | square feet | 1,963 | $ 2.00 | $ 3,925.98 |
| Inflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Overflow pipe (36" RCP) | lineal feet | 350 | $ 200.00 | $ 70,000.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Landscaping | square feet | 30,000 | $ 2.50 | $ 75,000.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 379,772 | $ 379,771.81 |
| Land Cost | square feet | 42,000 | $ 5.25 | $ 220,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 341,795 | $ 341,794.63 |
| Design (20% of Construction) | lump sum | 1 | $ 455,726 | $ 455,726.18 |
| | | | Total | $ 3,296,651.68 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 59,461.78 | $ 59,461.78 |
| | | | Total | $ 59,461.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 91,145.24 | $ 91,145.24 |
| | | | Total | $ 91,145.24 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 156,096.46 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,160.14 |
| Total EUAC | $ 217,718.38 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 1,065 | $ 35.00 | $ 37,268.52 |
| Excavate & offhaul pavement subgrade area | cubic yards | 3,620 | $ 30.00 | $ 108,611.11 |
| Rock backfill | cubic feet | 48,875 | $ 1.45 | $ 70,868.75 |
| Arch pipe (36" x 23") | lineal feet | 11,108 | $ 150.00 | $ 1,666,193.18 |
| Geotextile fabric | square feet | 34,500 | $ 2.00 | $ 69,000.00 |
| Impermeable liner | square feet | 2,105 | $ 2.00 | $ 4,210.15 |
| Inflow pipe (18" RCP) | lineal feet | 250 | $ 100.00 | $ 25,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 125 | $ 100.00 | $ 12,500.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Pavement restoration/landscaping | square feet | 34,500 | $ 2.50 | $ 86,250.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 419,980 | $ 419,980.34 |
| Land Cost | square feet | 34,500 | $ 21.00 | $ 724,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 377,982 | $ 377,982.31 |
| Design (20% of Construction) | lump sum | 1 | $ 503,976 | $ 503,976.41 |
| | | | Total | $ 4,126,340.77 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 63,561.78 | $ 63,561.78 |
| | | | Total | $ 63,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $100,795.28 | $ 100,795.28 |
| | | | Total | $ 100,795.28 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 195,382.24 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,388.85 |
| Total EUAC | $ 261,332.86 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 1,065 | $ 35.00 | $ 37,268.52 |
| Excavate & offhaul pavement subgrade area | cubic yards | 3,620 | $ 30.00 | $ 108,611.11 |
| Rock backfill | cubic feet | 48,875 | $ 1.45 | $ 70,868.75 |
| Arch pipe (36" x 23") | lineal feet | 11,108 | $ 150.00 | $ 1,666,193.18 |
| Geotextile fabric | square feet | 34,500 | $ 2.00 | $ 69,000.00 |
| Impermeable liner | square feet | 2,105 | $ 2.00 | $ 4,210.15 |
| Inflow pipe (18" RCP) | lineal feet | 250 | $ 100.00 | $ 25,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 125 | $ 100.00 | $ 12,500.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Pavement restoration/landscaping | square feet | 34,500 | $ 2.50 | $ 86,250.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 419,980 | $ 419,980.34 |
| Land Cost | square feet | 34,500 | $ 21.00 | $ 724,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 377,982 | $ 377,982.31 |
| Design (20% of Construction) | lump sum | 1 | $ 503,976 | $ 503,976.41 |
| | | | Total | $ 4,126,340.77 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 63,561.78 | $ 63,561.78 |
| | | | Total | $ 63,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $100,795.28 | $ 100,795.28 |
| | | | Total | $ 100,795.28 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 195,382.24 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,388.85 |
| Total EUAC | $ 261,332.86 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 1,065 | $ 35.00 | $ 37,268.52 |
| Excavate & offhaul pavement subgrade area | cubic yards | 3,620 | $ 30.00 | $ 108,611.11 |
| Rock backfill | cubic feet | 48,875 | $ 1.45 | $ 70,868.75 |
| Arch pipe (36" x 23") | lineal feet | 11,108 | $ 150.00 | $ 1,666,193.18 |
| Geotextile fabric | square feet | 34,500 | $ 2.00 | $ 69,000.00 |
| Impermeable liner | square feet | 2,105 | $ 2.00 | $ 4,210.15 |
| Inflow pipe (18" RCP) | lineal feet | 250 | $ 100.00 | $ 25,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 125 | $ 100.00 | $ 12,500.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Pavement restoration/landscaping | square feet | 34,500 | $ 2.50 | $ 86,250.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 419,980 | $ 419,980.34 |
| Land Cost | square feet | 34,500 | $ 21.00 | $ 724,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 377,982 | $ 377,982.31 |
| Design (20% of Construction) | lump sum | 1 | $ 503,976 | $ 503,976.41 |
| | | | Total | $ 4,126,340.77 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 63,561.78 | $ 63,561.78 |
| | | | Total | $ 63,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 100,795.28 | $ 100,795.28 |
| | | | Total | $ 100,795.28 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 195,382.24 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,388.85 |
| Total EUAC | $ 261,332.86 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 1,065 | $ 35.00 | $ 37,268.52 |
| Excavate & offhaul pavement subgrade area | cubic yards | 3,620 | $ 30.00 | $ 108,611.11 |
| Rock backfill | cubic feet | 48,875 | $ 1.45 | $ 70,868.75 |
| Arch pipe (36" x 23") | lineal feet | 11,108 | $ 150.00 | $ 1,666,193.18 |
| Geotextile fabric | square feet | 34,500 | $ 2.00 | $ 69,000.00 |
| Impermeable liner | square feet | 2,105 | $ 2.00 | $ 4,210.15 |
| Inflow pipe (18" RCP) | lineal feet | 250 | $ 100.00 | $ 25,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 125 | $ 100.00 | $ 12,500.00 |
| Structures | lump sum | 1 | $ 15,000.00 | $ 15,000.00 |
| Pavement restoration/landscaping | square feet | 34,500 | $ 2.50 | $ 86,250.00 |
| Striping | lump sum | 1 | $ 5,000.00 | $ 5,000.00 |
| Contingency (20%) | lump sum | 1 | $ 419,980 | $ 419,980.34 |
| Land Cost | square feet | 34,500 | $ 21.00 | $ 724,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 377,982 | $ 377,982.31 |
| Design (20% of Construction) | lump sum | 1 | $ 503,976 | $ 503,976.41 |
| | | | Total | $ 4,126,340.77 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 63,561.78 | $ 63,561.78 |
| | | | Total | $ 63,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 100,795.28 | $ 100,795.28 |
| | | | Total | $ 100,795.28 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 195,382.24 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 2,388.85 |
| Total EUAC | $ 261,332.86 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 5,090 | $ 30.00 | $ 152,685.19 |
| Rock backfill | cubic feet | 68,708 | $ 1.45 | $ 99,627.08 |
| Arch pipe (36" x 23") | lineal feet | 15,616 | $ 150.00 | $ 2,342,329.55 |
| Geotextile fabric | square feet | 48,500 | $ 2.00 | $ 97,000.00 |
| Impermeable liner | square feet | 2,496 | $ 2.00 | $ 4,991.82 |
| Inflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 48,500 | $ 2.50 | $ 121,250.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 572,777 | $ 572,776.73 |
| Land Cost | square feet | 48,500 | $ 21.00 | $ 1,018,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 515,499 | $ 515,499.05 |
| Design (20% of Construction) | lump sum | 1 | $ 687,332 | $ 687,332.07 |
| | | | Total | $ 5,657,991.48 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 75,761.78 | $ 75,761.78 |
| | | | Total | $ 75,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 137,466.41 | $ 137,466.41 |
| | | | Total | $ 137,466.41 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 267,905.90 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 3,257.95 |
| Total EUAC | $ 346,925.63 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 5,090 | $ 30.00 | $ 152,685.19 |
| Rock backfill | cubic feet | 68,708 | $ 1.45 | $ 99,627.08 |
| Arch pipe (36" x 23") | lineal feet | 15,616 | $ 150.00 | $ 2,342,329.55 |
| Geotextile fabric | square feet | 48,500 | $ 2.00 | $ 97,000.00 |
| Impermeable liner | square feet | 2,496 | $ 2.00 | $ 4,991.82 |
| Inflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 48,500 | $ 2.50 | $ 121,250.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 572,777 | $ 572,776.73 |
| Land Cost | square feet | 48,500 | $ 21.00 | $ 1,018,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 515,499 | $ 515,499.05 |
| Design (20% of Construction) | lump sum | 1 | $ 687,332 | $ 687,332.07 |
| | | | Total | $ 5,657,991.48 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 75,761.78 | $ 75,761.78 |
| | | | Total | $ 75,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 137,466.41 | $ 137,466.41 |
| | | | Total | $ 137,466.41 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 267,905.90 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 3,257.95 |
| Total EUAC | $ 346,925.63 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 5,090 | $ 30.00 | $ 152,685.19 |
| Rock backfill | cubic feet | 68,708 | $ 1.45 | $ 99,627.08 |
| Arch pipe (36" x 23") | lineal feet | 15,616 | $ 150.00 | $ 2,342,329.55 |
| Geotextile fabric | square feet | 48,500 | $ 2.00 | $ 97,000.00 |
| Impermeable liner | square feet | 2,496 | $ 2.00 | $ 4,991.82 |
| Inflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 48,500 | $ 2.50 | $ 121,250.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 572,777 | $ 572,776.73 |
| Land Cost | square feet | 48,500 | $ 21.00 | $ 1,018,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 515,499 | $ 515,499.05 |
| Design (20% of Construction) | lump sum | 1 | $ 687,332 | $ 687,332.07 |
| | | | Total | $ 5,657,991.48 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 75,761.78 | $ 75,761.78 |
| | | | Total | $ 75,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 137,466.41 | $ 137,466.41 |
| | | | Total | $ 137,466.41 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 267,905.90 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 3,257.95 |
| Total EUAC | $ 346,925.63 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Demo & offhaul pavement | cubic yards | 0 | $ 35.00 | $ - |
| Excavate & offhaul subgrade area | cubic yards | 5,090 | $ 30.00 | $ 152,685.19 |
| Rock backfill | cubic feet | 68,708 | $ 1.45 | $ 99,627.08 |
| Arch pipe (36" x 23") | lineal feet | 15,616 | $ 150.00 | $ 2,342,329.55 |
| Geotextile fabric | square feet | 48,500 | $ 2.00 | $ 97,000.00 |
| Impermeable liner | square feet | 2,496 | $ 2.00 | $ 4,991.82 |
| Inflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Overflow pipe (18" RCP) | lineal feet | 180 | $ 100.00 | $ 18,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Landscaping | square feet | 48,500 | $ 2.50 | $ 121,250.00 |
| Striping | lump sum | 0 | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 572,777 | $ 572,776.73 |
| Land Cost | square feet | 48,500 | $ 21.00 | $ 1,018,500.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 515,499 | $ 515,499.05 |
| Design (20% of Construction) | lump sum | 1 | $ 687,332 | $ 687,332.07 |
| | | | Total | $ 5,657,991.48 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 75,761.78 | $ 75,761.78 |
| | | | Total | $ 75,761.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 137,466.41 | $ 137,466.41 |
| | | | Total | $ 137,466.41 |

***Estimated*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 267,905.90 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 3,257.95 |
| Total EUAC | $ 346,925.63 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.05 | $ 20,000.00 | $ 918.27 |
| Excavate & offhaul | cubic yards | 148 | $ 30.00 | $ 4,444.44 |
| Impermeable liner | square feet | 3,000 | $ 2.00 | $ 6,000.00 |
| Rock backfill | cubic feet | 1,500 | $ 1.45 | $ 2,175.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,364 | $ 75.00 | $ 102,272.73 |
| Landscaping | square feet | 2,000 | $ 1.00 | $ 2,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 28,062.09 | $ 28,062.09 |
| Contingency (20%) | lump sum | 1 | $ 33,675 | $ 33,674.51 |
| Land Cost | square feet | 2,000 | $ 21.00 | $ 42,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 30,307 | $ 30,307.06 |
| Design (20% of Construction) | lump sum | 1 | $ 40,409 | $ 40,409.41 |
| | | | Total | $ 314,763.51 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 45,561.78 | $ 45,561.78 |
| | | | Total | $ 45,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 8,081.88 | $ 8,081.88 |
| | | | Total | $ 8,081.88 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 14,904.05 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 191.54 |
| Total EUAC | $ 60,657.37 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.05 | $ 20,000.00 | $ 918.27 |
| Excavate & offhaul | cubic yards | 148 | $ 30.00 | $ 4,444.44 |
| Impermeable liner | square feet | 3,000 | $ 2.00 | $ 6,000.00 |
| Rock backfill | cubic feet | 1,500 | $ 1.45 | $ 2,175.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,364 | $ 75.00 | $ 102,272.73 |
| Landscaping | square feet | 2,000 | $ 1.00 | $ 2,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 28,062.09 | $ 28,062.09 |
| Contingency (20%) | lump sum | 1 | $ 33,675 | $ 33,674.51 |
| Land Cost | square feet | 2,000 | $ 21.00 | $ 42,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 30,307 | $ 30,307.06 |
| Design (20% of Construction) | lump sum | 1 | $ 40,409 | $ 40,409.41 |
| | | | Total | $ 314,763.51 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 45,561.78 | $ 45,561.78 |
| | | | Total | $ 45,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 8,081.88 | $ 8,081.88 |
| | | | Total | $ 8,081.88 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 14,904.05 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 191.54 |
| Total EUAC | $ 60,657.37 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.05 | $ 20,000.00 | $ 918.27 |
| Excavate & offhaul | cubic yards | 148 | $ 30.00 | $ 4,444.44 |
| Impermeable liner | square feet | 3,000 | $ 2.00 | $ 6,000.00 |
| Rock backfill | cubic feet | 1,500 | $ 1.45 | $ 2,175.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,364 | $ 75.00 | $ 102,272.73 |
| Landscaping | square feet | 2,000 | $ 1.00 | $ 2,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 28,062.09 | $ 28,062.09 |
| Contingency (20%) | lump sum | 1 | $ 33,675 | $ 33,674.51 |
| Land Cost | square feet | 2,000 | $ 21.00 | $ 42,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 30,307 | $ 30,307.06 |
| Design (20% of Construction) | lump sum | 1 | $ 40,409 | $ 40,409.41 |
| | | | Total | $ 314,763.51 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 45,561.78 | $ 45,561.78 |
| | | | Total | $ 45,561.78 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 8,081.88 | $ 8,081.88 |
| | | | Total | $ 8,081.88 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 14,904.05 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 191.54 |
| Total EUAC (3%) | $ 60,657.37 |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Clear & grub | acres | 0.05 | $ 20,000.00 | $ 918.27 |
| Excavate & offhaul | cubic yards | 148 | $ 30.00 | $ 4,444.44 |
| Impermeable liner | square feet | 3,000 | $ 2.00 | $ 6,000.00 |
| Rock backfill | cubic feet | 1,500 | $ 1.45 | $ 2,175.00 |
| Perf. Arch pipes (18" x 11") | lineal feet | 1,364 | $ 75.00 | $ 102,272.73 |
| Landscaping | square feet | 2,000 | $ 1.00 | $ 2,000.00 |
| Structures | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| Inflow pipe (18" RCP) | lineal feet | 100 | $ 100.00 | $ 10,000.00 |
| Backflow prevention device | each | 1 | $ 2,500.00 | $ 2,500.00 |
| Pump & appurtenances | lump sum | 1 | $ 28,062.09 | $ 28,062.09 |
| Contingency (20%) | lump sum | 1 | $ 33,675 | $ 33,674.51 |
| Land Cost | square feet | 2,000 | $ 21.00 | $ 42,000.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 30,307 | $ 30,307.06 |
| Design (20% of Construction) | lump sum | 1 | $ 40,409 | $ 40,409.41 |
| | | | Total | $ 314,763.51 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 45,561.78 | $ 45,561.78 |
| | | | Total | $ 45,561.78 |

***Corrective Maintenance at Year*** 25

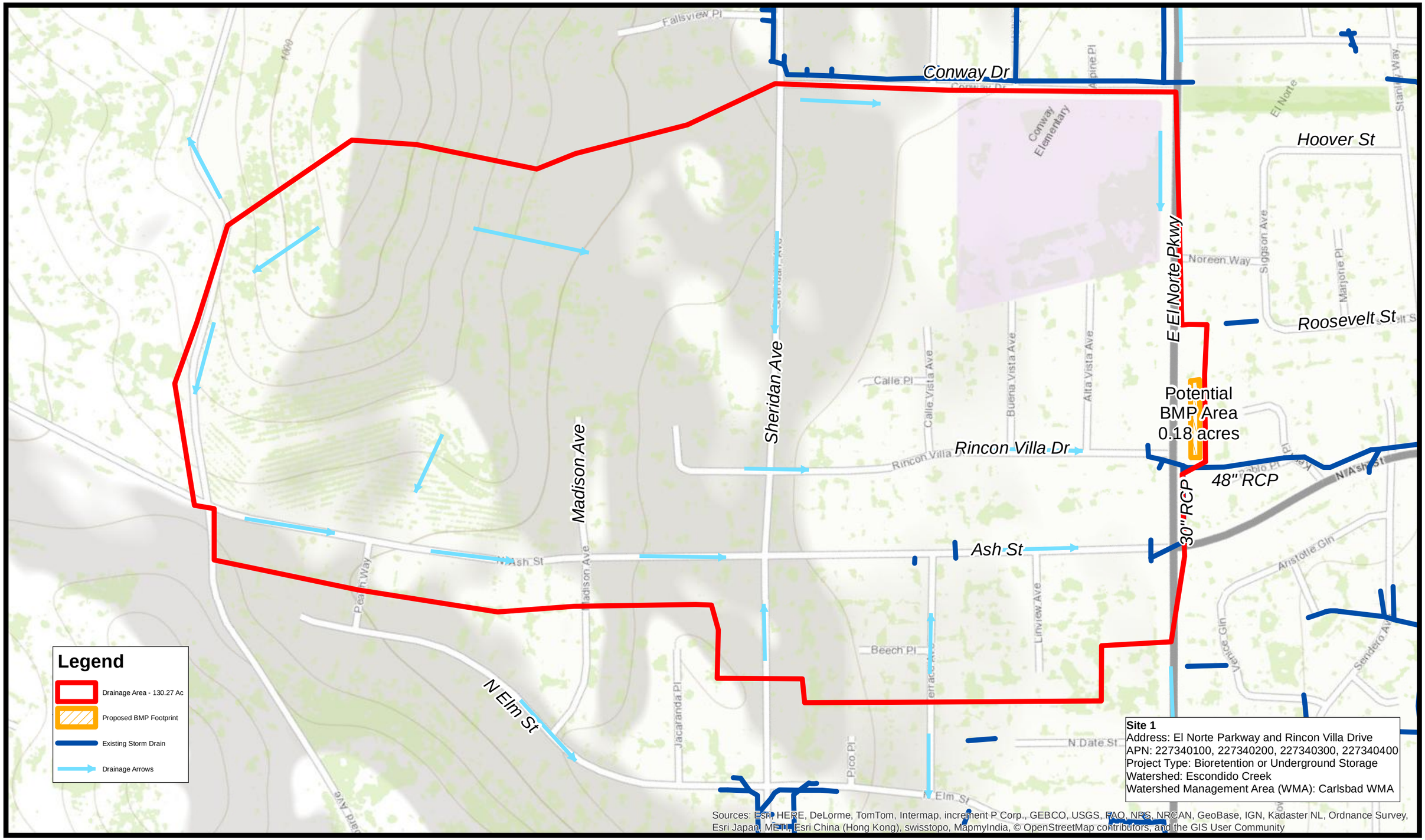
| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ 8,081.88 | $ 8,081.88 |
| | | | Total | $ 8,081.88 |

***Estimated Lifespan*** 50

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.04735 |
| Annual Cost Capital Investment | $ 14,904.05 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ 191.54 |
| Total EUAC | $ 60,657.37 |
| (Based on 4.1% Average Annual CPI Increase) | |

Michael Baker
INTERNATIONAL

# Appendix D ACP Site Hydrology and Land Use Maps




Michael Baker INTERNATIONAL

0 150 300 600 Feet

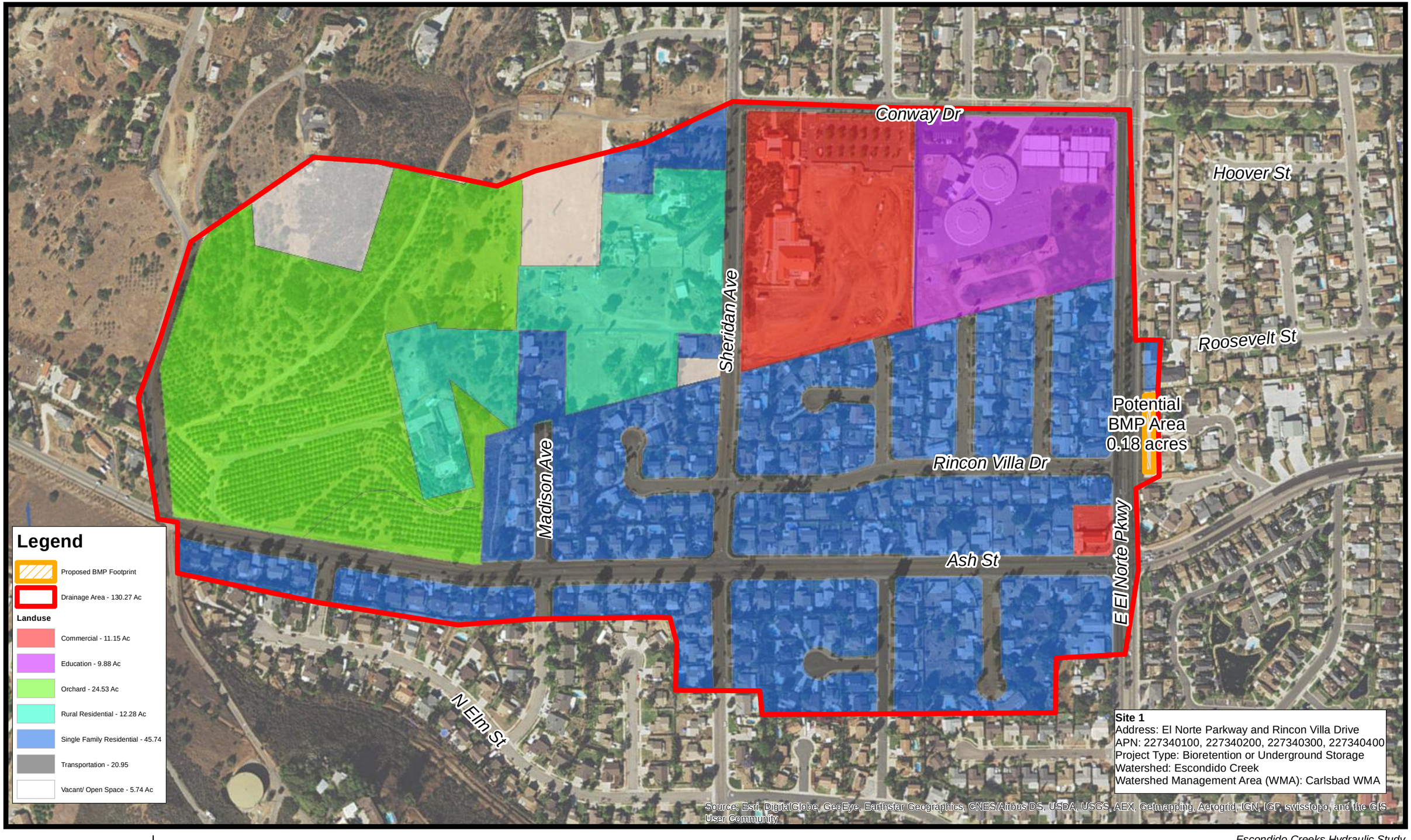
1 in = 300 feet

*Escondido Creeks Hydraulic Study*

# Drainage Area Exhibit

***El Norte Parkway and Rincon Villa Drive***

***SITE1***




Michael Baker INTERNATIONAL

0 125 250 500 Feet

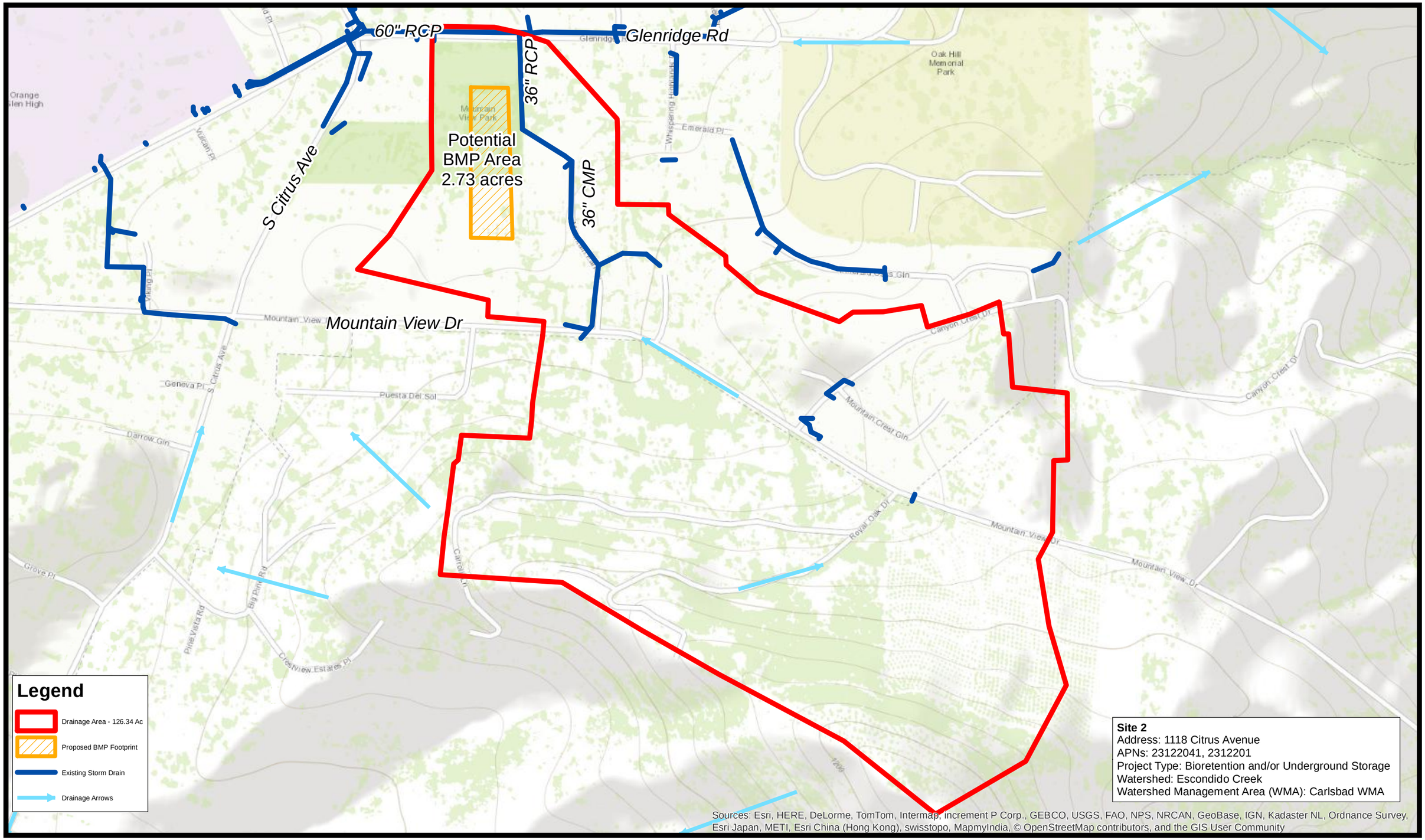
1 in = 300 feet

*Escondido Creeks Hydraulic Study*

# Landuse Exhibit

***El Norte Parkway and Rincon Villa Drive***

***SITE1***




Michael Baker INTERNATIONAL

0 200 400 800 Feet

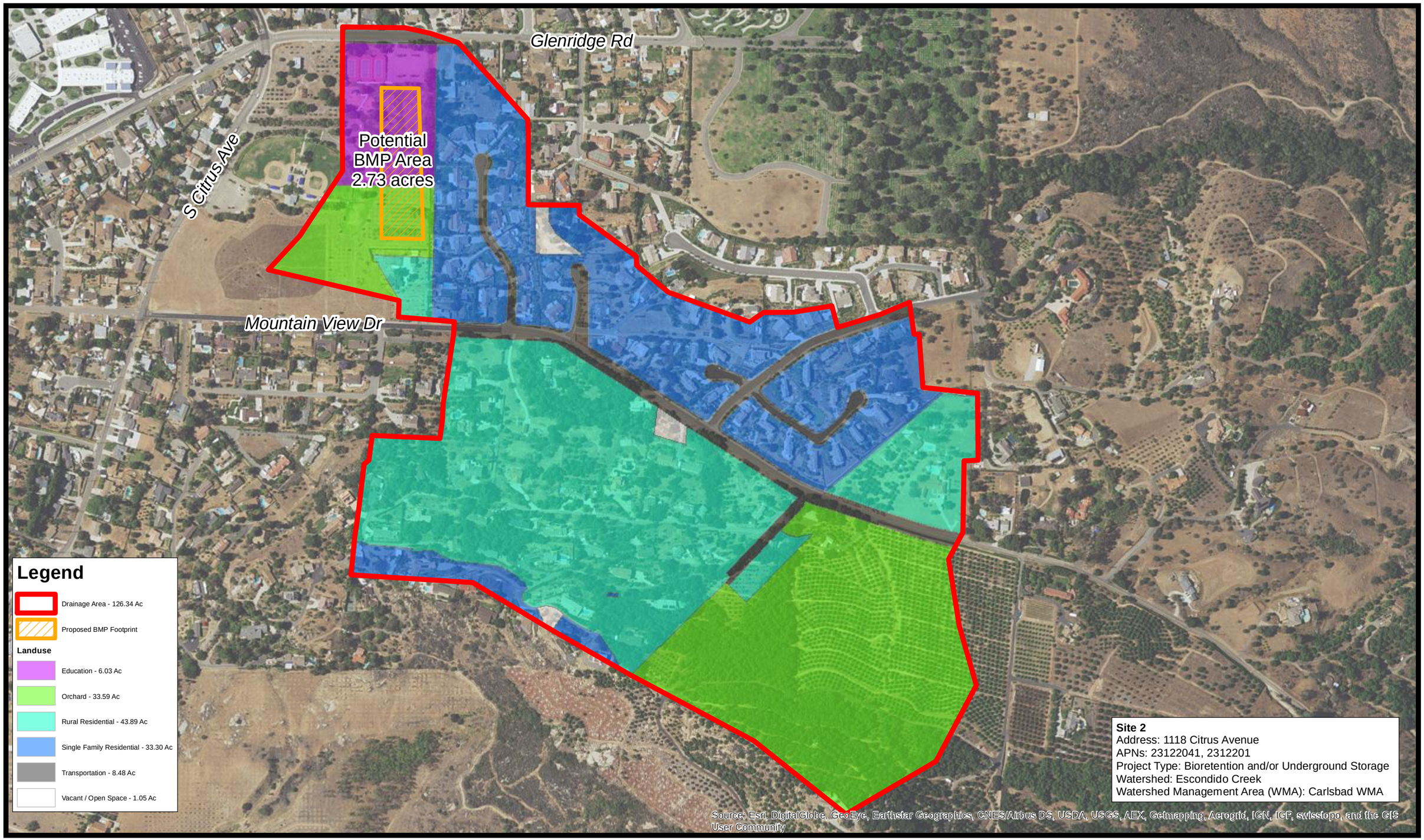
1 in = 400 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Mountain View Park***

***SITE2***




Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

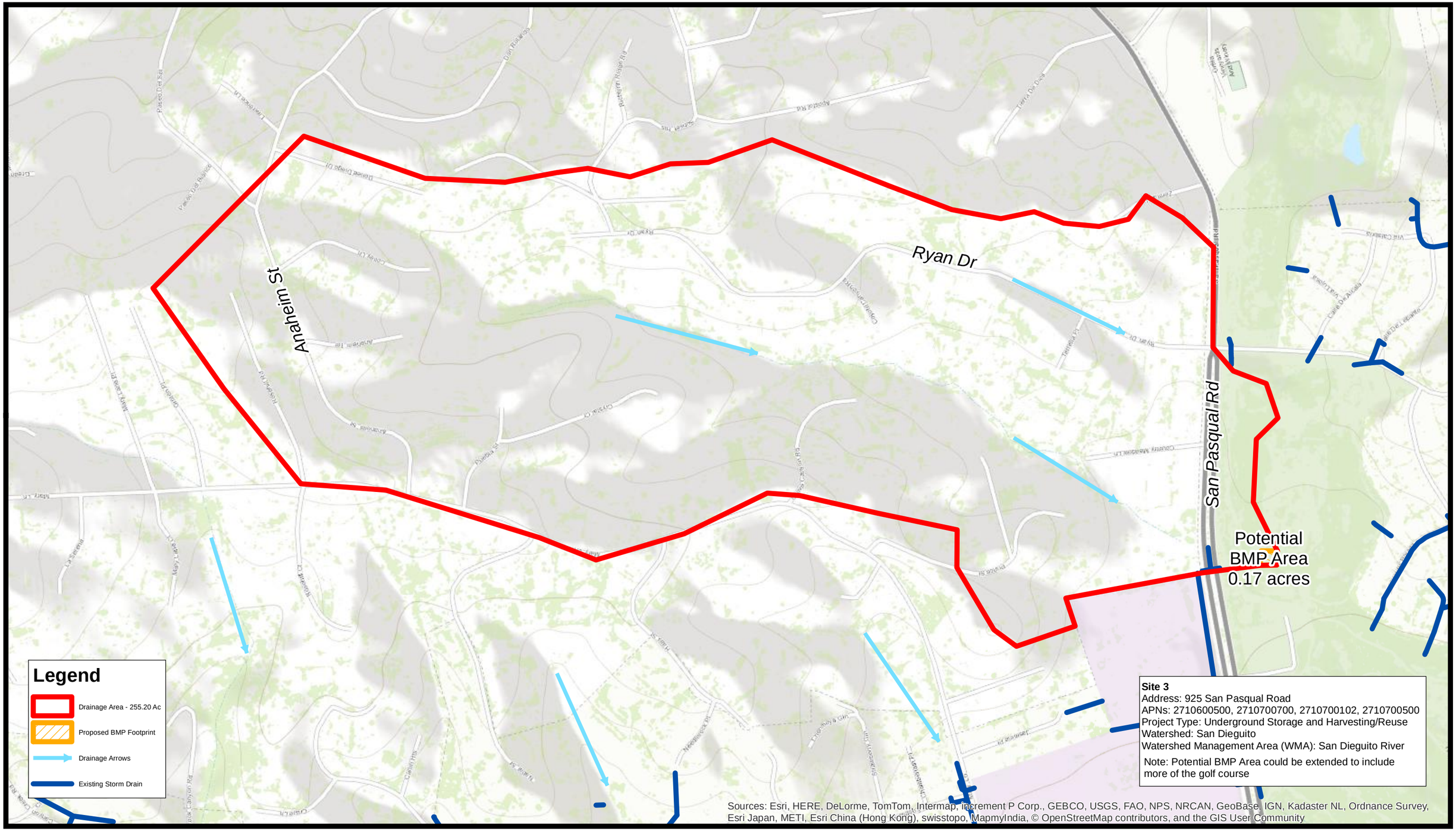
1 in = 400 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Mountain View Park***

***SITE2***




Michael Baker INTERNATIONAL

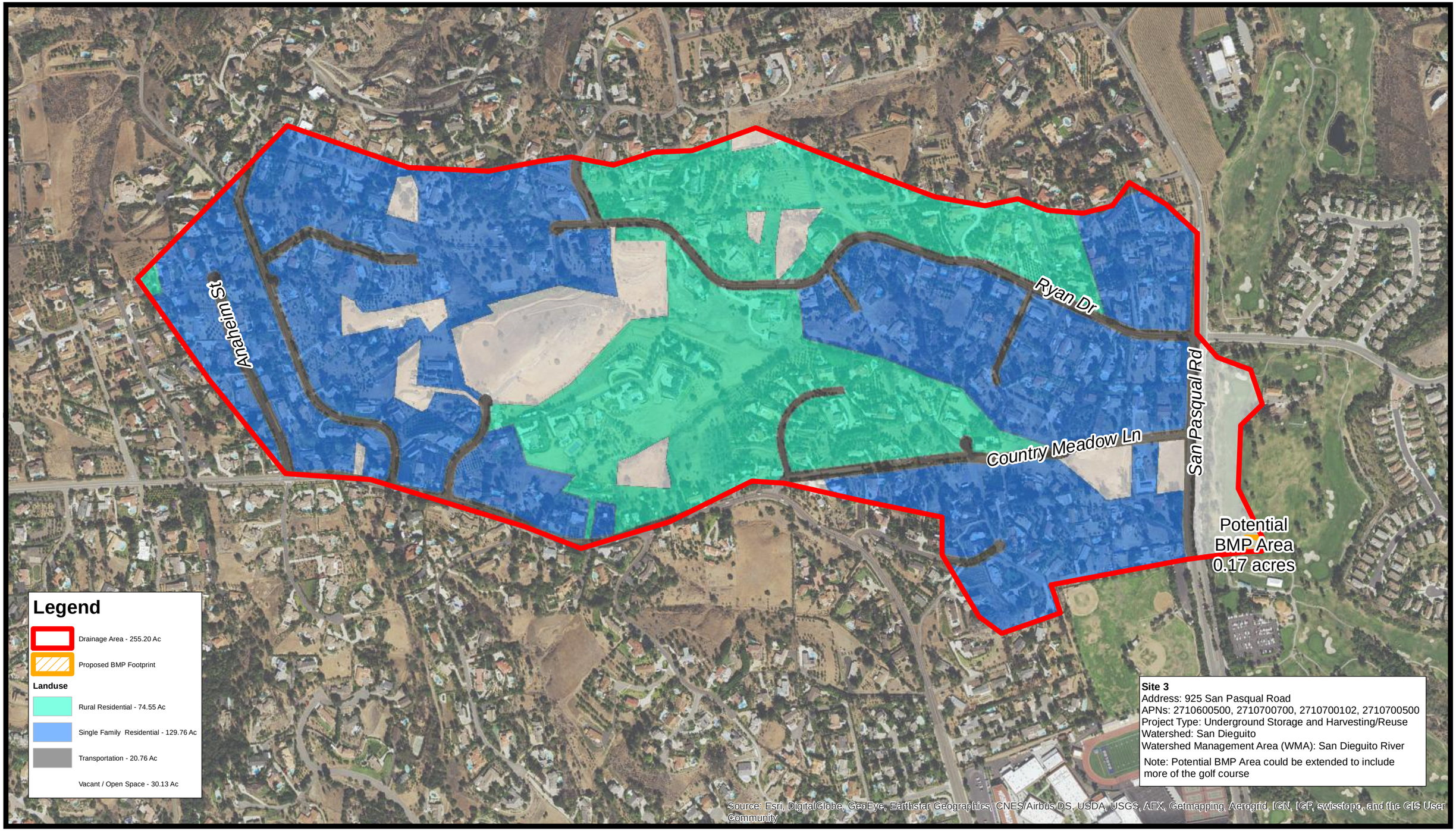
0 250 500 1,000 Feet

1 in = 500 feet

*Escondido Creeks Hydraulic Study*

# Drainage Area Exihibit

***The Vineyard at Escondido Golf Course***
***SITE 3***




Michael Baker INTERNATIONAL

0 265 530 1,060 Feet

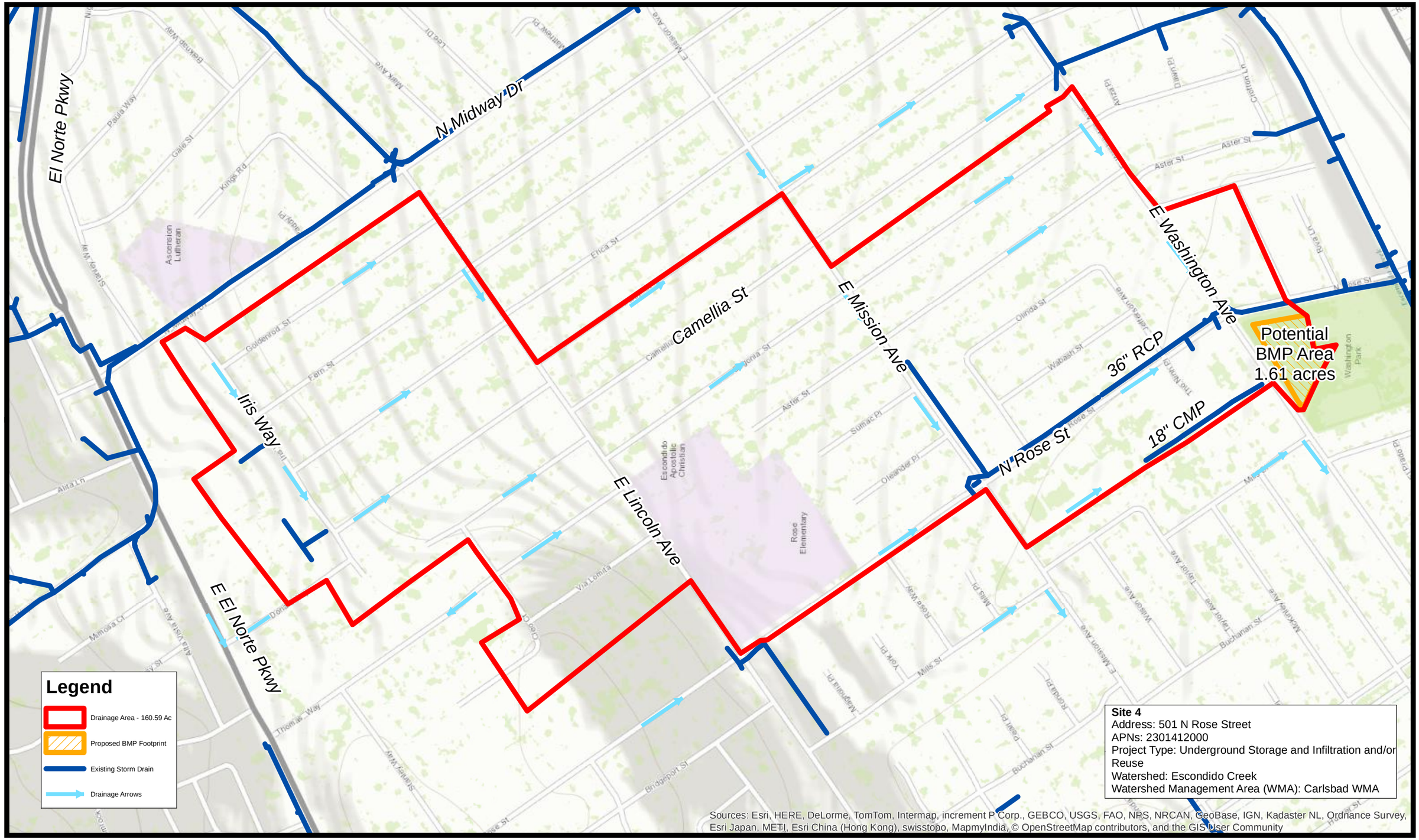
1 in = 500 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exibit**

***The Vineyard at Escondido Golf Course***

***SITE 3***




Michael Baker INTERNATIONAL

0 200 400 800 Feet

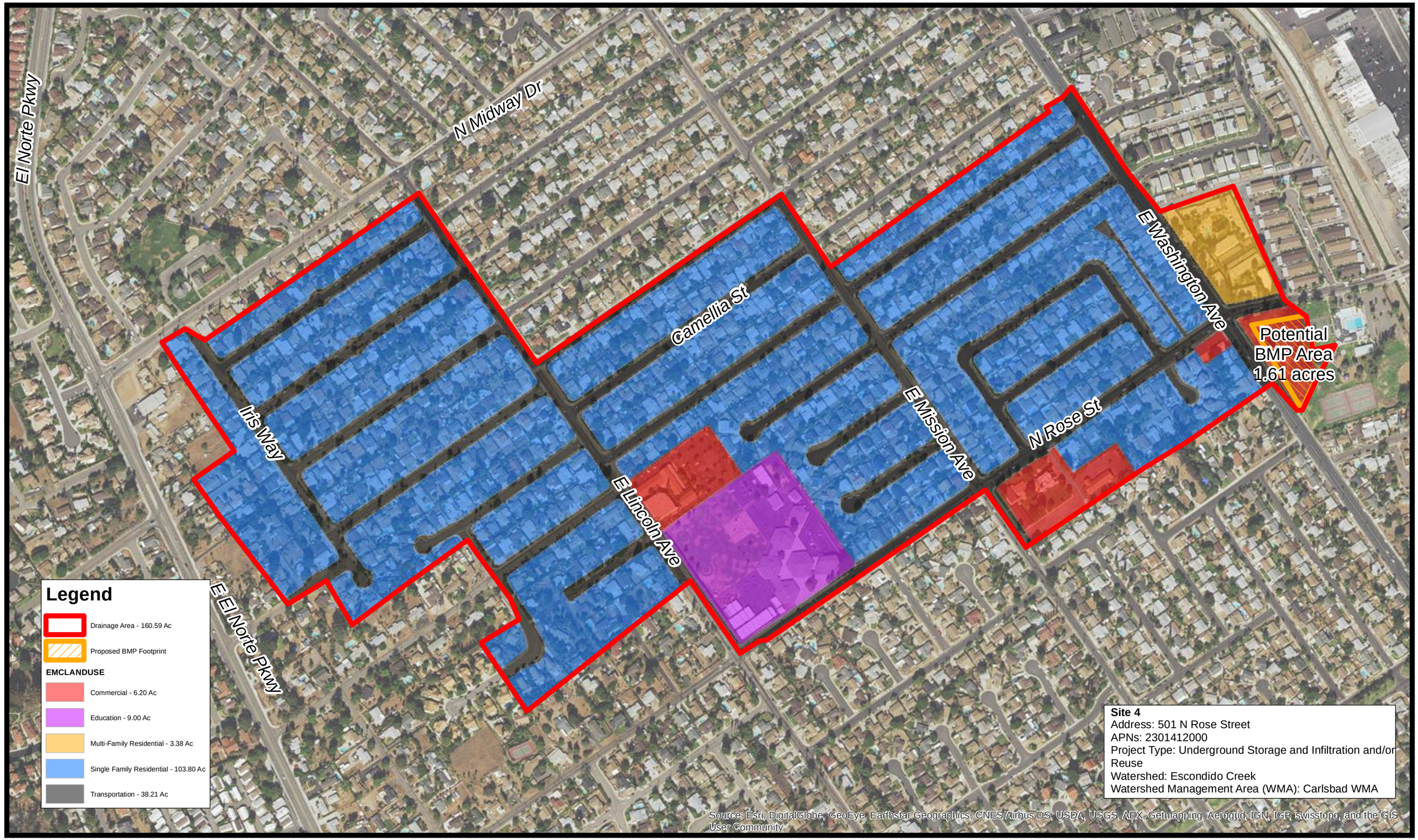
1 in = 400 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Washington Park***

***SITE 4***




Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

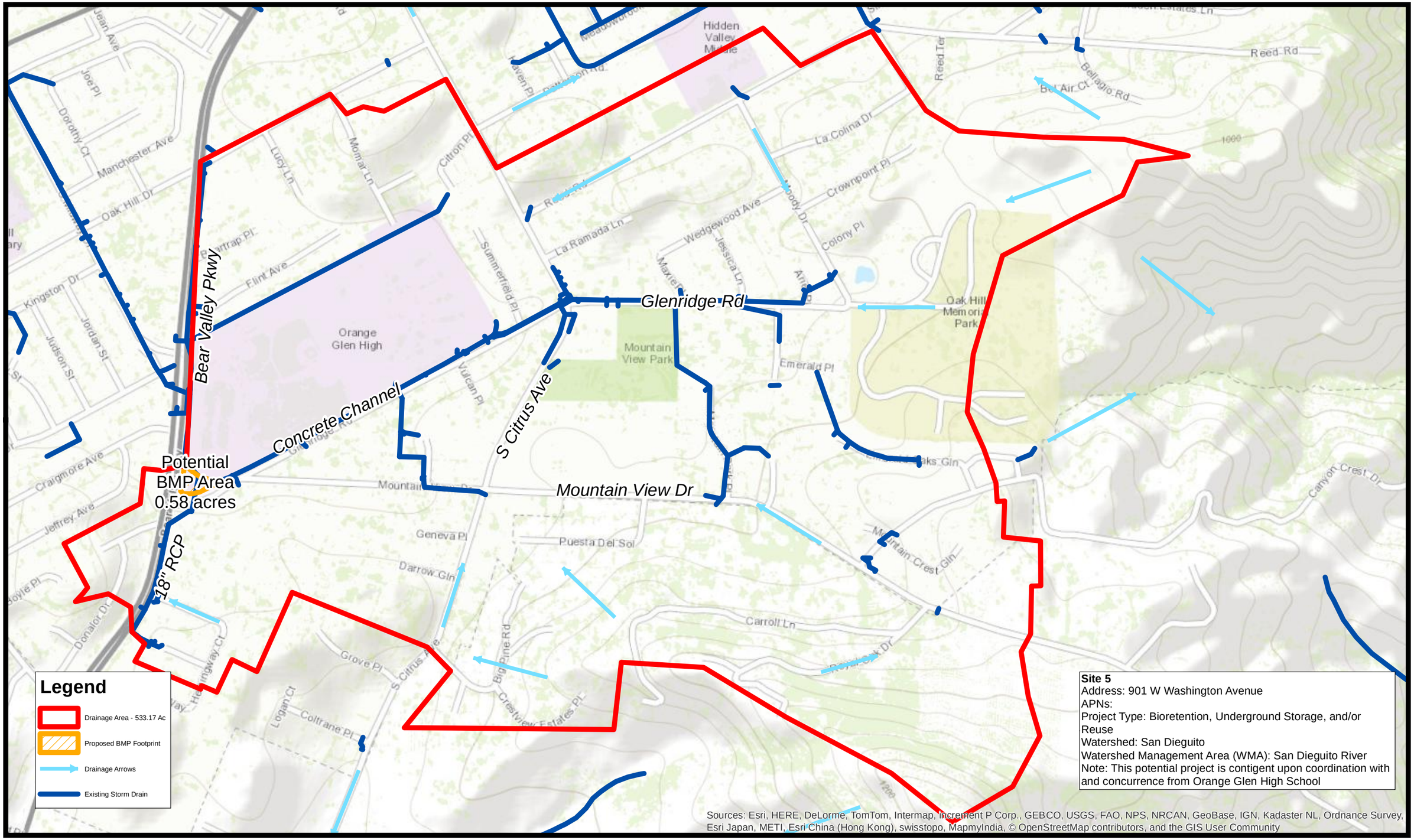
1 in = 400 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Washington Park***

***SITE 4***




Michael Baker INTERNATIONAL

0 300 600 1,200 Feet

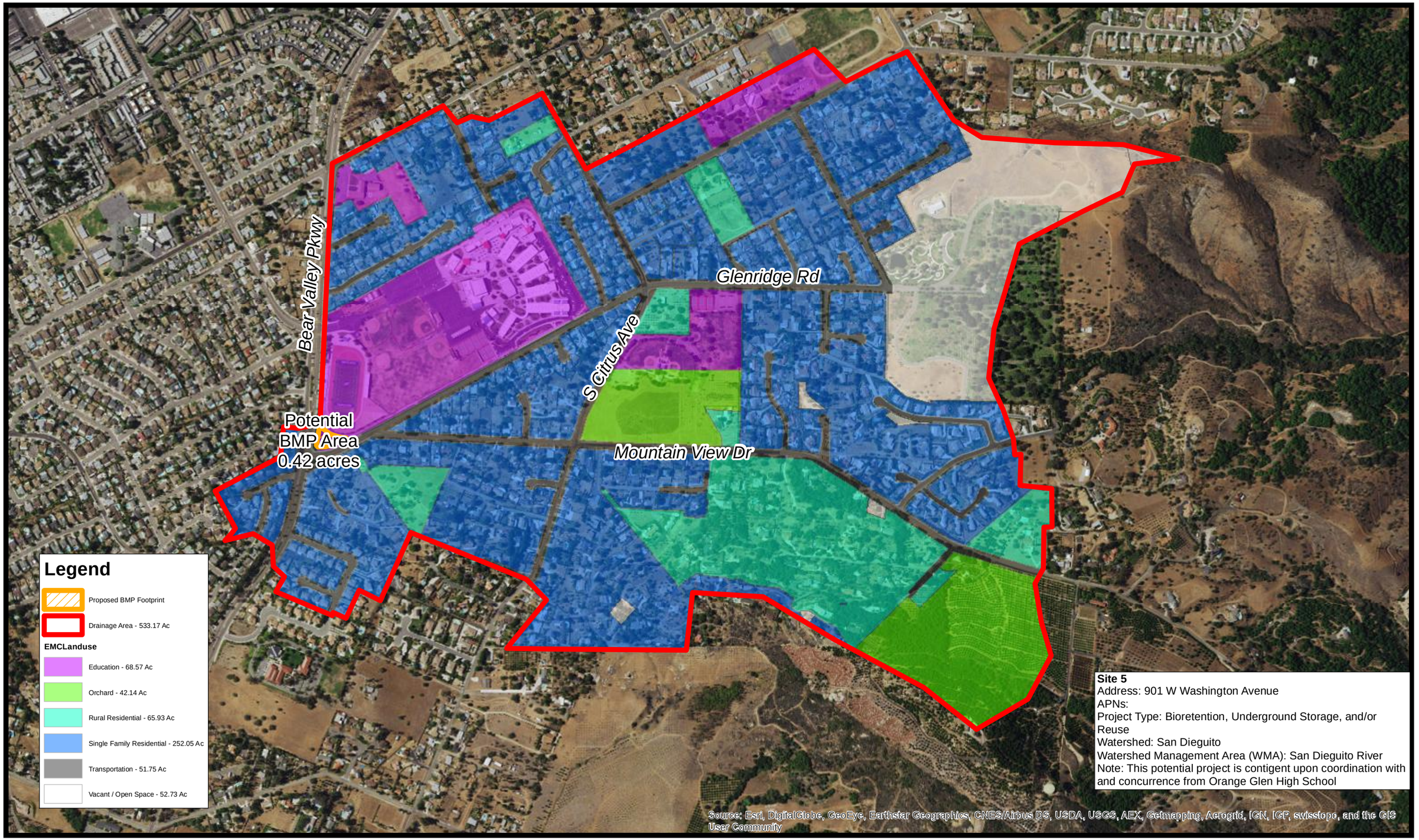
1 in = 600 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Orange Glen High School***

***SITE 5***




Michael Baker INTERNATIONAL

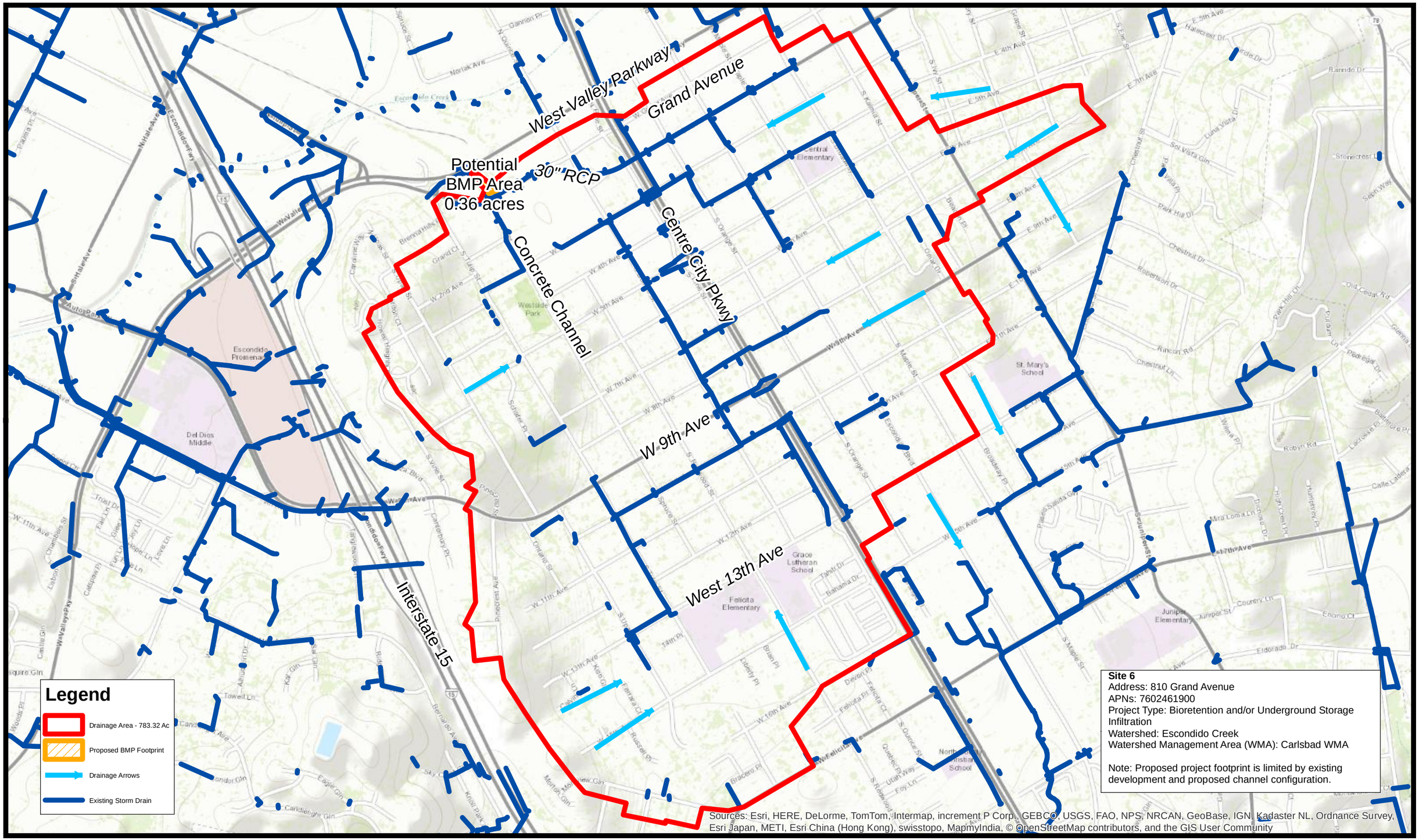
0 350 700 1,400 Feet

1 in = 700 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Orange Glen High School***
***SITE 5***




Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Michael Baker INTERNATIONAL

0 450 900 1,800 Feet

1 in = 900 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Spruce Street Channel Improvement Project***

***SITE 6A***

West Valley Parkway

Grand Avenue

Potential
BMP Area
0.36 acres

Centre City Pkwy

Interstate 15

W 9th Ave

West 13th Ave

## Legend

Drainage Area - 783.32 Ac

Proposed BMP Footprint

**Landuse**

Commercial - 96.81 Ac

Education - 16.08 Ac

Industrial - 21.21 Ac

Multi Family Residential - 39.84 Ac

Orchard - 2.16 Ac

Rural Residential - 1.91 Ac

Single Family Residential - 345.05 Ac

Transportation - 250.32 Ac

Vacant / Open Space - 9.94 Ac

**Site 6**
Address: 810 Grand Avenue
APNs: 7602461900
Project Type: Bioretention and/or Underground Storage Infiltration
Watershed: Escondido Creek
Watershed Management Area (WMA): Carlsbad WMA

Note: Proposed project footprint is limited by existing development and proposed channel configuration.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Michael Baker INTERNATIONAL

0 375 750 1,500 Feet

1 in = 1,000 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Spruce Street Channel Improvement Project***

***SITE 6A***

Michael Baker INTERNATIONAL

0 150 300 600 Feet

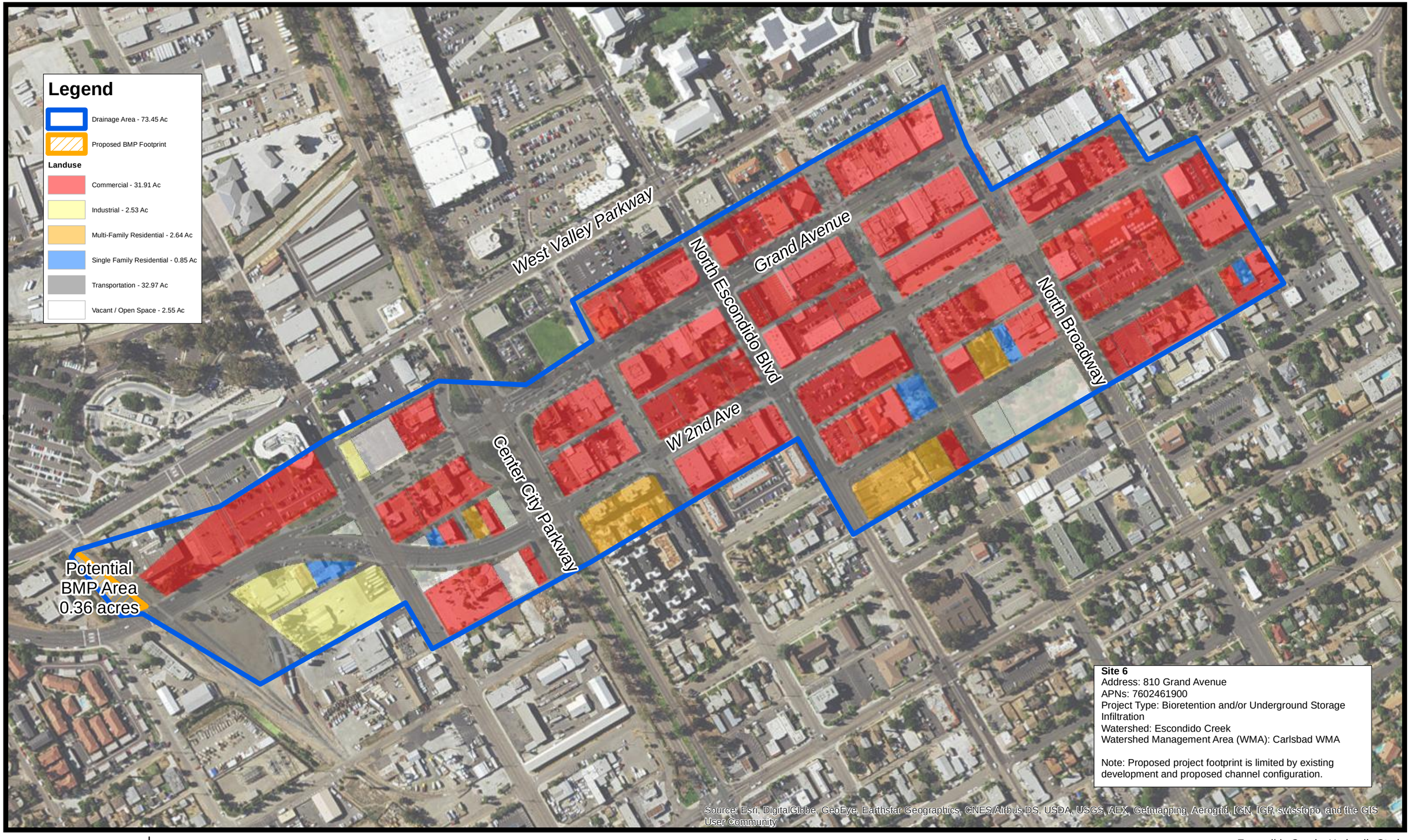
1 in = 300 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Spruce Street Channel Improvement Project***

***SITE 6B***




Michael Baker INTERNATIONAL

0 137.5 275 550 Feet

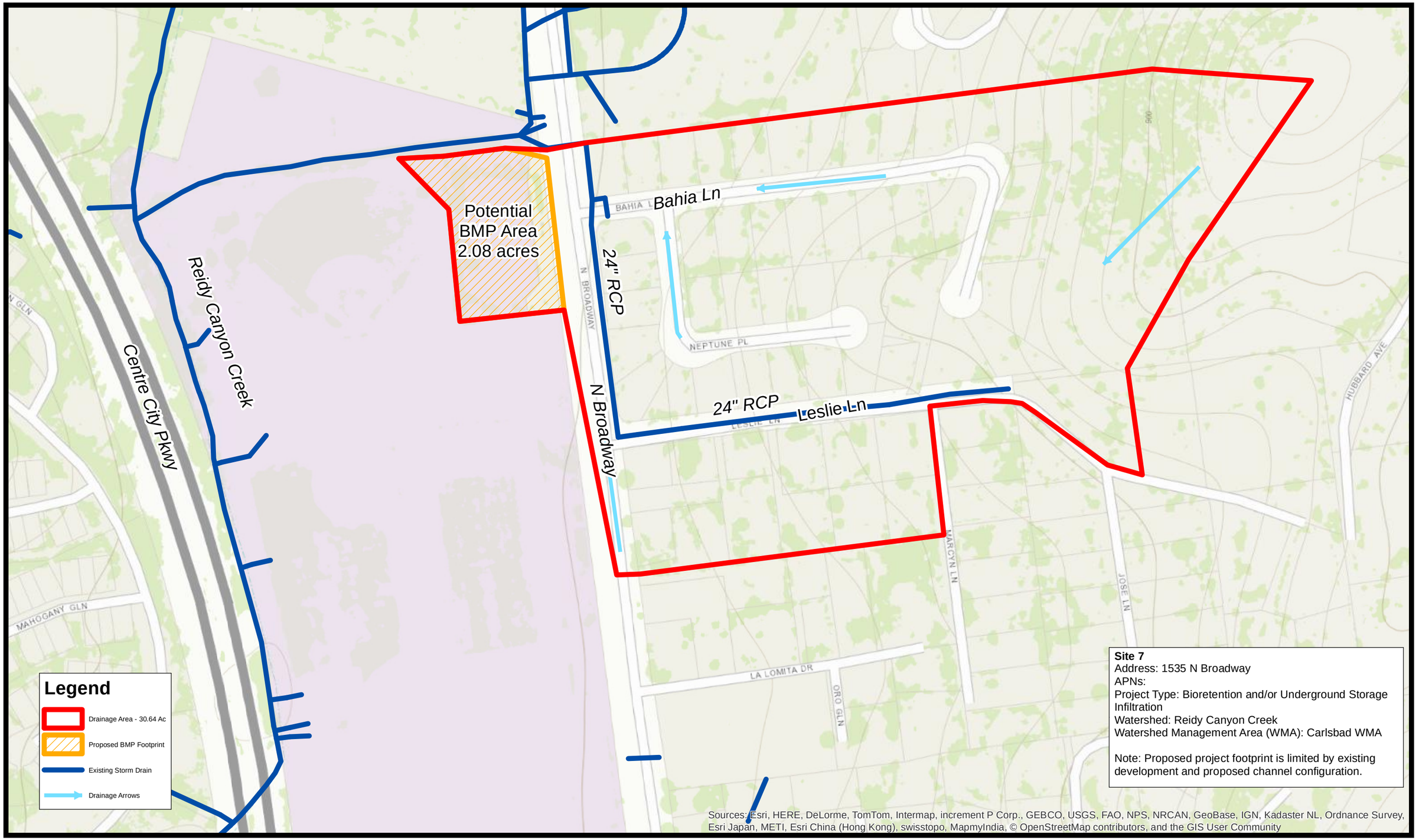
1 in = 300 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Spruce Street Channel Improvement Project***

***SITE 6B***




Michael Baker INTERNATIONAL

0 100 200 400 Feet

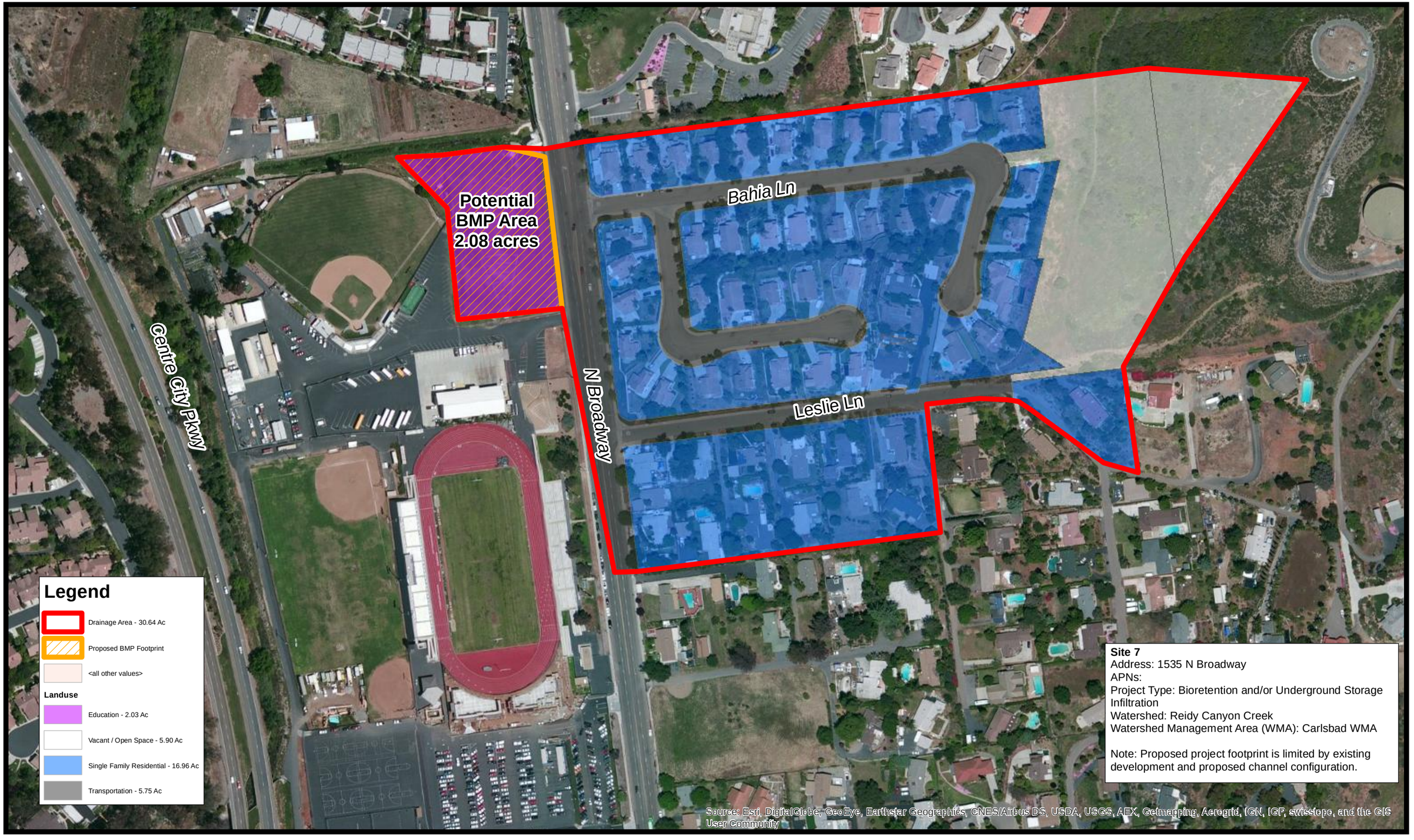
1 in = 200 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Reidy Canyon Creek Channel Improvements***

***SITE 7***




Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 in = 200 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Reidy Canyon Creek Channel Improvements***

***SITE 7***

Potential BMP Area 0.67 acres

120" Concrete Channel

Avenida Del Diablo

Citracado Parkway

West Valley Pkwy

Interstate 15

## Legend

- Drainage Aea - 527.30 Ac
- Proposed BMP Footprint
- Drainage Arrows
- Existing Storm Drain

**Site 8**
Address: Citricado Parkway Extension
APNs: 2350510500
Project Type: Bioretention and/or Underground Storage Infiltration
Watershed: Escondido Creek
Watershed Management Area (WMA): Carlsbad WMA

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Michael Baker INTERNATIONAL

0 305 610 1,220 Feet

1 in = 614 feet

*Escondido Creeks Hydraulic Study*

# Drainage Area Exhibit

***Citracado Parkway Extension***
***SITE 8***

Michael Baker INTERNATIONAL

0 300 600 1,200 Feet

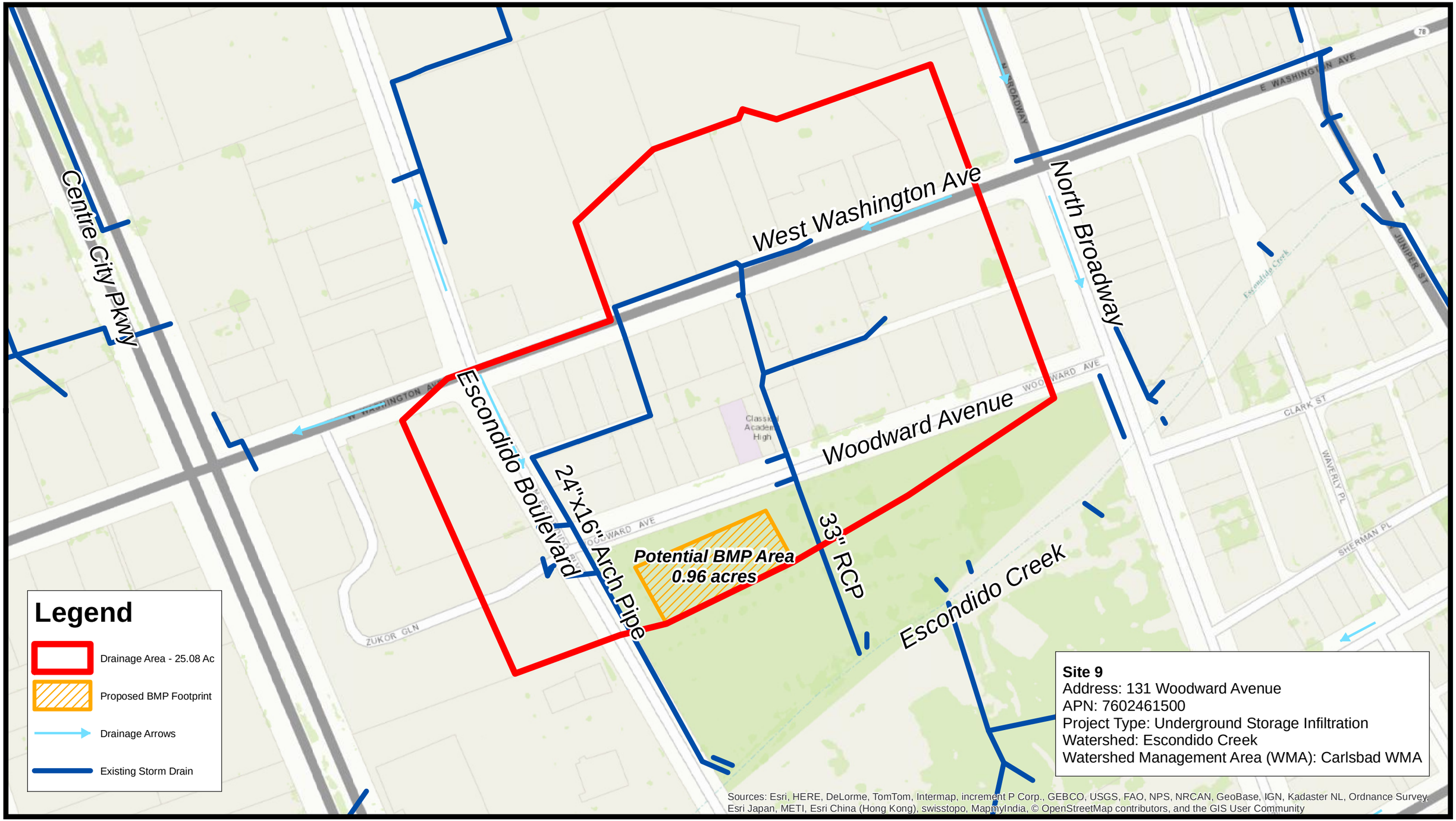
1 in = 700 feet

*Escondido Creeks Hydraulic Study*

**Landuse Exhibit**

***Citracado Parkway Extension***

***SITE 8***




Michael Baker INTERNATIONAL

0 100 200 400 Feet

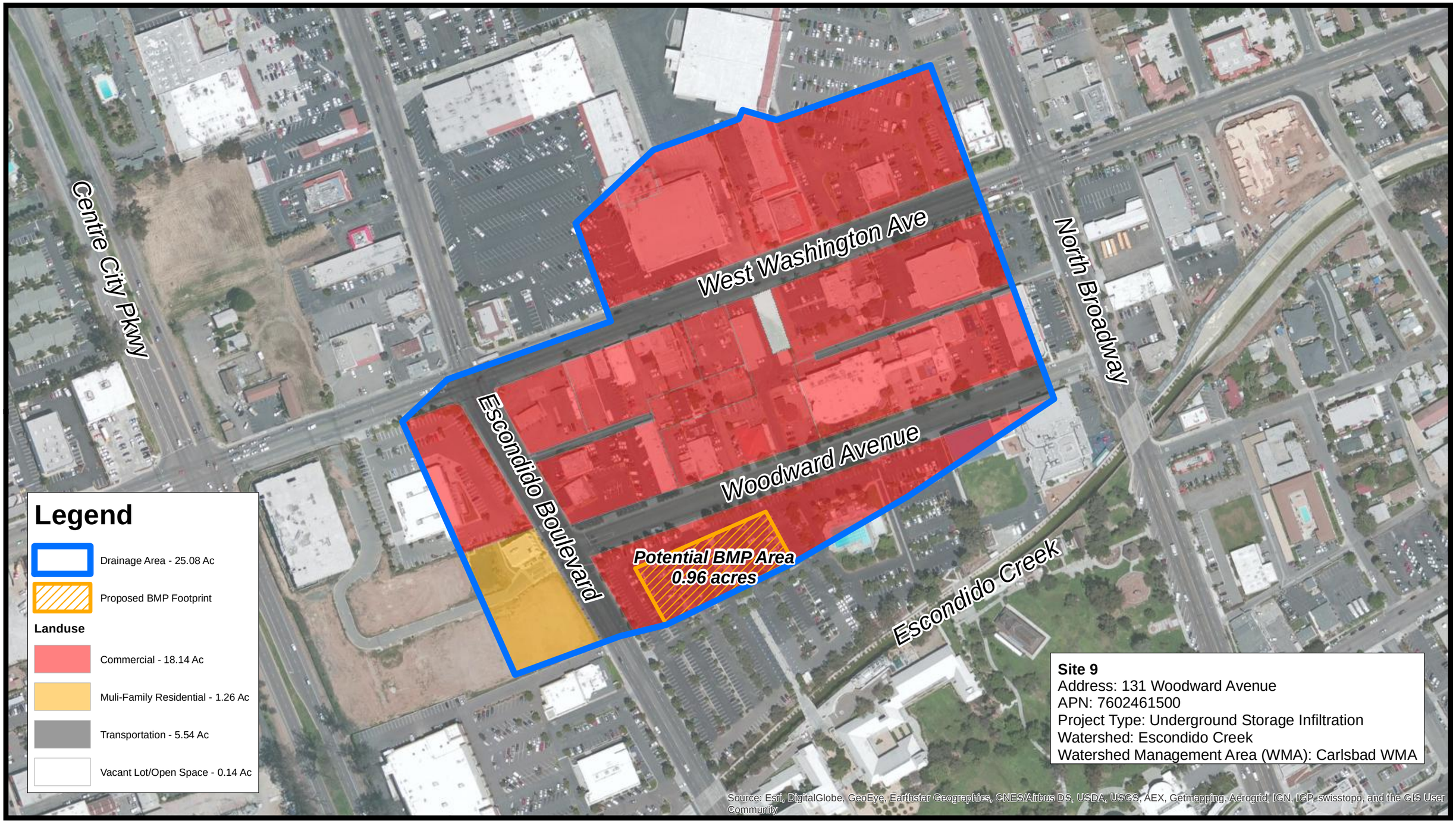
1 in = 200 feet

*Escondido Creeks Hydraulic Study*

# Drainage Area Exhibit

***James A. Stone Municipal Swimming Pool***

***SITE 9***




Michael Baker INTERNATIONAL

0 125 250 500 Feet

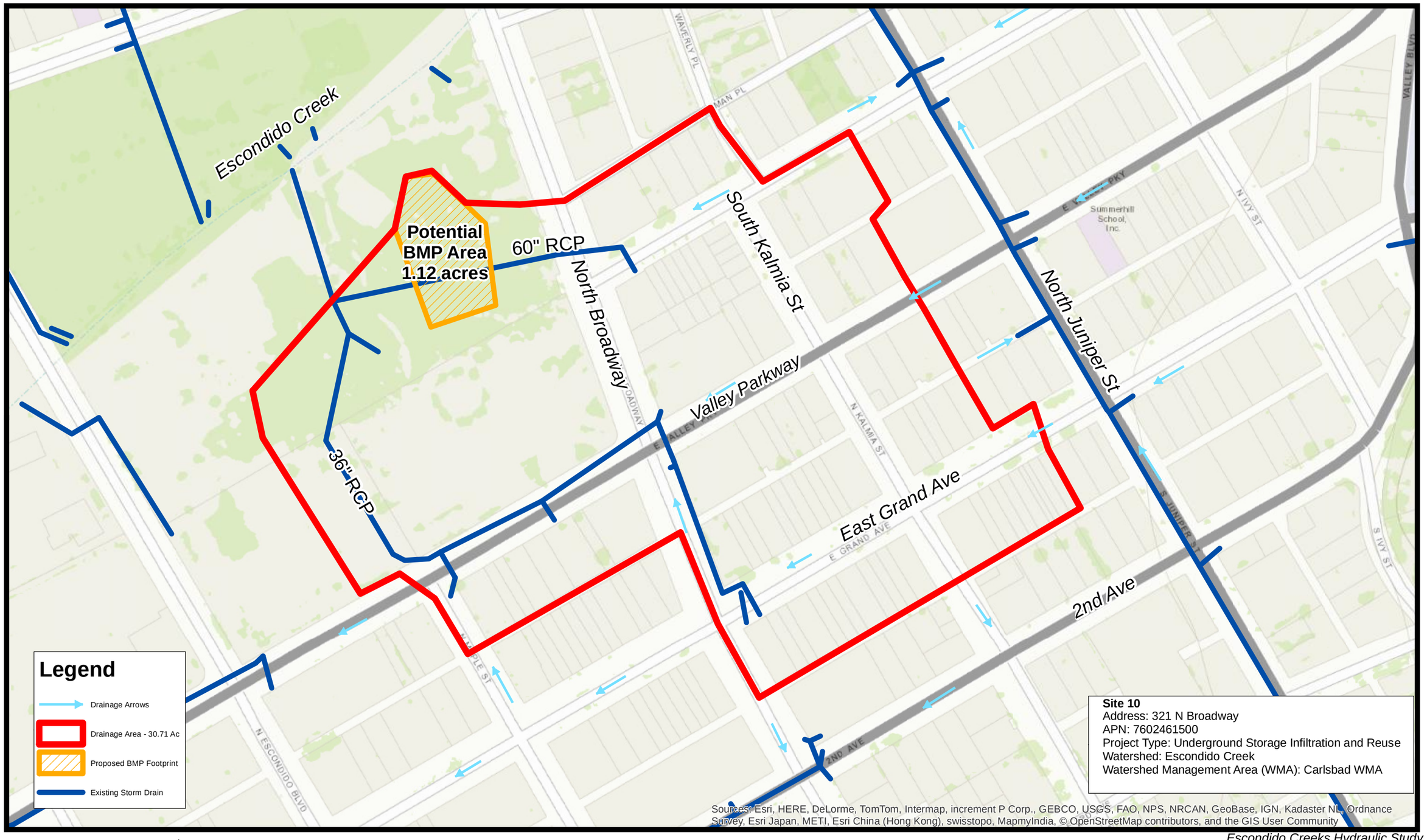
1 in = 200 feet

*Escondido Creeks Hydraulic Study*

# Landuse Exhibit

***James A. Stone Municipal Swimming Pool***

***SITE 9***




Michael Baker INTERNATIONAL

0 100 200 400 Feet

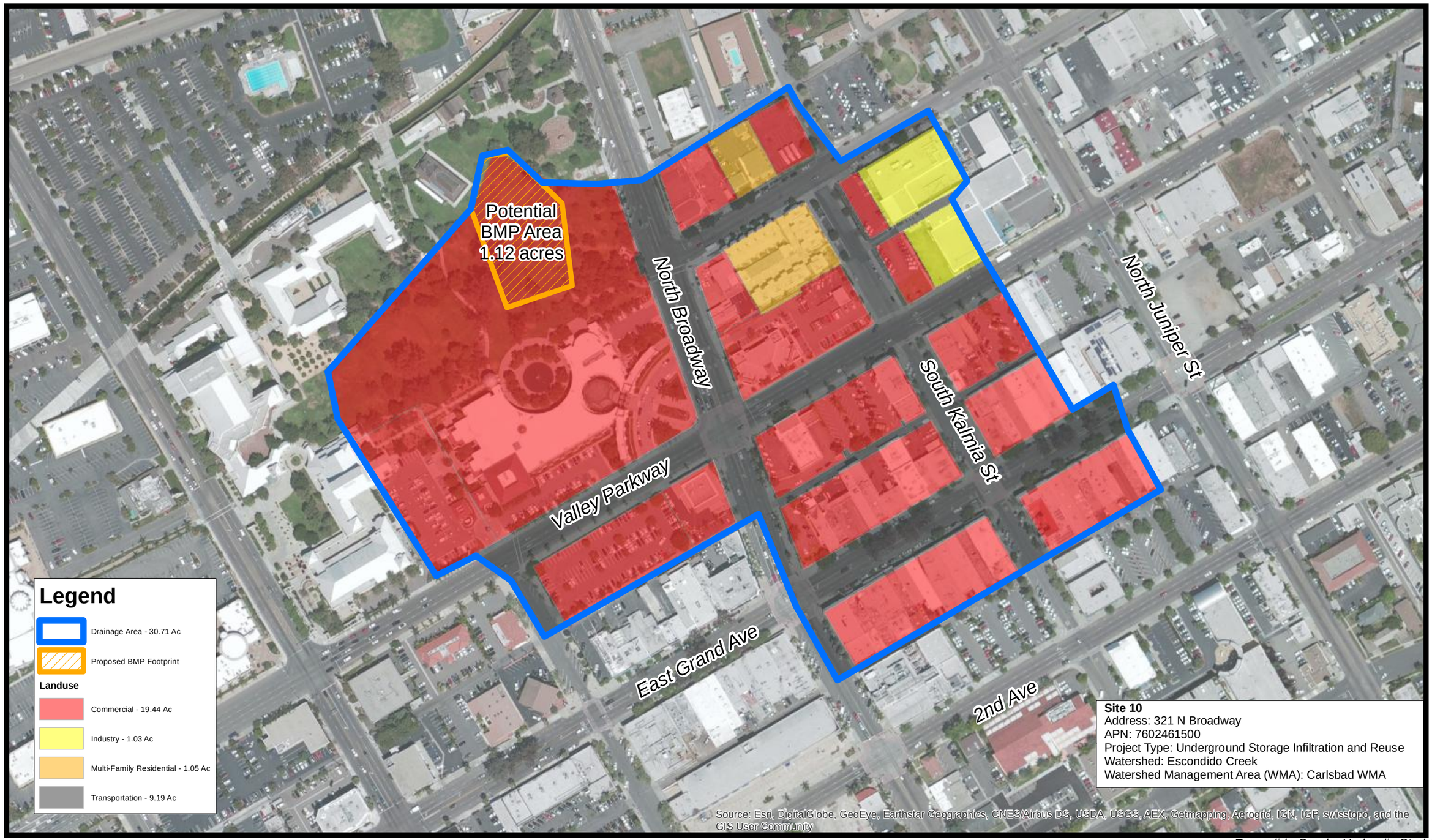
1 in = 200 feet

*Escondido Creeks Hydraulic Study*

# Drainage Area Exhibit

***Grape Day Park***

***SITE 10***




Michael Baker INTERNATIONAL

0 125 250 500 Feet

1 in = 200 feet

*Escondido Creeks Hydraulic Study*

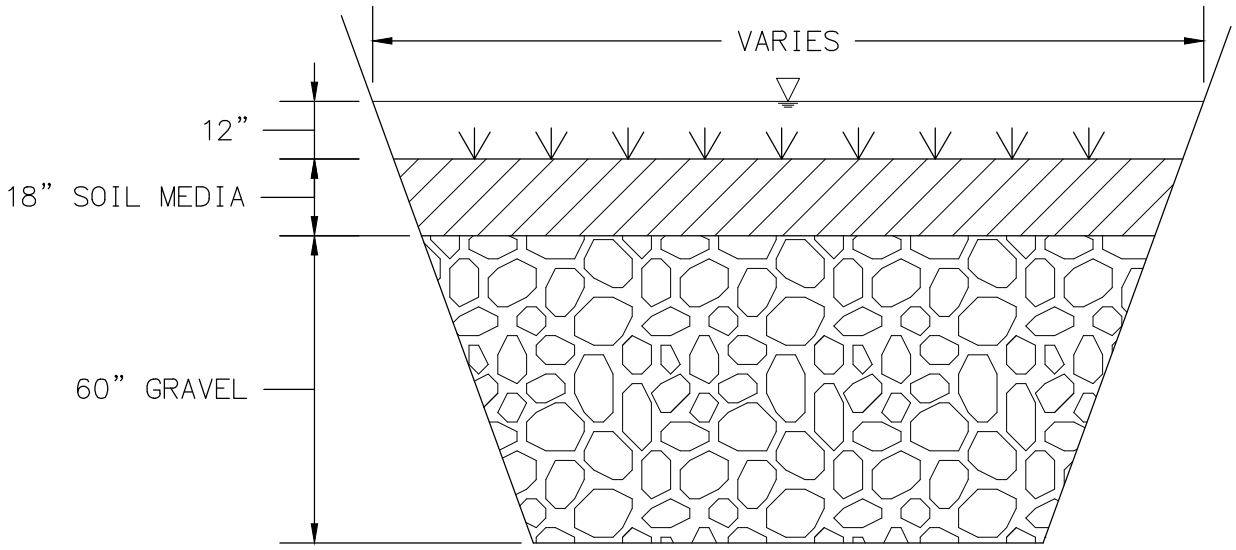
# Landuse Exhibit

***Grape Day Park***

***SITE 10***

Michael Baker
INTERNATIONAL

# Appendix E Typical BMP Design Parameters




DETAIL

NOT TO SCALE

# BIORETENTION

Michael Baker INTERNATIONAL
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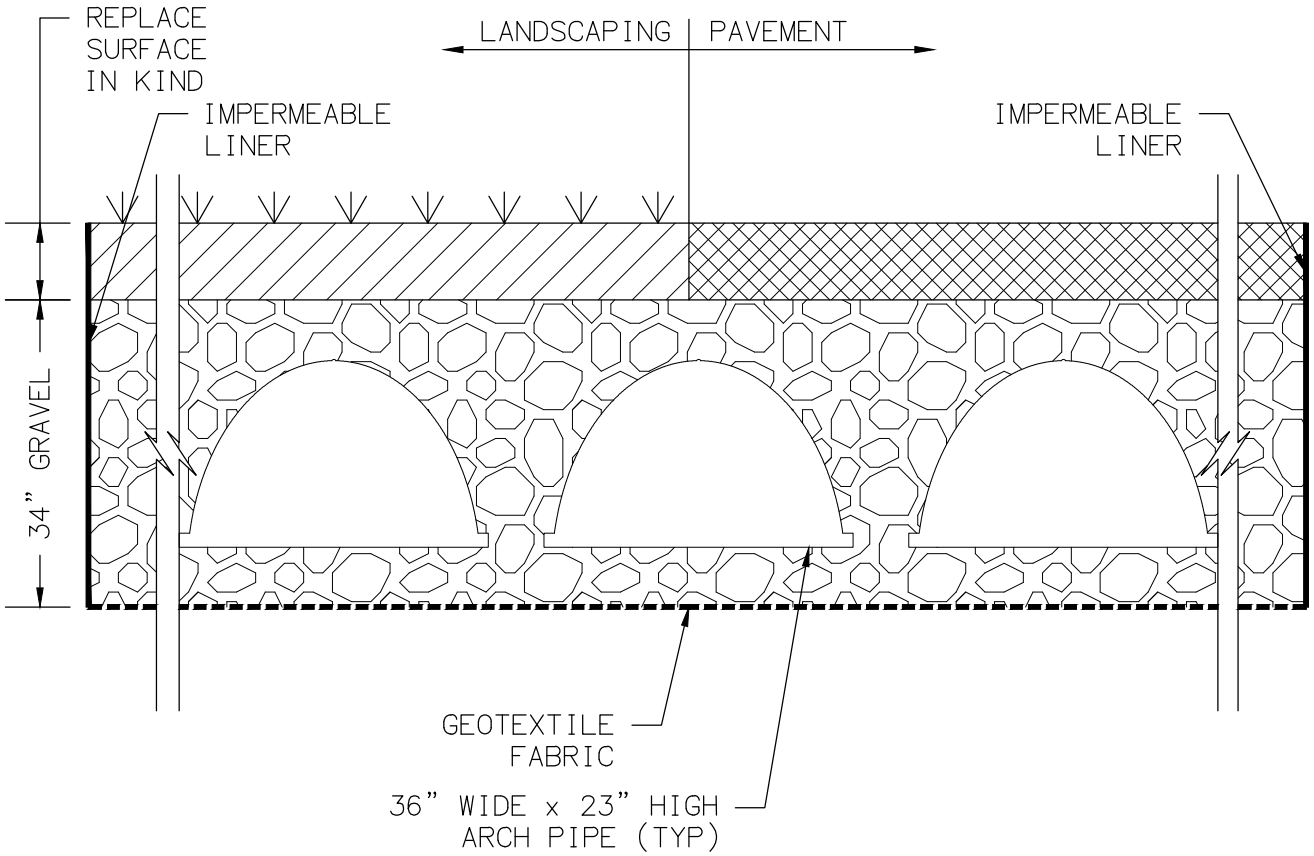


## DETAIL

NOT TO SCALE

# UNDERGROUND STORAGE

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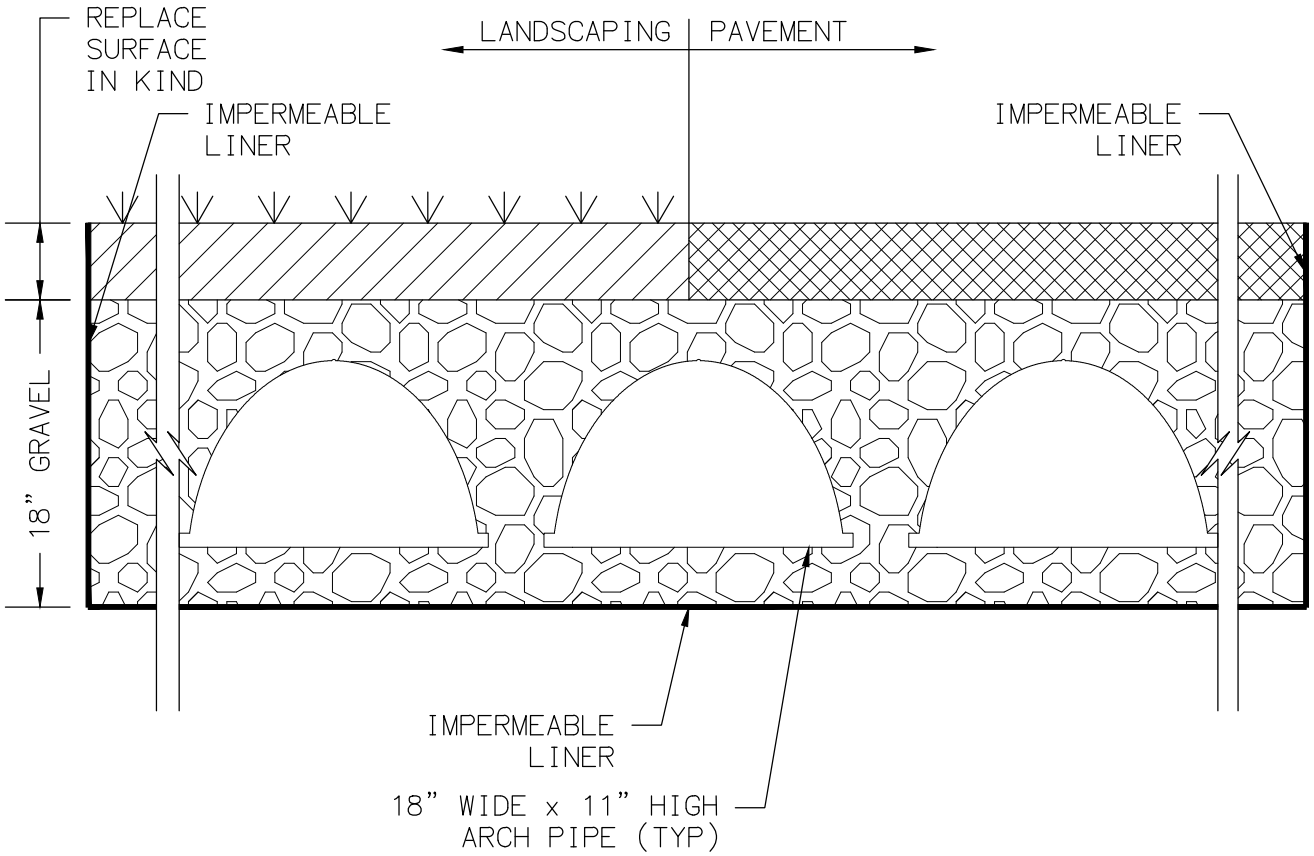


## DETAIL

NOT TO SCALE

# IRRIGATION REUSE

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# Appendix F Hydrologic Parameters and SWMM Input & Output

# Alternative 1 - Wet Weather



Alternative 1

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**Analysis Options**

| | |
|---|---|
| Flow Units | CFS |
| Process Models: | |
| Rainfall/Runoff | YES |
| RDII | NO |
| Snowmelt | NO |
| Groundwater | NO |
| Flow Routing | YES |
| Ponding Allowed | NO |
| Water Quality | NO |
| Infiltration Method | GREEN_AMPT |
| Flow Routing Method | KINWAVE |
| Starting Date | SEP-24-1964 13:00:00 |
| Ending Date | MAY-23-2008 22:00:00 |
| Antecedent Dry Days | 0.0 |
| Report Time Step | 00:15:00 |
| Wet Time Step | 00:05:00 |
| Dry Time Step | 01:00:00 |
| Routing Time Step | 30.00 sec |

| Runoff Quantity Continuity | Volume acre-feet | Depth inches |
|---|---|---|
| Total Precipitation | 561880.043 | 611.127 |
| Evaporation Loss | 0.000 | 0.000 |
| Infiltration Loss | 273269.609 | 297.221 |
| Surface Runoff | 288551.765 | 313.842 |
| Final Surface Storage | 75.422 | 0.082 |
| Continuity Error (%) | -0.003 | |

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow | 0.000 | 0.000 |
| Wet Weather Inflow | 288551.324 | 94028.760 |
| Groundwater Inflow | 0.000 | 0.000 |
| RDII Inflow | 0.000 | 0.000 |
| External Inflow | 0.000 | 0.000 |
| External Outflow | 217502.095 | 70876.307 |
| Internal Outflow | 67105.655 | 21867.380 |
| Evaporation Loss | 0.000 | 0.000 |
| Exfiltration Loss | 14972.117 | 4878.888 |
| Initial Stored Volume | 0.000 | 0.000 |
| Final Stored Volume | 2.321 | 0.756 |
| Continuity Error (%) | -3.823 | |

**Highest Flow Instability Indexes**

All links are stable.

**********
Routing Time Step Summary
**********

| | | |
|---|---|---|
| Minimum Time Step | : | 30.00 sec |
| Average Time Step | : | 30.00 sec |
| Maximum Time Step | : | 30.00 sec |
| Percent in Steady State | : | 0.00 |
| Average Iterations per Step | : | 1.00 |
| Percent Not Converging | : | 0.00 |

**********
Subcatchment Runoff Summary
**********

| Subcatchment | Total Precip in | Total Runon in | Total Evap in | Total Infil in | Total Runoff in | Total Runoff 10^6 gal | Peak Runoff CFS | Runoff Coeff |
|---|---|---|---|---|---|---|---|---|
| ElCaballo | 611.13 | 0.00 | 0.00 | 475.67 | 135.48 | 15881.56 | 2007.06 | 0.222 |
| GrapeDay | 611.13 | 0.00 | 0.00 | 182.51 | 428.49 | 78140.36 | 2730.72 | 0.701 |

**********
Node Depth Summary
**********

| Node | Type | Average Depth Feet | Maximum Depth Feet | Maximum HGL Feet | Time of Max Occurrence days hr:min |
|---|---|---|---|---|---|
| 1 | JUNCTION | 0.06 | 10.00 | 735.00 | 424 01:22 |
| 2 | JUNCTION | 0.06 | 10.00 | 725.00 | 424 01:29 |
| 3 | JUNCTION | 0.40 | 10.00 | 656.00 | 54 04:55 |
| GDOut | OUTFALL | 0.37 | 10.00 | 652.00 | 54 05:06 |

**********
Node Inflow Summary
**********

| Node | Type | Maximum Lateral Inflow CFS | Maximum Total Inflow CFS | Time of Max Occurrence days hr:min | Lateral Inflow Volume 10^6 gal | Total Inflow Volume 10^6 gal | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|

```
------------------------------------------------------------------------------
------------------
  1                    JUNCTION   2007.06  2007.06   801  19:00   1.59e+004
1.59e+004       0.000
  2                    JUNCTION      0.00   462.03   424  01:29           0
1.4e+004        0.000
  3                    JUNCTION   2730.72  3192.76   801  21:00   7.81e+004
9.24e+004       0.000
  GDOut                OUTFALL       0.00   310.33    54  05:06           0
7.09e+004       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  -------------------------------------------------------------------------
                                          Max. Height   Min. Depth
                                Hours     Above Crown    Below Rim
  Node                  Type    Surcharged      Feet          Feet
  -------------------------------------------------------------------------
  1                     JUNCTION    236.72         0.000         0.000
  2                     JUNCTION    230.28         0.000         0.000
  3                     JUNCTION   2276.39         0.000         0.000


  **********************
  Node Flooding Summary
  **********************

  Flooding refers to all water that overflows a node, whether it ponds or not.
  ------------------------------------------------------------------------------
                                                                 Total   Maximum
                                Maximum   Time of Max           Flood    Ponded
                    Hours         Rate    Occurrence          Volume    Volume
  Node              Flooded        CFS   days hr:min        10^6 gal  1000 ft3
  ------------------------------------------------------------------------------
  1                  236.72   1544.77    801  19:00        1807.080     0.000
  3                 2276.38   2882.22    801  21:00       20058.676     0.000


  ************************
  Outfall Loading Summary
  ************************

  ---------------------------------------------------------
                       Flow       Avg       Max       Total
                       Freq      Flow      Flow      Volume
  Outfall Node         Pcnt       CFS       CFS    10^6 gal
  ---------------------------------------------------------
  GDOut               30.47     22.57    310.33   70871.043
  ---------------------------------------------------------
  System              30.47     22.57    310.33   70871.043


  ********************
  Link Flow Summary
  ********************


------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/
Max/
                                 |Flow|   Occurrence   |Veloc|    Full
```

| Link | Type | CFS | days | hr:min | ft/sec | Flow Depth |
|---|---|---|---|---|---|---|
| 1 | CONDUIT | 462.03 | 424 | 01:29 | 1.57 | 1.00 1.00 |
| 2 | CONDUIT | 469.40 | 15675 | 20:06 | 9.44 | 0.07 0.17 |
| 3 | CONDUIT | 310.33 | 54 | 05:06 | 1.05 | 1.00 1.00 |

**********
Conduit Surcharge Summary
**********

| Conduit | Hours Full (Both Ends) | Hours Full (Upstream) | Hours Full (Dnstream) | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| 1 | 226.58 | 236.10 | 230.15 | 230.15 | 236.10 |
| 3 | 2209.28 | 2273.46 | 2232.45 | 2232.45 | 2273.46 |

Analysis begun on: Fri Aug 14 09:38:01 2015
Analysis ended on: Fri Aug 14 09:41:06 2015
Total elapsed time: 00:03:05

# Alternative 2 - Wet Weather



Alternative 2

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**Analysis Options**

| | |
|---|---|
| Flow Units | CFS |
| Process Models: | |
| Rainfall/Runoff | YES |
| RDII | NO |
| Snowmelt | NO |
| Groundwater | NO |
| Flow Routing | YES |
| Ponding Allowed | NO |
| Water Quality | NO |
| Infiltration Method | GREEN_AMPT |
| Flow Routing Method | KINWAVE |
| Starting Date | SEP-24-1964 13:00:00 |
| Ending Date | MAY-23-2008 22:00:00 |
| Antecedent Dry Days | 0.0 |
| Report Time Step | 00:15:00 |
| Wet Time Step | 00:05:00 |
| Dry Time Step | 01:00:00 |
| Routing Time Step | 30.00 sec |

| Runoff Quantity Continuity | Volume acre-feet | Depth inches |
|---|---|---|
| Total Precipitation | 561880.043 | 611.127 |
| Evaporation Loss | 0.000 | 0.000 |
| Infiltration Loss | 273269.609 | 297.221 |
| Surface Runoff | 288551.765 | 313.842 |
| Final Surface Storage | 75.422 | 0.082 |
| Continuity Error (%) | -0.003 | |

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow | 0.000 | 0.000 |
| Wet Weather Inflow | 288551.324 | 94028.760 |
| Groundwater Inflow | 0.000 | 0.000 |
| RDII Inflow | 0.000 | 0.000 |
| External Inflow | 0.000 | 0.000 |
| External Outflow | 220838.031 | 71963.372 |
| Internal Outflow | 63739.873 | 20770.590 |
| Evaporation Loss | 0.000 | 0.000 |
| Exfiltration Loss | 14958.315 | 4874.390 |
| Initial Stored Volume | 0.000 | 0.000 |
| Final Stored Volume | 2.241 | 0.730 |
| Continuity Error (%) | -3.808 | |

**Highest Flow Instability Indexes**

All links are stable.

**********
Routing Time Step Summary
**********

| | | |
|---|---|---|
| Minimum Time Step | : | 30.00 sec |
| Average Time Step | : | 30.00 sec |
| Maximum Time Step | : | 30.00 sec |
| Percent in Steady State | : | 0.00 |
| Average Iterations per Step | : | 1.00 |
| Percent Not Converging | : | 0.00 |

**********
Subcatchment Runoff Summary
**********

| Subcatchment | Total Precip in | Total Runon in | Total Evap in | Total Infil in | Total Runoff in | Total Runoff 10^6 gal | Peak Runoff CFS | Runoff Coeff |
|---|---|---|---|---|---|---|---|---|
| ElCaballo | 611.13 | 0.00 | 0.00 | 475.67 | 135.48 | 15881.56 | 2007.06 | 0.222 |
| GrapeDay | 611.13 | 0.00 | 0.00 | 182.51 | 428.49 | 78140.36 | 2730.72 | 0.701 |

**********
Node Depth Summary
**********

| Node | Type | Average Depth Feet | Maximum Depth Feet | Maximum HGL Feet | Time of Max Occurrence days hr:min |
|---|---|---|---|---|---|
| 1 | JUNCTION | 0.06 | 10.00 | 735.00 | 424 01:32 |
| 2 | JUNCTION | 0.06 | 10.00 | 730.00 | 424 01:39 |
| 3 | JUNCTION | 0.39 | 10.00 | 656.00 | 54 04:59 |
| GDOut | OUTFALL | 0.36 | 10.00 | 654.00 | 54 05:11 |

**********
Node Inflow Summary
**********

| Node | Type | Maximum Lateral Inflow CFS | Maximum Total Inflow CFS | Time of Max Occurrence days hr:min | Lateral Inflow Volume 10^6 gal | Total Inflow Volume 10^6 gal | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|

```
------------------------------------------------------------------------------
------------------
  1                    JUNCTION   2007.06  2007.06   801  19:00   1.59e+004
1.59e+004      -0.000
  2                    JUNCTION      0.00   490.05   424  01:39           0
1.42e+004       0.000
  3                    JUNCTION   2730.72  3220.77   801  21:00   7.81e+004
9.25e+004      -0.000
  GDOut                OUTFALL       0.00   329.15    54  05:11           0
7.2e+004       0.000
```

**********
Node Surcharge Summary
**********

Surcharging occurs when water rises above the top of the highest conduit.

| Node | Type | Hours Surcharged | Max. Height Above Crown Feet | Min. Depth Below Rim Feet |
|---|---|---|---|---|
| 1 | JUNCTION | 210.06 | 0.000 | 0.000 |
| 2 | JUNCTION | 204.34 | 0.000 | 0.000 |
| 3 | JUNCTION | 2112.13 | 0.000 | 0.000 |

**********
Node Flooding Summary
**********

Flooding refers to all water that overflows a node, whether it ponds or not.

| Node | Hours Flooded | Maximum Rate CFS | Time of Max Occurrence days hr:min | Total Flood Volume 10^6 gal | Maximum Ponded Volume 1000 ft3 |
|---|---|---|---|---|---|
| 1 | 210.06 | 1516.75 | 801 19:00 | 1639.214 | 0.000 |
| 3 | 2112.11 | 2891.42 | 801 21:00 | 19129.833 | 0.000 |

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow CFS | Max Flow CFS | Total Volume 10^6 gal |
|---|---|---|---|---|
| GDOut | 30.45 | 22.93 | 329.15 | 71958.027 |
| System | 30.45 | 22.93 | 329.15 | 71958.027 |

**********
Link Flow Summary
**********

```
------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/
Max/
                                 |Flow|   Occurrence   |Veloc|    Full
```

| Link | Type | CFS | days | hr:min | ft/sec | Full Flow | Full Depth |
|---|---|---|---|---|---|---|---|
| 1 | CONDUIT | 490.05 | 424 | 01:39 | 1.66 | 1.00 | 1.00 |
| 2 | CONDUIT | 498.64 | 1151 | 00:02 | 9.81 | 0.07 | 0.17 |
| 3 | CONDUIT | 329.15 | 54 | 05:11 | 1.11 | 1.00 | 1.00 |

**********
Conduit Surcharge Summary
**********

| Conduit | Hours Full: Both Ends | Hours Full: Upstream | Hours Full: Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| 1 | 201.04 | 209.49 | 204.19 | 204.19 | 209.49 |
| 3 | 2048.87 | 2109.28 | 2070.08 | 2070.08 | 2109.28 |

Analysis begun on: Fri Aug 14 09:44:08 2015
Analysis ended on: Fri Aug 14 09:47:12 2015
Total elapsed time: 00:03:04

# Alternative 3 - Wet Weather



Alternative 3

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**Analysis Options**

| | |
|---|---|
| Flow Units | CFS |
| Process Models: | |
| Rainfall/Runoff | YES |
| RDII | NO |
| Snowmelt | NO |
| Groundwater | NO |
| Flow Routing | YES |
| Ponding Allowed | NO |
| Water Quality | NO |
| Infiltration Method | GREEN_AMPT |
| Flow Routing Method | KINWAVE |
| Starting Date | SEP-24-1964 13:00:00 |
| Ending Date | MAY-23-2008 22:00:00 |
| Antecedent Dry Days | 0.0 |
| Report Time Step | 00:15:00 |
| Wet Time Step | 00:05:00 |
| Dry Time Step | 01:00:00 |
| Routing Time Step | 30.00 sec |

| Runoff Quantity Continuity | Volume acre-feet | Depth inches |
|---|---|---|
| Total Precipitation | 561880.043 | 611.127 |
| Evaporation Loss | 0.000 | 0.000 |
| Infiltration Loss | 273269.609 | 297.221 |
| Surface Runoff | 288551.765 | 313.842 |
| Final Surface Storage | 75.422 | 0.082 |
| Continuity Error (%) | -0.003 | |

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow | 0.000 | 0.000 |
| Wet Weather Inflow | 288551.324 | 94028.760 |
| Groundwater Inflow | 0.000 | 0.000 |
| RDII Inflow | 0.000 | 0.000 |
| External Inflow | 0.000 | 0.000 |
| External Outflow | 196506.553 | 64034.596 |
| Internal Outflow | 88165.985 | 28730.204 |
| Evaporation Loss | 0.000 | 0.000 |
| Exfiltration Loss | 15058.905 | 4907.169 |
| Initial Stored Volume | 0.000 | 0.000 |
| Final Stored Volume | 2.803 | 0.913 |
| Continuity Error (%) | -3.876 | |

**Highest Flow Instability Indexes**

All links are stable.

**********
Routing Time Step Summary
**********

| | | |
|---|---|---|
| Minimum Time Step | : | 30.00 sec |
| Average Time Step | : | 30.00 sec |
| Maximum Time Step | : | 30.00 sec |
| Percent in Steady State | : | 0.00 |
| Average Iterations per Step | : | 1.00 |
| Percent Not Converging | : | 0.00 |

**********
Subcatchment Runoff Summary
**********

| Subcatchment | Total Precip in | Total Runon in | Total Evap in | Total Infil in | Total Runoff in | Total Runoff 10^6 gal | Peak Runoff CFS | Runoff Coeff |
|---|---|---|---|---|---|---|---|---|
| ElCaballo | 611.13 | 0.00 | 0.00 | 475.67 | 135.48 | 15881.56 | 2007.06 | 0.222 |
| GrapeDay | 611.13 | 0.00 | 0.00 | 182.51 | 428.49 | 78140.36 | 2730.72 | 0.701 |

**********
Node Depth Summary
**********

| Node | Type | Average Depth Feet | Maximum Depth Feet | Maximum HGL Feet | Time of Max Occurrence days hr:min |
|---|---|---|---|---|---|
| 1 | JUNCTION | 0.07 | 10.00 | 735.00 | 196 04:53 |
| 2 | JUNCTION | 0.07 | 10.00 | 730.00 | 196 05:04 |
| 3 | JUNCTION | 0.48 | 10.00 | 656.00 | 47 04:42 |
| GDOut | OUTFALL | 0.44 | 10.00 | 654.00 | 47 04:57 |

**********
Node Inflow Summary
**********

| Node | Type | Maximum Lateral Inflow CFS | Maximum Total Inflow CFS | Time of Max Occurrence days hr:min | Lateral Inflow Volume 10^6 gal | Total Inflow Volume 10^6 gal | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|

```
------------------------------------------------------------------------------
------------------
  1                    JUNCTION   2007.06  2007.06   801  19:00   1.59e+004
1.59e+004       0.000
  2                    JUNCTION      0.00   326.70   196  05:04           0
1.29e+004       0.000
  3                    JUNCTION   2730.72  3057.42   801  21:00   7.81e+004
9.12e+004       0.000
  GDOut                OUTFALL       0.00   219.43    47  04:57           0
6.4e+004       0.000
```

**********
Node Surcharge Summary
**********

Surcharging occurs when water rises above the top of the highest conduit.

| Node | Type | Hours Surcharged | Max. Height Above Crown Feet | Min. Depth Below Rim Feet |
|---|---|---|---|---|
| 1 | JUNCTION | 412.85 | 0.000 | 0.000 |
| 2 | JUNCTION | 399.83 | 0.000 | 0.000 |
| 3 | JUNCTION | 3461.38 | 0.000 | 0.000 |

**********
Node Flooding Summary
**********

Flooding refers to all water that overflows a node, whether it ponds or not.

| Node | Hours Flooded | Maximum Rate CFS | Time of Max Occurrence days hr:min | Total Flood Volume 10^6 gal | Maximum Ponded Volume 1000 ft3 |
|---|---|---|---|---|---|
| 1 | 412.84 | 1680.10 | 801 19:00 | 2951.701 | 0.000 |
| 3 | 3461.36 | 2837.78 | 801 21:00 | 25776.369 | 0.000 |

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow CFS | Max Flow CFS | Total Volume 10^6 gal |
|---|---|---|---|---|
| GDOut | 30.58 | 20.32 | 219.43 | 64029.840 |
| System | 30.58 | 20.32 | 219.43 | 64029.840 |

**********
Link Flow Summary
**********

```
------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/
Max/
                                 |Flow|   Occurrence   |Veloc|    Full
```

| Link | Type | CFS | days hr:min | ft/sec | Flow Depth |
|---|---|---|---|---|---|
| 1 | CONDUIT | 326.70 | 196 05:04 | 1.13 | 1.00 1.00 |
| 2 | CONDUIT | 333.18 | 15675 20:36 | 8.51 | 0.05 0.14 |
| 3 | CONDUIT | 219.43 | 47 04:57 | 0.74 | 1.00 1.00 |

**********
Conduit Surcharge Summary
**********

| Conduit | Hours Full: Both Ends | Hours Full: Upstream | Hours Full: Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| 1 | 391.93 | 411.92 | 399.53 | 399.53 | 411.92 |
| 3 | 3339.73 | 3457.59 | 3380.21 | 3380.21 | 3457.59 |

Analysis begun on: Fri Aug 14 09:49:32 2015
Analysis ended on: Fri Aug 14 09:52:34 2015
Total elapsed time: 00:03:02

# Alternative 4 - Wet Weather



Alternative 4

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**********
Analysis Options
**********

| | |
|---|---|
| Flow Units | CFS |
| Process Models: | |
| Rainfall/Runoff | YES |
| RDII | NO |
| Snowmelt | NO |
| Groundwater | NO |
| Flow Routing | YES |
| Ponding Allowed | NO |
| Water Quality | NO |
| Infiltration Method | GREEN_AMPT |
| Flow Routing Method | KINWAVE |
| Starting Date | SEP-24-1964 13:00:00 |
| Ending Date | MAY-23-2008 22:00:00 |
| Antecedent Dry Days | 0.0 |
| Report Time Step | 00:15:00 |
| Wet Time Step | 00:05:00 |
| Dry Time Step | 01:00:00 |
| Routing Time Step | 30.00 sec |

| Runoff Quantity Continuity | Volume acre-feet | Depth inches |
|---|---|---|
| Total Precipitation | 561880.043 | 611.127 |
| Evaporation Loss | 0.000 | 0.000 |
| Infiltration Loss | 273269.609 | 297.221 |
| Surface Runoff | 288551.765 | 313.842 |
| Final Surface Storage | 75.422 | 0.082 |
| Continuity Error (%) | -0.003 | |

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow | 0.000 | 0.000 |
| Wet Weather Inflow | 288551.324 | 94028.760 |
| Groundwater Inflow | 0.000 | 0.000 |
| RDII Inflow | 0.000 | 0.000 |

| | | |
|---|---|---|
| External Inflow ..... | 0.000 | 0.000 |
| External Outflow ..... | 90573.024 | 29514.573 |
| Internal Outflow ..... | 197405.568 | 64327.553 |
| Evaporation Loss ..... | 0.000 | 0.000 |
| Exfiltration Loss ..... | 4958.409 | 1615.772 |
| Initial Stored Volume .... | 0.000 | 0.000 |
| Final Stored Volume ..... | 0.990 | 0.323 |
| Continuity Error (%) ..... | -1.520 | |

**********
Highest Flow Instability Indexes
**********
All links are stable.

**********
Routing Time Step Summary
**********

| | | |
|---|---|---|
| Minimum Time Step | : | 30.00 sec |
| Average Time Step | : | 30.00 sec |
| Maximum Time Step | : | 30.00 sec |
| Percent in Steady State | : | 0.00 |
| Average Iterations per Step | : | 1.00 |
| Percent Not Converging | : | 0.00 |

**********
Subcatchment Runoff Summary
**********

| Subcatchment | Total Precip in | Total Runon in | Total Evap in | Total Infil in | Total Runoff in | Total Runoff 10^6 gal | Peak Runoff CFS | Runoff Coeff |
|---|---|---|---|---|---|---|---|---|
| ElCaballo | 611.13 | 0.00 | 0.00 | 475.67 | 135.48 | 15881.56 | 2007.06 | 0.222 |
| GrapeDay | 611.13 | 0.00 | 0.00 | 182.51 | 428.49 | 78140.36 | 2730.72 | 0.701 |

**********
Node Depth Summary
**********

| | Average Depth | Maximum Depth | Maximum HGL | Time of Max Occurrence |
|---|---|---|---|---|

| Node | Type | Feet | Feet | Feet | days | hr:min |
|---|---|---|---|---|---|---|
| 1 | JUNCTION | 0.07 | 10.00 | 735.00 | 196 | 04:53 |
| 2 | JUNCTION | 0.07 | 10.00 | 730.00 | 196 | 05:04 |
| 3 | JUNCTION | 0.80 | 10.00 | 656.00 | 0 | 00:51 |
| GDOut | OUTFALL | 0.34 | 1.50 | 645.50 | 0 | 00:56 |

**********
Node Inflow Summary
**********

| Node | Type | Maximum Lateral Inflow CFS | Maximum Total Inflow CFS | Time of Max Occurrence days hr:min | Lateral Inflow Volume 10^6 gal | Total Inflow Volume 10^6 gal | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|
| 1 | JUNCTION | 2007.06 | 2007.06 | 801 19:00 | 1.59e+004 | 1.59e+004 | 0.000 |
| 2 | JUNCTION | 0.00 | 326.70 | 196 05:04 | 0 | 1.29e+004 | 0.000 |
| 3 | JUNCTION | 2730.72 | 3057.42 | 801 21:00 | 7.81e+004 | 9.12e+004 | 0.000 |
| GDOut | OUTFALL | 0.00 | 35.20 | 0 00:56 | 0 | 2.95e+004 | 0.000 |

**********
Node Surcharge Summary
**********

Surcharging occurs when water rises above the top of the highest conduit.

| Node | Type | Hours Surcharged | Max. Height Above Crown Feet | Min. Depth Below Rim Feet |
|---|---|---|---|---|
| 1 | JUNCTION | 412.85 | 0.000 | 0.000 |
| 2 | JUNCTION | 399.83 | 0.000 | 0.000 |
| 3 | JUNCTION | 16699.69 | 0.000 | 0.000 |

**********
Node Flooding Summary
**********

Flooding refers to all water that overflows a node, whether it ponds or not.

| Node | Hours Flooded | Maximum Rate CFS | Time of Max Occurrence days hr:min | Total Flood Volume 10^6 gal | Maximum Ponded Volume 1000 ft3 |
|---|---|---|---|---|---|
| 1 | 412.84 | 1680.10 | 801 19:00 | 2951.701 | 0.000 |
| 3 | 16699.69 | 3022.01 | 801 21:00 | 61371.076 | 0.000 |

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow CFS | Max Flow CFS | Total Volume 10^6 gal |
|---|---|---|---|---|
| GDOut | 51.43 | 5.57 | 35.20 | 29512.381 |
| System | 51.43 | 5.57 | 35.20 | 29512.381 |

**********
Link Flow Summary
**********

| Link | Type | Maximum \|Flow\| CFS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| ft/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 1 | CONDUIT | 326.70 | 196 05:04 | 1.13 | 1.00 | 1.00 |
| 2 | CONDUIT | 333.18 | 15675 20:36 | 8.51 | 0.05 | 0.14 |
| 3 | CHANNEL | 35.20 | 0 00:56 | 1.57 | 1.00 | 1.00 |

**********
Conduit Surcharge Summary
**********

| Conduit | Hours Full: Both Ends | Hours Full: Upstream | Hours Full: Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| 1 | 391.93 | 411.92 | 399.53 | 399.53 | 411.92 |
| 3 | 16620.75 | 16692.82 | 16650.07 | 16650.07 | 16692.82 |

Analysis begun on: Thu Sep 17 15:44:36 2015
Analysis ended on: Thu Sep 17 15:49:06 2015
Total elapsed time: 00:04:30

# Alternative 2 - Dry Weather

Alt2Dry.rpt

Alternative 2

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**********
Analysis Options
**********
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date ..... SEP-24-1964 13:00:00
Ending Date ..... JUL-17-2012 22:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:15:00
Routing Time Step ..... 30.00 sec

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow ..... | 0.000 | 0.000 |
| Wet Weather Inflow ..... | 0.000 | 0.000 |
| Groundwater Inflow ..... | 0.000 | 0.000 |
| RDII Inflow ..... | 0.000 | 0.000 |
| External Inflow ..... | 5.673 | 1.849 |
| External Outflow ..... | 0.037 | 0.012 |
| Internal Outflow ..... | 0.000 | 0.000 |
| Evaporation Loss ..... | 0.000 | 0.000 |
| Exfiltration Loss ..... | 23.445 | 7.640 |
| Initial Stored Volume .... | 0.000 | 0.000 |
| Final Stored Volume ..... | 0.000 | 0.000 |
| Continuity Error (%) ..... | -313.923 | |

**********
Highest Flow Instability Indexes
**********
All links are stable.

```
  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00


  ******************
  Node Depth Summary
  ******************

  -----------------------------------------------------------------------
                                  Average  Maximum  Maximum  Time of Max
                                    Depth    Depth      HGL   Occurrence
  Node                 Type          Feet     Feet     Feet  days hr:min
  -----------------------------------------------------------------------
  3                    JUNCTION      0.00     0.10   646.10  17435  20:40
  GDOut                OUTFALL       0.00     0.07   644.07  17435  21:00


  *******************
  Node Inflow Summary
  *******************

  -------------------------------------------------------------------------
--------------------------
                                  Maximum  Maximum
Lateral       Total        Flow
                                  Lateral    Total  Time of Max
Inflow      Inflow     Balance
                                   Inflow   Inflow   Occurrence
Volume      Volume       Error
  Node                 Type           CFS      CFS  days hr:min    10^6
gal    10^6 gal     Percent
  -------------------------------------------------------------------------
--------------------------
  3                    JUNCTION      1.18     1.18  17435  20:40
1.85        1.85       0.000
  GDOut                OUTFALL       0.00     0.61  17435  21:00
0       0.012       0.000


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.
```

**********
Node Flooding Summary
**********

No nodes were flooded.

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow CFS | Max Flow CFS | Total Volume 10^6 gal |
|---|---|---|---|---|
| GDOut | 0.00 | 0.12 | 0.61 | 0.012 |
| System | 0.00 | 0.12 | 0.61 | 0.012 |

**********
Link Flow Summary
**********

| Link | Type | Maximum \|Flow\| CFS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| ft/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 3 | CONDUIT | 0.61 | 17435 21:00 | 0.43 | 0.00 | 0.01 |

**********
Conduit Surcharge Summary
**********

No conduits were surcharged.

Analysis begun on: Thu Aug 13 10:16:05 2015
Analysis ended on: Thu Aug 13 10:16:45 2015
Total elapsed time: 00:00:40

# Alternative 4 - Dry Weather

Alt4Dry.rpt

Alternative 4

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**********
Analysis Options
**********
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date ..... SEP-24-1964 13:00:00
Ending Date ..... JUL-17-2012 22:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:15:00
Routing Time Step ..... 30.00 sec

| Flow Routing Continuity | Volume acre-feet | Volume 10^6 gal |
|---|---|---|
| Dry Weather Inflow ..... | 0.000 | 0.000 |
| Wet Weather Inflow ..... | 0.000 | 0.000 |
| Groundwater Inflow ..... | 0.000 | 0.000 |
| RDII Inflow ..... | 0.000 | 0.000 |
| External Inflow ..... | 5.673 | 1.849 |
| External Outflow ..... | 1.952 | 0.636 |
| Internal Outflow ..... | 0.000 | 0.000 |
| Evaporation Loss ..... | 0.000 | 0.000 |
| Exfiltration Loss ..... | 3.884 | 1.266 |
| Initial Stored Volume .... | 0.000 | 0.000 |
| Final Stored Volume ..... | 0.000 | 0.000 |
| Continuity Error (%) ..... | -2.874 | |

**********
Highest Flow Instability Indexes
**********
All links are stable.

```
  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00


  ******************
  Node Depth Summary
  ******************

  -----------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max
                                  Depth    Depth      HGL   Occurrence
  Node                 Type        Feet     Feet     Feet  days hr:min
  -----------------------------------------------------------------------
  3                    JUNCTION    0.00     0.72   646.72  17435  20:40
  GDOut                OUTFALL     0.00     0.62   644.62  17435  21:00


  *******************
  Node Inflow Summary
  *******************

  -------------------------------------------------------------------------
--------------------------
                                  Maximum  Maximum
Lateral       Total        Flow
                                  Lateral    Total  Time of Max
Inflow      Inflow     Balance
                                   Inflow   Inflow   Occurrence
Volume      Volume       Error
  Node                 Type           CFS      CFS  days hr:min    10^6
gal    10^6 gal     Percent
  -------------------------------------------------------------------------
--------------------------
  3                    JUNCTION      1.18     1.18  17435  20:40
1.85        1.85       0.000
  GDOut                OUTFALL       0.00     0.52  17435  21:00
0       0.636       0.000


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.
```

**********
Node Flooding Summary
**********

No nodes were flooded.

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow CFS | Max Flow CFS | Total Volume 10^6 gal |
|---|---|---|---|---|
| GDOut | 0.14 | 0.04 | 0.52 | 0.636 |
| System | 0.14 | 0.04 | 0.52 | 0.636 |

**********
Link Flow Summary
**********

| Link | Type | Maximum \|Flow\| CFS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| ft/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 3 | CHANNEL | 0.52 | 17435 21:00 | 0.34 | 0.01 | 0.38 |

**********
Conduit Surcharge Summary
**********

No conduits were surcharged.

Analysis begun on:  Thu Sep 17 15:39:51 2015
Analysis ended on:  Thu Sep 17 15:40:32 2015
Total elapsed time: 00:00:41

# Grape Day Park - Existing - High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.013 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 13.61 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 385.84 | ft² |
| Wetted Perimeter | | 54.37 | ft |

# Grape Day Park - Existing - High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 7.10 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 13.61 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.00246 | ft/ft |
| Velocity | | 26.70 | ft/s |
| Velocity Head | | 11.07 | ft |
| Specific Energy | | 24.69 | ft |
| Froude Number | | 1.31 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 13.61 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.00246 | ft/ft |

# Grape Day Park - Alt 1- High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.060 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 29.74 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 869.58 | ft² |
| Wetted Perimeter | | 86.62 | ft |

# Grape Day Park - Alt 1- High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 10.04 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 29.74 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.01988 | ft/ft |
| Velocity | | 11.84 | ft/s |
| Velocity Head | | 2.18 | ft |
| Specific Energy | | 31.92 | ft |
| Froude Number | | 0.39 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 29.74 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.01988 | ft/ft |

# Grape Day Park - Alt 4 - High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+05, 99.00) | 0.013 |
| (-0+05, 99.00) | (0+05, 99.00) | 0.060 |
| (0+05, 99.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 22.27 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 645.56 | ft² |
| Wetted Perimeter | | 71.69 | ft |

# Grape Day Park - Alt 4 - High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 9.01 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 22.27 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.00948 | ft/ft |
| Velocity | | 15.96 | ft/s |
| Velocity Head | | 3.96 | ft |
| Specific Energy | | 26.22 | ft |
| Froude Number | | 0.61 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 22.27 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.00948 | ft/ft |

# Grape Day Park - Alt 1 - Low Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 500.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.400 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | |
|---|---|---|
| Normal Depth | 14.51 | ft |
| Elevation Range | 98.50 to 120.00 ft | |
| Flow Area | 412.72 | ft² |
| Wetted Perimeter | 56.16 | ft |

# Grape Day Park - Alt 1 - Low Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 7.35 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 14.51 | ft |
| Critical Depth | | 2.80 | ft |
| Critical Slope | | 1.10832 | ft/ft |
| Velocity | | 1.21 | ft/s |
| Velocity Head | | 0.02 | ft |
| Specific Energy | | 14.53 | ft |
| Froude Number | | 0.06 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 14.51 | ft |
| Critical Depth | 2.80 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 1.10832 | ft/ft |

Michael Baker
INTERNATIONAL

# Appendix G Proposed Condition Hydraulic Calculations Escondido Creek

# Grape Day Park - Existing - High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.013 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 13.61 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 385.84 | ft² |
| Wetted Perimeter | | 54.37 | ft |

# Grape Day Park - Existing - High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 7.10 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 13.61 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.00246 | ft/ft |
| Velocity | | 26.70 | ft/s |
| Velocity Head | | 11.07 | ft |
| Specific Energy | | 24.69 | ft |
| Froude Number | | 1.31 | |
| Flow Type | Supercritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 13.61 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.00246 | ft/ft |

# Grape Day Park - Alt 1- High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.060 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 29.74 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 869.58 | ft² |
| Wetted Perimeter | | 86.62 | ft |

# Grape Day Park - Alt 1- High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 10.04 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 29.74 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.01988 | ft/ft |
| Velocity | | 11.84 | ft/s |
| Velocity Head | | 2.18 | ft |
| Specific Energy | | 31.92 | ft |
| Froude Number | | 0.39 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 29.74 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.01988 | ft/ft |

# Grape Day Park - Alt 4 - High Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 10300.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+05, 99.00) | 0.013 |
| (-0+05, 99.00) | (0+05, 99.00) | 0.060 |
| (0+05, 99.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 22.27 | ft |
| Elevation Range | 98.50 to 120.00 ft | | |
| Flow Area | | 645.56 | ft² |
| Wetted Perimeter | | 71.69 | ft |

# Grape Day Park - Alt 4 - High Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 9.01 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 22.27 | ft |
| Critical Depth | | 16.17 | ft |
| Critical Slope | | 0.00948 | ft/ft |
| Velocity | | 15.96 | ft/s |
| Velocity Head | | 3.96 | ft |
| Specific Energy | | 26.22 | ft |
| Froude Number | | 0.61 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 22.27 | ft |
| Critical Depth | 16.17 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 0.00948 | ft/ft |

# Grape Day Park - Alt 1 - Low Flow

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 0.00400 | ft/ft |
| Discharge | 500.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| -0+15 | 120.00 |
| -0+15 | 100.00 |
| -0+05 | 99.00 |
| 0+00 | 98.50 |
| 0+05 | 99.00 |
| 0+15 | 100.00 |
| 0+15 | 120.00 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (-0+15, 120.00) | (-0+15, 100.00) | 0.013 |
| (-0+15, 100.00) | (0+15, 100.00) | 0.400 |
| (0+15, 100.00) | (0+15, 120.00) | 0.013 |

## Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

## Results

| | | |
|---|---|---|
| Normal Depth | 14.51 | ft |
| Elevation Range | 98.50 to 120.00 ft | |
| Flow Area | 412.72 | ft² |
| Wetted Perimeter | 56.16 | ft |

# Grape Day Park - Alt 1 - Low Flow

## Results

| | | | |
|---|---|---|---|
| Hydraulic Radius | | 7.35 | ft |
| Top Width | | 30.00 | ft |
| Normal Depth | | 14.51 | ft |
| Critical Depth | | 2.80 | ft |
| Critical Slope | | 1.10832 | ft/ft |
| Velocity | | 1.21 | ft/s |
| Velocity Head | | 0.02 | ft |
| Specific Energy | | 14.53 | ft |
| Froude Number | | 0.06 | |
| Flow Type | Subcritical | | |

## GVF Input Data

| | | |
|---|---|---|
| Downstream Depth | 0.00 | ft |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 14.51 | ft |
| Critical Depth | 2.80 | ft |
| Channel Slope | 0.00400 | ft/ft |
| Critical Slope | 1.10832 | ft/ft |

Michael Baker
INTERNATIONAL

# Appendix H Escondido Creek Channel Retrofit Earned Stormwater Pollutant Control Credit

# Escondido Creek - Water Quality

Water Quality Grape Day.rpt
Escondido Creek – ACP

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.001)
---

**********
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********

**********
Analysis Options
**********
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... KINWAVE
Starting Date ..... JAN-01-1990 00:00:00
Ending Date ..... JAN-03-1990 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:05:00
Wet Time Step ..... 00:00:30
Dry Time Step ..... 00:00:30
Routing Time Step ..... 30.00 sec

| ********** | Volume | Depth |
|---|---|---|
| Runoff Quantity Continuity | acre-feet | inches |
| ********** | --- | --- |
| Total Precipitation ..... | 2174.032 | 2.365 |
| Evaporation Loss ..... | 0.000 | 0.000 |
| Infiltration Loss ..... | 1239.163 | 1.348 |
| Surface Runoff ..... | 792.983 | 0.862 |
| Final Surface Storage .... | 141.941 | 0.154 |
| Continuity Error (%) ..... | -0.003 | |

| ********** | Volume | Volume |
|---|---|---|
| Flow Routing Continuity | acre-feet | 10^6 gal |
| ********** | --- | --- |
| Dry Weather Inflow ..... | 0.000 | 0.000 |
| Wet Weather Inflow ..... | 792.928 | 258.387 |
| Groundwater Inflow ..... | 0.000 | 0.000 |
| RDII Inflow ..... | 0.000 | 0.000 |
| External Inflow ..... | 0.000 | 0.000 |

```
  External Outflow .........       783.104       255.186
  Internal Outflow .........         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Seepage Loss .............         3.825         1.246
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         6.285         2.048
  Continuity Error (%) .....        -0.036

  ********************************
  Highest Flow Instability Indexes
  ********************************
  All links are stable.


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00


  ***************************
  Subcatchment Runoff Summary
  ***************************

  ---------------------------------------------------------------------------
---------------------------------
                            Total      Total      Total      Total
Total       Total     Peak  Runoff
                           Precip      Runon       Evap      Infil
Runoff      Runoff   Runoff   Coeff
  Subcatchment                in         in         in         in
in    10^6 gal      CFS
  ---------------------------------------------------------------------------
---------------------------------
  ElCaballo                  2.36       0.00       0.00       2.34
0.02        2.72     1.45   0.010
  GrapeDay                   2.36       0.00       0.00       0.71
1.40      255.67   157.86   0.593


  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------
                                  Average  Maximum  Maximum  Time of Max
                                    Depth    Depth      HGL   Occurrence
  Node                 Type         Feet     Feet     Feet  days hr:min
```

```
  ---------------------------------------------------------------------
  1                    JUNCTION     0.57     0.58   725.58     0  07:12
  2                    JUNCTION     0.53     0.54   720.54     0  17:56
  3                    JUNCTION     6.97     7.97   653.97     2  23:00
  GDOut                OUTFALL      6.90     7.95   651.95     2  23:00


  ********************
  Node Inflow Summary
  ********************

  ------------------------------------------------------------------------
--------------------------
                                   Maximum  Maximum
Lateral       Total        Flow
                                   Lateral    Total  Time of Max
Inflow      Inflow     Balance
                                    Inflow   Inflow   Occurrence
Volume      Volume       Error
  Node                 Type           CFS      CFS  days hr:min    10^6
gal    10^6 gal     Percent
  ------------------------------------------------------------------------
--------------------------
  1                    JUNCTION      1.45     1.45     0  07:12
2.72        2.72       0.000
  2                    JUNCTION      0.00     1.30     0  17:57
0          2.4       0.000
  3                    JUNCTION    157.86   159.16     2  23:00
256          258       0.000
  GDOut                OUTFALL       0.00   158.63     2  23:00
0          255       0.000


  ***********************
  Node Surcharge Summary
  ***********************

  No nodes were surcharged.


  **********************
  Node Flooding Summary
  **********************

  No nodes were flooded.


  ************************
  Outfall Loading Summary
  ************************

  -----------------------------------------------------------
                        Flow       Avg       Max       Total
                        Freq      Flow      Flow      Volume
```

| Outfall Node | Pcnt | CFS | CFS | 10^6 gal |
|---|---|---|---|---|
| GDOut | 97.95 | 136.26 | 158.63 | 255.167 |
| System | 97.95 | 136.26 | 158.63 | 255.167 |

**********
Link Flow Summary
**********

| Link | Type | Maximum \|Flow\| CFS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| ft/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 1 | CONDUIT | 1.30 | 0 17:57 | 0.21 | 0.00 | 0.06 |
| 2 | CONDUIT | 1.30 | 2 23:00 | 0.91 | 0.00 | 0.00 |
| 3 | CONDUIT | 158.63 | 2 23:00 | 0.66 | 0.72 | 0.80 |

**********
Conduit Surcharge Summary
**********

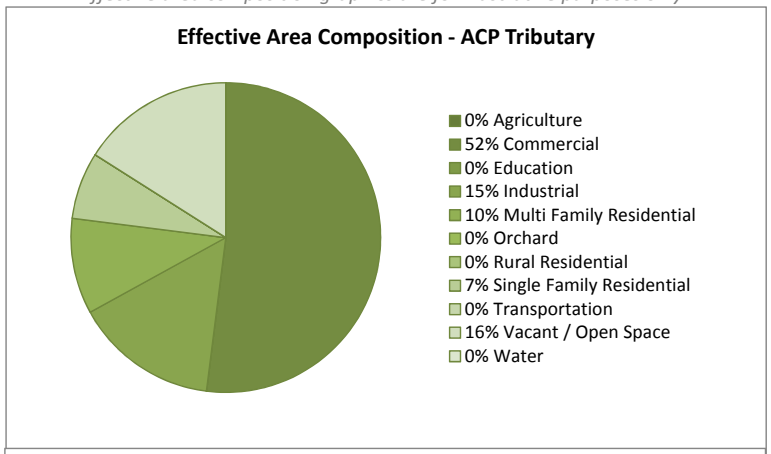
No conduits were surcharged.

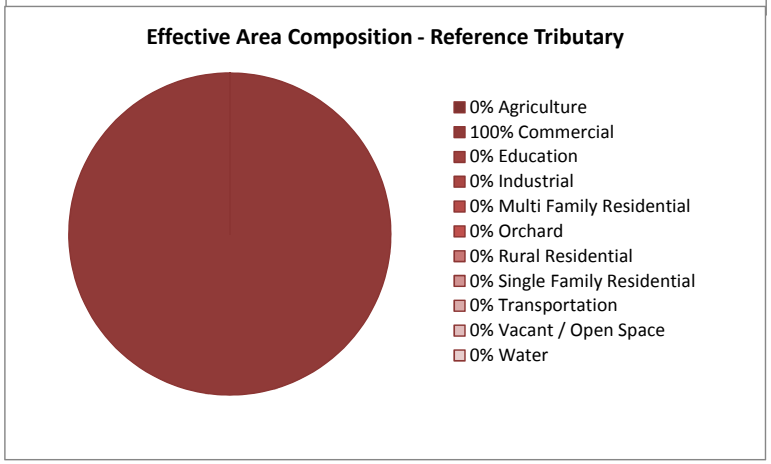
Analysis begun on: Tue Sep 22 18:39:00 2015
Analysis ended on: Tue Sep 22 18:39:00 2015
Total elapsed time: < 1 sec

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 2,560.00 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 0.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 640.00 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 640.00 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 0.00 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 0.00 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 640.00 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 0.00 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 6,400.00 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 10,880.00 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.13 | 0.15 | 0.15 | 0.42 | 0.41 | 0.72 | 0.61 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.02** | **0.96** | **0.91** | - | - | - | **0.70** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

Grape Day Commercial WQE Calculations.xlsx
Equivalent Land Use

| | |
|---|---|
| Estimated SWMM Model Average Event Infiltration | 55539 |

| | | | |
|---|---|---|---|
| **Ve** | 38,877 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.80 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 22.3 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 55,539 | | |
| **Equivalent Development Area** | 7.91 | 15.32 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **7.91** | **15.32** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

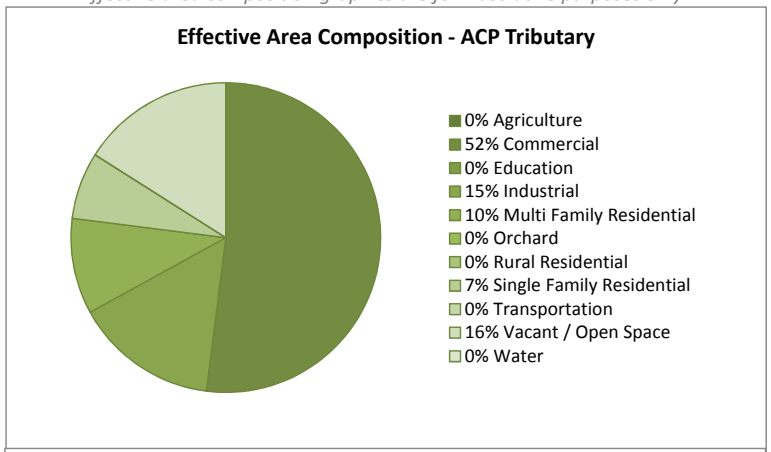
1) Only yellow cells are user input.

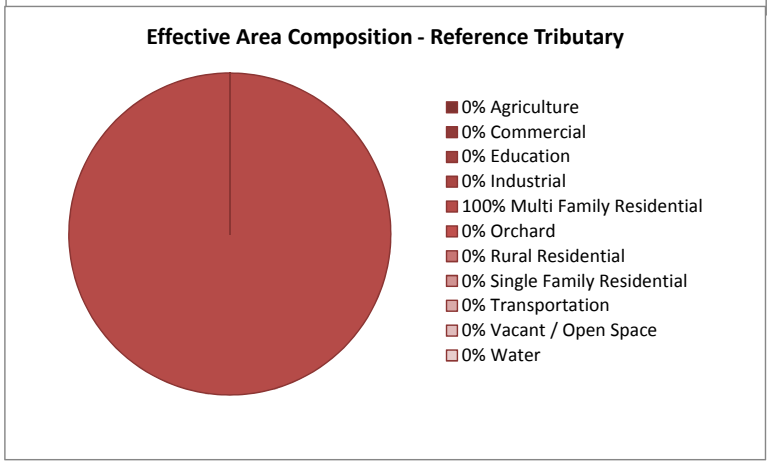
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 2,560.00 | 0.80 | 0.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 0.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 640.00 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 640.00 | 0.60 | 1.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 0.00 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 0.00 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 640.00 | 0.40 | 0.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 0.00 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 6,400.00 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 10,880.00 | - | 1.00 | - | - | - | - | - | - | - | - |
| Relative Pollutant Concentration for ACP Tributary [4] | | | | | 0.13 | 0.15 | 0.15 | 0.42 | 0.41 | 0.72 | 0.61 |
| Relative Pollutant Concentration for Reference Tributary [4] | | | | | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Watershed Management Area | | | | | Carlsbad | | | | | | |
| Hydrologic Unit | | | | | Carlsbad (904.00) | | | | | | |
| Land Use Factor [5] | | | | | **1.32** | **1.19** | **1.12** | **-** | **-** | **-** | **2.27** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

Grape Day Multi Family WQE Calculations.xlsx
Equivalent Land Use

| | | |
|---|---|---|
| Estimated SWMM Model Average Event Infiltration | 55539 | |

| | | | |
|---|---|---|---|
| **Ve** | 62,204 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.60 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 35.7 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 55,539 | | |
| **Equivalent Development Area** | 10.55 | 20.43 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **10.55** | **20.43** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

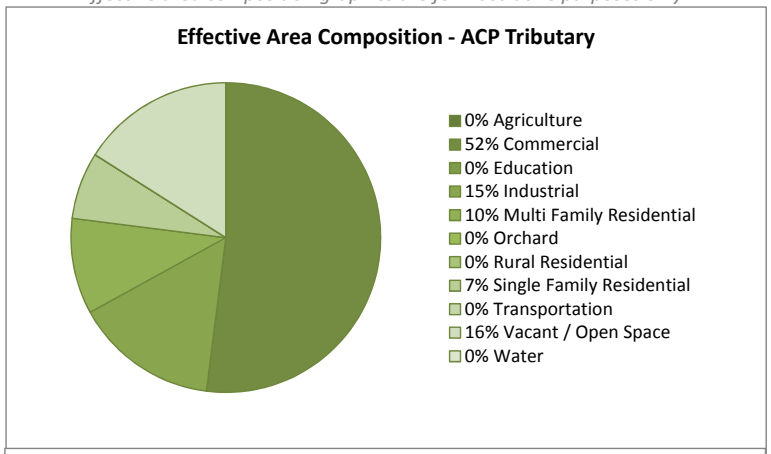
1) Only yellow cells are user input.

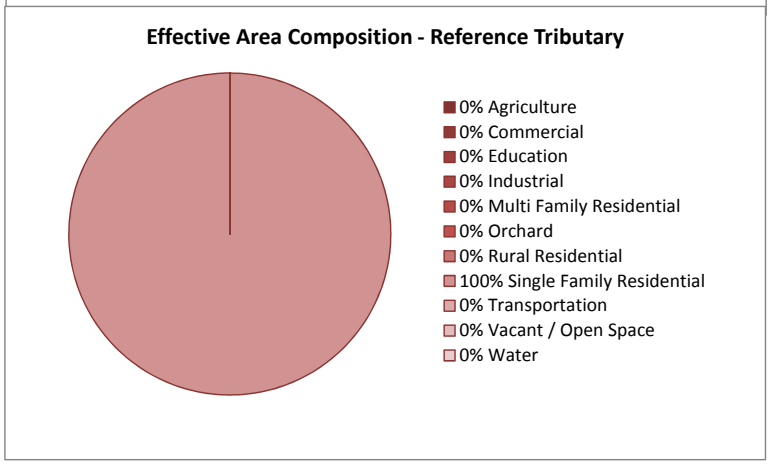
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 2,560.00 | 0.80 | 0.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 0.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 640.00 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 640.00 | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 0.00 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 0.00 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 640.00 | 0.40 | 1.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 0.00 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 6,400.00 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 10,880.00 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.13 | 0.15 | 0.15 | 0.42 | 0.41 | 0.72 | 0.61 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.02** | **0.77** | **0.97** | **-** | **-** | **-** | **0.97** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

Grape Day Single Family WQE Calculations.xlsx
Equivalent Land Use

| | | |
|---|---|---|
| Estimated SWMM Model Average Event Infiltration | 55539 | |

| | | | |
|---|---|---|---|
| **Ve** | 42,765 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.40 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 24.5 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 55,539 | | |
| **Equivalent Development Area** | 15.82 | 30.65 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **15.82** | **24.54** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

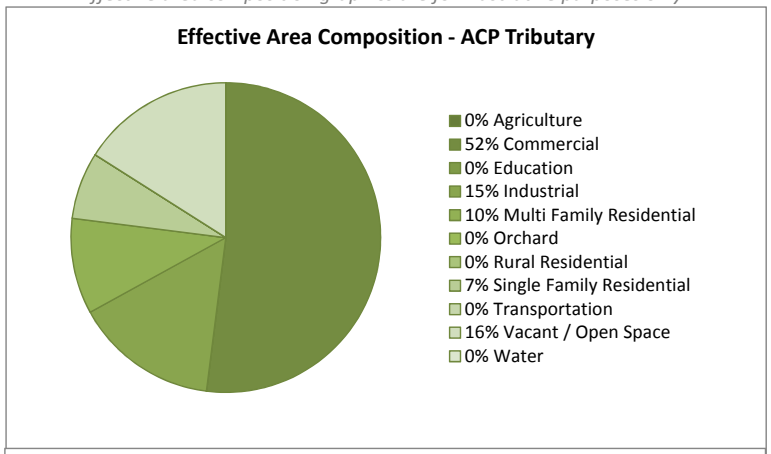
1) Only yellow cells are user input.

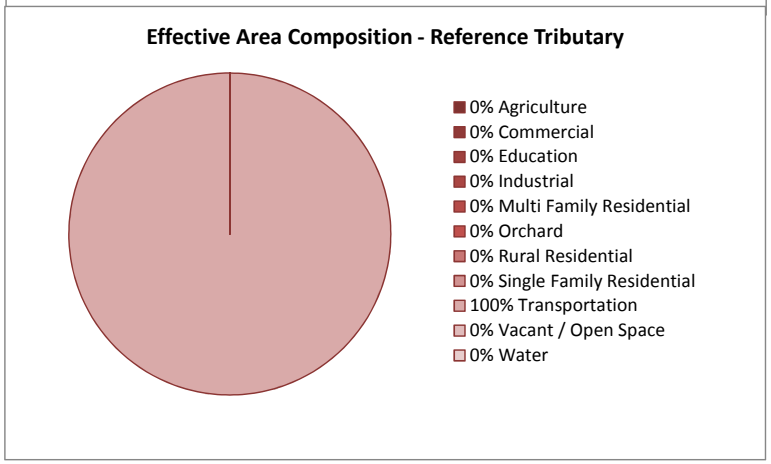
2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 2,560.00 | 0.80 | 0.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 0.00 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | 640.00 | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | 640.00 | 0.60 | 0.00 | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 0.00 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 0.00 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 640.00 | 0.40 | 0.00 | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 0.00 | 0.90 | 1.00 | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 6,400.00 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 10,880.00 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.13 | 0.15 | 0.15 | 0.42 | 0.41 | 0.72 | 0.61 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.20** | **0.59** | **1.21** | **-** | **-** | **-** | **5.11** |

*Effective area composition graphics are for illustrative purposes only.*




**Notes:**

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference **Table 2-3** for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in **Appendix B**.
4. Relative Pollutant Concentrations for ACP and Reference Tributaries are calculated for each WQE Pollutant of Concern per **Equation 2-2**.
5. Calculate the Land Use Factor for each priority pollutant by dividing the Relative Pollutant Concentration for the ACP Tributary by the Relative Pollutant Concentration for the Reference Tributary. Land Use Factors may never be lower than 0.10 and may never exceed 10.0.

**Example:** An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

Equation 2-2:

$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

Grape Day Transportation WQE Calculations.xlsx
Equivalent Land Use

| | | |
|---|---|---|
| Estimated SWMM Model Average Event Infiltration | 55539 | |

| | | | |
|---|---|---|---|
| **Ve** | 32,768 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| **"C" Factor Reference Tributary Area** | 0.90 | | |
| **"C" Factor ACP Area** | 0.36 | | |
| **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| **Equivalent Development Area** | 18.8 | (acres) | |

| | **Maximum** | **Minimum** | |
|---|---|---|---|
| **V1 (hydromod)** | 0.2015 | 0.1040 | |
| **ACP Ret BMP Volume** | 55,539 | | |
| **Equivalent Development Area** | 7.03 | 13.62 | (acres) |

| | | | |
|---|---|---|---|
| **Governing Equivalent Development Area** | **7.03** | **13.62** | **(acres)** |

**For Use With Irrigation Re-Use Only**

| | | |
|---|---|---|
| Landscaped Area | 0 | (acres) |
| Irrigation Demand | 0.25 | (inches per week) |
| Assumed Inter Event Duration | 4 | (days) |
| Irrigation Demand Volume | - | ($ft^3$) |
| Minimum Design Depth | 0.00 | (inches) |
| Effective Draw Down Rate | 0.0000 | (in/hr) |
| Daily Irrigation Cycle | 15 | (min) |
| Pump Rate | 0 | (GPM) |

***Notes:***

1) Only yellow cells are user input.

2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis

Michael Baker
INTERNATIONAL

# Appendix I Effective FEMA Information

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

117°05'37.5"

33°07'30"

$^{36}65^{000m}$N

$^{4}92^{000m}$E

$^{4}93^{000m}$E

JOINS PANEL 0814

MARS GLEN

WAVERLY PL

WOODWARD AVE

SHERMAN PL

W WASHINGTON AVE

MERCURY GLEN

ZUKOR GLEN

SATURN GLEN

JUPITER GLEN

E PENNSYLVANIA AVE

N JUNIPER ST

N IVY ST

VALLEY BOULEVARD

S IVY ST

S HICKORY ST

ZONE X

ZONE X

ZONE X

N QUINCE ST

N CENTRE CITY PKWY

GANNON PL

Escondido Creek

N BROADWAY

N KALMIA ST

Grape Day Park

W VALLEY PKWY

N MAPLE ST

W GRAND AVE

2ND AVE

N SPRUCE ST

NORLAK AVE

N ESCONDIDO BLVD

DX1144

W 2ND AVE

BROADWAY

S KALMIA ST

3RD AVE

JUNIPER ST

4TH AVE

N ORANGE ST

ZONE X

S ESCONDIDO BLVD

N PINE ST

S CENTRE CITY PKWY

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

RAILROAD

W 2ND AVE

BRENNA HILL PL

GRAND CT

W 3RD AVE

W 4TH AVE

S PINE ST

ORANGE ST

DX1142

6TH AVE

MAPLE ST

BEACON PL

S KALMIA ST

OMAR DR

7TH AVE

8TH AVE

REDWOOD ST

W 2ND AVE

W 3RD AVE

W 4TH AVE

S SPRUCE ST

5TH AVE

7TH AVE

QUINCE ST

10TH AVE

RANCHO RINCON DEL DIABLO LAND GRANT

$^{36}64^{000m}$N

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1077G

# FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1077 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| ESCONDIDO, CITY OF | 060290 | 1077 | G |
| SAN DIEGO COUNTY | 060284 | 1077 | G |

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

**MAP NUMBER 06073C1077G**

**MAP REVISED MAY 16, 2012**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ELEVATION (FEET NGVD)

590 600 610 620 630

78,500 79,500 80,500 81,500 82,000

STREAM DISTANCE IN FEET ABOVE MOUTH

AD

AE

SAN DIEGO COUNTY
CITY OF ESCONDIDO

HARMONY GROVE ROAD

UPSTREAM OF THIS POINT
100-YEAR FLOOD IS
CONTAINED IN CHANNEL

LEGEND

500 - YEAR FLOOD

100 - YEAR FLOOD

50 - YEAR FLOOD

10 - YEAR FLOOD

STREAM BED

CROSS SECTION LOCATION

91P

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

FLOOD PROFILES

ESCONDIDO CREEK

Table 4. Summary of Discharges (Cont'd)

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Coyote Creek | | | | | |
| At Apex of Alluvial Fan | 132.0 | 5,200 | 16,000 | 24,000 | 35,200 |
| Culp-Tubb Canyon | | | | | |
| At Apex of Alluvial Fan | 13.0 | 2,400 | 6,000 | 8,500 | 12,500 |
| Deer Springs Creek | | | | | |
| At Mouth | 1.8 | --[1] | --[1] | 1,550 | --[1] |
| Descanso Creek | | | | | |
| At Mouth | 5.6 | 1,300 | 3,800 | 6,000 | 10,400 |
| Dry Canyon | | | | | |
| At Apex of Alluvial Fan | 1.9 | 450 | 1,150 | 1,700 | 2,650 |
| Encanto Branch | | | | | |
| Above Confluence with South Las Chollas Creek | 6.0 | 1,200 | 2,700 | 3,500 | 6,600 |
| Above Confluence with Radio Drive Tributary | 4.8 | 1,100 | 2,600 | 3,400 | 6,500 |
| At 64th Street | 4.2 | 950 | 2,300 | 3,000 | 6,100 |
| Above Confluence with Jamacha Branch | 2.4 | 640 | 1,400 | 1,700 | 3,200 |
| Escondido Creek | | | | | |
| At Interstate Highway 5 | 77.7 | 3,400 | 15,500 | 22,000 | 41,000 |
| Upstream of Lake Val Sereno | 68.0 | 3,200 | 14,500 | 21,000 | 38,400 |
| Upstream of Elfin Forest Lake | 55.7 | 2,800 | 13,000 | 19,000 | 35,000 |
| At Harmony Grove Road | 48.3 | 2,600 | 12,000 | 18,000 | 32,000 |
| Approximately 11,200 feet Upstream of Wohlford Dam | 2.2 | --[1] | --[1] | 2,700 | --[1] |
| Eucalyptus Hills East Branch | | | | | |
| At Riverside Drive | 1.5 | --[1] | --[1] | 860 | --[1] |

[1]Data Not Available

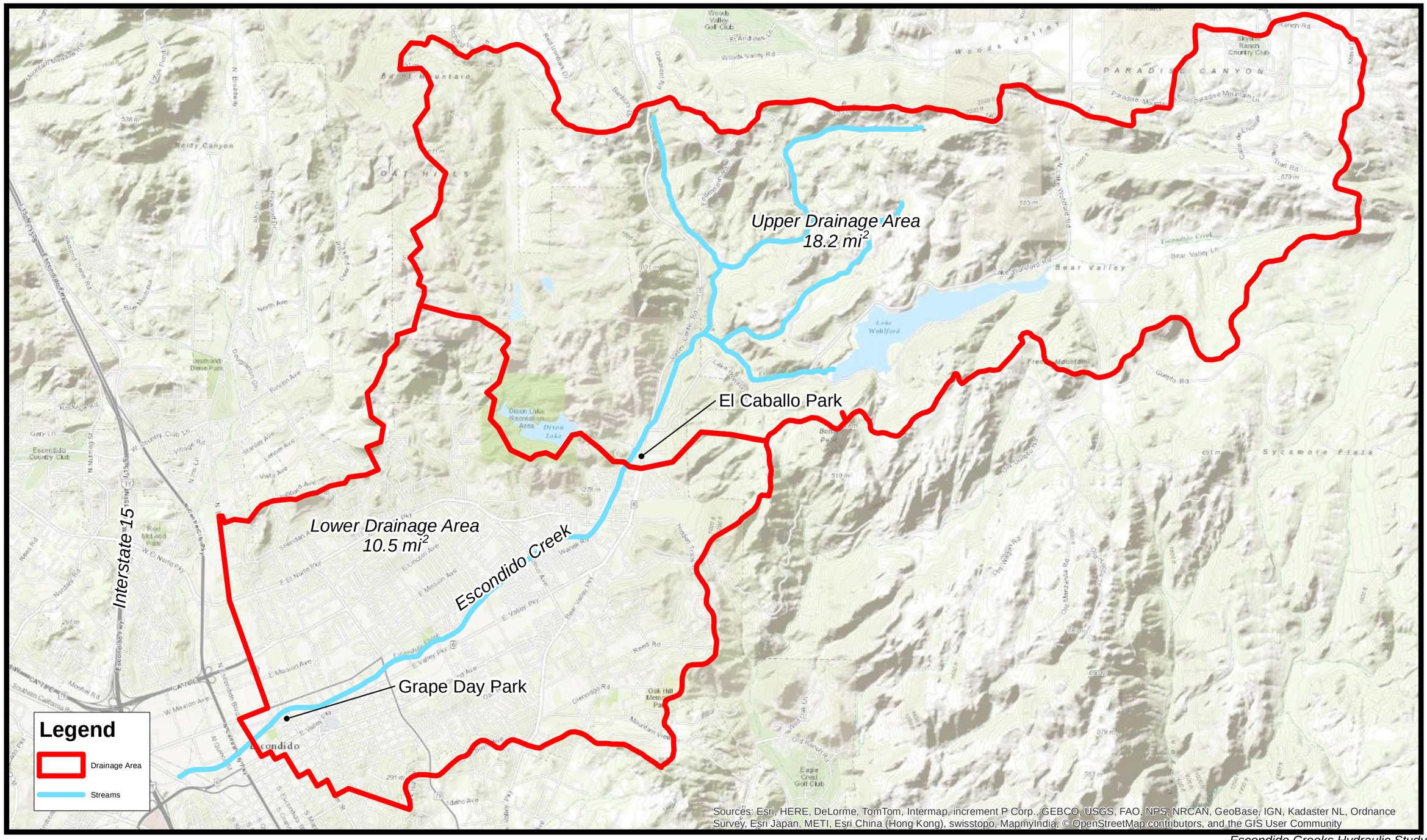
Table 4. Summary of Discharges (Cont'd)

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Pomerado Creek | | | | | |
| At confluence with Poway Creek | 4.3 | -- | -- | 2,900 | -- |
| At Tassel Road | 3.9 | -- | -- | 2,840 | -- |
| At Vaughn Road | 3.3 | -- | -- | 2,590 | -- |
| At Holland Road | 2.9 | -- | -- | 2,300 | -- |
| Poway Creek | | | | | |
| USGS Gage at Cobblestone Creek Road | 31.2 | 2,500 | 8,700 | 14,000 | 34,000 |
| USGS Gage 1,000 feet Upstream of Standish Drive | 7.9 | 1,100 | 3,700 | 5,600 | 14,000 |
| Rainbow Creek | | | | | |
| At Interstate Highway 15 | 7.1 | --[1] | --[1] | 5,210 | --[1] |
| Rattlesnake Creek | | | | | |
| USGS Gage 400 feet Upstream of Confluence with Poway Creek | 8.1 | 750 | 2,500 | 3,900 | 9,700 |
| Reidy Creek | | | | | |
| Above Confluence with Escondido Creek | 15.1 | 1,300 | 5,000 | 7,700 | 14,000 |
| At Rincon Avenue | 10.3 | 1,100 | 3,900 | 7,100 | 14,000 |
| Upstream of Jesmond Dene Avenue | 4.5 | 600 | 2,600 | 4,000 | 7,300 |
| Rice Canyon Creek | | | | | |
| 4,780 Feet Upstream of H Street | 2.64 | 140 | 780 | 1,200 | 1,710 |
| At H Street | 3.25 | 170 | 890 | 1,350 | 1,940 |
| At Confluence with Sweetwater River | 3.60 | 180 | 920 | 1,400 | 2,030 |
| Rose Canyon Creek | | | | | |
| At Mouth | 37.0 | 2,700 | 8,100 | 12,000 | 28,000 |
| Downstream of Confluence with San Clemente Creek | 32.1 | 2,500 | 7,600 | 11,000 | 26,500 |
| Upstream of Confluence with San Clemente Creek | 13.7 | 1,300 | 4,000 | 6,200 | 13,900 |
| Upstream of State Highway 52 | 13.2 | 1,300 | 3,800 | 6,100 | 13,400 |
| Downstream of Genesse Avenue | 9.7 | 1,100 | 3,200 | 5,000 | 11,200 |
| Downstream of Interstate Highway 805 | 6.9 | 900 | 2,700 | 4,100 | 9,400 |

[1]Data Not Available

Michael Baker
INTERNATIONAL

# Appendix J Grape Day Park and El Caballo Park Flood Impact Hydrology Maps




Michael Baker INTERNATIONAL

0 2,000 4,000 8,000 Feet

1 in = 4,000 feet

*Escondido Creeks Hydraulic Study*

**Drainage Area Exhibit**

***Grape Day & El Caballo Parks***

Upper Drainage Area
18.2 mi²

Lower Drainage Area
10.5 mi²

Escondido Creek

El Caballo Park

Grape Day Park

Interstate 15

## Legend

Drainage Area

**landuse**

- Commercial
- Education
- Industrial
- Multi-Family Residential
- Orchard
- Rural Residential
- Single Family Residential
- Transportation
- Vacant/Open Space
- Water

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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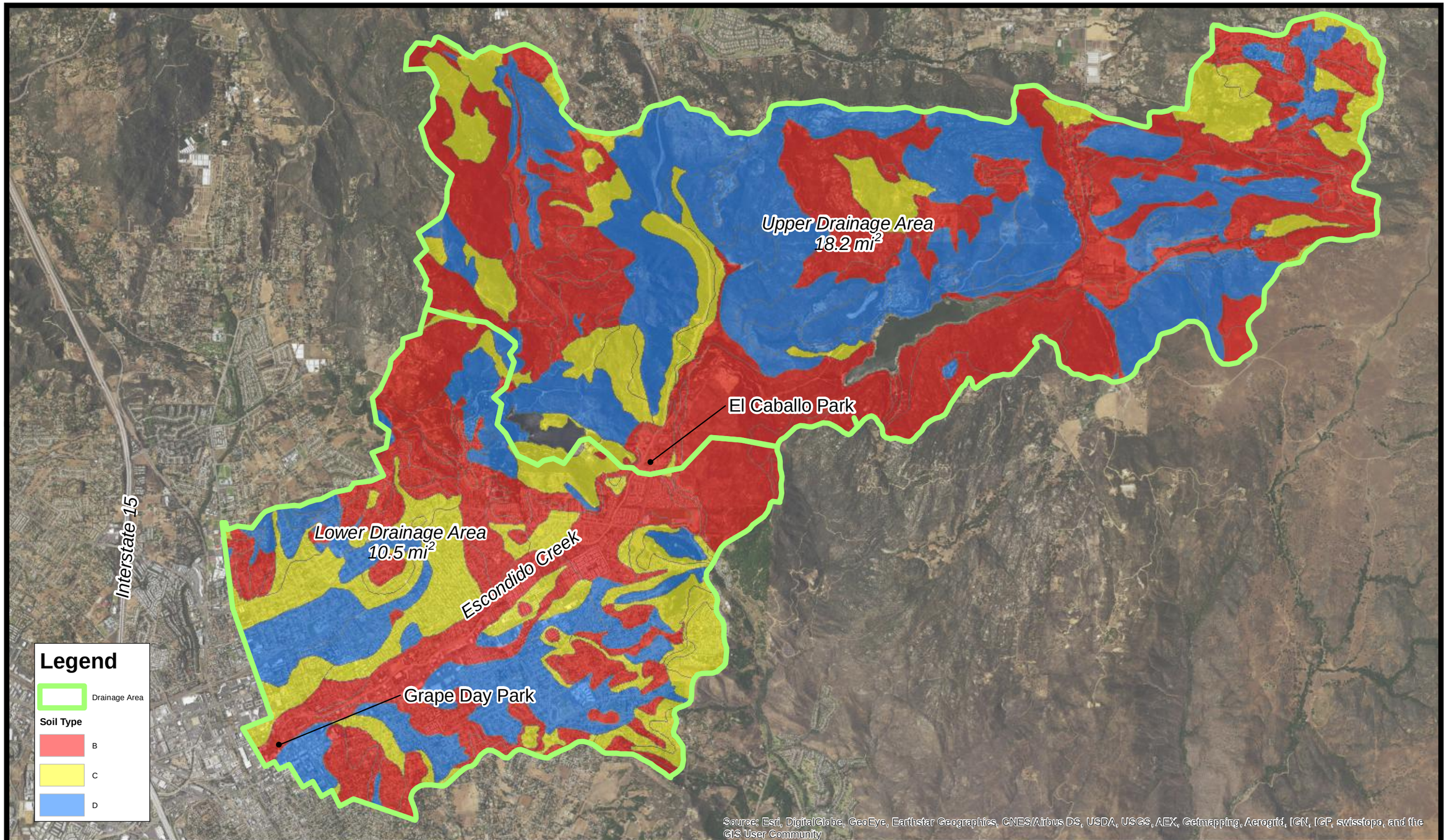
0 2,000 4,000 8,000 Feet

1 in = 4,000 feet

*Escondido Creeks Hydraulic Study*

# Land Use Exhibit

***Grape Day & El Caballo Parks***

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0 2,000 4,000 8,000 Feet

1 in = 4,000 feet

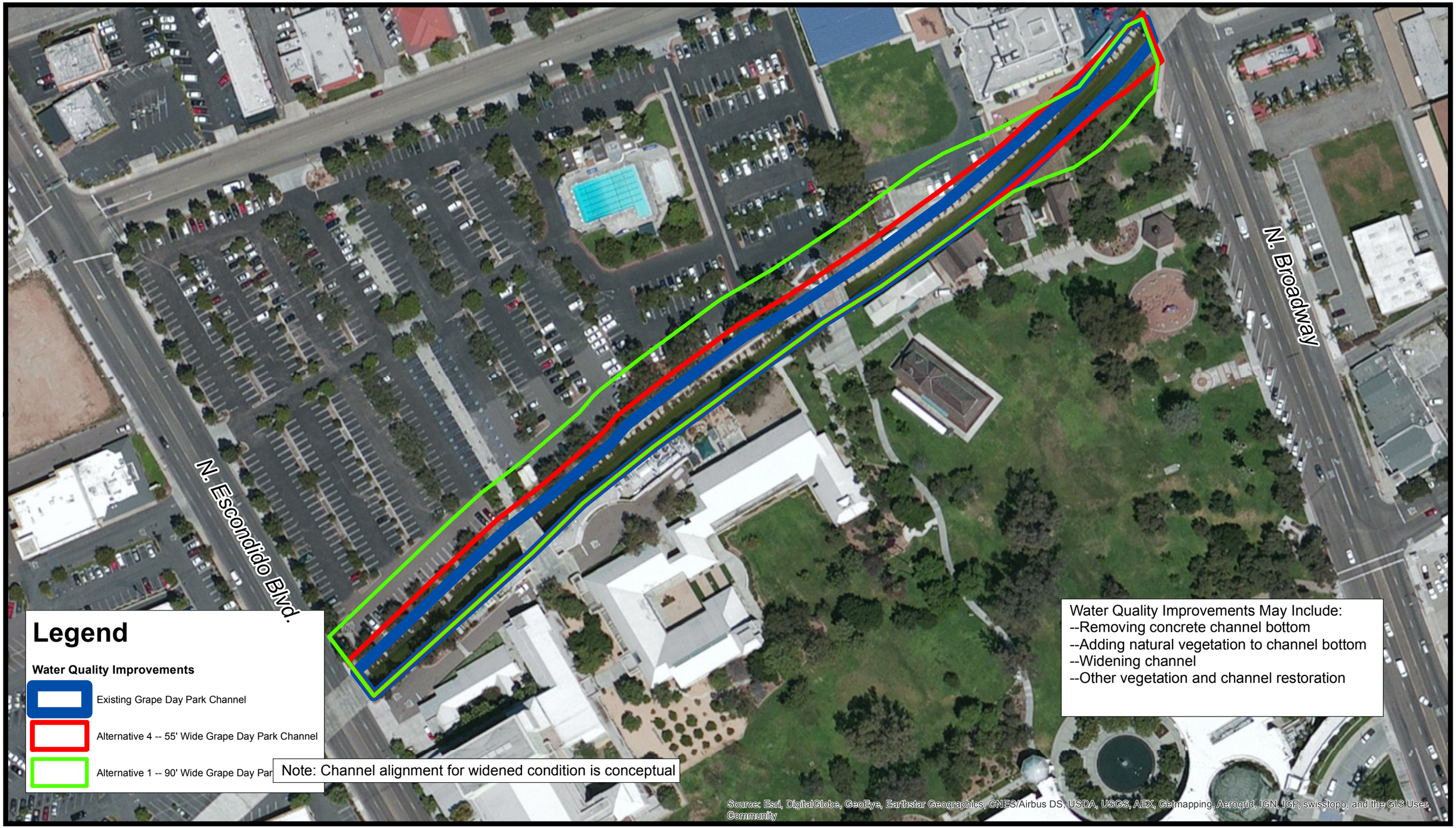
*Escondido Creeks Hydraulic Study*

## Soils Exhibit

***Grape Day & El Caballo Parks***

Michael Baker
INTERNATIONAL

# Appendix K Grape Day Park and El Caballo Park Water Quality Channel Improvements Site Plans

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0 50 100 200 Feet

1 in = 100 feet

*Escondido Creeks Hydraulic Study*

# Water Quality Improvements: Escondido Creek

***Grape Day Park***

Michael Baker INTERNATIONAL

0 100 200 400 Feet

1 in = 200 feet

*Escondido Creeks Hydraulic Study*

# Water Quality Improvements: Escondido Creek

***El Caballo Park***

All photos taken December 7, 2015

## Grape Day Channel Improvements (Task 2.3)

## Grape Day Channel Improvements (Task 2.3)

## El Caballo Channel Improvements (Task 2.3)

## El Caballo Channel Improvements (Task 2.3)

## El Caballo Channel Improvements (Task 2.3)

Michael Baker
INTERNATIONAL

# Appendix L Grape Day Park and El Caballo Park Water In-Channel Improvements Cost Estimates

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 19,000 | $ 4.00 | $ 76,000.00 |
| Native Planting | square feet | 12,000 | $ 0.48 | $ 5,760.00 |
| Turf Reinforcement Mat | square feet | 12,000 | $ 2.25 | $ 27,000.00 |
| Grade Control Structure | lump sum | 0 | $ 20,000.00 | $ - |
| Excavation and Offhaul | cubic yards | 0 | $ 30.00 | $ - |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 21,752 | $ 21,752.00 |
| Land Cost | square feet | 0 | $ 28.00 | $ - |
| Permitting (15% of Construction) | lump sum | 1 | $ 16,314 | $ 16,314.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 19,577 | $ 19,576.80 |
| Design (20% of Construction) | lump sum | 1 | $ 26,102 | $ 26,102.40 |
| | | | Total | $ 192,505.20 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 8,037.28 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 18,037.28 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 19,000 | $ 4.00 | $ 76,000.00 |
| Native Planting | square feet | 12,000 | $ 0.48 | $ 5,760.00 |
| Turf Reinforcement Mat | square feet | 12,000 | $ 2.25 | $ 27,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 0 | $ 30.00 | $ - |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 25,752 | $ 25,752.00 |
| Land Cost | square feet | 0 | $ 28.00 | $ - |
| Permitting (15% of Construction) | lump sum | 1 | $ 19,314 | $ 19,314.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,177 | $ 23,176.80 |
| Design (20% of Construction) | lump sum | 1 | $ 30,902 | $ 30,902.40 |
| | | | Total | $ 227,905.20 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,515.27 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 19,515.27 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 19,000 | $ 4.00 | $ 76,000.00 |
| Native Planting | square feet | 12,000 | $ 0.48 | $ 5,760.00 |
| Turf Reinforcement Mat | square feet | 12,000 | $ 2.25 | $ 27,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 0 | $ 30.00 | $ - |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 25,752 | $ 25,752.00 |
| Land Cost | square feet | 0 | $ 28.00 | $ - |
| Permitting (15% of Construction) | lump sum | 1 | $ 19,314 | $ 19,314.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 23,177 | $ 23,176.80 |
| Design (20% of Construction) | lump sum | 1 | $ 30,902 | $ 30,902.40 |
| | | | Total | $ 227,905.20 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 9,515.27 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 19,515.27 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 108,000 | $ 0.48 | $ 51,840.00 |
| Turf Reinforcement Mat | square feet | 108,000 | $ 2.25 | $ 243,000.00 |
| Grade Control Structure | lump sum | 0 | $ 20,000.00 | $ - |
| Excavation and Offhaul | cubic yards | 33,333 | $ 30.00 | $ 999,990.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 412,624 | $ 412,623.60 |
| Land Cost | square feet | 60,000 | $ 28.00 | $ 1,680,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 309,468 | $ 309,467.70 |
| Administration (15% of Construction) | lump sum | 1 | $ 371,361 | $ 371,361.24 |
| Design (20% of Construction) | lump sum | 1 | $ 495,148 | $ 495,148.32 |
| | | | Total | $ 5,331,718.86 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 222,604.59 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ - |
| Total EUAC | $ 232,604.59 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 7,200 | $ 0.48 | $ 3,456.00 |
| Turf Reinforcement Mat | square feet | 7,200 | $ 2.25 | $ 16,200.00 |
| Grade Control Structure | lump sum | 0 | $ 20,000.00 | $ - |
| Excavation and Offhaul | cubic yards | 13,333 | $ 30.00 | $ 399,990.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 237,587 | $ 237,586.80 |
| Land Cost | square feet | 24,000 | $ 28.00 | $ 672,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 178,190 | $ 178,190.10 |
| Administration (15% of Construction) | lump sum | 1 | $ 213,828 | $ 213,828.12 |
| Design (20% of Construction) | lump sum | 1 | $ 285,104 | $ 285,104.16 |
| | | | Total | $ 2,774,643.18 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 115,844.13 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ - |
| Total EUAC | $ 125,844.13 |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 96,000 | $ 0.48 | $ 46,080.00 |
| Turf Reinforcement Mat | square feet | 96,000 | $ 2.25 | $ 216,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 26,666 | $ 30.00 | $ 799,980.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 370,070 | $ 370,069.60 |
| Land Cost | square feet | 48,000 | $ 28.00 | $ 1,344,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 277,552 | $ 277,552.20 |
| Administration (15% of Construction) | lump sum | 1 | $ 333,063 | $ 333,062.64 |
| Design (20% of Construction) | lump sum | 1 | $ 444,084 | $ 444,083.52 |
| | | | Total | $ 4,619,115.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 192,852.71 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ - |
| Total EUAC | $ 202,852.71 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 60,000 | $ 0.48 | $ 28,800.00 |
| Turf Reinforcement Mat | square feet | 60,000 | $ 2.25 | $ 135,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 6,667 | $ 30.00 | $ 200,010.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 230,420 | $ 230,419.60 |
| Land Cost | square feet | 12,000 | $ 28.00 | $ 336,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 172,815 | $ 172,814.70 |
| Administration (15% of Construction) | lump sum | 1 | $ 207,378 | $ 207,377.64 |
| Design (20% of Construction) | lump sum | 1 | $ 276,504 | $ 276,503.52 |
| | | | Total | $ 2,375,213.46 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 99,167.54 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 109,167.54 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 168,000 | $ 0.48 | $ 80,640.00 |
| Turf Reinforcement Mat | square feet | 168,000 | $ 2.25 | $ 378,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 66,667 | $ 30.00 | $ 2,000,010.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 649,388 | $ 649,387.60 |
| Land Cost | square feet | 120,000 | $ 28.00 | $ 3,360,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 487,041 | $ 487,040.70 |
| Administration (15% of Construction) | lump sum | 1 | $ 584,449 | $ 584,448.84 |
| Design (20% of Construction) | lump sum | 1 | $ 779,265 | $ 779,265.12 |
| | | | Total | $ 9,107,080.26 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 380,229.71 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ - |
| Total EUAC | $ 390,229.71 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 48,000 | $ 4.00 | $ 192,000.00 |
| Native Planting | square feet | 74,400 | $ 0.48 | $ 35,712.00 |
| Turf Reinforcement Mat | square feet | 74,400 | $ 2.25 | $ 167,400.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 14,667 | $ 30.00 | $ 440,010.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 286,282 | $ 286,282.00 |
| Land Cost | square feet | 26,400 | $ 28.00 | $ 739,200.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 214,712 | $ 214,711.50 |
| Administration (15% of Construction) | lump sum | 1 | $ 257,654 | $ 257,653.80 |
| Design (20% of Construction) | lump sum | 1 | $ 343,538 | $ 343,538.40 |
| | | | Total | $ 3,272,795.70 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | |
|---|---|
| Present to Annual Cost Conversion Factor | 0.041751 |
| Annual Cost Capital Investment | $ 136,642.49 |
| Future to Annual Cost Conversion | 0.0237 |
| Annual Cost Corrective Maintenance | $ - |
| Total EUAC | $ 146,642.49 |
| (Based on 4.1% Average Annual CPI Increase) | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 12,000 | $ 4.00 | $ 48,000.00 |
| Native Planting | square feet | 12,000 | $ 0.48 | $ 5,760.00 |
| Turf Reinforcement Mat | square feet | 12,000 | $ 2.25 | $ 27,000.00 |
| Grade Control Structure | lump sum | 1 | $ 20,000.00 | $ 20,000.00 |
| Excavation and Offhaul | cubic yards | 10,000 | $ 30.00 | $ 300,000.00 |
| Retaining Wall | cubic yards | 667 | $ 864.00 | $ 576,288.00 |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 195,410 | $ 195,409.60 |
| Land Cost | square feet | 18,000 | $ 28.00 | $ 504,000.00 |
| Permitting (15% of Construction) | lump sum | 1 | $ 146,557 | $ 146,557.20 |
| Administration (15% of Construction) | lump sum | 1 | $ 175,869 | $ 175,868.64 |
| Design (20% of Construction) | lump sum | 1 | $ 234,492 | $ 234,491.52 |
| | | | Total | $ 2,233,374.96 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 93,245.64 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 103,245.64 |
| (Based on 4.1% Average Annual CPI Increase) | | |

**Cost**

***Capital Construction***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Concrete Removal | square feet | 12,000 | $ 4.00 | $ 48,000.00 |
| Native Planting | square feet | 12,000 | $ 0.48 | $ 5,760.00 |
| Turf Reinforcement Mat | square feet | 12,000 | $ 2.25 | $ 27,000.00 |
| Grade Control Structure | lump sum | 0 | $ 20,000.00 | $ - |
| Excavation and Offhaul | cubic yards | 0 | $ 30.00 | $ - |
| Retaining Wall | cubic yards | 0 | $ 864.00 | $ - |
| | | | $ - | $ - |
| | | | $ - | $ - |
| Contingency (20%) | lump sum | 1 | $ 16,152 | $ 16,152.00 |
| Land Cost | square feet | 0 | $ 28.00 | $ - |
| Permitting (15% of Construction) | lump sum | 1 | $ 12,114 | $ 12,114.00 |
| Administration (15% of Construction) | lump sum | 1 | $ 14,537 | $ 14,536.80 |
| Design (20% of Construction) | lump sum | 1 | $ 19,382 | $ 19,382.40 |
| | | | Total | $ 142,945.20 |

***Annual O & M***

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| Annual Maintenance | lump sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | | | Total | $ 10,000.00 |

***Corrective Maintenance at Year*** 25

| | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|
| N/A | lump sum | 1 | $ - | $ - |
| | | | Total | $ - |

***Estimated Lifespan*** 100

| | | |
|---|---|---|
| Present to Annual Cost Conversion Factor | | 0.041751 |
| Annual Cost Capital Investment | $ | 5,968.11 |
| Future to Annual Cost Conversion | | 0.0237 |
| Annual Cost Corrective Maintenance | $ | - |
| Total EUAC | $ | 15,968.11 |
| (Based on 4.1% Average Annual CPI Increase) | | |

Michael Baker
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# Appendix M Tutorial for Determining Equivalent Development Area

**Tutorial to Determine the Equivalent Development Area**

**Step 1.**

Open the WQE Calculation Spreadsheet, Tab A.5L Factor

This column is based on the area tributary to the ACP project. If any new or better information is available, this should be updated.

**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | 1.40 | 1.44 | 1.00 | - | - | - | 0.46 |

Notes:

**Step 2.**

Update the Reference Tributary Characteristics Area column with the applicable land use areas for the project for which an alternative compliance is sought.

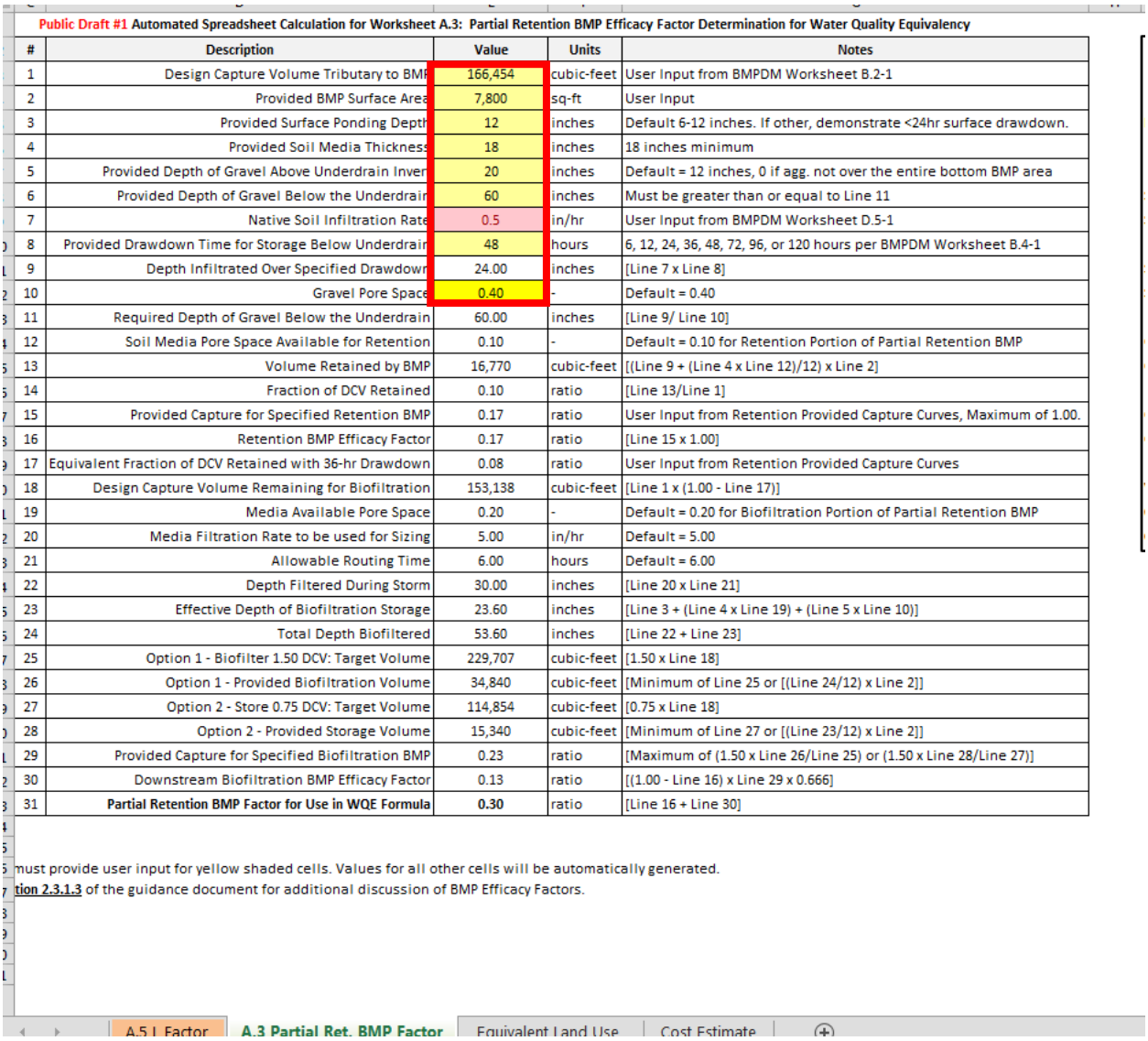
**Public Draft #1 Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination**

| Land Use Designation | ACP Tributary Characteristics | | Reference Tributary Characteristics [2] | | Relative Pollutant Concentrations by Land Use [3] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (Acres) | Runoff Factor [1] | Area (Acres) | Runoff Factor [1] | TSS | TP | TN | Tcu | TPb | TZn | FC |
| Agriculture | | 0.10 | | 0.10 | 0.45 | 1.00 | 1.00 | 1.00 | 1.00 | 0.59 | 1.00 |
| Commercial | 11.15 | 0.80 | 1.00 | 0.80 | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| Education | 9.88 | 0.50 | | 0.50 | 0.13 | 0.20 | 0.11 | 0.14 | 0.25 | 0.39 | 0.13 |
| Industrial | | 0.90 | | 0.90 | 0.13 | 0.19 | 0.15 | 0.54 | 0.68 | 0.89 | 0.49 |
| Multi Family Residential | | 0.60 | | 0.60 | 0.10 | 0.13 | 0.13 | 0.14 | 0.15 | 0.29 | 0.27 |
| Orchard | 24.53 | 0.10 | | 0.10 | 0.18 | 0.17 | 0.67 | 1.00 | 1.00 | 0.59 | 0.11 |
| Rural Residential | 12.28 | 0.30 | | 0.30 | 1.00 | 0.51 | 0.14 | 0.10 | 0.71 | 0.13 | 0.19 |
| Single Family Residential | 45.74 | 0.40 | | 0.40 | 0.13 | 0.20 | 0.15 | 0.27 | 0.43 | 0.35 | 0.63 |
| Transportation | 20.95 | 0.90 | | 0.90 | 0.11 | 0.26 | 0.12 | 0.53 | 0.31 | 0.62 | 0.12 |
| Vacant / Open Space | 5.74 | 0.10 | | 0.10 | 0.16 | 0.10 | 0.10 | 0.12 | 0.10 | 0.10 | 0.10 |
| Water | | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 130.27 | - | 1.00 | - | - | - | - | - | - | - | - |
| | Relative Pollutant Concentration for ACP Tributary [4] | | | | 0.18 | 0.23 | 0.16 | 0.41 | 0.42 | 0.54 | 0.40 |
| | Relative Pollutant Concentration for Reference Tributary [4] | | | | 0.13 | 0.16 | 0.16 | 0.56 | 0.48 | 1.00 | 0.87 |
| | Watershed Management Area | | | | Carlsbad | | | | | | |
| | Hydrologic Unit | | | | Carlsbad (904.00) | | | | | | |
| | Land Use Factor [5] | | | | **1.40** | **1.44** | **1.00** | - | - | - | 0.46 |

**Notes:**

**Step 3.**

On the A.3. Partial Ret. BMP Factor, update the BMP characteristics if different than the preliminary design included in the February 2016 Escondido Creeks Hydraulic Study.



Public Draft #1 **Automated Spreadsheet Calculation for Worksheet A.3: Partial Retention BMP Efficacy Factor Determination for Water Quality Equivalency**

| # | Description | Value | Units | Notes |
|---|---|---|---|---|
| 1 | Design Capture Volume Tributary to BMP | 166,454 | cubic-feet | User Input from BMPDM Worksheet B.2-1 |
| 2 | Provided BMP Surface Area | 7,800 | sq-ft | User Input |
| 3 | Provided Surface Ponding Depth | 12 | inches | Default 6-12 inches. If other, demonstrate <24hr surface drawdown. |
| 4 | Provided Soil Media Thickness | 18 | inches | 18 inches minimum |
| 5 | Provided Depth of Gravel Above Underdrain Inver | 20 | inches | Default = 12 inches, 0 if agg. not over the entire bottom BMP area |
| 6 | Provided Depth of Gravel Below the Underdrain | 60 | inches | Must be greater than or equal to Line 11 |
| 7 | Native Soil Infiltration Rate | 0.5 | in/hr | User Input from BMPDM Worksheet D.5-1 |
| 8 | Provided Drawdown Time for Storage Below Underdrain | 48 | hours | 6, 12, 24, 36, 48, 72, 96, or 120 hours per BMPDM Worksheet B.4-1 |
| 9 | Depth Infiltrated Over Specified Drawdown | 24.00 | inches | [Line 7 x Line 8] |
| 10 | Gravel Pore Space | 0.40 | - | Default = 0.40 |
| 11 | Required Depth of Gravel Below the Underdrain | 60.00 | inches | [Line 9/ Line 10] |
| 12 | Soil Media Pore Space Available for Retention | 0.10 | - | Default = 0.10 for Retention Portion of Partial Retention BMP |
| 13 | Volume Retained by BMP | 16,770 | cubic-feet | [(Line 9 + (Line 4 x Line 12)/12) x Line 2] |
| 14 | Fraction of DCV Retained | 0.10 | ratio | [Line 13/Line 1] |
| 15 | Provided Capture for Specified Retention BMP | 0.17 | ratio | User Input from Retention Provided Capture Curves, Maximum of 1.00. |
| 16 | Retention BMP Efficacy Factor | 0.17 | ratio | [Line 15 x 1.00] |
| 17 | Equivalent Fraction of DCV Retained with 36-hr Drawdown | 0.08 | ratio | User Input from Retention Provided Capture Curves |
| 18 | Design Capture Volume Remaining for Biofiltration | 153,138 | cubic-feet | [Line 1 x (1.00 - Line 17)] |
| 19 | Media Available Pore Space | 0.20 | - | Default = 0.20 for Biofiltration Portion of Partial Retention BMP |
| 20 | Media Filtration Rate to be used for Sizing | 5.00 | in/hr | Default = 5.00 |
| 21 | Allowable Routing Time | 6.00 | hours | Default = 6.00 |
| 22 | Depth Filtered During Storm | 30.00 | inches | [Line 20 x Line 21] |
| 23 | Effective Depth of Biofiltration Storage | 23.60 | inches | [Line 3 + (Line 4 x Line 19) + (Line 5 x Line 10)] |
| 24 | Total Depth Biofiltered | 53.60 | inches | [Line 22 + Line 23] |
| 25 | Option 1 - Biofilter 1.50 DCV: Target Volume | 229,707 | cubic-feet | [1.50 x Line 18] |
| 26 | Option 1 - Provided Biofiltration Volume | 34,840 | cubic-feet | [Minimum of Line 25 or [(Line 24/12) x Line 2]] |
| 27 | Option 2 - Store 0.75 DCV: Target Volume | 114,854 | cubic-feet | [0.75 x Line 18] |
| 28 | Option 2 - Provided Storage Volume | 15,340 | cubic-feet | [Minimum of Line 27 or [(Line 23/12) x Line 2]] |
| 29 | Provided Capture for Specified Biofiltration BMP | 0.23 | ratio | [Maximum of (1.50 x Line 26/Line 25) or (1.50 x Line 28/Line 27)] |
| 30 | Downstream Biofiltration BMP Efficacy Factor | 0.13 | ratio | [(1.00 - Line 16) x Line 29 x 0.666] |
| 31 | **Partial Retention BMP Factor for Use in WQE Formula** | **0.30** | ratio | [Line 16 + Line 30] |

must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.
tion 2.3.1.3 of the guidance document for additional discussion of BMP Efficacy Factors.

A.5 L Factor | A.3 Partial Ret. BMP Factor | Equivalent Land Use | Cost Estimate

**Step 4.**

On the Equivalent Land Use tab, update yellow cells, if necessary or if more accurate information is available. The 85th percentile rainfall is an average used for preliminary analysis. The v1 (hydromod) are reflective of the regional values (See Regional Hydromodification Sizing Tables by Brown and Caldwell) based on 0.5, 0.3 and 0.1 Q2, Flat Type B soil (maximum) and 0.5, 0.3, and 0.1 Q2, Steep, Type A soil (minimum). The values from the tables should be updated to reflect the actual composition of the reference area tributary watershed. It is also recommended that continuous simulation modeling be completed in lieu of using the regional tables as it will give a more accurate value that will most likely be less conservative than using the Regional Tables.

The total area that can be offset by the ACP project is listed as the Governing Equivalent Development Area.

| | A | B | C | D |
|---|---|---|---|---|
| 5 | **Ve** | 22,640 | ($ft^3$) | Earned Stormwater Pollutant Control Volume |
| 6 | **"C" Factor Reference Tributary Area** | 0.80 | | |
| 7 | **"C" Factor ACP Area** | 0.44 | | |
| 8 | **85th Percentile Rainfall** | 0.80 | (inches) | *0.80 is average for Escondido* |
| 9 | **Equivalent Development Area** | 13.0 | (acres) | |
| 10 | | | | |
| 11 | | **Maximum** | **Minimum** | |
| 12 | **V1 (hydromod)** | 0.2015 | 0.1040 | |
| 13 | **ACP Ret BMP Volume** | 15,600 | | |
| 14 | **Equivalent Development Area** | 2.22 | 4.30 | (acres) |
| 15 | | | | |
| 16 | **Governing Equivalent Development Area** | **2.22** | **4.30** | **(acres)** |
| 17 | | | | |
| 18 | **For Use With Irrigation Re-Use Only** | | | |
| 19 | | | | |
| 20 | Landscaped Area | 0 | (acres) | |
| 21 | Irrigation Demand | 0.25 | (inches per week) | |
| 22 | Assumed Inter Event Duration | 4 | (days) | |
| 23 | Irrigation Demand Volume | - | ($ft^3$) | |
| 24 | Minimum Design Depth | 0.00 | (inches) | |
| 25 | Effective Draw Down Rate | 0.0000 | (in/hr) | |
| 26 | Daily Irrigation Cycle | 15 | (min) | |
| 27 | Pump Rate | 0 | (GPM) | |
| 28 | | | | |
| 29 | | | | |
| 30 | ***Notes:*** | | | |
| 31 | 1) Only yellow cells are user input. | | | |
| 32 | 2) V1 (Hydromod) Based upon Regional BMP Sizing Tables or External Analysis | | | |