

APPENDIX SW

STORMWATER DESIGN REPORT

STORMWATER DESIGN REPORT

ADMINISTRATIVE DRAFT

MAHA

Revised: September 26, 2019

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OBJECTIVE

The objective of this report is to provide an overview of the stormwater management design criteria as related to the first phase of the proposed MAHA Resort at the Guenoc Valley, as defined in the Specific Plan of Development ("The Project"). This report includes development types, approximate quantities of proposed impervious area, and other stormwater design considerations including descriptions of the existing site conditions and dominant drainage patterns and methodologies for meeting post-construction mitigation requirements in compliance with State and Federal requirements.

PRIMARY DESIGN CRITERIA

As of the writing of this report, Lake County has not adopted approved Phase II, Municipal Separate Storm Sewer System (MS4) permit guidelines and defers to State requirements associated with the General Construction Permit for post-construction stormwater mitigation. In meetings with representation of the Lake County Public Works Department, this project has proposed designing to the requirements the Bay Area Stormwater Management Agencies Association (BASMAA) guidelines¹, which have been adopted in neighboring Marin, Sonoma, Napa, and Solano Counties and comply with State and Federal NPDES requirements. Accordingly, the following references BASMAA guidelines.

In general, The Project will be designed to minimize disturbance to existing drainage patterns and to improve runoff quality at every opportunity. While the existing site is largely undeveloped, decades of livestock grazing and vineyard farming operations have created conditions that will benefit from improved runoff management strategies and restoration efforts associated with The Project.

The Project's Goals:

- Comply with regionally adopted Phase II MS4 guidelines (BASMAA)
- No Hydromodification - No increase in peak flow rate for up to the 2-year 24-hour storm.
- Minimize impact of development to receiving waters. Improve upon existing conditions where feasible.
- Mitigate impacts to existing drainages.

The above goals will be achieved through a range of strategies including:

- Selection of materials that encourage infiltration rather than runoff
- Improved runoff quality by flowing hardscape runoff through constructed bio-treatment areas prior to discharge to existing drainage pattern
- Use of undisturbed existing landscape and vegetation to treat runoff
- Design conveyances to return collected runoff to sheet flow over undisturbed landscape rather than concentrated discharges
- Continue to collect runoff in existing lakes/ponds for use in vineyard and landscape irrigation

1. Bay Area Stormwater Management Agencies Association (BASMAA), *BASMAA Post-Construction Manual: Design Guidance for Stormwater Treatment and Control for Projects in Marin, Sonoma, Napa, and Solano Counties*, January 2019.

EXISTING SITE CONDITIONS AND FEATURES

The Project, comprised of 49 assessor's parcels totaling approximately 16,000 acres within Guenoc Valley, is located three miles southeast of Middletown on the southeast border of Lake County, bordering Yolo and Napa Counties to the south and east with primary access along Butts Canyon Road. The area is broken into eight primary watersheds, which are bounded by Bucksnot Creek on the West, Putah Creek on the North, Upper Bohn Lake on the East, and Butts Canyon Road on the South. These watersheds are largely contained within the bounds of the project limits and discharge to ponds, drainages and creeks that eventually flow offsite to existing regional drainage patterns. See **Figure 1** for an overview of the overall watersheds that The Project will affect.

The Bucksnot Creek and Easter Peak Watersheds are composed of large areas of wooded hillsides which include drainages, gullies, and perennial streams. In addition, there are large areas of vineyards in the flat portion of Easter Peak Watershed. These drainages migrate water through the watersheds and into Bucksnot Creek. This creek starts on the southwest side of the property and flows north into McCreary Lake. From there Bucksnot Creek continues east through the site until it bends back north and eventually discharges into Putah Creek on the north edge of the property.

The Wilderness Watershed is located at the north tip of the property. This watershed is sparsely forested, hilly terrain which slopes steeply down to Putah Creek. Throughout this slope there are small drainages and multiple discharge points into the creek at the north of the watershed.

The Butcherknife Creek Watershed is located in the central and northern portions of the property. This watershed is composed primarily of grassed hills and oak woodlands, which sheet flow into a series of tributary drainages that converge in the center of the watershed at Butcherknife Creek. The creek flows north and discharges into Putah Creek.

The Trout Flat and Upper Trout Flat Watersheds are located at the east side of the property. They are composed of hillsides with loose soils and areas with erosion channels. These drainages generally flow from west to east and eventually discharge into Putah Creek beyond the eastern limits of the project.

The Upper Bohn Watershed is a half circle located in the center of the property on the east side. This small watershed flows into small drainages that discharge into Upper Bohn Lake.

The Bohn Valley watershed is located in the center of the property and drains to Lower Bohn Lake at the center. This roughly circular watershed is composed of medium to steep slopes which drain toward a vineyard planted at the flat basin above the lake. The slopes surrounding the watershed are heavily forested and have deep drainages.

The McCain Canyon and West McCain Canyon Watersheds are located in the southeast corner of the property. This watershed is dominated by steep slopes, which drain into McCain Creek. The creek flows south until it discharges into Butts Creek at the southern end of the property.

The Three Peaks and South Three Peaks Watersheds are located at the south and center of the property. This watershed is composed of steeply sloped and sparsely vegetated hillsides, which sheet flow into drainages throughout this portion of the property. The drainages converge at the south of the property and discharge into Butts Creek prior to flowing east.

The Bucksnot South Watershed is located on the south side of Butts Canyon Road. The main portion of this watershed is an abandoned golf course and is relatively flat. The south side of the watershed is a steep hillside that drains into small streams which flow through the old golf course area.

Lastly, there is a small watershed associated with the float plane dock. The Watershed for Float Plane Dock slopes from Butts Canyon Road into the Detert Reservoir.

PROPOSED SITE CONDITIONS

The Project will be a resort-residential clustered development dispersed across approximately 11,200 acres of land in Lake County, CA. The existing land use has primarily been farming and vineyard operations, which consist of large areas of planted vineyards and an extensive network of gravel ranch roads (approximately 61 acres). For the purposes of this analysis, the proposed development has been broken down into three types: roadways, residential villa parcels, and commercial areas. In order to minimize disturbance to the overall site hydrology, more intensive mitigation strategies will largely be focused at the denser commercial development sites rather than a network of conveyance and collection to large basins that treat multiple areas. By treating water close to the proposed development through land-based strategies, runoff is returned to the natural drainage pattern. See **Table 1** for watersheds and existing roads acreage breakdown.

Roadways

In order to minimize the impact to the undisturbed site, the roadway network being developed for the MAHA Resorts will primarily use the alignments of the existing network of ranch roads, upgrading and widening them to paved roads to meet County requirements. The proposed roadway network will have a total acreage of approximately 150 acres and is dispersed throughout the entire development, producing minimal increase to hardcape and runoff at any specific location. Runoff from roads will be collected into roadside swales and ditches which will convey stormwater to small sediment forebays prior to entering culvert crossings (where necessary) and being dispersed by level spreaders into the adjacent landscape, which will function as treatment measures that remove sediment and pollutants before returning runoff to the natural drainage pattern, consistent with BASMAA requirements. In the event the roadways are impacting an ephemeral stream, the same treatment methodologies will be implemented in order to provide runoff quality mitigation before that runoff is returned to the Waters of the State.

See **Table 1** for acreage of proposed roads per watershed.

Residential Villa Parcels

The proposed development includes 400 residential villa parcels and 141 resort residential parcels dispersed in clusters throughout the development. These parcels will each include a single family house with a driveway and exterior hardscape with an estimated 0.5-1.0 acres of impermeable area per parcel. Since the residential parcels represent a relatively small and non-contiguous portion of the project development and associated increase in runoff, each parcel will address stormwater mitigation within the parcel boundary through a range of strategies chosen to best fit the proposed residential design and site size, topography, and landscape design. Compliance with mitigation requirements will be demonstrated in the civil site construction documents and will be unique and integral to the layout of each residential site and proposed architectural and landscape design. The majority of residential parcels include significant undeveloped areas with ample opportunity to include stormwater management strategies, including:

- Green/living roofs
- Rainwater harvesting
- Rain Gardens and/or Flow-thru Planters
- Pervious hardscape materials that infiltrate runoff
- Landscape areas that serve as water quality mitigation for hardscape runoff
- Use of existing undisturbed landscape to treat hardscape runoff
- Dispersal of treated runoff to existing drainage pattern via sheet flow

For more densely developed residential parcels adjacent to commercial zones, projects will achieve stormwater compliance through use of multiple strategies including:

- Green/living roofs
- Rainwater harvesting
- Pervious hardscape materials that infiltrate runoff
- Landscape areas that serve as water quality mitigation for hardscape runoff
- Use of existing undisturbed landscape to treat hardscape runoff
- Dispersal of treated runoff to existing drainage pattern via sheet flow

These approaches are in conformance with the BASMAA guidelines for mitigation of water quality and are consistent with the intended development of the MAHA properties. Conformance with stormwater regulations will be demonstrated with the building and site permit application materials submitted for each residential parcel at the time of development. **Figure 1** displays the locations of the commercial areas which have a larger percentage of hardscape and more intensive stormwater management facilities to provide through treatment.

Commercial Areas

The project includes 14 proposed commercial zones. These zones are relatively densely developed and will contain a higher percentage of hardscape than the rest of the proposed site development. As such, these sites will use a combination of self-retaining landscape features and bio-retention areas to address stormwater runoff and comply with the post-construction requirements. Each of the commercial areas has multiple DMAs associated with it, which are cataloged in **Table 2** at the end of this report. A figure illustrating the layout of hardscape within commercial areas and conceptual locations of mitigation

strategies can be found in **Appendix A – Commercial Area Drainage Management Areas**. Location, size, and type of mitigation strategies shown are conceptual and will be refined during the detailed design process.

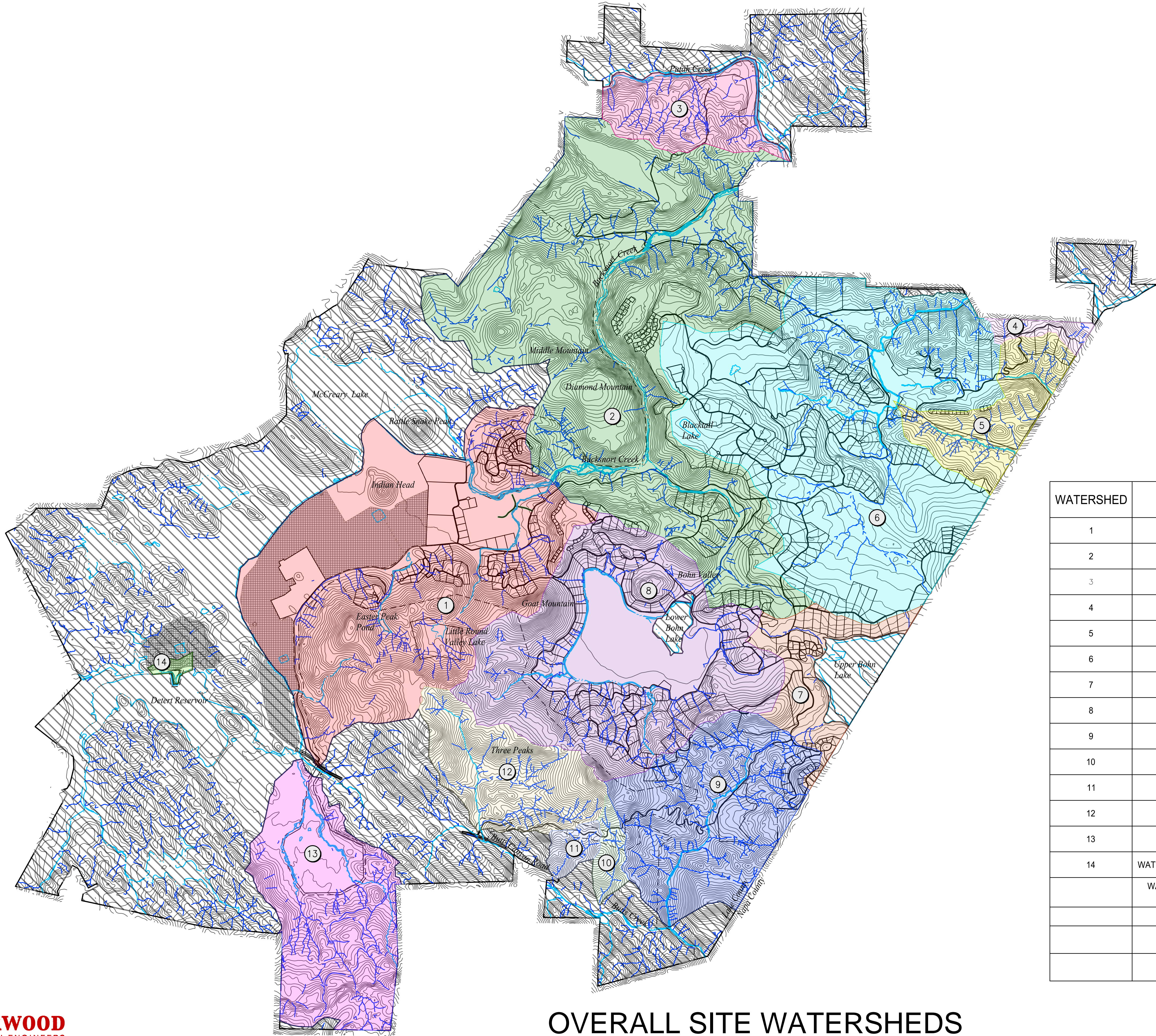
SUMMARY

Construction occurring within these watersheds within the proposed MAHA Development have total areas of approximately 11,200 acres. Throughout this 11,200 acres there are approximately 80 acres of impervious commercial area, 151 acres of roads, and 263 acres estimated residential impervious area. The commercial areas and residential areas will utilize a range of stormwater conveyances and treatments to provide stormwater mitigation, and if necessary, hydraulic modification. Since the roadways have impervious area equal to approximately 1.5% of the area it encompasses, they will be treated as self treating area and will use the undisturbed adjacent landscape for treatment where feasible. Where necessary, constructed BMPs will be installed to meet or exceed mitigation requirements.

Because all runoff from the proposed development is routed through a self-retaining area, a bio-retention area, or a self treating area, there should be no net increase of stormwater leaving the site for the 2-year 24-hour storm, meeting the hydromodification requirements set by the regionally accepted BASMAA guidelines in compliance with Phase II MS4 permits.

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P:\2018\18-016_Maha_Master\City\03_Design\02_Exhibits\01_STORMWATER\Stormwater Analysis Support - Watersheds\CAD\Stormwater Analysis Support - Watershed Areas.dwg, Layout1, Pauline Nguyen, 9/18/2019 4:47:32 PM, Letter (8.50 x 11.00 Inches), 1:1

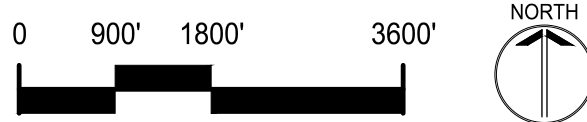


| WATERSHED | WATERSHED NAME | WATERSHED HATCH | AREA (AC) |
|-----------|---|---|-----------|
| 1 | EASTER PEAK |  | 1,933 |
| 2 | BUCKSNORT CREEK |  | 2,600 |
| 3 | WILDERNESS |  | 330 |
| 4 | UPPER TROUT FLAT |  | 54 |
| 5 | TROUT FLAT |  | 328 |
| 6 | BUTCHERKNIFE |  | 2,097 |
| 7 | UPPER BOHN |  | 263 |
| 8 | BOHN VALLEY |  | 1,383 |
| 9 | MCCAIN CANYON |  | 788 |
| 10 | WEST MCCAIN CANYON |  | 67 |
| 11 | SOUTH THREE PEAKS |  | 59 |
| 12 | THREE PEAKS |  | 445 |
| 13 | BUCKSNORT SOUTH |  | 775 |
| 14 | WATERSHED FOR FLOAT PLANE DOCK |  | 19 |
| | WATERSHED AREAS BEYOND PH1 (WATERBODIES INCL.) |  | 5,402 |
| | | | |
| | | TOTAL PH1 WATERSHED AREA | 11,141 |
| | | TOTAL PROJECT BOUNDARY AREA | 16,543 |

OVERALL SITE WATERSHEDS

MAHA
LAKE COUNTY, CA

September 18, 2019



Stormwater Analysis: Pre- and Post- Road Runoff Calculations (100-Year Storm Frequency)

18-016 Maha
Stormwater: 100 year

| PRE-DEVELOPMENT (EXISTING) CONDITIONS - ROADS ONLY | | | | | | | | | | |
|--|-----------------|---------------------------|--------------|-------------------------|--------------------|-----------------------|-----------------------|-----------|--------|---------|
| Watershed | Total Area (ac) | Road/Impervious Area (ac) | % Impervious | C _{IMPERVIOUS} | Pervious Area (ac) | C _{PERVIOUS} | C _{WEIGHTED} | I (in/hr) | A (ac) | Q (cfs) |
| Watershed #1 | 792 | 0.1 | 0.02% | 0.9 | 792 | 0.3 | 0.30 | 2.12 | 792 | 504 |
| Watershed #2 | 67 | 0 | 0.0% | 0.9 | 67 | 0.3 | 0.30 | 2.12 | 67 | 42 |
| Watershed #3 | 59 | 0 | 0.0% | 0.9 | 59 | 0.3 | 0.30 | 2.12 | 59 | 37 |
| Watershed #4 | 445 | 0 | 0.0% | 0.9 | 445 | 0.3 | 0.30 | 2.12 | 445 | 283 |
| Watershed #5 | 262 | 2 | 0.7% | 0.9 | 260 | 0.3 | 0.30 | 2.12 | 262 | 169 |
| Watershed #6 | 1,383 | 7 | 0.5% | 0.9 | 1,376 | 0.3 | 0.30 | 2.12 | 1,383 | 889 |
| Watershed #7 | 1,898 | 9 | 0.5% | 0.9 | 1,890 | 0.3 | 0.30 | 2.12 | 1,898 | 1,218 |
| Watershed #8 | 2,592 | 10 | 0.4% | 0.9 | 2,582 | 0.3 | 0.30 | 2.12 | 2,592 | 1,661 |
| Watershed #9 | 2,094 | 5 | 0.2% | 0.9 | 2,089 | 0.3 | 0.30 | 2.12 | 2,094 | 1,338 |
| Watershed #10 | 352 | 0.3 | 0.1% | 0.9 | 352 | 0.3 | 0.30 | 2.12 | 352 | 225 |
| Watershed #11 | 51 | 0 | 0.0% | 0.9 | 51 | 0.3 | 0.30 | 2.12 | 51 | 32 |
| Watershed #12 | 330 | 1 | 0.4% | 0.9 | 329 | 0.3 | 0.30 | 2.12 | 330 | 212 |
| Watershed #13 | 19 | 0 | 0.0% | 0.9 | 19 | 0.3 | 0.30 | 2.12 | 19 | 12 |
| Watershed #14 | 467 | 0 | 0.0% | 0.9 | 467 | 0.3 | 0.30 | 2.12 | 467 | 297 |
| TOTAL | 10,811 | 34 | 0.3% | | | | | | | |

- Notes:
1. Intensity from NOAA (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca). Assume 100 year storm, 30 minute intensity. This is a preliminary assumption, actual intensities will vary based on watershed time of concentration.
 2. Rational Method used with its general assumptions.
 3. Assumed avg. 0.9 C-value for impervious surfaces and 0.3 value for pervious surfaces.
 4. Primary roadway width = 28 ft., secondary roadway width = 22 ft.
 5. Existing Roads range from 18'-22', so an average of 20' used.

| POST-DEVELOPMENT (PROPOSED) CONDITIONS - ROADS ONLY | | | | | | | | | | | |
|---|-----------------|---------------------------|--------------|-------------------------|--------------------|-----------------------|-----------------------|-----------|--------|---------|----------------------------|
| Watershed | Total Area (ac) | Road/Impervious Area (ac) | % Impervious | C _{IMPERVIOUS} | Pervious Area (ac) | C _{PERVIOUS} | C _{WEIGHTED} | I (in/hr) | A (ac) | Q (cfs) | Increase in Road Area (ac) |
| Watershed #1 | 792 | 10 | 1.3% | 0.9 | 782 | 0.3 | 0.31 | 2.12 | 792 | 516 | 10 |
| Watershed #2 | 67 | 0.6 | 0.9% | 0.9 | 66 | 0.3 | 0.31 | 2.12 | 67 | 43 | 1 |
| Watershed #3 | 59 | 0.6 | 1.1% | 0.9 | 58 | 0.3 | 0.31 | 2.12 | 59 | 38 | 1 |
| Watershed #4 | 445 | 2 | 0.5% | 0.9 | 442 | 0.3 | 0.30 | 2.12 | 445 | 286 | 2 |
| Watershed #5 | 262 | 6 | 2.4% | 0.9 | 256 | 0.3 | 0.31 | 2.12 | 262 | 175 | 5 |
| Watershed #6 | 1,383 | 26 | 1.9% | 0.9 | 1,357 | 0.3 | 0.31 | 2.12 | 1,383 | 913 | 19 |
| Watershed #7 | 1,898 | 24 | 1.3% | 0.9 | 1,874 | 0.3 | 0.31 | 2.12 | 1,898 | 1,238 | 15 |
| Watershed #8 | 2,592 | 50 | 1.9% | 0.9 | 2,542 | 0.3 | 0.31 | 2.12 | 2,592 | 1,712 | 40 |
| Watershed #9 | 2,094 | 26 | 1.3% | 0.9 | 2,068 | 0.3 | 0.31 | 2.12 | 2,094 | 1,365 | 21 |
| Watershed #10 | 352 | 1 | 0.4% | 0.9 | 351 | 0.3 | 0.30 | 2.12 | 352 | 226 | 1 |
| Watershed #11 | 51 | 2 | 3.0% | 0.9 | 49 | 0.3 | 0.32 | 2.12 | 51 | 34 | 2 |
| Watershed #12 | 330 | 1 | 0.4% | 0.9 | 329 | 0.3 | 0.30 | 2.12 | 330 | 212 | 0.1 |
| Watershed #13 | 19 | 0 | 0.0% | 0.9 | 19 | 0.3 | 0.30 | 2.12 | 19 | 12 | 0.0 |
| Watershed #14 | 467 | 0 | 0.0% | 0.9 | 467 | 0.3 | 0.30 | 2.12 | 467 | 297 | 0.0 |
| TOTAL | 10,811 | 151 | 1.4% | | | | | | | | 116 |

Table 1 - Watershed Drainage Management Areas and Roadway Summary

Stormwater Analysis: Commercial Site DMA Treatment Area Calculations

18-016 Maha

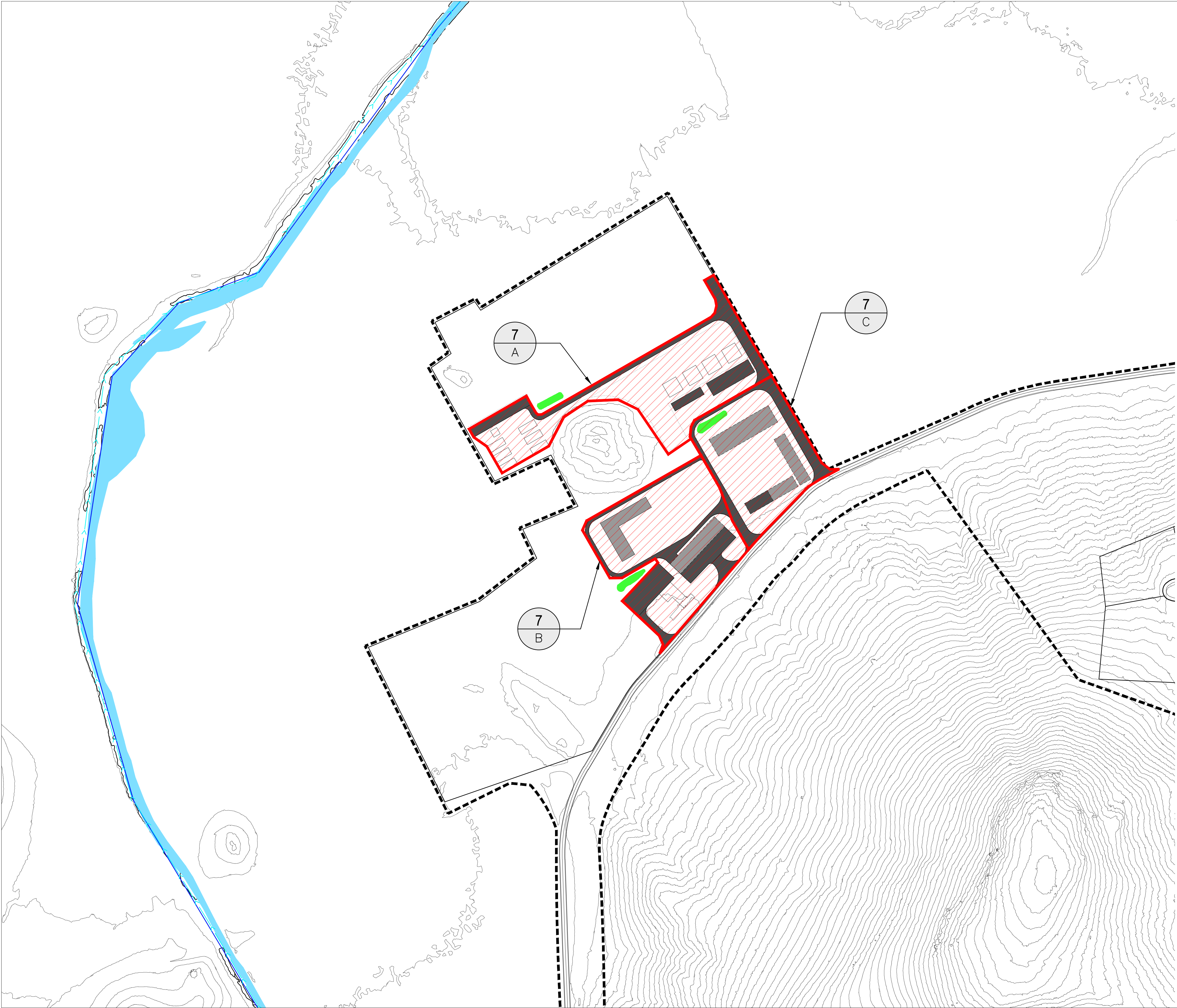
| Site | DMA | DMA Area (ac) | Roof (ac) | Hardscape (ac) | Total New Impervious Area (ac) | Treatment Required | |
|----------------------------|-------|---------------|-----------|----------------|--------------------------------|--------------------|-----------|
| | | | | | | Type | Area (ac) |
| Back of House | 7-A | 6.7 | 0.0 | 1.6 | 1.6 | Bioretention | 0.1 |
| Back of House | 7-B | 6.6 | 0.4 | 1.7 | 2.2 | Bioretention | 0.1 |
| Back of House | 7-C | 5.1 | 0.9 | 1.1 | 2.0 | Bioretention | 0.1 |
| Barns | 1-A | 6.8 | 1.0 | 0.7 | 1.6 | Self Retaining | 0.8 |
| Maha Farms Parking Lot | 1-C | 0.8 | 0.0 | 0.5 | 0.5 | Self Retaining | 0.2 |
| Sales Center | 1-B | 2.8 | 0.0 | 1.1 | 1.1 | Bioretention | 0.0 |
| Sales Center | 5-A | 2.9 | 0.7 | 0.2 | 0.9 | Bioretention | 0.0 |
| Maha Winery | 5-B | 2.0 | 0.3 | 0.3 | 0.7 | Self Retaining | 0.3 |
| Maha Farms North Res. | 5-C | 5.5 | 1.5 | 0.1 | 1.6 | Bioretention | 0.1 |
| Maha Farms | 5-D | 37.7 | 2.5 | 5.3 | 7.8 | Bioretention | 0.3 |
| Maha Farms | 5-E | 4.0 | 0.4 | 1.5 | 1.8 | Bioretention | 0.1 |
| Maha Farm South Resort Res | 5-F | 1.4 | 1.0 | 0.0 | 1.0 | Bioretention | 0.0 |
| Maha Farm South Resort Res | 5-G | 3.2 | 1.2 | 0.0 | 1.2 | Self Treatment | 0.6 |
| Maha Farm South Resort Res | 1-D | 2.4 | 1.4 | 0.0 | 1.4 | Self Treatment | 0.7 |
| Estate Winery | 9-A | 4.3 | 1.3 | 0.9 | 2.2 | Bioretention | 0.1 |
| Equestrian Lodge | 7-I | 5.7 | 0.5 | 0.1 | 0.7 | Bioretention | 0.0 |
| Equestrian Lodge | 8-A | 0.3 | 0.3 | 0.0 | 0.3 | Bioretention | 0.0 |
| Equestrian Center | 7-E | 1.7 | 0.6 | 0.5 | 1.1 | Self Retaining | 0.5 |
| Equestrian Center | 7-G | 2.9 | 0.6 | 0.3 | 1.0 | Self Retaining | 0.5 |
| Equestrian Center | 7-H | 1.1 | 0.1 | 0.4 | 0.5 | Self Retaining | 0.3 |
| Equestrian Center | 7-F | 0.8 | 0.8 | 0.0 | 0.8 | Bioretention | 0.0 |
| Equestrian Center | 7-D | 2.0 | 0.0 | 1.0 | 1.0 | Self Retaining | 0.5 |
| Red Hill | 8-B | 12.7 | 4.2 | 1.6 | 5.8 | Bioretention | 0.2 |
| Red Hill | 8-C | 3.3 | 1.6 | 0.0 | 1.6 | Bioretention | 0.1 |
| Red Hill | 8-D | 3.4 | 1.5 | 0.0 | 1.5 | Bioretention | 0.1 |
| Red Hill | 8-E | 7.6 | 2.3 | 0.0 | 2.3 | Bioretention | 0.1 |
| 1st Hole Clubhouse | 9-B | 0.5 | 0.1 | 0.3 | 0.4 | Self Retaining | 0.2 |
| 9th Hole Clubhouse | 9-C | 0.6 | 0.2 | 0.2 | 0.4 | Self Retaining | 0.2 |
| 18th Hole Clubhouse | 9-E | 0.6 | 0.1 | 0.2 | 0.4 | Self Retaining | 0.2 |
| Golf Maintenance Bldg 1 | 9-D | 0.3 | 0.1 | 0.2 | 0.3 | Self Retaining | 0.2 |
| Golf Maintenance Bldg 2 | 9-F | 1.1 | 0.5 | 0.5 | 1.1 | Bioretention | 0.0 |
| Kerry Hill | 9-H | 14.8 | 3.9 | 2.8 | 6.7 | Bioretention | 0.3 |
| Bohn Ridge | 8-F | 21.1 | 4.5 | 5.1 | 9.5 | Bioretention | 0.4 |
| Spa | 8-G | 10.3 | 3.0 | 4.8 | 7.8 | Bioretention | 0.3 |
| ERC/Entourage | 9 -G | 4.4 | 0.6 | 1.3 | 1.9 | Bioretention | 0.1 |
| Wilderness Camp | 12-A | 4.3 | 0.9 | 3.2 | 4.1 | Self Retaining | 2.0 |
| Staff Housing | 13-A | 4.7 | 0.6 | 2.5 | 3.1 | Bioretention | 0.1 |
| Airplane Dock | 14-A | 1.9 | 0.0 | 0.4 | 0.5 | Self Retaining | 0.2 |
| | TOTAL | 198 | 40 | 41 | 80 | | 10 |

- Notes:
1. In accordance with BASMAA, limit ratio of impervious to pervious area to be 2:1 maximum for self-retaining treatment system areas.
 2. In accordance with BASMAA, surface area of bioretention must be a minimum 4% of the tributary impervious area.
 3. Natural drainage pattern for pervious portions of site is best maintained, thus flowing into a specific watershed outlet.

Table 2 - Commercial Area Summary

Appendix A

Commercial Area Drainage Management Areas



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

- NOTES
1. IN ACCORDANCE WITH BASMAA, SURFACE AREAS OF BIORETENTION ARE TO BE A MINIMUM 4% OF THE TRIBUTARY IMPERVIOUS AREA.

2. IN ACCORDANCE WITH BASMAA, LIMIT RATIO OF IMPERVIOUS TO PERVIOUS AREA ARE TO BE 2:1 MAXIMUM.

3. ROADS ARE CONSIDERED SELF-TREATING DUE TO THE MINIMAL AREA OF NEW IMPERVIOUS IN THE POST-DEVELOPMENT CONDITION WITHIN THE OVERALL WATERSHED. ALTERNATIVE TREATMENT METHODS WILL STILL BE IMPLEMENTED AS STATED IN THE STORMWATER MANAGEMENT REPORT.

4. INDIVIDUAL RESIDENTIAL VILLA PARCELS ARE NOT INCLUDED IN THIS ANALYSIS SINCE THEY WILL EACH BE REQUIRED TO PROVIDE FULL TREATMENT AND DETENTION MEASURES IN COMPLIANCE WITH BASMAA REGULATIONS. SEPARATE STORMWATER MANAGEMENT PLANS WILL BE REQUIRED UPON SUBMITTAL OF BUILDING PERMIT FOR EACH PARCEL.

| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 7-A | 6.7 | 1.6 | BIORETENTION | 0.07 |
| 7-B | 6.6 | 2.2 | BIORETENTION | 0.09 |
| 7-C | 5.1 | 2.0 | BIORETENTION | 0.09 |

SCALE: 0 1"

Note: If the graphic scale does not equal 1", this sheet has been modified from its original size.

| NO | DATE | REVISION |
|----|------|----------|
| | | |

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PROJECT NO. 18-016

DATE 07/02/2019

DRAWN PN

DESIGNED MH

CHECKED CA

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

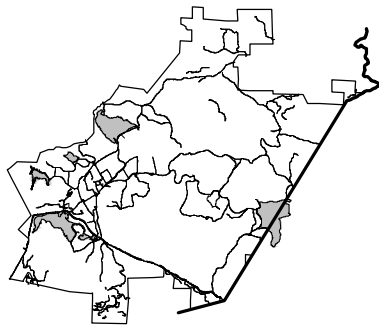
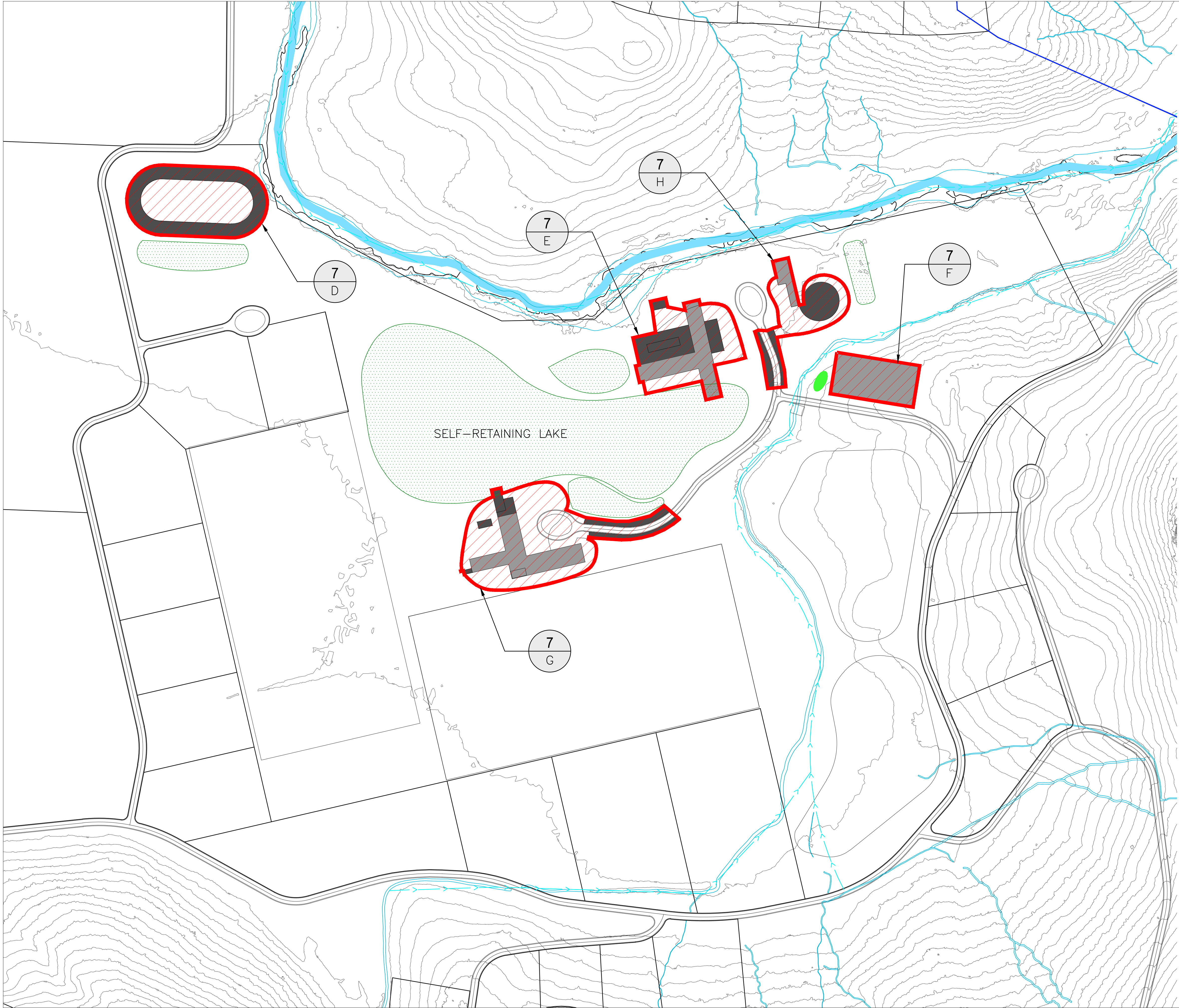


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

BACK OF HOUSE



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

- NOTES
1. IN ACCORDANCE WITH BASMAA, SURFACE AREAS OF BIORETENTION ARE TO BE A MINIMUM 4% OF THE TRIBUTARY IMPERVIOUS AREA.
 2. IN ACCORDANCE WITH BASMAA, LIMIT RATIO OF IMPERVIOUS TO PERVIOUS AREA ARE TO BE 2:1 MAXIMUM.
 3. ROADS ARE CONSIDERED SELF-TREATING DUE TO THE MINIMAL AREA OF NEW IMPERVIOUS IN THE POST-DEVELOPMENT CONDITION WITHIN THE OVERALL WATERSHED. ALTERNATIVE TREATMENT METHODS WILL STILL BE IMPLEMENTED AS STATED IN THE STORMWATER MANAGEMENT REPORT.
 4. INDIVIDUAL RESIDENTIAL VILLA PARCELS ARE NOT INCLUDED IN THIS ANALYSIS SINCE THEY WILL EACH BE REQUIRED TO PROVIDE FULL TREATMENT AND DETENTION MEASURES IN COMPLIANCE WITH BASMAA REGULATIONS. SEPARATE STORMWATER MANAGEMENT PLANS WILL BE REQUIRED UPON SUBMITTAL OF BUILDING PERMIT FOR EACH PARCEL.

| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 7-D | 2.0 | 1.0 | SELF-RETAINING | 0.62 |
| 7-E | 1.7 | 1.1 | SELF-RETAINING | 0.59 |
| 7-F | 0.8 | 0.8 | BIORETENTION | 0.04 |
| 7-G | 2.9 | 1.0 | SELF-RETAINING | 0.48 |
| 7-H | 1.1 | 0.5 | SELF-RETAINING | 0.27 |

SCALE: 0 1"

Note: If the graphic scale does not equal 1", this sheet has been modified from its original size.

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PROJECT NO. 18-016

DATE 07/02/2019

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DESIGNED MH

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MAHA GUENOC
LAKE COUNTY
CALIFORNIA

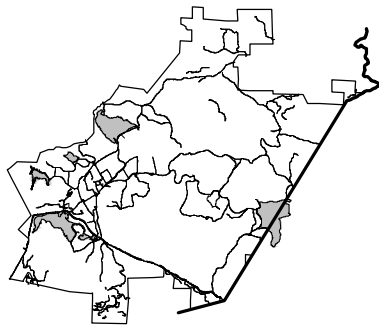
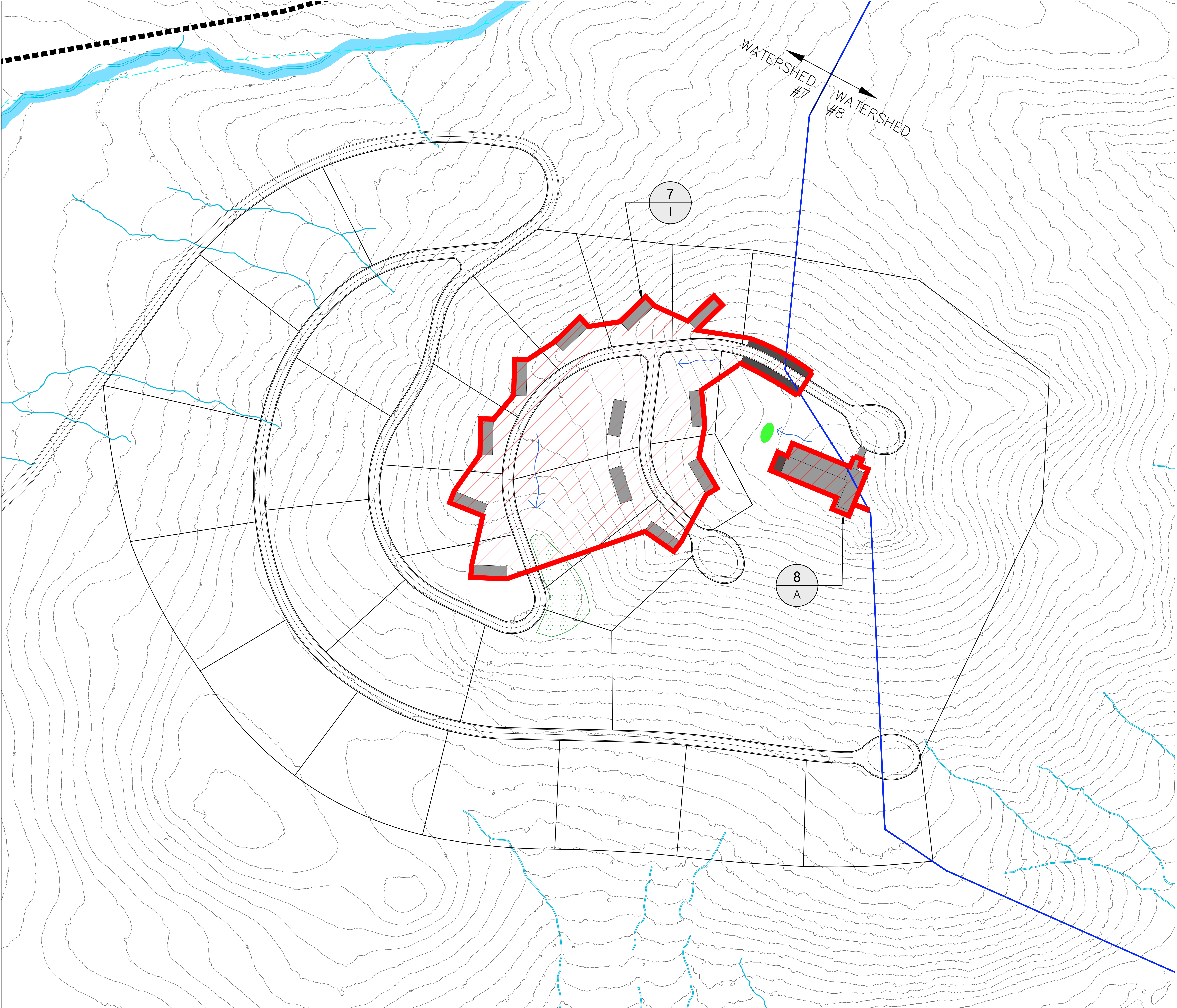


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

EQUESTRIAN CENTER





LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

- NOTES
1. IN ACCORDANCE WITH BASMAA, SURFACE AREAS OF BIORETENTION ARE TO BE A MINIMUM 4% OF THE TRIBUTARY IMPERVIOUS AREA.
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 7-I | 5.7 | 0.7 | BIORETENTION | 0.03 |
| 8-A | 0.3 | 0.3 | BIORETENTION | 0.02 |

SCALE: 0 1"

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LAKE COUNTY
CALIFORNIA

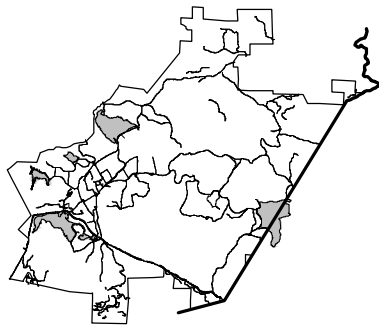
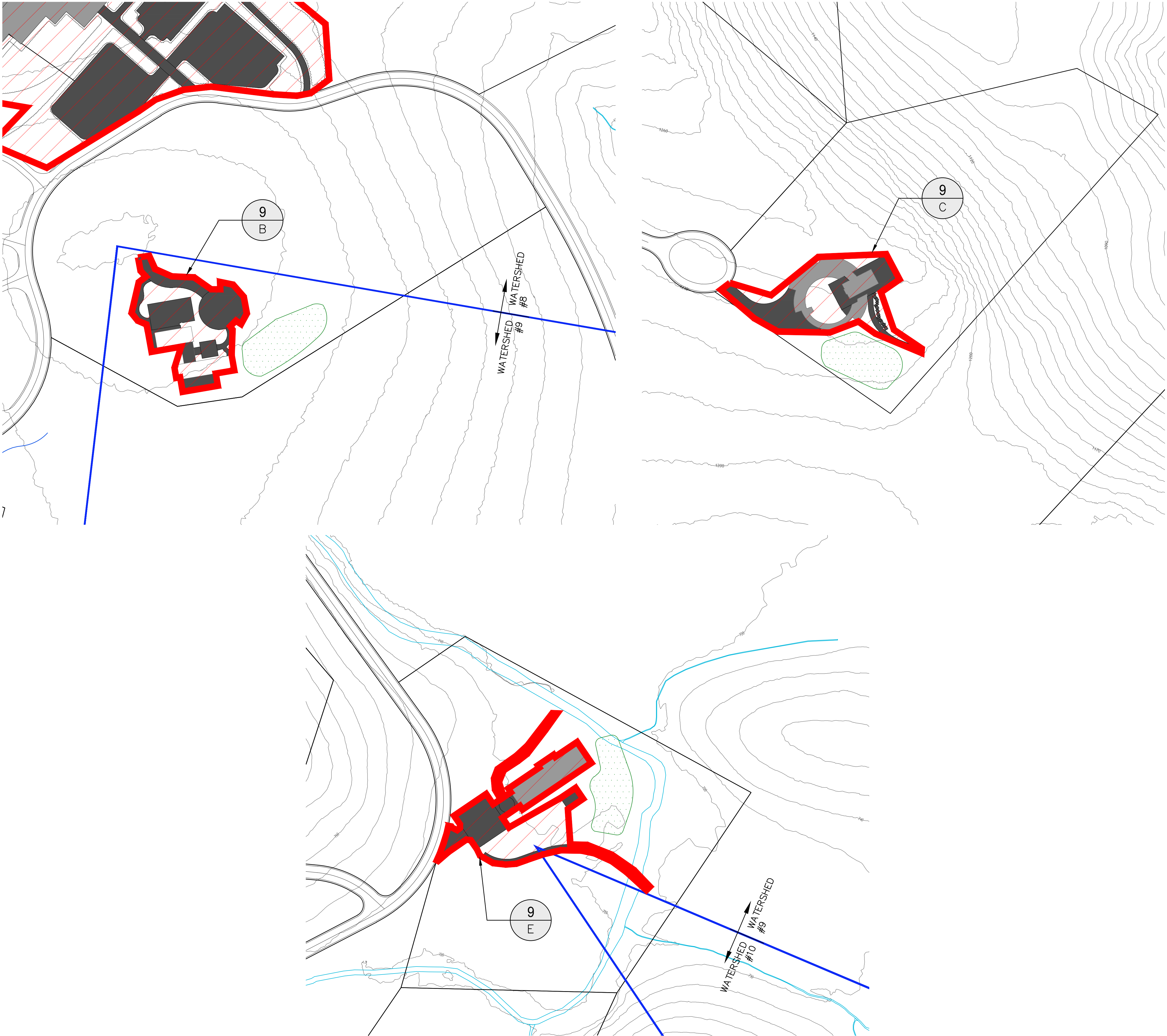


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

EQUESTRIAN LODGE





LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 9-B | 0.5 | 0.4 | SELF-RETAINING | 0.20 |
| 9-C | 0.6 | 0.4 | SELF-RETAINING | 0.19 |
| 9-E | 0.6 | 0.4 | SELF-RETAINING | 0.19 |

SCALE: 0 1"

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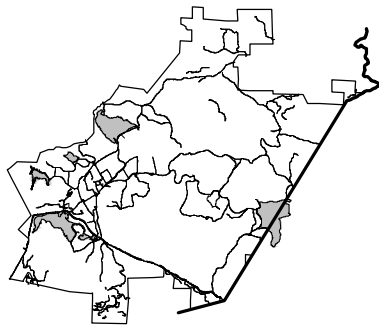
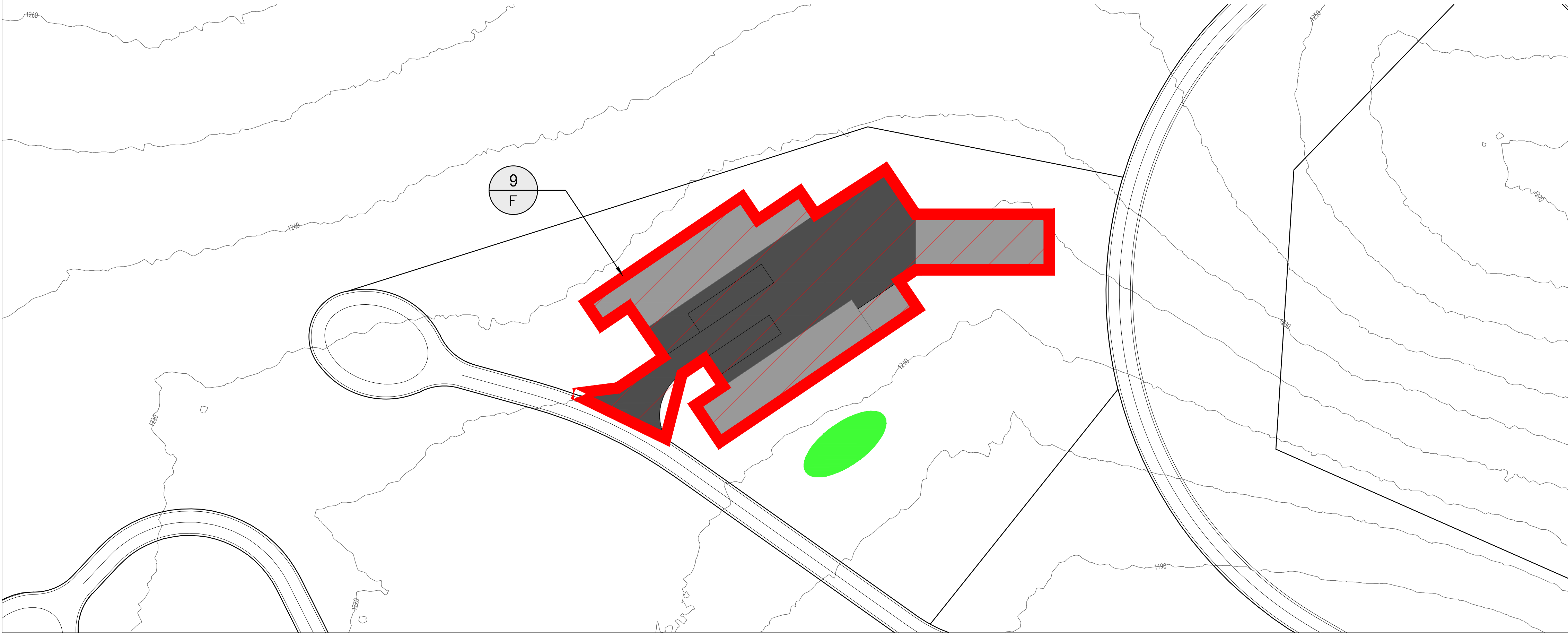
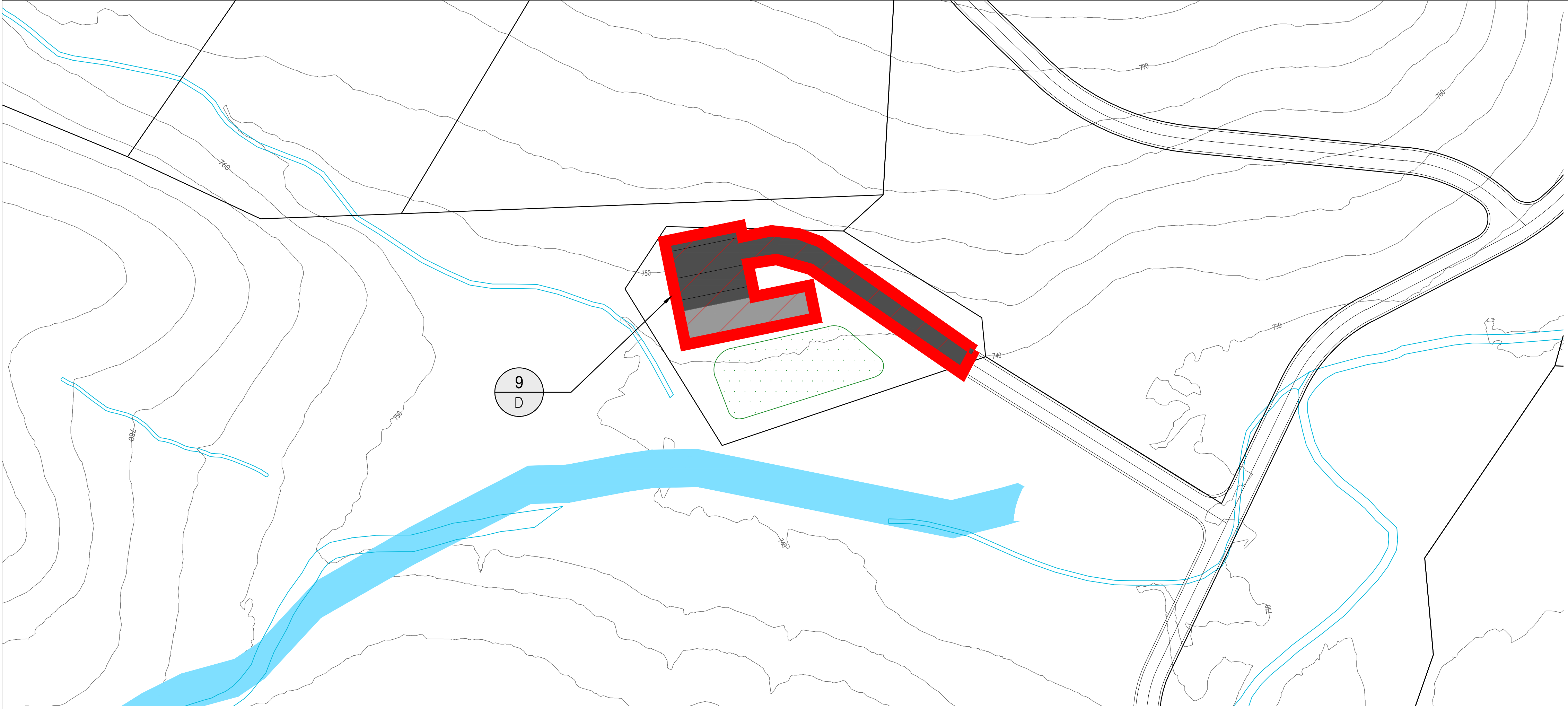


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

GOLF CLUBHOUSES





LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

NOTES

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 9-D | 0.3 | 0.3 | SELF-RETAINING | 0.18 |
| 9-F | 1.1 | 1.1 | BIORETENTION | 0.06 |

SCALE: 0 1"

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LAKE COUNTY
CALIFORNIA

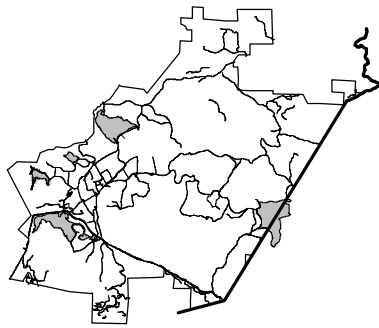
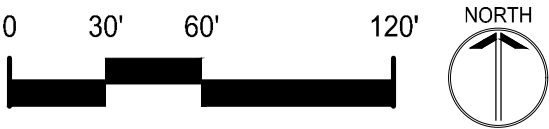
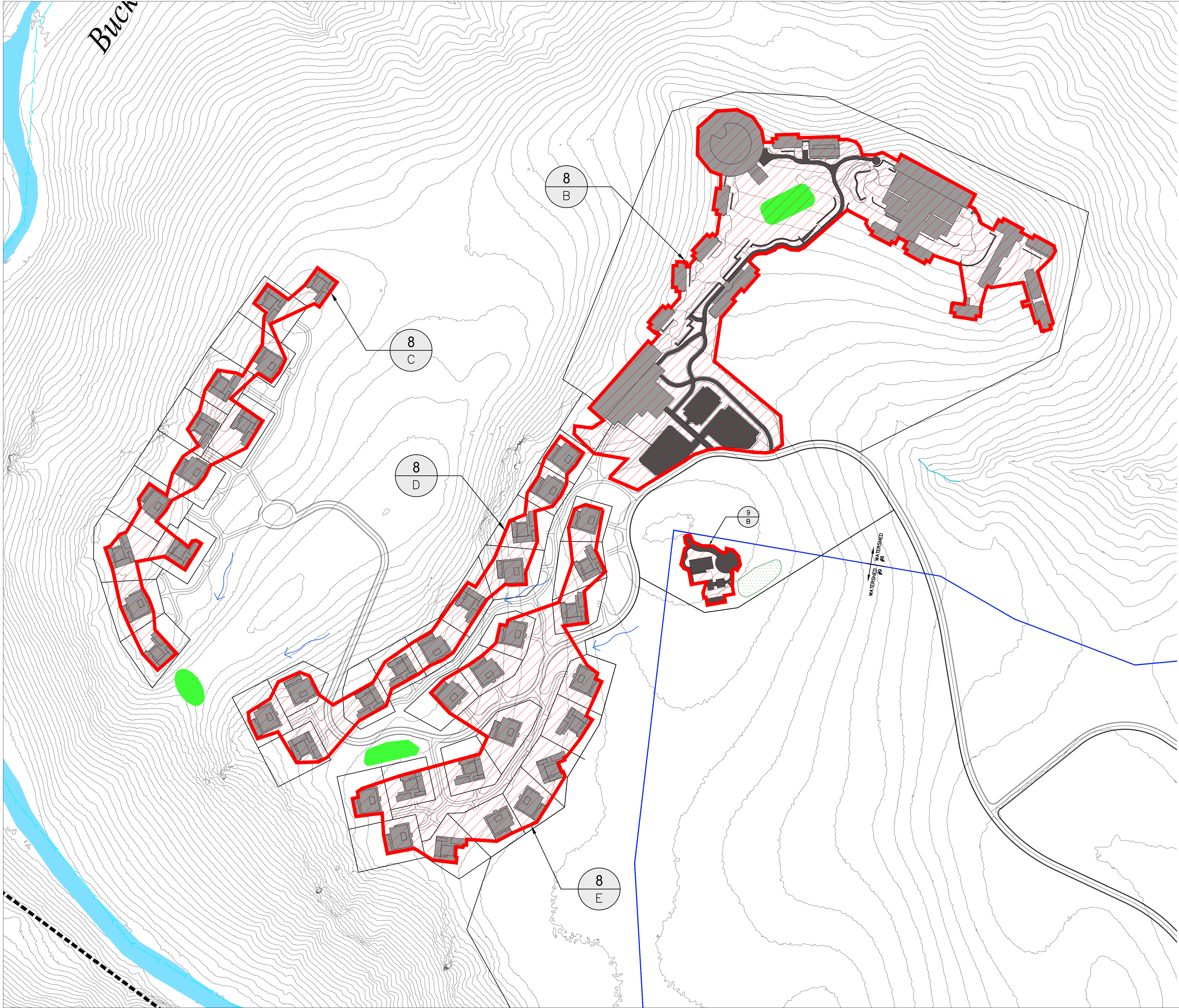


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

GOLF MAINTENANCE
BUILDINGS





| | |
|------------------------|--|
| LEGEND | |
| DMA BOUNDARY | |
| WATERSHED BOUNDARY | |
| DMA COMMERCIAL SITE | |
| FLOW DIRECTION | |
| IMPERVIOUS - ROOF | |
| IMPERVIOUS - HARDSCAPE | |
| BIORETENTION | |
| SELF-RETAINING AREA | |

- NOTES**
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 8-B | 12.7 | 5.8 | BIORETENTION | 0.29 |
| 8-C | 3.3 | 0.6 | BIORETENTION | 0.17 |
| 8-D | 3.4 | 1.5 | BIORETENTION | 0.17 |
| 8-E | 7.6 | 2.3 | BIORETENTION | 0.20 |

| SCALE: 0 1" | | |
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| CHECKED | CA |

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LAKE COUNTY
CALIFORNIA

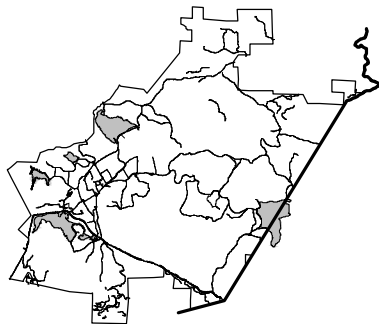
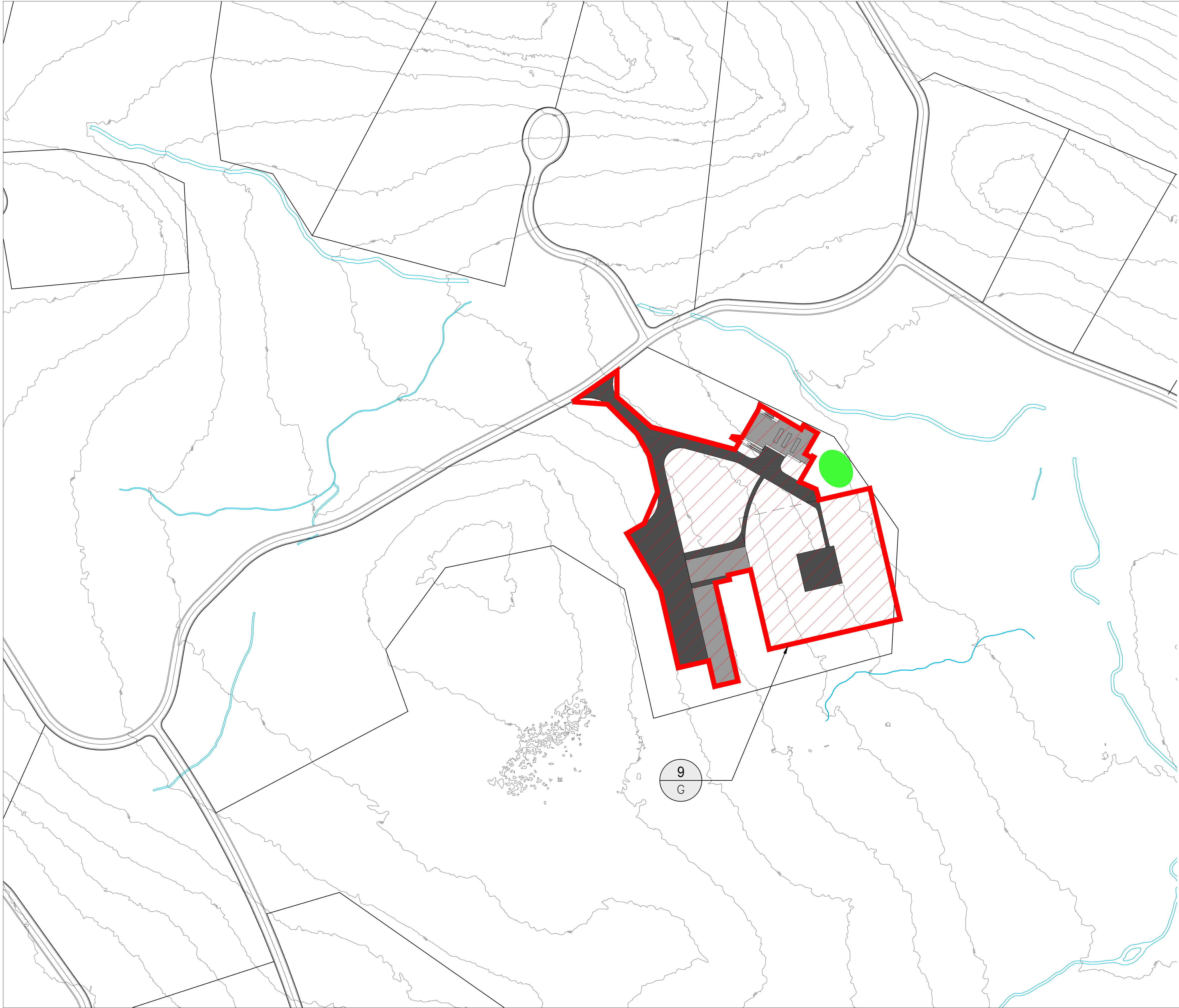


EXHIBIT A
STORMWATER
MANAGEMENT PLAN



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

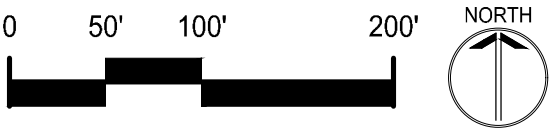
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 9-G | 4.4 | 1.9 | BIORETENTION | 0.1 |



SCALE: 0 1"

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LAKE COUNTY
CALIFORNIA

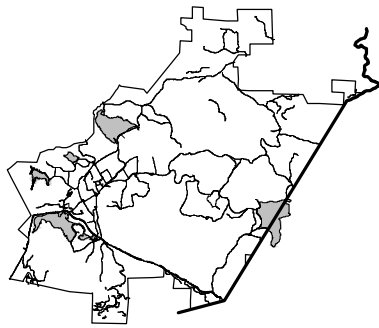
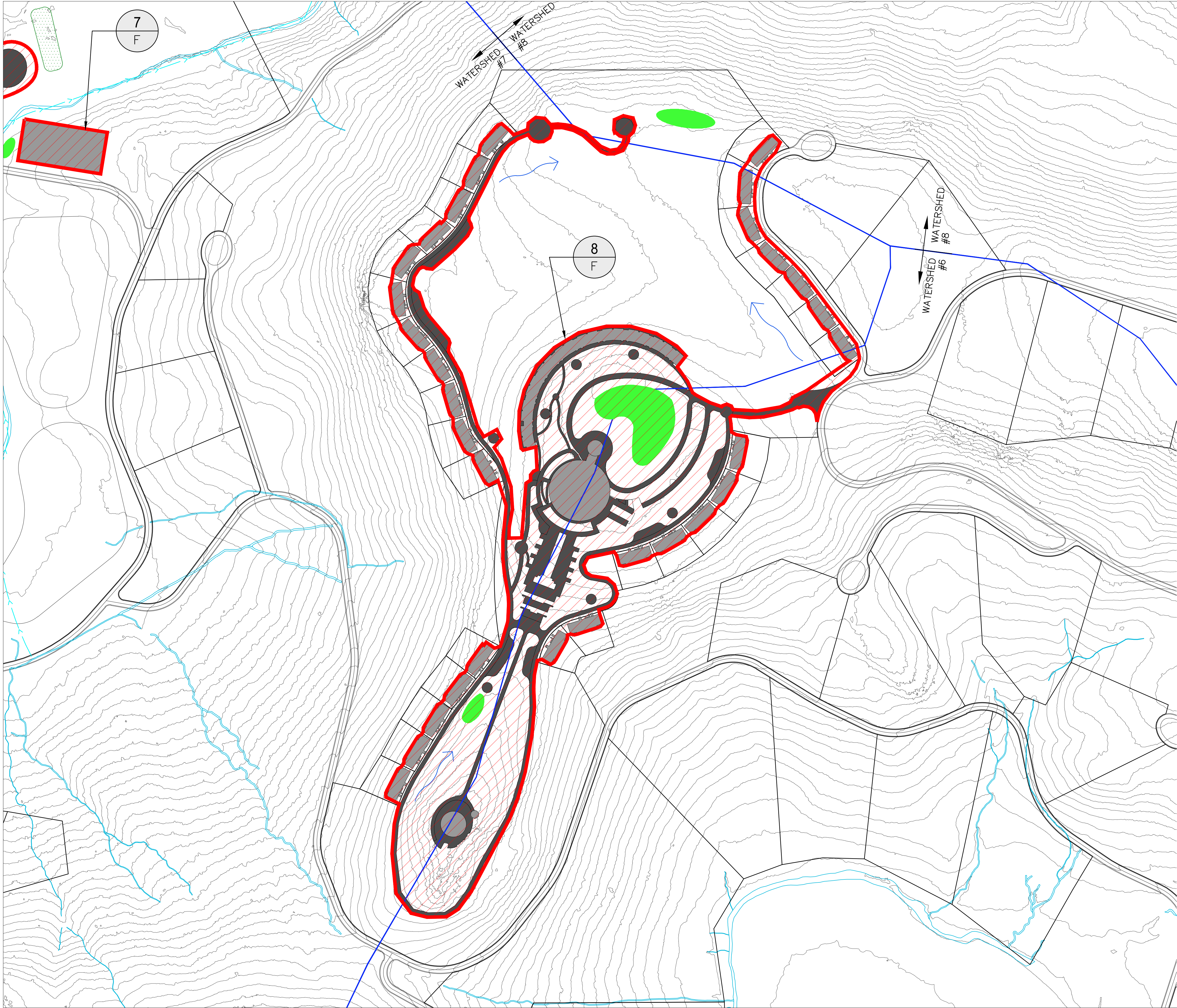


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

ERC/ENTOURAGE



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| LEGEND | |
| DMA BOUNDARY | <div></div> |
| WATERSHED BOUNDARY | <div></div> |
| DMA COMMERCIAL SITE | <div></div> |
| FLOW DIRECTION | <div></div> |
| IMPERVIOUS - ROOF | <div></div> |
| IMPERVIOUS - HARDSCAPE | <div></div> |
| BIORETENTION | <div></div> |
| SELF-RETAINING AREA | <div></div> |

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 8-F | 21.1 | 9.5 | BIORETENTION | 1.12 |

| SCALE: 0 1" | | |
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| CHECKED | CA |

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

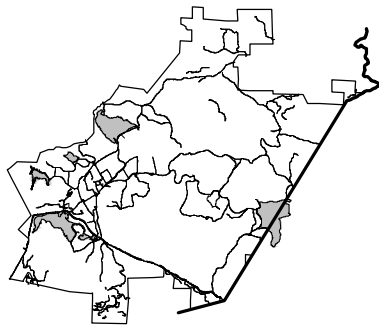
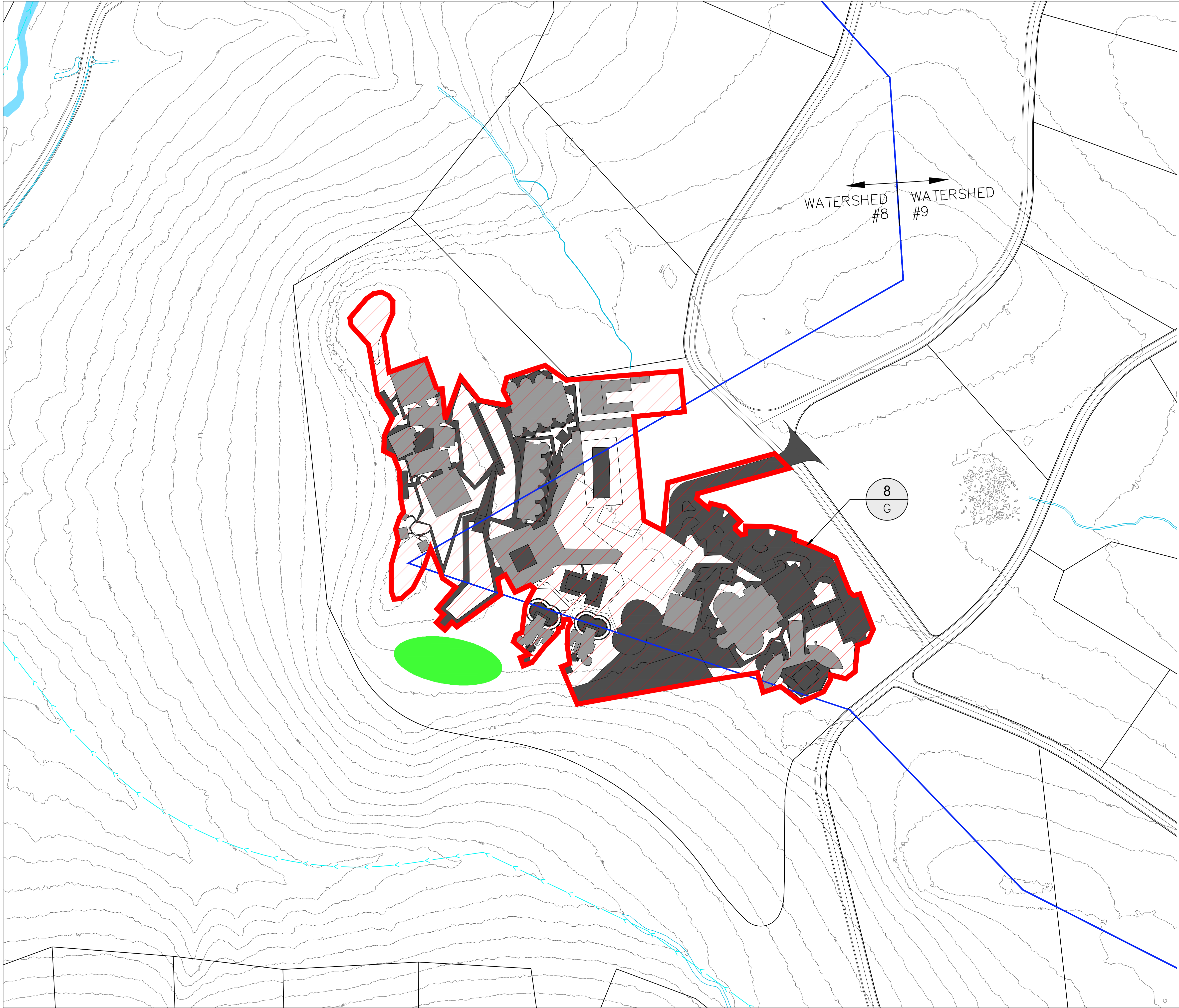


EXHIBIT A
**STORMWATER
MANAGEMENT PLAN**

BOHN RIDGE



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

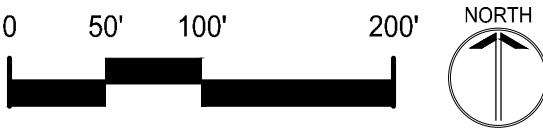
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 8-G | 10.3 | 7.8 | BIORETENTION | 0.40 |



SCALE: 0 1"

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MAHA GUENOC
LAKE COUNTY
CALIFORNIA

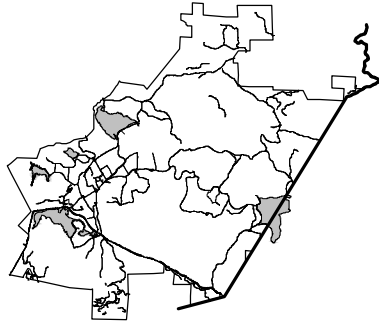
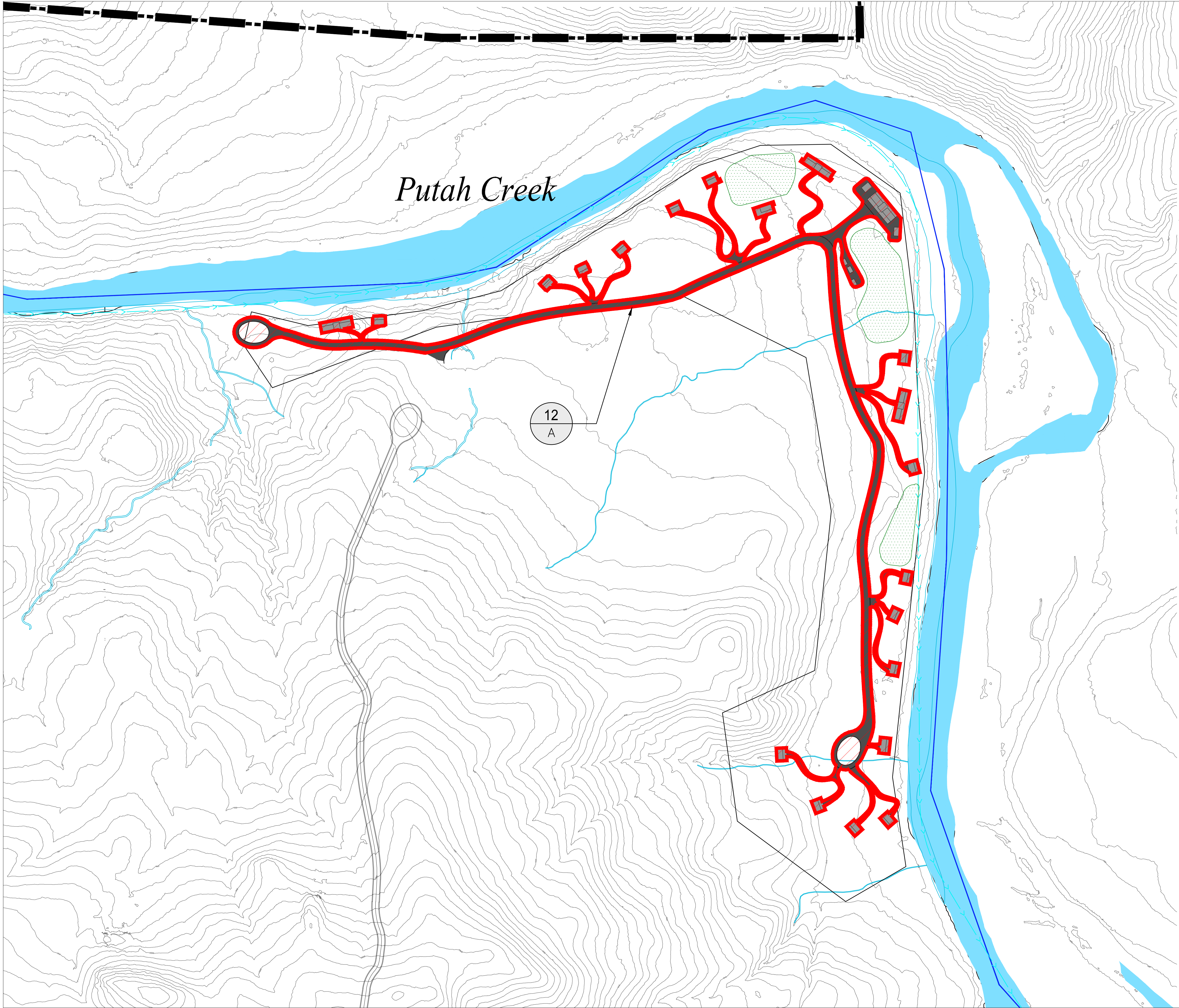


EXHIBIT A
STORMWATER
MANAGEMENT PLAN



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

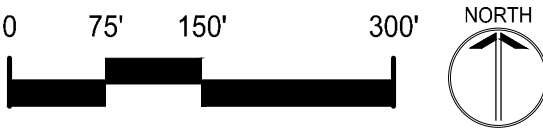
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|------|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 12-A | 4.3 | 4.1 | SELF-RETAINING | 2.10 |



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LAKE COUNTY
CALIFORNIA

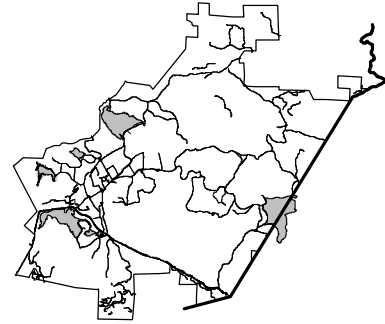
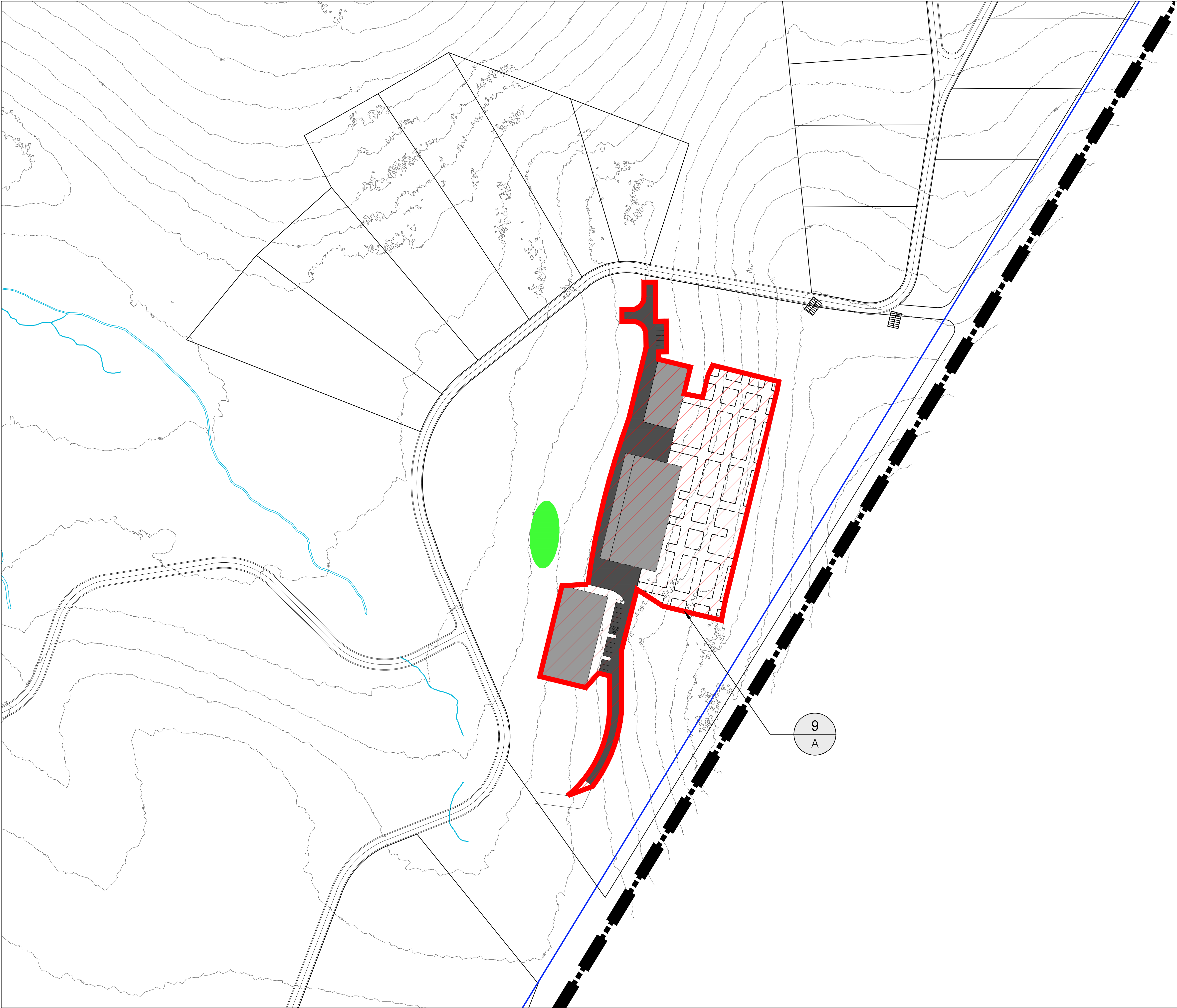


EXHIBIT A
STORMWATER
MANAGEMENT PLAN

WILDERNESS CAMP



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

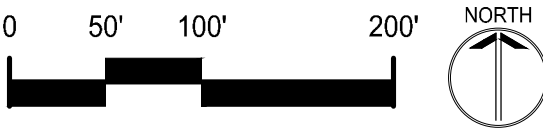
BIORETENTION

SELF-RETAINING AREA

NOTES

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 9-A | 4.3 | 2.2 | BIORETENTION | 0.15 |



SCALE: 0 1"

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| PROJECT NO. | 18-016 |
| DATE | 07/02/2019 |
| DRAWN | PN |
| DESIGNED | MH |
| CHECKED | CA |

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

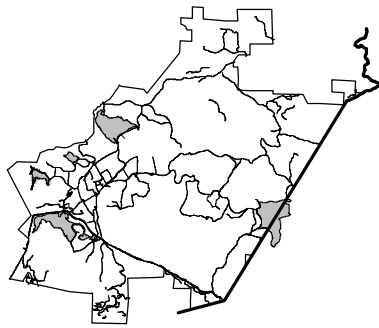
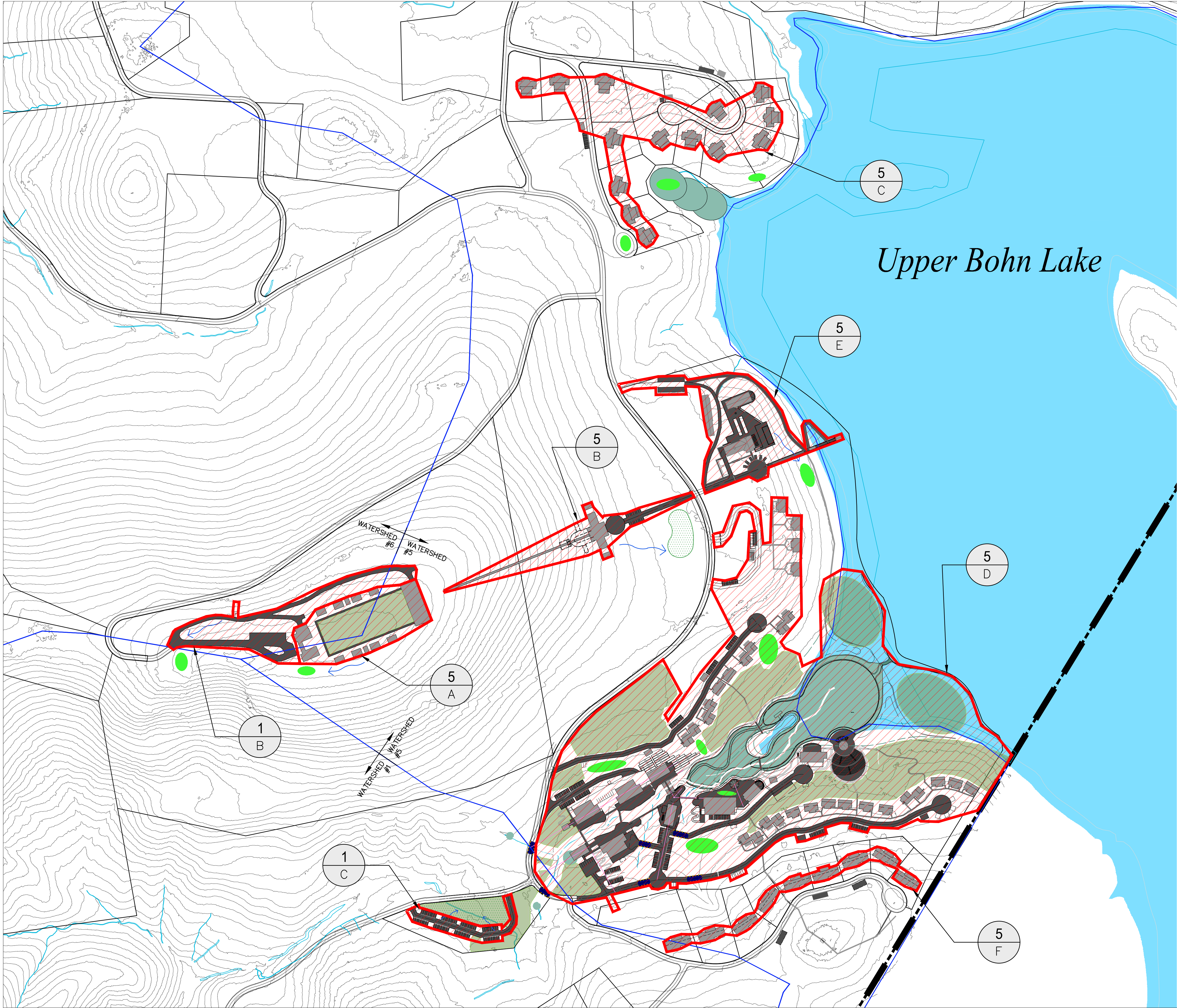


EXHIBIT A
STORMWATER
MANAGEMENT PLAN



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

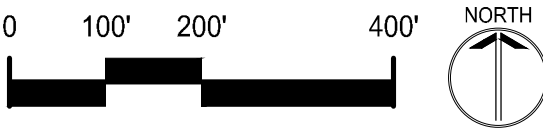
- NOTES
1. IN ACCORDANCE WITH BASMAA, SURFACE AREAS OF BIORETENTION ARE TO BE A MINIMUM 4% OF THE TRIBUTARY IMPERVIOUS AREA.

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 1-B | 2.8 | 1.1 | BIORETENTION | 0.07 |
| 1-C | 0.8 | 0.5 | SELF-RETAINING | 0.68 |
| 5-A | 2.9 | 0.9 | BIORETENTION | 0.05 |
| 5-B | 2.0 | 0.7 | SELF-RETAINING | 0.39 |
| 5-C | 5.5 | 1.6 | BIORETENTION | 0.09 |
| 5-D | 37.7 | 7.8 | BIORETENTION | 0.52 |
| 5-E | 4.0 | 1.8 | BIORETENTION | 0.09 |
| 5-F | 1.4 | 1.0 | BIORETENTION | 0.15 |



SCALE: 0 1"

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PROJECT NO. 18-016

DATE 07/02/2019

DRAWN PN

DESIGNED MH

CHECKED CA

MAHA GUENOC

LAKE COUNTY

CALIFORNIA

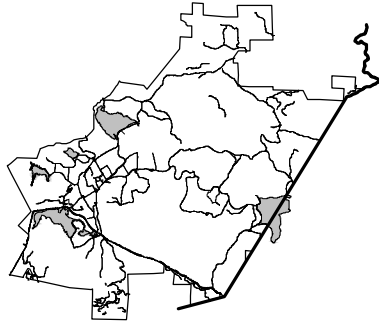


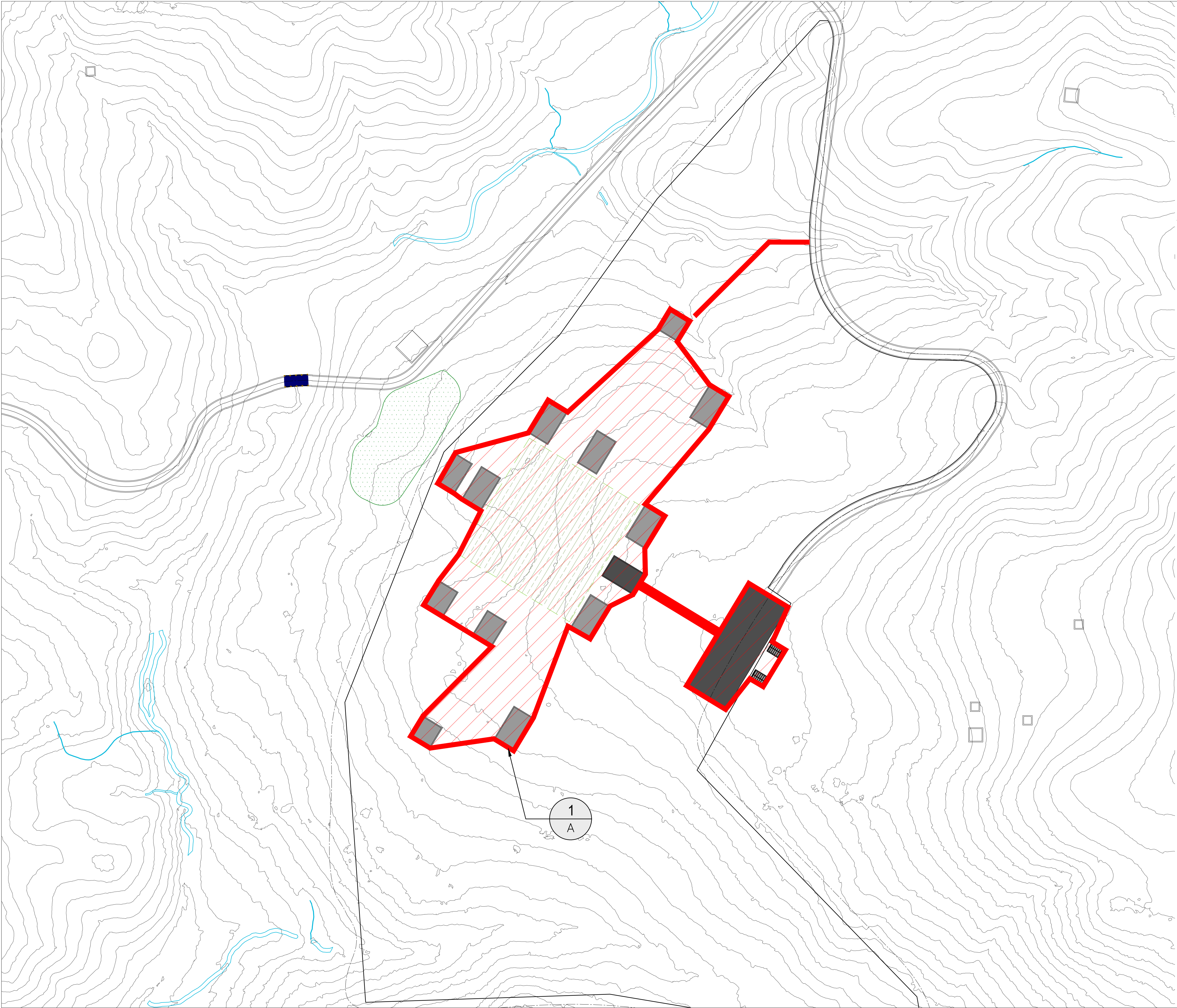
EXHIBIT A

STORMWATER

MANAGEMENT PLAN

MAHA FARMS

SALES CENTER



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

NOTES

1. IN ACCORDANCE WITH BASMAA, SURFACE AREAS OF BIORETENTION ARE TO BE A MINIMUM 4% OF THE TRIBUTARY IMPERVIOUS AREA.
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-------|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 1 – A | 6.8 | 1.6 | BIORETENTION | 0.83 |

SCALE: 0 1"

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PROJECT NO. 18-016

DATE 07/02/2019

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DESIGNED MH

CHECKED CA

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

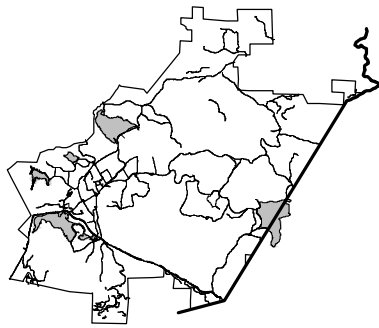
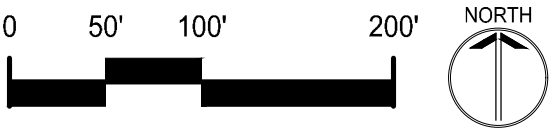
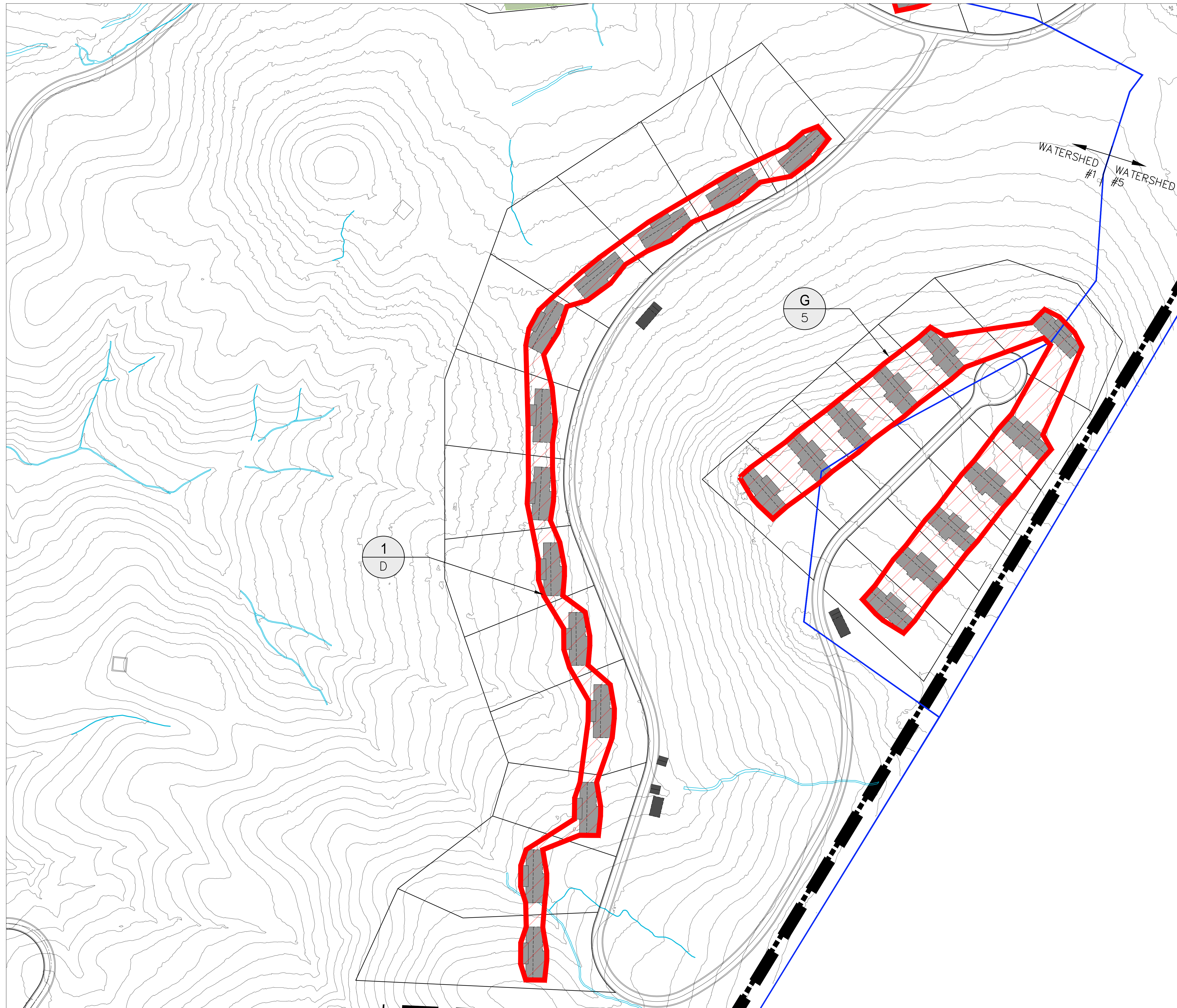










EXHIBIT A
STORMWATER
MANAGEMENT PLAN

MAHA FARMS BARNs





LEGEND

| | |
|------------------------|---|
| DMA BOUNDARY |  |
| WATERSHED BOUNDARY |  |
| DMA COMMERCIAL SITE |  |
| FLOW DIRECTION |  |
| IMPERVIOUS - ROOF |  |
| IMPERVIOUS - HARDSCAPE |  |
| BIORETENTION |  |
| SELF-RETAINING AREA |  |

NOTES

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|-----|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 1-D | 2.4 | 1.4 | SELF-TREATMENT | - |
| 5-G | 3.2 | 1.2 | SELF-TREATMENT | - |

SCALE:

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| DESIGNED | MH |
| CHECKED | CA |

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

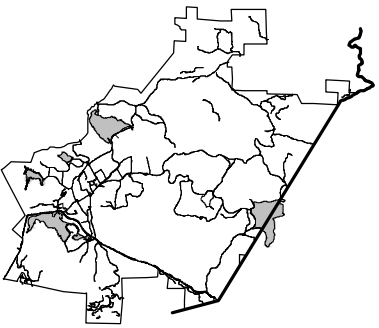
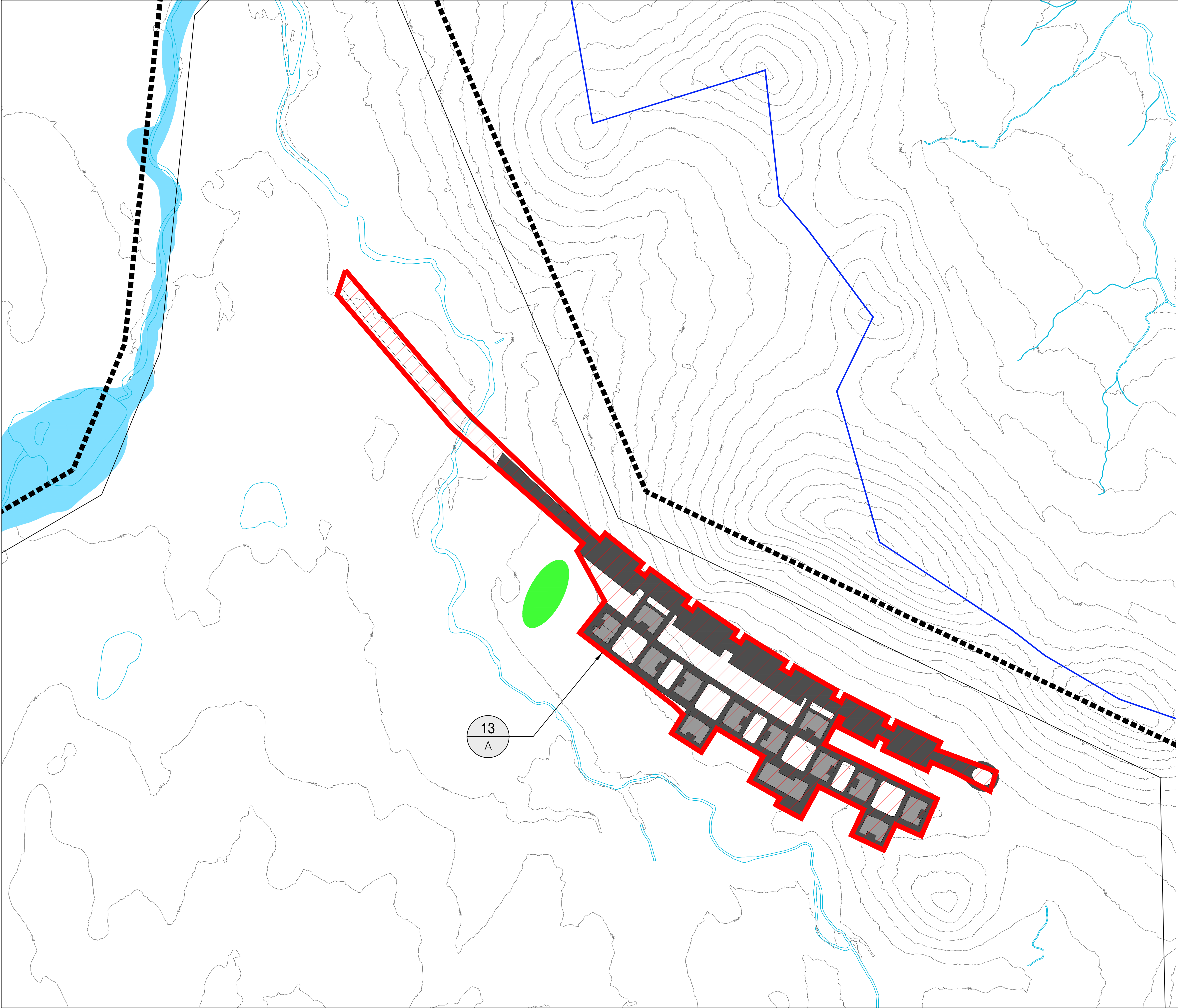


EXHIBIT A STORMWATER MANAGEMENT PLAN

MAHA FARMS SOUTH



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

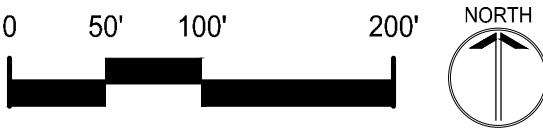
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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|------|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 13-A | 4.7 | 3.1 | BIORETENTION | 0.20 |



SCALE: 0 1"

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| CHECKED | CA |

MAHA GUENOC
LAKE COUNTY
CALIFORNIA

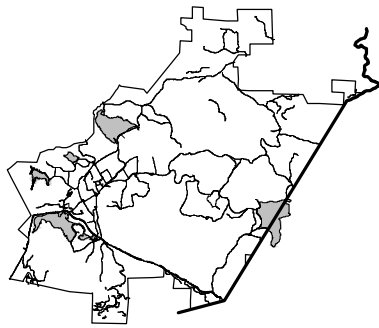
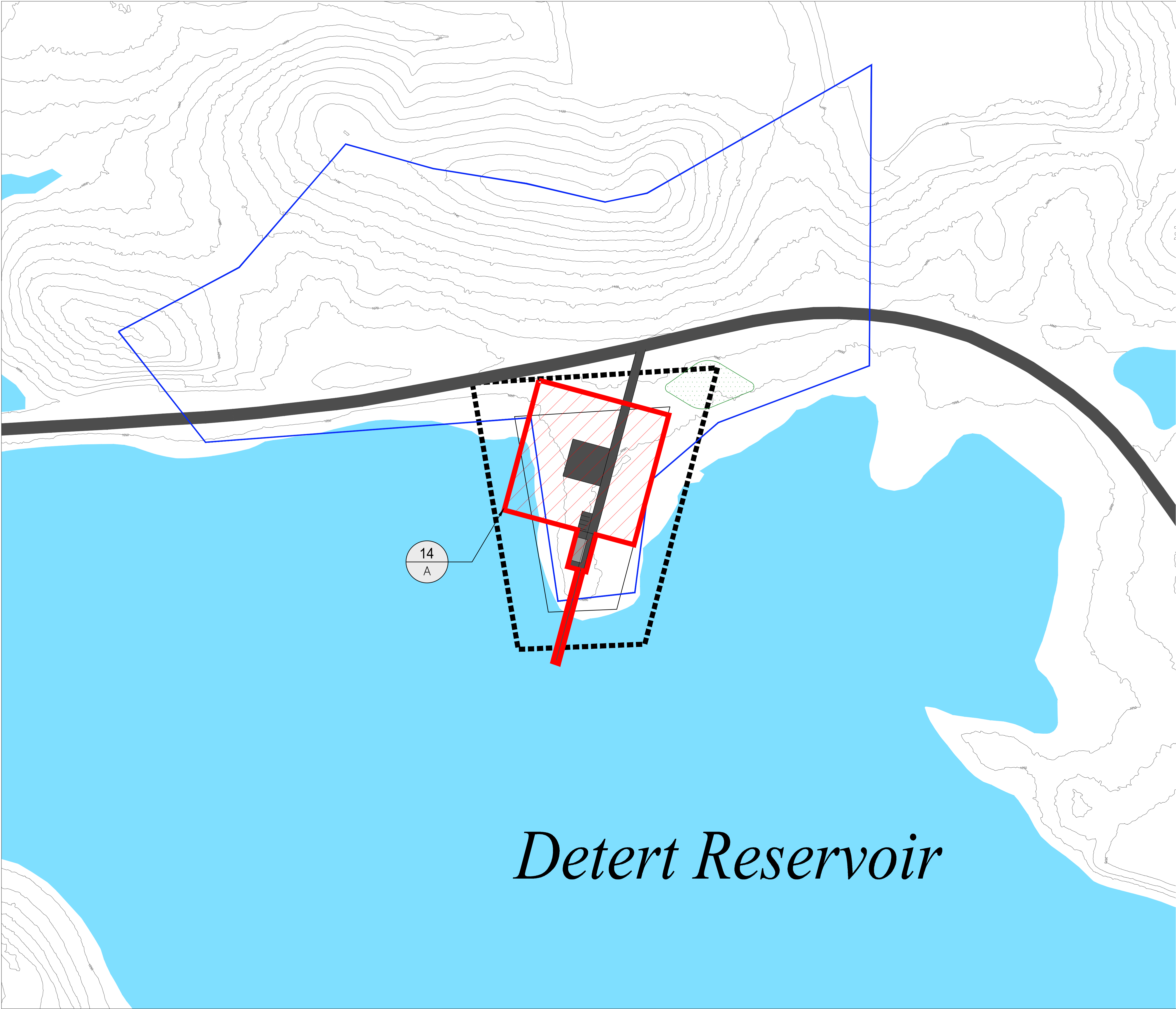


EXHIBIT A

STORMWATER
MANAGEMENT PLAN

STAFF HOUSING



LEGEND

DMA BOUNDARY

WATERSHED BOUNDARY

DMA COMMERCIAL SITE

FLOW DIRECTION

IMPERVIOUS - ROOF

IMPERVIOUS - HARDSCAPE

BIORETENTION

SELF-RETAINING AREA

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| DMA | | NEW IMPERVIOUS AREA (AC) | TREATMENT PROVIDED | |
|------|-----------|--------------------------|--------------------|-----------|
| # | AREA (AC) | | TYPE | AREA (AC) |
| 14-A | 1.9 | 0.5 | SELF-RETAINING | 0.26 |

SCALE: 0 1"

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MAHA GUENOC

LAKE COUNTY

CALIFORNIA

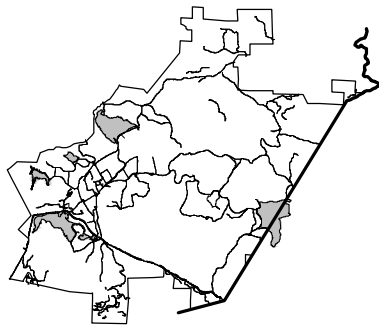


EXHIBIT A

STORMWATER

MANAGEMENT PLAN

FLOAT PLANE DOCK