

**MEMORANDUM**

Date: 8/23/15  
To: Paul Sorensen and Dennis Meyer, The Portico Group  
From: Nicole Stern, Biohabitats, Inc.  
RE: **Hakone Estate & Gardens  
Stormwater Management**

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**A. EXISTING CONDITIONS**

Hakone Estate & Gardens, a historic Japanese garden and National Trust for Historic Preservation site, is located in the foothills of the Santa Cruz Mountains within the City of Saratoga. The property is owned by the City of Saratoga and leased to the Hakone Foundation.

Biohabitats' landscape architect, Nicole Stern, visited the site and met with Jacob Kellner, Head of the Grounds Maintenance, on July 5<sup>th</sup>, 2015. The following existing condition observations related to stormwater management are based on this site visit.

*Upper Site*

The Hakone Estate & Gardens property sits on a steep hillside slope. The Hakone site receives stormwater runoff from the mostly forested slope uphill of the gardens as well as from neighboring residential properties. (Biohabitats has not analyzed the extent of the sub-watershed or the runoff flowing onto the site but could perform this analysis in the future given more extensive topographic map data from the City of Saratoga). The upper elevations of the property are predominantly permeable gardens with gravel or stabilized pathways. While much of the stormwater runoff presumably infiltrates into the permeable garden areas, there is no formal stormwater management system for the upper gardens and some stormwater runoff enters the koi pond. According to Jacob Kellner, Head of the Grounds Maintenance, while storm events are infrequent during the current drought, when it does rain, stormwater from uphill flows through the gardens, cutting gullies into pathways.

*Lower Site*

Stormwater which doesn't infiltrate in the upper gardens flows to the parking lots and entry area. There are catch basin storm drains near the entry, restrooms, and at the low point where the parking lot meets the entry road in front of the gift shop. One gated, residential road accessed through the main parking lot drains runoff from hardscape of multiple

residences into the Hakone parking lot. Jacob Kellner relays that the combined runoff from the upper site, entry, parking lot, and neighboring residential property areas clog and flood the main catch basin drain in front of the gift shop. Surface stormwater runoff leaving the parking lot which is not drained through the catch basin system is conveyed via curb and gutter down the entry road. The City of Saratoga installed a series of newer curb cuts and catch basins along the upper exit road (the entry/exit road splits into two, one-way lanes). The catch basin system (as well as at least one other exposed culvert from residential areas and the direct road drainage) drains to a vegetated basin between the entry and exit roads. Jacob Kellner observed that the retention capacity of this basin is minimal with most of the stormwater quickly overflowing through a culvert under the entry road. (Further analysis is needed to determine the functionality of this basin as well as potential retrofit opportunities to improve this function). This culvert drains to an eroding gully on a steep slope, into another culvert flowing under Highway 9/Big Basin Way and into Saratoga Creek.

#### *Larger Watershed Context*

The Saratoga Creek watershed is part of the San Tomas Aquino watershed, within the Santa Clara Basin sub watershed to the larger San Francisco Bay Watershed.

## **B. MASTER PLAN**

The Portico Group is currently working with the Hakone Foundation to develop a new master plan for the estate and gardens. The plan includes renovation of existing structures and addition of new structures and buildings to improve the function, event capacity, maintenance facilities, and visitor experience on the site. Some issues to be resolved through the master plan include clarifying the arrival experience, ADA accessibility, and stormwater management on the site. Most of the new structures and buildings are planned to replace the inner parking lot and will therefore replace existing impervious cover. Some new structures may replace pervious cover while some impervious cover may be replaced with new permeable garden area. The existing main parking lot may also be regraded and resurfaced to reduce steep slopes and improve ADA access.

## **C. STORMWATER REGULATION BACKGROUND**

Properties within the City of Saratoga and the County of Santa Clara, must comply with all relevant stormwater permitting requirements (see Appendix A for an expanded explanation of these regulations). The Hakone Estate & Gardens property is owned by the City of Saratoga (leased to the Hakone Foundation) and also a National Trust for Historic Preservation site. Therefore, the site may or may not be subjected to the same stormwater regulations as other sites would be. In order to determine this, more specific discussions with the City and County are needed which are beyond the scope of Biohabitats' preliminary analysis.

The three regulatory stormwater permits and their stormwater management requirements which could apply to the site, based on the County of Santa Clara Department of Planning and Development Clean Water Questionnaire, include:

1. **State Construction General Permit** - applies if disturbed area is  $\geq 1$  acre
2. **Municipal Regional Stormwater Permit (MRP) Provision C.3** – applies if project adds or replaces more than 10,000 sq. ft. of impervious cover
3. **Hydromodification Management (HM)** – applies if project adds or replaces  $\geq 1$  acre of impervious cover AND has a net total increase of impervious cover.

#### **D. DESIGN SCENARIOS & RECOMMENDATIONS**

Based on Biohabitats' initial analysis and regardless of applicable regulations, the existing stormwater management for the Hakone Estate & Gardens property appears inadequate – anecdotally, stormwater flow through pathways and into the koi pond in the upper portion of the site create maintenance issues; accumulated flows on the lower end of the property clog and flood catch basins; and runoff quickly overflows and drains through the vegetated collection basin between the entry driveways. Further analysis beyond this scope would be required to determine actual stormwater runoff quantity and quality. However, based on preliminary observation of the outfall for the property, the site is likely contributing to erosion and increased suspended solids in Saratoga Creek. Typical parking lot pollutants such as oil and metals as well as any fertilizers applied to the gardens may also be flowing from the site into Saratoga Creek. Biohabitats recommends that Hakone address these issues holistically for the master plan area as well as the full property through a variety of practices to harvest, slow, filter, and infiltrate stormwater on the site.

##### *Scenarios*

The Portico Group has developed two potential Master Plan scenarios:

1. The Ramp Concept without the parking lot improvement
2. The Ramp Concept with the parking lot improvement

##### *Recommendations for Scenario 1: Ramp Concept without parking lot improvement*

Based on Portico's preliminary calculations, the Ramp Concept version of the Master Plan concept design would add/replace approximately **15,000** sq. ft. of impervious cover.

Since the Limit of Disturbance (LOD) is greater than 1 acre, the State Construction General Permit is required. The new and replaced impervious cover is over 10,000 sq. ft. Therefore, the Municipal Regional Stormwater Permit (MRP) Provision C.3 applies. The percent replacement of impervious cover within the LOD is greater than 50%. Hence, the MRP stormwater management measures (source control, site design, and treatment) will be required for all area within the LOD (not just for the new/replaced impervious area). The total area of new and replaced impervious cover for this scenario greater than 1 acre but the total post-project impervious cover is less than the existing impervious cover area.

Therefore, the Hydromodification Management (HM) regulations do not apply. See the table below for estimated areas for Scenario 1:

<i>a. Total Site Area: 18 acres</i>	<b>b. Total Site Area Disturbed: 1.4 acres</b> (including clearing, grading, or excavating)			
	Existing Area (sq. ft)	Proposed Area (sq. ft)		Total Post-Project Area (sq. ft)
		Replaced	New	
<b>Impervious Area</b>				
<i>Roof</i>	2436	0	1173	3609
<i>Parking</i>	50346	0	0	34009
<i>Sidewalks and Streets</i>	6664	3303	10555	15769
<b>c. Total Impervious Area</b>	59446	3303	11728	53387
<b>d. Total new and replaced impervious area</b>		15031		
<b>Pervious Area</b>				
<i>Landscaping</i>	44595	20726	7544	54039
<i>Pervious Paving</i>	0	0	0	0
<i>Other (e.g. Green Roof)</i>	0	0	0	0
<b>e. Total Pervious Area</b>	44595			54039
<b>f. Percent Replacement of Impervious Area in Redevelopment Projects</b> (Replaced Total Impervious Area / Existing Total Impervious Area) x 100% = 63.37%				

The State Construction General Permit will require development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). With some overlap in measures, the MRP will require source control, site design, and treatment. To responsibly manage stormwater on the Hakone Estate & Gardens Master Plan improvements site, Biohabitats recommends the following strategies:

1. While regulations presumably only require managing stormwater from within the LOD area, Biohabitats recommends accounting for stormwater flowing through the site as well to reduce maintenance on the site and to responsibly protect the larger Saratoga Creek and San Francisco Bay Watersheds.
2. In accordance with a SWPPP, Biohabitats recommends erosion and sediment control and monitoring during and after construction.
3. Biohabitats recommends implementing as many of the site design measures recommended by the County as possible (see Appendix A). Some likely measures from this list which could apply to the Hakone project include:
  - a. Minimize land disturbed
  - b. Minimize impervious surfaces
  - c. Minimum-impact parking lot design

- d. Cluster structures/pavement
  - e. Disconnected downspouts
  - f. Pervious pavement
  - g. Green roof
  - h. Directing runoff from impervious cover to pervious (planting areas or other permeable surfaces)
    - Microdetention in landscape
    - Other self-treating and/or self-retaining area
  - i. Rainwater harvesting and use
4. Biohabitats recommends implementing as many of the source control measures recommended by the County as possible (see Appendix A). Some likely measures from this list which could apply to the Hakone project include:
- a. Alternative (non-toxic/leaching) building materials
  - b. Wash areas, dumpsters, material storage and other pollutant contributing maintenance areas drain to sanitary sewer and are covered
  - c. Proper maintenance (pavement sweeping, catch basin cleaning, etc.)
  - d. Beneficial landscaping – minimize irrigation, runoff, pesticides & fertilizers; use of landscape area for treatment and infiltration
5. Biohabitats recommends Treatment Systems in accordance with the County's requirements. Further analysis is needed to select and determine sizing for stormwater LID and Biotreatment practices. However, Biohabitats initially recommends the following integrated system of practices (pursued in this order):
- a. Rainwater/Stormwater Harvesting and Reuse.** Harvest rainwater from structures in above or below ground rainwater cisterns and/or surface stormwater at low points in underground stormwater cisterns; reuse harvested rainwater and stormwater for garden irrigation.
  - b. Infiltrator/Bioinfiltration (Basin, Trench, or other).** Soil testing in specified areas will be needed to determine the ability of existing soil to infiltrate stormwater (a key factor in sizing these practices). If soil allows sufficient infiltration, grading should direct runoff to pervious infiltration areas. These areas can be planted or gravel/rock surfaces with sub-surface media to encourage infiltration.
  - c. Biotreatment/Bioretenion.** If soil infiltration capacities are insufficient or harvesting and infiltration practices are infeasible, stormwater runoff may be treated and retained in bioretention areas (similar to bioinfiltration but with piped under drains and overflow strategies).
  - d. Retrofit of existing vegetated detention basin.** If the above strategies are insufficient to manage the regulated runoff volumes, the existing vegetated detention basin between the entry roads may be given credit for detention. This would likely require a retrofit (excavated/regraded for more depth/detention capacity and revegetated with appropriate planting). Ideally the overflow swale

flowing under Highway 9 to Saratoga Creek would be stabilized with rock work and planting to address erosion as well.

*Recommendations for Scenario 2: Ramp Concept with parking lot improvement*

Based on Portico's preliminary calculations, the Ramp Concept with parking lot improvement version of the Master Plan concept design would add/replace approximately **53,000** sq. ft. of impervious cover.

Like Scenario 1, Scenario 2 also has an LOD of over 1 acre, adds and replaces over 1 acre of impervious cover, but the total proposed impervious cover is less than the total existing impervious cover. Therefore, the State Construction General Permit and MRP Provision C.3 apply for the LOD area. See the table below for estimated areas for Scenario 2:

<b>a. Total Site Area: 18 acres</b>		<b>b. Total Site Area Disturbed: 2.4 acres</b> (including clearing, grading, or excavating)		
	Existing Area (sq. ft)	Proposed Area (sq. ft)		Total Post-Project Area (sq. ft)
		Replaced	New	
<b>Impervious Area</b>				
<i>Roof</i>	2436	0	1173	3609
<i>Parking</i>	50346	34370	3206	37,576
<i>Sidewalks and Streets</i>	6664	3303	10555	15769
<b>c. Total Impervious Area</b>	59446	37673	14934	56954
<b>d. Total new and replaced impervious area</b>		52607		
<b>Pervious Area</b>				
<i>Landscaping</i>	44595	20726	9444	54039
<i>Pervious Paving</i>	0	0	0	0
<i>Other (e.g. Green Roof)</i>	0	0	0	0
<b>e. Total Pervious Area</b>	44595			54039
<b>f. Percent Replacement of Impervious Area in Redevelopment Projects</b> (Replaced Total Impervious Area / Existing Total Impervious Area) x 100% = 63.37%				

Recommendations for Scenario 2 are the same as for Scenario 1. However, with the significant addition of replacing the main parking lot area impervious cover, treatment practice sizing will likely be larger and retrofitting the existing detention basin will most likely be required.

## References

1. California State Water Resources Control Board. *Storm Water Program: Construction Storm Water Program*. [http://www.swrcb.ca.gov/water\\_issues/programs/stormwater/construction.shtml](http://www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml). Accessed Aug. 7, 2015.
2. County of Santa Clara Department of Planning and Development. *Clean Water Questionnaire*. [https://www.sccgov.org/sites/dpd/DocsForms/Documents/Water Questionnaire Worksheets %28LID%29.pdf](https://www.sccgov.org/sites/dpd/DocsForms/Documents/Water_Questionnaire_Worksheets_%28LID%29.pdf). Dec. 2011. Accessed Aug. 7, 2015.
3. Santa Clara Valley Urban Runoff Pollution Prevention Program. <http://www.scvurppp-w2k.com>. Accessed Aug. 7, 2015.
4. Santa Clara Valley Urban Runoff Pollution Prevention Program. *C.3 Stormwater Handbook: Guidance for Implementing Stormwater Requirements for New Development and Redevelopment Projects*. [http://www.scvurppp-w2k.com/pdfs/1112/C3 Handbook Chapters-042012-Web.pdf](http://www.scvurppp-w2k.com/pdfs/1112/C3_Handbook_Chapters-042012-Web.pdf). April 2012. Accessed Aug. 7, 2015.
5. West Valley Clean Water Program. <http://www.cleancreeks.org/>. Accessed Aug. 7, 2015.

## **APPENDIX A: STORMWATER REGULATION BACKGROUND**

Properties within the City of Saratoga and the County of Santa Clara, must comply with all relevant stormwater permitting requirements.

### *Regulatory Background*

Stemming from the 1987 amendment to the federal Clean Water Act, the resulting US EPA's National Pollutant Discharge Elimination System (NPDES) stormwater and Municipal Separate Storm Sewer System (MS4s) programs, storm sewer systems serving populations of 100,000 or greater are required to obtain a permit and implement a stormwater management program to control pollutants conveyed through storm sewers into the larger watershed and waterbodies.

The San Francisco Bay Regional Water Quality Control Board, a subset of the California EPA State Water Resources Control Board, has issued NPDES permits to Counties and Cities within the San Francisco Bay Watershed since the 1990s. The most recent Bay Area Municipal Regional Stormwater Permit (MRP) was issued in 2009. Provision C.3 of the MRP requires post-construction stormwater controls for development and redevelopment projects.

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), an association of fifteen agencies in the Santa Clara Valley (including the City of Saratoga) with a common discharge permit for the South San Francisco Bay, formed in 1990 to facilitate compliance with the NPDES requirements. SCVURPPP prepared the 2012 C.3 Stormwater Handbook which provides guidance on implementing the MRP provision C.3. More locally, The West Valley Clean Water Program, a cooperative between the Cities of Campbell, Monte Sereno, Saratoga, and the Town of Los Gatos, also collaborates to control pollutant discharge into local creeks and the larger San Francisco Bay watershed.

The State Construction General Permit also stems from NPDES and was also issued in 2009 for construction sites which disturb one acre or more. This permit requires development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

The State Water Resources Control Board also issues Hydromodification Management (HM) permits for sites with one or more acres of impervious cover. HM focuses on preventing impacts to receiving channels, such as Saratoga Creek, by stormwater runoff. Practices required for HM are aimed at flow duration control such as larger retention and detention areas.

The County of Santa Clara Department of Planning and Development summarizes applicability of these three permit types through their Clean Water Questionnaire, a document to be completed as part of project permitting for development and redevelopment projects within the County.

*Regulatory Requirements*

Specific stormwater management requirements are based on quantity of impervious surface cover within the site LOD. Impervious surfaces include any surface which does not allow stormwater to infiltrate into the soil such as buildings and other structures, paved walkways, driveways, parking lots, and other hardscape. Square footage of interior remodeling or re-paving as part of typical maintenance, as in the case of retrofitting existing buildings or re-paving (without regrading) parking lots, does not count towards this area.

The County of Santa Clara Department of Planning and Development Clean Water Questionnaire uses the following table to determine applicability of regulatory requirements:

<b>a. Total Site Area:</b> _____ acre	<b>b. Total Site Area Disturbed:</b> _____ acre (including clearing, grading, or excavating)			
	<b>Existing Area (ft<sup>2</sup>)</b>	<b>Proposed Area (ft<sup>2</sup>)</b>		<b>Total Post-Project Area (ft<sup>2</sup>)</b>
		<b>Replaced</b>	<b>New</b>	
<b>Impervious Area</b>				
Roof				
Parking				
Sidewalks and Streets				
<b>c. Total Impervious Area</b>				
<b>d. Total new and replaced impervious area</b>				
<b>Pervious Area</b>				
Landscaping				
Pervious Paving				
Other (e.g. Green Roof)				
<b>e. Total Pervious Area</b>				
<b>f. Percent Replacement of Impervious Area in Redevelopment Projects</b> (Replaced Total Impervious Area ÷ Existing Total Impervious Area) x 100% = _____ %				

*Scenarios of applicability of regulations to project:*

1. State Construction General Permit
  - a. If the Total Site Area Disturbed (Limit of Disturbance) is equal to or greater than 1 acre (cell b in the table above), the project must apply for a State Construction General Permit.
2. MRP Provision C.3
  - a. If project creates or replaces less than 10K sq ft of impervious cover (cell d in the table above) → MRP C.3 regulations likely don't apply (but still need to confirm with local agency)
  - b. If project creates or replaces more than 10K sq ft of impervious cover (cell d in the table above) → MRP C.3 regulations apply.
    - i. Percent replacement of Impervious area (cell f) is equal to 50% or more → Source control, site design, and treatment requirements apply for entire site (LOD) area

- ii. Percent replacement of Impervious area (cell f) is less than 50% → Source control, site design, and treatment requirements only apply to impervious area created and/or replaced
- 3. Hydromodification Management (HM)
  - a. If project creates and/or replaces 1 acre or more of impervious surface AND the total post-project impervious area is greater than pre-project (existing) impervious area → continue to b below (if not, the project is exempt from HM).
  - b. If project is located in area of HM applicability on the HM Applicability Map (areas with less than 65% impervious cover → HM requirements apply (Hakone is located in one of these areas)

Page 3 of the County of Santa Clara Department of Planning and Development Clean Water Questionnaire form lists potential stormwater control measures to meet applicable regulations:

**6. Selection of Specific Stormwater Control Measures:**

**Site Design Measures**

- Minimize land disturbed
- Minimize impervious surfaces
- Minimum-impact street or parking lot design
- Cluster structures/pavement
- Disconnected downspouts
- Pervious pavement
- Green roof
- Microdetention in landscape
- Other self-treating area
- Self-retaining area
- Rainwater harvesting and use (e.g., rain barrel, cistern connected to roof drains)<sup>1</sup>
- Preserved open space: \_\_\_\_\_ ac. or sq. ft. (circle one)
- Protected riparian and wetland areas/buffers (Setback from top of bank: \_\_\_\_\_ ft.)
- Other \_\_\_\_\_

**Source Control Measures**

- Alternative building materials
- Wash area/racks, drain to sanitary sewer<sup>2</sup>
- Covered dumpster area, drain to sanitary sewer<sup>2</sup>
- Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain<sup>2</sup>
- Beneficial landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)
- Outdoor material storage protection
- Covers, drains for loading docks, maintenance bays, fueling areas
- Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)
- Storm drain labeling
- Other \_\_\_\_\_

**Treatment Systems**

- None (all impervious surface drains to self-retaining areas)

***LID Treatment***

- Rainwater harvest and use (e.g., cistern or rain barrel sized for C.3.d treatment)
- Infiltration basin
- Infiltration trench
- Exfiltration trench
- Underground detention and infiltration system (e.g. pervious pavement drain rock, large diameter conduit)

***Biotreatment***<sup>3</sup>

- Bioretention area
- Flow-through planter
- Tree box with bioretention soils
- Other \_\_\_\_\_

***Other Treatment Methods***

- Proprietary tree box filter<sup>4</sup>
- Media filter (sand, compost, or proprietary media)<sup>4</sup>
- Vegetated filter strip<sup>5</sup>
- Dry detention basin<sup>5</sup>
- Other \_\_\_\_\_

**Flow Duration Controls for Hydromodification Management (HM)**

- Detention basin
- Underground tank or vault
- Bioretention with outlet control
- Other \_\_\_\_\_

<sup>1</sup> Optional site design measure; does not have to be sized to comply with Provision C.3.d treatment requirements.

<sup>2</sup> Subject to sanitary sewer authority requirements.

<sup>3</sup> Biotreatment measures are allowed only with completed feasibility analysis showing that infiltration and rainwater harvest and use are infeasible. Fill out Forms 1, 2 and 3 to determine feasibility, as applicable.

<sup>4</sup> These treatment measures are only allowed if the project qualifies as a "Special Project".

<sup>5</sup> These treatment measures are only allowed as part of a multi-step treatment process.