

SEAL ISLAND ESTATES

SUBDIVISION 8745

CONTRA COSTA COUNTY, CALIFORNIA

STORMWATER CONTROL PLAN

May 25, 2005

PREPARED FOR:
DISCOVERY BUILDERS, INC.
4061 PORT CHICAGO HIGHWAY, SUITE H
CONCORD, CALIFORNIA 94520
PH: (925) 682-6419 FAX: (925) 689-7741

PREPARED BY:
ISAKSON & ASSOCIATES, INC.

2255 YGNACIO VALLEY ROAD, SUITE C
WALNUT CREEK, CA 94598
PH: (925) 937-9333 FAX: (925) 937-7926

WITH ASSISTANCE FROM **DAN CLOAK ENVIRONMENTAL CONSULTING**
ON BEHALF OF THE CONTRA COSTA COUNTY CLEAN WATER PROGRAM

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I. PROJECT SETTING

I.A. Project Description and Location

Seal Island Estates will be 27 single family homes and two small parks on approximately 5.2 acres. The project is located north of Central Avenue in the Martinez area of unincorporated Contra Costa County (Figure 1).

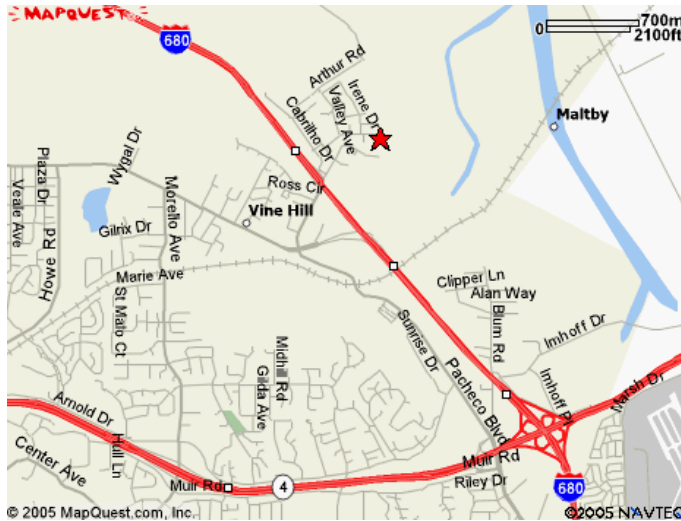


Figure 1. Project Location

I.B. Existing Site Condition

The site slopes toward the southwest. Three water storage tanks belonging to the Contra Costa Water District are located just upslope of the subject site. Total relief on the site is approximately 60 feet, ranging from approximately 45 feet above mean sea level at the southwestern portion of the site to approximately 105 feet at the highest location in the northeastern portion of the site. The property is currently undeveloped and covered with seasonal grasses.

A geotechnical exploration of the site was performed by ENGEO, Inc. ENGEO's report dated June

20, 2003 (project number 5906.2.002.01) indicates no active surface faults in the site vicinity. No groundwater was encountered by the four exploratory borings of up to 15 feet in depth. Expansive clayey soils (NRCS Hydrologic Soil Group "D") were encountered across the site.

The area near the project is characterized by poorly draining soils, steep relief, and limited drainage infrastructure. Existing drainage is to the southwest of the site, with surface drainage to the vicinity of Michelle Drive and Central Avenue.

The existing zoning is A-2 (agricultural) with a 5-acre minimum lot size. A planned development (PD) use is proposed with lots as small as 5,000 square feet.

I.C. Opportunities and Constraints for Stormwater Control

Constraints include impermeable soils (soil group D), high intensity land use (5,000 square foot minimum lot size), steep hillside slopes, and lack of connection to underground storm drains. The site will be extensively graded to create building pads and parking areas.

Disposal of runoff to deep infiltration is not feasible on this site due to the low permeability of the clay soils.

Run-on from adjacent sites complicates the site drainage design. Runoff from the hillside north of the site, which is owned by the Contra Costa Water District, drains onto the site. To the southeast, the adjacent development drains toward the site.

A 10' wide gas easement runs roughly parallel to and 40 to 50 feet inside the site's southern boundary (see Stormwater Control Plan Exhibit). This easement follows the direction of drainage toward the southwest.

A 50' wide water district access easement traverses the site near its western end. This easement runs up and down the existing slope and provides access to the water tanks above the site.

The site plan includes two “pocket parks” which will be an amenity for residents of this development and the neighboring area. One of these pocket parks is located at the intersection of the proposed extension of Central Avenue and the proposed Seal Island Drive. The other is at the site’s lowest point at the intersection of Michelle Drive and Seal Island Drive.

Differences in elevation provide sufficient hydraulic head for “dry” swales, biofiltration, or other soil-filtration BMPs.

II. MEASURES TO LIMIT IMPERVIOUSNESS

II.A. Measures to Cluster Development and Protect Natural Resources

Portions of the project site have been previously disturbed by agricultural use, pipeline burial and maintenance, and impacts from adjacent development, landfill, and utility operations. There are no streams, seeps, or similar hydrologic features and no significant trees. Run-on from the upslope Contra Costa Water District property will be routed around the development by a concrete swale along the northern perimeter (see Stormwater Control Plan Exhibit).

The following site layout characteristics serve to reduce imperviousness:

- The site is densely developed infill within the existing urbanized area.
- The site is developed to maximum density; lot sizes are near the minimum allowed by the County for this zoning.
- The houses will incorporate garages beneath a usable second story.
- The two urban “pocket” parks provide mostly unpaved open space for recreation.

II.B. Measures to Limit Directly Connected Impervious Area

II.B.1. *Selection of paving materials*

Conventional concrete and conventional asphalt are used throughout the site. Permeable pavements are impractical for this site because pavements overlie expansive clay soils on steep slopes.

II.B.2. *Self-Retaining Areas*

Because of the steep slopes and dense development on the site, it is not possible to make non-impervious areas on the individual lots self-retaining. Instead, the bioretention areas and swales receiving runoff from the lots have been sized using the conservative assumption that the entire developed area of each lot (as well as the pocket parks) is impervious.

To reduce the amount and velocity of runoff, and to protect downslope bioretention areas and swales from siltation, exposed slopes will be terraced with low retaining walls and slopes will be limited to no greater than 4:1 wherever possible. Exposed slopes will be stabilized and revegetated.

III. SELECTION AND PRELIMINARY DESIGN OF STORMWATER TREATMENT BMPS

Runoff from roofs and paved areas on each of the 27 residential lots, as well as the public streets to be constructed in connection with the project, will be collected and conveyed to one of five treatment BMPs—two bioretention areas and three swales.

The BMPs are located to accommodate the complex topography of the site, while allowing maintenance access from public streets or parks. Each BMP has adequate hydraulic head to allow drainage into, through, and away from the BMP without need for pumps.

Runoff from all impervious areas will be treated, except as follows.

- Runoff from about 825 square feet at the intersection of Michelle Drive and Seal Island Drive and from about 984 square feet on Central Avenue will drain along those streets away from the project area. These portions of public streets account for less than 1% of the total project impervious area and slope away from the site. They were omitted from the treated area to develop an overall workable and efficient plan for treating runoff from the project area.
- Treatment facilities are designed to accommodate runoff from the specified design storm intensity of 0.2 inches per hour. Because treatment facilities have been substantially oversized, runoff from somewhat more intense storms will also be treated.

Requirements to manage increases in runoff peak flows and durations (hydrograph modification management), will not apply, as those requirements have not yet been placed into effect by the County.

The Stormwater Control Plan Exhibit shows the BMPs and the corresponding areas of the site that drain to each swale or bioretention area.

The sizes of each drainage area and the corresponding BMP are shown in Table 2.

III.A. General Treatment BMP Characteristics

III.A.1. Bioretention Areas.

The two bioretention areas will be designed and constructed according to the following criteria, adapted from the *Contra Costa Clean Water Program Stormwater C.3 Guidebook, Second Edition* (Attachment C-1-6):

- Ponding depth between 4 inches and 12 inches.
- Layer of sandy loam soil, minimum 18 inches deep, with a minimum infiltration rate of 5 inches per hour.
- Filter fabric between soil and gravel layers
- Pea gravel or drain rock layer, minimum 10 inches deep.
- Perforated pipe underdrain, min. 6 inches diameter, connected to off-site drainage.
- Overflow drain connected to off-site drainage.
- Plantings suitable to the imported sandy loam soil, the site, and the location. Plantings will be selected to minimize potential future need for fertilizers or pesticides.

III.A.2. Swales.

The three swales will be designed and constructed according to the following criteria, adapted from *Guidebook* Attachment C-1-7.

- Overall width between four feet and ten feet. Total surface area will be as shown in sizing calculations.
- Swale alignment may be straight or may simulate natural meanders.
- Steepness of slopes immediately adjacent to the swale will be minimized within the constraints of the site layout, but will be no greater than 2:1 horizontal:vertical.
- Layer of sandy loam, 18 inches deep, with a minimum infiltration rate of 5 inches per hour.
- Pea gravel or drain rock underdrain, minimum 18 inches wide by 12 inches deep.
- Perforated pipe underdrain, minimum 6 inches diameter, connected to off-site drainage.
- Overflow drains to be set a minimum 6 inches above the swale flow line and connected to off-site drainage.
- Check dams will be spaced according to the steepness of slope.

III.B. Specific Characteristics of Each Impervious Area and Swale

Specific descriptions of each drainage area and swale follow:

- *Bioretention Area BRA-1.* Runoff from roofs, parking areas, driveways in the lots in the northeastern portion of the site (Lots 10, 12, 14, 16, 18, 20, 21, 22, 23, and 24) will be collected in pipes and conveyed to a bioretention area (BRA-1) located in the park in Parcel "A." BRA-1 is an irregularly-shaped landscaped area of about 2,500 square feet. Design issues for this BMP (to be addressed in final design) include dissipating energy from entering piped flows and stabilizing the adjacent engineered slope to prevent excess sediment from entering the bioretention area.
- *Bioretention Area BRA-2.* Runoff from Lots 1 and 2, in the northwestern portion of the site, drain to a bioretention area (BRA-2) in Parcel "B," a park area/open space at the northwestern corner of the site. A portion of Seal Island Drive, at the intersection with Michelle Drive, also drains to BRA-2. BRA-2 is an irregularly shaped area of about 1,150 square feet. It is located within a proposed detention basin designed to reduce peak flows to the downstream drainage system. The need for and sizing of this basin will be evaluated in the context of the detention provided by upstream swales and bioretention areas. In the final design, the bioretention area should be protected from potential sediment in run-on from adjacent steep slopes.
- *Vegetated Swale VS-1.* Runoff from Lots 25 and 26 drain to Central Avenue. This portion of Central Avenue ends in a cul-de-sac at the easterly end of the site. Drainage from this cul-de-sac is to a swale (VS-1) draining easterly and away from the site. Swale VS-1 is 10 feet wide and 95 feet long. Design issues for this swale include potential erosion of the swale bottom due to steepness of the slope; this can be addressed in final design by specifying the spacing of check dams.
- *Vegetated Swale VS-2.* Runoff from Lots 17, 19, and 27 and the lower portion of the park in Parcel "A" will flow to converging swales (VS-2) which meet at a low point in the southern corner of Lot 19. A small portion of Seal Island Drive also drains to this swale in Lots 17 and 19. The portions of Central Avenue (to the road crown) fronting Parcel "A" and Lot 27 also drain to swale VS-2. Swale VS-2 varies from 4 feet to 8 feet wide. Total length is approximately 300 feet. Total area will be approximately 2200 square feet. Design issues for this swale include the need, in final design, to minimize the steepness of adjacent side slopes. (Steep slopes could make landscape maintenance more difficult.)

- *Vegetated Swale VS-3*. Runoff from Lots 3, 4, 5, 6, 7, 8, 9, 11, 13, and 15, and connecting driveways, will flow down driveways to a continuous swale (VS-3) running parallel to Seal Island Drive. Adjacent portions of Seal Island Drive also drain to this swale. This swale drains at a slope of 2-3% from a high point on Seal Island Drive and ends at an inlet at the northwest corner of Lot 5. Swale VS-3 varies from 4 feet to 8 feet wide and is approximately 385 feet in length. Total area will be approximately 3000 square feet. Design issues for this swale include the need, in final design, to minimize the steepness of adjacent side slopes (Steep slopes could make landscape maintenance more difficult.)

IV. SOURCE CONTROL MEASURES

This single-family residential project will create few potential sources of stormwater pollutants. Sources to be controlled are:

- Potential dumping of washwater or other liquids into storm drain inlets.
- Need for future indoor or structural pest control.
- Fertilizers and pesticides used in park maintenance and home yard and garden maintenance.
- Vehicle washing.

Table 4 lists potential pollutant sources on the development site and the corresponding source control measures specified in the *Stormwater C.3 Guidebook, Second Edition*, Appendix E.

All areas where these activities occur will drain to stormwater treatment BMPs. To further reduce the potential for pollutants to enter runoff, permanent and operational BMPs will be implemented as described in Table 4.

V. PERMITTING AND CODE COMPLIANCE ISSUES

There are no known conflicts between the stormwater control BMPs and other Contra Costa County codes or other development requirements.

The primary issue to be coordinated with County staff is to quantify the benefit bioretention areas and swales will have in reducing peak flows from the 10- and 100-year storm and to possibly reduce the size of the detention basin accordingly.

The design for drainage from Seal Island Drive and Central Avenue adjacent to the site is unconventional but typical of the design strategies that will need to be used for C.3 compliance. It is anticipated that minor changes to curb and inlet configurations, which may be developed during final design, will not affect compliance with stormwater treatment requirements.

These and any other conflicts will be resolved through the County's development review process or during subsequent permitting.

Table 4. Sources and Source Control BMPs

Potential Source	Permanent BMPs	Operational BMPs
On-site storm drain inlets	All accessible on-site inlets will be marked with the words "No Dumping! Flows to Bay"	Markings will be periodically repainted or replaced. Inlets and pipes conveying stormwater to BMPs will be inspected and maintained as part of BMP Operation and Maintenance Plan.
Need for future indoor and structural pest control.		Integrated Pest Management (IPM) information will be provided to new homeowners.
Landscape/outdoor pesticide use	Final landscape plans will: Be designed to minimize irrigation and runoff and to minimize use of fertilizers and pesticides that can contribute to stormwater pollution. Specify plantings within bioretention areas and swales that are tolerant of the sandy loam soils and periodic inundation. Include pest-resistant plants. Include plantings appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency and plant interactions.	Landscape will be maintained using minimum or no pesticides. IPM information will be provided to new homeowners.
Vehicle washing	Driveways and parking areas drain to bioretention areas or swales.	Distribute stormwater pollution prevention information to homeowners.

VI. BMP OPERATION AND MAINTENANCE

VI.A. Means to Finance and Implement BMP Maintenance

VI.A.1. Commitment to Execute any Necessary Agreements.

Discovery Builders, Inc. agrees to provide any necessary easements or rights of entry to Contra Costa County for access and inspection of stormwater BMPs and to make provision of easements or rights of entry a condition of sale.

VI.A.2. Statement Accepting Responsibility for Operation and Maintenance until Responsibility is Transferred.

Discovery Builders, Inc. agrees to operate and maintain the swales and bioretention areas constructed in connection with the project until one of the following occurs: (1) Acceptance of maintenance responsibility by the County, including the filing of all required easements and establishment of a special district or other permanent funding mechanism or (2) Legal incorporation of a homeowners' association or other private entity to be responsible for maintenance, execution of Codes, Covenants, and Responsibilities or other agreement that runs with the land and requires future owners to provide and pay for maintenance of stormwater BMPs, and execution of a Stormwater Management Facilities Operation and Maintenance Agreement and Right of Entry in the form provided by the County.

VI.A.3. Stormwater Facilities Operation and Maintenance Plan

Discovery Builders, Inc. will submit, with the application for building permits, a draft Stormwater Facilities Operation and Maintenance Plan including detailed maintenance requirements and a maintenance schedule.

VI.B. Summary of Maintenance Requirements

Swales remove pollutants primarily by filtering runoff slowly through an active layer of soil. Routine maintenance is needed to insure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical routine maintenance consists of the following:

- Inspect inlets for channels, exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment. Examine rock or other material used as a splash pad and replenish if necessary.
- Inspect outlets for erosion or plugging.
- Inspect side slopes for evidence of instability or erosion and correct as necessary.
- Observe soil at the bottom of the swale or filter for uniform percolation throughout. If portions of the swale or filter do not drain within 48 hours after the end of a storm, the soil should be tilled and replanted. Remove any debris or accumulations of sediment.
- Confirm that check dams and flow spreaders are in place and level and that channelization within the swale or filter is effectively prevented.
- Examine the vegetation to insure that it is healthy and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas. Confirm that irrigation is adequate and not excessive. Replace dead plants and remove invasive vegetation.
- Abate any potential vectors by filling holes in the ground in and around the swale and by insuring that there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact the Contra Costa County Vector Control District for information and advice. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

Stormwater Control Plan Reference	BMP Description	Plan Sheet Number
Page 2, Section II.B.2	Exposed slopes terraced with low retaining walls, and slopes limited to 4:1 wherever possible.	
Page 4, Section III.B.	Slopes adjacent to and draining toward swales and bioretention areas set back, minimized, and/or stabilized to avoid siltation.	
Table 2, Exhibit, Section III.A.1 and III.B.	Drainage from Lots 10, 12, 14, 16, 18, 20, 21, 22, 23, and 24 collected and routed to Bioretention Area BRA-1. BRA-1 sized and designed as stated in Section III.A.1 and III.B.	
Table 2, Exhibit, Section III.A.1 and III.B.	Drainage from Lots 1 and 2 and portions of Seal Island Drive, as delineated conveyed to Bioretention Area BRA-2 in Parcel "B." BRA-2 sized and designed as stated.	
Table 2, Exhibit, Section III.A.2 and III.B.	Drainage from Lots 25 and 26 conveyed to Central Avenue, Central Avenue graded and paved to direct drainage to Swale VS-1. VS-1 sized and designed as stated, including erosion protection.	
Table 2, Exhibit, Section III.A.2 and III.B.	Drainage from Lots 17, 19, and 27, and portions of Central Avenue, Seal Island Drive, and connecting driveways directed to Swale VS-2. VS-2 sized and designed as stated. Adjacent side slopes set back and/or stabilized.	
Table 2, Exhibit, Section III.A.2 and III.B.	Drainage from Lots 3, 4, 5, 6, 7, 8, 9, 11, 13, and 15, and portions of Seal Island Drive and connecting driveways, as delineated, flows to Swale VS-3. VS-3 sized and designed as stated.	
Table 4	On-site drain inlets, if accessible from driveways or walkways, to be marked with "No Dumping" message.	
Table 4	Plant selection to minimize irrigation, to minimize use of fertilizers and pesticides, and for pest resistance.	

VIII. CERTIFICATION

The selection, sizing, and preliminary design of treatment BMPs and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2003-0022.

