BIG CANYON CREEK
SIMPLIFIED HABITAT RESTORATION PROJECT
2010 PROJECT SPECIFICATION – 9/17/10 REVISION

EXECUTIVE SUMMARY

Big Canyon is an open space area of about 60 acres which lies in the City of Newport Beach about half a mile north of San Joaquin Road and which stretches from Jamboree Road on the east to Back Bay Drive on the west side. A creek that drains an area of about two square miles east of Jamboree Road enters the north east corner of the canyon through a culvert under Jamboree Road and meanders down through the canyon. About 2/3 of the way down flow splits and follows two distinct paths. The southern path includes a freshwater pond and marsh; the northern path is riparian. Both streams discharge into Upper Newport Bay (UNB), which lies immediately west of Back Bay Drive. Historically these roughly 11 acres of freshwater pond and marsh and riparian were tidelands which were filled in with dredge spoils during the 1960's. This acreage is part of the Upper Newport Bay Ecological Reserve, managed by the California Department of Fish and Game (DFG). The rest of Big Canyon is owned by the City of Newport Beach, and is know as Big Canyon Nature Park. The higher slopes and bluff tops on the north and south sides are privately owned residential areas.

The freshwater pond and marsh were created in 1981 as mitigation for a gravity-flow sewer line and access road installed in Big Canyon. Unfortunately this constructed wetland was poorly engineered, leading to several problems. Over time and without adequate maintenance access, the pond silted up leading to elevated water temperatures detrimental to native pond life. Huge stands of cattail and bulrush grew that impeded proper stormwater flow and led to major downstream damage during the December 6, 1997 El Nino storm. The vegetation dammed the stormwater and a huge slug of water was released when the dam gave way. The parking lot on the bay side was partially washed away and other major damage was done to trails, footbridges, kiosks and other interpretive elements that have still not been properly repaired.

Big Canyon has been dear to the heart of the Newport Bay Naturalists and Friends (NBNF), whose volunteers worked extensively in cooperation with DFG staff, scout troops and service groups to create the trail system, remove invasive plants and restore native habitat during the 1990's. A 2002 Case Statement "Restore Upper Newport Bay" funded and partially written by NBNF provided the impetus for a detailed study of water quality, habitat degradation, flood risk management and other issues at Big Canyon, and the examination of project alternatives to resolve these issues. The study led to the "Big Canyon Historic Tidal Wetlands Conceptual Restoration Plan" which was issued in 2004. Under this plan, Back Bay Drive would be relocated inland and tidal wetlands and mudflat recreated where the current freshwater pond and marsh are.

Unfortunately as detailed project design and permitting proceeded various problems arose that were making the Historic Tidal Wetlands Plan difficult to achieve. The most recent of these related to high levels of selenium which would cause substantial difficulties in creating a new freshwater pond to replace the existing one that would be removed in creating the tidelands. With all the constraints imposed the Historic Tidal Wetlands Plan was becoming increasingly impractical and costly, and the City placed the project on hold in late 2009.

NBNF suggested a simplified approach to addressing the following issues that are the most significant:

1. The freshwater pond is completely overrun with cattail such that it no longer provides foraging for migratory water fowl, and access for vector control is becoming increasingly difficult.
2. Sediment has accumulated in the pond making it shallow and warm. The physical conditions in the pond, together with an infestation of African clawed frogs has led to a drastic decline in native fish, invertebrates, amphibians and reptiles, including the western pond turtle.
3. The dense walls of cattail and bulrush in and around the pond are likely to dam stormwater in a major flood event, as occurred during a 1997 El Nino storm. As before, major damage to the road, parking lot, and other downstream features is likely once the dam gives way.
4. Disruption of the freshwater flow patterns to/in the areas west of Back Bay Drive where saltmarsh bird's beak is found must be avoided so as not to impact plant germination of this endangered plant.
5. California gnatcatcher territory in the southwest corner of Big Canyon needs to be protected.

In April of 2010, NBNF presented a preliminary conceptual design addressing the above issues to DFG and the City and received the go-ahead to prepare a more detailed project specification and schedule for this new project, which it has named the Simplified Big Canyon Restoration Project.

In July of 2010, NBNF issued the first draft of this specification detailing a 2-phase approach to the project. In Phase 1 the original acreages of freshwater pond and marsh would be restored with only slight reconfiguration to improve habitat value, maintainability, and vector control access and lessen the potential for downstream flood damage. At the same time upland habitat would be restored as appropriate in the western third of Big Canyon and repairs and improvements made to trails and interpretive elements. Back Bay Drive would keep its current path. The "Arizona Crossing" (the dip in the road just past the parking lot) would be refurbished, as would the pavement in the parking lot. Dry toilet facilities would be added. In Phase 2 a treatment system would be added to reduce the selenium entering Big Canyon at Jamboree Road. At that time habitat restoration and trail improvement would be performed as appropriate in the eastern two thirds of the Big Canyon.

In August of 2010, based on input from the Regional Water Quality Control Board, NBNF proposed a revised approach involving installation of a selenium treatment system at the stream entry into Big Canyon Nature Park at Jamboree Road, concurrent with the freshwater pond and marsh restoration. The project elements are essentially the same, but the project sequence has been changed to avoid attracting foraging and nesting birds to the restored pond before selenium levels have been reduced. The freshwater pond will be cleared and reconstructed in the window between the end of breeding season and the start of the wet season in the fall of 2012 (not 2011 as previously proposed), to allow time for selenium source characterization and treatment system selection. Upland restoration and trail improvements throughout Big Canyon would begin in fall 2011.

The preliminary cost estimate is $3,000,000 including a contingency of roughly $400,000 for landfill disposal of sediment if a suitable onsite use cannot be found because of selenium levels present. To what extent selenium treatment of incoming surface water flows needs to be included in this project or addressed separately is yet to be established. It is preferable to address selenium reduction and treatment for the Big Canyon watershed as a whole, and do it as part of the Newport Bay watershed selenium program that is cost shared by all the watershed partners. Furthermore, the City has indicated that any "end-of-pipe" treatment could be installed outside the boundaries of this project in the City yard on the east of Jamboree Road. However, without suitable guarantees about the timing of upstream selenium reduction and treatment, this project may be subject to regulatory delays that may put some or all of its funding in jeopardy. It is therefore suggested that this project include an allocation of $1,000,000 for a selenium treatment system installed west of Jamboree Road inside the project area, which can work initially as a stand-alone system, and later as a polishing system when upstream treatment/reduction is implemented. Thus an overall project budget of $4,000,000 should be assumed for now.

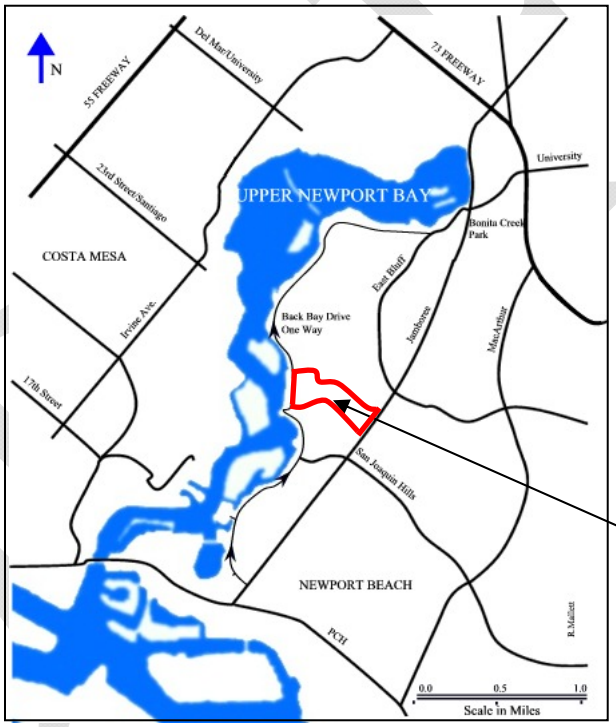
NBNF is proposing to act as ongoing Project Manager for this "project" and to split the project into a series of integrated mini projects and ongoing programs of varying size and complexity that can be accomplished independently with a mixture of contractor-based and community-based approaches. Contractor-based activities range from spillway construction requiring detailed engineering, to site preparation for native plant plantings by community volunteers. Community-based activities range from Eagle Scout projects such as construction of a footbridge to planting native plants by members of the public who show up for a monthly community-based restoration event. NBNF has managed projects at UNB with both approaches. In particular, NBNF aims to engage the local property owners along the bluff tops to address erosion control, water runoff, invasive plant and illegal trail issues holistically.

NBNF intends to provide ongoing stewardship of Big Canyon in accordance with adaptive management principles and due regard for maintainability and maintenance, which is budgeted. To do this effectively, NBNF intends to establish an integrated, ongoing monitoring program addressing habitat, wildlife, water quality, public use and edge effects and meeting regulatory requirements and/or permit conditions for pre-construction, construction and post-construction monitoring in the most cost-effective manner.

1.0 INTRODUCTION

1.1 Background

1.1.1 Big Canyon is an open space area of about 60 acres which lies in the City of Newport Beach about half a mile north of San Joaquin Road and which stretches from Jamboree Road on the east to Back Bay Drive on the west side. A creek that drains an area of about two square miles east of Jamboree Road enters the north east corner of the canyon through a culvert under Jamboree Road and meanders down through the canyon. About 2/3 of the way down flow splits and follows two distinct paths. The southern path includes a freshwater pond and marsh; the northern path is riparian. Both streams discharge into Upper Newport Bay (UNB), which lies immediately west of Back Bay Drive. Historically these roughly 11 acres of freshwater pond and marsh and riparian were tidelands which were filled in with dredge spoils during the 1960's. This acreage is part of the Upper Newport Bay Ecological Reserve, managed by the California Department of Fish and Game (DFG). The rest of Big Canyon is owned by the City of Newport Beach, and is know as Big Canyon Nature Park. The higher slopes and bluff tops on the north and south sides are privately owned residential areas.



Big Canyon

1.1.2 The freshwater pond and marsh were created in 1981 as mitigation for a gravity-flow sewer line and access road installed in Big Canyon. Unfortunately this constructed wetland was poorly engineered, leading to several problems. Over time and without adequate maintenance access, the pond silted up leading to elevated water temperatures detrimental to native pond life. Huge stands of cattail grew that impeded proper stormwater flow and led to major downstream damage during the December 6, 1997 El Nino storm. The vegetation dammed the stormwater and a huge slug of water was released when the dam gave way. The parking lot on the bay side was partially washed away and other major damage was done to trails, footbridges, kiosks and other interpretive elements that have still not been properly repaired.

1.1.3 The following aerial photo shows the DFG and City property lines and other key information:

1.1.4 Big Canyon has been dear to the heart of the Newport Bay Naturalists and Friends (NBNF), whose volunteers worked extensively in cooperation with DFG staff, scout troops and service groups to create the trail system, remove invasive plants and restore native habitat during the 1990's. A 2002 Case Statement "Restore Upper Newport Bay" funded and partially written by NBNF provided the impetus for a detailed study of water quality, habitat degradation, flood risk management and other issues at Big Canyon, and the examination of project alternatives to resolve these issues..

1.1.5 The study led to the "Big Canyon Historic Tidal Wetlands Conceptual Restoration Plan" which was issued in 2004. Under this plan, Back Bay Drive would be relocated inland and tidal wetlands and mudflat recreated where the current freshwater pond and marsh area. The desire to create additional mudflat was driven to some extent to address loss of mudflat issues associated with the Army Corps of Engineers (ACOE) UNB Ecosystem Restoration Project (the "Dredging Project").

1.1.6 Unfortunately as detailed project design and permitting proceeded various problems arose that were making the Historic Tidal Wetlands Plan difficult to achieve. The most recent of these problems related to the detection of significant levels of selenium which would cause substantial difficulties in creating a new freshwater pond to replace the existing one that would be removed in creating the tidelands. With all the constraints imposed the Historic Tidal Wetlands Plan was becoming increasingly impractical and costly, and the City of Newport Beach placed the project on hold in late 2009.

1.1.7 In early 2010, NBNF proposed a simplified project addressing the key issues that prompted the initial study. In April of 2010, NBNF presented a preliminary conceptual design addressing the these issues to DFG and the City and received the go-ahead to prepare a more detailed project specification and schedule for this new project, which it has named the Simplified Big Canyon Restoration Project.

1.2 Proposed Approach

1.2.1 NBNF is proposing to act as ongoing Project Manager for this "project" and to split the project into a series of elements of varying size and complexity that can be accomplished independently with a mixture of contractor-based and community-based approaches. Contractor-based activities range from spillway construction requiring detailed engineering, to site preparation for native plant plantings by community volunteers. Community-based activities range from Eagle Scout projects such as construction of a footbridge to planting native plants by members of the public who show up for a monthly community-based restoration event. NBNF has managed projects at UNB with both approaches.

1.2.2 Big Canyon is an integral part of the larger UNB ecosystem and any decisions regarding wildlife protection, habitat restoration and appropriate public use at Big Canyon need to be made with an understanding of the issues, opportunities, constraints and priorities for all of UNB.

1.2.3 NBNF intends to provide ongoing stewardship of Big Canyon in accordance with adaptive management principles that should apply to all of UNB. Thus the development of adaptive management processes and protocols for Big Canyon will set the stage for the development of the Comprehensive Resource Management Program (CRMP) for all of the DFG, City and OC Parks open space at/around UNB.

1.2.4 Until development of the CRMP proceeds, it is anticipated that the coordination between the UNB stakeholders to promote a consistent adaptive management approach will be done under the auspices of the UNB Management Coalition, and the UNB Restoration Team which functions under the Management Coalition. The Restoration Team, which is chaired by NBNF, has the following standing membership:

- California Department of Fish and Game
- California Coastal Commission
- City of Newport Beach
- Newport Bay Naturalists and Friends
- OC Parks
- OC Watersheds

Other frequent attendees include representatives from the UC Natural Reserve System and The Nature Conservancy who have shared information on various restoration issues. Meetings have been held at least twice a year for the past 8 or 9 years.

1.2.5 A key NBNF initiative in support of the UNB Restoration Team is the development and periodic update of an online project information system. The public version of it can be found at:

http://newportbay.org/rest

The aerial map from the home webpage, which provides links to individual pages on all projects, is included below as Figure 1.2.3. For planning purposes the Bay and surroundings have been divided into Project Areas which are shown with pink boundaries and white text. Within the Project Areas are actual projects, or project components ("sub-projects") in the case of large projects spread out over a wide area and/or constructed at different times. Projects are color coded (white for the ACOE Dredging Project, blue for other primarily contractor-based projects, green for primarily community-based projects, and turquoise for sphere projects (i.e. on neighboring property and affecting Bay). The project NBNF did in 2008 with the Bluffs HOA is shown as a sphere project.

1.2.6 The Restoration Team has developed guidelines for how both contractor-based projects community-based projects should be planned, executed and monitored. As the planning process is solidified the intent is to identify the quantities of all native plants in advance so that they may be cultivated as much as possible in the native plant nursery at the Back Bay Science Center.

1.2.7 Another initiative in support of the push towards adaptive management in all restoration activities at UNB is the ongoing habitat and wildlife survey program. A team of more than a dozen trained NBNF Naturalists has been conducting wildlife surveys every two months and/or monitoring percent coverage of native plants every six months multiple locations around UNB. Surveys and/or monitoring is done along marked transects in mature native, degraded non-native, recently restored, and mature restored Coastal Sage Scrub habitat in accordance with rigorous written protocols, and results entered into a database for scientific analysis.

1.2.8 To further this effort NBNF intends to establish a comprehensive integrated, ongoing monitoring program for Big Canyon addressing habitat, wildlife, water quality, public use and edge effects and meeting regulatory requirements and/or permit conditions for pre-construction, construction and post-construction monitoring in the most cost-effective manner. This approach will save significant money in the long run and provide the data to allow for a more streamlined regulatory approval process. Nearly half of the special conditions imposed by the California Coastal Commission on the Big Canyon Historic Tidal Wetlands Project pertained to monitoring.

Figure 1.2.3


West Bay
Project Area
Bayview
Project Area
Tideland
Project Area
Eastbluff
Project Area
Galaxy
Project Area
Big Canyon
Project Area
Tideland
Project Area
Dover Shores
Project Area
San Joaquin
Project Area
Shellmaker
Project Area
© 2008 Europa Technologies
© 2008 Tele Atlas
Google

2.0 EXISTING CONDITIONS

2.1 Overview

2.1.1 Various surveys, studies and analyses have been prepared documenting existing conditions in Big Canyon, and upstream and downstream. The following are published on the city website:

- 2004 Conceptual Plan
- 2007 Phase II Feasibility Report
- 2007 EIR
- 2009 Revised MND Study and Technical Appendices

Only brief highlights of the most significant items relating to existing conditions are reported herein. Reference should be made to the above for more details.

2.1.2 The most substantial change in existing conditions has been the dramatic shrinking of the freshwater pond as show below. Less than 10% of the original acreage of pond created in 1981 as mitigation for a gravity-flow sewer line and access road installed in Big Canyon exists now:

2003   2009

2.1.3 The main problems associated with this are:

1. The freshwater pond is completely overrun with cattail such that it no longer provides foraging for migratory water fowl, and access for vector control is becoming increasingly difficult.
2. Sediment has accumulated in the pond making it shallow and warm. The physical conditions in the pond, together with an infestation of African clawed frogs has led to a drastic decline in native fish, invertebrates, amphibians and reptiles, including the western pond turtle.
3. The dense walls of cattail and bulrush in and around the pond are likely to dam and/or divert stormwater in a major flood event, as occurred during a 1997 El Nino storm. As before, major damage to the road, parking lot, and other downstream features is likely.

2.1.4 During water quality sampling and analysis in 2007 the presence of significant concentrations of selenium were found in the surface water. Selenium is a naturally occurring mineral that is needed

in low concentrations for normal metabolic function in humans and other animals. However, at high concentrations and in certain forms, it causes reproductive failure and/or embryonic deformity. (A well-publicized case occurred at Kesterson Reservoir in the San Joaquin Valley. There bird deaths and malformed embryos were observed and selenium concentrations of up to 350 parts per billion (ppb) in the water were measured.) More detailed sampling and analysis was performed in Big Canyon in 2008 water concentrations of roughly 10 – 30 ppb were found which are well above California Toxics Rule limits. Additionally high concentrations in sediment and invertebrate tissues were found. Though long-time NBNF Naturalists who are very familiar with Big Canyon are not aware of any past instances of wildlife embryo deformities, the presence of selenium is a concern. The primary source of the selenium is believed to be the golf course upstream to the east of Jamboree Road. Further source testing and characterization is needed.

2.1.5 Saltmarsh birds beak is the one endangered plant found at UNB. It is an annual herb that occurs in the high marsh zone of coastal saltmarshes. At UNB it is found mostly in dredge spoil disposal areas. Growth seem to occur in the vicinity of freshwater sources which appear to be necessary for germination. Salt marsh birds beak is present at many locations to the west of the Big canyon parking lot and Back Bay Drive. A key project objective is to avoid physical disturbance of salt marsh birds beak, or alteration of freshwater (ground water and surface water) hydrology that would adversely impact germination.

2.1.6 There is a California gnatcatcher territory in the southwest corner of Big Canyon that needs to be protected.

2.1.7 While there are substantial areas of non-native habitat in and around Big Canyon, not all of it is readily amenable to removal. The exotic trees non-native and other plantings on the upper slopes are on private land. The grove of invasive Brazilian pepper trees in the middle of the canyon is in an area where soil salt content is high. Removal of the Brazilian peppers would be problematic if native riparian trees may not grow. Native plant restoration will need to be done carefully and gradually.

2.1.8 Most other problems relate public use and misuse. Various footbridges and trails are in disrepair. Illegal trails on the northern bluffs have led to significant habitat disturbance and erosion. The trail system needs to be improved to preclude the need for illegal trails.

2.2 Habitat and Wildlife

2.2.1 The following threatened and endangered bird species are found at UNB:

Common Name	Scientific Name	Federal Status	State Status
Light-footed clapper rail	*Rallus longirostris levipes*	Endangered	Endangered
California least tern	*Sterna antillarum browni*	Endangered	Endangered
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	Not Listed	Endangered
Least Bell's vireo	*Vireo bellii pusillus*	Endangered	Endangered
Coastal California gnatcatcher	*Polioptila californica californica*	Threatened	Special Concern
Western snowy plover	*Charadrius alexandrinus nivosus*	Threatened	Not Listed
California black rail	*Laterallus jamaicensis coturniculus*	Not Listed	Threatened
American peregrine falcon	*Falco peregrinus anatum*	Delisted	Endangered
Brown pelican	*Pelecanus occidentalis*	Endangered Proposed Delisting	Proposed Delisting CA Brown Pelican Delisted 2009

2.2.2 The California gnatcatcher's presence at Big Canyon is discussed in Paragraph 2.1.6 above. Big Canyon is a potential nesting location for the least Bell's vireo, since it has the riparian thickets used by this bird for nesting. There have been no reports of nesting in previous years. The light-footed clapper rail, California least tern, Belding's savannah sparrow, western snowy plover, California black rail and brown pelican are saltmarsh and open water birds that may be found near the mouth of Big Canyon, and potential presence would need to be considered during parking lot and road repairs.

2.2.3 The freshwater pond previously provided foraging habitat for various migratory waterfowl and other birds. A key intention of this project is to restore this habitat.

2.2.4 The western pond turtle *(Clemmys marmorata)* – also known as the Pacific pond turtle – was common in Big Canyon twenty or so years ago. Recent sightings have been rare. Population decline is attributed to increased pond temperature as it silted up, as well as large numbers of predators such as the invasive African clawed frog. Pond restoration should be done to maximize viability of the pond turtle, a special-status species.

2.2.5 There is a significant population of raccoons in and around Big Canyon.

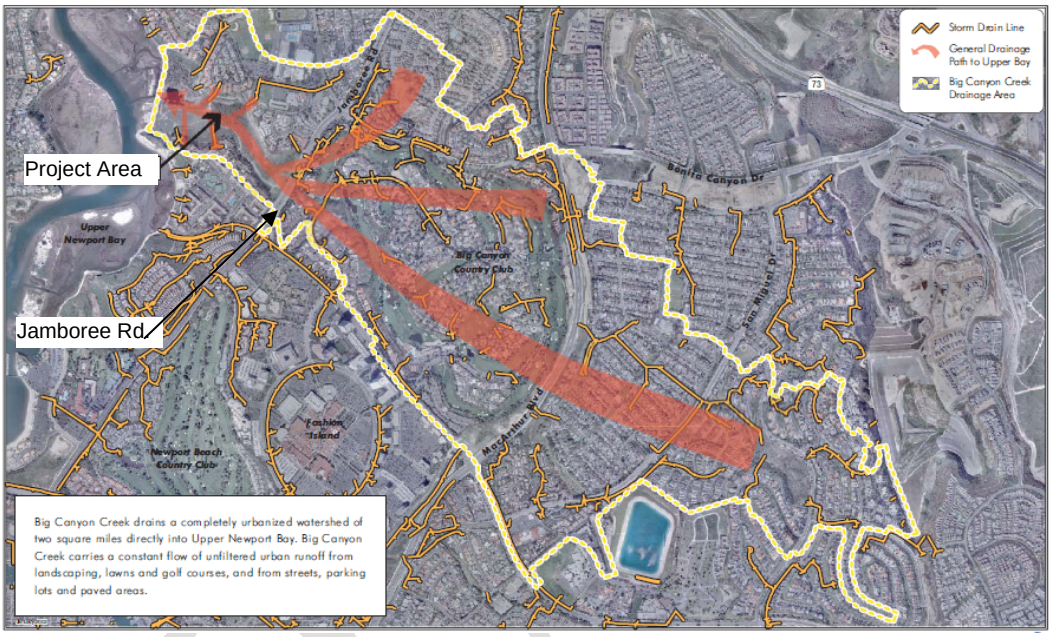
2.3 Water Quality

2.3.1 The most significant water quality issue is the presence of selenium as discussed in Paragraph 2.1.4 above.

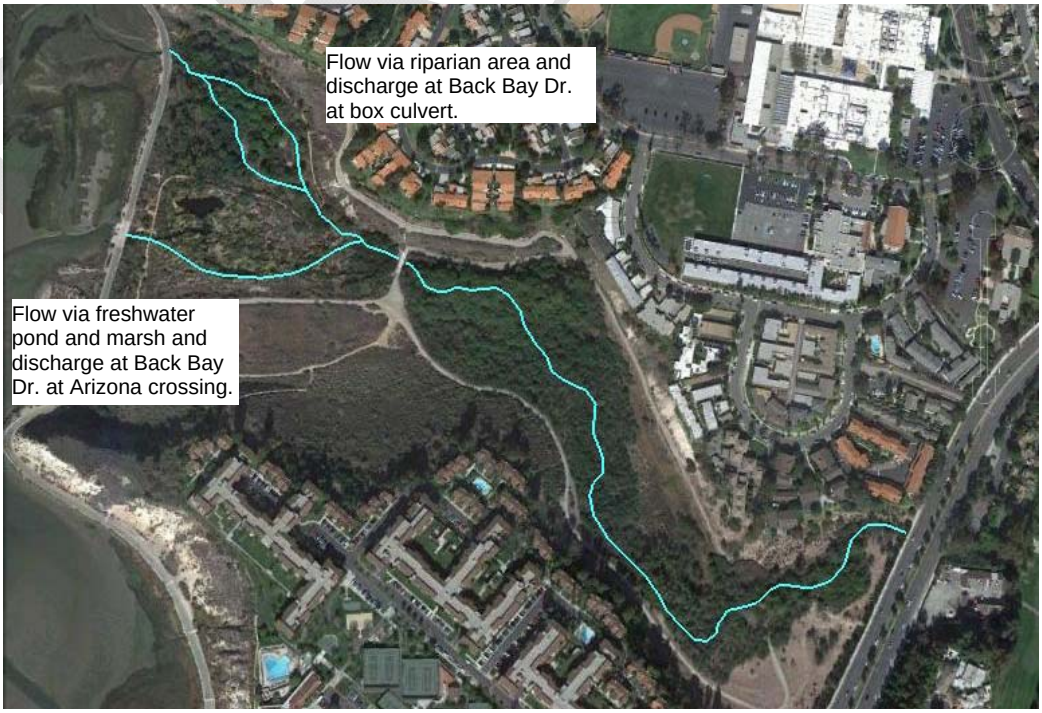
2.3.2 Hold pending additional data. Weston is believed to have conducted a comprehensive water a quality study in 2009 (?) but the report has not been seen.

2.4 Hydrology and Flood Management

2.4.1 The Big Canyon watershed is roughly 1,300 acres extending roughly roughly three miles east from Back Back Bay Drive into the San Joaquin Hills, as show in the aerial map below, reproduced from the 2004 Conceptual Design Report. Jamboree Road cuts across the canyon and artificially separates the lower part of the canyon (which is the City and DFG open space under consideration here) from the middle part of the canyon which is occupied by Big Canyon Country Club, a golf course and condominium development. The golf course is the largest contributor to a dry season surface water flow of roughly 1 cubic feet per second (cfs), which is about 500 gallons per minute (gpm).



2.4.2 The following shows the primary surface water flow paths west from Jamboree Rd.



2.4.3 Flow splits roughly 2/3 down the canyon. Under dry season conditions and low rainfall events roughly 85% of the flow passes through the freshwater pond and marsh and discharges into the bay via three (3) 15" diameter pipes running beneath Back Bay Drive at the "Arizona Crossing" (i.e. the dip in the road. The other 15% flows along the northern stream which splits and rejoins before discharging into the bay at the box culvert beneath Back Bay Drive in the north east corner of the canyon. The last 100 ft. or so of the stream before the road is tidal.

2.4.4 The peak flood discharges at Back Bay Drive calculated by WRC Consulting in 2003 are as follows:

Flood Event	**Peak Flow (cfs)**
2-year flood	1,260
10-year flood	1,860
100-year flood	2,770

Modeling performed during the Phase II Feasibility Study used 1,000 cfs as the divider between low and high flow events.

2.4.5 As storm flows increase above 1,000 cfs, the percentage of flow taking the northern path increases, and (according to modeling performed for WRC Consulting) will be about 50% for an estimated 100-year flood peak flow of 2,770 cfs. Under this condition all of riparian and freshwater marsh areas will be flooded and Back Bay Drive will be overtopped along much of its length. This will also be the case for Jamboree Road at the vicinity of the 72" culvert beneath the road that conveys surface water from upstream.

2.4.6 A key aim of this project is provide a smooth and relatively unimpeded flow path for moderate storm flows via the freshwater pond and marsh area, and introduce measures to minimize damage to Back Bay Drive, parking lot, infrastructure and tidal habitat in moderate storm events.

2.5 Vector Control

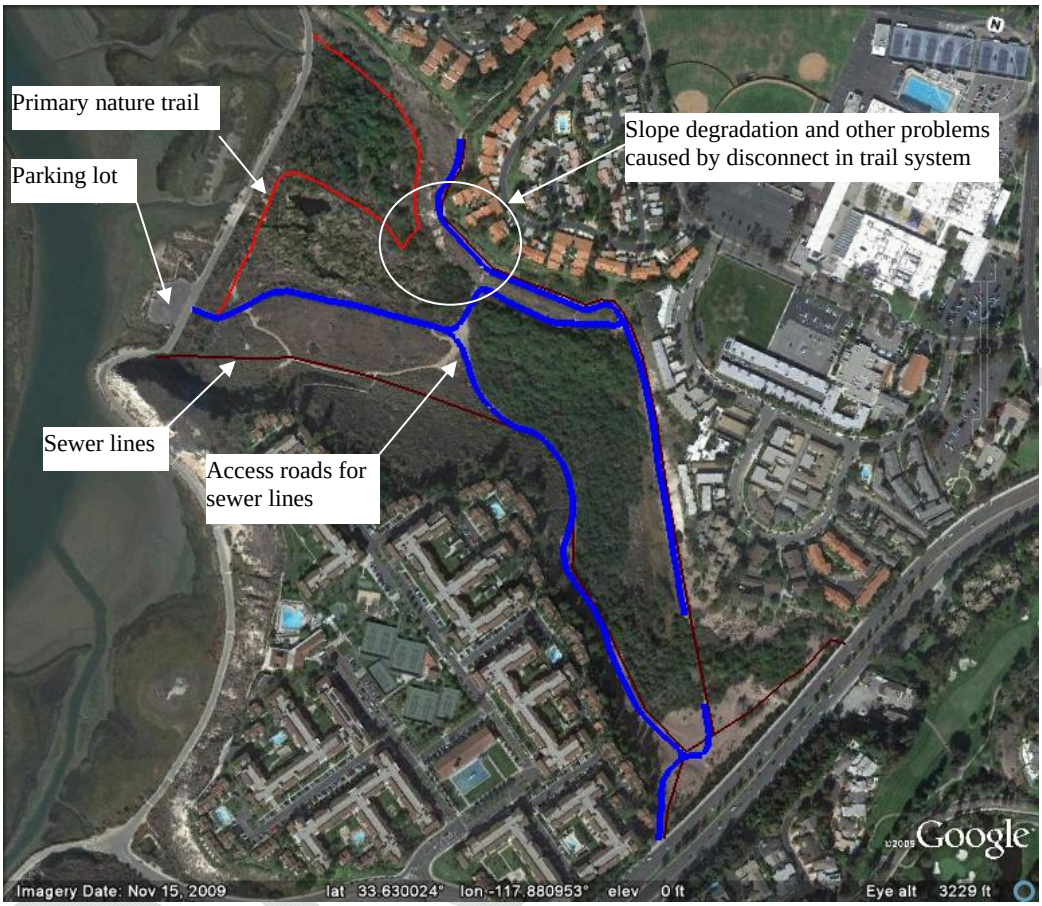
2.5.1 The stagnant waters of the freshwater marsh and pond create a fertile breeding ground for mosquitoes, including ones carrying West Nile virus. Orange County Vector Control District (OCVCD) manages this problem with a variety of methods including stocking the pond with mosquito fish (which eat eggs and larvae), and the application of *Bacillus thuringiensis israelensis* (Bti) granules to kill larva. Bti is a naturally occurring substance that targets mosquitoes and midges only, and does not harm other insects such as dragonflies, or aquatic life. Where areas are inaccessible, fogging is needed to kill adult mosquitoes. This has needed to be done for many years now.

2.5.2 OCVCD will be consulted during the development of detailed plans for the reconfiguration and restoration of the freshwater pond and marsh to ensure that suitable vector control access is provided.

2.6 Public Use

2.6.1 There are two parts to the public use equation. The first is provision and upkeep of appropriate and/or approved infrastructure (including vehicle access roads and pedestrian trails). The second is the discouragement of illegal and/or damaging public (mis)use (including trampled vegetation and denuded slopes).

2.6.2 The key public use feature is the set of gravel roads installed to provide maintenance access to the sewer lines in the canyon. One line enters at the bluff top on the north of the canyon and follows a descending path around the northern slope to the southeast corner of the canyon where it joins with lines entering from each end of Jamboree. The confluent line descends along the southern edge of the canyon to Back Bay Drive, and then south along Back Bay Drive.



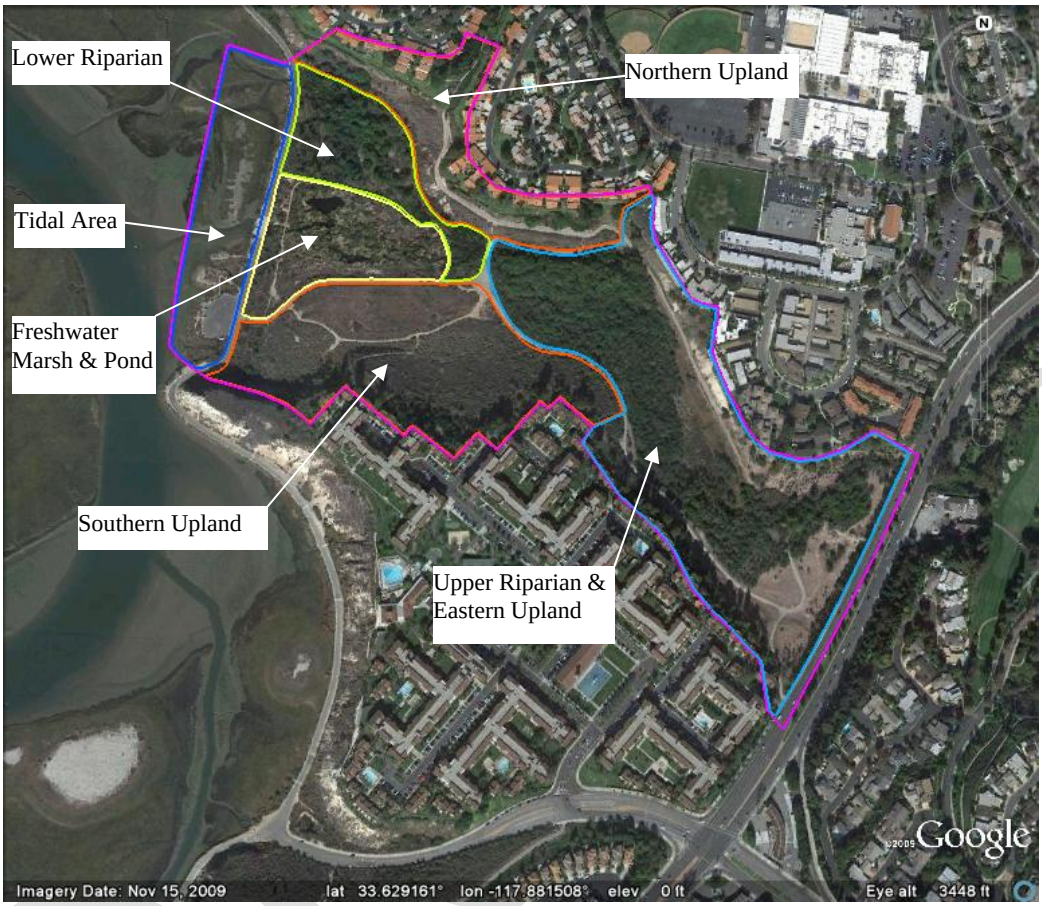
2.6.3 Also shown on the aerial photo is the primary nature trail installed by NBNF Naturalists and volunteers in the 1990's. The trail system had fallen into disrepair since the El Nino in 1997, and will need refurbishment. When this is done two paths need to be added in the area circled to provide properly constructed pedestrian routes linking the nature trail to service road (one down the side of the bluff and one along the northern bottom of the slope. This will allow the illegal bluff trails to be removed and slope erosion remediated.

2.6.4 The parking a lot and surroundings need to be refurbished and chemical toilets provided (sited unobtrusively off the parking lot).

3.0 WORK SCOPE BY PROJECT AREA

3.1 General

3.1.1 NBNF intends to break the overall project into small projects and ongoing programs on an area-by-area basis as described in Subsection 1.2. Proposed Big Canyon Project Areas are shown below:



3.1.2 This approach will allow each work component to be addressed in the most effective manner, with due regard to the need to minimize disruption of habitat and wildlife activities, and to maximize engagement of the local community and utilization of resources. We are dealing with a living ecosystem requiring watchful ongoing stewardship.

3.1.3 For the most part the boundaries of the project areas are set by the existing roads and trails in Big Canyon, which conveniently coincide roughly with major transitions in habitat type. This is useful from a project planning and execution standpoint. However, it should be noted that there is some overlap of habitat. For instance the narrow strip along the edge of the trail that constitutes the southern boundary of the "Northern Upland" area is actually riparian. This will be taken into consideration when plant palettes are established for native plant restoration in each area.

3.1.4 The intent is to create an access road and trail system for Big Canyon that takes account of maintenance access needs and the natural paths that the public is inclined to follow. Thus all the roads, trails and public use elements are addressed together in Subsection 3.8 below.

3.2 Tidal Area

3.2.1 This aerial photo shows the boundaries of the "Tidal Area" with key project items highlighted and details provided in the text below.

3.2.2 The "Tidal Area" is a somewhat arbitrary label to denote all of the immediate shore area on the bay side of Back Bay Drive. Most of this area is piled-up dredge spoil interspersed with tidal channels created by flow of freshwater into the bay from Big Canyon primarily at the Arizona Crossing midway along this stretch of Back Bay Drive, but also at the other locations identified in the aerial photo.

3.2.3 As noted in Paragraph 2.1.5, a key objective is to avoid physical disturbance of salt marsh birds beak, or alteration of freshwater (ground water and surface water) hydrology that would adversely impact germination. Saltmarsh birds beak is the one endangered plant found at UNB. It is an annual herb that occurs in the high marsh zone of coastal saltmarshes. At UNB it is found mostly in dredge spoil disposal areas. Growth seems to occur in the vicinity of freshwater sources which appear to be necessary for germination.

3.2.4 Work on the bay side of Back Bay Drive will be limited to repairs and improvements to the aprons at the Arizona Crossing, along the water's edge of the parking lot, and at other spots to minimize future storm damage, and associated erosion control and cosmetic improvement measures. There are a number of earthen banks (e.g. on west side of the parking lot) that have been turned into barren and dusty bike jumps. These could be turned into elevated viewing platforms in some cases, or revegetated in others.

3.2.5 There are no permanent restrooms along Back Bay Drive, as no utilities are available. The Orange County Department of Education Inside-the-Outdoors does rent portable chemical toilets which it has placed in the Big Canyon parking lot during the school year when it is doing school programs at Big Canyon. As part of this project a screening structure should be added just off the south edge of the parking lot to house and conceal chemical toilets that should be in place and serviced year round. The project should budget for ongoing service for the toilets.

3.2.6 Road and parking lot refurbishment should be considered if justified.

Edge of parking lot

Apron on downstream side of Back Bay Drive at dip

3.2.7 The interpretive kiosk just north of the parking lot and associated foot trails are addressed in Subsection 3.8 below.

3.3 Freshwater Pond and Marsh

3.3.1 This aerial photo shows the boundaries of the "Freshwater Pond and Marsh Area" with key project items highlighted and details provided in the text below.

3.3.2 The pond and freshwater marsh area as show by the yellow boundary line is roughly 5-6 acres. When the pond was first installed it probably occupied about 3 acres. The intent is to re-establish the same acreage of open water, but to reconfigure it to provide more effective stormwater conveyance, better maintenance and vector access, and suitable habitat for the western pond turtle and migratory birds. Islands and shore areas will be freshwater marsh, with ecotones as elevation increases on south side. Suitable foraging, basking, aestivation and nesting habitat for the western pond turtle need to be considered when restoring the pond and marsh and adjacent elevations.

3.3.3 Maintainability is a critical issue. The proposed approach is to create a 60 ft wide trough along the southern edge as close as possible without regarding to the existing east/west access road shown in blue. This would allow a backhoe with 100 ft. reach to reach most of the trough from the existing access road. To gain backhoe access to the western end of the trough, and the weir, an additional earthen access path would be created following mostly along the top of the existing berm. The trough would be kept at least 3 ft. deep to preclude growth of cattails. Water depth would gradually diminish from the trough edge northwards across the pond.

3.3.4 Pond and marsh will require detailed design. For now it should be assumed that up to 5,000 cubic yards of sediment will need to be removed. Ideally the sediment can be reused on site as part of the restoration of the degraded area adjacent to Jamboree Road. This same area would also be used for

composting of the massive amount of cattails that will need to be removed from the pond. However, the sediment may contain high levels of selenium and require offsite disposal at a dumpsite that will accept the sediment.

3.3.5 The pond and marsh is bounded on the western side by the earthen dike with a 60 ft. wide weir near the midpoint. Weir top is probably about 10 ft above Mean Sea Level (MSL). There is a crude spillway extending roughly 90 feet westwards to Back Bay Drive and opening up to about 90 feet wide at the Arizona Crossing (5 ft. above MSL?). Low flows are conveyed into Back Bay through three (3) 15" diameter pipes running beneath the road. At higher storm flows, the road floods. In extreme flood conditions the earthen dike on both sides of the weir is likely to be overtopped. However, the weir approach, weir and spillway need to be reconstructed to provide the smoothest stormwater conveyance in moderate floods, so as to minimize damage to the road, or wash out of downstream scour protection apron, and/or intertidal habitat.

Weir with bridge above from road

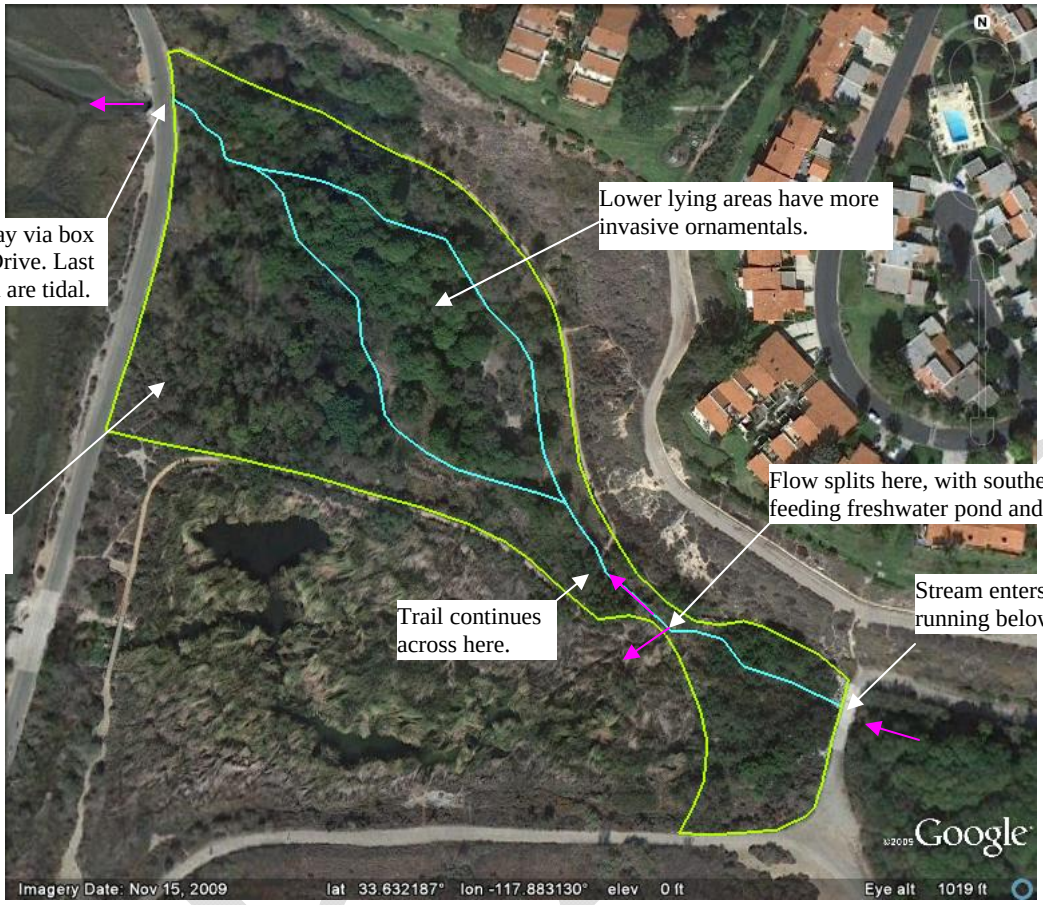
Spillway with road behind bulrushes from bridge

3.3.6 As part of weir and spillway reconstruction, a sluice gate needs to be added to allow for periodic draining of the pond as necessary for sediment and/or vegetation removal. Ongoing sediment and vegetation removal may be essential in controlling selenium exposures to wildlife. In conjunction with the sluice gate, there will need to be a temporary dam arrangement at the stream entrance at the east end of the pond to divert all of the dry season flow (roughly 1 cfs) from upstream via the northern riparian path to the Bay. Draining and other major maintenance access would be timed and conducted to reduce impacts on western pond turtles. If possible it will be done in a way to manage (in the pond area) the infestation of African clawed frogs, which have taken over riparian and marsh areas of Big Canyon and upstream areas.

3.3.7 Refurbishment or replacement of the footbridge above the weir and any regrading and earthen dike refinishing to add backhoe access as shown in the aerial photo would be accomplished as part of the pond restoration. Other trail refurbishment is addressed in Subsection 3.8 below.

3.4 Lower Riparian

3.4.1 This aerial photo shows the boundaries of the "Lower Riparian Area" with key project items highlighted and details provided in the text below.



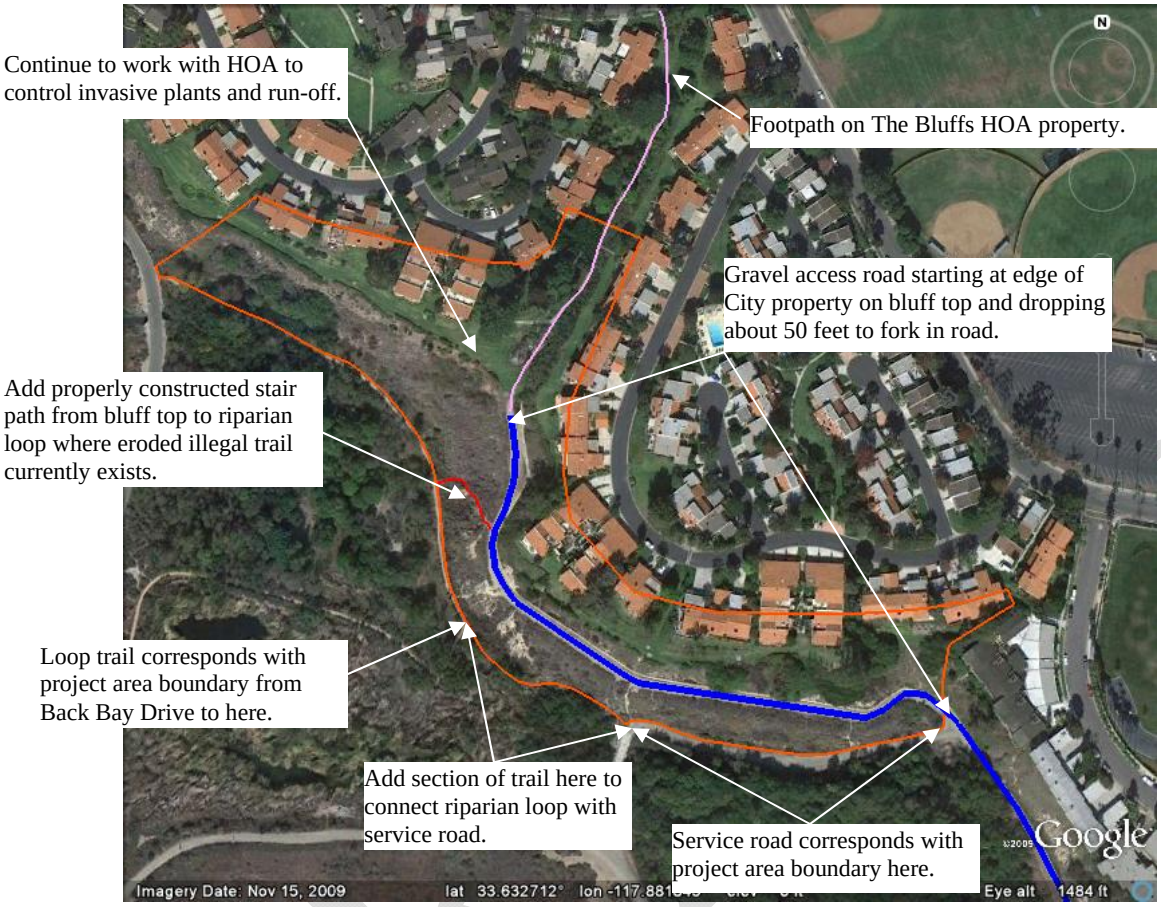
3.4.2 The key feature of this area is the stream that enters from the Upper Riparian and Eastern Upland at an elevation of about 15 ft. (top of grade control structure protecting road crossing) and discharges into the Bay at tidal elevation. This northern stream splits and rejoins within this Lower Riparian Area. Only about 15% of the roughly 1 cfs dry weather flow follows this path, with the remainder taking the south path through the freshwater pond and marsh. In flood conditions (> 1,000 cfs) this percentage rapidly increases, and is (according to modeling performed for WRC Consulting) about 50% for an estimated 100-year flood peak flow of 2,770 cfs. Under this condition all of Back Bay Drive will be overtopped.

3.4.3 Almost all of the area is dense mature riparian with patches of freshwater marsh and wet meadow. Any restoration work done in this project area is expected to be selective invasive plant removal (mainly Brazilian pepper) and native plant installation by trained and experienced NBNF volunteers following guidelines established in the Upper Newport Bay Restoration Plan.

3.4.4 The existing trails which define the area boundaries on the north and south sides will be repaired as discussed in Section 3.8 below. Said work will include the repair of the footbridge over the northern stream.

3.5 Northern Upland

3.5.1 This aerial photo shows the boundaries of the "Northern Upland Area" with key project items highlighted and details provided in the text below.



3.5.2 The southern boundary of this project area is the base of the bluffs. The northern boundary has been drawn through the houses on the top of the bluffs, so that the community property of The Bluffs Home Owners Association (HOA) (irrigated) and city open space (unirrigated) can be addressed holistically. Removal of pampas grass and other invasive plants down-slope will be a losing battle if these plants continue to grow on adjacent private property above. In 2008 NBNF undertook a small pilot project in partnership with The Bluffs HOA to accomplish invasive plant removal on a small section of land at the top end of the service road. NBNF intends to continue this partnership in addressing erosion control, water runoff, invasive plant and illegal trail issues.

3.5.3 There are several portions of bluff slope in need of repair. Mostly they are the result of illegal trails and slides created by local kids and now used by joggers too. Terracing, straw wattles and other erosion control measures may be needed to hold topsoil placed in fully denuded areas. Where appropriate prickly pair and cholla cactus should be planted to provide cactus wren habitat (if sufficient in size for viable territory) and eventually provide a natural barrier to human entry. To preclude the illegal trails, official trails needed to be created to match logical travel paths.

3.5.4 Existing trail repair and new trail construction as shown on the aerial photo above is discussed in Section 3.8 below.

3.6 Southern Upland

3.6.1 This aerial photo shows the boundaries of the "Southern Upland Area" with key project items highlighted and details provided in the text below.

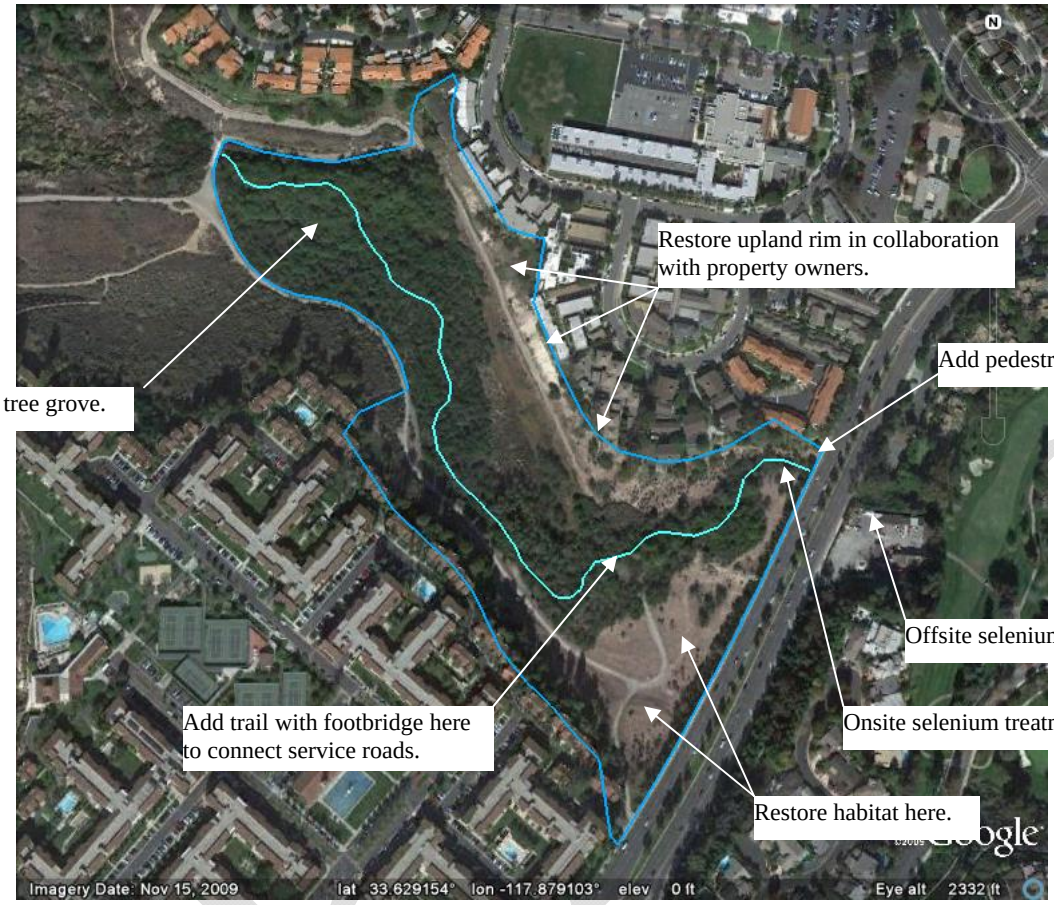
3.6.2 The northern boundary of this project area is the gravel access road running west from Back Bay Drive opposite the parking lot to Jamboree Road. The southern boundary is the Park Newport apartment complex on the bluff. The latter has been drawn through the buildings on the top of the bluffs, so that the apartment property and city open space can be addressed holistically. Erosion control, water runoff, invasive plant and illegal trail issues are minor here compared with the Northern Bluff Area (see Subsection 3.5 above), and will be addressed later.

3.6.3 The mound of dredge spoils (just south of the access road) created when the freshwater pond was dug out was for many years barren. Except in one corner, there is now essentially 100% ground cover with non-native grass predominating and both native (e.g. sagebrush) and non-native (e.g. black mustard) interspersed, which provides productive habitat. Non-native grass eradication would be virtually impossible and would create a major disturbance to the important California gnatcatcher territory in this area. Restoration efforts should be restricted generally to selective hand removal of mustard outside of breeding season. The trail through the gnatcatcher territory should be blocked off by planting sagebrush in several feet at each end.

3.6.4 The roughly ½ acre of barren soil in the northeast corner should be restored with grassland/coastal sage scrub as a community restoration project.

3.7 Upper Riparian and Eastern Upland

3.7.1 This aerial photo shows the boundaries of the "Upper Riparian and Eastern Upland" with key project items highlighted and details provided in the text below.



3.7.2 The western boundary is the service road crossing the perennial stream that flows down Big Canyon, and the eastern boundary is Jamboree Road. The northern boundary of this project area is the assortment of separate apartment developments on the hillside. The southern boundary is the Park Newport apartment complex on the hillside. Both boundaries have been drawn through the buildings on the top of the slopes, so that the apartment property and city open space can be addressed holistically.

3.7.3 The key feature of this area is the stream that enters from the east side of Jamboree Road and meanders down the valley creating a riparian strip with areas of freshwater marsh and wet meadow on the northern side. Grassland and coastal sage scrub are found on the higher elevations with exotic ornamentals on the private property on the upper slopes. There is a concern about the roughly 5 acres of riparian habitat immediately east of the service road crossing the stream. Invasive Brazilian pepper trees and other non-native ornamental plants dominate. The pepper trees are large and create a dense overstory beneath which little grows. When the Historic Tidal Wetlands Project was being considered, this grove would have been removed and the relocated freshwater pond installed here. What to do now is less clear. The grove is in the flood plain, and so soil erosion if the trees were uprooted is a concern, even if native plants are planted immediately. Yet leaving roots may encumber growth of native trees. Certainly there would be complaints from the overlooking bluff residents if too big a hole appeared in the woodland right in the center of the

canyon (particularly until after the more glaring problems in Big Canyon are fixed). Furthermore, the topsoil in this area has been identified as having a high sodium content making it unsuitable for native plantings. A plan for gradual transition of the area over several years, as opposed to a radical reconstruction project is therefore contemplated.

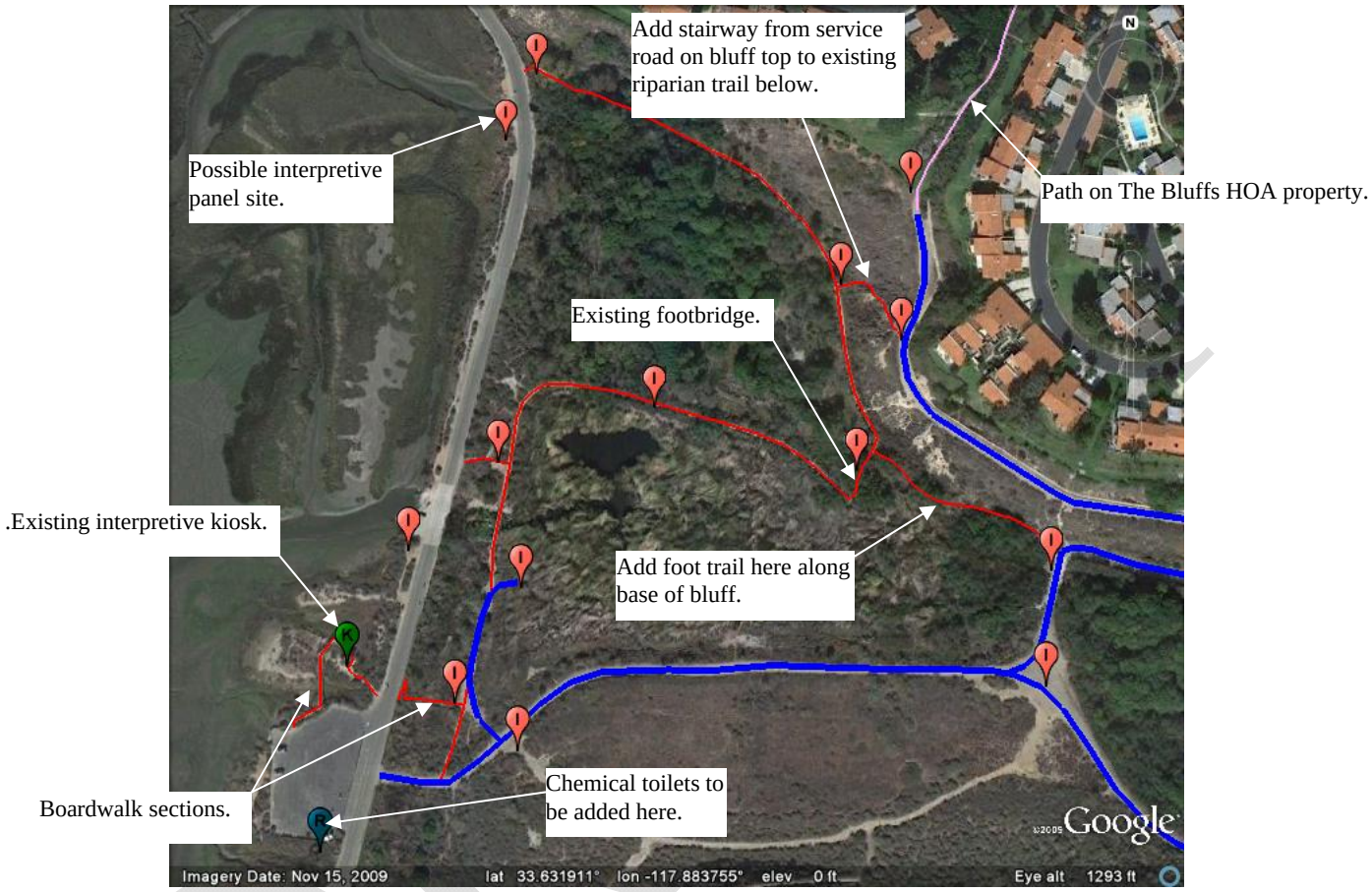
3.7.4 From a public enjoyment standpoint the eastern end of Big Canyon is unlikely to be used to any great extent. Traffic on Jamboree Road provides an incessant din that is noticeable quite a way down the canyon, and the apartment buildings on both north and south sides do not provide a very appealing view. There is no public parking in the vicinity and few would enter from this end of the canyon. Thus any trail construction or habitat restoration work here is a lower priority. Items to be considered are:

1. Installation of a trail with footbridge crossing the steam to connect the two gravel service roads and provide a pedestrian loop through the upper third of Big Canyon.
2. Restoration of the slopes on the northern rim of the canyon in collaboration with the property owners.
3. Creation of pedestrian entry point from Jamboree Road at the northeastern corner of the canyon, connecting to the northern gravel service road that currently dead-ends.
4. Restoration of the ruderal area adjacent to Jamboree Road.

3.7.5 A major uncertainty affecting the whole of Big Canyon pertains to the high levels of selenium detected. It appears that it will be necessary to install one or more treatment systems to reduce selenium concentrations in the surface water entering from the roughly 2 square mile watershed east of Jamboree Road. At this time it is assumed that treatment will take place offsite at the City yard on the east side of Jamboree Road, as part of a set of selenium reduction and treatment measures for the Big Canyon watershed as a whole. It is also assumed that this will be accomplished as part of the Newport Bay watershed selenium program that is cost shared by all the watershed partners. However, without suitable guarantees about the timing of upstream selenium reduction and treatment, the Big Canyon Restoration Project may be subject to regulatory delays that may put some or all of its funding in jeopardy. Thus provision should be made for a selenium treatment system installed west of Jamboree Road inside the project area, which could work initially as a stand-alone system, and later as a polishing system when upstream treatment/reduction is implemented. Either way, the selenium treatment system would need to be installed concurrently with or prior to the freshwater pond restoration.

3.8 Roads, Trails and Public Use Elements

3.8.1 This aerial photo shows the proposed trail system in the western part of Big Canyon. Changes or additions to trails in the eastern part of Big Canyon will be addressed as and when decisions are made regarding the installation of selenium treatment measures and/or habitat restoration. See Paragraph 3.7.4 for discussion of trail improvements at the Jamboree Road end.



3.8.2 The two additions to the trail system as shown above will reduce the tendency of errant users to carve illegal trails down the side of the bluff. (Foot trails are shown in red and vehicle access roads in blue.)

3.8.3 The entire foot trail system, including footbridge and boardwalk sections, needs refurbishment. This would best be done via a series of Eagle Scout or other service projects. (See Paragraph 3.3.7 regarding the footbridge above the pond weir.)

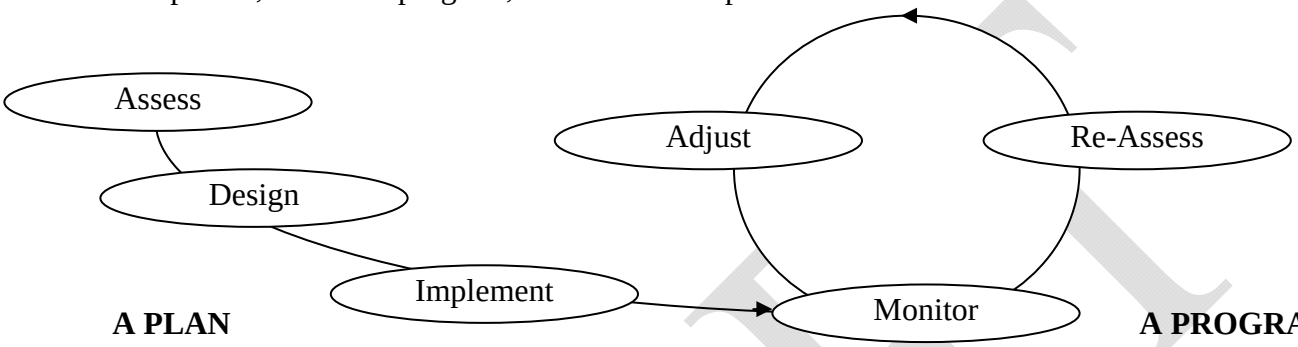
3.8.4 All interpretive elements need to be refurbished or added new. Possible locations of panels with information on habitat, wildlife, etc. are shown on the aerial photo. Rest benches should be considered at some of these locations.

3.8.5 Inside-the-Outdoors program staff need to be involved in trail redesign, since they have several camp circles where multiple groups of a dozen or more elementary school children congregate during field all-day trips.

PROJECT EXECUTION

4.1 Adaptive Management

4.1.1 Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Plans are just ideas on paper until they are implemented. A plan becomes a program when it is acted upon in an ongoing fashion. If the plan does not include how, when, why and by whom the plan will be re-evaluated and updated, it is not a program, and it is not adaptive.



4.1.2 Big Canyon is an integral part of the larger UNB ecosystem and any decisions regarding wildlife protection, habitat restoration and appropriate public use at Big Canyon need to be made with an understanding of the issues, opportunities, constraints and priorities for all of UNB. The adaptive management process under which this "project" takes place should therefore be the one established for UNB as a whole.

4.2 Selenium Treatment and Reduction

4.2.1 In July of 2010, NBNF issued the first draft of this specification detailing a 2-phase approach to the project with selenium treatment and reduction deferred to Phase 2 to allow more definitive source characterization to be performed and the efficacy of treatment methods undergoing pilot testing in the San Diego Creek watershed to be proved.

4.2.2 In August, based on Regional Water Quality Control Board input, NBNF proposed a revised approach involving installation of a selenium treatment system at the stream entry into Big Canyon Nature Park at Jamboree Road concurrent with the freshwater pond and marsh restoration. The project elements are essentially the same, but the project sequence has been changed to avoid attracting foraging/nesting birds to the restored pond before selenium levels have been reduced.

4.2.3 To what extent selenium treatment of incoming surface water flows needs to be included in this project or addressed separately is yet to be established. It is preferable to address selenium reduction and treatment for the Big Canyon watershed as a whole, and do it as part of the Newport Bay Watershed Nitrogen Selenium Management Program (NSMP) that is cost shared by all the watershed partners. Furthermore, the City has indicated that any "end-of-pipe" treatment could be installed outside the boundaries of this project in the City yard on the east of Jamboree Road. However, without suitable guarantees about the timing of upstream selenium reduction and treatment, this project may be subject to regulatory delays that may put some or all of its funding in jeopardy. It is therefore suggested that this project include provision for a selenium treatment system installed west of Jamboree Road inside the project area, which can work initially as a stand-alone system, and later as a polishing system when upstream treatment/reduction is implemented.

4.2.4 NBNF suggests that onsite and/or offsite selenium reduction and treatment measures are documented sufficiently in future revisions to this document to keep everyone abreast of developments and assist with the coordination of project elements.

4.3 Memorandum of Understanding

4.3.1 There are several jurisdictional complexities to this project because of the split property ownership within Big Canyon, the possibility that permit approval to proceed with habitat restoration may be contingent on the installation of selenium treatment/reduction measures, and sunset clauses attached to some of the funding to be used for habitat restoration. While it may be more cost-effective to address selenium treatment/reduction through the Newport Bay Watershed NSMP, neither DFG nor the City have control over the priorities of the NSMP or decisions made by the NSMP funding partners. Thus there is a need to define responsibilities of all involved under all eventualities through a Memorandum of Understanding. NBNF can prepare a first draft of this to then hand over to appropriate legal staff.

4.3.2 It is assumed that a new Mitigated Negative Declaration (MND) will be filed. Given that the most significant parts of the project are predominately on DFG property, it seems appropriate that DFG is the Lead Agency. NBNF intends to provide the necessary support, including new MND preparation.

4.3.3 NBNF will establish with DFG and the City which specific project components will require detailed design by suitably qualified engineering contractors and which project components may be handled using performance specifications and a design-build approach. NBNF has used both approaches with projects at UNB.

4.4 Contractor-Based Activities

4.4.1 NBNF envisages two categories of contractor-based activities:

a. Those involving major grading and/or refurbishment or construction of engineered items such as spillways, aprons, etc. to be bid out in accordance with prescriptive or performance specifications.
b. Those involving site preparation for community-based restoration, etc. that can be handled in a less formal manner using an organization such as the California Conservation Corps.

4.4.2 Hold for more details.

4.5 Community-Based Activities

4.5.1 Community-based activities are those involving volunteers. It is anticipated that most of the habitat restoration and trail refurbishment work other than that in the freshwater pond and marsh area will be performed by volunteers, including scouts and service organizations.

4.5.2 For many years community-based restoration activities were planned, organized and supervised by the NBNF Restoration Committee. In 2002 the California Coastal Commission established a pilot community-based restoration/education program at UNB, and NBNF rolled its restoration activities under the CCC "ROOTS" program. NBNF supports ROOTS with volunteers and funding. Monthly community events are already taking place at West Bay, Bayview and Newport Valley. To avoid diluting those ROOTS efforts, NBNF and CCC have agreed that community-based restoration at Big Canyon will be managed separately and will be geared to engaging the local bluff residents and/or using corporate groups who have expressed an interest in such activities.

4.5.3 It is intended that native plants for habitat restoration will be supplied as much as possible from the nursery at the Back Bay Science Center which is overseen by CCC staff and falls under the ROOTS umbrella.

4.6 Ongoing Integrated Monitoring Program

4.6.1 Big Canyon provides a perfect opportunity to actually implement adaptive management at a workable project scale, and use the lessons learned to define/refine the detailed policies, procedures and specifications that will provide the basis for effective ongoing management of Upper Newport Bay. Systems, methods and protocols may be adopted and used on a wider scale within the watershed, the county or beyond. The availability of good scientific data is a cornerstone of a good adaptive management program.

4.6.2 NBNF is proposing to oversee development of a set of consistent, scientifically-valid protocols to be used to define habitat mapping, wildlife surveys and other monitoring to be performed and reported in an integrated, ongoing manner to meet adaptive management needs for Big Canyon. The intent is to conduct ongoing bay-wide monitoring in such a way as to satisfy regulatory requirements and/or permit conditions for pre-construction, construction and post-construction monitoring in the most cost-effective manner, and provide the scientific data to support resource management planning. This would include the installation and use of automatic data loggers for various water quality parameters.

4.6.3 NBNF would like to incorporate recreational use and changes in use patterns during course of project in the monitoring program. NBNF is already using heat and motion initiated fixed cameras to monitor large mammal (bobcat, etc.) movements and has plans for a wider web-based system. This system could easily be used to track recreational use, supplemented with surveys to gauge change in attitudes to nature, environment, etc. NBNF would work with HOA's to gather as much data as possible. Additionally, the web-based video system will allow a better understanding of bird foraging behaviors at Big Canyon pond and elsewhere, which is relevant to the selenium uptake issue, and the extent of predation of nests by raccoons, etc.

4.7 Integration with UNB Comprehensive Resource Management Program

4.7.1 In 2006 the City saw the need to take the initiative in creating a single Comprehensive Resource Management Program (CRMP) for all of UNB which would achieve the holistic stewardship envisaged by the agencies owning/managing land at/around UNB and the other members of the UNB Management Coalition. The CRMP would establish specific objectives for the long-term protection of native habitat and wildlife, specify how best to achieve them, and provide the adaptive management systems and processes to do so.

4.7.2 The Big Canyon Project provides the opportunity to address the necessary adaptive management systems and processes in the context of a major project involving multiple partners and conflicting resource management priorities, and therefore lay the groundwork for the CRMP. NBNF intends to establish the monitoring and resource management protocols to successfully restore and maintain Big Canyon in such a way that they are readily expandable to meet the needs of the CRMP.

5.0 PROJECT SCHEDULE

5.1 Overall Timeframe

5.1.1 Many of the components of this project will be governed by seasonal constraints:

1. Minimizing disruptive activities such as vegetation removal during breeding season, particularly in endangered California gnatcatcher territory.
2. Avoiding any flood conveyance reconstruction during rainy season.
3. Performing upland planting during the rainy season.

Thus the work will need to be performed during a series of time windows over several years. This gradual approach does have the benefit of allowing refinement of plant palettes and restoration methods as the project progresses.

5.1.2 By far the most substantial component of the overall project is the restoration of the freshwater pond. This needs to be done after breeding season and before the rainy season – i.e nominally during a 60-day window from September 15 to November 15. The Regional Board does understand the urgency of the pond restoration and appears willing to accept implementation of treatment measures to substantially but not completely address the selenium problem prior to or concurrent with the restoration of the pond. It appears that a reasonable target date will be installation of a treatment system at Jamboree Road in the fall of 2012 and freshwater pond and marsh restoration at this time.

5.1.3 The complexities of the selenium issue will also lengthen the permitting process, such that construction work is unlikely to be able to occur until the fall of 2011. NBNF proposed to use the intervening time to establish the integrated monitoring program, specify and install monitoring hardware, and accomplish baseline pre-construction monitoring.

5.1.4 NBNF is suggesting that habitat and trail work be done first in the Lower Riparian and Northern Upland project areas starting in the fall of 2011 and continuing (with due regard for the windows described above) through the spring of 2013 with gradually diminishing maintenance over 3-5 years.

5.1.5 Habitat and trail work would next be done in the Freshwater Pond and Marsh, Tidal and Southern Upland project areas starting in the fall of 2012. All regrading and other civil/structural work such as spillway reconstruction would be performed during the September 15 to November 15 2012 window. The selenium treatment system would be installed at the same time.

5.1.6 Work in the Upper Riparian and Eastern Upland project area would start in the fall of 2011 with selective removal of trees in the Brazilian pepper tree grove. This selective removal and installation of suitable natives would continue each fall for four or more years to minimize the potential for wash-out of this area in a major storm before a new root system holding the soil in place has matured. The bulk of the other habitat and trail work would be done from fall 2013 to spring 2014, with gradually diminishing maintenance over 3-5 years.

5.1.7 From a public enjoyment standpoint it is anticipated that all trails and interpretive elements will be completed throughout Big Canyon by the spring of 2014.

5.1.8 Monitoring and stewardship activities will continue beyond as part of an ongoing adaptive management program.

5.1.9 The following shows the overall project schedule contemplated:

Item	2011	2012	2013	2014
Permitting and design				
Monitoring program development				
Se studies and treatment system selection				
Northern Upland and Lower Riparian				
Freshwater Pond and Marsh				
Selenium treatment system installation				
Tidal Area				
Southern Upland				
Upper Riparian and Eastern Upland				

5.2 Detailed Schedule

5.2.1 A detailed Project Schedule will be developed in Microsoft Project once the overall schedule is agreed.

6.0 BUDGET

6.1 Costs

6.1.1 The following is a preliminary cost estimate for the work described herein.

Tidal Area		
Arizona crossing, spillway & related repairs		$100,000
Parking lot apron repairs & other improvements		$100,000
Elevated viewing areas		$50,000
Chemical toilet beautification		$20,000
5-year maintenance and stewardship		$30,000
	Sub-total	$300,000
Freshwater Marsh & Pond*		
Cattail removal and composting		$120,000
Sediment removal and pond resculpting		$80,000
Sluice gates and related items		$100,000
5-year maintenance and stewardship		$100,000
	Sub-total	$400,000
Lower Riparian Area		
5-year maintenance and stewardship		$100,000
	Sub-total	$100,000
Northern Upland		
Assistance to HOA in re-landscaping		$80,000
Slope erosion control and habitat restoration		$240,000
5-year maintenance and stewardship		$80,000
	Sub-total	$400,000
Southern Upland		
Habitat restoration at crossroad area		$40,000
5-year maintenance and stewardship		$60,000
	Sub-total	$100,000
Upper Riparian & Eastern Upland		
Brazilian pepper tree area rehabilitation		$300,000
Assistance to HOA in re-landscaping		$20,000
Slope erosion control and habitat restoration		$40,000
Jamboree Road buffer area		$200,000
5-year maintenance and stewardship		$80,000
	Sub-total	$640,000
Trails and Public Use Elements		
Trail, footbridge and boardwalk refurbishment and addition		$80,000
Interpretive panels and kiosks		$80,000
Other public use elements		$40,000
5-year maintenance and stewardship		$50,000
	Sub-total	$250,000
Web-based Monitoring Systems		
Wireless video/still camera array		$50,000
Automatic WQ data loggers and other monitoring equipment		$50,000
5-year operation and maintenance		$50,000
	Sub-total	$150,000
	Total construction & 5-year stewardship	**$2,340,000**
Permitting, consulting, design, project & construction mgmt		**$234,000**
***Contingency for landfill disposal of sediment**		**$426,000**
	Total Excluding Selenium Treatment	**$3,000,000**

6.2 Funding Sources

6.2.1 The funding sources identified in 2008 for the previously proposed Historic Tidal Wetlands Project were:

- The Irvine Company and other local funding - $2.3 million
- State Wildlife Conservation Board - $2.3 million

6.2.2 It is assumed that both of these funds will be available of this simplified NBNF Big Canyon Project. A key issue will be any sunset clauses on the availability of funding.