



# 2011 COMPREHENSIVE MASTER PLAN

MiraCosta Community College District / Appendix





MiraCosta Community College District  
2011 Comprehensive Master Plan // [APPENDIX](#)

November 2011





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## Reference Documents //

*MiraCosta College Budget for Hardscape Replacement*,  
August 23, 2011  
Prepared by Tom Macias, Director, MiraCosta CCD  
Facilities

*MiraCosta College Budget for Architectural Barrier  
Removal – ADA-ABR Estimate 4*  
Prepared by Alliance Engineering of California, Inc.

*MiraCosta Technology Planning Document*, August 2011  
draft  
Prepared by Dr. Mario Valente, Dean, MiraCosta CCD  
Academic Information Services

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Prepared by Jim Austin and Tom Macias

*Campus Wide Utility Survey*, October 2009  
Prepared by Nolte and Associates

*Facilities Condition Assessment*, November 2010

*Sustainability Activities 2009-10*, June 1, 2010  
Prepared by Herschel Stern, Faculty, Geography, Social  
Sciences

*Board Policy 3260: Energy and Sustainability and Draft  
Administrative Procedures*  
MiraCosta College

*Sabbatical Leave Report*, Fall 2009  
Prepared by Keith G. Cunningham, Faculty, Biological  
Sciences

*Species Preservation in North San Diego County, A Role  
for MiraCosta College*  
A proposal in conservation and sustainability  
Prepared by Keith G. Cunningham, Faculty, Biological  
Sciences

*The San Elijo Native Garden*, plan and plant list,  
September 2010  
Prepared by Megan Fairleigh, ASLA, Faculty, Horticulture

*MiraCosta College Demand Response Technical Audit*,  
San Elijo Campus and the Community Learning Center,  
Oceanside Campus, September 14, 2010  
Prepared by Shadpour Consulting Engineers, Inc.

*MiraCosta College Master Energy Plan*, Oceanside  
Campus, June 20, 2011  
San Elijo Campus, September 14, 2010  
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*Comprehensive Energy Assessment for MiraCosta College* (draft), February 17, 2006  
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*Energy Conservation Analysis for MiraCosta College*, Oceanside Campus, January 24, 2002  
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*Erosion and Slope Repair Recommendations*, MiraCosta College, Oceanside Campus, April 1, 2005

*Update Plan Review Report, Proposed Creative Arts Expansion Project*, MiraCosta College, Oceanside Campus, October 10, 2007

*Preliminary Geotechnical Investigation*, Proposed Creative Arts Expansion Project, MiraCosta College, Oceanside Campus, June 27, 2007

*Geotechnical Investigation*, Proposed Garage Structure Police Parking Lot, MiraCosta College, Oceanside Campus, May 26, 2009

*Geotechnical Investigation*, Ground Movement and Failure Conditions, Portion of Parking Lot 2B, MiraCosta College, Oceanside Campus, November 17, 2008

*Geotechnical Investigation and Geologic Hazard Report*, Proposed Pump House Facility, MiraCosta College, Oceanside Campus, October 21, 2009

*Slope Evaluation and Improvement Recommendations*, Graded Embankment Near Building 1000 MiraCosta College, Oceanside Campus, May 29, 2007  
Prepared by Vinje & Middleton Engineering, Inc.

*Draft Biological Resources Assessment for MiraCosta College*, San Elijo Campus, February 10, 1998  
Prepared by Planning Systems

*San Elijo Coastal Development Permit No. 6-64-578*, March 15, 1985

*Amendment Request Revised Findings*, Application No. 6-84-578-A5, February 5, 2003  
Issued by California Coastal Commission

*MiraCosta College San Elijo Campus, Water Quality and Source Identification Study*, November 7, 2007  
Prepared by Weston Solutions







# CMP Building Program Assumptions





## CMP Program Assumptions //

During the CMP planning process, a series of meetings were held to discuss the preliminary programming assumptions for the new and renovated facilities on each campus. During these meetings, decisions were made related to the location of programs and the amount of space that would be allocated to align with the CMP space needs. A summary of these preliminary program assumptions are included here for reference.

The building program assumptions include a summary of the spaces to be included in the new facilities and the recommended total assignable square footage (ASF). It is important to note that these assumptions form the basis for the CMP recommendations and will serve as parameters for detailed programming and design that will occur as projects are funded and user groups are established.

The CMP recommends that new facilities include large, interdisciplinary classrooms to seat up to 50 students on the OC Campus. These flexible instructional spaces will support the entire campus need and improve the efficiency and utilization of space.

## OC CAMPUS NEW FACILITIES

Instructional Building 01		
	ASF	
Lecture		7,700
	Classroom	
Lab		14,000
	Skills Lab - 4 bed	
	Simulation Lab (for up to 10 people)	
	Surgery Tech Lab	
	Nursing Skills Practice Lab	
	Lab Service	
Office		2,400
	Deans Office/Admin	
	Faculty Office - two person	
	Instructional Associates Area	
	Conference/Evaluation	
	Application & Registration Office	
Other		2,500
	Workroom/Lounge	
	Meeting Room	
	Art Gallery	
	Total ASF	26,600

## OC CAMPUS NEW FACILITIES (cont'd)

Instructional Building 02		
		ASF
Lecture		9,600
	Classroom	
Lab		15,000
	Biology Lab (including Biotech)	
	Biology Lab Service	
Office		2,500
	Deans Office/Admin	
	Faculty Office - two person	
	Instructional Associates Area	
	Conference	
Other		1,700
	Workroom/Lounge	
	Meeting Room	
	Total ASF	28,800

Instructional Building 03		
		ASF
Lecture		2,400
	Classroom	
Lab		0
	Included in PE/Other	
Office		2,340
	Deans Office/Admin	
	Faculty Office - two person	
	Instructional Associates Office	
	Conference	
	Athletic Office	
PE/Other		32,900
	Gymnasium	
	Dance Studio	
	MP Studio	
	MP Studio	
	Fitness Center	
	Athletic Training (or other)	
	Locker Rooms	
	Equipment Storage	
	Total ASF	37,640

Maintenance, Operations, and Purchasing Complex		
		ASF
Lecture		0
Lab		0
Office		6,530
	Purchasing Office	
	Facilities Management Office	
	Maintenance Office	
	Custodial Office	
	Grounds Office	
	Mail Operations	
	Warehouse Office	
	Copy Center	
Other		26,280
	Warehouse	
	Recycling/Waste Management Center	
	Mechanic Shop & Storage	
	Maintenance Shop & Storage	
	Custodial Shop & Storage	
	Grounds Shop & Storage	
	Total ASF	32,810



## SEC CAMPUS NEW FACILITIES

Instructional Building 01		
		Total ASF
Lecture		2,700
	Classroom	
Lab		5,200
	Biology Lab	
	Chemistry Lab	
	General Studies Dry Lab	
	Lab Service	
Office		420
	Faculty Office - two person	
	<b>Total ASF</b>	<b>8,320</b>

Student Services Building		
		Total ASF
Office		5,200
	Admissions and Records	
	Cashier	
	Financial Aid	
	Counseling	
	Transfer Center	
	Health Services	
	Associate Dean	
	Testing	
Other		1,800
	Workroom/Lounge	
	Storage/Vault	
	Meeting	
	<b>Total ASF</b>	<b>7,000</b>

## CLC NEW FACILITIES

Student Services Building		
		Total ASF
Office		5,650
	Admissions and Records Office	
	Admissions and Records Open Space	
	Cashier Office/Counter	
	Counseling Offices	
	Shared Student Services Office	
	Health Services Office	
	Academic Support/Library/Testing	
	Associate Dean's Office	
	Dean's Office	
	Faculty Offices - double	
	Faculty Offices - single	
	Student Services Shared Open Area	
Other		3,900
	Police	
	Student Lounge	
	Bookstore	
	Bookstore Office	
	Bookstore Storage	
	Workroom/Lounge	
	Storage	
	Records Vault	
	<b>Total ASF</b>	<b>9,550</b>



# Preliminary Options







## Preliminary Options //

Following the Existing Analysis Phase, options for the development of each campus were reviewed with the Master Plan Team. A first round of Preliminary Options were reviewed in March of 2011. The comments from the Master Plan Team guided the development of additional options, which were reviewed in April of 2011. At that meeting, the Master Plan Team members selected a preferred option for each campus, from which the planning solution was subsequently developed. The resulting facilities plan solutions reflect further refinements made throughout the solution development phase, and may differ in some aspects from the preferred options.

## Oceanside Campus //

### March 18, 2011 CMP Team Meeting

#### Option 1

Proposed new buildings:

- Welcome Center/Security Office near the tennis courts
- Facilities/Purchasing
- P.E. Building east of the bridge
- Wellness Center at the north edge of Pedley Park
- New building north of the Library

Additional parking:

- Parking structure in the track and field bowl
- Surface lot near P.E.
- Surface lot replacing the existing tennis courts

Proposed athletic facilities:

- Athletic fields near the P.E. Building
- Hard courts north of the city water tank

Proposed circulation improvements:

- Barnard Drive intersection at the east campus entry
- Driveway and passenger drop-off near Student Services
- Parking and passenger drop-off at the CDC
- North passenger drop-off
- New pedestrian bridge/plaza

#### Option 2

Proposed new buildings:

- Welcome Center/Security Office near the tennis courts
- Facilities/Purchasing
- P.E./Wellness east of the bridge
- Building north of the Library
- Building north of the city water tank

Additional parking:

- Southwest parking structure
- North surface lot
- Surface lot near P.E.
- Surface lot replacing the existing tennis courts

Proposed athletic facilities:

- Athletic field near the P.E./Wellness Building
- Keep field in bowl

Proposed circulation improvements:

- Barnard Drive intersection at the east campus entry
- Driveway and passenger drop-off near Student Services
- Parking and passenger drop-off at the CDC
- North passenger drop-off
- New pedestrian bridge/plaza

#### Option 3

Proposed new buildings:

- Welcome Center/Security Office near the tennis courts
- Facilities/Purchasing
- P.E. Building east of bridge
- Wellness Center at the north edge of Pedley Park
- Building north of the Library

Additional parking includes:

- North surface lot
- Southwest parking structure
- Surface lot near P.E.
- Surface lot replacing the existing tennis courts

Proposed athletic facilities:

- Athletic field near the P.E. Building
- Keep field in bowl
- Courts north of the city water tank

Proposed circulation improvements:

- the Barnard Drive intersection at the east campus entry
- Driveway and passenger drop-off near Student Services
- Parking and passenger drop-off at the CDC
- North passenger drop-off
- New pedestrian bridge/plaza

**Discussion:**

## Proposed New Buildings:

- The Purchasing Office will be included with Facilities and Purchasing.
- Existing track and field:
  - / Continued effort to maintain this facility is not desired.
  - / Strongly consider a parking structure here.
  - / A large amphitheater venue would have much local competition.

## Athletic facilities:

- Extension of athletic and recreational facilities into the campus core is desirable.
- All three options show more athletic field area than will be needed.

## Traffic circulation:

- Circulation and aesthetics of both entries must be improved.
- Parking lots should be screened if visible from the entry routes on Barnard and Glaser Drives.
- Rerouting of Bernard Drive to the east of the gym was discussed as a way to bring more space into the campus core.
  - / The existing route provides a grade separation between the pedestrian axis and Bernard Drive.
  - / Rerouting would make it necessary for pedestrians to cross Bernard Drive at grade.
  - / An improved bridge would serve as a plaza.
- The entrance to the Child Development Center must be isolated from vehicular traffic.

**Summary:**

The CMP Team preferred different aspects of all three options.



## April 15, 2011 CMP Team Meeting

### Option 4

Proposed new buildings:

- Small building at the existing tennis courts.
- Maintenance, Operations, Purchasing Complex in Lot 4C.
- Kinesiology/Intramurals/Dance (KID) Building east of the bridge.
- Instructional Building at the north edge of Pedley Park.
- Instructional Buildings at the site of Portables.

Additional parking (approximately 3,100 total campus stalls – 2,500 needed).

- Parking structure in the track and field bowl.
- Surface lot at the site of the existing Facilities Buildings.
- Surface lot north of the P.E. Buildings.
- Surface lot replacing some of the existing tennis courts.

### Option 5

Proposed new buildings:

- Building at the tennis courts (larger than Option 4).
- Maintenance, Operations, Purchasing Complex in the track and field bowl.
- KID Building east of the bridge.
- Instructional Building at the north edge of Pedley Park.
- Smaller Instructional Building at the site of Portables.

Additional parking (approximately 3,350 total campus stalls):

- Parking structure in the track and field bowl.
- Expanded Lot 4C.
- Surface lot at the site of the existing Facilities Buildings.
- Surface lot north of the P.E. Buildings (less stalls).
- Surface lot at the site of the existing tennis courts.

### Option 6

Proposed new buildings:

- Building at the tennis courts (larger than Option 4).
- Maintenance, Operations, Purchasing Complex in the track and field bowl.
- KID Building east of the bridge.
- Instructional Building at the north edge of Pedley Park.
- Smaller Instructional Building at the site of Portables.

Additional parking (approximately 2,590 total campus stalls):

- Surface lot at the site of the existing Facilities Buildings.
- Expanded Lot 4C.
- Surface lot near the KID Building, new driveway from the traffic circle.
- Surface lot at the site of the existing tennis courts.

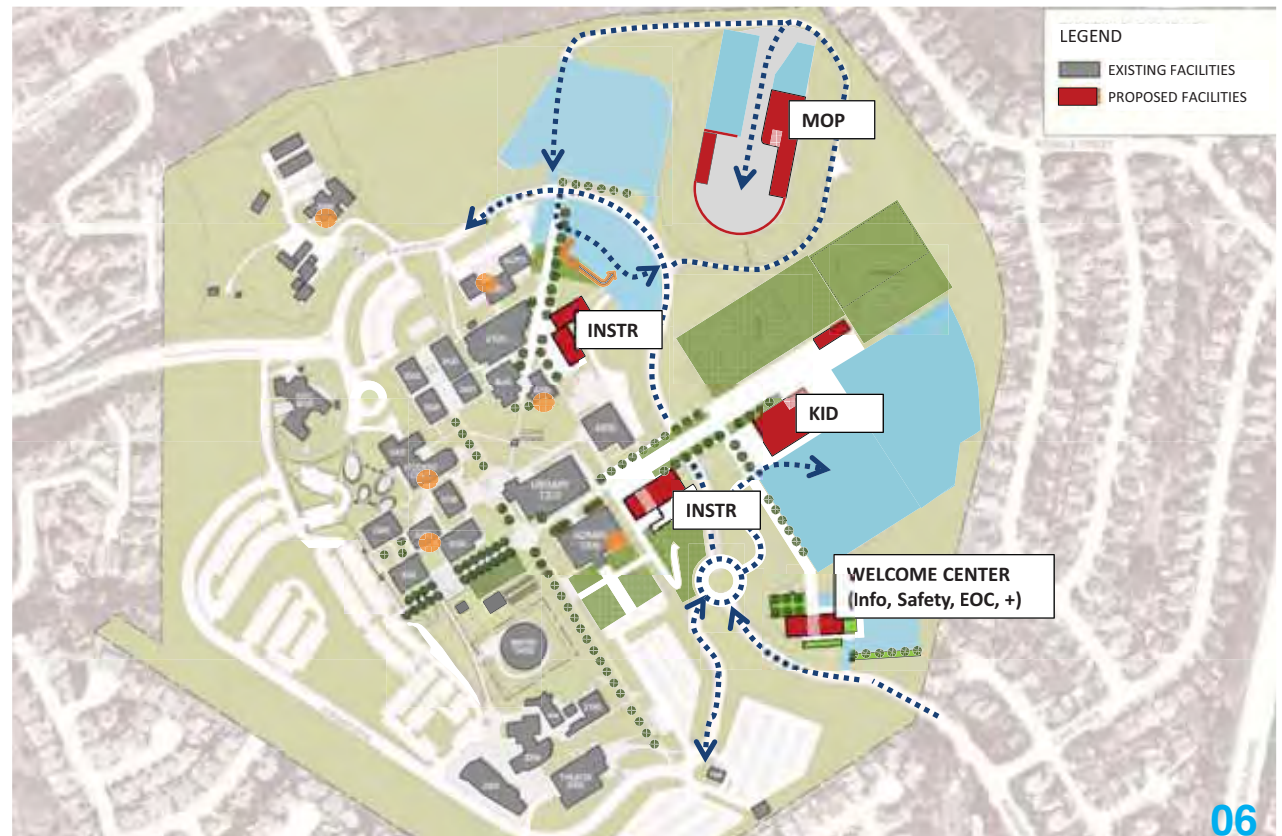
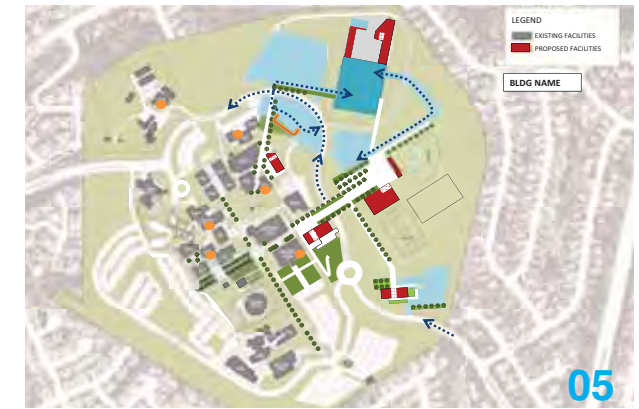


**Discussion:**

- A passenger drop-off at the Concert Hall is also needed.
- Barnard Drive must be separated from the CDC paths.
- Kinesiology, Intramurals and Dance would share the P.E., Wellness facilities and open spaces.
- The Campus Green to be used for graduations and KID.
- Tennis court building location:
  - / Isolated from the campus core.
  - / Potential function include-Information Office, Police, Emergency Ops Center, Community Relations, Conference Center/Board Room, Foundation Office, instructional space, future building site.
- The MOP Complex will be at the north side of the track bowl, reserving the south side for future needs.
- Surface parking was preferred to a structure in the track bowl, due to the lower cost and convenient access.

**Decision:**

The CMP Team approved Option 6 as the Preferred Option.

**Preferred Option //**

# San Elijo Campus //

## March 18, 2011 CMP Team Meeting

### Option 1

Two new buildings are provided - one to the east of the Library and another to the east of Admin. A new quad is framed by the Library, Admin and one of the new buildings. A passenger drop off is provided in front of the new quad.

### Option 2

A new building is located to the east of the Library. A new quad is framed by the Library and Admin Buildings. A second building is located north of Building 400, across the fire lane. A passenger drop off is provided in front of the Library.

### Discussion:

- A multipurpose turf field and courts is needed to support intramural sports.
- The location of new science facilities should be considered in relation to existing Science Building 400.
- Consider including space for a future building in the northern part of campus.
- The passenger drop off in Option 1 is configured to slow traffic to safer speeds.

### Summary:

The CMP Team selected Option 1 for further development.

## April 15, 2011 CMP Team Meeting

### Option 3

Improves campus connectivity, and removes Building 400, which is aged and beset with maintenance issues.

### New Buildings:

- Student Services and Administration Building at front.
- Instructional Building

### Repurpose Existing Buildings:

- Building 800
- Student Center 900

### Circulation and Open Space:

- Parking, service and drop-off at vacated site of Building 400.
- The fire road will be redesigned as a pedestrian plaza.
- The amphitheater will be improved.
- The northern campus area will be developed for intramural sports and recreation.

### Discussion:

- Make better use of the Student Center upper deck.
- There is a need for student club/organization space.
- The northern campus area could be developed for many activities.
- Facilities Building 700 needs to be renovated.

### Summary:

The CMP Team approved of Option 3 as the Preferred Option.







Preferred Option //

# Community Learning Center //

## March 18, 2011 CMP Team Meeting

### Option 1

A new building is provided parallel to the Mission Avenue street front. The Mission Avenue campus entry driveway is relocated to the east. Additional open space and surface parking are provided.

### Option 2

A new building is provided perpendicular to the Mission Avenue street front. The Mission Avenue campus entry driveway is enhanced and remains in roughly the same location as the existing driveway. Additional open space and surface parking are provided.

### Discussion:

- Improving visibility along Mission Avenue is a priority.
- Two passenger drop-off zones is a plus for Option 1.
- Traffic calming measures should be considered for the pedestrian crossing at the driveway.
- A larger green space would be desirable.
- Confirm that the alley to the east and south of Building A can accommodate two-way vehicular traffic.
- The District will decide the location of the Small Business Development Center.

### Summary:

The CMP Team selected Option 1 for further development.

## April 15, 2011 CMP Team Meeting

### Option 3

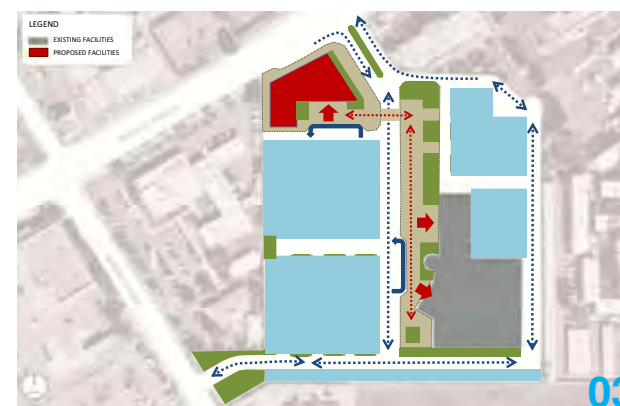
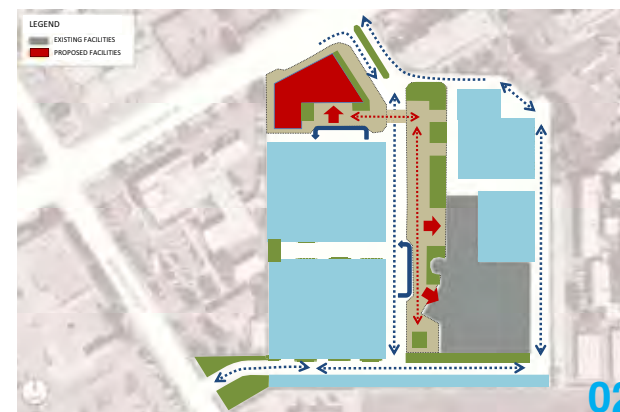
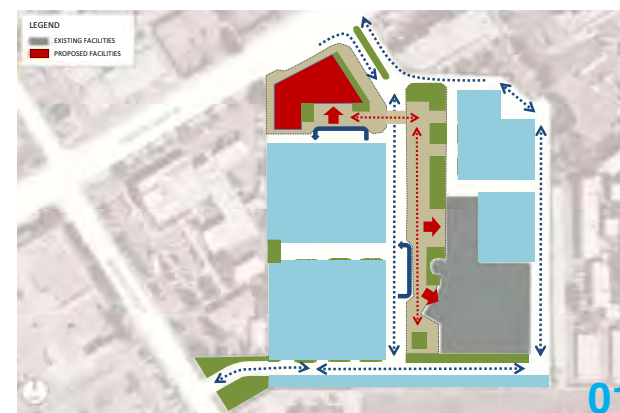
The new will be visible to motorists, and will have a pass-thru lobby. Vacated existing space will be repurposed for instruction. Open spaces have been developed. A storage building and facilities yard are provided.

### Discussion:

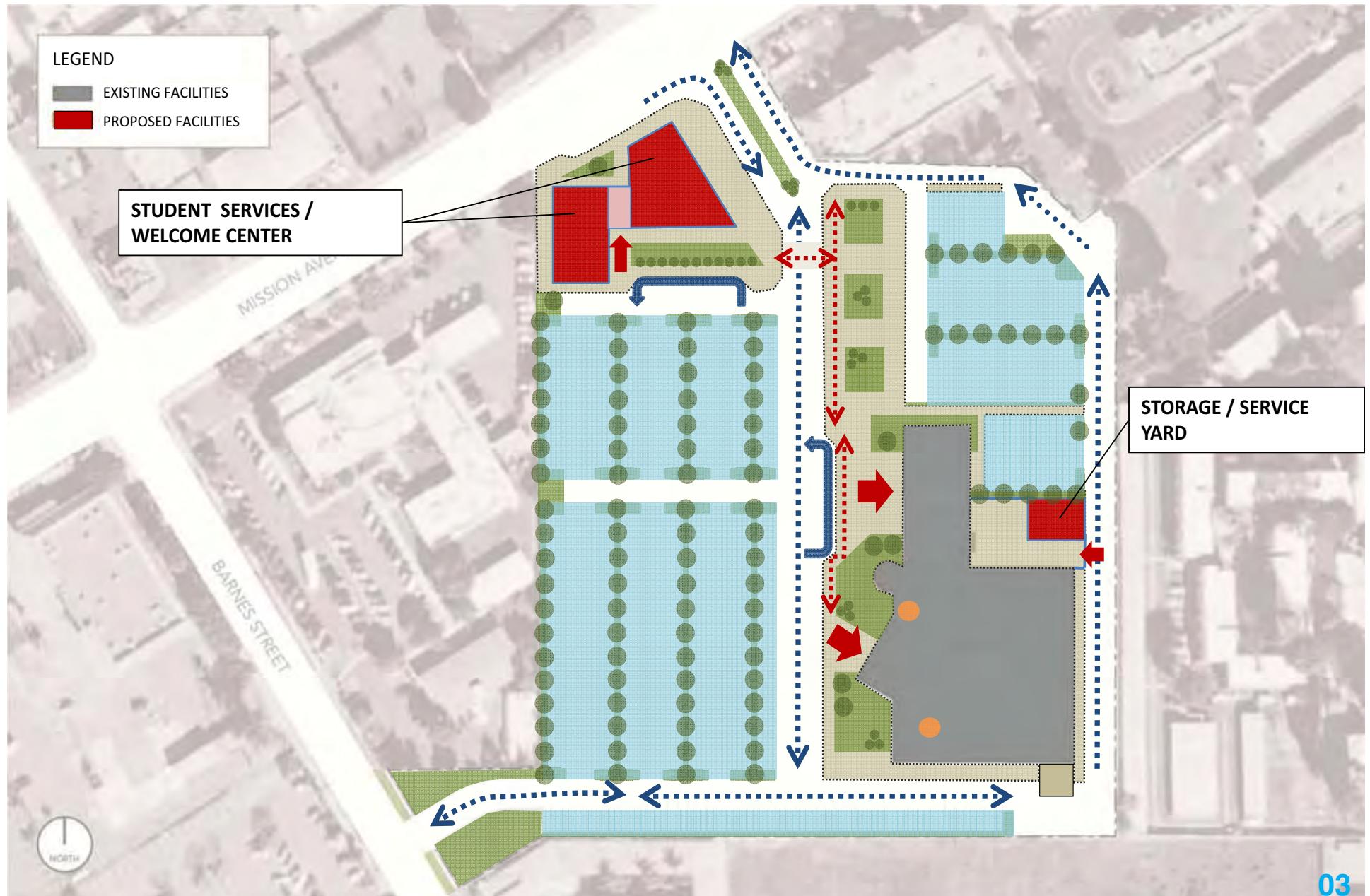
The new building will house Student Services, Administrative offices, and Campus Police. The SBDC will be moved to another location.

### Summary:

The CMP Team approved Option 3 as the Preferred Option.







Preferred Option //







# Sustainability Visioning & Goal Setting

February 11, 2011 Workshop





## Attendees //

### MiraCosta College Sustainability Advisory Committee

Jim Austin, Fiscal/Policy Advisory  
 Susan Asato, Fiscal/Policy Advisory  
 Tom Macias, Chair  
 Keith Cunningham, Faculty, Biology  
 Herschel Stern, Faculty, Geography  
 David Parker, Faculty, Architectural Technology  
 Megan Fairleigh, Faculty, Horticulture  
 Tracy Gibson, Maintenance  
 Ralph Pickering, Grounds  
 Jason Kubrock, Horticulture  
 Kim Simonds, Purchasing  
 Myeshia Armstrong, Administration  
 Sally Foster, Administration  
 Jonathan Cole, Faculty, Physical Sciences

### Master Planning Consultant Team

#### HMC Architects, Facilities Planning

Eera Babbawale  
 Mitchell De Jarnette  
 Sheryl Sterry

#### Glumac, Mechanical/Electrical/Plumbing Engineering

Brian Berg

#### Nolte and Associates, Civil Engineering

Scott Berkebile  
 Scott Vinton

#### SWA Group, Landscape Architecture

Kevin Slawson

### Partners

#### San Diego Gas and Electric

Linh-Chi Hua

#### SC Engineers

Joseph Kilcoyne







## Background //

In 2010 MiraCosta College launched their current comprehensive master planning effort. From the outset it was the college's intent to integrate sustainability into every component of their facilities plan. This vision was reinforced by the following institutional strategic goal that was formulated in the educational planning process.

As facilities planning proceeded, it became clear that a college committee was needed to focus on sustainability with the planning consultant team. To meet this need, the Sustainability Advisory Committee was established. The committee reports directly to the president, and in their first meeting on January 20, 2011, Dr. Francisco Rodriguez charged the members with the responsibility to define their aspirations, and guide the establishment of sustainability practices and policies for the district.

### Institutional Goal I:

**MiraCosta Community College District will become a vanguard educational institution committed to innovation and researched best practices, broad access to higher education, and environmental sustainability**

**Objective:** Develop strategies and an implementation plan to establish model environmentally sustainable practices





## Workshop Purpose //

The MiraCosta College Sustainability Workshop was held at the request of the Comprehensive Master Planning Consultant Team. It provided a forum for the members of the Sustainability Advisory Committee to voice their visions and goals, and to exchange information about opportunities that might be pursued. The result is a formal statement of interest in a list of opportunities that may be developed into a focused plan for sustainability. It will serve as a starting point to guide the integration of sustainability into the development of planning options by the Planning Consultant Team.

A full day was devoted to an informal and free flowing exchange between the members of the MiraCosta Sustainability Advisory Committees. The discussion was facilitated by Jim Austin, Advisory Member, and Tom Macias, Chair; and supported by input from the Planning Consultant Team. The Aztlan meeting rooms in the Oceanside Campus Student Center were made available by the District. These rooms provided a spacious setting, blessed with natural light and an expansive view of the surrounding environment. The discussion was documented throughout the day in the form of the following lists.

- Sustainability Visioning and Goal Setting - District-wide
- Campus Specific Visions and Goals
  - / Community Learning Center
  - / San Elijo Campus
  - / Oceanside Campus

Within this report, each list was organized into an outline under the themes which emerged and were reinforced throughout the day's discussions. These themes reflect a developing focus, and a path toward a sustainable lifestyle and culture that is uniquely tailored to MiraCosta Community College District.

Themes for Sustainability at MiraCosta CCD:

- Leadership in Sustainability
- Environmental Preservation
- The Campus as a Living Lab

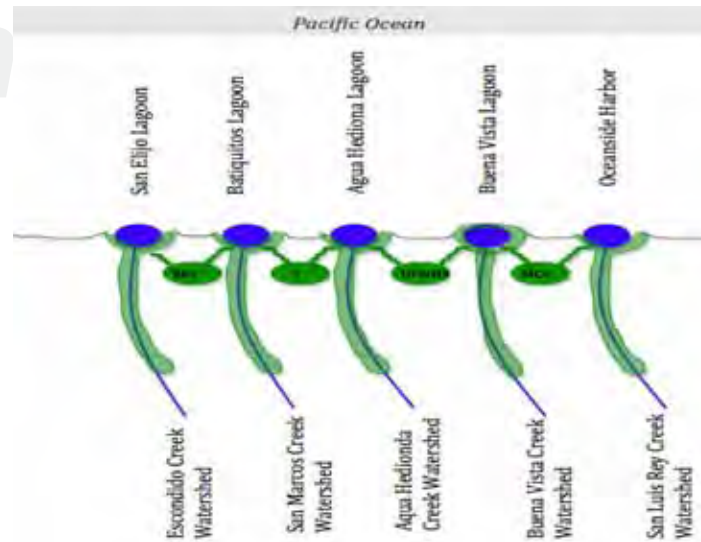


## **Sustainability Visioning and Goal Setting - District-wide //**

The members of the MiraCosta Sustainability Advisory Committee spoke about their vision for sustainability. In response to a request by the Planning Consultant Team, several members brought images which illustrated their vision for MiraCosta College.

## Keith Cunningham

- San Diego Floristic Province
  - / Wetlands – “String of Pearls” need repair and preservation
- OC and SEC campuses
  - / hubs to connect natural habitat corridors and migratory pathway
  - / link existing reserves – reach out to private landowners, K-12 schools, utilities
  - / Natural Wildlife Foundation Campus Ecology membership
  - / Use MCC campuses unique settings to do something different from any other college campus
  - / Establish the MCC campuses as nature reserves
- Build Green Buildings
  - / Example – Bren Center, University of California Santa Barbara





## Herschel Stern *vision*

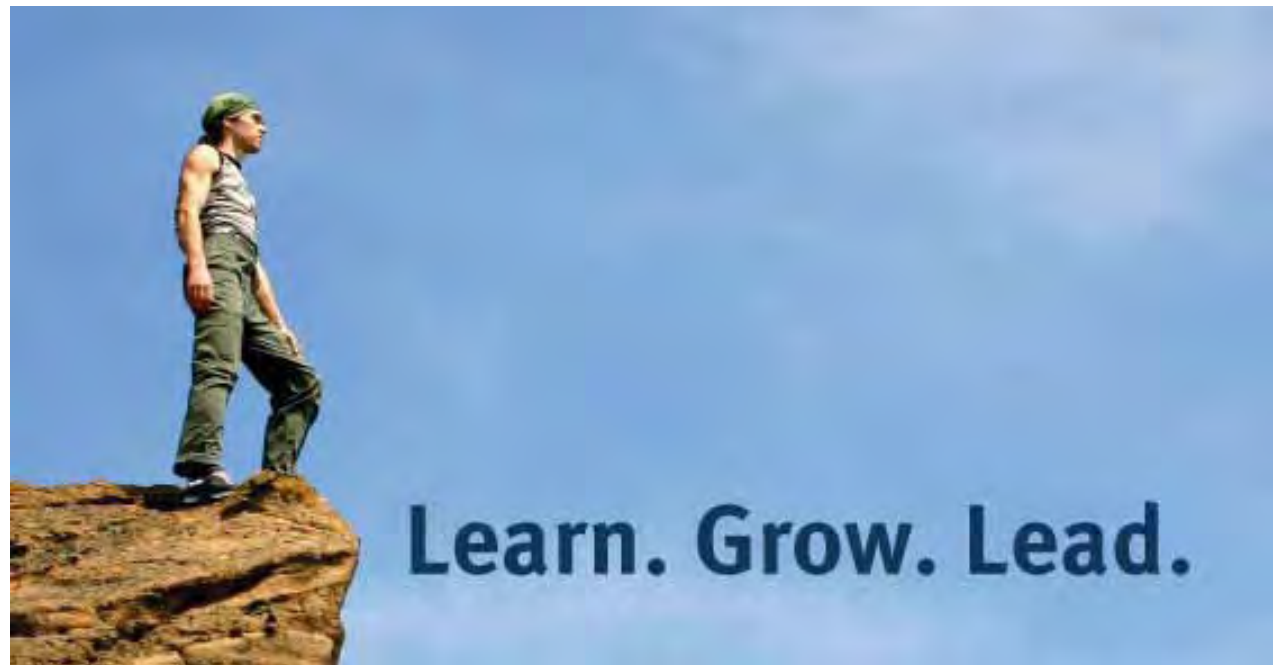
- Campus as a model to teach sustainability
  - / Example:  
Kirsch Center, De Anza College – innovative educational design to support collaborative learning
  - / Campus environmental education signage – what students are seeing and why it is important  
Opportunity - view from Student Center patio shows regional geography
  - / Campus green technology  
Photovoltaic parking lot shade structure



## Megan Fairleigh

*vision*

- Demonstrate credibility to our students  
/ Practicing what we teach
- Lead, not follow  
/ Look toward the future

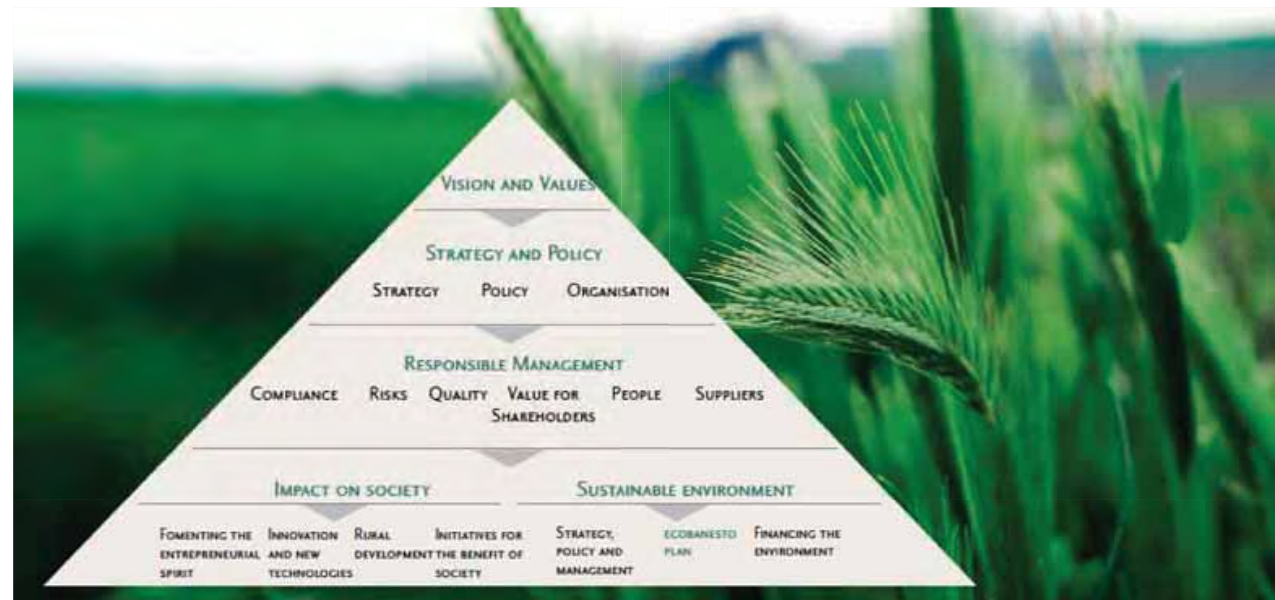




## Tom Macias

# vision

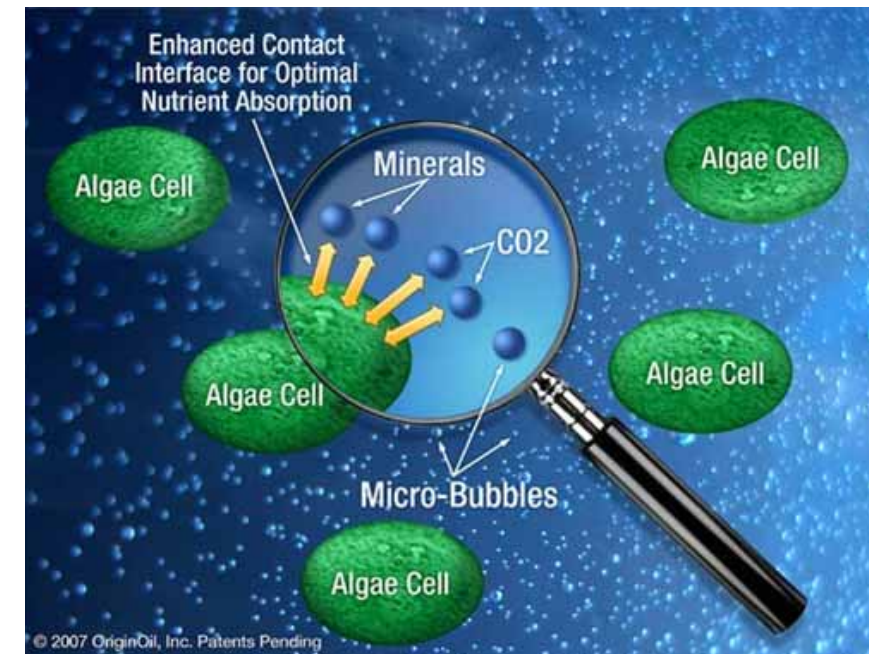
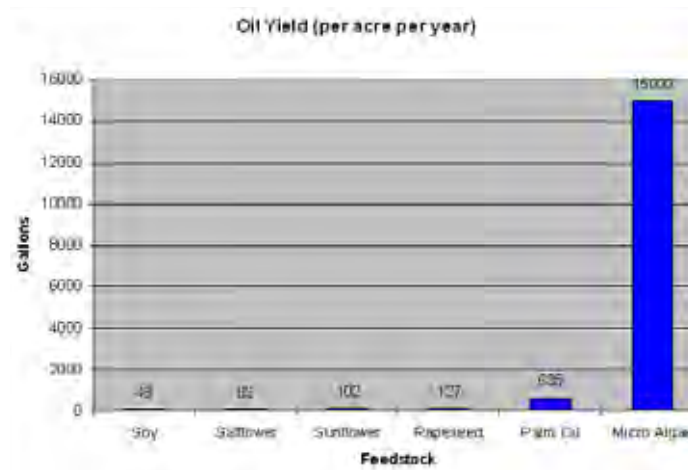
- Focus on achievable goals – be financially responsible
- Onsite renewable power – less dependence on the power grid
- Be a model for sustainability
  - / Must have top down policy support
- Sustainability must be institutionalized as a core value. For example, include in...
  - / Educational program review criteria
  - / Associated Student Government charter
- Establish a process for sustainability
  - / Set vision and core values
  - / Develop strategies and policy
  - / Assign resources
  - / Include stakeholders
  - / Support fiscally
  - / Institute metrics
- “Responsibility” – hands holding earth



## Sally Foster

*vision*

- Proposition 50 Demonstration Garden – a start
- Lagoon biological research
  - / Uses for algae – energy, pharmacology, etc.
  - / Student involvement in research
- Strawberry fields – potential acquisition
  - / Sustainable agriculture and food production – permaculture and viticulture
  - / Horticulture, nursery industry

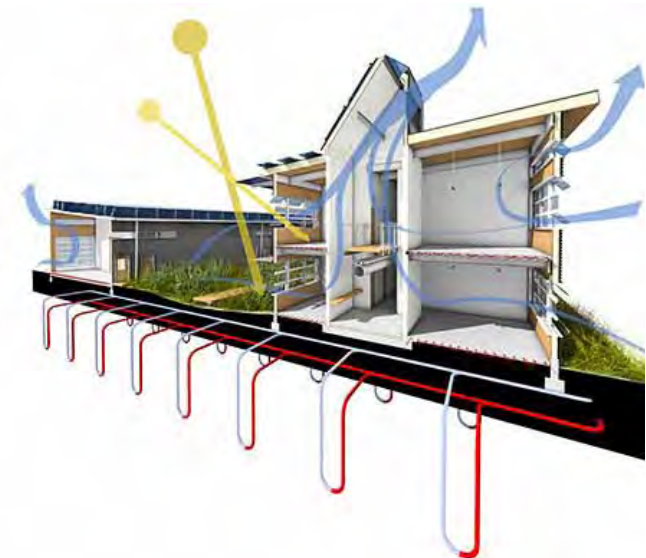
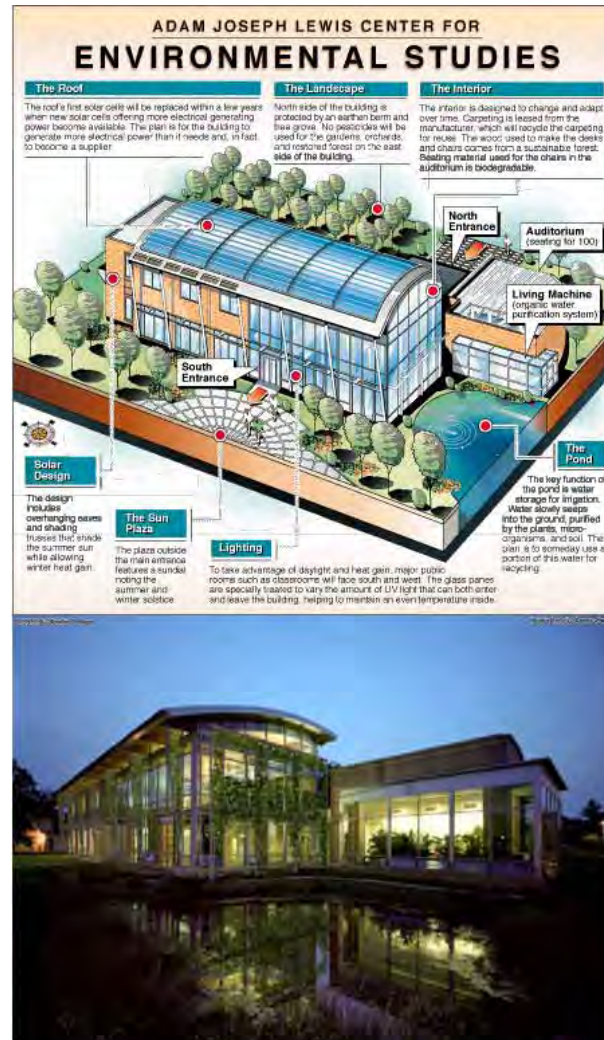




## David Parker

# vision

- Building design - Don't fight nature--take advantage of the moderate climate
  - / Make use of low technology strategies
- Examples:
  - / Adam Joseph Lewis Center, Oberlin College – efficient HVAC, renewable power, recycling of waste water
  - / California Academy of Sciences, San Francisco – photovoltaics, green roof



# vision

## Jim Austin

- Design for energy efficiency and student success
  - / Spaces for students to collaborate and hang out and remain on campus
- Strawberry fields adjacent to San Elijo Campus – opportunity to acquire
  - / Opportunities to research
- Sustainable agricultural
- Uses for algae
- Student involvement in research

## Jonathan Cole

- Distinguish ourselves through sustainability – key to balance...
  - / Community outreach
  - / Campus practices
- Share ideas, publicize to the college and community
- Measure progress
  - / Measure and reduce the college carbon footprint

## Ralph Pickering

- Institute sustainable campus practices
- Make sustainability a priority from the top down
- Nurture a MiraCosta sustainable lifestyle
- Have a positive impact beyond the campus borders
  - / Managing storm water will benefit the Buena Vista Lagoon
  - / Rainwater harvesting, storage and use
- Make the Arroyo into an eco-reserve and provide nature trails
- Campus landscaping
  - / Eco-reserves - Native plants, dormant during the dry season
  - / Campus core - Adapted, Mediterranean plants where appearances are important
- Institute waste management practices to divert waste from landfills
- Career Technical Education – opportunity to teach green technology

# vision

## Jason Kubrock

- Set aside the arroyo and other sloped land areas as nature preserves
- Green building design – seek LEED certification
- Rooftop rain water harvesting and use for irrigation  
/ Solved erosion problem from roof runoff
- Air conditioning condensate capture and use for irrigation

## Tracy Gibson

- Build on improvements made over the last twenty years
- Onsite renewable energy

## Kim Simonds

- Need to educate ourselves and formulate a plan for green purchasing

## Myeshia Armstrong

- Need to achieve and measure financial savings gained from sustainability
- Benefit from partnerships and mentors at other institutions



# MCC Path to Sustainability





## Sustainability Planning Information //

These documents provide additional information about the sustainability strategies that are recommended in the Facilities Plan.

### Contents

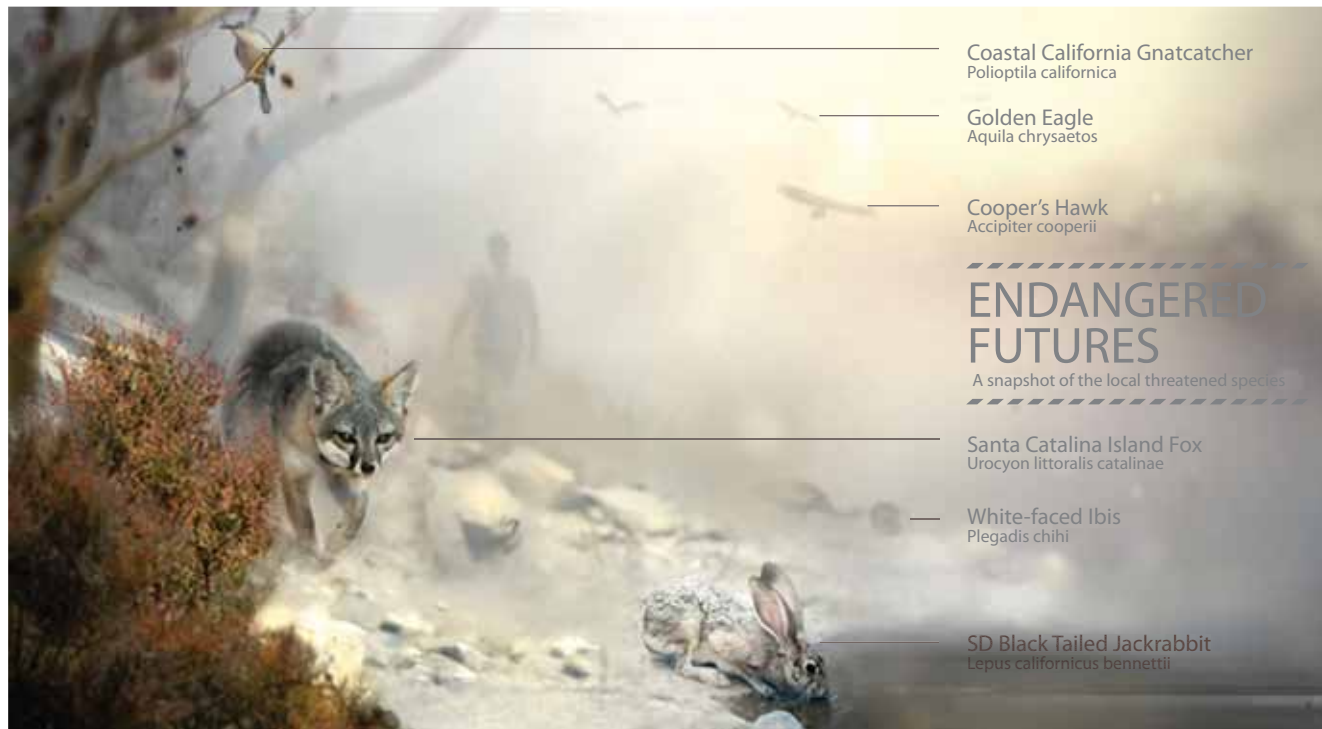
- Regional Preservation
- Oceanside Campus Habitat
- District Path to Sustainability
- Energy and Water Use Recommendations

## Regional Preservation //

The landscape is comprised of many layers that form a complex and integrated matrix, which supports natural processes, wildlife, and ultimately our built environment. This matrix is dynamic and constantly evolving to adapt to different conditions, both natural and man-made. However, sprawling urbanization patterns have taken their toll on the landscape's ability to support a healthy ecosystem. As development encroaches into the natural environment it begins to fragment habitats and effectively puts up barriers to vital animal movement patterns. Think of the landscape as a series of pixels, where each pixel is a component of the landscape or city. The more separated or randomized the pixels are, the more difficult it is to step back and make out the overall picture. Without continuous swaths of landscape, the performative characteristics are greatly diminished, which can have detrimental effects for our overall environment.

Animal habitats are made up of two distinct components: patches and corridors. Patches serve as specific habitat areas and corridors are the links between them. This stepping stone relationship is very important to the overall health of our ecosystem because isolated patches have increased rates of species inbreeding that leads to homogeneity and ultimately extinction. Therefore, the structural pattern of patches and corridors that support functional flows and movements through the landscape is a major determinant of the health of our ecosystem.

The MiraCosta Community College District has the opportunity to play a vital role in substantially increasing the health of the regional ecosystem of northern San Diego County. If the district can repurpose existing under-utilized land as functional habitat, it can be linked into the larger regional matrix, and contribute to a healthier environment while providing a tangible educational tool for students and the local community.



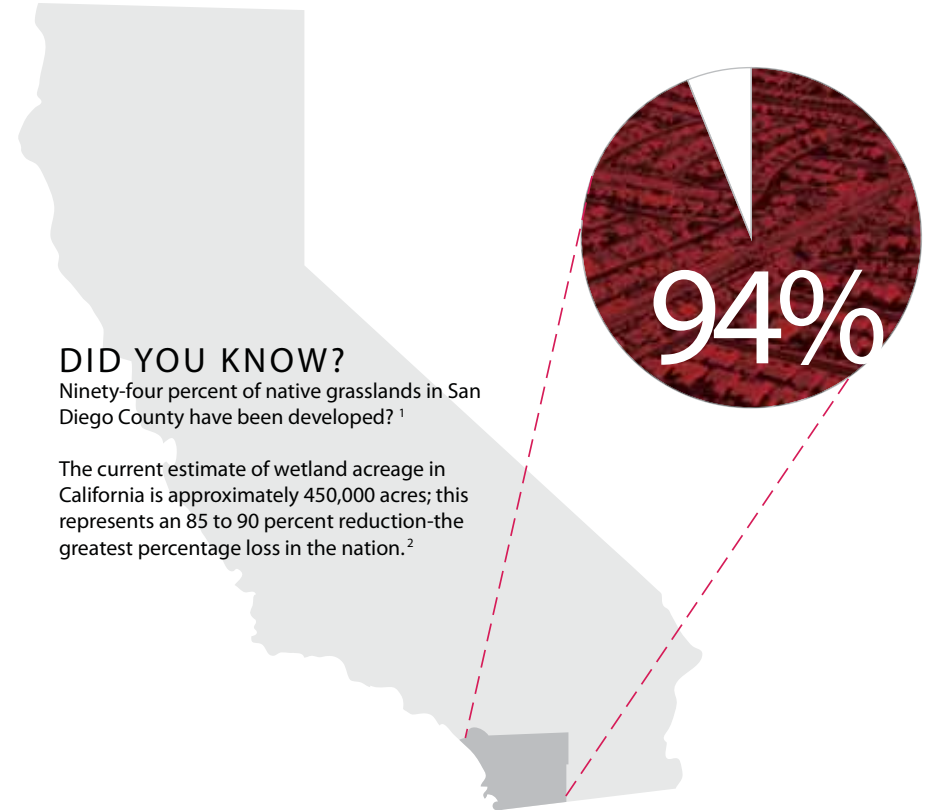
*“Mundane and ignored patches of unused land can yield ecological surprises. The picture that emerges is thus one of discovery, of an urban society beginning to look at its immediate surroundings with fresh eyes, seeing new possibilities in old things. A radical change in perception is created.”*

*David Nicholson, The Greening of Cities*



## FRAGMENTATION

The main threat to species, and biodiversity in general, is habitat loss and fragmentation. Fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller, isolated parcels.



When patterns of continuous fragmentation and increasing encroachment on habitat arise, contiguous habitats are broken down into isolated patches. This activity results in less biological heterogeneity and less interspecies relations. Biodiversity is necessary for a thriving ecosystem and is directly involved in water purification, recycling nutrients and providing fertile soils.

1. Multiple Habitat Conservation Program Public Review Draft, Volume 1, November 2000  
2. [http://ceres.ca.gov/ceres/calweb/wetlands/wetland\\_past.html](http://ceres.ca.gov/ceres/calweb/wetlands/wetland_past.html)

# Regional Preservation //

San Diego County contains four subregional habitat conservation areas as mandated by the State of California’s Natural Community Conservation Planning (NCCP) Act of 1991. The Multiple Habitat Conservation Program (MHCP) is one of these large multi-jurisdictional planning efforts in which all three of the District’s campuses are located.

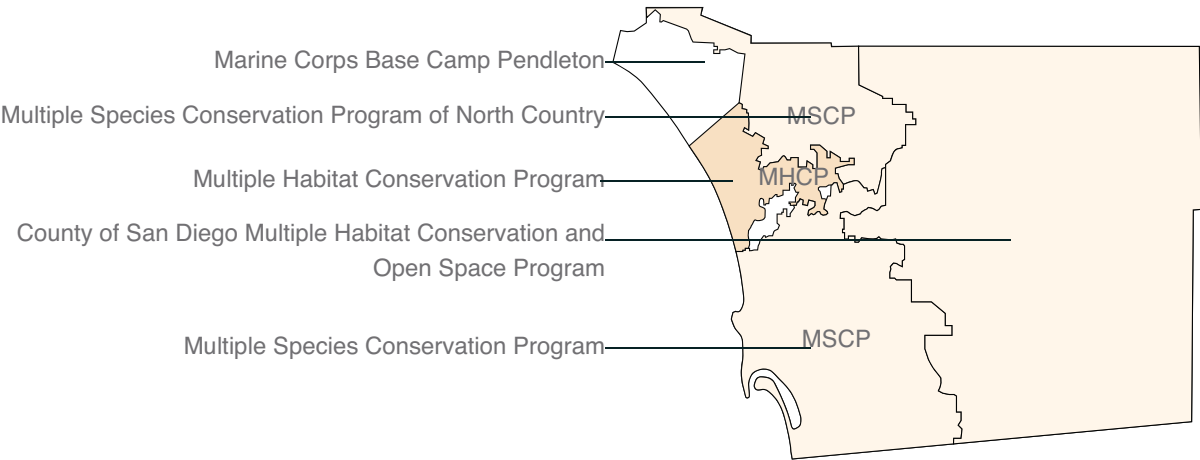
The MHCP has two key goals that relate to maintaining biodiversity and overall ecosystem health:

- Biological Goal: Maintain natural biological communities and species native to the region
- Social Goal: Protect the quality of life for local residents by maintaining the area’s scenic beauty and natural biological diversity.

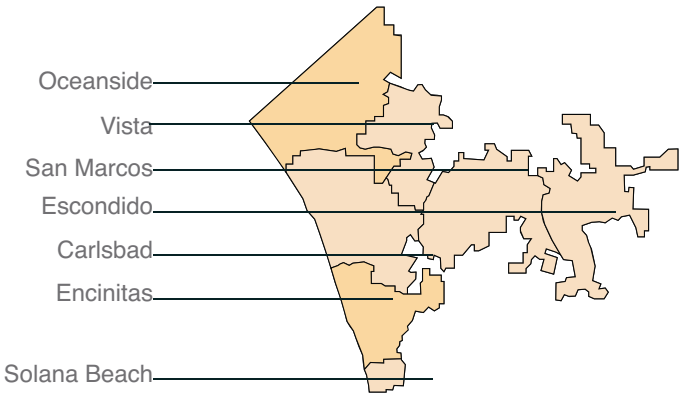
This planning approach will replace the existing project-by-project biological mitigation process with a comprehensive conservation plan. By identifying priority areas for conservation the MHCP will conserve the most biologically valuable areas, and avoid the haphazard and widespread habitat loss created by piecemeal mitigation efforts.

The MHCP planning effort is needed because the San Diego region has more rare, threatened, and endangered species than any comparable land area in the United States.<sup>1</sup> San Diego County is also one of the fastest growing regions in the country, therefore the MHCP plan will help to ensure that future development does not have a detrimental impact to the environmental health of the region.

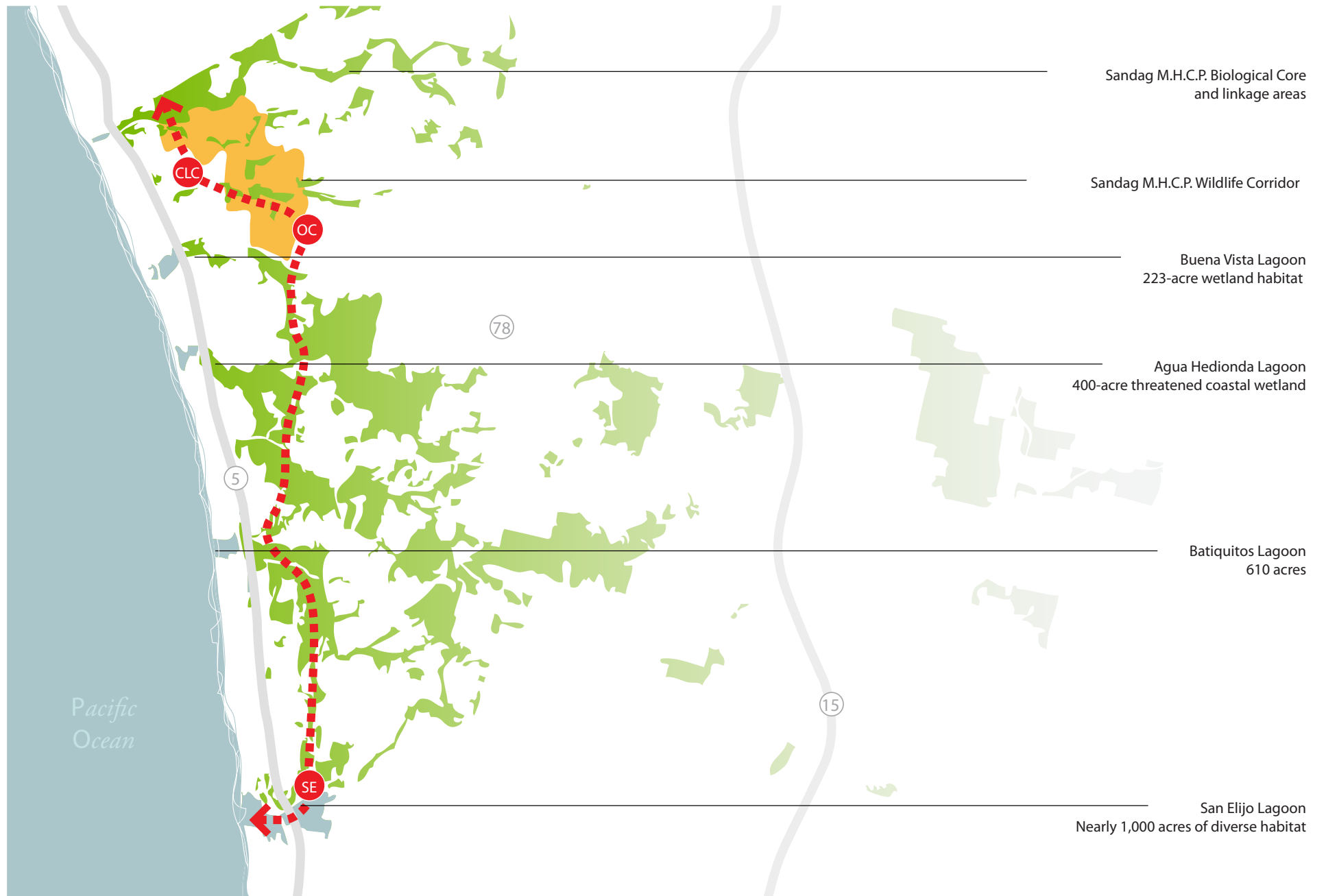
<sup>1</sup> MHCP Public Review Draft, Volume 1



Habitat conservation planning areas in San Diego County



MHCP Subarea composite



## Oceanside Campus Habitat typology //

Habitat and corridor typology is crucial in ensuring a productive ecosystem is established and maintained. The structural character of the landscape includes topography, hydrology, size, and plant species. Each one of these components will vary depending on the target species that the corridor is designed for. Generally, the larger and more connected habitat patches are, the more biodiversity they will support.

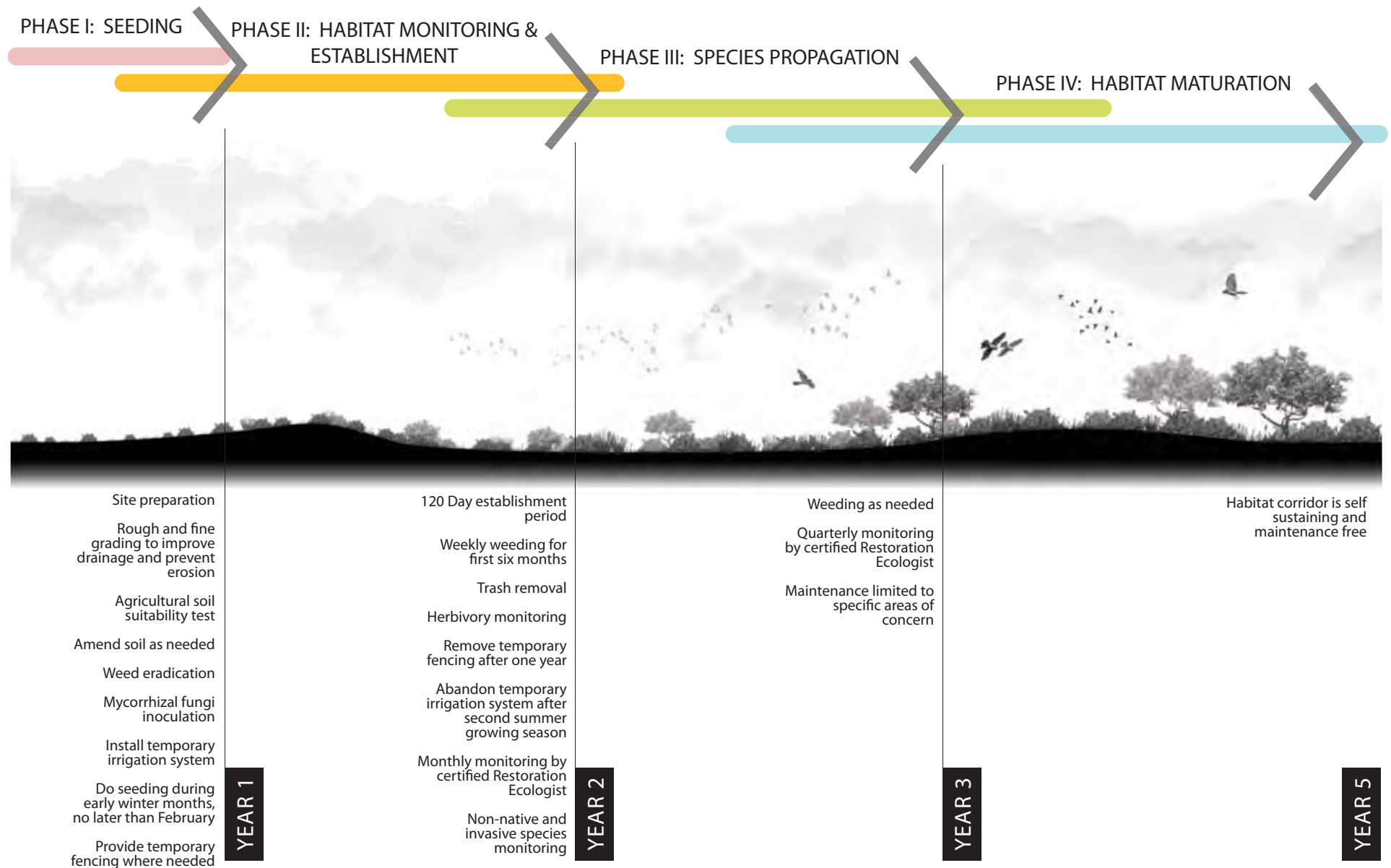
The Coastal California Gnatcatcher is a federally threatened species that has several recorded locations around the Oceanside Campus. Creating a productive habitat will benefit this species, however it must be designed around the Gnatcatcher's needs. The transitional corridors need to allow safe passage by providing adequate planting coverage, and the habitat patches need to provide safe breeding grounds and sufficient foraging area. Optimal patch size for the California Gnatcatcher is 6 acres, and the maximum dispersal distance is about 5 miles.<sup>1</sup>

Establishing a habitat on campus can be done in 4 phases over 5 to 6 years. To ensure success it is important that a certified Restoration Ecologist is involved with the design and maintenance of the habitat and linkage corridors. Even more important is the District's commitment to preserving land and allow it to establish itself and flourish into a productive habitat that contributes to the MHCP goal of regional ecosystem health. This area can also be used as stormwater retention and filtration zones that help mitigate pressure on the city's stormwater infrastructure. Once established, the District can use this land as an outdoor laboratory for both students and the community to showcase the environmental processes that help support our daily lives.



<sup>1</sup> MHCP Public Review Draft, Volume 2, Section 4





## Habitat implementation and phasing time line //

A typical habitat is broken into five zones: two outer transition zones, two protection zones, and one habitat zone. The outer zones will serve as campus use areas including street trees, parking, and sidewalks. The protection zone will help separate human activity from the habitat, and help keep pollutants from contaminating the core area. The habitat zone should remain as continuous and protected as possible to allow for maximum effect.

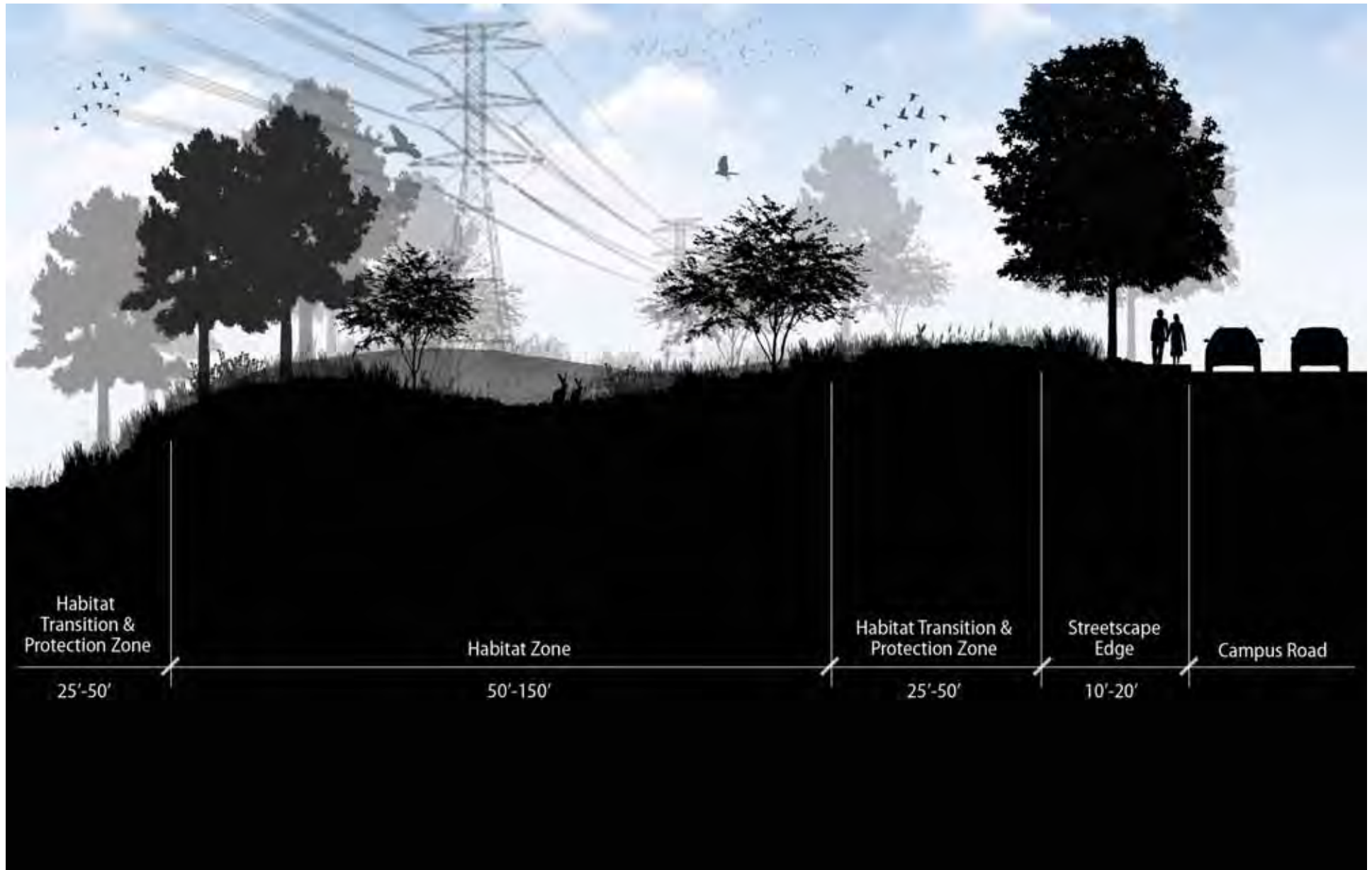
The habitat type specified by the MHCP for this area is California Coastal Sage Scrub, which supports the protected Coastal California Gnatcatcher along with many other species. The sage scrub habitat is dominated by large portions of *Artemisia californica* and *Eriogonum fasciculatum*. Both of these shrubs provide adequate protection and foraging for the targeted species.

Habitat grading should include gentle slopes that mimic the typical coastal California climate zone. These slopes provide breeding grounds for species and help control and direct stormwater runoff. It is important that nonnative vegetation that requires supplemental irrigation, and invasive species that may take over native vegetation be avoided so that the performative characteristics of the habitat can be fully realized.

Habitat edges are areas with less plant density and coverage, which result in higher rates of predation by cowbirds, house cats, raccoons, and ground squirrels. Therefore, it is important that the inner habitat zone maintain a healthy width of establish native plant material that minimizes these edge effects.



Typical coastal sage scrub habitat



Typical Oceanside campus habitat section //

## Habitat Framework Planting List //

### Trees:

Acacia farnesiana	Sweet Acacia
Pinus torreyana	Torrey Pine
Ornithostaphylos oppositifolia	Palo Blanco

### Shrubs:

Arctostaphylos glandulosa ssp.	Del Mar Manzanita crassifolia**
Artemisia californica	California Sagebrush
Baccharis pilularis	Coyote Brush
Encelia californica	California sunflower
Eriogonum fasciculatum	California buckwheat
Eriophyllum confertiflorum	Goldern-Yarrow
Eschscholzia californica	California Poppy
Gnaphalium californicum	Cudweed
Layia platyglossa	Tidy-Tips
Lotus scoparius	Deerweed
Lupinus bicolor	Miniature lupine
Lupinus succulentus	Arroyo Lupine
Malosma laurina	Laure Sumac
Nassella pulchra	Purple Needlegrass
Plantago insularis	Plantain
Rhus integrifolia	Lemonadeberry
Rhus ovata	Sugar bush
Salvia apiana	White Sage
Sambucus mexicana	Mexican Elderberry

### Federal & State Protection Status:

\* Federal Species of Concern

\*\* Federally Endangered

o Federally Threatened

+ State Species of Special Concern

## Habitat Target Species List //

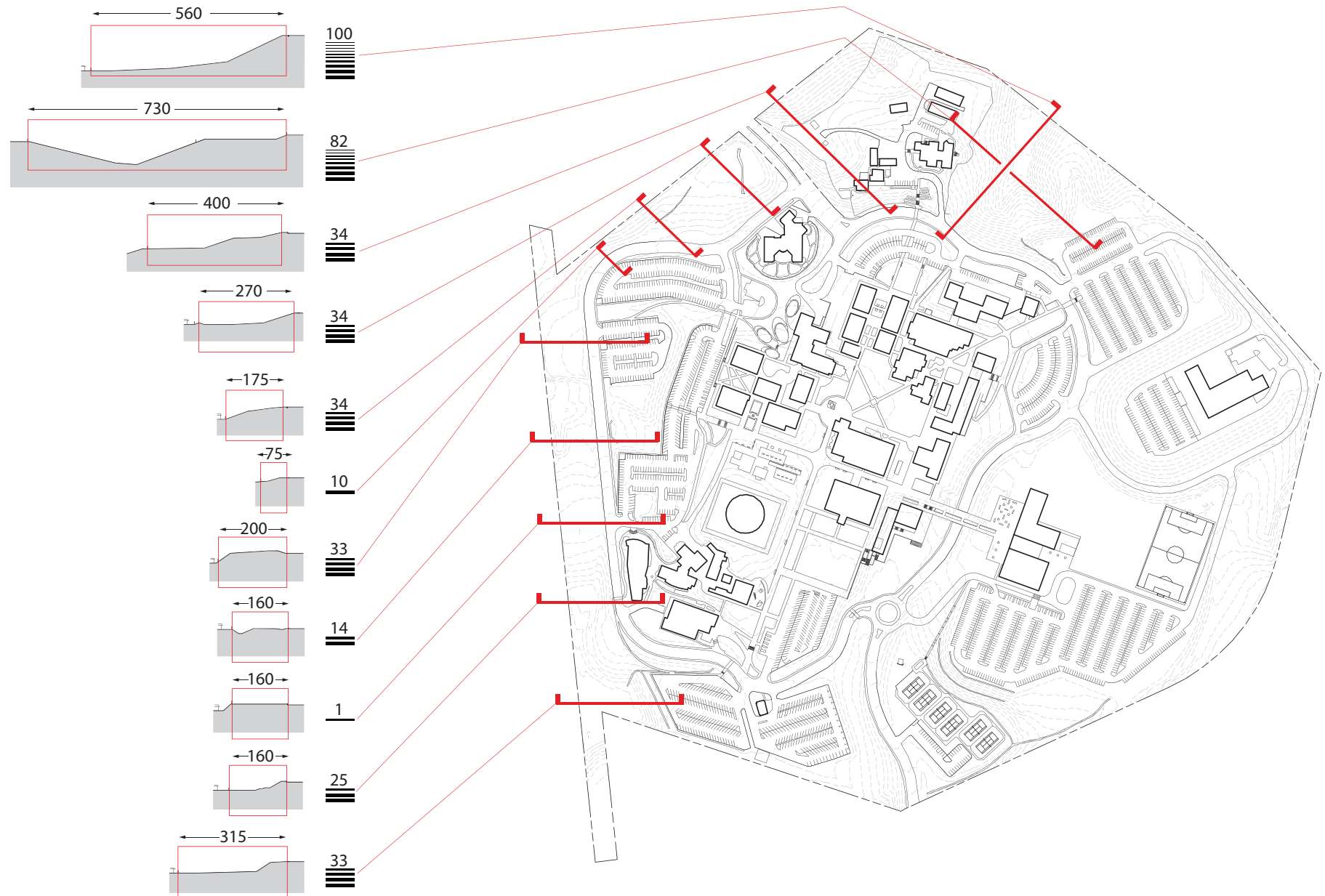
### Birds:

Accipiter cooperii	Cooper's Hawk
Aquila chrysaetos <sup>o+</sup>	Golden Eagle
Circus cyaneus <sup>+</sup>	Northern Harrier
Icteria virens	Yellow-Breasted Chat
Plegadis chihi	White-Faced Ibis
Polioptila californica californica <sup>o+</sup>	Coastal California Gnatcatcher
Vireo bellii pusillus	Least Bell's Vireo

### Mammals:

Chaetodipus californicus femoralis**	Dulzura Pocket Mouse
Chaetodipus fallax fallax**	Northwestern San Diego Pocket Mouse
Lepus californicus bennittii**	San Diego Black-Tailed Jackrabbit
Odocoileus hemionus fuliginata	Southern Mule Deer
Perognathus logimembris pacificus**	Pacific Pocket Mouse





## Perimeter Habitat Sections //

Average habitat widths and vertical grade change

## Oceanside Campus Habitat Zone //

The Oceanside campus is currently located along the eastern edge of the MHCP wildlife corridor that extends north to Camp Pendleton and south to the 78 freeway. This corridor serves as the last remaining natural open space linkage within the Oceanside subarea, and therefore a vital component to the regional habitat matrix. The 5-mile long corridor is a key habitat for protected California Gnatcatcher populations. Due to its proximity, the Oceanside campus has the opportunity to add over 18 acres of productive habitat to this north/south corridor, and contribute to the repopulation of the California Gnatcatcher and other protected species.

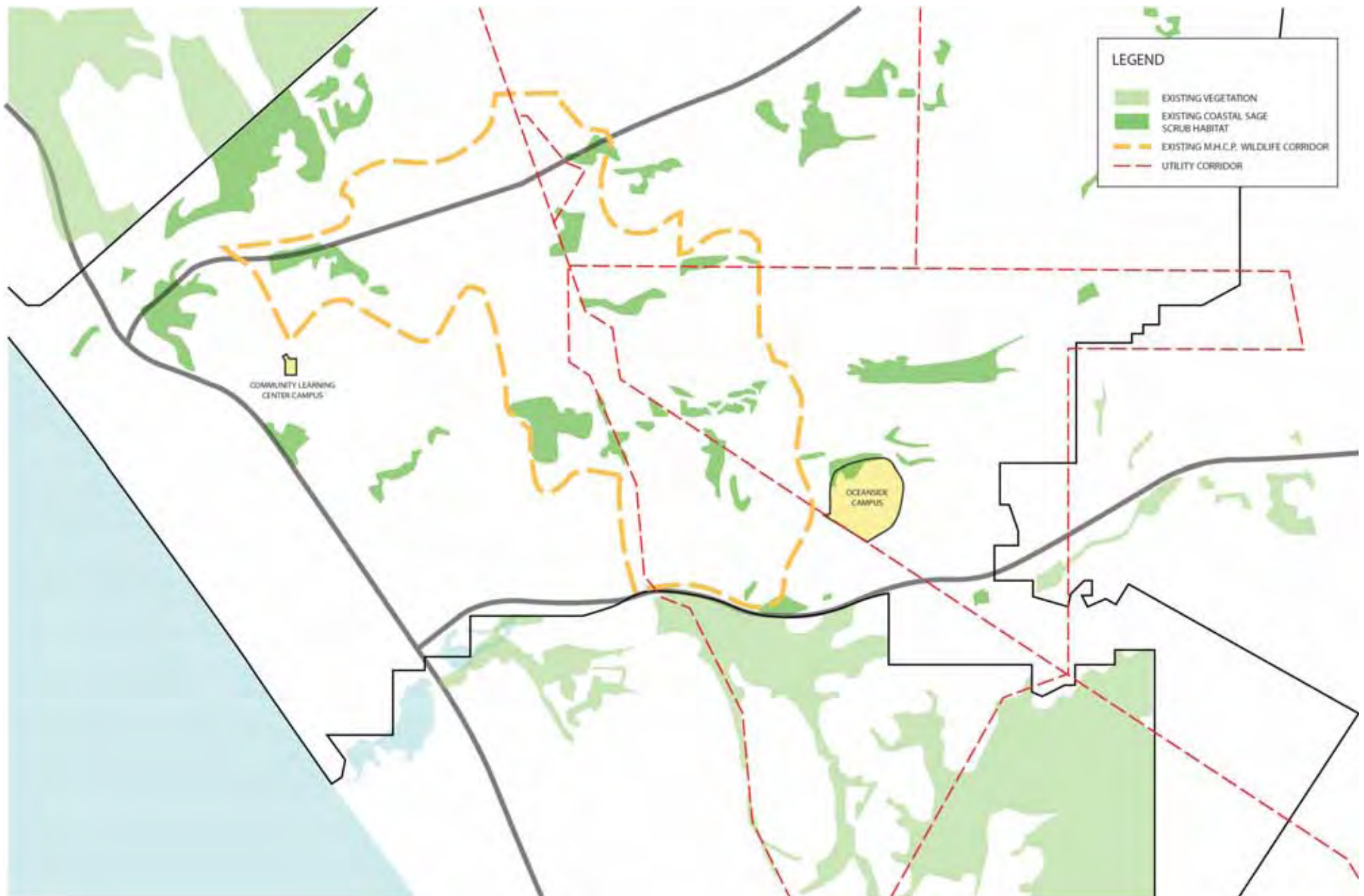
Located along the western edge of campus is the SDG&E utility corridor, which travels through the heart of the MHCP wildlife corridor and continues north into Camp Pendleton. This edge of campus is presently underutilized and may present opportunity in establishing a functional habitat zone.



1 View of the southwest corner of campus  
2 View looking north along utility corridor

3 View looking north along utility corridor over Glasser Drive





Existing MHCP Preserve Areas //



Several state and federally protected species are located within the MHCP wildlife corridor including the California Gnatcatcher and the Golden Eagle. The existing species map helps illustrate the concentration of these species just northwest of the Oceanside campus. Further study of this map also reveals that there is a large void in species sightings between the central wildlife corridor zone that continues south beyond the 78 freeway.

The proposed habitat linkage corridors are centralized along the SDG&E utility corridor. This linkage will maximise the efficiency and full potential of this underutilized piece of land, and return habitat connectivity to the MHCP region.

Re-purposing the SDG&E utility corridor on the Oceanside campus will result in over 18 acres of productive habitat as shown in the campus habitat exhibit. With the District leading by example and taking the first steps in establishing a habitat, the community and local government agencies can learn and hopefully emulate their efforts in extending the habitat beyond the campus boundaries. With the addition of just two more habitat tunnels a significant wildlife zone will be created.



Existing MHCP species map



Proposed habitat linkage corridors

## Proposed Habitat Corridor and Linkages //







## District Path to Sustainability //

### Vision for a Sustainable Future

From the outset of the CMP planning process, MiraCosta College intended to integrate sustainability into every component of the plan. This vision was reinforced through the institutional strategic goal, (which were formulated in the educational planning process. MiraCosta will become a vanguard educational institution committed to environmental sustainability, through the development of an implementation plan to establish model environmentally sustainable practices.

This implementation plan would include strategies to achieve leadership in sustainability, environmental preservation, and the transformation of each campus into a living lab of sustainable practices. Detailed strategies to achieve this are highlighted in Chapters 5, 6, and 7 as part of the 'Path to Sustainability' and in the Facilities Plan Appendix, Sustainability Planning.

### Leadership in Sustainability

Through the development of sustainably related curriculum, the exercise of top down support for sustainability policies, and the harnessing of partnership opportunities within the surrounding community to further sustainable goals; MiraCosta College will distinguish itself as a leader in sustainability within the educational community. As part of this leadership role, the District will have the opportunity to demonstrate its initiative in carbon emissions reduction through the implementation of energy, water and waste conservation measures. Through the responsible implementation of these measures, it will establish and continue to demonstrate high standards of stewardship and fiscal prudence. This opportunity is detailed in the sustainable strategies recommended for each campus in the following chapters.

### Environmental Preservation

As a premier learning institution, MiraCosta College has the opportunity to provide its students, faculty and surrounding community with an invaluable resource for sustainable practices. The College's unique proximity to the coast and adjacent reserves makes this opportunity even more relevant. It is recommended that MiraCosta College researches the potential of becoming a registered member of the National Wildlife Federation Campus Ecology program. This program would enable the College to establish and restore permanent natural habitat reserves on each campus. MiraCosta's role as a champion for natural habitat preservation would also become a key differentiator, when compared to other like institutions, and support its institutional goal to be a conscientious community partner.

### Campus as a Living Lab

By establishing the campuses as models for green site & building design MiraCosta College will use both interior and exterior environments as learning tools for students. Sustainable technologies and strategies will be highlighted within buildings and within the campus landscape through the implementation of sustainable educational signage, kiosks, and information technology systems. These facilities will provide a foundation for student learning and participation in the path to sustainability.



## Path to Sustainability: Carbon Footprint //

In order to best assess MiraCosta's sustainable future, it was necessary to first assess its existing state. A thorough analysis of the District's energy, and water use, and waste management (from 2009-2010) use was conducted. These three criteria were converted into a common unit of measure known as CO<sub>2</sub>e.<sup>1</sup>

**CO<sub>2</sub>e** stands for carbon dioxide equivalent, and is the standard unit used to measure the global warming potential (GWP) of greenhouse gases emitted into the earth's atmosphere. By using this unit of measurement, a carbon footprint consisting of various sources can be expressed as a single number. For the purposes of this analysis, the annual number of Kilowatt-hours of electricity, therms of fuel, gallons of water and pounds of waste have been converted into pounds of CO<sub>2</sub>e per square foot of building area.

Energy (electricity and fuel), water and waste were chosen as the main criteria, as a solid set of data was available to provide a basis for the calculation. It is recognized that transportation is a significant factor in determining the carbon footprint of an educational institution. This is especially the case with community colleges, where the proportion of commuters is much greater than for the average higher educational institution. However, pending a transportation study, commuter data was excluded from the carbon footprint calculation.

### Energy

Emissions from energy related processes were calculated for all operations that require energy (electricity or fuel) to keep the campus and the buildings operating. Energy emissions can originate from energy used on site (such as natural gas) or at an off-site power plant (electricity) to run heating and cooling equipment, lighting and appliances. These emissions are calculated by determining the energy consumption and then multiplying by a carbon dioxide conversion factor. For MiraCosta College conversion factors of 0.72 for electricity (eGRID2006 Version 2.1 Summary Tables)<sup>2</sup> and 0.42 lb of CO<sub>2</sub> per kilowatt-hour (11.93 lb CO<sub>2</sub>e per therm) for natural gas were utilized.

### Water

Water consumption in the building also generates GHG emissions. Water used in the building must be pumped from the source and treated. Wastewater from the building must be treated to remove physical, chemical and biological contaminants. This energy use is different from that used for domestic water heating, which is considered an energy related item. The conversion factor used for water operations was 13,021 kWh per million gallons, or 0.013021 kilowatts per gallon (California Energy Commission study of embedded energy in water for Southern and Northern California).<sup>3</sup>

### Waste

Solid waste (not transported in water) must also be moved from the campus and treated, thereby generating emissions. More waste requires more treatment and usually generates more GHGs as methane from the landfills. The waste conversion factor is derived from the Environmental Protection Agency waste calculator. (<http://tinyurl.com/2Insex>).<sup>4</sup>

### Campus Carbon Footprints

The three MiraCosta campuses each provide unique examples of levels of CO<sub>2</sub>e/sf. Oceanside, the largest of the campuses, currently stands at 16.9 lbs CO<sub>2</sub>e/sf; San Elijo is the second largest of the campuses and is currently emitting 9.9 lbs CO<sub>2</sub>e/sf; Community Learning Center is the smallest of the campuses, both in terms of square footage and student population, however is currently at 20.3 lbs of CO<sub>2</sub>e/sf.

The reasoning behind each of these existing carbon footprint values varies for each campus and will be explained in further detail. However, the common characteristic among all three is the prevalence of energy use as a main contributor to carbon emissions.

<sup>1</sup> La Roche, Pablo. Calculating green house gas emissions for buildings: analysis of the performance of several carbon counting tools in different climates (Informes de La Construcción, January-March 2010 issue.

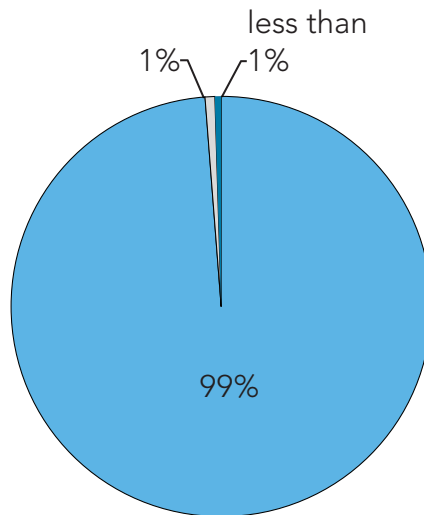
<sup>2</sup> eGRID2006 Version 2.1 (April 2007) Year 2004 Summary Tables

<sup>3</sup> Krebs, Martha. Water-Related Energy Use in California. Public Interest Energy Research Program California Energy Commission, February 20, 2007.

<sup>4</sup> EPA Emissions Calculator, <http://tinyurl.com/2Insex>

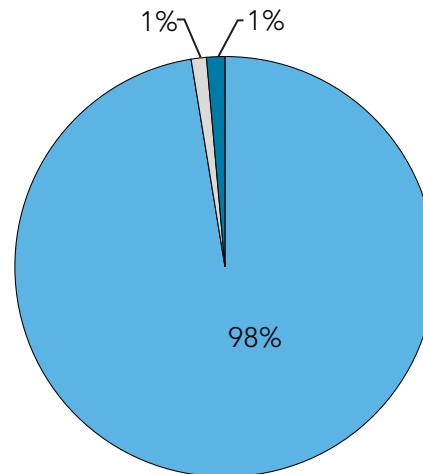
Existing CO<sub>2</sub>e Emissions

## Oceanside

16.9 CO<sub>2</sub>e lbs/sf

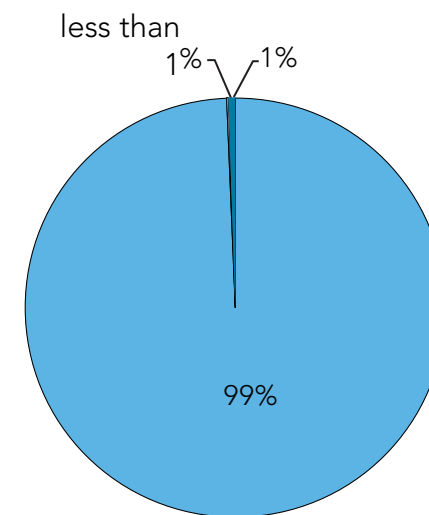
2009

## San Elijo

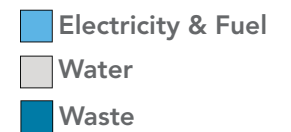
9.9 CO<sub>2</sub>e lbs/sf

2009

## Community Learning Center

20.3 CO<sub>2</sub>e lbs/sf

2009



## Current Trajectory vs. Proposed Paths //

In developing a path to sustainability for the District, it is essential to predict anticipated emission levels based on “business as usual” practices, in order to determine the extent of reductions necessary through local action. Modeling future emissions requires assumptions about population growth or decline, as well as anticipated changes in society that may alter resource supplies, change energy efficiency and affect behavior. This analysis adopts 2020 as the main planning horizon, and includes 2030 and 2050 as long range milestones.

Energy use was studied for each campus in order to determine the projected path along a 40 year period based upon one of four scenarios. Each resulting path provides a unique perspective of MiraCosta’s potential energy outlook. Four potential trajectory paths have been plotted along a 40 year time span which are based upon one of the following:

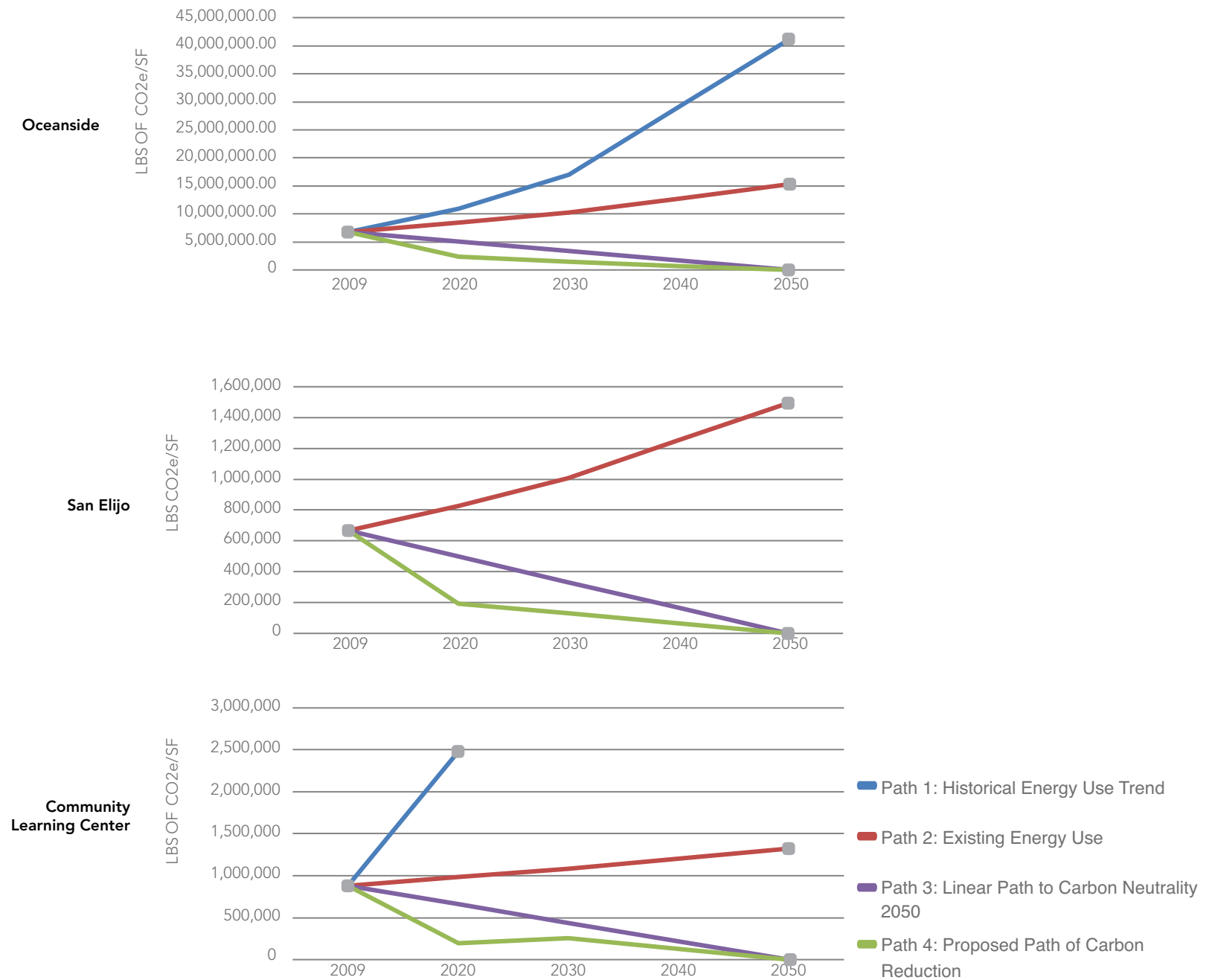
1. Historical energy use data projected against 2% compounded student growth;
2. Average rate of annual energy use increase;
3. Rate of decrease required to achieve carbon neutrality by 2050;
4. Proposed path of carbon reduction.

**Path 1** is based on an assumption of significant campus growth in student population, as well as corresponding growth in energy needs. The calculations assume that no sustainable intervention was administered. This “business as usual” model provides a benchmark for understanding the impact of local greenhouse gas reduction efforts. Path 1 demonstrates how a high use of energy is not sustainable. Path 1 was calculated for Oceanside and Community Learning Center only, San Elijo historical data was not available.

**Path 2** is based on an assumption that the current rate of energy consumption will continue along the course of the next 40 years. The calculations assume that no sustainable intervention was administered. If MiraCosta College continues on its current trajectory of GHG emissions, the total emissions will continue to rise steadily.

**Path 3** is based on a linear path to carbon neutrality by 2050. This direct path demands a consistently applied level of decrease in lbs of CO<sub>2</sub>e/sf each year.

**Path 4** illustrates the proposed path of carbon reduction based on specific sustainability strategies. When compared to the Path 3, It becomes apparent that more significant reductions in carbon emissions are possible within the 40 year time frame. The specific strategies for each campus will be detailed further in the recommendations for each campus.





# Comparison to Other Higher Educational Institutions //

In order to gauge the District's carbon footprint, the carbon footprint of each campus was compared to existing metrics supplied by three main resources:

## 1. EnergyStar

Energy Star utilizes the Energy Information Administration's Commercial Buildings Energy Consumption Survey (CBECS) to determine the type and scale of energy usage a building should meet in order to qualify as an Energy Star building. A building should perform 35% better than an average building of a similar building type in a similar climate zone to be considered an Energy Star building. A 35% more efficient higher education building would operate at 49.9 kBtu/sf/year or 8.2 lbs of CO<sub>2</sub>e/sf/year and would be minimally compliant with EnergyStar requirements.<sup>1</sup>

## 2. California Energy Commission's Average Building Energy Use index

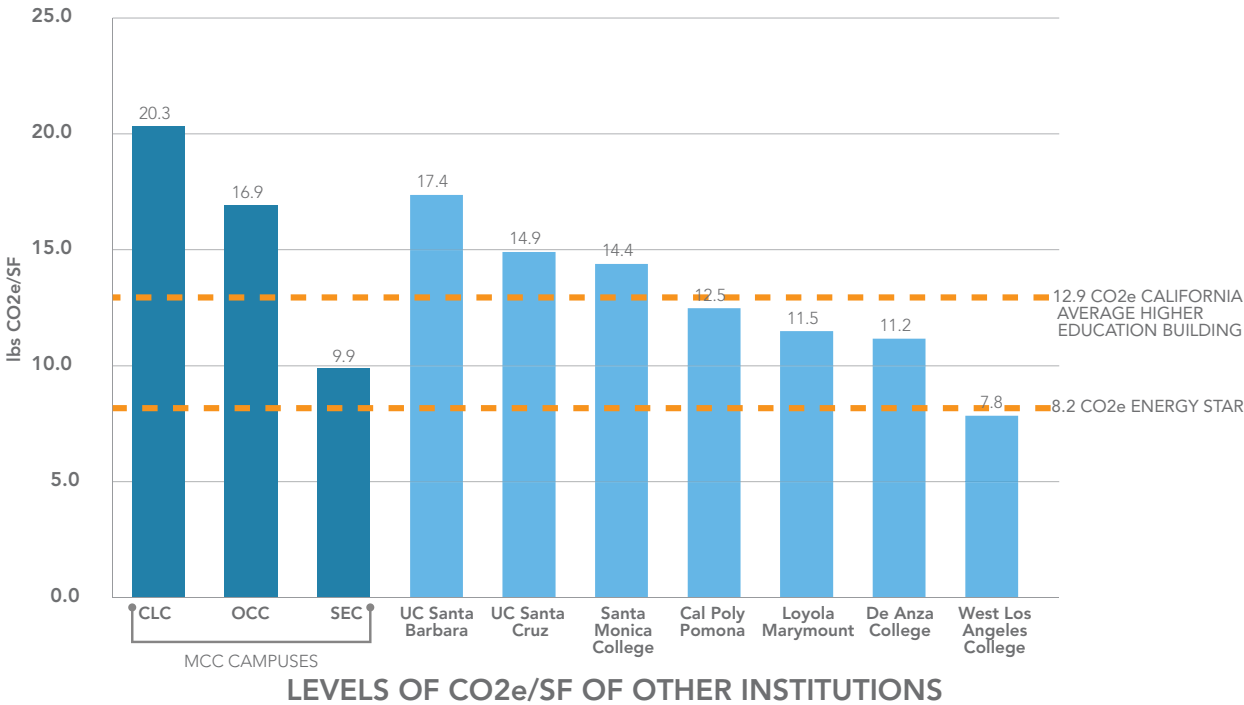
The index summarizes the electrical and natural gas usage for various types of building throughout the state. For the purposes of this study, the "College" category was used. This category lists an annual electrical and natural gas usage of 76.1 kBtu/sf/year or 12.9 lbs of CO<sub>2</sub>e/sf/year for an average college in California.<sup>2</sup>

## 3. American College and University President's Climate Commitment<sup>3</sup>

A comparative analysis of like institutions was conducted. The carbon footprints of several higher education institutions was calculated, based off of each institution's published carbon footprint data provided from the American College and University Climate Action Plan's 2009 Annual report. Many of these institutions are located in similar climates and also have a similar campus make up as the MiraCosta College campuses.

The San Elijo campus outperforms the CEC standards at 9.9 lbs. of CO<sub>2</sub>e/sf, while the Oceanside campus and Community Learning Center's CO<sub>2</sub>e/sf levels are considerably higher than all three metrics. The chart illustrates each campuses' performance relative to this database.

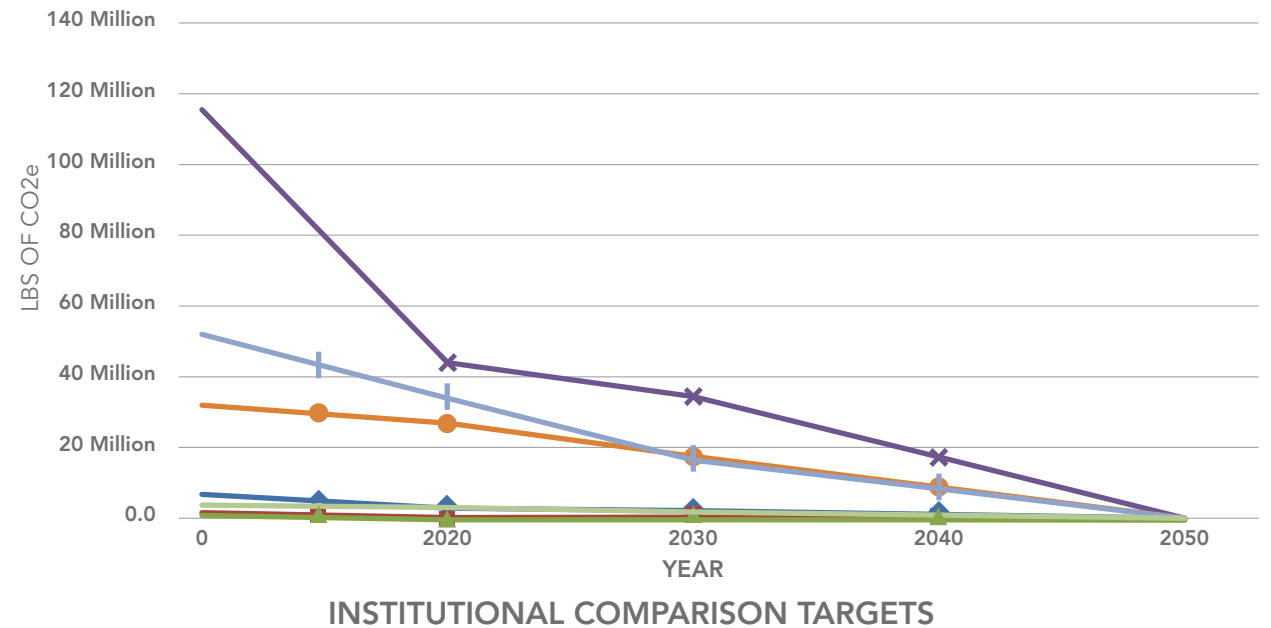
<sup>1</sup> Table C10. Consumption and Gross Energy Intensity by Climate Zone for Non-Mall Buildings, 2003  
<sup>2</sup> Itron, Inc., California Energy Commission, *California Commercial End-Use Survey*. March, 2006.  
<sup>3</sup> ACUPPC Steering Committee, American College and University President's Climate Commitment 2009 Annual Report, 2009.



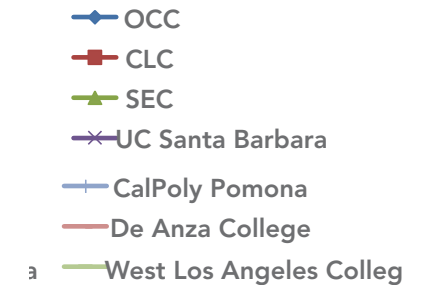
## Milestone Targets //

With the implementation of sustainability strategies in the sectors of energy, water and waste, a significant reduction in carbon may be achieved. In 2020, the Oceanside Campus could realize a reduction of 62% ; at San Elijo a reduction of 70% could be achieved; at the Community Learning Center a reduction of 78% could be achieved. The strategies supporting these reduction values are detailed further in the 'Summary of Strategies' spreadsheet in Chapters 5, 6 and 7.

The overall proposed mitigation strategy for the District is to avoid emissions where possible through implementation of sustainable strategies which are integrated in this CMP, to reduce emissions through improved efficiency, and to replace high-carbon energy sources with lower carbon sources. These strategies will be implemented through changes in new construction, retrofitting of existing facilities, changes in policy and practices, and education and outreach.



COLLEGE CAMPUS	2020 target	2030 target	2040	2050
UC Santa Barbara	62%	70%	85%	climate neutral
Loyola Maramount	16%	45%	72.50%	climate neutral
CalPoly Pomona	35%	68%	84%	climate neutral
De Anza College	neutral			
West Los Angeles College	20%	54%	77%	climate neutral

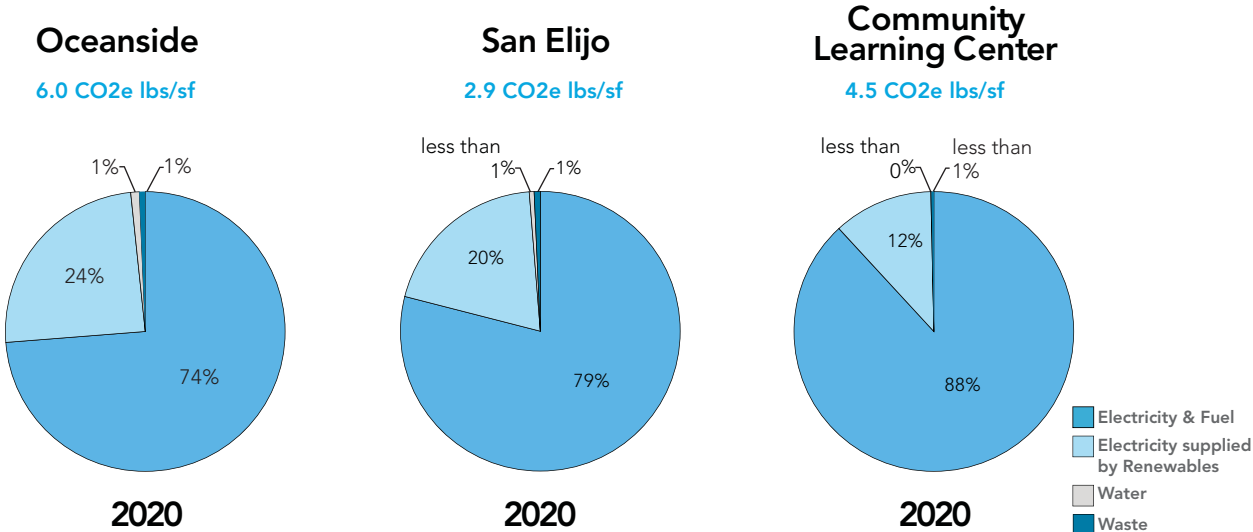


Proposed 2020 Carbon Footprint //

With the implementation of sustainability strategies in the sectors of energy, water and waste, a significant reduction in carbon may be achieved. The proposed carbon reduction path (Path 4) illustrated in the Trajectory of Energy Use graph demonstrates how a significant reduction in carbon emissions is possible by the year 2020, should these strategies be employed.

Oceanside could realize a carbon footprint of 6 lbs of CO2e/ sf (64% reduction from 2009 levels); San Elijo would project 2.9 lbs of CO2e/sf (70% reduction from 2009 levels); Community Learning Center could achieve 4.5 lbs of CO2e/sf (77% reduction from 2009 levels).

Proposed CO2e Emissions





## Strategy: Sustainable Education //

To meet the growing demand for environmentally, economically and socially sustainable careers, MiraCosta College is exploring means to integrate sustainability into curricula. As a student focused community college district which is immersed within an environmentally resonant context, the college offers great potential to serve its sustainably minded student body.

By providing sustainably focused or related courses, MiraCosta College will provide students with the skill sets required for present day and future careers, while working toward the District's institutional goal of becoming a vanguard institution through leadership in sustainability. Courses may focus on the social, economic, and environmental dimensions or examine an issue or topic using sustainability as a lens. Sustainability-related courses may include sustainability as a course component or module, or concentrate on a key sustainability principle or issue.

Course offerings may include the following examples:

- Energy Management
- Green Building Maintenance and Management
- Renewable Energy Technology
- Water Conservation
- Environmental Studies
- Sustainable Agriculture
- Sustainable Ecosystems
- Sustainable Architectural Design
- Sustainable Engineering
- Sustainable Product Design
- Green Auto Technology
- Marine Resource Management
- Environmental Economics and Policy
- Environmental Planning
- Recycling and Resource Management



## Strategy: Setting Targets //

To monitor MiraCosta College's progress towards a more sustainable future, the adoption of measurable standards is recommended. This may be achieved by aligning campus practices with a specific set of metrics. The Board-approved policy 3260 requires all new construction to meet an energy performance of 15% better than the existing Title 24 energy code, and for all renovation projects to meet an energy performance of 10% better than Title 24. In light of its feasibility, it is recommended that new buildings be designed to perform at least 28-30% better than Title 24, and that existing building renovations be designed to perform 24% better than Title 24. In addition to these standards, it is recommended that the College pursue the following:

- A Climate Action Plan which targets climate neutrality by a specific year. This can be facilitated through the American College and University President's Climate Commitment program.
- Registration of each campus as a reserve through the National Wildlife Federation Campus Ecology program
- LEED Silver certification as a minimum for new and renovated facilities. A sample LEED 2009 Checklist (New Construction and Major Renovation) is included for future construction projects. The points shown in the columns at the left side of the checklist (under 'yes', '?' and 'no') are supported by the recommended strategies and performance standards, and indicate the likelihood of achieving Silver certification or better.
- Compliance with CALGreen where required.



### LEED 2009 for New Construction and Major Renovations

#### Project Checklist

12	1	1
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	1	
	1	
	1	

#### Sustainable Sites

Possible Points: 26

C Prereq 1	Construction Activity Pollution Prevention	
d Credit 1	Site Selection	1
d Credit 2	Development Density and Community Connectivity	5
d Credit 3	Brownfield Redevelopment	1
d Credit 4.1	Alternative Transportation—Public Transportation Access	6
d Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
d Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
d Credit 4.4	Alternative Transportation—Parking Capacity	2
C Credit 5.1	Site Development—Protect or Restore Habitat	1
d Credit 5.2	Site Development—Maximize Open Space	1
d Credit 6.1	Stormwater Design—Quantity Control	1
d Credit 6.2	Stormwater Design—Quality Control	1
C Credit 7.1	Heat Island Effect—Non-roof	1
d Credit 7.2	Heat Island Effect—Roof	1
d Credit 8	Light Pollution Reduction	1

#### Water Efficiency

Possible Points: 10

d Prereq 1	Water Use Reduction—20% Reduction	
d Credit 1	Water Efficient Landscaping	2 to 4
	2 Reduce by 50%	2
	2 No Potable Water Use or Irrigation	4
d Credit 2	Innovative Wastewater Technologies	2
d Credit 3	Water Use Reduction	2 to 4
	Reduce by 30%	2
	3 Reduce by 35%	3
	Reduce by 40%	4

#### Energy and Atmosphere

Possible Points: 35

C Prereq 1	Fundamental Commissioning of Building Energy Systems	
d Prereq 2	Minimum Energy Performance	
d Prereq 3	Fundamental Refrigerant Management	
d Credit 1	Optimize Energy Performance (Improve by 28% for New Buildings or 24% for Existing Buildings)	1 to 19
d Credit 2	On-Site Renewable Energy (5% Renewable Energy)	1 to 7
C Credit 3	Enhanced Commissioning	2
d Credit 4	Enhanced Refrigerant Management	2
C Credit 5	Measurement and Verification	3
C Credit 6	Green Power	2

4 10 0

**Materials and Resources**

Possible Points: 14

Y ? N

Y

3

d Prereq 1 Storage and Collection of Recyclables

c Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof

1 to 3

1 Reuse 55%

1

1 Reuse 75%

2

1 Reuse 95%

3

1

c Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements

1

2

c Credit 2 Construction Waste Management

1 to 2

50% Recycled or Salvaged

1

2 75% Recycled or Salvaged

2

2

c Credit 3 Materials Reuse

1 to 2

1 Reuse 5%

1

1 Reuse 10%

2

1 1

c Credit 4 Recycled Content

1 to 2

1 10% of Content

1

1 20% of Content

2

1 1

c Credit 5 Regional Materials

1 to 2

1 10% of Materials

1

1 20% of Materials

2

1

c Credit 6 Rapidly Renewable Materials

1

1

c Credit 7 Certified Wood

1

11 4 0

**Indoor Environmental Quality**

Possible Points: 15

Y ? N

Y

d Prereq 1 Minimum Indoor Air Quality Performance

Y

d Prereq 2 Environmental Tobacco Smoke (ETS) Control

1

d Credit 1 Outdoor Air Delivery Monitoring

1

1

d Credit 2 Increased Ventilation

1

1

c Credit 3.1 Construction IAQ Management Plan—During Construction

1

1

c Credit 3.2 Construction IAQ Management Plan—Before Occupancy

1

1

c Credit 4.1 Low-Emitting Materials—Adhesives and Sealants

1

1

c Credit 4.2 Low-Emitting Materials—Paints and Coatings

1

1

c Credit 4.3 Low-Emitting Materials—Flooring Systems

1

1

c Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products

1

1

c Credit 5 Indoor Chemical and Pollutant Source Control

1

1

d Credit 6.1 Controllability of Systems—Lighting

1

1

d Credit 6.2 Controllability of Systems—Thermal Comfort

1

1

d Credit 7.1 Thermal Comfort—Design

1

1

d Credit 7.2 Thermal Comfort—Verification

1

1

d Credit 8.1 Daylight and Views—Daylight

1

1

d Credit 8.2 Daylight and Views—Views

1

6 0 0

**Innovation and Design Process**

Possible Points: 6

Y ? N

1

d/C Credit 1.1 Innovation in Design: Green Cleaning Program

1

1

d/C Credit 1.2 Innovation in Design: Green Education

1

1

d/C Credit 1.3 Innovation in Design: TBD

1

1

d/C Credit 1.4 Innovation in Design: TBD

1

1

d/C Credit 1.5 Innovation in Design: TBD

1

1

d/C Credit 2 LEED Accredited Professional

1

0 4 0

**Regional Priority Credits**

Possible Points: 4

Y ? N

1

d/C Credit 1.1 Regional Priority: Specific Credit

1

1

d/C Credit 1.2 Regional Priority: Specific Credit

1

1

d/C Credit 1.3 Regional Priority: Specific Credit

1

1

d/C Credit 1.4 Regional Priority: Specific Credit

1

50 42 1

**Total**

Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110



## Strategy: Transportation //

The majority of MiraCosta's student and faculty population is composed of single occupant vehicle (SOV) drivers. This volume and frequency of vehicular operations impacts the District overall carbon footprint. As automobiles are a major contributor to greenhouse gas emissions. In order to support MiraCosta College's goals relating to the provision of cost effective access to quality education, and in order to aid in reducing the District's overall carbon footprint, it is recommended that a thorough transportation analysis be conducted for all three campuses.

The following justifications are provided:

- **Improve Access:** From a transportation point of view, access can refer to the facilitation of student travel to MiraCosta College campuses and center locations.
- **Reduce Reliance on Single Occupant Vehicle (SOV) Travel:** By reducing student and employee dependence on (SOV) travel MiraCosta College benefits in terms of: reduced need to expand parking capacity and the realization of associated costs savings; compliance with state and city programs and regulations that seek to minimize vehicle miles traveled and/or parking requirements; and support for the District's role in moving toward sustainability.
- **Maintain Affordability:** MiraCosta College will be able to retain its important role as an affordable provider of higher education.

In addition, the following strategies are recommended:

- Improve public transportation access by continuing to collaborate with North County Transportation District.
- Provision of preferred parking for alternative fuel vehicles.
- Provision of electric vehicle charging stations, shaded and powered by photovoltaic shade structures.
- Provision of incentives for carpooling.
- Coordinate class timings with mass transit schedules in order to facilitate the use of mass transit options.
- Develop more opportunities for distance learning to reduce the need to commute to the campuses.
- Advertise and provide more amenities and resources to help retain students on campus between courses.



## Strategy: Green Operations //

Green operations and maintenance of buildings and the campus sites increase the life of facilities, reduce exposure to chemicals and toxic substances, and reduce the cost to operate equipment.

Green operations meet three fundamental objectives:

- Increase energy efficiency
- Conserve natural resources
- Improve indoor air quality

Green maintenance practices make buildings last longer, cost less to operate, and promote occupant health and comfort.

### Green Cleaning

Green cleaning is one of the most efficient ways for building managers to make their facilities healthier and safer for occupants, while limiting their impact on the overall environment. Recent studies have shown that sustainable buildings yield measurable financial gains due to occupant health, productivity, and retention as well as lower operating costs.

The following strategies are recommended for Green Cleaning Operations at MiraCosta:

- Environmentally responsible cleaning products and floor finishes.
- Chemical measuring and dilution control systems that minimize waste and that limits exposure.
- Micro Fiber dusting cloths and dust sleeves.
- Color coded Micro Fiber cleaning cloths to prevent cross contamination.

- Vacuums that meet the Carpet and Rug Institute (CRI) green label program requirements.
- Carpet extraction equipment that meets the CRI standard.
- Green cleaning procedures such as straight stream spray with cleaners, vacuuming stairwells, dust control burnishes, allowing proper dwell time for restroom cleaners.

### Green Purchasing

Green Purchasing, also known as Environmentally Preferable Purchasing (EPP), addresses the environmental impact of the College's buying decision. The benefits of green purchasing include occupant satisfaction, leadership image, reduced risk through compliance with green regulations, and reduced cost due to inherent qualities of green products, which use less energy, generate less waste, and last longer. Green purchasing options extend across a vast inventory of products used by the District. Examples include information technology, office supplies, furniture, cleaning supplies, lighting, campus transportation (campus fleet), food services, and energy. The following general recommendations are provided in regards to green purchasing for any one of the mentioned categories.

Purchase products which are:

- Energy efficient product options such as compact fluorescent fixtures.
- Free of hazardous materials.
- Repairable.

- Made of modular components that can easily be swapped out when they fail so you don't have to replace whole systems until they reach the end of their useful life.
- Highly recyclable.
- Designed to be easily disassembled and recycled.
- Use minimal packaging.
- Returnable to the manufacturer under an end-of-life program.
- High quality and have a long life span.
- Non-toxic and/or bio-based.
- Available in concentrate form, such as green cleaning products.
- Chemical and pesticide free, such as food goods and pesticide treatments.
- Locally sourced or grown during harvest season, i.e. food goods.

### Recycling Program and Landfill Diversion

MiraCosta currently runs a robust recycling and landfill diversion program. It is recommended that the following strategies be implemented to further the success of this operation:

- Support student participation in Recyclemania.
- Increase construction waste management plan specification requirements to 95% landfill diversion.
- Increase composting opportunities on site.
- Conduct recycling and landfill diversion study, organized by product type (glass, paper, cardboard, etc.) to determine efficiency opportunities.







## Energy and Water Use Recommendations //

### Oceanside Campus

- / Energy and Water use Recommendations for New Facilities
- / Energy and Water Use Recommendations for Renovation and Modernization Projects
- / Energy and Water use Recommendations for Site improvements Projects

### San Elijo Campus

- / Energy and Water use Recommendations for New Facilities
- / Energy and Water Use Recommendations for Renovation and Modernization Projects
- / Energy and Water use Recommendations for Site improvements Projects

### Community Learning Center

- / Energy and Water use Recommendations for New Facilities
- / Energy and Water Use Recommendations for Renovation and Modernization Projects
- / Energy and Water use Recommendations for Site improvements Projects

### Living Machine

### Natural Ventilation



## Oceanside Campus Energy and Water Use Recommendations for New Facilities //

### Energy Use

#### Technology Power Management

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of an institutional building's total energy consumption. Recommended strategies, with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District, are included in the Facilities Plan Appendix, Site Infrastructure Planning section, in the Technology Infrastructure report.

#### Lighting

It is recommended that occupancy sensors be provided for all lights in new buildings rather than tying the lights into a lighting control panel. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on.

All lights near windows or skylights should be controlled by continuous dimming daylight controls. Studies have shown an over 50% reduction in lighting power usage when daylighting systems are designed and operated correctly in areas with daylight access. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction.

All new buildings will exceed the baseline Title-24 lighting power density requirements by 40% at the time of building design.

#### Heating, Ventilation, and Air Conditioning

The existing campus has one large central utility plant near the center of campus along with several smaller plants spread throughout. New buildings should connect to the existing large campus central plant where possible. If not possible, every effort should be made to provide infrastructure enabling future connection to the central plant.

#### Natural Ventilation

The local Oceanside climate is ideal for using natural ventilation instead of traditional mechanical HVAC systems. It is recommended that all new buildings on campus be designed to take advantage of this climate. Operable windows should be used and building openings will be oriented for optimal natural ventilation opportunities. All HVAC systems in the building should have interlocks to shut down when a space is being naturally ventilated. Special care should be taken to avoid acoustical migration between outdoors and indoors.

#### Solar Domestic Hot Water

Solar domestic hot water systems are a good match for the type of weather available in Oceanside. These systems should be installed to generate a portion of the needed hot water in all new buildings. Traditional gas water heating systems will still be installed but will be used much less often than without the solar hot water system saving utility costs.

#### Displacement Ventilation and Underfloor Air

It is recommended that displacement ventilation and underfloor air distribution strategies be explored for all new buildings. Both of these methods of air delivery supply air at a much higher temperature than traditional overhead air distribution systems. While more fan energy is used because of this, a less amount of mechanical cooling is required while the range of a free-cooling economizer cycle is greatly expanded. Traditional overhead systems supply air at 55 degrees F. To be able to operate in 100% free cooling mode, the outdoor air temperature would then need to be at 55 degrees or less. Displacement ventilation and underfloor air distribution systems supply air at approximately 63 degrees. Historically, the outdoor ambient air is 63 degrees or less 3,812 hours each year during normally occupied hours. This is 2,620 hours more often than it is 55 degrees or less and 2,620 hours more often that the building can be in free cooling mode.

## Skylights

Skylights, Solatubes, and similar products should be used in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed.

## Submeters

It is suggested that submeters for all utilities and energy usage be provided for each new building. At a minimum, the lighting, receptacles, process load, and HVAC load should be submetered. If the building is connected to the central plant, chilled water and hot water should also be metered. By metering all of these uses, energy use trending can be observed making abnormalities in the systems obvious for immediate corrective action by the facilities maintenance staff. This allows building systems to operate at prime performance rather than at lesser efficiencies.

## Overall Building Performance

It is recommended that new buildings be designed to operate at 35% better than Title-24 minimum baseline at the time of design. This will be achieved by using the strategies above as well as using premium efficiency HVAC equipment, superior envelope properties, shading devices, and other efficiency strategies that make sense for the building under design.

## Water Use

### Water fixtures

New buildings should install water fixtures to allow the building to be, at a minimum, 40% below the Energy Policy Act water usage baseline at the time of construction. With the current baseline, a 40% reduction can be achieved with 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals, 0.5 gallon per minute (gpm) lavatories that operate on a 10 second metered cycle, 1.0 gpm sinks, and 1.5 gpm shower heads. These fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals.

### Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce over 470,000 gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. It is recommended that new buildings have condensate recovery vessels adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas.



## Oceanside Campus

### Energy and Water Use

### Recommendations for Renovation and Modernization Projects //

#### Existing Building Energy Efficiency Upgrades

##### Technology Power Management

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of an institutional building's total energy consumption. Recommended strategies, with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District, are included in the Facilities Plan Appendix, Site Infrastructure Planning section, in the Technology Infrastructure report.

##### Lighting

It is suggested that all light fixtures throughout campus be changed to 25 watt T8 fixtures. This should be done during a regularly scheduled lamp replacement time frame or when replacing a burned-out lamp. By the time all lamps are changed to 25 watt T8 fixtures, the campus will save approximately 366,200 kWh annually when compared to the existing lighting. This will cost approximately \$80,000 to implement and will have a payback of 1.5 years.

We recommend that occupancy sensors be retrofitted for all lights. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on. Assuming all rooms throughout campus are occupied for two-thirds of the time the campus is operational and vacant the other one-third allowing the lights to be off, this will save approximately 216,730 kWh per year. The upfront installed costs associated with this change will be approximately \$679,200. Payback will occur in approximately 21 years. This is assuming the recommended 25 watt lamp replacement described above has been completed. If older lamps are in place, the savings because of occupancy sensor upgrade will be even larger.

All lights near windows or skylights should be retrofitted to be controlled by continuous dimming daylight controls. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction. It is estimated that a savings of 84,900 kWh per year will occur after the implementation of daylighting controls. This will cost approximately \$100,000 and will have a payback of just under eight years.

##### Heating, Ventilation, and Air Conditioning

Temperature setpoints throughout campus are currently set at 72 degrees for cooling and 70 degrees for heating. It is recommended that the setpoints be changed to 74 degrees for cooling and 68 degrees for heating per typical industry standard. Changing these setpoints will still maintain a high level of comfort in the buildings while saving 285,400 kWh per year in electric usage. The only costs associated with this measure is the costs to have facilities personnel manually change the thermostat setpoints throughout the campus.

##### Natural Ventilation

The local Oceanside climate is ideal for using natural ventilation instead of traditional mechanical HVAC systems. Classroom instructors have realized this and open doors and windows can be seen all throughout campus on all buildings. This is done even while the HVAC system is operating. All HVAC systems throughout campus that are in an area capable of having doors or windows propped open should have interlocks installed to shut down the equipment when a space is being naturally ventilated by the open doors or windows. At an upfront cost of roughly \$50,000, the 169,100 kWh savings per year will pay back in approximately two years.



## Solar Domestic Hot Water

Solar domestic hot water systems are a good match for the type of weather available in Oceanside. These systems should be installed to generate a portion of the needed hot water in all buildings. Traditional gas water heating systems will still be maintained but will be used much less often than without the solar hot water system saving utility costs. It is suggested that solar hot water systems be installed on the existing food services building. This system will offset approximately 6,930 Therms of natural gas per year. The estimated upfront costs will be \$223,458.

## Skylights

Studies have shown that students exposed to natural daylight will have higher concentration levels and productivity. Skylights, Solatubes, and similar products should be added in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed. Assuming that Solatubes can be installed in 25% of the spaces throughout campus to provide a level of daylighting not currently seen, the upfront costs would be approximately \$509,400. The estimated annual savings will be 95,616 kWh per year.

## Cool Roof Installation

It is recommended that all flat roof areas have highly reflective “cool roof” coatings spray-applied. This will allow heat from the sun to be reflected back to the atmosphere rather than be absorbed by the building. Applying this coating to the applicable roof surfaces will save 14,000 kWh per year. At a cost of \$35,500 to apply, a simple payback will be seen in 17 years.

## Building Insulation Improvements

It is recommended that all walls and roofs undergo building insulation improvements. With the buildings on this campus constructed in the 60's, 70's, and 80's, the energy code requirements were much less than they are today. Adding additional insulation into the existing walls or roofs could result in considerable energy savings. For example, estimating the total wall area on campus and assuming current R-11 insulation, adjusting the insulation in the walls and roofs to perform to an R-19 level of insulation would result in an energy savings of just under 303,705 kWh per year and 47,900 Therms per year. With an estimated cost of \$617,340 for installation, the payback could be in 7.6 years.

## Window Coatings

Low-e window film should be applied to all older glazing systems throughout campus to obtain a minimum solar heat gain coefficient of 0.3 for all windows. Reducing the solar heat gain coefficient in the glazing system will reduce the amount of heat in the form of radiation that will enter the building through the windows. This will reduce the amount of energy used to operate the HVAC systems. At a \$30,000 up front cost and a savings of 21,500 kWh per year, this measure is estimated to pay back in 9.3 years.

## Submeters

Submeters for all utilities and energy usage is recommended to be provided for each building. At a minimum, all power usage, central plant chilled water, and central plant hot water will be submetered. By metering all of these uses, energy use trending can be observed making abnormalities in the systems obvious for immediate corrective action by the facilities maintenance staff. This allows building systems to operate at prime performance rather than at lesser efficiencies. At an estimated upfront cost of \$140,000, the payback is difficult to pin down. If the campus is already operating very efficiency and no problems occur in the future, the payback will be very minimal. However, if there are currently any problems with system operation or if anything should go wrong with any systems in the future, which is a much more likely scenario, then the savings could be very significant. If submetering various energy usages, it would be easy to find any abnormalities in system operation. If there were no submetering in place, these abnormalities may not be noticed and would be allowed to continue operating in an inefficient manner until they were noticed, IF they were noticed.

## Existing Building Water Efficiency Upgrades

### Water fixtures

There is currently a phase-out plan in place to replace older plumbing fixtures with newer, low-flow fixtures. This project should continue to be implemented. To reiterate, the following fixtures should be installed throughout campus: 1.28 gpf water closets, 0.125 gpf urinals, 0.5 gpm lavatories, 1.0 gpm sinks, and 1.5 gpm shower heads. Existing fixtures have been observed to be: 1.6 gpf water closets, 1.0 gpf urinals, and 2.5 gpm lavatories. The new fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals. At a cost of approximately \$290,000 to fixture upgrades, the estimated savings would be nearly three million gallons of water per year. This translates into a simple payback of 14.3 years.

## Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce over nearly half a million gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. Existing buildings will have condensate recovery vessels installed adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas saving the nearly half million gallons of water each year sent down the drain. It is estimated that small systems could be installed throughout campus for approximately \$30,000. With a 470,800 gallon per year savings, a payback could be seen in 9.4 years.







## Oceanside Campus

### Energy and Water use Recommendations for Site Improvement Projects //

#### Open Space Energy Efficiency

##### Lighting

It is recommended that all street, parking, and walkway lighting be replaced with wind and solar powered LED lighting fixtures. Current fixtures account for over 220,000 kWh of power usage per year. Installing these new fixtures will eliminate that entire annual power usage. It is proposed that half of the fixtures be installed before 2020 and the other half of the fixtures be replaced by 2030. This will have a total installation cost of \$417,000(half by 2020 and the other half by 2030) with a payback of approximately 12.4 years.

##### Chilled Water Temperature Reset

Currently, the chillers on campus operate at 45 degree chilled water temperature whether the outdoor temperature conditions dictate the need for water that cold or not. It is recommended that the controls be modified as such so that the chilled water temperature varies with the outdoor air conditions. As the outdoor temperature gets cooler, the chilled water temperature will be warmer because less cooling will be needed and the chiller can operate more efficiently at the higher supply temperature. As the outdoor weather conditions warm up, the chilled water temperature will become colder to account for the higher cooling load needs. A savings of 54,100 kWh per year can be realized by implementing this control strategy on all chillers.

#### Art Complex Central Plant Consolidation

The Art Complex currently consists of three buildings served by three chillers located immediately next to one another but operating separately. These systems would operate in a much more efficient manner if they were combined into one chilled water system serving all three buildings. Some pipe and control modifications would allow this to occur. Once complete, these revisions would allow for 39,000 kWh in annual power savings.

With both the temperature reset and art complex chiller consolidation implemented, the total costs would be about \$133,000 with a payback of approximately 4.4 years.

##### Photovoltaics

It is suggested that photovoltaic panels be installed above open parking lots on campus to provide 40% of the campus power requirements. Assuming all energy efficient recommendations are followed in this master plan, the annual energy usage of the campus is estimated to be 7,263,235 kWh by 2020 per year (electricity and equivalent gas). To offset 20% of this power usage, 153,850 sf photovoltaic (PV)panels would need to be installed. Panels made of crystalline silicon that generate 13 watts per square foot are common today and will be used in the parking lots. It is also recommended that PV panels be installed near the new maintenance building to power the electrical

maintenance carts. At current installation costs of about \$6 per watt, the costs for full implementation would be about \$12 million dollars. A payback of 27.2 years could be seen without regards to any incentives.

##### Fuel Cells

Fuel cells are devices that when supplied with natural gas and water will generate electrical power with the only byproducts being water. A fuel cell will not be installed to handle the entire electrical needs of the campus, but rather it will be large enough to provide a base load for most of the year. At times in the summer there will be a need to use energy from the electrical grid, but much of this will be offset by the photovoltaics installed as described above. Having a 500 kW fuel cell will occupy approximately 1,800 square feet on campus and will offset approximately 2,000,000 kWh per year. It is recommended that the fuel cells be installed after 2020 but before 2030 as part of carbon neutral efforts for the campus.

## Open Space Water Efficiency

### Chemical Free Water Treatment

If not treated properly, water in a cooling tower will develop scale and biological growth. The will foul up the tower itself but also the chiller that the tower serves. To prevent this from occurring, chemical treatment has traditionally been used to maintain the proper chemical composition of the water. An alternative to chemical treatment systems are chemical-free water treatment systems. These consist of a device mounted in the condenser water piping that will treat the water going to the cooling tower. This eliminates the need for onsite chemicals and reduces the amount of water discharged from the tower to maintain proper levels of particle concentrations. A water reduction amount estimated for the 300 ton cooling tower on the Oceanside campus is over 160,000 gallons per year. A chemical-free system will cost approximately \$55,000. It should be noted though, that using the chemical free system will also save the campus the cost of chemicals used in the tower. There is also the piece-of-mind savings of just not having any chemicals on campus.

### Cooling Tower Blow-Down used for Irrigation

As mentioned above, a cooling tower will discharge a certain amount of water on a regular basis to maintain proper level of particle concentrations in the condenser water. This is known as blow-down. With a chemical treatment system, this blow-down must be drained to the sanitary sewer. With a chemical-free system, this blow-down is considered gray water and may be used to irrigate the local landscape areas. With a chemical-free treatment system used on the 300 ton cooling tower on campus, over 120,000 gallons per year will be available for landscape irrigation as a result of this tower blow-down. For the one tower an upfront cost of about \$1,000 would be anticipated. A payback of 1.2 years could be seen for this measure.

### Wastewater Treatment

Plumbing waste from the campus currently exits the campus via Bernard Drive and connects to the main city sewage system on College Blvd. Mira Costa College contributes approximately 9.87 million gallons of waste annually that will need to be treated by the local wastewater treatment plant. To avoid this discharge of waste, an on-site wastewater treatment plant will be constructed at the entrance of the campus along Bernard Drive. The Living Machine is a proprietary sewage treatment system that employs a four day process to treat and consume raw sewage in a functioning, indoor, man-made wetlands environment. This biological system employs the use of a wide variety of native aquatic plants, fish, bacteria, algae, snails, protozoa, and other organisms to provide specific cleaning functions. Using a Living Machine on campus will allow MiraCosta to capture all wastewater that would normally end up in the city sewage system, and instead use that water, once treated naturally with local flora and fauna, to irrigate landscape on the campus. As with the fuel cell, this measure is recommended to be implemented after 2020 but before 2030 as part of the College's push towards carbon neutrality.

## San Elijo Campus

### Energy and Water Use Recommendations for New Facilities //

#### Energy Use

##### Technology Power Management

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of an institutional building's total energy consumption. Recommended strategies, with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District, are included in the Facilities Plan Appendix, Site Infrastructure Planning section, in the Technology Infrastructure report.

##### Lighting

It is recommended that occupancy sensors be provided for all lights in new buildings rather than tying the lights into a lighting control panel. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on.

All lights near windows or skylights should be controlled by continuous dimming daylight controls. Studies have shown an over 50% reduction in lighting power usage when daylighting systems are designed and operated correctly in areas with daylight access. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction.

All new buildings will exceed the baseline Title-24 lighting power density requirements by 40% at the time of building design.

##### Natural Ventilation

The local Oceanside climate is ideal for using natural ventilation instead of traditional mechanical HVAC systems. It is recommended that all new buildings on campus be designed to take advantage of this climate. Operable windows should be used and building openings will be oriented for optimal natural ventilation opportunities. All HVAC systems in the building should have interlocks to shut down when a space is being naturally ventilated. Special care should be taken to avoid acoustical migration between outdoors and indoors.

Solar chimneys will be used where applicable. A solar chimney is a building element strategically located and designed that allows the natural buoyancy of hot air to rise up through the chimney allowing for air movement through a building. Solar chimneys combined with other natural ventilation strategies allow for an effective means of naturally cooling a space with minimal mechanical air conditioning usage.

##### Solar Domestic Hot Water

Solar domestic hot water systems are a good match for the type of weather available in Oceanside. These systems should be installed on the new Science building to generate a portion of the needed hot water in all new buildings. Traditional gas water heating systems will still be installed but will be used much less often than without the solar hot water system saving utility costs.

##### Displacement Ventilation and Underfloor Air

It is recommended that displacement ventilation and underfloor air distribution strategies be explored for all new buildings. Both of these methods of air delivery supply air at a much higher temperature than traditional overhead air distribution systems. While more fan energy is used because of this, a less amount of mechanical cooling is required while the range of a free-cooling economizer cycle is greatly expanded. Traditional overhead systems supply air at 55 degrees F. To be able to operate in 100% free cooling mode, the outdoor air temperature would then need to be at 55 degrees or less. Displacement ventilation and underfloor air distribution systems supply air at approximately 63 degrees. Historically, the outdoor ambient air is 63 degrees or less 3,812 hours each year during normally occupied hours. This is 2,620 hours more often than it is 55 degrees or less and 2,620 hours more often that the building can be in free cooling mode.



## Radiant Heating and Cooling

Radiant HVAC systems are recommended for the new buildings. Radiant floors may consist of PEX tubing built into the floor construction. The tubing carries heating hot water or chilled water to heat/cool the floor, which in turn heats/cools the rest of the room. Radiant systems save operating costs over conventional overhead air distribution systems because of reduced fan power, and moderate operating temperatures. Radiant heating and cooling has the affect of a more comfortable environment, while radiant heating is well suited for use in conjunction with natural ventilation systems.

## Earth-coupled Geothermal HVAC Systems

It is suggested that the new buildings utilize geothermal heating and cooling systems to serve the buildings. Ground-coupled or geothermal systems rely on heat rejected or absorbed from the earth or aquifer on a project site via thousands of feet of tubing buried in the ground. These types of systems will eliminate the need for a cooling tower or boiler in the new building unlike the rest of the buildings on the San Elijo campus that currently use boilers and cooling towers. The buried tubing will be connected to water-to-water heat pumps to produce chilled and hot water to serve the radiant systems as described above, or to water-to-air heat pumps for direct use in conditioning space.

## Skylights

Skylights, Solatubes, and similar products should be used in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed.

## Submeters

It is suggested that submeters for all utilities and energy usage be provided for each new building. At a minimum, the lighting, receptacles, process load, and HVAC load should be submetered. If the building is connected to the central plant, chilled water and hot water should also be metered. By metering all of these uses, energy use trending can be observed making abnormalities in the systems obvious for immediate corrective action by the facilities maintenance staff. This allows building systems to operate at prime performance rather than at lesser efficiencies.

## Overall Building Performance

It is recommended that new buildings be designed to operate at 35% better than Title-24 minimum baseline at the time of design. This will be achieved by using the strategies above as well as using premium efficiency HVAC equipment, superior envelope properties, shading devices, and other efficiency strategies that make sense for the building under design.

## New Building Water Use

### Water fixtures

New buildings should install water fixtures to allow the building to be, at a minimum, 40% below the Energy Policy Act water usage baseline at the time of construction. With the current baseline, a 40% reduction can be achieved with 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals, 0.5 gallon per minute (gpm) lavatories that operate on a 10 second metered cycle, 1.0 gpm sinks, and 1.5 gpm shower heads. These fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals.

### Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce nearly 100,000 gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. It is recommended that new buildings have condensate recovery vessels adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas.

## San Elijo Campus

### Energy and Water Use Recommendations for Renovation and Modernization Projects //

#### Lighting

It is suggested that all light fixtures throughout campus be changed to 25 watt T8 fixtures. This should be done during a regularly scheduled lamp replacement time frame or when replacing a burned-out lamp. By the time all lamps are changed to 25 watt T8 fixtures, the campus will save approximately 46,300 kWh annually when compared to the existing lighting. This will cost approximately \$7,000 to implement and will have a payback of just under a year.

We recommend that occupancy sensors be retrofitted for all lights. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on. Assuming all rooms throughout campus are occupied for two-thirds of the time the campus is operational and vacant the other one-third allowing the lights to be off, this will save approximately 59,275 kWh per year. The upfront installed costs associated with this change will be approximately \$141,400. Payback will occur in approximately 14 years. This is assuming the recommended 25 watt lamp replacement described above has been completed. If older lamps are in place, the savings because of occupancy sensor upgrade will be even larger.

All lights near windows or skylights should be retrofitted to be controlled by continuous dimming daylight controls. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction. It is estimated that a savings of 29,150 kWh per year will occur after the implementation of daylighting controls. This will cost approximately \$20,000 and will have a payback of four years.

#### Heating, Ventilation, and Air Conditioning

Temperature setpoints throughout campus are currently set at 72 degrees for cooling and 70 degrees for heating. It is recommended that the setpoints be changed to 74 degrees for cooling and 68 degrees for heating per typical industry standard. Changing these setpoints will still maintain a high level of comfort in the buildings while saving 23,850 kWh per year in electric usage. The only costs associated with this measure is the costs to have facilities personnel manually change the thermostat setpoints throughout the campus.

#### Natural Ventilation

The local Oceanside climate is ideal for using natural ventilation instead of traditional mechanical HVAC systems. Classroom instructors have realized this and open doors and windows can be seen all throughout campus on all buildings. This is done even while the HVAC system is operating. All HVAC systems throughout campus that are in an area capable of having doors or windows propped open should have interlocks installed to shut down the equipment when a space is being naturally ventilated by the open doors or windows. At an upfront cost of roughly \$20,000, the 13,150 kWh savings per year will pay back in approximately nine years. A solar chimney is a building element strategically located and designed that allows the natural buoyancy of hot air to rise up through the chimney allowing for air movement through a building. Solar chimneys combined with other natural ventilation strategies allow for an effective means of naturally cooling a space with minimal mechanical air conditioning usage. For the Student Center, it is recommended that the existing lobby architecture be retrofitted to utilize a solar chimney. For a cost of approximately \$7,500, annual savings of 5,334 kWh per year could be seen. This could result in a simple payback of approximately 8.3 years.

### Water Source Heat pump Replacement

Many of the existing water source heat pumps on campus are original units from the initial building construction. These are beyond their services lives and are rather inefficient compared to newer water source heat pump units. It is recommended that the existing units be replaced with newer, more efficient water source heat pumps. Doing this will cost approximately \$262,500 and save 37,000 kWh per year.

### Skylights

Studies have shown that students exposed to natural daylight will have higher concentration levels and productivity. Skylights, Solatubes, and similar products should be added in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed. Assuming that Solatubes can be installed in 25% of the spaces throughout campus to provide a level of daylighting not currently seen, the upfront costs would be approximately \$106,050. At an estimated savings of 26,150 kWh per year, the simple payback for these devices will be 24 years.

### Cool Roof Installation

It is recommended that all flat roof areas have highly reflective “cool roof” coatings spray-applied. This will allow heat from the sun to be reflected back to the atmosphere rather than be absorbed by the building. Applying this coating to the applicable roof surfaces will save 8,700 kWh per year. At a cost of \$13,200 to apply, a simple payback will be seen in nine years.

### Building Insulation Improvements

It is recommended that all walls and roofs undergo building insulation improvements. With the buildings on this campus constructed in the late 80's and early 90's, the energy code requirements were much less than they are today. Adding additional insulation into the existing walls or roofs could result in considerable energy savings. For example, estimating the total wall area on campus and assuming current R-11 insulation, adjusting the insulation in the walls and roofs to perform to an R-19 level of insulation would result in an energy savings of just under 179,000 kWh per year and 4,000 Therms per year. With an estimated cost of \$118,000 for installation, the payback could be in 3.5 years.

### Submeters

Submeters for all utilities and energy usage is recommended to be provided for each building. At a minimum, all power usage, central plant chilled water, and central plant hot water will be submetered. By metering all of these uses, energy use trending can be observed making abnormalities in the systems obvious for immediate corrective action by the facilities maintenance staff. This allows building systems to operate at prime performance rather than at lesser efficiencies. At an estimated upfront cost of \$36,000, the payback is difficult to pin down. If the campus is already operating very efficiency and no problems occur in the future, the payback will be very minimal. However, if there are currently any problems with system operation or if anything should go wrong with any systems in the future, which is a much more likely scenario, then the savings could be very significant. If submetering various energy usages, it would be easy to find any abnormalities in system operation. If there were no submetering in place, these abnormalities may not be noticed and would be allowed to continue operating in an inefficient manner until they were noticed, IF they were noticed.



## Existing Building Water Efficiency Upgrades

### Water Fixtures

There is currently a phase-out plan in place to replace older plumbing fixtures with newer, low-flow fixtures. This project should continue to be implemented. To reiterate, the following fixtures should be installed throughout campus: 1.28 gpf water closets, 0.125 gpf urinals, 0.5 gpm lavatories, 1.0 gpm sinks, and 1.5 gpm shower heads. Existing fixtures have been observed to be: 1.6 gpf water closets, 1.0 gpf urinals, and 2.5 gpm lavatories. The new fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals. At a cost of approximately \$82,000 to fixture upgrades, the estimated savings would be over a half a million gallons of water per year. This translates into a simple payback of 24 years.

### Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce over nearly half a million gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. Existing buildings will have condensate recovery vessels installed adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas saving the nearly half million gallons of water each year sent down the drain. It is estimated that small systems could be installed throughout campus for approximately \$9,000. With a 94,400 gallon per year savings, a payback could be seen in 14 years.







## San Elijo Campus

### Energy and Water use Recommendations for Site Improvement Projects //

#### Lighting

It is recommended that all street, parking, and walkway lighting be replaced with wind and solar powered LED lighting fixtures. Current fixtures account for over 220,000 kWh of power usage per year. Installing these new fixtures will eliminate that entire annual power usage. It is proposed that half of the fixtures be installed before 2020 and the other half of the fixtures be replaced by 2030. This will have a total installation cost of \$448,000 (half by 2020 and the other half by 2030) with a payback of approximately 22.2 years.

#### Condenser water flow

Currently, the condenser water systems on campus operate at constant flow. Even when flow to some water source heat pumps is not needed, the pump will still attempt to pump enough water as if that water source heat pump needs water. It is recommended that variable speed drives be added to the condenser water pumps to reduce the amount of water pumped when it is not needed. We also suggest adjusting the valving at the water source heat pumps to prevent water from being pumped through them when the units are not in need of water. A savings of 45,150 kWh per year can be realized by implementing these changes at each building. The total costs would be about \$40,000 with a payback of approximately 5.2 years.

#### Photovoltaics

It is suggested that photovoltaic panels be installed above open parking lots on campus to provide 40% of the campus power requirements. Assuming all energy efficient recommendations are followed in this master plan, the annual energy usage of the campus is estimated to be 486,210 kWh. This is the energy usage after all conservation strategies are implemented before 2020 and after all new buildings are built before 2020. This includes electrical usage and equivalent gas usage in kWh. To offset 40% of this power usage, 10,770 square feet of photovoltaic (PV) panels will need to be installed. Panels made of crystalline silicon that generate 13 watts per square foot are common today and will be used in the parking lots. It is also recommended that PV panels be installed near the new maintenance building to power the electrical maintenance carts. At current installation costs of about \$6 per watt, the costs for full implementation would be about \$840,000 dollars. A payback of 25 years could be seen without regards to any incentives.

#### Fuel Cells

Fuel cells are devices that when supplied with natural gas and water will generate electrical power with the only byproducts being water. A fuel cell will not be installed to handle the entire electrical needs of the campus, but rather it will be large enough to provide a base load for most of the year. At times in the summer there will be a need to use energy from the electrical grid, but much of this will be offset by the photovoltaics installed as described above. Having a 100 kW fuel cell will occupy approximately 590 square feet on campus and will offset approximately 100,000 kWh per year. It is recommended that the fuel cells be installed after 2020 but before 2030 as part of carbon neutral efforts for the campus.



## Open Space Water Efficiency

### Chemical Free Water Treatment

If not treated properly, water in a cooling tower will develop scale and biological growth. The will foul up the tower itself but also the chiller that the tower serves. To prevent this from occurring, chemical treatment has traditionally been used to maintain the proper chemical composition of the water. An alternative to chemical treatment systems are chemical-free water treatment systems. These consist of a device mounted in the condenser water piping that will treat the water going to the cooling tower. This eliminates the need for onsite chemicals and reduces the amount of water discharged from the tower to maintain proper levels of particle concentrations. A water reduction amount estimated for the cooling towers on the San Elijo campus is over 160,000 gallons per year. At an approximately \$270,000 installation cost for the system, a simple payback of will be several years off. It should be noted though, that using the chemical free system will also save the campus the cost of chemicals used in the towers. There is also the piece-of-mind savings of just not having any chemicals on campus.

### Cooling Tower Blow-Down used for Irrigation

As mentioned above, a cooling tower will discharge a certain amount of water on a regular basis to maintain proper level of particle concentrations in the condenser water. This is known as blow-down. With a chemical treatment system, this blow-down must be drained to the sanitary sewer. With a chemical-free system, this blow-down is considered gray water and may be used to irrigate the local landscape areas. With a chemical-free treatment system used on the cooling towers on campus, over 110,000 gallons per year will be available for landscape irrigation as a result of this tower blow-down. An upfront cost of about \$9,000 would be anticipated. A payback of just under 12 years could be seen for this measure.

### Earth-coupled Geothermal HVAC Systems

It is suggested that the existing cooling towers and boilers be replaced with a geothermal heating and cooling system to serve the buildings. Ground-coupled or geothermal systems rely on heat rejected or absorbed from the earth or aquifer on a project site via thousands of feet of tubing buried in the ground. These types of systems will eliminate the need for a cooling tower or boilers on campus while utilizing the existing water source heat pump and air distribution systems already in place. It is recommended that this measure be implemented after 2020 but before 2030 as part of the College's push towards carbon neutrality.

### Wastewater Treatment

Plumbing waste from the campus currently exits the campus at Manchester Avenue. The San Elijo campus contributes approximately one million gallons of waste annually that will need to be treated by the local wastewater treatment plant. To avoid this discharge of waste, an on-site wastewater treatment plant will be constructed at the entrance of the campus near the campus entrance. The Living Machine is a proprietary sewage treatment system that employs a four day process to treat and consume raw sewage in a functioning, indoor, man-made wetlands environment. This biological system employs the use of a wide variety of native aquatic plants, fish, bacteria, algae, snails, protozoa, and other organisms to provide specific cleaning functions. Using a Living Machine on campus will allow MiraCosta to capture all wastewater that would normally end up in the city sewage system, and instead use that water, once treated naturally with local flora and fauna, to irrigate landscape on the campus. As with the fuel cell, this measure is recommended to be implemented after 2020 but before 2030 as part of the College's push towards carbon neutrality.

## Community Learning Center

### Energy and Water Use Recommendations for New Facilities //

#### Energy Use

##### Technology Power Management

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of an institutional building's total energy consumption. Recommended strategies, with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District, are included in the Facilities Plan Appendix, Site Infrastructure Planning section, in the Technology Infrastructure report.

##### Lighting

It is recommended that occupancy sensors be provided for all lights in new buildings rather than tying the lights into a lighting control panel. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on.

All lights near windows or skylights should be controlled by continuous dimming daylight controls. Studies have shown an over 50% reduction in lighting power usage when daylighting systems are designed and operated correctly in areas with daylight access. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction.

All new buildings will exceed the baseline Title-24 lighting power density requirements by 40% at the time of building design.

##### Natural Ventilation

The local Oceanside climate is ideal for using natural ventilation instead of traditional mechanical HVAC systems. It is recommended that all new buildings on campus be designed to take advantage of this climate. Operable windows should be used and building openings will be oriented for optimal natural ventilation opportunities. All HVAC systems in the building should have interlocks to shut down when a space is being naturally ventilated. Special care should be taken to avoid acoustical migration between outdoors and indoors.

Solar chimneys will be used where applicable. A solar chimney is a building element strategically located and designed that allows the natural buoyancy of hot air to rise up through the chimney allowing for air movement through a building. Solar chimneys combined with other natural ventilation strategies allow for an effective means of naturally cooling a space with minimal mechanical air conditioning usage.

##### Displacement Ventilation and Underfloor Air

It is recommended that displacement ventilation and underfloor air distribution strategies be explored for all new buildings. Both of these methods of air delivery supply air at a much higher temperature than traditional overhead air distribution systems. While more fan energy is used because of this, a less amount of mechanical cooling is required while the range of a free-cooling economizer cycle is greatly expanded. Traditional overhead systems supply air at 55 degrees F. To be able to operate in 100% free cooling mode, the outdoor air temperature would then need to be at 55 degrees or less. Displacement ventilation and underfloor air distribution systems supply air at approximately 63 degrees. Historically, the outdoor ambient air is 63 degrees or less 3,812 hours each year during normally occupied hours. This is 2,620 hours more often than it is 55 degrees or less and 2,620 hours more often that the building can be in free cooling mode.

## Skylights

Skylights, Solatubes, and similar products should be used in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed.

## Overall Building Performance

It is recommended that new buildings be designed to operate at 35% better than Title-24 minimum baseline at the time of design. This will be achieved by using the strategies above as well as using premium efficiency HVAC equipment, superior envelope properties, shading devices, and other efficiency strategies that make sense for the building under design.

## Water Use

### Water fixtures

New buildings should install water fixtures to allow the building to be, at a minimum, 40% below the Energy Policy Act water usage baseline at the time of construction. With the current baseline, a 40% reduction can be achieved with 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals, 0.5 gallon per minute (gpm) lavatories that operate on a 10 second metered cycle, 1.0 gpm sinks, and 1.5 gpm shower heads. These fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals.

## Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce nearly 68,000 gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. It is recommended that new buildings have condensate recovery vessels adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas.





## Community Learning Center

### Energy and Water Use Recommendations for Renovation and Modernization Projects //

#### Existing Building Energy Efficiency Upgrades

##### Technology Power Management

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of an institutional building's total energy consumption. Recommended strategies, with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District, are included in the Facilities Plan Appendix, Site Infrastructure Planning section, in the Technology Infrastructure report.

##### Lighting

It is suggested that all light fixtures throughout campus be changed to 25 watt T8 fixtures. This should be done during a regularly scheduled lamp replacement time frame or when replacing a burned-out lamp. By the time all lamps are changed to 25 watt T8 fixtures, the campus will save approximately 46,750 kWh annually when compared to the existing lighting. This will cost approximately \$10,750 to implement and will have a payback of approximately 1.5 years.

We recommend that occupancy sensors be retrofitted for all lights. There is no reason for the lights to be on if there is nobody in the room. Having the lights controlled by occupancy sensors will prevent lights in unoccupied rooms from staying on. Assuming all rooms throughout campus are occupied for two-thirds of the time the campus is operational and vacant the other one-third allowing the lights to be off, this will save approximately 68,021 kWh per year. The upfront installed costs associated with this change will be approximately \$112,600. Payback will occur in approximately 10.3 years. This is assuming the recommended 25 watt lamp replacement described above has been completed. If older lamps are in place, the savings because of occupancy sensor upgrade will be even larger.

All lights near windows or skylights should be retrofitted to be controlled by continuous dimming daylight controls. Using continuously dimming daylight controls rather than stepped dimming allows for greater occupant comfort and satisfaction. It is estimated that a savings of 21,200 kWh per year will occur after the implementation of daylighting controls. This will cost approximately \$20,000 and will have a payback of six years.

##### Heating, Ventilation, and Air Conditioning

Temperature setpoints throughout campus are currently set at 72 degrees for cooling and 70 degrees for heating. It is recommended that the setpoints be changed to 74 degrees for cooling and 68 degrees for heating per typical industry standard. Changing these setpoints will still maintain a high level of comfort in the buildings while saving 22,580 kWh per year in electric usage. The only costs associated with this measure is the costs to have facilities personnel manually change the thermostat setpoints throughout the campus.

## Natural Ventilation

A solar chimney is a building element strategically located and designed that allows the natural buoyancy of hot air to rise up through the chimney allowing for air movement through a building. Solar chimneys combined with other natural ventilation strategies allow for an effective means of naturally cooling a space with minimal mechanical air conditioning usage. For Building A, it is recommended that the existing lobby architecture be retrofitted to utilize a solar chimney. That lobby and all adjacent classroom areas should utilize this solar chimney to assist with natural ventilation. For a cost of approximately \$50,000, annual savings of 54,062 kWh per year could be seen. This could result in a simple payback of approximately 5.8 years.

## Skylights

Studies have shown that students exposed to natural daylight will have higher concentration levels and productivity. Skylights, Solatubes, and similar products should be added in spaces with no exterior windows to provide a level of natural daylighting. Solatubes and similar products have a wall mounted switch to close the light orifice so that it functions like a light and can be darkened if needed. Assuming that Solatubes can be installed in 25% of the spaces throughout campus to provide a level of daylighting not currently seen, the upfront costs would be approximately \$54,450. At an estimated savings of 30,010 kWh per year, the simple payback for these devices will be approximately 11.3 years.

## Cool Roof Installation

It is recommended that all flat roof areas have highly reflective “cool roof” coatings spray-applied. This will allow heat from the sun to be reflected back to the atmosphere rather than be absorbed by the building. Applying this coating to the applicable roof surfaces will save 3,050 kWh per year. At a cost of \$8,000 to apply, a simple payback could be seen in 16.4 years.

## Building Insulation Improvements

It is recommended that all walls and roofs undergo building insulation improvements. With the buildings on this campus constructed in the 1970's, the energy code requirements were much less than they are today. Adding additional insulation into the existing walls or roofs could result in considerable energy savings. For example, estimating the total wall area on campus and assuming current R-11 insulation, adjusting the insulation in the walls and roofs to perform to an R-19 level of insulation would result in an energy savings of just under 118,694 kWh per year and 15,450 Therms per year. With an estimated cost of \$72,500 for installation, the payback could be in 2.3 years.



## Air Handler and Boiler Replacement

The air handlers and boiler used on site will see the end of their service life in the next 10 years. It is recommended to replace the existing equipment with newer, more efficient equipment. Doing this will cost approximately \$213,000 and save 20,200 kWh per year and 2,350 Therms per year.

## Existing Building Water Efficiency Upgrades

### Water fixtures

There is currently a phase-out plan in place to replace older plumbing fixtures with newer, low-flow fixtures. This project should continue to be implemented. To reiterate, the following fixtures should be installed throughout campus: 1.28 gpf water closets, 0.125 gpf urinals, 0.5 gpm lavatories, 1.0 gpm sinks, and 1.5 gpm shower heads. Existing fixtures have been observed to be: 1.6 gpf water closets, 1.0 gpf urinals, and 2.5 gpm lavatories. The new fixtures are standard fixtures that the maintenance staff will be able to maintain similar to existing plumbing fixtures throughout the campus. These will not require additional maintenance like such water efficient fixtures as waterless urinals. At a cost of approximately \$64,000 to fixture upgrades, the estimated savings would be 157,320 gallons of water per year.

## Condensate Recovery

HVAC cooling coils inherently produce condensate. The existing HVAC equipment located throughout the campus is estimated to produce over nearly half a million gallons of condensate each year. This gray water is discharged into the sanitary sewer system instead of being kept on campus for use. Existing buildings will have condensate recovery vessels installed adjacent to the buildings in the local landscape area. HVAC equipment will have the associated condensate piped to these retention vessels where it can be used to irrigate the local landscape areas saving the nearly half million gallons of water each year sent down the drain. It is estimated that small systems could be installed throughout campus for approximately \$3,000. With a 67,920 gallon per year savings, a payback could be seen in 6.2 years.







## Community Learning Center

### Energy and Water use Recommendations for Site improvement Projects //

#### Open Space Energy Efficiency

##### Lighting

It is recommended that all street, parking, and walkway lighting be replaced with wind and solar powered LED lighting fixtures. Current fixtures account for nearly 119,000 kWh of power usage per year. Installing these new fixtures will eliminate that entire annual power usage. This will have a total installation cost of \$88,000 with a payback of approximately 4.6 years.

#### Photovoltaics

It is suggested that photovoltaic panels be installed above open parking lots on campus to provide 40% of the campus power requirements. Assuming all energy efficient recommendations are followed in this master plan, the annual energy usage of the campus is estimated to be 544,510 kWh per year. This is the estimated campus energy usage in 2020 with all efficiency measures implemented and new buildings built. This includes both electricity and equivalent gas. To offset 40% of this power usage, 11,540 square feet of photovoltaic (PV) panels will need to be installed. Panels made of crystalline silicon that generate 13 watts per square foot are common today and will be used in the parking lots. It is also recommended that PV panels be installed near the new maintenance building to power the electrical maintenance carts. At current installation costs of about \$6 per watt, the costs for full implementation would be about \$900,000 dollars. A payback of 26.8 years could be seen without regards to any incentives.

#### Fuel Cells

Fuel cells are devices that when supplied with natural gas and water will generate electrical power with the only byproducts being water. A fuel cell will not be installed to handle the entire electrical needs of the campus, but rather it will be large enough to provide a base load for most of the year. At times in the summer there will be a need to use energy from the electrical grid, but much of this will be offset by the photovoltaics installed as described above. Having a 100 kW fuel cell will occupy approximately 590 square feet on campus and will offset approximately 250,000 kWh per year. It is recommended that the fuel cells be installed after 2020 but before 2030 as part of carbon neutral efforts for the campus.

## Living Machine //

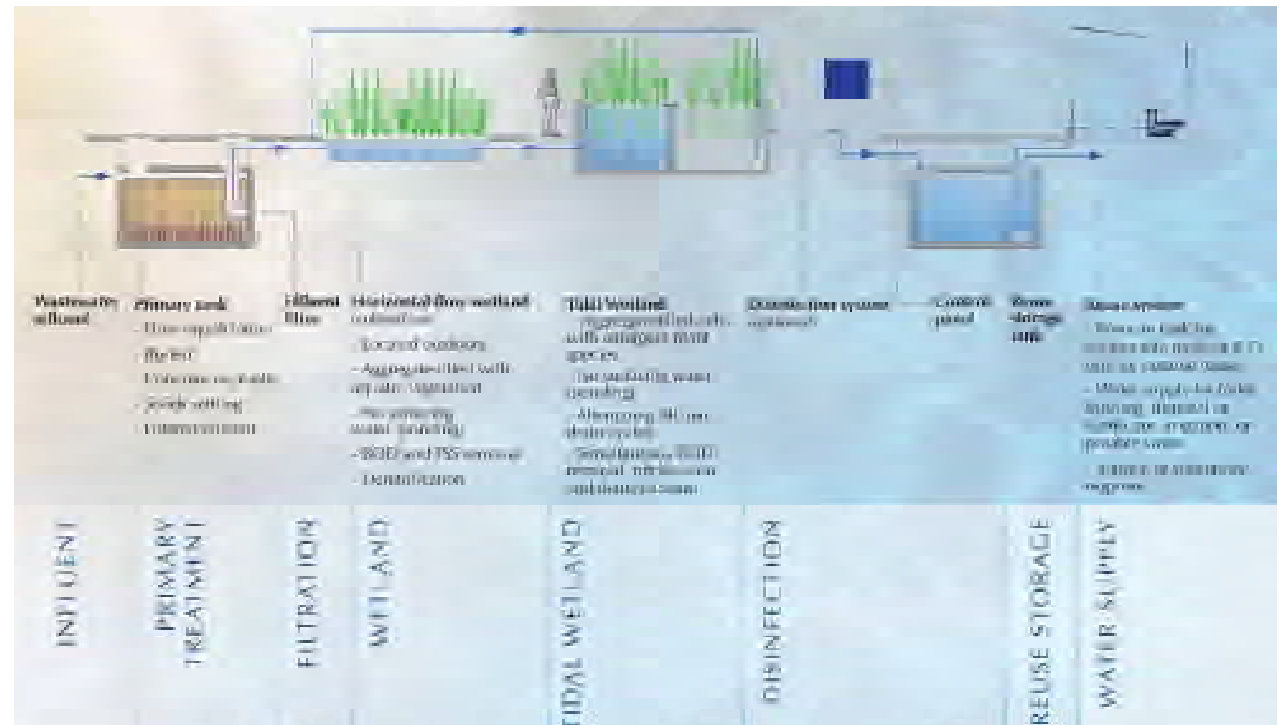
Living Machine™ is a proprietary sewage treatment system invented by John Todd and now owned by Living Designs Group LLG. A Living Machine employs a 4 day process that treats and consumes raw sewage in a functioning, indoor, man-made wetlands environment. This intense biological system employs the use of a wide variety of aquatic plants, fish, bacteria, algae, snails, protozoa and other organisms to provide specific cleaning functions.

## Process

The procedure is broken down into 5 steps: anaerobic settling tank, biofilter, a series of aerobic tanks with aquatic plant and other organisms, an indoor wetland that acts as a final filter, and finally the disinfection system and storage tank. Similar to the bioreactor, the effluent from the plumbing fixtures and drains is routed in a conventional waste system to a grinder to break up the solids. After screening, the effluent is routed into an underground anaerobic settling tank. Solids fall out of suspension as various anaerobic bacteria that are present in the tank consume the matter. Sewer odors are not present because the primary tank is underground with a carbon filter, so no special ventilation is required. As the effluent travels from the settling tank to the aerobic tanks, it passes through a filter which prevents solids and odors to pass. The aerobic tanks contain many varieties of organisms. Photosynthetic algae provides oxygen to the water and bacteria are present to immobilize pollutant minerals. Aquatic plants, such as hyacinth and bulrush consume heavy metals and acts as a biofilter. Plankton feed on extremely small

particles of contaminants and microbes. Clams absorb colloidal material and other suspended solids. Fish and snails clean and filter the water and the tank, keeping the food chain of the ecosystem intact. Once the water has passed through the final wetlands, the water is then disinfected and stored in a tank for future use as reclaimed water.

The reclaimed water has minimum standards in order to be used for flush water or landscape irrigation. The following data is provided by the NSF (National Sanitation Foundation) trials of a membrane bioreactor system:





System Requirements

On-site waste water treatment utilizing the Living Machine will depend on the size of the project and the contents of the wastewater introduced to the system. As an example, using a 4,000 gallon per day system would require approximately 700 square feet of indoor space for the treatment system.

A Living Machine uses plants that are native to the installation location. This ensures ease of accessibility to replacement plants and keeps costs low. Similarly, the fish and other biological organisms are also either transplanted from local sources or purchased from a local vendor. This is a relatively low maintenance system. However, proper monitoring will be needed to adjust the system for sporadic, high concentrations of toxins and heavy metals.

Cost Analysis

The total cost for a Living Machine has two major parts: 1) the price for the Living Machine components and services, and 2) the site installation costs. Both components of the cost are affected by the size of the system. The following example would be for a system 4,000 gallons per day (gpd)

**Part 1** - Components and services such as site water budget and reuse plan, detailed system design (including stamped engineering documents), assistance with regulatory permits, fabrication and delivery of our proprietary mechanical and electronic components, control system hardware and software, Living Machine site license, construction oversight, operator and maintenance training, one year warranty, and system commissioning and start-up. This price would be in the range of \$200,000 to \$215,000.

**Part 2** - This would be the site installation costs most of which will be needed for any onsite wastewater treatment system: wastewater collection system, excavating and lining the treatment cells (for a 4,000 gpd system, the cells would have an area of about 600 sq ft, and could be provided through the use of prefabricated/purchased tubs), site plumbing and electrical, any greenhouse enclosure, or treated water storage and reuse system. These site costs will vary depending on calculated flow volume and other design factors and local conditions including: aesthetic treatments, integration with architectural design and landscaping features, local labor and materials costs, topography, site soils and groundwater conditions, etc.

For example:

\$2.16 per 100 ft3 water = 1 unit 100 ft3 = 748 gallons

\$3.14 per 100 ft3 sewer = 1 unit

4,000 gpd with approx. 230 school days per year = 920,000 gpy

920,000 gpy / 748 = 1230 units

1230 units x \$5.30 = \$6,520 total sewer & water cost per year if untreated

If a Living Machine is installed:

Requires a 10% water make-up

920,000 gpy x 10% = 92,000

92,000 / 748 = 123 units 123 units x \$2.16 = \$266

No sewer cost

Total yearly savings = \$6,520 - \$266 = \$6,254

Payback is approximately 34+ years

A substantial savings in system development costs imposed by the utility could be negotiated to help offset much of the cost of installation.

### Pros and Cons - Living Machine vs Membrane Bioreactor

**Water Quality** – Comparing the final reclaimed water of both systems, the water qualities are close in many of the different categories. However, the Living Machine does process phosphorus better and has a higher removal rate of nitrogen.

**Turnover Time** – A Living Machine takes approximately 4 days to process incoming effluence, whereas a membrane bioreactor only takes a few hours.

**Simplicity of Design** – A membrane bioreactor is a single system from a single vendor. A Living Machine is a complex design requiring different stages to process the material.

**Maintenance/Monitoring** – Water quality testing will be required on the reclaimed water for both systems according to local municipalities. Living Machines will need periodic pruning, removed or replaced of the plants in the system. The toxin levels of the effluence will be remotely monitored to prevent damage to the ecosystem. Bioreactors need to have the filters monitored for breakage, spillage and clogs. The manufacturers recommend replacement of the filters every 3-5 years, depending on the effluence strength.



### Additional Resources

<http://www.inhabitat.com/2008/08/06/living-machines-turning-wastewaterclean-with-plants/>

<http://www.livingmachines.com/>

## Natural Ventilation //

Natural ventilation uses the natural forces of wind and buoyancy to deliver fresh outdoor air into buildings for ventilation and thermal comfort within a space. With an increased awareness of the cost and environmental impacts of energy use, natural ventilation has become an increasingly attractive method for reducing energy costs and environmental impact, and for providing acceptable or even superior indoor air quality (IAQ) in order to maintain a healthy, comfortable and productive indoor climate.

### Driving Forces

Natural ventilation systems rely on naturally occurring pressure differences to supply fresh air through an indoor space. Pressure differences can be caused by wind or the buoyancy effect created by temperature differences.

**Wind:** When wind hits a side of a building (the windward side), air is brought to a rest, creating a positive static pressure while a negative pressure on the opposite side of the building (the leeward side). This pressure difference between inside and outside of the building

allows air to enter openings on the windward side and to exit through openings on the leeward side, creating an air movement within the building.

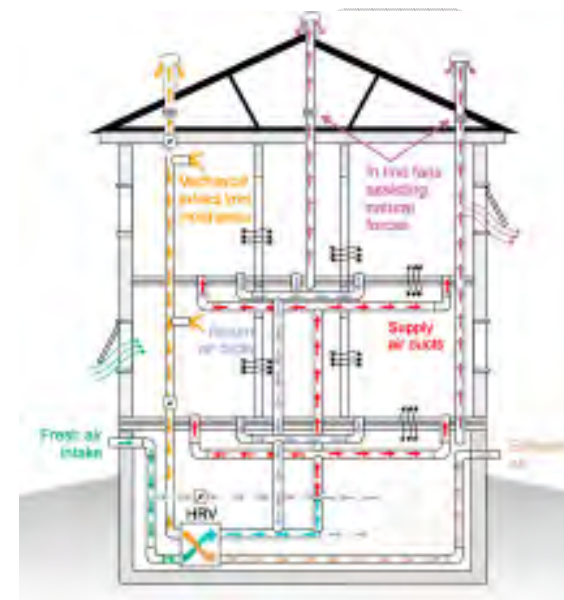
**Buoyancy:** Buoyancy results from difference in air density, where warm air is less dense than cool air. Indoor/outdoor temperature difference causes density difference and therefore pressure difference that creates exchange between indoor and outdoor air.

### Implementation Strategies

**Cross Ventilation:** Pressure difference caused by wind is utilized in cross ventilation. Outdoor air enters through openings at high pressure and flows across the space and exits through openings at low pressure. To take advantage of this ventilation scheme, it is best to have openings on opposite sides (the windward and leeward sides, for example). The effectiveness of this strategy is a function of building location and orientation, outdoor air conditions, opening size, shape and orientation.

**Stack Ventilation:** Pressure difference caused by temperature difference between indoor and outdoor is utilized in stack ventilation. In winter, cold outdoor air comes in and is heated. The heated air rises and flows out from openings on the upper portion of a building. In summer, hot outdoor air flows in and is cooled down, creating a downward flow to the lower portion of the building.

A greater temperature difference yields a larger pressure difference between inside and outside of a building. In order to take advantage of this scheme, it is best to have large vertical distance between inlet/outlet openings because the greater vertical distances, the greater pressure difference.



Hybrid Ventilation

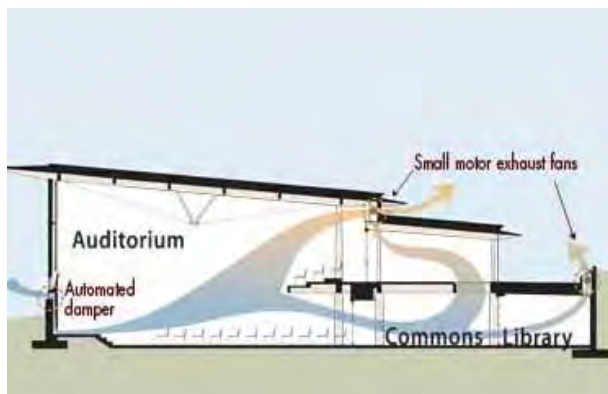
Some of the factors affecting the effectiveness of stack ventilation are building height, and indoor/outdoor temperature difference, size and location of the openings. Because it does not rely on wind direction, there is a greater control on locating the air intake. However, stack ventilation is limited to a lower magnitude than wind-driven, cross ventilation.

### Enhancement Strategies

In many cases, natural ventilation cannot alone provide the required airflow rate due to lack of wind and/or temperature difference. When natural ventilation cannot be ensured by wind and buoyancy, the following strategies can be considered to enhance natural ventilation:

**Fan-assisted:** Fans may be installed to ensure the necessary ventilation flow rate. Such fans may be installed either on stack ducts or in walls or windows.

**Solar-assisted:** Solar chimneys are a method of



Fan-assisted natural ventilation



enhancing stack ventilation. Solar energy is used to heat the air to increase inlet/outlet temperature difference, causing an increase in airflow within the building.

**Hybrid/mixed-mode:** Hybrid ventilation takes advantage of natural ventilation when it is available and supplements it as necessary with mechanical ventilation. The main benefit of some augmentation by mechanical systems is that there is less unpredictability with indoor environment conditions, though it will result in greater energy use.

### Suitability

Most suited to:

- Buildings with a narrow plan or atria
- Sites with minimal external air and noise pollution
- Open plan layouts—high degree of permeability within the building
- Temperate climate with low average humidity levels

Not suited to:

- Buildings with a deep floor plan
- Buildings that require precise temperature and humidity control
- Buildings with individual offices or small spaces
- Buildings with consistent heat loads above 110-125 btuh/s.f.
- Locations with poor air quality (If filtration is required, mechanical ventilation is necessary)

Problems associated with building openings are:

- Security
- Conflicts with fire or safety regulations
- Insects, odors, dust and air pollution
- Fluctuation of internal temperature

### General Design Guidelines

Some of the important considerations for natural ventilation design involve:

- Location, orientation and layout of building
- IAQ requirements, ventilation cooling requirements
- Sizes and location of building openings
- Strategic cooling load reductions- shading, heat-rejecting glazing, thermal mass to dampen temperature swings

Design Considerations with Cross Ventilation:

- Cross ventilation cooling is only viable when the outdoor
- temperature is at least 3°F lower than the indoor temperature.
- To maximize the effectiveness of openings, locate openings
- perpendicular to prevailing wind.
- Will work well if the width of the room is up to 5 times the ceiling height

### Design Considerations with Stack Ventilation

Locate outlet high above inlet to maximize stack effect. The vertical distance between inlet and outlet should take advantage of stack effect. The outlet must be placed on the leeward side to take advantage of negative wind pressure to draw air out. Consider the use of vented skylights. A vented skylight provides an opening for heated air to escape in stack ventilation. A well-designed skylight could also act as a solar chimney to enhance airflow.

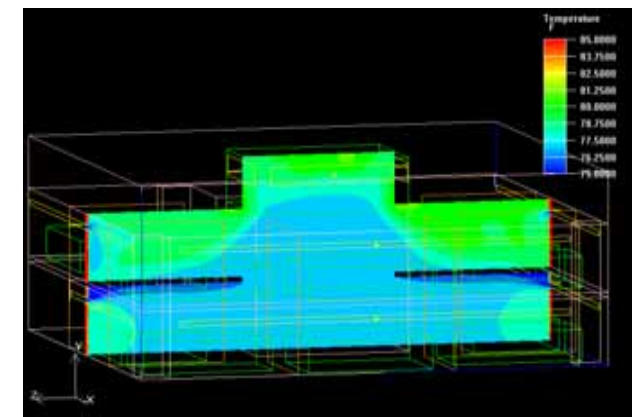
### Design Recommendations for MiraCosta College

The MiraCosta College campuses are good candidates for natural ventilation due to the mild climate of coastal Southern California, and presumably no strict temperature and humidity requirements for the spaces: To maximize cross ventilation, openings ideally would be located to take advantage of the NE wind. Provide inlet openings on the north and the east walls and outlet openings on the south wall. Outlet openings should be high above inlet openings to maximize stack effect.

Consider the use of vented skylights. A vented skylight will provide an opening for warm, stale air to escape. The light well of the skylight could act as a solar chimney to augment stack effect. In order for stack ventilation to work properly, sunlit areas should be confined to upper region of the building.

### Energy Impact

Designing around a natural ventilation system presents a tremendous energy savings opportunity. Near the three campuses, outdoor air temperature is between 65-80 degrees for 35% of annual hours between 7:00 AM and 7:00 PM (assumed operating hours).

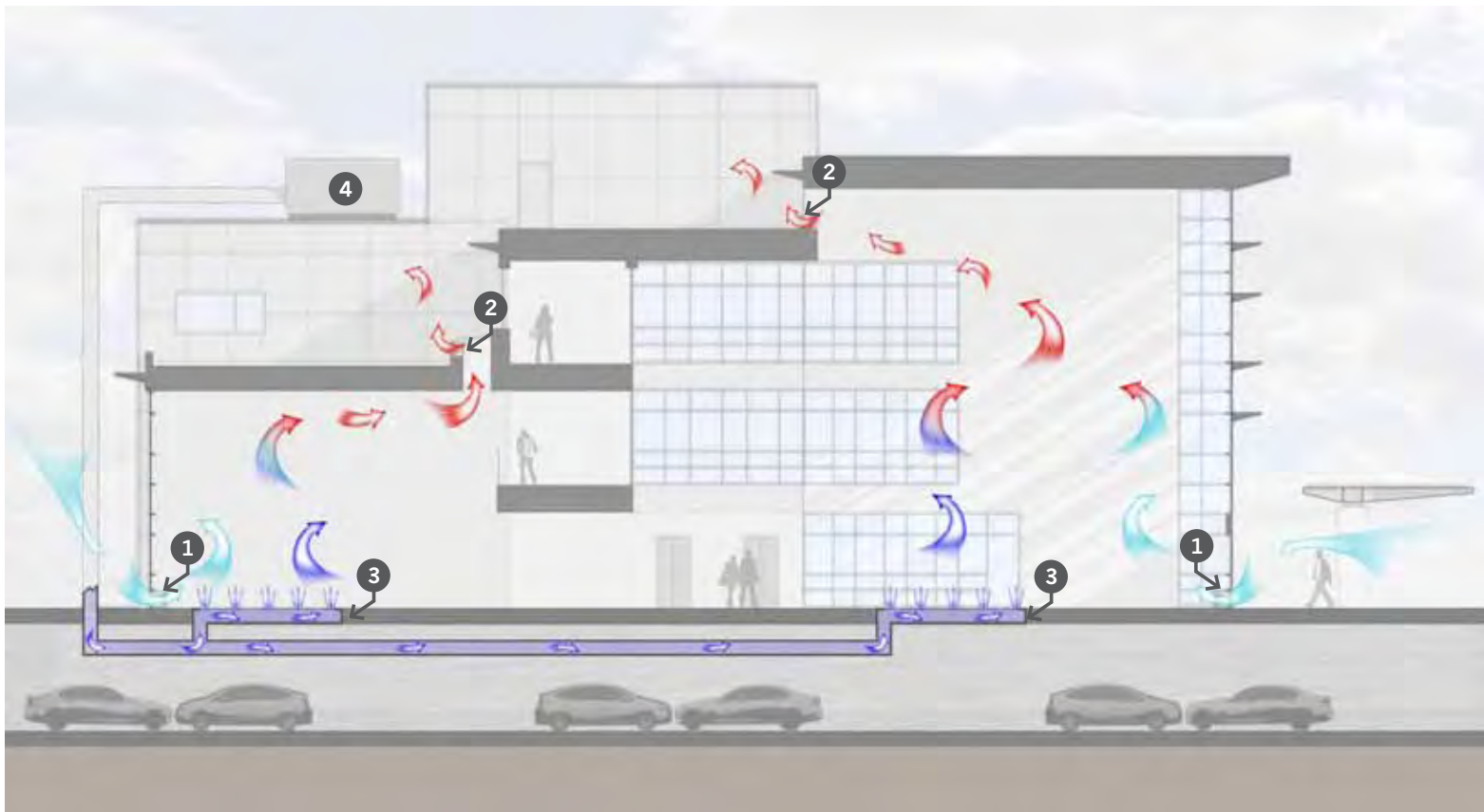


Temperature Distribution acquired by CFD Analysis

## Natural Ventilation in the State of Oregon North Mall Office Building

### LEGEND

1. Natural Ventilation Inlet Integrated into Perimeter Bench
2. Natural Ventilation Relief Integrated Into South Facing Skylight and Clear-story Windows
3. Relief air from Office Space AHU Recirculated in Atrium Through Floor Diffusers
4. Office Space AHU with Relief Air Ducted to Atrium

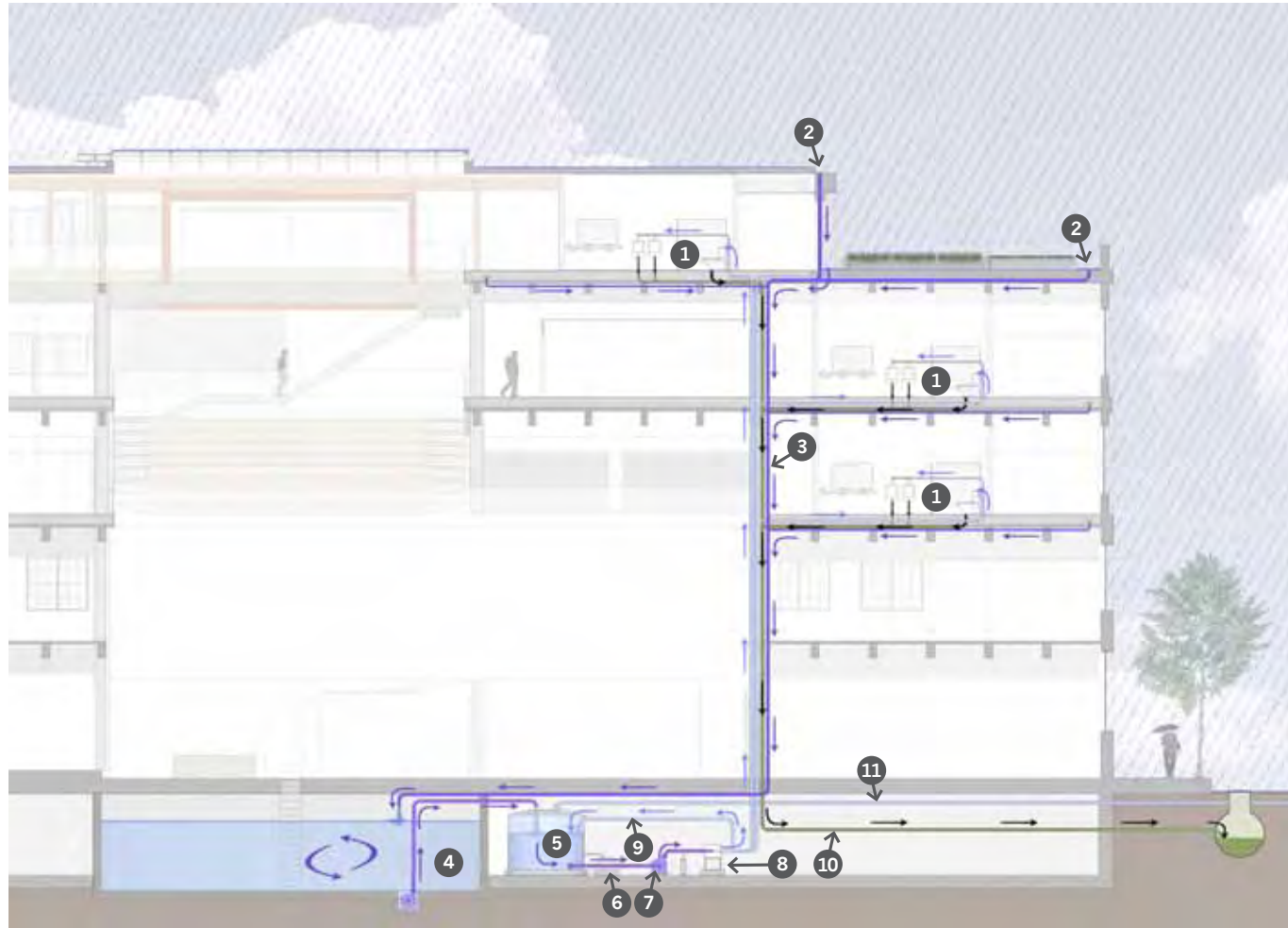


Relief air (78 degrees Fahrenheit) from the AHU serving the office space is recirculated through the atrium. Because the atrium is a transitional space and because of the good airflow provided by the natural ventilation system, this slightly higher temperature is comfortable. The recirculation system combined with the natural ventilation scheme provides energy savings by getting double duty out of all the conditioned air and by relying on the natural buoyancy of warm rather than mechanical equipment to move the air through the space. ~

## VESTAS RAINWATER RECLAMATION SYSTEM

### LEGEND

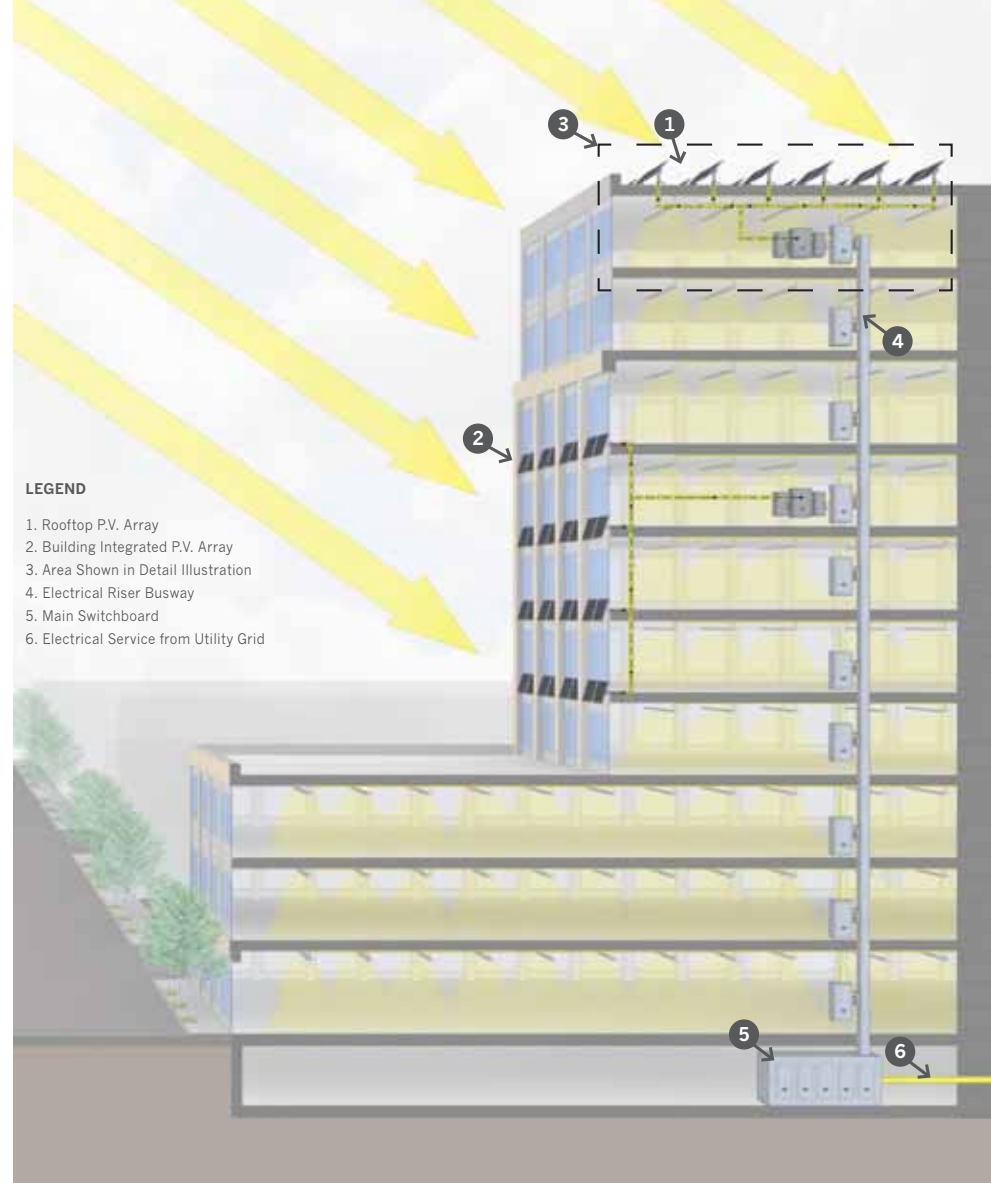
1. Toilets and urinals flushed with harvested water
2. Roof top water collection with roof drains
3. Rainwater leader
4. 212,000 Gallon collection cistern
5. 1,700 Filtration tank (200 gallon per hour)
6. Treatment skid
7. Pumps supply harvested water to toilets and urinals
8. Bag filter (150 gallon per minute)
9. Filtration system loop
10. Black water discharged to sewer
11. Make up water supply from city

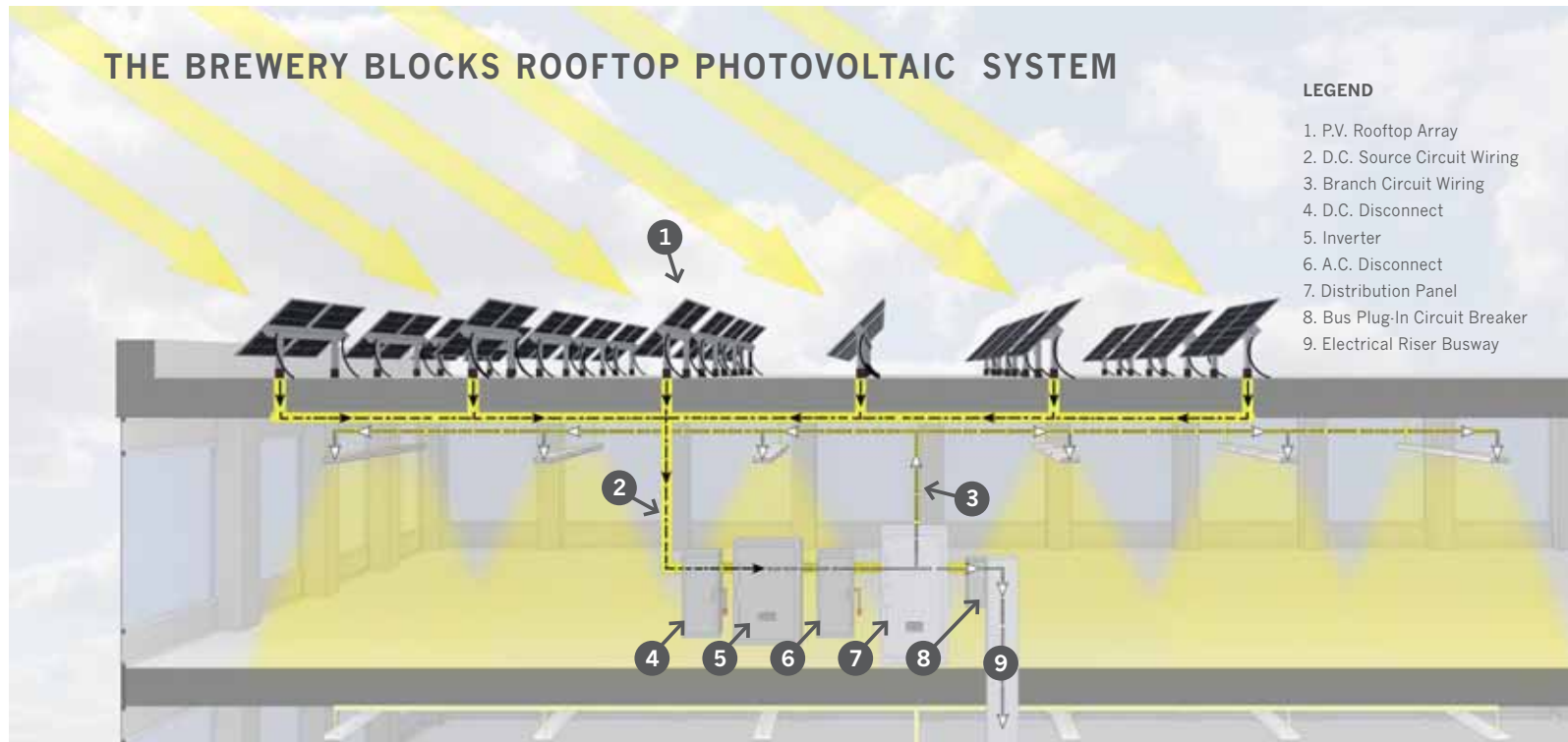




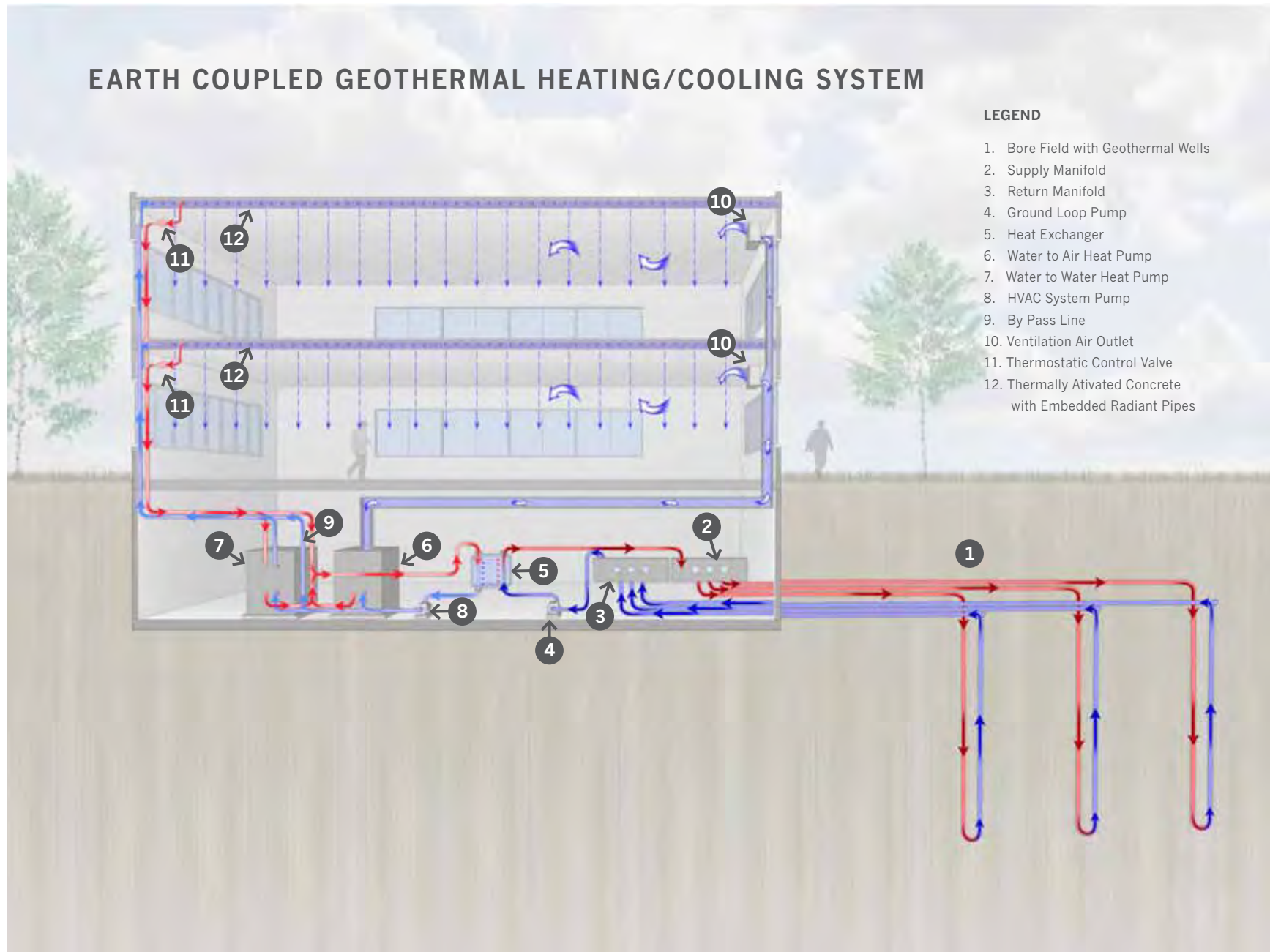
## THE BREWERY BLOCKS

### BUILDING INTEGRATED AND ROOFTOP PHOTOVOLTAIC SYSTEMS



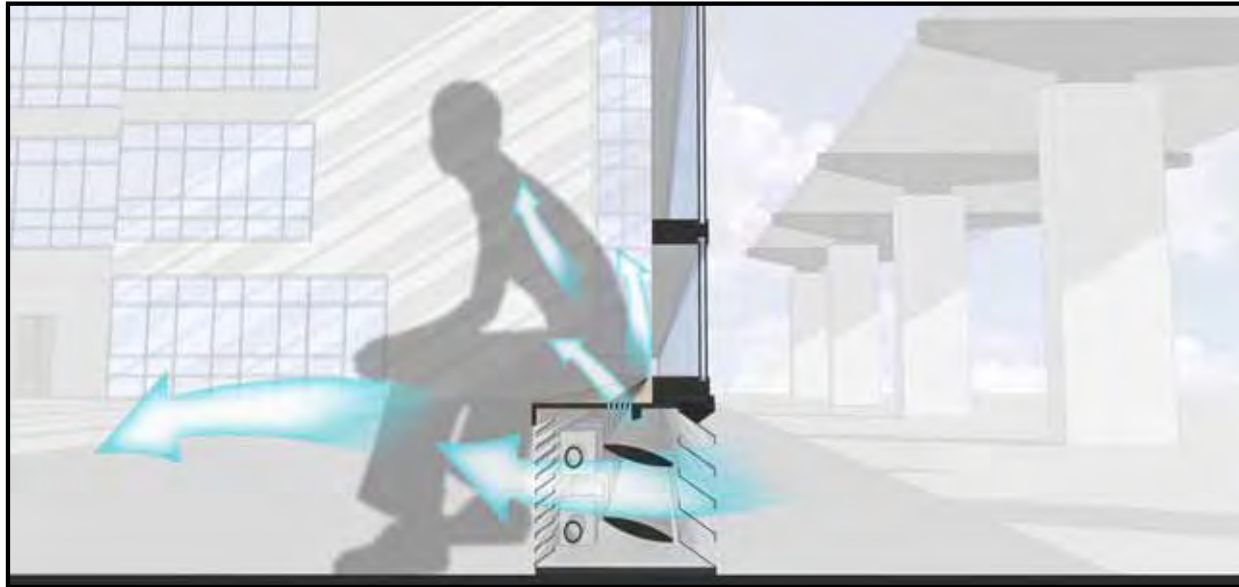


## EARTH COUPLED GEOTHERMAL HEATING/COOLING SYSTEM

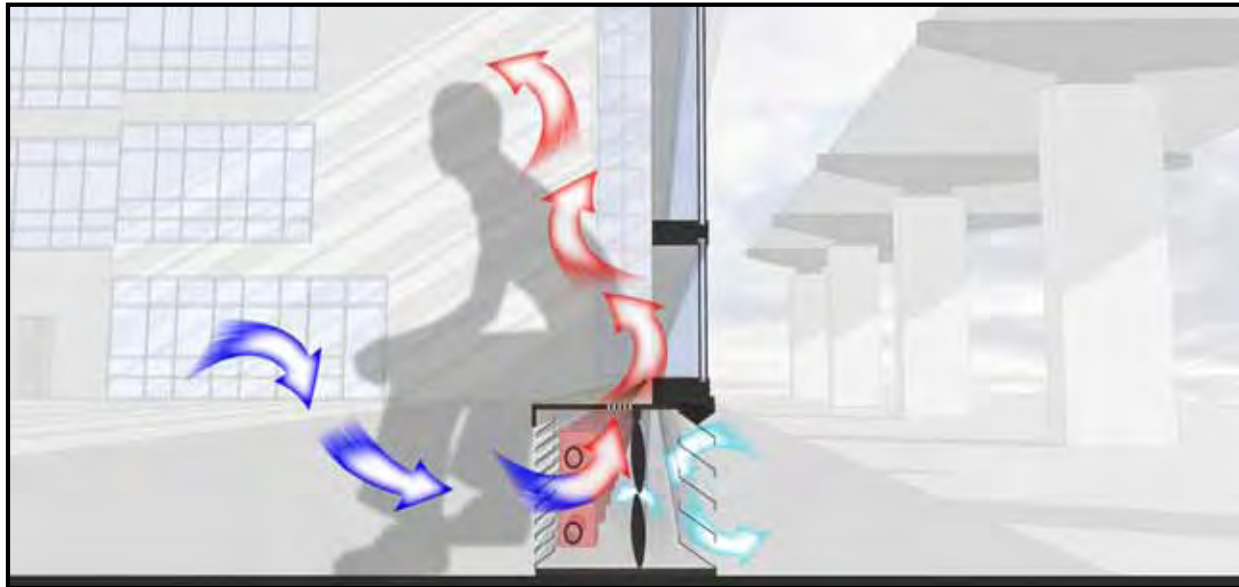




## Natural Ventilation in the State of Oregon North Mall Office Building Architectural Integration of Perimeter Bench Detail



In the summer the louvers inside the bench are open and the heaters are off, allowing the maximum amount of fresh outside air to naturally ventilate the atrium.



In the winter the louvers inside the bench are closed and the heaters are on. This heats a minimum amount of cold fresh outside air and heats and recirculates the cold air at the perimeter windows of the atrium.



# Site Infrastructure Planning







## Site Infrastructure Planning // District Wide

The site infrastructure recommendations support the District's strategic objective to develop exceptional facilities and infrastructure to anticipate needs and priorities. These recommendations are meant to guide the design of detailed engineered solutions in a fiscally responsible manner.

The reports in this section address the following site infrastructure systems. A set of phased conceptual plan drawings delineate the upgrades for each system. These drawings are bound in a separate document.

- Water Infrastructure
- Storm Water Infrastructure
- Sanitary Sewer Infrastructure
- Natural Gas Infrastructure
- Electricity Infrastructure
- Technology Infrastructure

## Water Infrastructure //

The water infrastructure at each of the MiraCosta College campuses provides water for fire protection, potable use, and landscape irrigation. Below are general descriptions of the water system for each campus.

### Oceanside Campus

The water system for the Oceanside Campus consists of two main components: 1) the potable water system, and 2) the fire suppression system. These two systems are connected to the City of Oceanside water system at several locations, including a storage tank that is located within the campus. The potable water system is comprised of pipelines that serve each of the existing buildings and a booster pump station to maintain adequate pressure. The fire suppression system includes a pump station and pipelines connected to fire hydrants located throughout the campus. The landscape irrigation system is connected to the fire suppression system pipelines.

### San Elijo Campus

The San Elijo Campus is served by and located within the Olivenhain Municipal Water District (OMWD) service area. The existing water infrastructure consists of a pipeline loop that connects to the OMWD distribution system at two locations. The pipeline loop is connected to fire hydrants for fire suppression. The potable water system branches from the pipeline loop and extends to each building for domestic use.

### Community Learning Center

The water system at the Learning Center consists of a single pipeline connected to the City of Oceanside distribution pipelines along Mission Avenue and Barnes Street. Potable water service connections for each building, fire hydrants for fire protection, and the irrigation system are connected to the water distribution pipeline.

### Methodology

The methodology outlined below summarizes the main tasks completed during the evaluation of the water system for each campus.

1. A comprehensive research, survey and mapping effort was undertaken at each campus to document the location and size of existing utilities.
2. Information was obtained from facilities' personnel regarding known issues with the water system at each campus.
3. A qualitative analysis was performed to determine improvements needed to address known issues and to accommodate future growth at each campus.
4. Approximate costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

### Analysis of Existing Systems

#### Oceanside Campus

Discussions with campus maintenance personnel regarding the existing water system identified the following:

1. Water quality issues have been identified in the area adjacent to Building 5000 which is a result of long pipelines with dead ends.
2. Similar water quality issues have been encountered in the vicinity of Building 7000.

#### San Elijo Campus

Based on information obtained from maintenance personnel, the existing water system does not have any identified deficiencies and is operating adequately.

#### Community Learning Center

The existing water system does not have any identified deficiencies and is operating adequately.



## Analysis of Future System

The impact on the existing water infrastructure due to future growth at each campus should be evaluated through an engineering analysis that accounts for increased demands and relocation of existing distribution pipelines to accommodate future buildings. The evaluation should also include an assessment of the age and condition of existing water infrastructure beyond the qualitative analysis completed for this master plan. In addition, the capacity of the fire suppression system should be verified based on future fire protection requirements and landscaping irrigation demands.

Future planned buildings will increase the demand on the potable water system which could exacerbate any existing problems due to the condition of the water infrastructure. Materials of existing pipelines that could be brittle or subject to corrosion, such as asbestos-cement pipe or cast iron pipe, should be replaced with PVC to extend their useful life and prevent future problems.

## Recommendations

The following are recommendations for improving the water system infrastructure for each campus.

### Oceanside Campus

The dead ends in the water distribution system identified as having water quality issues should be looped and connected to existing water mains to improve circulation in these areas. The existing distribution system will be extended to serve future buildings, such as the Maintenance, Operations and Purchasing Complex and the Welcome Center. Existing distribution lines will also be relocated to accommodate the future Instructional Building 1 (Science) and future Gymnasium which are currently planned to be built over existing pipelines. Additional piping is likely needed to provide fire water supply to the new buildings, especially for the Maintenance, Operations and Purchasing Complex. The fire water loop can most likely be extended to service the new buildings.

### San Elijo Campus

Planned improvements to allow vehicle turnaround and student drop-off will require coordination with OMWD regarding their distribution pipeline and with San Dieguito Irrigation District (SDID) regarding their 30-inch concrete pipe. Both pipelines are located within existing easements through the property and may need to be relocated depending on the proposed improvement design. Any designs will need to consider the minimum cover needed over those pipes and not add any structures within the easements because these agencies need to be able to access their pipelines without obstructions on the surface.

### Community Learning Center

Future buildings will require relocating the existing water pipeline that connects to the City of Oceanside distribution system on Mission Avenue. The proposed Student Services/Welcome Center is planned to be built over the existing pipeline, which will require relocation along the future driveway and main entrance.

## Storm Water Infrastructure //

The storm drain collection systems for all three MiraCosta College campuses are unique due to their terrain and functionality. Below are general descriptions of the storm drain collection system for each campus.

### Oceanside Campus

The campus is located at the top of a hill in northeast San Diego County without any development located above the campus that might contribute storm water runoff to the campus property. The campus has several discharge points where runoff leaves the site and enters the City of Oceanside's storm drain collection system. Within the campus is an elaborate storm drain collection system that consists of grate inlets, curb inlets, storm drain pipes, concrete swales, natural swales, and detention basins. The purpose of the system is to capture and convey storm water runoff away from structures and roadways, and then transport the runoff to the various discharge points throughout the perimeter of the campus. In many locations, storm water drains to local landscaped areas which allows the landscaping to rely less on irrigation during the winter months.



Hardscape drains towards some landscaping

### San Elijo Campus

The campus is located next to a hillside along the north coastal area of San Diego County. Storm water runoff from the nearby hillside is diverted from the campus by a concrete swale along the campus perimeter. The campus has two discharge points where runoff leaves the site and enters the San Elijo Lagoon to the south. Within the campus is an elaborate storm drain collection system that consists of grate inlets, curb inlets, storm drain pipes, concrete swales, natural swales, and detention basins. Previous campus planning incorporated various measures to reduce the quantity of pollutants that leave the site and drain into the nearby lagoon.



Detention basin used to allow pollutants to settle instead of draining directly into the lagoon

### Community Learning Center Campus

The campus is located in an urban area of Oceanside with a small amount of offsite area that drains onto the campus. Storm water runoff from the development to the east drains onto the campus at the northeast corner. The campus has two discharge points where runoff leaves the site and enters the City of Oceanside's storm drain collection system. The storm drain system within the campus is not complex. Storm water runoff drains via sheet flow to the two exit points, one along Mission Avenue and the other along Barnes Street. The campus only has a few area drains near the main building that diverts runoff to the nearby campus parking lot. There are no measures in place to remove pollutants from the storm water runoff prior to entering the City of Oceanside's storm drain system.



Area drains located near main building

## Methodology

The following methodology was adopted in formulating our utility infrastructure master plan. The methodology presented below outlines the critical tasks that were performed in development of this master plan report.

- A critical aspect in the evaluation of the existing storm drain system serving to protect life and property is a field investigation of the existing system. A detailed survey of the entire utility system, including the storm drain system was performed for all three campuses prior to the start of the Comprehensive Master Plan (CMP). Then, engineers gathered performance data from campus maintenance personnel regarding known problem areas of ponded storm water. The capacity and condition of the existing storm drain system is unknown at this time.
- A qualitative analysis was performed to locate potential areas for implementing natural facilities to reduce the pollutants that leave each campus.
- Recommendations were developed for upgrades and additions to support new buildings, new parking lots, and new activity areas that were identified in the proposed CMP.
- Approximate costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

## Analysis of Existing System

### Oceanside Campus

Field investigations and discussions with campus maintenance staff about the existing drainage system revealed the following:

1. A few small areas of localized flooding during typical storm events. These areas include an area immediately east of Building 61, an area on the west/southwest side of Building 3400, an existing utility box in the access road immediately south of Building 7000, and the west side of Building 2200 near the building entrance.
2. Several areas experience erosion problems during moderate to heavy storm events. Most of these areas are located at storm water discharge points in parking lots and areas where the terrain changes from flat hardscape to steep undeveloped surfaces.
3. Some landscaped areas within the central portion of the campus provide dual benefits in that storm water drains through these areas to reduce runoff and pollutants conveyed to the storm drain system.

### San Elijo Campus

Field investigations and discussions with campus maintenance staff about the existing drainage system revealed the following:

1. Some storm drain pipes have root intrusion and structural issues.
2. The existing sand filters appear to be non-functioning due to lack of proper maintenance and a short life span of each unit.
3. Minor erosion is present at the outlet of the concrete brow ditch near the southwest corner of the campus and along a side slope of the detention basin located near the campus and along a side slope of the detention basin located near the campus entrance from Manchester Avenue.
4. There are no documented areas of storm water ponding near buildings and other structures during typical storm events.

### Community Learning Center Campus

Field investigations of the existing drainage system revealed the following:

1. Two low points in the existing parking lots at opposite ends of the campus. One low point is near the northeast corner as the onsite road stretches around the temporary building. The second low point is at the south end of the campus near the former loading dock. Both areas show evidence of cracking in the asphalt due to water damage.



## Analysis of Future System

In addition to servicing the existing campus activities and buildings, the infrastructure should be analyzed by a quantitative engineering study to determine how new buildings and other improvements will affect the overall storm drain collection system. The proposed improvements to each campus will alter the quantity of storm water runoff and the direction in which the water will flow along the surface. New buildings and parking lots increase the impervious area at the specific locations which increases the quantity of runoff. A significant amount of the increased runoff can be diverted to new systems that provide natural treatment to remove pollutants while also providing a water supply to new landscaped areas. New storm drain collection systems will also be needed to ensure life and property is preserved during large storm events. The new storm drain systems can be connected into the existing system. A design engineer will need to analyze the impacts of added runoff to the existing system. Rain barrels can also be installed on various locations throughout each campus to collect storm water from rooftops, then reuse it for localized landscaping.



Natural systems collect and treat storm water runoff; Rain barrels collect storm water runoff and store for reuse.

## Recommendations

A general recommendation that would cover all three campuses is to prepare and implement a Storm Water Management Plan (SWMP) that outlines the potential pollutants from the campuses and describes the post-construction Best Management Practices (BMPs) used to mitigate for the potential pollutants. The SWMP also discusses maintenance schedules and procedures for each BMP to ensure they maintain their efficiency and design life.

The following are recommendations for improving the storm drain collection system infrastructure for each campus.

### Oceanside Campus

The areas identified as having historical flooding issues will require a detailed drainage analysis and modifications or additions to the existing storm drain system to capture and convey the runoff away from buildings. The areas identified as having erosion problems will require a detailed drainage analysis, slope repairs, and slope stabilization measures installed to reduce the erosion potential during future storm events. Installing natural systems to treat storm water runoff and provide water to nearby landscaping can be done for several locations throughout the campus, especially in existing and new parking lots. Implementing natural systems will reduce the impacts on the existing storm drain collection system and reduce the water usage and cost during winter months.

### San Elijo Campus

Areas where root intrusion and structural deficiencies are known will require pipe replacement to ensure storm water runoff will not damage campus structures. The existing sand filters will be replaced with bio-retention basins that are more efficient in removing pollutants and are easier to maintain. Additional natural systems will be installed in the existing parking lots to provide treatment and reduce the water usage and cost during winter months. The areas identified as having erosion problems will require a detailed drainage analysis, slope repairs, and slope stabilization measures installed to reduce the erosion potential during future storm events.

### Community Learning Center Campus

The areas identified as having low points will be addressed as part of the proposed campus circulation improvements. Installing natural systems to treat storm water runoff and provide water to nearby landscaping can be done for the existing and new parking lots. Implementing natural systems will reduce the impacts on the existing storm drain collection system and reduce the water usage and cost during winter months.

## Sanitary Sewer Infrastructure //

Below are general descriptions of the sewer collection system for each campus.

### Oceanside Campus

The sewer collection system consists of a network of 6-inch and 8-inch pipelines with service connections to each building. The majority of the sewer infrastructure is comprised of vitrified clay pipelines connected by manholes which ultimately discharge into the City of Oceanside collection system. Two separate pipelines serve the Horticulture buildings and Child Development Center and discharge into the City's system at different locations.



Manhole Cover

### San Elijo Campus

The San Elijo Campus is located on the side of a hill that slopes down toward Manchester Avenue. The sewer system collects wastewater generated throughout the campus and conveys it through three 8-inch sewer mains that discharge into the City of Encinitas sewer collection system.

### Community Learning Center

The Community Learning Center Campus is served by a two vitrified clay sewer pipelines that connect to the City of Oceanside collection system at Barnes Street.

### Methodology

The methodology outlined below summarizes the main tasks completed during the evaluation of the sewer collection system for each campus.

1. A comprehensive research, survey and mapping effort was undertaken at each campus to document the location and size of existing utilities.
2. Information was obtained from facilities' personnel regarding known issues with the sewer collection system at each campus.
3. A qualitative analysis was performed to determine improvements needed to address known issues and to accommodate future growth at each campus.
4. Approximate costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

### Analysis of Existing System

#### Oceanside Campus

Discussions with campus maintenance personnel regarding the existing sewer system and review of recent inspection videos of the portions of the collection system, identified the following deficiencies:

1. Based on a review of the CCTV inspection videos the sewer pipeline segments just upstream of the connection to the City of Oceanside collection system have some localized areas with significant root intrusion at pipe joints and sagging problems.
2. The capacity of a segment of the collection system adjacent to Buildings 4500 and 4700 (6-inch vitrified clay pipe) is exceeded during peak flow conditions.



Interior of a sanitary sewer manhole



### **San Elijo Campus**

The existing sewer collection system does not have any identified deficiencies. Based on information obtained from maintenance personnel, some of the sewer collection pipelines could have root intrusion but are currently operating adequately.

### **Community Learning Center**

The existing sewer collection system does not have any identified deficiencies and is operating adequately.

### **Analysis of Future System**

In addition to repairing existing sewer pipelines that present root intrusion, structural problems, or joint displacement, a detailed engineering analysis should be completed to ensure that the existing collection system has adequate capacity to accommodate wastewater generated by future buildings. Areas of the collection system that have not been recently inspected should be examined to identify any other potential issues that could arise in the near future.

### **Recommendations**

The following are recommendations for improving the sewer collection system infrastructure for each campus.

#### **Oceanside Campus**

The segments of the sewer collection that present root intrusion problems should be repaired utilizing either a trenchless technology or traditional cut-and-cover methods. The portions of the collection system for which their conveyance capacity has been exceeded should be sized and designed based on the results of the detailed engineering analysis to accommodate both existing flows and anticipated future flows. Based on the elevation of the future Maintenance, Purchasing and Operations Complex, a pump station and force main will be required to convey sewer generated at the facility to the sewer main along Barnard Drive.

Planned improvements to allow vehicle turnaround and student drop-off along the main driveway could require relocation of a segment of the collection system if the design requires structures to be placed over the pipeline that could obstruct future access for repairs.

#### **Community Learning Center**

No significant impacts to the sewer collection system are anticipated due to future growth. An engineering analysis should be completed to verify that the existing pipelines have capacity to accommodate future buildings.

## Natural Gas Infrastructure //

### System Description

#### Community Learning Center

MiraCosta Community Learning Center is currently served by two (2) separate high pressure SDGE natural gas lines. One line is serving buildings A & B and the other is serving the Small Business Development Center (SBDC) building. Buildings “A” and “B” are served by a one-inch high pressure gas line with a gas pressure regulator located outside Building “B” to convert high pressure to medium pressure.

Medium pressure gas lines from the meter/regulator branches to Buildings “A” and “B”.

At each of the buildings “A” and “B” there is a pressure regulator to convert medium pressure to low pressure serving these buildings.

The Small Business Development Center building is served by a separate high pressure line with gas meter and pressure regulator located on the south end of the building.

#### San Elijo Campus

The San Elijo Campus is served by one (1) high pressure SDGE natural gas line. The gas meter for this site is located at the east end of the parking lot off of Manchester Avenue. The high pressure line at the gas meter/regulator is converted to medium pressure gas line which runs through the entire site and serves as gas distribution system. Throughout the campus a medium pressure gas line branches to each of the buildings.

Outside of each building, a gas pressure regulator equipped with shut off valve converts medium pressure to low pressure to serve the buildings.

#### Oceanside Campus

The Oceanside Campus is served by one (1) high pressure SDGE natural gas line. The gas meter is located east of Parking Lot 1A off of Bernard Drive. The high pressure line at the gas meter/regulator is converted to medium pressure gas line which runs through the entire site serving as gas distribution system. Throughout the campus, a medium pressure gas line branches to the buildings. Outside of the building, a gas pressure regulator equipped with shut off valve converts medium pressure to low pressure to serve the buildings.

### Methodology

The methodology presented below outlines the critical tasks and actions taken in development and preparation of this master study and supporting documents, such as gas load requirements per building and drawing.

1. Several site visits to the campuses were undertaken in an effort to gather existing heating systems and gas appliance's required gas demand.
2. Available record drawings were studied to verify in more detail required gas demand at each building and campus gas distribution system.
3. Gas piping distribution system was then evaluated for capacity vs. requirements.

4. Drawings were created to identify required gas demand at each segment of the gas piping distribution and required upgrade if any.
5. Approximate costs for recommended required gas piping distribution upgrade were developed.
6. As noted on the drawings based on best available information, gas piping distribution analysis is based on 5 PSI pressure down stream of main gas meters/ pressure regulator, with available pressure of 1.5 PSI at farthest building.

### Analysis of Existing System

#### Community Learning Center

Based on site surveys and gas demand data gathered for the gas appliances and HVAC equipment, each of the existing 1 inch gas line serving Building “A” and “B” are adequate. The existing 1- 1/2 inch gas line serving the SBDC Building is also adequate.

Visible portions of the gas pipe were field verified for sizes and majority of the equipment and appliances using gas was also field verified.

For the total existing gas demand at this campus, refer to the following tables.

Note:

- 1) Refer to gas utility survey/drawing.
- 2) Existing gas line serving existing SBDC building is adequate for new building with maximum gas demand of 410 MBH

BUILDING A						
A	Admin/Classroom	B-1	Heating Hot Water Boiler	Raypak	H1-1468	1467
A	Admin/Classroom	WH-1	Water Heater	GE	SG5DT12AVG00	40
BUILDING A TOTAL GAS DEMAND						1507 MBH

BUILDING B						
B	Science/Classroom	AC-B1	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B2	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B3	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B4	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B5	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B6	AC Unit	Carrier	Not Available	115
B	Science/Classroom	AC-B7	AC Unit	Carrier	Not Available	115
B	Science/Classroom	N/A	Gas Cock	Not Available	Not Available	78
B	Science/Classroom	WH-1	Water Heater	GE	GG40506AUT00	36
BUILDING B TOTAL GAS DEMAND						919 MBH

SMALL BUSINESS DEVELOPMENT CENTER						
SBDC	Small Business Development Center	AC-1	AC Unit	GE	BYC0603316C	160
SBDC		AC-2	AC Unit	GE	BYC0603316C	160
SBDC		WH-1	Water Heater	Not Available	Not Available	90 Estimate
SMALL BUSINESS DEVELOPMENT CENTER TOTAL GAS DEMAND						410MBH

BUILDING LETTER	BUILDING NAME	GAS INPUT (MBH)
A	Administration/Classroom	1507
B	Science/Classroom	919
SBDC	Small Business Development Center	410
GRAND TOTAL CAMPUS GAS LOAD		2,836 MBH

**San Elijo Campus**

Based on site surveys and gas demand data gathered for the gas appliances and HVAC equipment, the existing 3-inch main medium pressure distribution gas line running through the entire campus is adequate. Visible portions of the gas pipe were field verified for sizes and majority of the equipment and appliances using gas was also field verified.

However some of the branches as noted below are inadequate:

The existing 3/4 inch branch pipe serving Building 100 is inadequate for the existing gas load of 379 MBH and shall be upgraded with 1 inch line.

The size of the existing medium pressure gas line prior to branching to Building 100 and 200 is unknown, but

the minimum required pipe size at this point shall be 1-1/2 inch. Refer to segment 12 on drawing. Services of a company specializing in underground utilities detection are required to determine the existing pipe size and then verify if any upgrades are required.

For the total existing gas demand at this campus, refer to the tables below:

BUILDING 100						
1000	Library	B-1	Heating Hot Water Boiler	Teledyne Laars	HH0600IN09KLACK	600
1000	Library	WH-1	Water Heater	A.O.Smith	FGR50242	38
BUILDING 100 TOTAL GAS DEMAND						638 MBH

BUILDING 200						
200	Arts	B-2	Heating Hot Water Boiler	Raypak	H-0263A-BCDUCEC	264
200	Arts	WH-2	Water Heater	A.O.Smith	PGC50930	40
200	Arts	K-1	Kiln	Geil Kilns	802	100
BUILDING 200 TOTAL GAS DEMAND						404 MBH

BUILDING 300						
300	Faculty/ Classroom	B-3	Heating Hot Water Boiler	Raypak	H0263ABLDECEC	264
BUILDING 300 TOTAL GAS DEMAND						264 MBH



BUILDING 400							
400	Science/ Classroom	B-4	Heating Hot Water Boiler	Raypak	H-0183ABCEUCEA	185	
400	Science/ Classroom	WH-4	Water Heater	A.O.Smith	PGC75230	75	
400	Science Lab	N/A	Gas Cock/Hood	N/A	N/A	125	Estimate
BUILDING 400 TOTAL GAS DEMAND						385 MBH	

BUILDING 500							
500	Faculty/ Classroom	B-5	Heating Hot Water Boiler	Raypak	H4-0514ACCDRCDA	511.5	
BUILDING 500 TOTAL GAS DEMAND						511.5 MBH	

BUILDING 600							
600	Faculty/ Classroom	B-6	Heating Hot Water Boiler	Raypak	WI-0333BCCDRBDA	333	
600	Faculty/ Classroom	WH-6	Water Heater	GE	GG40S0GAVJ00	36	
BUILDING 600 TOTAL GAS DEMAND						369 MBH	

BUILDING 700							
700	Facility	FAU-1	Furnace	Not Available	Not Available	100	Estimate
700	Facility	WH-7	Water Heater	GE	GG30TDGAUG00	30	
BUILDING 700 TOTAL GAS DEMAND						130 MBH	

BUILDING 800							
800	Administration	B-8	Heating Hot Water Boiler	Raypak	W-0133AKCDUCEA	136	
800	Administration	WH-8	Water Heater	Vanguard	1PLV6	32	
BUILDING 800 TOTAL GAS DEMAND						168 MBH	

BUILDING 900						
900	Kitchen/Student Center	B-9	Heating Hot Water Boiler	Raypak	H3-0624	300
900	Kitchen/Student Center	WH-9	Water Heater			156
900	Kitchen/Student Center	N/A	Total Of All Kitchen Appliances	425		
BUILDING 900 TOTAL GAS DEMAND						881 MBH

### Summary of Gas Demand for San Elijo Campus

BUILDING NUMBER	BUILDING NAME	GAS INPUT (MBH)
100	Library	638
200	Arts	404
300	Faculty/Classroom	264
400	Science/Classroom/Lab	385
500	Faculty/Classroom	511.5
600	Faculty/Classroom	369
700	Facility	130
800	Administration	168
900	Kitchen/Student Center	881

Note:

- 1) Refer to gas utility survey/drawing.
- 2) Although most segments of the gas piping distribution appears adequately sized, but proposed building gas demand may require replacing and upsizing these segments as well.

**Oceanside Campus**

Based on site survey and gas demand data gathered for the gas appliances and HVAC equipment considerable segments of the existing gas piping distribution requires upgrade as they are undersized. Visible portions of the

gas pipe were field verified for sizes and majority of the equipment and appliances using gas was also field verified.

Please refer to the drawings, each segment has been evaluated and includes notes for required upgrade.

For the total existing gas demand at this campus, refer to the tables below:

GRAND TOTAL CAMPUS GAS LOAD					3750.5 MBH	
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BUILDING 1000						
1000	Administration	B-1	Heating Hot Water Boiler	Raypak	992A	990
1000	Administration	WH-1	Water Heater	GE	GG40SO6AVGOO	36
BUILDING 1000 TOTAL GAS DEMAND						1026 MBH

BUILDING 1200						
1200	Library	B-1	Heating Hot Water Boiler	Lochinvar	PBN0750	750
1200	Library	B-2	Heating Hot Water Boiler	Lochinvar	PBN0750	750
1200	Library	WH-1	Water Heater	Rheem	G75-125	125
1200			Generator			1000
BUILDING 1200 TOTAL GAS DEMAND						2625 MBH

BUILDING 2000						
2000	Theatre	B-1	Heating Hot Water Boiler	Raypak	HI-0724	750
2000	Theatre	WH-1	Water Heater	A.O. Smith	BT-100-112	75
BUILDING 2000 TOTAL GAS DEMAND						825 MBH

BUILDING 2100							
2100	Woodshop	HV-1	Heat Vent	Reznor	XE300-4-2Y	300	
2100	Ceramics	HV-2	Heat Vent	Reznor	XE300-4-2Y	300	
2100		WH-1	Water Heater	Vanguard	3WA65	40	
2100	Ceramics	K-1	Kilns	Laguna Clay Company	LE200	585	
2100	Ceramics	K-2	Kilns	Geil Kilns	DL18F	224	
2100	Ceramics	K-3	Kilns	Not Available	Not Available	700	Estimate
2100	Ceramics	K-4	Kilns	Not Available	Not Available	700	Estimate
2100	Ceramics	K-5	Kilns	Not Available	Not Available	700	Estimate
BUILDING 2100 TOTAL GAS DEMAND						3549 MBH	

BUILDING 2200							
2200	Creative Art	B-1	Heating Hot Water Boiler	Raypak	H3-0752A	750	
2200	Creative Art	WH-1	Water Heater	Rheem	G75-125	125	
BUILDING 2200 TOTAL GAS DEMAND						875 MBH	

BUILDING 2300							
2304	Audio/Video	AC-1	Rooftop Air Conditioning	Carrier	48HJ005-B500355	60	
2306B	Sculpture/ Ceramics	AC-2	Rooftop Air Conditioning	Carrier	48HJ005-B500355	60	
2306A	New/Genre	AC-3	Rooftop Air Conditioning	Carrier	48HJ005-B500355	60	
BUILDING 2300 TOTAL GAS DEMAND						180 MBH	

BUILDING 2400							
2400	Concert Hall	B-1	Heating Hot Water Boiler	Raypak	H8-0992B	990	
BUILDING 2400 TOTAL GAS DEMAND						990 MBH	



BUILDING 3100						
3100		B-1	Heating Hot Water Boiler	Raypak	H1096CEARCAA	926
3100		WH-1	Water Heater	Bradford White	M45036FBN	40
BUILDING 3100 TOTAL GAS DEMAND						966 MBH

BUILDING 3400						
3400	Student Center	B-1	Heating Hot Water Boiler	Raypak	H3-0624	627
3400	Student Center	DF-1	Deep Fryer			80
3400	Student Center	G-1	Griddle			87
3400	Student Center	G-2	Countertop Griddle			80
3400	Student Center	S-1	Steamer			220
3400	Student Center	K-1	Kettle			60
3400	Student Center	BZ-1	Brazing Pan			75
3400	Student Center	WH-1	Water Heater	Bradford White	D100L199E3N	200
BUILDING 3400 TOTAL GAS DEMAND						1429 MBH

BUILDING 3500						
3500		B-1	Heater Hot Water Boiler	Raypak		760
BUILDING 3500 TOTAL GAS DEMAND						760 MBH

BUILDING 3600						
3600		WH-1	Water Heater	GE	GG30T06AVJOO	32
3600		DR-1	Dryer			30
BUILDING 3600 TOTAL GAS DEMAND						62 MBH

BUILDING 3700						
3700	Student Services	B-1	Heating	Raypak	H-261	264
BUILDING 3700 TOTAL GAS DEMAND						264 MBH

BUILDING 4000 Bio Technology						
4000	Bio Technology	B-1	Heating Hot Water Boiler	Raypak	H3-0624	627
4000	Bio Technology	WH-1	Water Heater	Lochinvar	EWN2000PM	200
4000	Bio Technology	GO-1	24 Gas Outlets			720
BUILDING 4000 TOTAL GAS DEMAND						1547 MBH

BUILDING 4000 Auto Mechanic						
4000	Auto Mechanic	RH-1	8 Radiant Heaters			480
4000	Auto Mechanic	AC-1	Roof Mount AC Unit		588APW042	80
4000	Auto Mechanic	AC-3	Roof Mount AC Unit	Carrier	48HJ006	60
4000	Auto Mechanic	AC-4	Roof Mount AC Unit	Carrier	588APW036	80
BUILDING 4000 TOTAL GAS DEMAND						700 MBH

BUILDING 4000 Auto Body						
4000	Auto Body	HV-1	Space Heater	Reznor	KPVPAK11	800
4000	Auto Body	RH-1	4 Radiant Heaters			240
BUILDING 4000 TOTAL GAS DEMAND						1040 MBH

BUILDING 4200						
4200	Maintenance	AC-1	AC Unit	Armstrong	2SCU13LE142P-1	80
4200	Maintenance	AC-2	AC Unit	Armstrong	2SCU13LE142P-1	80
4200	Maintenance	F-1	Furnace	Armstrong	GIN80BT075D16BL-A2	50
BUILDING 4200 TOTAL GAS DEMAND						210 MBH

BUILDING 4400						
4400	Nursing	AC-1	AC Unit	Carrier	48HJM004541	60
4400	Nursing	WH-1	Water Heater			40
BUILDING 4400 TOTAL GAS DEMAND						100 MBH

BUILDING 4500						
4500	Science	B-1	Heating Hot Water Boil	Rite	165	800
4500	Science	WH-1	Water Heater	A.O.Smith	PGXH-50	38
4500	Science	GO-1	54 Gas Outlets			1620
4500	Science	GO-2	54 Gas Outlets			1620
BUILDING 4500 TOTAL GAS DEMAND						4078 MBH

BUILDING 4800						
4800	Business	B-1	Heating Hot Water Boil	Raypak	H10263B	500
4800	Business	WH-1	Water Heater	GE	GG50T0GAVHOO	38
BUILDING 4800 TOTAL GAS DEMAND						538 MBH

BUILDING 5000						
5000	Gym	B-1	Heating Hot Water Boil	Raypak	H3-0752AE	750
BUILDING 5000 TOTAL GAS DEMAND						750 MBH

BUILDING 5100						
5100	Dance Studio	AC-1	AC Unit	Carrier	48T0008-621GA	80
5100	Dance Studio	AC-2	AC Unit	Bryant	582ANW042090AAAG	80
5100	Dance Studio	WH-1	Water Heater			40
BUILDING 5100 TOTAL GAS DEMAND						200 MBH

BUILDING 5200						
5200	Lockers	B-1	Heating Hot Water Boil	Raypak	H3-0514	514
5200	Lockers	WH-1	Water Heater	Lochinvar		750
BUILDING 5200 TOTAL GAS DEMAND						1264 MBH

BUILDING 7000						
7000	Culture	B-1	Heating Hot Water Boil	Raypak	H3-0402A	400
7000	Culture	WH-1	Water Heater	A.O.Smith		200
BUILDING 7000 TOTAL GAS DEMAND						600 MBH

BUILDING 8000						
8000	Childcare	B-1	Heating Hot Water Boil	Ajax	WEG-700	505
8000	Childcare	WH-1	Water Heater			750
8000	Childcare	Kitchen				200
BUILDING 8000 TOTAL GAS DEMAND						1455 MBH

GREENHOUSE BUILDING						
GH	Greenhouse	B-1	Heating Hot Water Boil	Raypak	H1-0400	400
GH	Greenhouse	B-2	Heating Hot Water Boil	Spectrum	SB3000	300
GH	Greenhouse	WH-1	Water Heater			33
GH	Propagation House					100
GREENHOUSE BUILDING TOTAL GAS DEMAND						833 MBH



## Summary of Gas Demand for Oceanside Campus

Appendix

BUILDING NUMBER	BUILDING NAME	GAS INPUT (MBH)
1000	Administration	1026
1200	Library	2625
2000	Theatre	825
2100	Woodshop and Ceramics	3549
2200	Creative Art	875
2300	Audio and Ceramics	180
2400	Concert Hall	990
3100		966
3400	Student Services and Art	1429
3500		760
3600		62
3700	Student Services and Counseling	264
4000	Bio Technology	1547
4000	Auto Mechanic	700
4000	Auto Body	1040
4200	Maintenance	210
4400	Nursing	100
4500	Science	4078
4800	Business	538
5000	Gym	750
5100	Dance Studio	200
5200	Lockers	1264
7000	Culture	600
8000	Childcare	1455
Greenhouses	Greenhouses	833
<b>GRAND TOTAL CAMPUS GAS LOAD</b>	<b>26,866 MBH</b>	

Note: 1) Refer to gas utility survey/drawing.  
 2) Although some segments of existing gas piping distribution appears to be adequately sized, but future building gas demand may result in replacing and upsizing those sections as well.

## Analysis of Future System

Future growth at each campus will have substantial impact on the existing gas distribution infrastructure and should be thoroughly evaluated and analyzed through engineering analysis which accounts for increased demand.

This analysis will determine upgrades required to existing gas lines to accommodate for proposed buildings and repurposed buildings. This analysis should also include a study and assessment of the age and condition of existing gas infrastructure.

Proposed buildings will increase the gas demand which could elevate any existing problems specific to the site. At some sites the existing gas line sizes are not known and must be determined and verified prior to adding gas loads or proposed buildings. Services of a company specializing in underground utilities detection are required to determine the existing pipe sizes. Some existing buildings may be removed during future improvements which could provide additional capacity for the existing gas lines. Further engineering analysis is needed to verify.

## Recommendation

Following are the recommendations for improving the gas infrastructure based on existing system and taking into account proposed and repurposed building at each site.

### Community Learning Center

Gas piping distribution study is based on 5 PSI pressure down steam of the main gas meter/ pressure regulator and 1.5 PSI at the farthest building.

Re-Purposed Existing Building: "A": This building has an existing gas demand of 1507 MBH and the allowable gas load for the existing 1 inch gas line is 1700 MBH. Therefore the existing line is adequate for an additional load of 200 MBH, which means any gas appliances or equipment added should not exceed 200 MBH Gas input.

Proposed Student Service/ Welcome Center: We recommend removing existing 1- 1/2 inch gas line and install new gas piping to this proposed building, size shall be determined based on building gas load.

We also recommend verifying existing gas meter / pressure regulator and possibly replaced with adequately sized for the proposed building gas demand.

### San Elijo Campus

Gas piping distribution study is based on 5 PSI pressure down steam of the main gas meter/ pressure regulator and 1.5 PSI at the farthest building.

## Repurposed Facility

Existing Building 200: Existing gas demand for this building 404 MBH and the allowable gas load for the existing 3/4 inch gas line is 279 MBH.

Since the existing 3/4 inch line is inadequate we recommend replacing with 1 inch line.

Existing Buildings 500 , 800, 900 : Please refer to the drawings for the existing pipe sizes and gas demand for these buildings. As long as the gas demand is less than the allowable gas load, the existing pipe sizes are adequate.

## Proposed Buildings

The main 3-inch medium pressure gas line downstream of gas meter prior to any branch has an allowable gas load of the 7,500 MBH. The existing gas demand at this point is 3,750 MBH. Therefore this existing 3 inches line is adequate for an additional load of 3,750 MBH.

The sum of gas loads for all the proposed buildings and any gas load increase for the repurposed buildings shall not exceed 3,750 MBH.

If it is determined that the gas demand is higher than 3,750 MBH, then the existing 3 inch line shall be upgraded or upsized.





## Electricity Infrastructure //

The Electrical Distribution System Infrastructure for all three Mira Costa College campuses is unique due to their functionality, age and capacity. Below are general descriptions of these systems for each campus.

### Oceanside Campus

The campus is located along Bernard Drive just off of College Drive in Oceanside, CA. The electrical distribution system is served to the campus from an existing SDG&E 12kV Service located along the west side of the campus to a step-down 4160V pad-mounted transformer. Power is distributed throughout the campus via two primary circuits. Circuit #1 serves facilities on the South and East side of the campus and Circuit #2 serves facilities to the West and North area of the campus. Distribution throughout the campus is a radial feed system at 4160V and steps down to 480/277V at each facility building.

Part of the Electrical System evaluation was to look at the parking lot and roadway lighting currently on campus and to see if a more energy efficient and more uniform roadway and parking lot lighting scheme would be advised. In our evaluation it was determined that lighting for both parking lots and roadways was not adequate to provide basic security for students and staff as well as inadequate for basic drivability around the campus.

### San Elijo Campus

The campus is located along Manchester Avenue in Oceanside, CA. The electrical distribution system is serving the campus from an existing SDG&E 12kV Service located along Manchester Avenue and is delivered to the campus from an SDG&E step-down 480/277V pad-mounted transformer. Power is distributed throughout the campus via an underground electrical duct-bank system.

### Community Learning Center Campus

The campus is located along Barnes Street. The electrical distribution system is serving the campus from an existing SDG&E 12kV Service located along Barnes Street and is delivered to the campus from an SDG&E step-down 480/277V pad-mounted transformer.

### Methodology

The following methodology was adopted in formulating our utility infrastructure master plan. The methodology presented below outlines the tasks that were performed in development of this master plan report.

- A critical aspect in the evaluation of the existing electrical system serving the campus was an onsite field investigation. A field survey of the entire campus utility system was performed for all three campuses prior to the start of the Comprehensive Master Plan

(CMP). Then, engineers gathered performance data from campus maintenance personnel regarding known problem areas, known capacity issues and overall condition of the existing electrical distribution systems.

- Recommendations were developed for upgrades and additions to support new buildings, new parking lots, and new activity areas that were identified in the proposed CMP.
- Approximate costs associated with each of the required utility upgrades were developed and the most cost effective solution was recommended.

### Analysis of Future Systems

In addition to servicing the existing campus activities and buildings, the infrastructure should be analyzed to determine how new buildings and other improvements will affect the electrical distribution system. The proposed improvements to each campus will alter the electrical distribution systems capacity at each site and may, in the case of the Oceanside Campus, overload the system. New buildings, facilities and parking lots will increase the electrical service demand on the existing distribution system to a point where future capacity is exhausted.



## Recommendations

The following are recommendations for improving the electrical distribution system infrastructure for each campus.

### Oceanside Campus

It is highly recommended that a more in-depth study be conducted that will identify each load on the two primary distribution circuits and determine if load shifting from one circuit the other will re-balance the loads without need to up-size the current SDG&E Service.

It would also be highly recommended that attention be directed to the potential to provide a Medium Voltage Loop Distribution system verses the current Radial Distribution system. A Loop will give the campus the most flexibility in providing the ability to isolate a portion of the distribution system without disruption to the campus as well as providing the ability to shift load from one Loop power source to another.

For the issues surrounding campus roadway and parking lot lighting, the proposed change to an LED source would provide several benefits. The energy savings would be significant and maintenance would be decreased significantly as well. It would not be recommended doing a one-for-one replacement of LED fixture heads on existing poles. The spacing of poles was not deemed as adequate to support a well-lit roadway or parking lot area. A more careful photometric lighting study is recommended to fully evaluate the accurate placement of fixtures for the most uniform

coverage of light. Another potential option would be to utilize off-the-grid, self-powered LED roadway lighting that would make installation much easier and the infrastructure to install them would be very minimal other than a concrete pole base.

### San Elijo Campus

Even though, from an electrical infrastructure standpoint, the electrical distribution system is adequate and no issues were found, and more in-depth study of how the proposed Student Services, Admin and Multi-Purpose facilities will affect the overall load capacity of the campus.

### Community Learning Center Campus

Even though, from an electrical infrastructure standpoint, the electrical distribution system is adequate and no issues were found, a more in-depth study of how the proposed Student Services and Welcome Center facilities will affect the overall load capacity of the campus. It is also evident that the location of the proposed Student Services Building and Welcome Center will disrupt a major underground Telecomm lines which will need to be rerouted and relocated outside the proposed building footprints.

## Technology Infrastructure //

### Systems Description

This section of the Facilities Plan addresses the District's technology systems and associated campus and building infrastructure. For the purpose of this plan, the term "technology" is established to include the following primary categories and components:

#### Campus/Site Technology Infrastructure

- Backbone Cable Distribution Pathways
- Outside Cabling Plant (Copper & Fiber)
- District/Campus Data Centers
- Outdoor Area WiFi Access

#### Base Building Technology (Group 1)

- Communication Equipment Rooms
- Building Structured Cabling
- ADA Support Systems (e.g. Assistive Listening Systems)

#### FF&E Technology (Group 2)

- Communications & Networking
- Computing
- Audiovisual
- Misc. Campus Systems (e.g. Central Clock, Digital Signage, etc.)

This assessment is focused on identifying critical future needs for technology to support the academic mission of the District as delineated in the Educational Master Plan. Emphasis is placed on the goal of building a reliable and adaptable framework of technology infrastructure and systems that can accommodate the varied and constantly evolving needs of students, faculty and staff.

This assessment does not address ongoing operation, maintenance and support of technology systems and infrastructure deployed throughout the District to support current and ongoing activities. The regular operating plans, budgets and support resources of the District and the Academic Information Services (AIS) group support these needs, including routine technology refresh within existing areas and operations.

#### Methodology

The analysis and recommendations presented in this section have been developed as a collaborative effort involving the project consulting team and District staff. The following summarizes the key elements of the methodology:

- Review of existing documentation and records pertaining to the academic mission of the District and the technology systems and infrastructure deployed to support that mission. This includes the District's Educational Plan, the most recent completed Technology Master Plan (2007-2010), and the draft Technology Master Plan currently in development.

- Perform a visual inspection of existing facilities and technology infrastructure on all three District campuses to identify the extent and nature of the technologies deployed and to make a general assessment of their condition and the condition of supporting infrastructure.
- Meet with District AIS staff to validate observations, to gather additional details and background information regarding existing conditions, and to review the draft Technology Master Plan currently in development.

With the goal of developing a reliable and adaptable technology framework to support the District's long-term needs, we have identified the following key points of focus in our assessment:

- Capacity of existing campus technology infrastructure to support planned new facilities as well as existing buildings and their current and anticipated future uses.
- Condition of technology infrastructure within existing buildings and the ability of that infrastructure to support anticipated future requirements.
- Identification of technology systems requirements associated with planned new buildings and renovation/reuse of existing buildings.
- Availability of critical technology planning and management tools for effective deployment and operation future technology investments.

## Assessment of Existing Conditions

### Overview

Technology systems and supporting infrastructure are deployed widely throughout all three of the District's campuses. At the "core", the District's technology systems (e.g. data network, phone, etc.) are in good condition and are performing reliably. However, as an "early adopter" of information and communication technology, the District is currently facing some challenges in terms of aging outside plant, limited growth capacity, and inadequate or sub-standard infrastructure within many campus buildings.

Student access to instructional and academic support technologies (e.g. computing, audiovisual, etc.) is very good. Again, however, being early adopters of these technologies, the District is currently facing the challenges posed by an aging installed technology base and major trends/shifts in technology. For example, the rapid adoption of mobile computing and communication devices such as iPads and smart phones will greatly affect the way students access the District's information resources. With regard to audiovisual technology, the adoption of digital high-definition/widescreen video formats, the advent of sophisticated digital content protection protocols, and the obsolescence of analog audio/video standards will greatly impact future audiovisual systems deployments in new buildings as well as in refreshes to existing facilities.

### Data Centers

When considering the space needs of the Oceanside and San Elijo data centers, the following factors were evaluated:

- Data Center usable square footage
- Racks/Cabinets/Cable Management
- Staff Workspace
- Staging and Storage Area

Network, server, and storage equipment required to support new or upgraded buildings are expected to exceed utility capabilities available in the existing data centers. Additionally, newer technologies such as desktop virtualization (already in pilot evaluation) will require significant data center cabinet space to accommodate the hardware components. Combined, these technologies will require additional administration, staging, and storage space that is currently not available.

Critical to the uninterrupted functionality of all systems, applications, data bases, and telecommunications are the utilities that maintain the consistent operability of the data centers. At both the Oceanside and San Elijo data center facilities, critical utilities are very close to maximum capacity or do not have a back-up in the event of emergency maintenance or failure. The initial assessment concluded that due to the dependencies that one utility has upon the next (e.g. more equipment cabinet space results in the need for more cooling, power, etc), the existing utilities will not be capable of supporting anticipated long-term needs.

Utilities requiring an upgrade in capacity are identified as follows:

- Power Service/Grounding
- Uninterruptable Power Supply (UPS)
- Back-up Generator
- HVAC
- Fire Suppression
- Lighting
- Space



### Communications Service Provider Connectivity

At each of the three campuses, communications entrance facilities housing service provider (SP) data circuits are at high risk of unplanned downtime should a break in path occur. These critical facilities share a single pathway that serve as the only communications link between the SP and the campus facilities. This issue is currently being addressed on the Oceanside campus through a project to bring a redundant service provider connection path into the campus.

### Outside Plant Infrastructure

The outside plant (OSP) facilities serve as the physical pathways for backbone communications cabling distribution from the data centers to the individual buildings on each campus. The complete infrastructure consists of maintenance-holes, pull boxes, underground conduits and cabling. The following components were considered during the initial review:

- Distribution method/topology
- Substructures/maintenance-holes and conduit
- Growth capacity-conduit
- Redundancy-points of failure
- Media-cable type and capacity

At each of the campuses, the OSP is installed in a point-to-point or star configuration offering only a single path of entry to the campus communications backbone. The media type, primarily fiber optics, is a mix of traditional and air-blown fibers. Many conduits are filled to capacity and/or contain media from legacy equipment.

### Telecommunications Equipment Rooms & Cabling

Design and construction of most existing buildings on all three campuses pre-date current industry standards for communications facilities and infrastructure. Therefore, many buildings are deficient in terms of providing adequate space and infrastructure (e.g. power, grounding, HVAC, etc.) to properly support data networking and communications equipment and cabling infrastructure. In many locations, building IT infrastructure is installed in electrical rooms, mechanical rooms, or janitor closets, putting the critical IT infrastructure at great risk of accidental or deliberate damage. And inappropriate environmental conditions are reducing reliability and operational life of the equipment



### Classroom Technologies

Most classroom and instructional spaces throughout the District's three campuses are equipped with instructional AV presentation systems, instructor computers, and data network connectivity, including WiFi access. Some informal standards for instructional AV systems are evidenced by similar system configurations and equipment compliments within classrooms in particular buildings. Across the District the configurations are more varied; most likely as a function of when the equipment was initially installed and the state of available technology at that time.





Image display in most classrooms is provided through projectors mounted on the classroom ceiling. Roll-down projection screens are provided and may be electrically or manually operated. Presentation media sources provided in most classrooms include a local computer, video (e.g. VCR, DVD) and input connections for a laptop or other portable video source. Sound from presentation sources is reproduced in most classrooms through loudspeakers in the ceiling. In some locations loudspeakers are located on the wall adjacent to the projection screen.



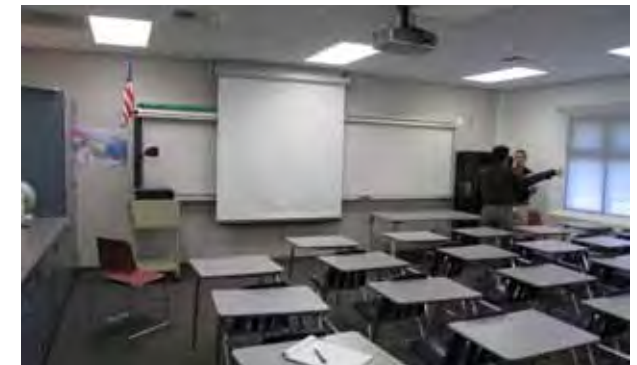
In classrooms and labs that are dedicated to specialized instruction (e.g. music, computer drafting/CAD, graphic design) the AV presentation systems are typically more technologically advanced. These classrooms may be equipped with enhanced technology tools such as video annotation tablets (i.e. Hitachi StarBoard), document cameras, high-resolution projectors, etc. There is a high degree of variability in the type and configuration of technology in these specialized instructional areas.

A common platform for integrated AV control is established at the equipment manufacturer level (i.e. Extron). Simple push-button control is utilized in most classrooms. None of the facilities visited were equipped with touchscreen graphical user interface (GUI) type controls as might be appropriate the more complex systems. The AIS group has recently deployed a network based management system to enable enterprise level management and control of AV equipment installed across the District. The system is expected to be integrated into all new system installations throughout the District.

As noted previously, very few of the AV systems installed in the District's instructional spaces provide current widescreen (e.g. 16:9, 16:10) high-resolution (e.g. 1080p, WXGA) image display. None of the systems viewed supported full digital signal routing and processing. While the installed base of legacy analog AV presentation systems continues to support daily teaching activities, they are rapidly becoming obsolete and eventually will not be supported by manufacturers and service providers.

To varying degrees, performance of the instructional media systems deployed in nearly all of the spaces observed was impaired by the physical space and building systems. These conditions can be attributed to the lack of facility and infrastructure design standards needed to ensure a physical environment that can support effective and sustainable technology deployment. The following describes some of the conditions observed that could be overcome by putting such standards in place:

- Undersized video/computer images
- Projected images obscured by poor lighting placement and controls
- Obscured viewing sightlines
- High background noise levels from HVAC and other equipment
- Impaired audio intelligibility
- Inadequate power and grounding
- Inadequate cable pathways



### Other Learning Technology Resources

The libraries on each of the campuses serve as the primary venues for unassigned technology support resources for students. Library and AIS staff indicated that the library plays an important leadership role in delivering technology-based learning resources to students and keeping the District at the forefront of academic and information technology applications.

Among the library's most heavily used technology resources are the open computing labs that provide drop-in access to computer workstations and the District's electronic information resources. The District maintains a regular refresh cycle that keeps computing equipment up to date. (Although current budget constraints have resulted in the refresh cycle being increased from 3 to 5 years.) All of the workstations observed in the open computing labs utilized flatscreen monitors. A mix of older standard format (4:3) and newer widescreen monitors were observed. However, workstation furniture appears to have been originally designed for larger CRT type monitors, making for inefficient and inflexible use of the space.

The libraries also provide a variety of hardware and software technologies for specialized learning applications (e.g. writing, language, physical disability). WiFi network access is available throughout the libraries and is utilized heavily by students with their own laptops and other mobile computing devices (e.g. iPads).



The utilization of distance learning technology within the District is limited primarily to online instruction and has little physical impact on the buildings and other physical resources. There is a small mobile videoconferencing system located in the library on the Oceanside campus. However, it is older and apparently seldom used. The system is inappropriate for use in the room where the equipment is located.

In the library on the Oceanside campus there is a media production facility that used to serve as the production head end for a local access television channel. The television channel is no longer active. The equipment is largely obsolete and has not been maintained. The facility contains some media duplication capability that is still currently used.

### Planning and Management Resources

Deficiencies in the existing building technology infrastructure (e.g. communications equipment rooms) can be attributed in part to the age of the buildings. However, a contributing factor is the lack of existing standards for design and construction of technology infrastructure in new construction and renovations.

## Conclusions and Recommendations

No one has a crystal ball that will predict the future of technology and, in turn, tell us how to make any organization forever “state of the art”. However, the development and adoption of new technologies is mostly evolutionary – not revolutionary. This provides an opportunity to look for trends that can offer indications of where things are headed. In examining the trends, the focus should be less on the technologies themselves and more on how people are using the technologies (what needs are the technology tools satisfying) and how are people responding to the available technology offerings.

Planning for technology in new and renovated facilities must anticipate and facilitate the continuous evolution of technology within the relatively static building environment. To achieve this goal we recommend that the issue be considered from two levels – the “core” and the “edge”. At the “core” the basic services and infrastructure of the building (e.g. electrical power, communications equipment rooms, pathways/cabling, etc.) need to provide adequate service capacity, reliable performance, and flexibility to adapt to evolving technology and uses. At the “edge” are the electronic devices that enable people to input and extract the contents from the electronic realm into intelligible form (e.g. sound and images). At the edge, technology evolves very quickly and is highly personalized. At the core it evolves much more slowly and is more standardized. In planning for technology in a physical building environment the organization must recognize these difference and design to accommodate them.

With this perspective, a series of recommendations are presented in this section. The recommendations presented are based on the general assessment conducted by the planning team, the District AIS staff’s validation of noted observations, as well as the the stated goals of the District’s Educational Plan, Technology Master Plan (2007-2010), and the new draft Technology Master Plan.

### Data Centers

The MiraCosta Community College District is strongly encouraged to consider the following initiatives to ensure the long-term viability of the District’s technology infrastructure:

- Oceanside Campus:
  - / Construction of a Secondary Data Center (Option I)
  - / Existing Data Center Expansion (Option II)
- San Elijo Campus: New Data Center Construction and Relocation

These improvements are proposed based on the current state of the infrastructure in both locations, as addressed above, and are recommended to meet the needs of anticipated District-wide technologies, availability of critical utilities supporting data center equipment, and capacity needs of planned new buildings and renovations.

At the Oceanside Campus, the future needs of the District and the campus would best be met by constructing a new secondary data center facility. This proposal (identified as Option I) would provide the additional resources to overcome the current and anticipated future deficiencies of the current data center and would support physical redundancy of critical systems. The new data center should be designed to address anticipated network growth and to also address sustainability goals through efficient energy management systems. It is proposed that this new secondary data center facility be constructed in the northwest area of the campus (see proposed Facilities Site Plans) where it could also serve as a Main Point of Entry (MPOE) for the proposed construction of redundant service provider circuits.

In the event that is not feasible to develop Option I, an alternative (identified as Option II) is to expand the existing Data Center. With Option II, consideration of the office space directly adjacent to the data center’s main entry should be evaluated as potential data center expansion space. Expanding into this adjacent space should accommodate the anticipated growth needs of the data center with minimal disruption to ongoing operations. Expansion work should be considered as a component of any renovation planned for the Library (1200) where the existing data center is located.

At the San Elijo campus, construction of a new data center facility should be considered within the proposed new Student Services/Administrative Building. The new facility should anticipate providing the critical data center components noted as lacking in the existing facility. It is recommended that the existing facility be retained as the campus MPOE and demarcation point for incoming services. Furthermore, it is recommended that development of a new data center on the San Elijo campus include audit and relocation of existing technology equipment as required to establish a back-up to the primary data center at the Oceanside Campus. Planning, construction and commissioning of the new data center must be carefully coordinated and sequenced with any proposed renovation work in the existing Library (100) and any other planned infrastructure improvement projects on the campus.

### **Construction and Relocation**

Measures are currently under way, through the addition of a redundant service connection, to mitigate the existing risk of a single service connection point on the Oceanside campus. At the San Elijo campus, consideration should be given to constructing a redundant service provider connection as a component of the new data center project. It is recommended that the Community Learning Center continue to operate on the existing single Service Provider connection with back-up provided from the Oceanside and San Elijo Data Centers.

### **Communications Service Provider Connectivity**

Measures are currently under way, through the addition of a redundant service connection, to mitigate the existing risk of a single service connection point on the Oceanside campus. At the San Elijo campus, consideration should be given to constructing a redundant service provider connection as a component of the new data center project. It is recommended that the Community Learning Center continue to operate on the existing single Service Provider connection with back-up provided from the Oceanside and San Elijo Data Centers.

### **Outside Plant Infrastructure**

Assessment of the existing OSP infrastructure on the Oceanside campus has concluded that it is insufficient to support the District's long-term technology needs. The infrastructure in place at the San Elijo campus is in better condition but it falls short in terms of redundancy. It is recommended that proposed infrastructure improvements on both campuses consider development of new primary distribution backbones with a ring topology, as opposed to the existing star topology. A new primary distribution backbone would tie into the existing infrastructure and building connections at existing convergence points.

A full audit and detailed feasibility analysis should be conducted in order to identify the most effective design solution in order to achieve the following goals:

- Create redundant (dual) entrances into the campus data center(s.)
- Expand campus backbone conduit capacity and access.
- Provide connectivity for future buildings and upgrades to renovated/repurposed existing facilities.
- Maximize utilization of existing infrastructure
- Support managed communications backbone cabling distribution plan

This Facility Plan proposes a concept for development of new communications cabling distribution backbone infrastructure on the Oceanside and San Elijo campuses. The concept provides for a new primary ring that intercepts existing building communication connections at selected existing manholes. A phased approach to construction and “cutting over” of existing buildings can be planned to meet the availability of resources and the alignment of work with other master plan projects. Proposed routing of the new infrastructure at each campus is illustrated in plans associated with this Facility Plan.

No changes are recommended for the Community Learning Center OSP due to the efficiency of the existing infrastructure, low risk of failure, and limited growth projections. Connection of proposed new building(s) to the existing communications infrastructure will require installation new conduit and cabling between to existing facilities.



### **Telecommunications Equipment Rooms & Cabling**

A comprehensive audit of the existing telecommunications equipment rooms and infrastructure conditions is recommended to identify specific areas and priorities for corrective action. All new buildings and future building renovation projects should anticipate development of dedicated, secure telecommunications equipment room spaces with power, HVAC, fire suppression, and other services in compliance with current industry standards.

### **Classroom Technologies**

The District should anticipate replacement of existing obsolete classroom technologies as a component of all future facility renovation projects. New building projects should include design and infrastructure accommodations for technology and deployment of appropriate systems. Planning for technology in future instructional spaces must consider evolving learning and teaching models as well as technology trends. Anticipating the need to make the transition to high-definition digital AV systems in new and renovated instructional spaces, the District would be well served to develop appropriate “models” and standards for future classroom technology systems. In addition, space planning and infrastructure standards should be developed to support effective deployment of those technology models. (See below for additional discussion regarding the recommendation to develop District standards for technology.)

New technology and teaching models should consider the following:

- Access, retrieval, processing and playback of network and Web based digital media.
- Digital acquisition, storage and retrieval of classroom-originated media.
- Digital content protection and licensing compliance verification.
- Enabling connection to a variety of mobile devices for content collaboration.
- High-definition, widescreen video formats (including larger and less expensive flat panel display technologies.)

While the District maintains a policy for regularly refreshing and replacing obsolete computing hardware and software, there does not appear to be a similarly comprehensive program for maintaining classroom AV technology. Some components of classroom AV systems (e.g. projectors) appear to be kept relatively current. But other components appear to be kept in service until their failure point. It is recommended that the District develop a lifecycle planning and funding strategy that considers refresh and replacement of all instructional technology components, including audiovisual systems.

### **Other Learning Technologies**

Currently, there are a number of technology trends that are influencing learning outside the classroom. Technologies to consider include mobile communications (e.g. smart phones, iPads), collaboration tools (e.g. HD videoconferencing, WebEx), and social networking (e.g. Facebook, Twitter). The common denominator in all of these shows a trend of linking together people with a common interest/need to share information and create “community”. This is opening opportunities for learning to take place anywhere, anytime.

The District should anticipate that this trend will increase the expectation among the student population that electronic access to the District’s information resources will be available to them anywhere, anytime. At the “core”, these increased demands on the District’s technology infrastructure are the drivers behind the need to improve the redundancy and resilience of the District’s networking and communications infrastructure (as noted previously).

At the “edge” these trends may lead in time to a significant shift away from the need for library space to dedicated computing workstations and more toward collaborative work space. Increased need for study rooms, collaboration areas, reconfigurable furnishings and accessibility to electrical power will be important considerations in future renovations to these spaces.

### **Planning and Management Resources**

The District is strongly advised to develop a set of documented standards to ensure that technology requirements are appropriately and consistently integrated within the facilities planning and building design process for all District building projects. By developing facility standards for technology, the District will establish the necessary minimum performance requirements and guidelines for installation of technology related facility components to ensure an open-architecture infrastructure that will support current and future needs.

At a minimum, District-wide technology infrastructure standards should include criteria for the following areas:

#### **Data Centers**

- Power services & distribution
- Backup/emergency power
- Electrical grounding
- HVAC
- Security
- Cable management

#### **Outside Plant**

- Pathways & containment
- Access
- Security
- Service provider connections

### **Building Structured Cabling**

- Communications equipment room planning & space requirements
- Power services & distribution
- Electrical grounding
- Cable management
- HVAC
- Security
- OSP connection
- Vertical (riser) & horizontal cabling

#### **Audiovisual**

- Standard AV room layouts (e.g. classrooms, labs, lecture halls, conference rooms, etc.)
- Room planning and design criteria (e.g. sightlines, acoustics, equipment housing, etc.)
- Technology requirements checklist

### **General Campus Technologies**

- Master clock
- Voice paging
- Emergency notification
- Digital signage
- Integrated building controls

### **Technology and Sustainability**

Sustainable campus operations, as well as “green” building design and construction, are high priorities for the District. The following provides some insights and recommendations with regard to maximizing the energy efficiency and minimizing the environmental impact of the technology systems deployed throughout the District.

#### **Technology Energy Efficiency**

Computers, office equipment, AV systems, and other technology hardware account for a substantial proportion of a commercial or institutional building’s total energy consumption. While LEED and other “green building” design and construction guidelines address efficiency of major building systems such as lighting and HVAC, they do not address power consumed by devices plugged into building power receptacles (i.e. plug loads). In large buildings and across campuses, the plug loads associated with unmanaged technology hardware can represent an enormous waste of energy and money.

Some technology hardware manufacturers have started to recognize this and are responding with products that provide improved energy efficiency and energy management features. ENERGY STAR, for example, is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that maintains a rating and certification system for energy efficient products and practices. This includes technology products such as computing equipment, monitors, document imaging equipment and some audiovisual products. Utilization of ENERGY STAR rated products, when properly configured and managed, can result in notable gains in operating efficiency.

Other, more simplified, power management systems are also available to enable shut-down of hardware after prolonged periods of non-use or unoccupied building space. While these systems may be useful in limited application, they are not recommended for most commercial or institutional technology installations due to problems that may result from unmanaged power shut-down of the devices.

### **Technology Operations & Maintenance**

While, initial planning, design and deployment of energy efficient technology systems can reduce negative environmental impact, the greatest potential benefit will be gained from the efficiency of ongoing management and operations. Operations and maintenance policies and practices should consider the following with regard to minimizing environmental impact of the District's technology systems and operations:

- Power efficiency and power management capabilities of new/replacement equipment purchases.
- Awareness of the manufacturing and distribution practices of technology suppliers.
- Ongoing optimization of device and system energy management settings.
- Electronic waste disposal and recycling practices.
- Implementation of enterprise resource management for new/replacement technology systems.
- Coordination/integration of IT/AV technology systems management with other campus/building management systems.

### **“Smart” Building Technology**

Power and controls for building systems such as air conditioning, lighting, office equipment, audiovisual systems, and window shading are typically managed on a building-by-building basis without any intercommunication between these systems. Recent advancements in building control technology are opening new opportunities to gain greater efficiencies through integrated, enterprise-wide energy and resource management.

For example, an integrated “smart” building management system might be configured to monitor exterior daylighting to adjust window shading and interior lighting levels, while also correlating those settings with room occupancy sensors and room scheduling software. Audiovisual systems may also be automatically powered on or off, while the room air conditioning system raises or lowers room temperature, all based on anticipated occupancy and usage. And feedback from continuous monitoring and measurement can be used to make periodic improvements and adjustments as the needs of the organization and use of the facilities evolve.

This type of building intelligence requires a significant commitment and up-front investment. But, for organizations with a significant inventory of physical plant and extensive technology deployment, there is significant potential for a positive return on that investment – financially as well as environmentally. However, before committing to deployment of such a comprehensive and costly resource management system, the organization must thoroughly assess the associated costs and long-term benefits that are unique to their organization. Further, in order to realize the efficiencies and a return on the investment, deployment of this type of building “intelligence” must be planned and implemented as an enterprise initiative that is executed consistently and with adequate commitment of human and capital resources.

#### **Sustainable Technology Environments Program (STEP)**

The LEED rating system addresses many aspects of a sustainable building plan. However, LEED is primarily focused on building siting, water management, and energy consumption related to core building systems like HVAC and lighting. Building technologies such as IT networks, AV systems, security technologies, and building automation, and the plug loads associated with these technologies, are not specifically addressed within LEED.

A rating system has recently been created that does address sustainable design and implementation of low voltage technologies. This new system is called the Sustainable Technology Environments Program or STEP. The STEP rating system has recently been adopted by several technology trade associations, including InfoComm International, BICSI, TIA, and Comp-TIA.

STEP defines a sustainable technology design and integration process, as well as operational best practices to enhance building performance while minimizing technology related energy consumption, e-waste, and carbon emissions that can be offset through the use of advanced technologies. STEP delineates a phase-by-phase approach to earning STEP credits from program phase through operations phase and identifies the responsible parties for each credit. Like LEED, STEP is a point system with ascending levels of certification based on the number of points earned.

Nearly 30 percent of the points within STEP are related to integrated building technologies or IBT. The IBT credits outline the coordination efforts among the design team and required deliverables to achieve a high-performance, “smart” building. When the technology silos of disparate building systems are integrated, operational efficiencies can be realized and energy monitoring and management tools can be deployed to offer a continuous commissioning process allowing the building to intelligently adapt to usage changes over time.

We recommend that the District review the STEP program outlined at [www.thestepfoundation.org](http://www.thestepfoundation.org) for more information and consider engaging the STEP process on all future projects.



MIRACOSTA COMMUNITY COLLEGE DISTRICT

