Developing a SITING Application for Electric Transmission Facilities

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International Association for Impact Assessment
Vancouver, April 27, 2004

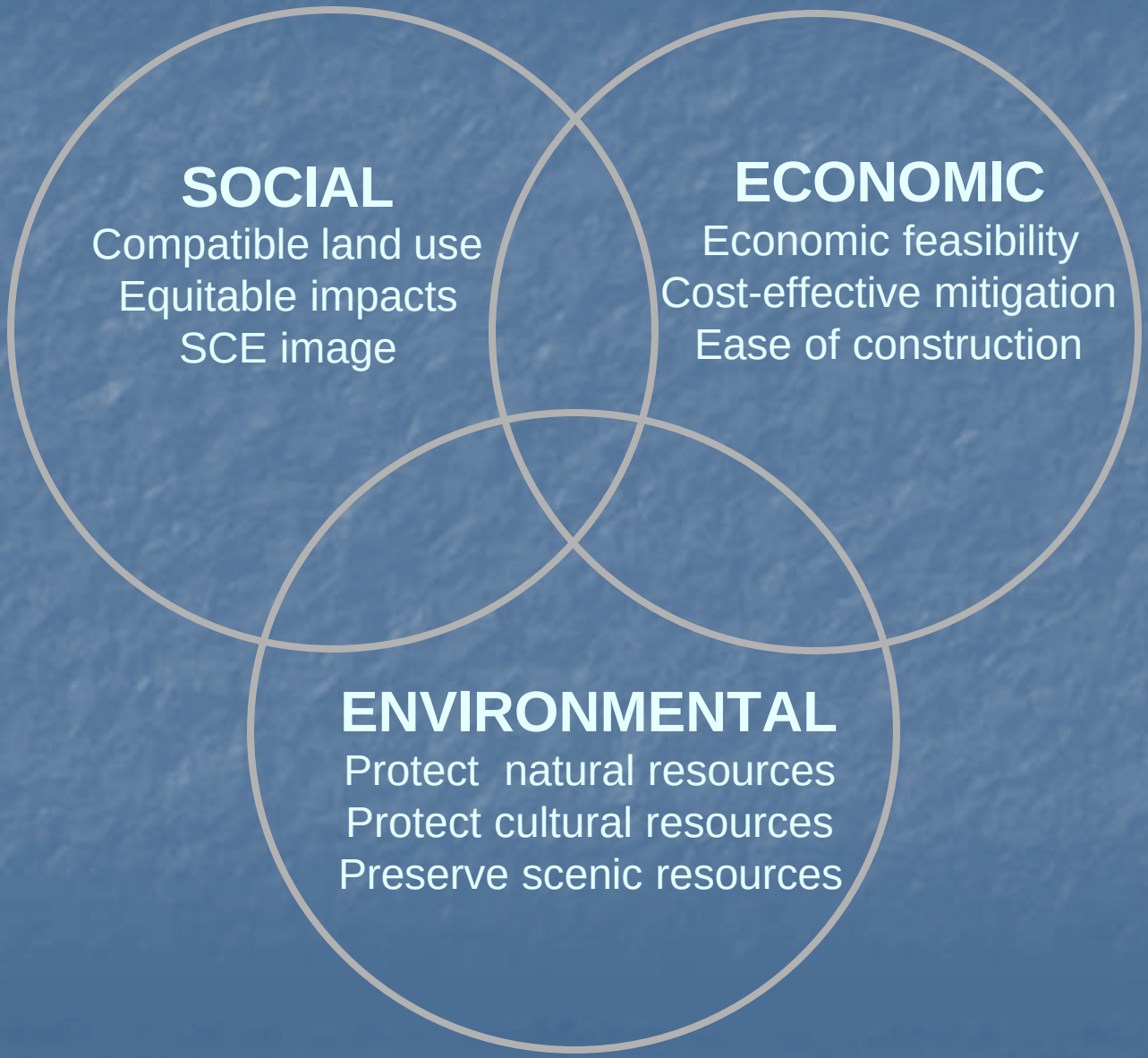
Overview

- Project siting and licensing challenges
- Organizational challenges and issues in the development of the SITING application
- Capabilities of the SITING Application
- Overview of the SITING application
  - Evaluates and plans lines/substations
  - Results in website format
- Lessons learned and next steps

Project Siting and Licensing Challenges

- Technical complexity
- Environmental diversity
- Stakeholder uncertainties
- Schedule and budget constraints
- Decision making at three levels
  - Inter-disciplinary
  - Inter-departmental
  - SCE-external
- Decision making over time

Triple-Bottom-Line Measurement



Evolution of Electrical Project Decisions

Decisions	Decision Criteria	Analysis	Review & Approval	Alternatives & Criteria
Site/route identification	Constraints (Pass/Fail)	Expert opinion Binary models Low cost data	Internal to project team	Large # of alternatives Few criteria
Site evaluation to select the top few sites/routes	Categorical	Expert opinion Classification models Some high quality data	Project team proxies for stakeholders & regulators	Restricted # of alternatives Multiple account criteria
Final evaluation to select and document the “best” site/route	Continuous	Detailed technical models Preliminary design studies Detailed surveys	Input from public & regulators	Few alternatives Detailed technical & multiple account criteria

Organizational Challenges

- Project teams are multi-disciplinary
- Teams require shared data and display, capture of the project history, shared understanding of results
- Decisions involve values in addition to technical information
- Different stakeholders hold different values
- Disclosure involves sensitivities (data, stakeholder values, results)
- Decisions have to be defensible to external stakeholders
- Effective and efficient communication is required

SITING Development Challenges

- A vision without the necessary technology early in the project (~1993)
- A model without test cases (~1992-2002)
- A project without much funding after 1997

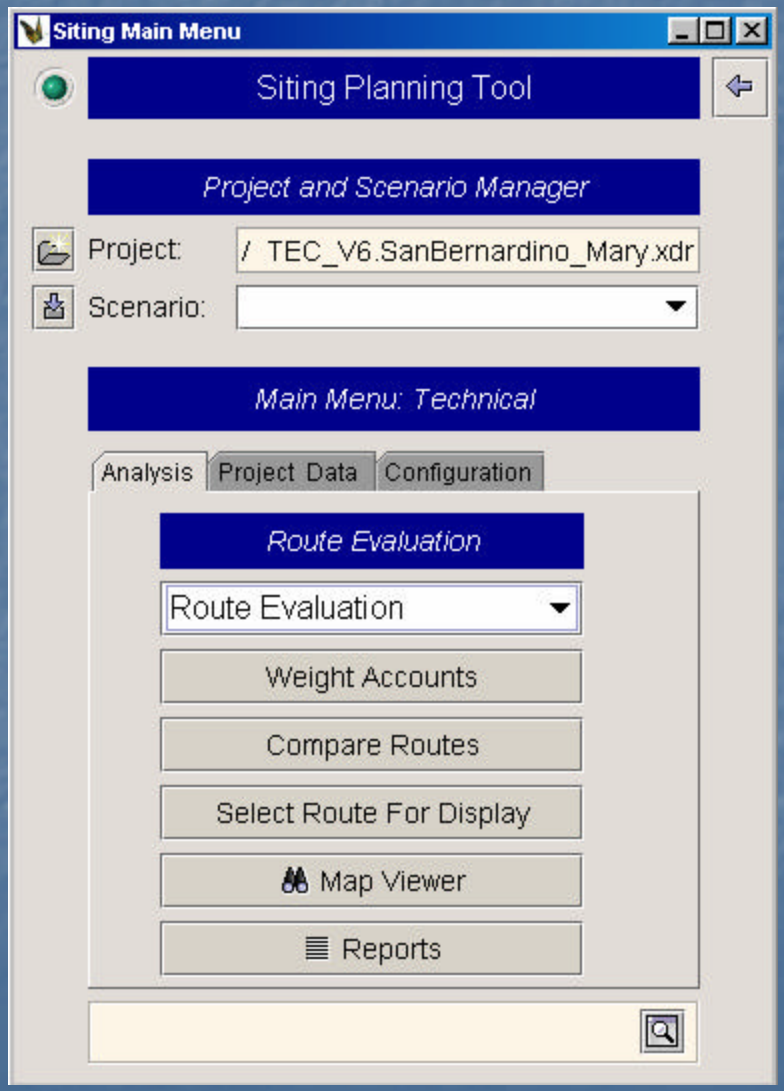
SITING Application Characteristics

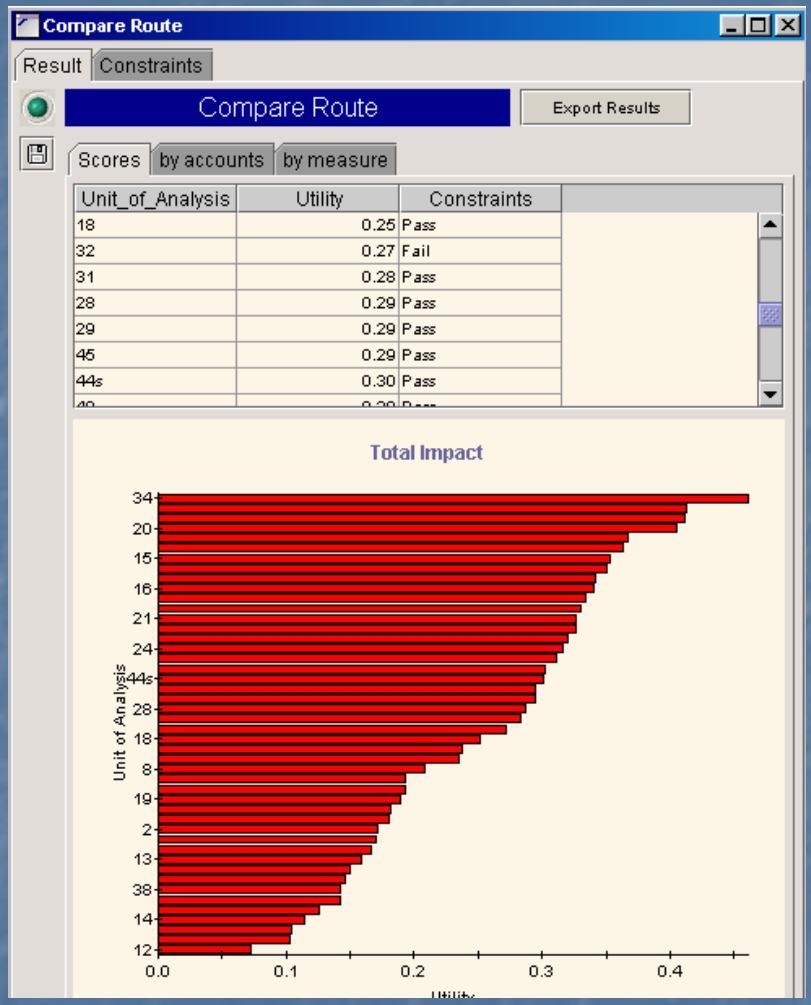
- Data
  - GIS layers, secondary data, consultant data, qualitative data, computer generated data
- Display
  - Website format to represent values and display results
- Decisions
  - Decision framework can “roll up” to summary scores and “drill down” to explain results
- Documentation
  - Stores alternative scenarios, makes assumptions explicit, supports non-linear problem solving and consensus building

Overall Design of the SITING Technical Model

- Evaluation of given sites/routes
- Identification of optimal sites/routes

Site Evaluation in SITING

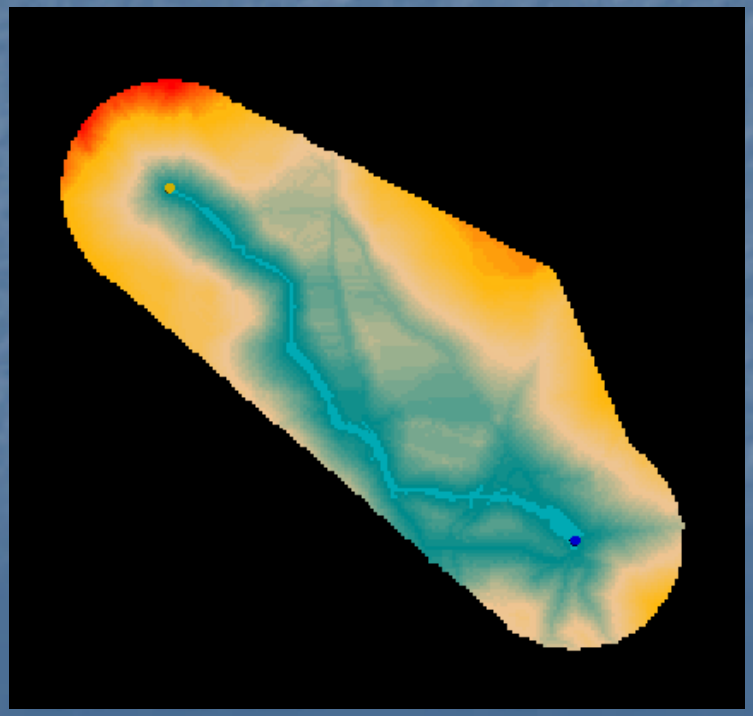


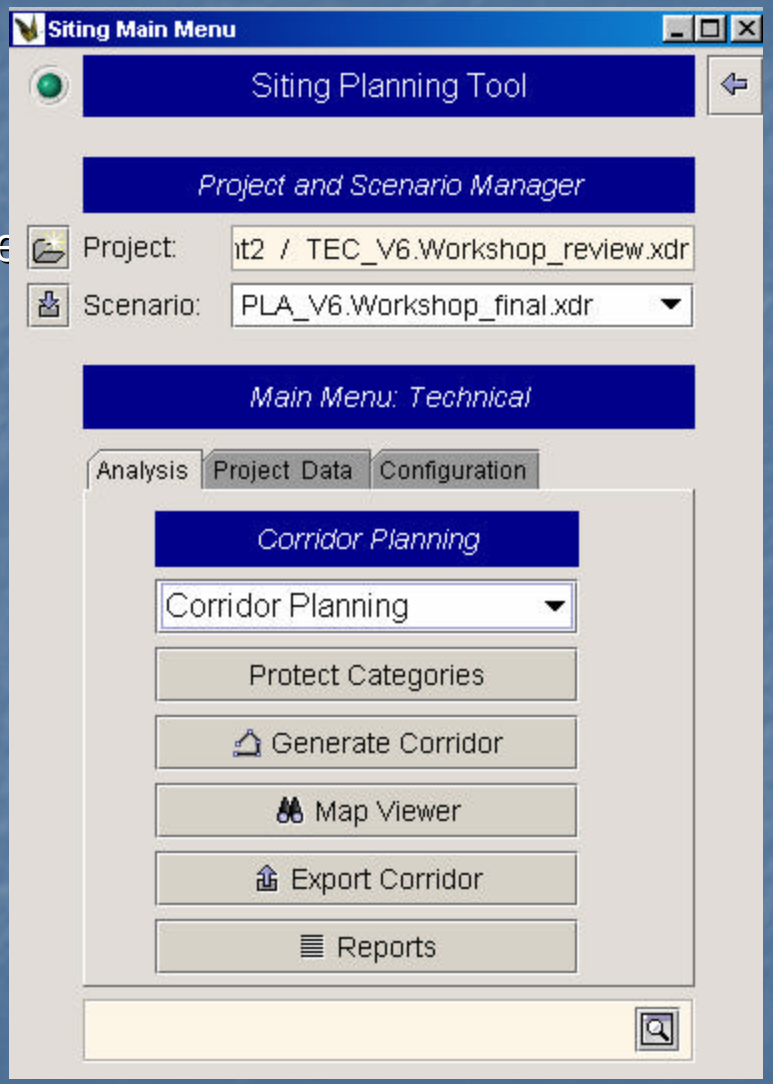


Alternatives are evaluated based on Stakeholder values and given a "Score" based on overall impact.

Corridor Identification in SITING

Based on selected Summary Maps, Corridor Planning will select the route with the least cumulative impacts to the environment. The corridor can be digitized and evaluated against other alternatives.





Overall Design of the Website(s)

- Different websites for different scenarios
- Classification of decision factors
  (the navigation bar)
- Comparison of sites (bar graphs)
  - Performance
  - Impact
- Input data (in pop-up screens)
- Context (maps)

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Executive Summary

Purpose

SCE's Transmission Long Range Plan has identified the need for a new AA bank substation in approximately 2008. This is when we expect to exceed the AA bank transformer capacity of Mira Loma substation. To avoid overload at Mira Loma, a 500/230 kV substation will be required somewhere between Etiwanda and San Bernardino substations.

Site Evaluation

Twenty five potential sites for the new 500 kV substation are evaluated here using SCE's SITING computer modeling solution. The SITING tool converts technical indicators into a suitability score between 0 (least impact/best choice) and 1 (greatest impact/worst choice). Performance scores are calculated for each indicator and combined into an overall suitability score for each site. Sites can also be compared based on the raw technical indicators themselves. The Appendix lists all the indicators in detail.

Click for more information ⓘ

Options

Set in numerical terms, the protection priority for the strategic components. For each component, choose a protection priority factor.

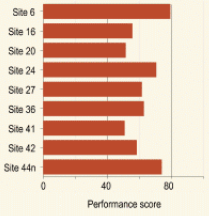
Select your weighting for Environmental: High ⓘ
Select your weighting for Community: High ⓘ
Select your weighting for Cost: High ⓘ
Select your weighting for Engineering: High ⓘ

Save your selections

Site Performance ⓘ

This chart shows the performance for each sites

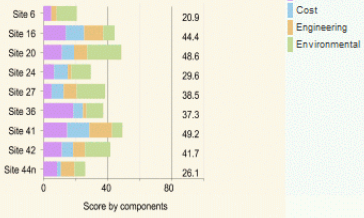
A long bar indicates good performance



Site Comparison ⓘ

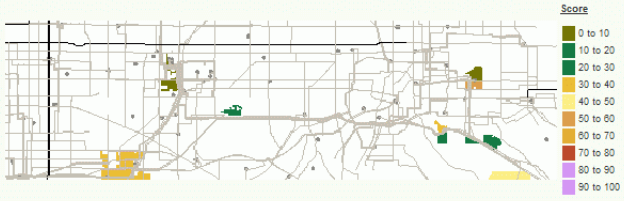
This chart shows strategic components impacts for each site.

A long bar indicates high impact.

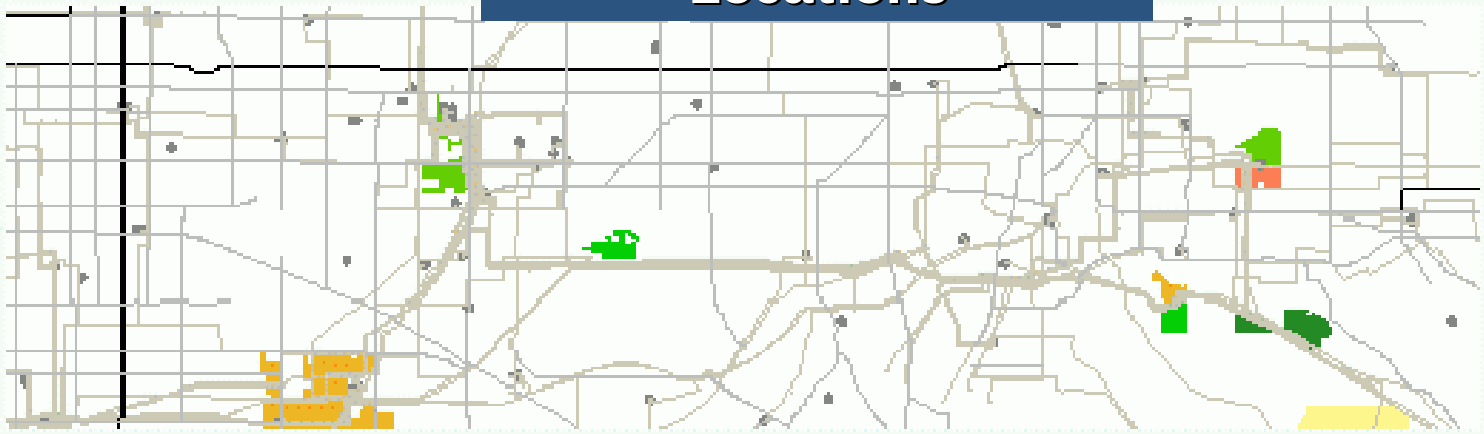


Site Comparison Map ⓘ

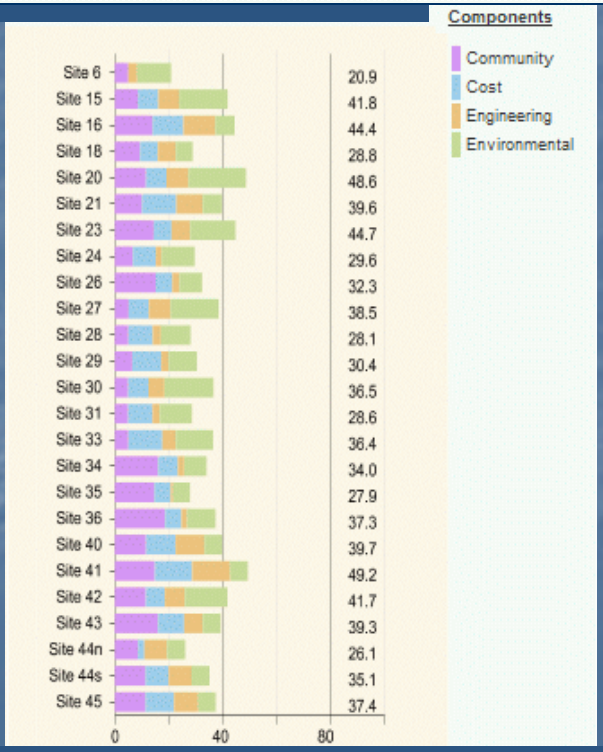
This map shows all of the site locations and site scores for this project. The site with the lowest score is the best site, as the low score indicates the least impedence or obstacles for building on that site.



Locations



Performance Score



Score by Components

Equal weights (original settings)

Options

Set in numerical terms, the protection priority for the strategic components. For each component, choose a protection priority factor.

Select your weighting for Environmental: High

Select your weighting for Community: High

Select your weighting for Cost: High

Select your weighting for Engineering: High

None
Low
LowMedium
Medium
High

Sa s

Site Performance

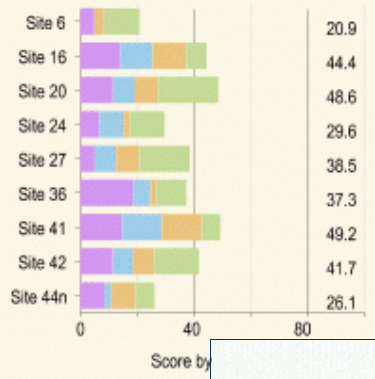
This chart shows the performance for each sites

A long bar indicates good performance

Site Comparison

This chart shows strategic components impacts for each site.

A long bar indicates high impact.



Components

Community

Cost

Engineering

Environmental

Unequal weights (new settings)

Options

Set in numerical terms, the protection priority for the strategic components. For each component, choose a protection priority factor.

Select your weighting for Environmental: High

Select your weighting for Community: Low

Select your weighting for Cost: Medium

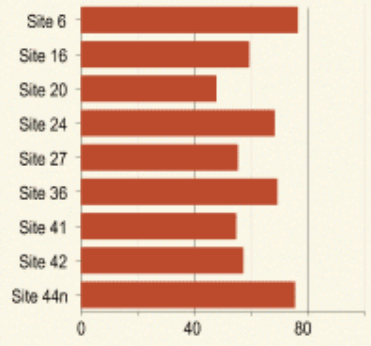
Select your weighting for Engineering: Medium

Save your selections

Site Performance

This chart shows the performance for each sites

A long bar indicates good performance



Site Comparison

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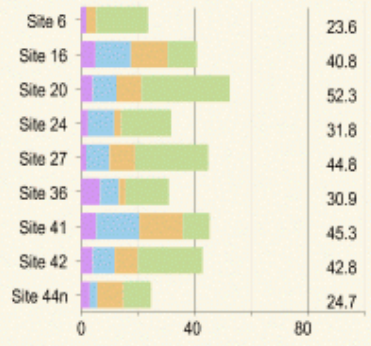
A long bar indicates hig



Environmental Summary

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Environmental

SCE believes that a sound environment makes the regions where we operate better places in which to live and work. Accordingly, the company is committed to preserving and protecting that environment for the benefit of its neighbors, customers, employees and future generations. This commitment encompasses full compliance with environmental laws, integration of sound environmental practices into SCE's operations, and a pledge of environmental stewardship in the communities where the company does business.

Environmental Scores

The total score for the Environmental component is made up of several indicators that relate to Environmental issues. The Environmental Scores show the detail on what indicators are part of the Environmental component and how each site scored.

Click for more information

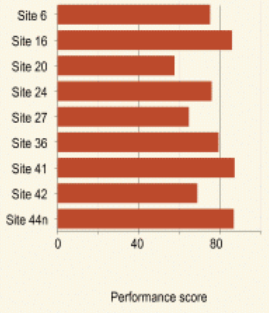
Options

There are no selections required on this page.

Site Performance

Overall performance of each site.

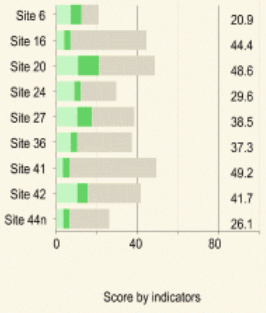
Higher the bar is, better the performance



Site Comparison

Impact on each site by Environmental indicator, as shown in the legend.

Higher the bar is, higher is the impact



Environmental Indicators

Environmental Cont.

Biological

Within the Environmental decision factor, let us look at the Biological indicators.

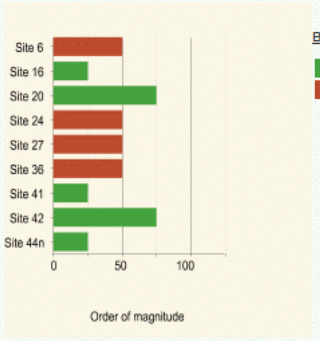
Click for more information

Options

There are no selections required on this page.

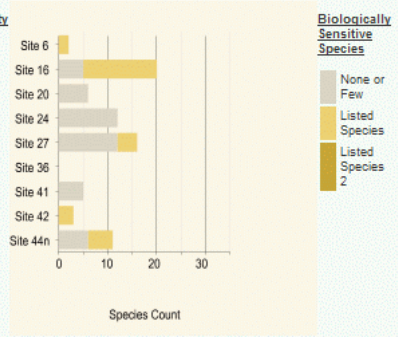
Biologically Sensitive Species

Biologically sensitive species in each site



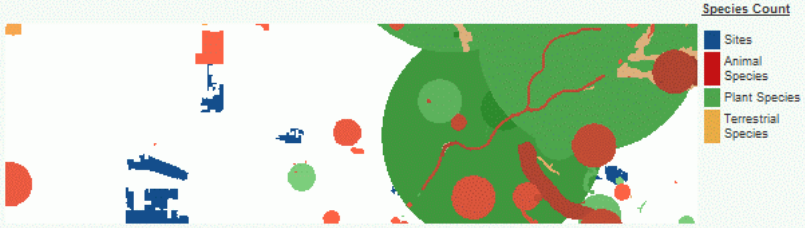
Species Bio Diversity

Number of different plant and animal species counted in each site.



Bio Diversity Map

The locations of the selected sites and the known levels of biological diversity in that area are shown in the map below.



Cutural Resources

Within the Environmental decision factor, let us look at the indicators for Cultural Resources.

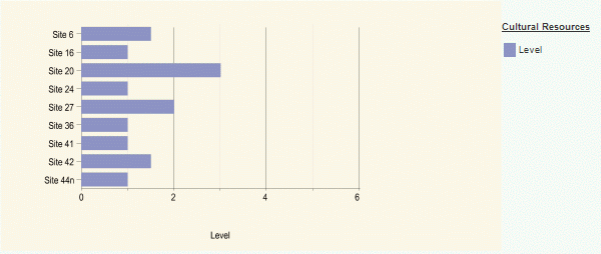
Click for more information

Options

There are no selections required on this page.

Cultural Resources

Level of cultural resources in each site.



Others CEQA

Within the Environmental decision factor, Others CEQA indicators are:

- Agricultural resources
- Air Quality
- Hazards and Hazardous materials
- Mineral resources
- Noise
- Popolation and Housing
- Public services
- Recreation
- Transportation/Traffic
- Utilities and service systems

Under Construction

Community Summary

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Community

SCE establishes and maintains positive, constructive working relationships on environmental issues with stakeholders including public policymakers, relevant regulatory agencies, various coalitions, and local communities. SCE supports and encourages early and continuous dialogue regarding its transmission and substation projects. The facility siting process supports SCE's policies by soliciting the values of the affected public/stakeholders with respect to siting a proposed facility, involving the affected public/stakeholders in the development and review of alternatives, incorporating public/stakeholder values in the decision process, and keeping the public/stakeholders informed during all phases of the decision process.

Community Scores

The total score for the Community component is made up of several indicators that relate to Community issues. The Community Scores show the detail on what indicators are part of the Community component and how each site scored.

Click for more information

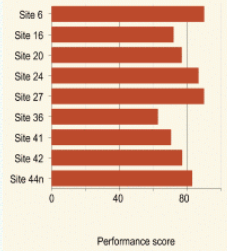
Options

There are no selections required on this page.

Site Performance

Overall performance of each site.

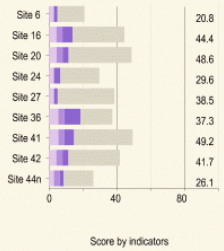
Higher the bar is, better the performance



Site Comparison

Impact on each site by Community indicator, as shown in the legend.

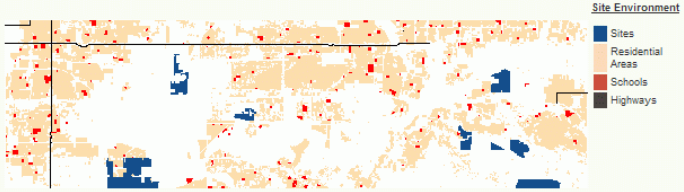
Higher the bar is, higher is the impact



Community Indicators
- Aesthetics
- Political
- Land Use
- Others

Land Use Map

The locations of the selected sites and their relative distance to schools and residential areas are shown in the map below.



Community Cont.

Aesthetics

Within the Community decision factor, let us look at the indicators for Aesthetics.

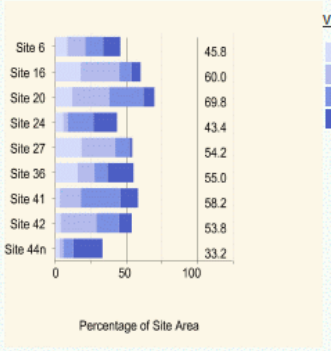
Click for more information

Options

There are no selections required on this page.

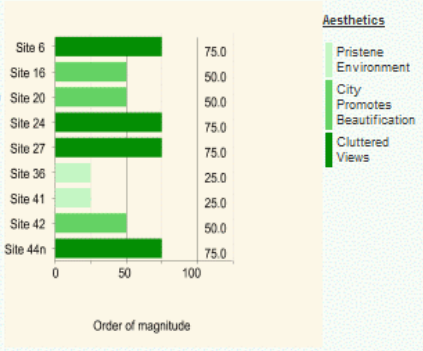
Site Visibility

This chart shows tpercentage of study area that can see each site.



Site Aesthetics

This chart shows the aesthetics value for each site.



Political

Within the Community decision factor, let us look at the Political indicator.

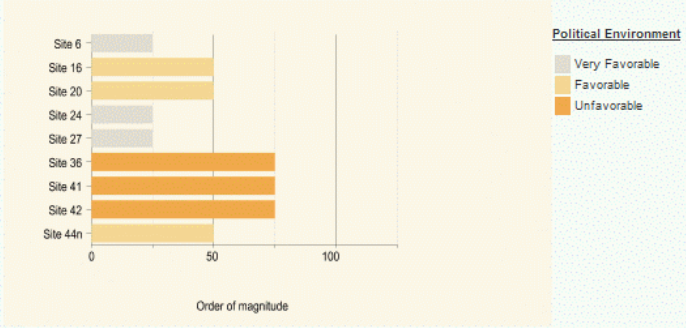
Click for more information

Options

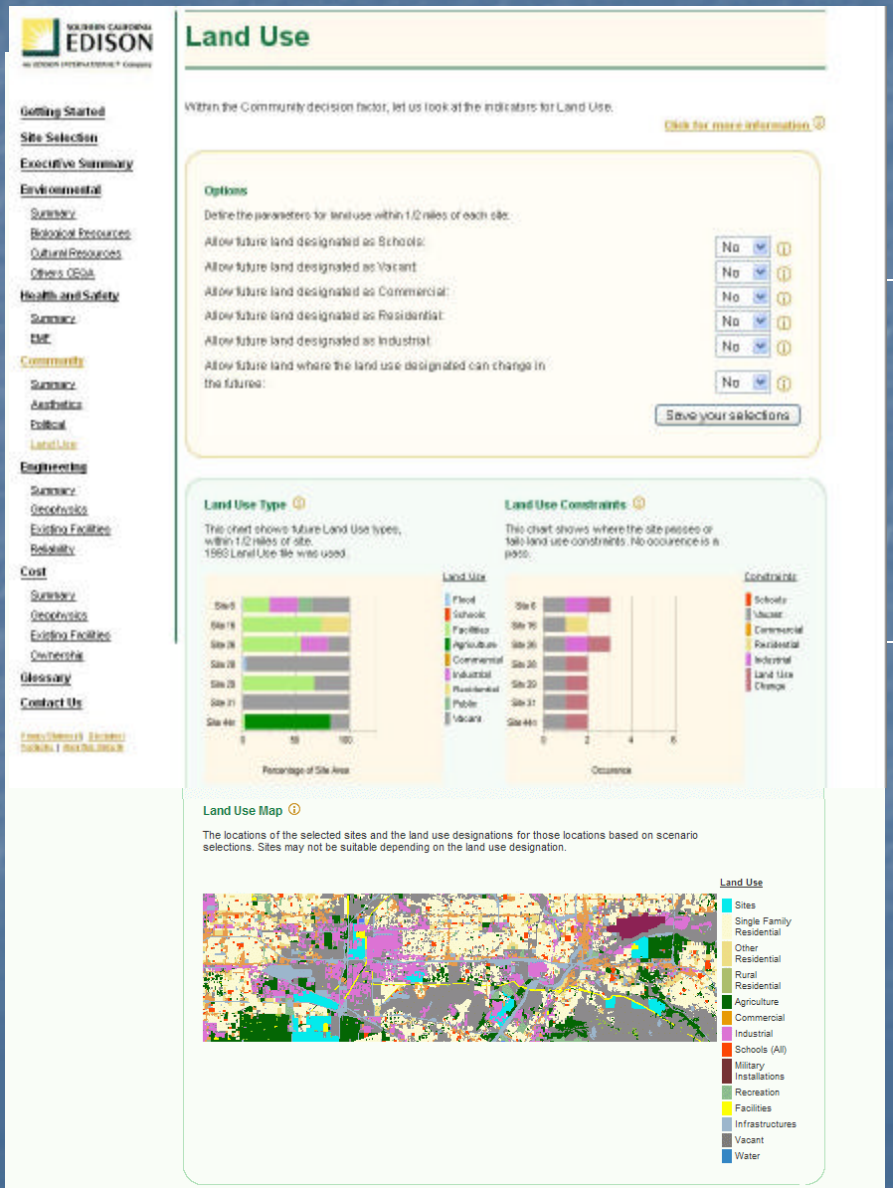
There are no selections required on this page.

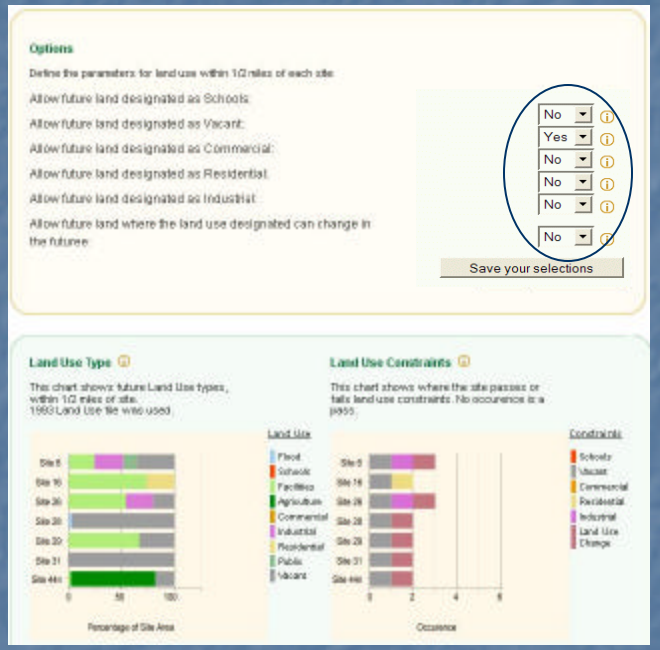
Political

This chart shows the political climate in the juridiction where the site is located



Defining Land Use Options





Engineering Summary

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Engineering

The total score for the Engineering component is made up of several indicators that relate to Engineering issues.

Engineering Scores

The Engineering Scores show the detail on what indicators are part of the Engineering component and how each site scored.

Click for more information

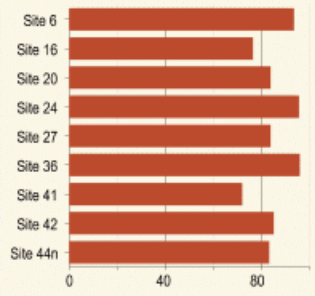
Options

There are no selections required on this page.

Site Performance

Overall performance of each site.

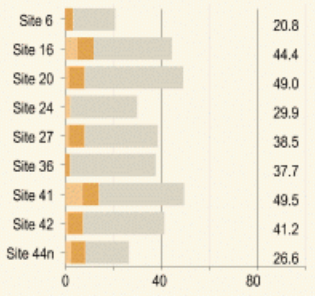
Higher the bar is, better the performance



Site Comparison

Impact on each site by Engineering indicator, as shown in the legend.

Higher the bar is, higher is the impact



Engineering Indicators

- Geophysics
- Existing Facilities
- Others

Engineering

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  - Aesthetics
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- Engineering
  - Summary
  - Geophysics
  - Existing Facilities
  - Reliability
- Cost
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  - Geophysics
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Geophysics

Within the Engineering decision factor, let us look at the indicators that determine Risk.

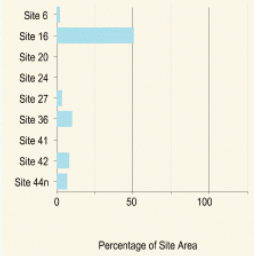
Click for more informat

Options

There are no selections required on this page.

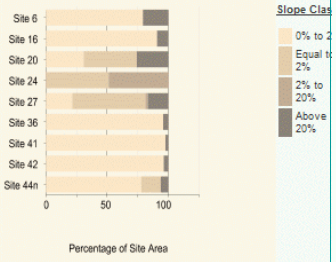
Flood Areas

Percentage of site area prone to flooding for each site.



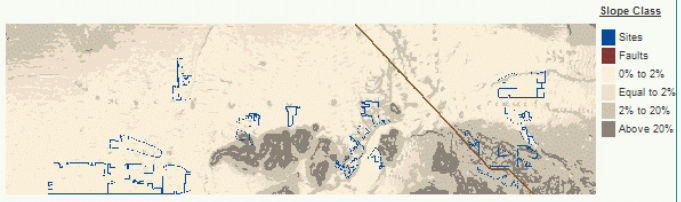
Slopes

Percentage of site area with steep slopes.



Slopes and Faults Map

The locations of the selected sites and the percent of ground slope in the area are shown in the map below.



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Existing Facilities

Within the Engineering decision factor, let us look at the indicators for the Existing Facilities.

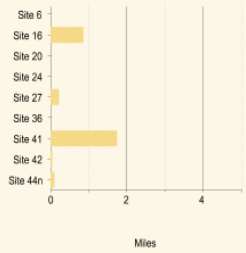
Click for more information

Options

There are no selections required on this page.

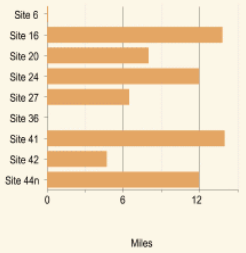
Distance to Existing 220KV Lines

Distance from each site the the nearest existing 220KV line.



Distance to Existing 500KV Lines

Distance from each site the the nearest existing 500KV line.



Distance to 220 KV & 500 KV Lines Map

The locations of the selected sites and their proximity to 220KV lines and 500KV lines are shown in the map below.

Lessons Learned

- More GIS data would be better
- But only necessary and sufficient data for the decision are necessary
- R&D and utility planning may operate on different timetables
- It is hard for team members to make assumptions explicit and to structure the decision criteria they use
- Facility projects are complicated to represent in a model
- Everyone wants to be heard and their input considered
- Everyone wants access to the same information and to understand the results

Next Steps and Opportunities

- SCE project test
  - Power line and/or substation test
- State-wide project test
  - Power line application with a CA utility steering group
- Additional SCE application
  - Long-range planning of the grid
- State-wide application
  - Long-range planning of transmission corridors and/or renewable development

Thank you