Introduction to Sustainable Sites
Sustainable Sites

• Key concepts
• LEED Goals
• Strategies
• Measures
• Standards
Sustainable Sites

• Key concepts
  – Transportation
  – Site Selection
  – Site Design and Management
  – Stormwater Management
• Locate, plan, and design to reduce impacts and increase sustainability in four key areas:
  – Reduce transportation demand
  – Minimize stormwater impacts
  – Protect habitat
  – Reuse or restore sites
Sustainable Sites - Construction

- Protect ecosystems
- Minimize construction impacts
Sustainable Sites - Operations

- Sustain and maintain over time:
  - On-site stormwater management systems
  - On-site habitat systems
Sustainable Sites

- Location and Planning
- Site Design and Management
MANAGE ON-SITE WATER: Limit stormwater runoff, control and harvest rainwater.

PROTECT OPEN HABITAT: Limit site disturbance, protect open space and plan for protected areas.

USE PUBLIC TRANSPORTATION: Provide easy access to mass transit.

ENCOURAGE CONNECTIVITY: Provide pedestrian access to services and public space.

LIMIT LIGHT POLLUTION: Use dark sky compliant fixtures, reduce lighting power and limit duration of operation.

REDUCE HEAT ISLAND EFFECT: Use cool roof technologies and/or install green roofs. Use pervious paving and provide shade where possible.

PRACTICE GOOD SITE STEWARDSHIP: Use erosion and sediment control strategies during construction activities.

DEVELOP AN APPROPRIATE SITE: Choose a site in high density areas with access to existing infrastructure.

PROMOTE ALTERNATE TRANSPORTATION: Encourage car/vanpools, offer preferred parking for fuel efficient vehicles and plan for bicycle accessibility.
Sustainable Sites

• Location and Planning
  – Foundation for the sustainability of individual buildings or an entire neighborhood

SAN FRANCISCO'S TRANSAMERICA BUILDING GETS LEED GOLD
Sustainable Sites

• Location and Planning
  – Choose sites that have access to:
    • Transportation
    • Housing
    • Employment
    • Services
  – Take advantage of existing infrastructure
  – Develop an appropriate site
  – Use Public Transportation
Sustainable Sites

• Location and Planning Goals
  – Select sustainable location
  – Avoid and protect natural areas
  – Encourage density and diversity
  – Restore natural areas
Sustainable Sites

• Location and Planning Strategies
  – Protect Natural Areas
  – Avoid sensitive sites (wetlands) and floodplains
  – Limited or no building on steep slopes
  – Provide transportation options
    • Car sharing and van pooling
    • Walking and bike paths
Sustainable Sites

• Location and Planning Strategies
  – Dense and diverse sites
  – Compact development
Sustainable Sites

• Site Design and Management
  – Protect and restore natural habitat and ecosystems
  – Reduce building impacts
  – Improve performance over time
Sustainable Sites

• Site Design and Management Goals
  – Reduce Light Pollution
  – Reduce Heat-Island Effect
  – Manage On-Site Water
  – Select Previously Developed Sites
  – Protect Human Health
  – Preserve Habitat and Wetlands
  – Reduce Environmental Impacts
Sustainable Sites

• Site Design and Management Strategies
  – Protect Water Quality and aquatic ecosystems
    • Manage Stormwater
    • USE BMPs
    • Prevent Runoff
Sustainable Sites

• Site Design and Management Strategies
  – Reduce Heat island
    • Shade Trees
    • Cool Roofs
    • Green Roofs
    • Living Walls
    • Reflective Paving
Sustainable Sites

- Site Design and Management Strategies
  - Reduce Light Pollution
    - Reduce the escape of interior light
    - Control exterior lighting
Assessments and Measurements

• Evaluate the performance of site-related strategies

• Metrics and Measures
  – Quantitative
  – Qualitative
Assessments and Measurements

• Brownfield
  – A brownfield is real property whose use may be complicated by the presence or possible presence of a hazardous substance, pollutant, or contaminant.
Assessments and Measurements

• Community Connectivity
  – The amount of connection between a site and the surrounding community
  – Measured by proximity of site to:
    • Homes
    • Schools
    • Parks
    • Stores
    • Restaurants
    • Medical facilities
    • Other service and amenities
Assessments and Measurements

- Development Density

  Total square footage of all buildings within a particular area

  Measured in square feet per acre or units per acre
Assessments and Measurements

• Diversity of uses or housing types
  – The number or types of spaces or housing types per acre.
  – A neighborhood that includes a diversity of uses –
    • Offices
    • Homes
    • Schools
    • Parks
    • Stores
  – Encourages walking. Residents and visitors are less dependent on personal vehicles
  – Allows households of different types, sizes, ages, and incomes to live in the same neighborhood
Assessments and Measurements

• Floodplain
  – Land that is likely to be flooded by a storm of a given size (e.g., a 100-year storm)
• Floor-area ratio
  – The relationship between the total building floor area and the allowable land area the building can cover.
  – In green building, the object is to build up rather than out
  – Smaller building footprint – less site disruption
Assessments and Measurements

- **Footcandle**
  - A measure of the amount of illumination falling on a surface.
  - One Footcandle = One Lumen per square foot

- **Site Lighting**
  - Minimize footcandles
    - Reduces light pollution
    - Protects dark skies and nocturnal animals
Assessments and Measurements

• Imperviousness
  – The resistance of a material to penetration by a liquid.
  – Prevent rainwater from infiltrating into the ground
    • Increases runoff
    • Reduces groundwater recharge
    • Degrades surface water quality
Assessments and Measurements

• Pervious Paving – Alternative Surfaces
• Native plants
  – Occur naturally in a given location and ecosystem
• Adaptive plants
  – Not native to a location but grow reliable with minimal attention from humans
• Benefits
  – Reduce amount of water required for irrigation
  – Reduce the need for pesticides or fertilizers
  – Provide for local wildlife
Assessments and Measurements

• Prime Farmland
  – Previously undeveloped land with soil suitable for cultivation.
Assessments and Measurements

- Site Disturbance
  - The amount of a site that is disturbed by construction activity.

- Previously undeveloped sites
  - Limiting the amount and boundary of site disturbance can protect surrounding habitat
Assessments and Measurements

• Solar Reflectance Index (SRI)
  – A measure of how well a material rejects solar heat
  – Index: 0 (least reflective) to 100 (most reflective)

Cooler Materials
Help to prevent the urban thermal heat island effect

Minimizes demand for cooling of nearby buildings
Assessments and Measurements

• Street grid density
  – An indicator of neighborhood density, calculated as the number of centerline miles per square mile.

• Centerline miles - Length of a road down its center

• High street grid density and narrow, interconnected streets:
  – Good
  – More likely to be pedestrian friendly
Assessments and Measurements

- Transportation demand management
  - The process of reducing peak-period vehicle trips

- Vehicle miles traveled (vmt)
  - A measure of transportation demand that estimates the travel miles associated with a project.
  - Most often for single-passenger cars
Sustainable Sites

• Referenced Standard
  – **ASHRAE / IESNA Standard 90.1** Exterior Lighting Standard
    • Exterior Lighting
    • Photocells
    • Timers