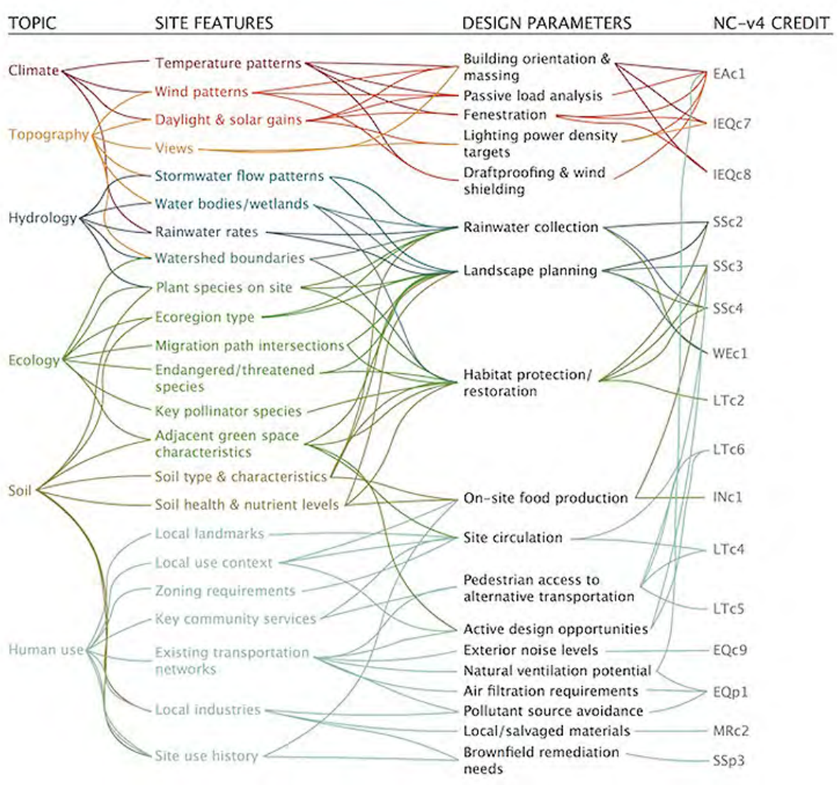
Site Assessment



Purpose of the Site Assessment

A site assessment evaluates environmental features that the design of a sustainable site and building should take into consideration. It identifies assets, such as favorable climate conditions, good solar access, and healthy plant populations, as well as liabilities, such as unhealthy soils, blighted structures, pollution sources, steep slopes, and extreme climate patterns.

Performing a site assessment is part of an integrative design process that incorporates a site's ecological and historical contexts. A site assessment informs good design decisions, such as locating community gardens in areas with fertile soils, placing outdoor gathering spaces near large trees or desirable water features, orienting buildings to take advantage of prevailing winds and solar access, and optimizing the location of rainwater management features.

A well-developed assessment conducted before or during the conceptual design phase may reduce project costs and risks, promote occupants' health, and honor a site's unique characteristics.

Understanding a site's topography, climate, soil types, water availability, and ambient air quality is important because such features can significantly influence a project's design and its ultimate performance.

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Design Phase Activities

Topography

- Include the site survey data on the site plan. Utilize existing GIS land data.
- Detail contours and significant features such as rock outcroppings, unusually steep terrain and the direction of overland flow regions influencing the project design.
- Include man-made structures.
- Utilize site survey data to identify areas of potential slope stability risk.

Hydrology

- Identify surface waters, buffers, flood zones and other hydrological features that would impact the direction of water flow, infiltration and beneficial use as it passes through a site.
- Include existing water management infrastructure that supports collection and reuse.
- Include this information on the site assessment worksheet.
- Estimate the water storage capacity of the site using TR-55 guidelines.
- Utilize a water budget assessment to compare peak demand with available supply to direct design decisions.

Soils

- Describe NRCS soils delineation.
- Determine if the site is prime farmland.
- Identify healthy soils and previously disturbed soils.
- Develop a soils management plan that works towards improving poor soils and supports appropriate vegetation.

Vegetation

- Include a basic vegetation survey on the site plan.
- Develop a list of primary vegetation types and identify their location on the site plan. Are there significant plants and trees that need special protection/attention?
- Indicate previously undeveloped sites including unique habit and/or wildlife corridors for endangered or threatened species.
- Detail the location of invasive plants.
- Due to the capacity for vegetation to influence infiltration rates, rainwater management and a wide range of other environmental services, this data must be collected prior to estimating site water storage capacity.

Human Use

- Create a document describing current, future and past human use of the site.
- Identify onsite location and condition of existing and future infrastructure and buildings.
- Detail view corridors that enhance the outdoor experience of building occupants.
- Document any planned infrastructure adjacent to the site.
- Inventory materials that can be reused or recycled.
- Culturally significant information can be included, though it is not required for the assessment.

Human Health Effects

- Evaluate the natural environment of and adjacent to the site.
- Inventory quantitatively the proximity of vulnerable populations that may be susceptible to on-site pollution.
- Locate opportunities for outdoor activities on site or adjacent to the boundary.
- Identify sources or air, noise and water pollution. Utilize climatic data to inform design decisions that can mitigate the exposure of vulnerable populations to toxins.

Climate

- Identify solar exposure, seasonal sun angles, prevailing winds, seasonal temperature ranges, humidity and average monthly precipitation to aid optimized integration of mechanical systems, passive design strategies and regionally appropriate landscaping.
- Utilize the climate assessment.
- Classify pavement and roof surfaces that could contribute to potential heat island effect.

TOC

Topography

Guidance

Include the site survey data on the site plan. Utilize existing GIS land data.

Detail contours and significant features such as rock outcroppings, unusually steep terrain and the direction of overland flow regions influencing the project design.

Include man-made structures.

Utilize site survey data to identify areas of potential slope stability risk.

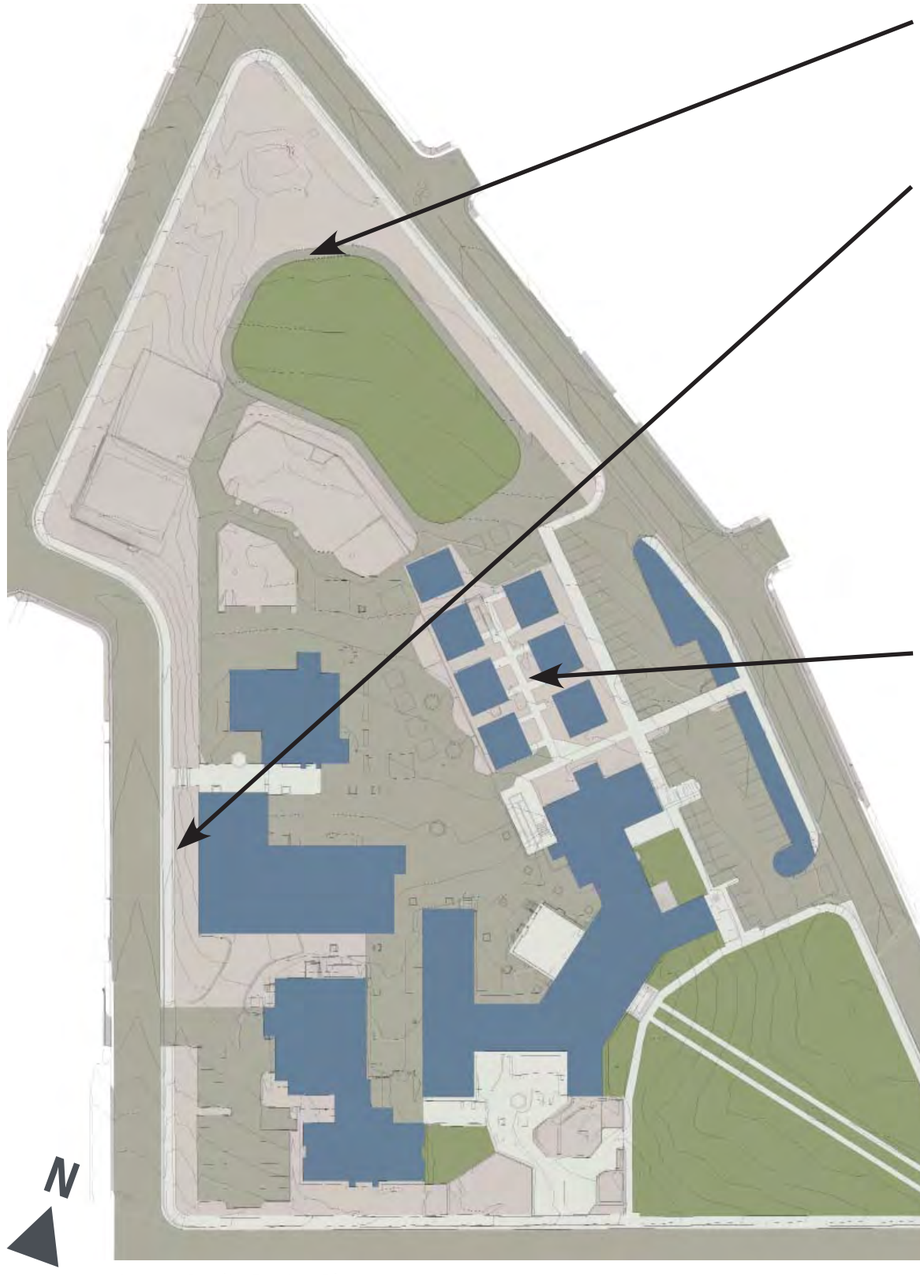

Image Credit: Design Plus

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Hydrology

Significance

Understanding the hydrology of a site is critical to the creation of an effective rainwater management plan.

Vegetated buffer zones filter runoff, slow overland flow and provide erosion control.

The ability to identify flood hazards, proximity to surface water, and natural buffers can influence the design of drainage plans and rainwater collection reuse and strategies.

Performing water assessments can inform landscaping strategies and support water use reduction strategies.

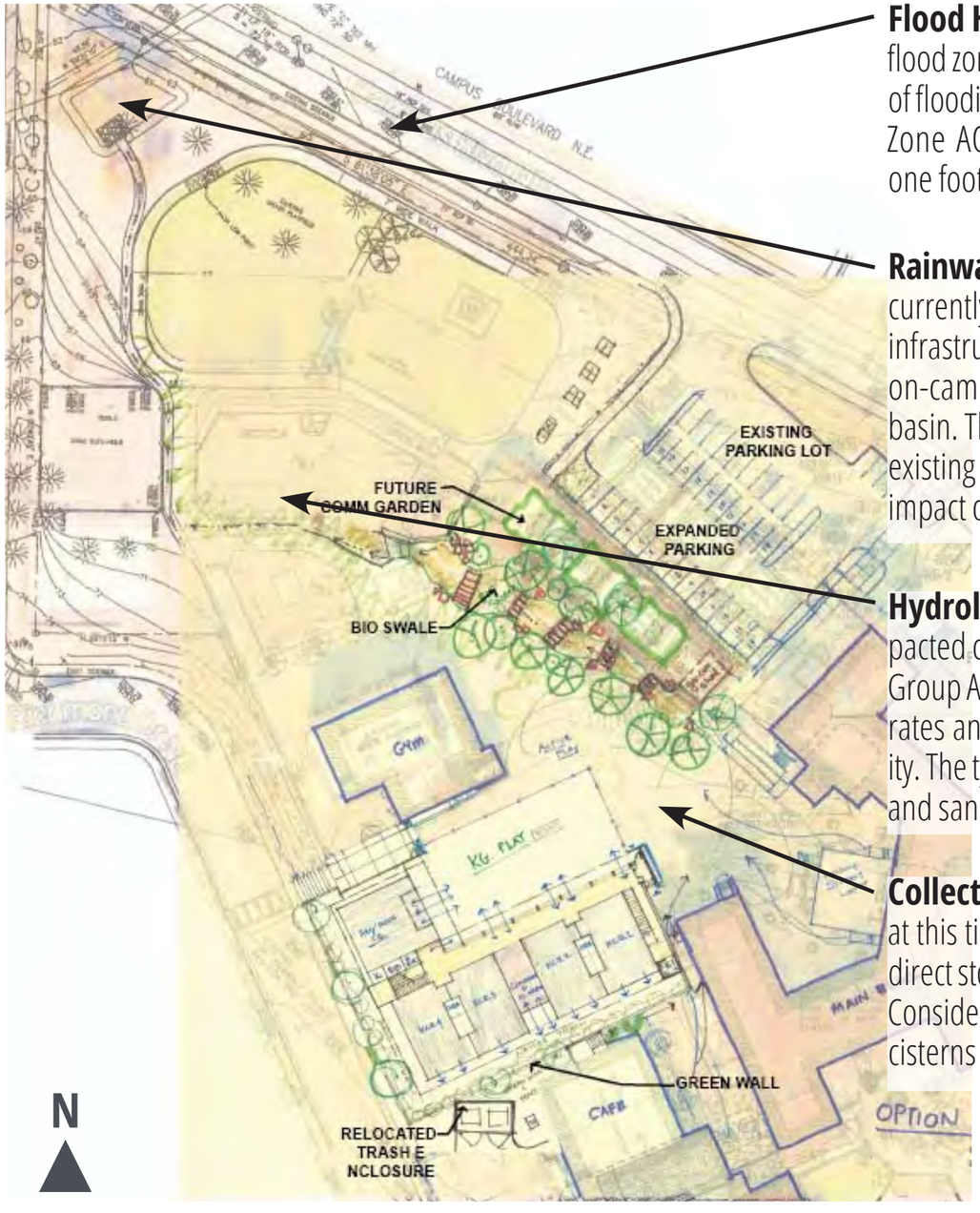

Image Credit: Design Plus

Flood Hazards: This site is located in flood zone X with less than 0.2% chance of flooding; Campus Blvd. is designated Zone AO subject to flood depths of one foot.

Rainwater Infrastructure: The site currently has surface and below grade infrastructure to transport water to an on-campus retention and infiltration basin. The project intent is to maintain existing and implement additional low impact design strategies.

Hydrologic Capacity: The non-compacted condition is expected to be Soil Group A -Well drained, high infiltration rates and limited water storage capacity. The typical profile consists of gravels and sandy loam.

Collection / Reuse: None expected at this time. Consider opportunities to direct stormwater into landscape areas. Consider incorporating water collection cisterns in the project design.

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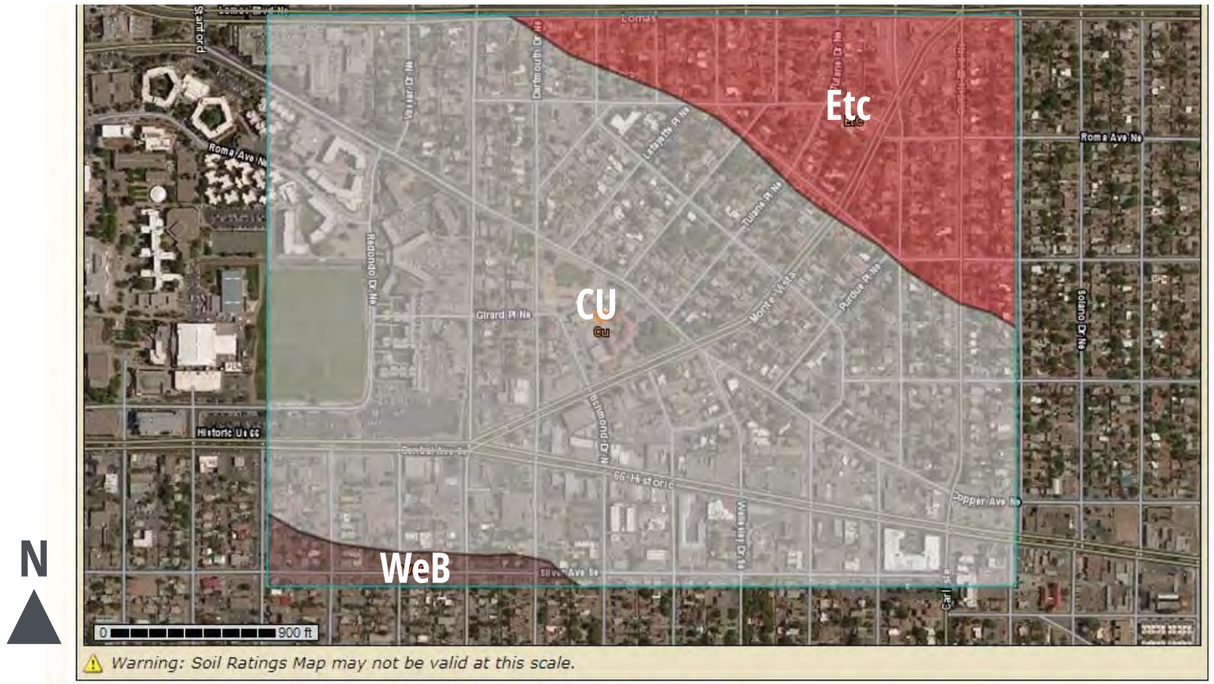
Soil Conditions

Significance

Healthy soils have the capacity to maintain vegetated buffers, and have a greater capacity to support native vegetation, enhance water storage, and restore greenfield infiltration rates.

Healthy soils also have a greater structural capacity to support building foundations and can inform design location due to that integrity.

Previously disturbed soils may need to be rehabilitated using a soils management plan, so that they can support native vegetation and create an optimal environment for water storage and greenfield infiltration rates.



Tables — Ecological Site ID: NRCS Rangeland Site — Summary By Map Unit

Summary by Map Unit — Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico (NM600)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Cu	Cut and fill land		232.0	79.3%
EtC	Embudo-Tijeras complex, 0 to 9 percent slopes	R042XA051NM	52.8	18.0%
WeB	Wink-Embudo complex, 0 to 5 percent slopes	R042XA052NM	7.8	2.7%

NRCS Soils: The site soils are classified as type CUT AND FILL with Embudo-Tijeras to the north and Wink-Embudo complex to the south. Embudo is described as well-drained gravelly loam. Capacity of the most limiting layer to transmit water is High (2-6 in/hr). Refer to attached NRCS report for the project site.

Healthy Soils: The existing land capability classification is 7e, having severe nutrient limitations making it unsuitable for cultivation. It is expected that restoration and amendments will be required as follows: Organic Matter - Amend soils with mature, stable compost material such that top 12 inches (300 mm) of soil (at minimum) contains at least 3% organic matter. Compaction - Ensure bulk densities within 100% of root zone, defined as minimum of 12 inches (300 mm) in depth OR comparable to Embudo, gravel and sandy loam. Infiltration Rate: Achieve infiltration rates comparable to site reference soil type (2-6 inches/hour).

Previously Disturbed Soils: This site is devoid of greenfield. Follow appropriate soil restoration guidelines for soil type.

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Image Credit: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Vegetation

Significance

An “ecological site” is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community

Vegetation can be used to manage rainwater infiltration, contribute to healthy soil production and provide areas for building occupants to enjoy the outdoors.

Maintaining greenfields can protect wildlife corridors, provide habitat for endangered or threatened species and allow native species to thrive.

Black Grama Grassland

Sand Sage Shrubs

Indian Ricegrass

Primary Types: NRCS Ecological Site Description: MLRA-42, SD-1: Sandy. The site is not suitable for agriculture; the climax plant community was likely dominated by black grama grassland, indian ricegrass, galleta grass and low shrubs such as sand sage and snakeweed. Average annual biomass is 650 lbs/ac dry per year with approximately 25% plant coverage. Refer to the ecological site description included herein. Compliance with the vegetation requirement for APS (7%-15% of the school site) also satisfies the LEED requirement for open pace vegetated area.

Threatened Species: Sand sage and snakeweed will out-compete black grama where soils have been disturbed.

Habitat Corridors: None identified.

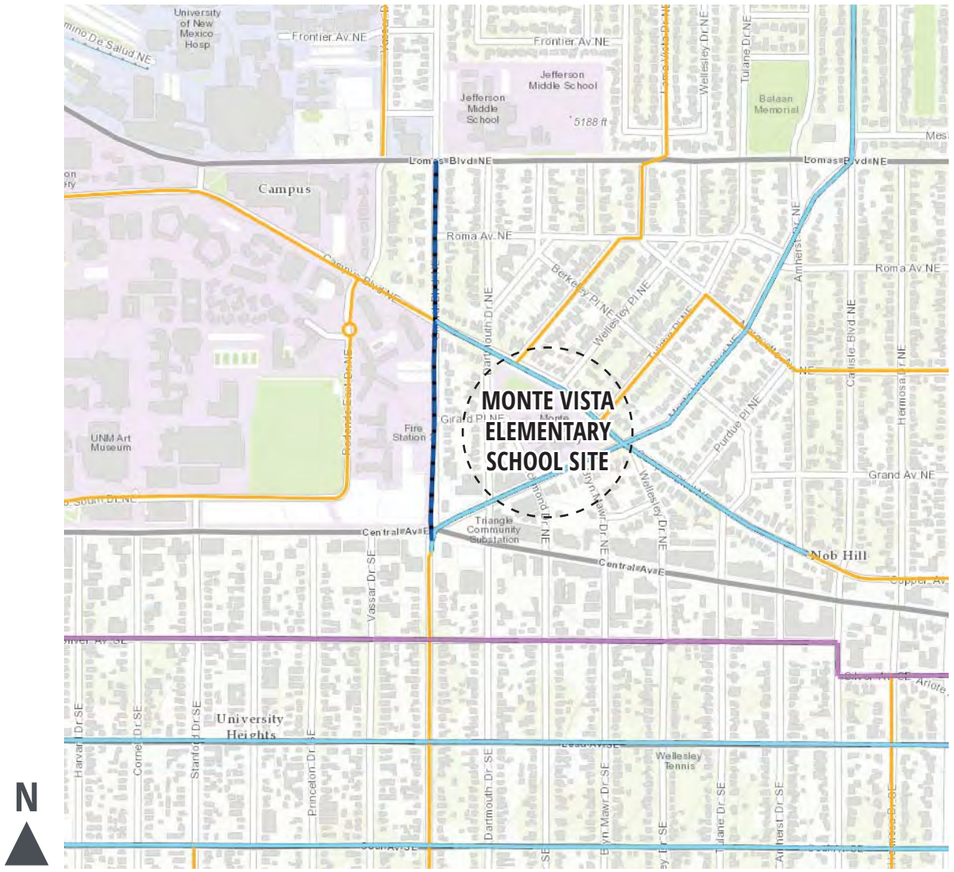
Human Use

Significance

Access to public transportation, bicycle networks and other pedestrian centers contribute to the reduction of greenhouse gases and increased outdoor air quality.

Outdoor space utilization could be encouraged by the establishment of a context for human use and identification of recreational spaces, such as parks and walking paths.

Through the use of existing structure renovation and onsite material recycling, the waste produced due to construction can be reduced, causing less stress on landfills.



Transportation Infrastructure: The urban infrastructure around Monte Vista Elementary School includes a comprehensive bicycle network to support students and family bike commuting. The planned and funded Albuquerque Rapid Transit system will be operational in 2018 providing over 100 weekday trips.

Adjacent Land Use: This new facility will be adjacent to housing and in close proximity to diverse uses, including retail and community services.

Adjacent Wildlife Habitat: None anticipated.

Recycle Potential: Portables to be removed and reused off site.

Reuse Potential: All playground equipment will be reused.

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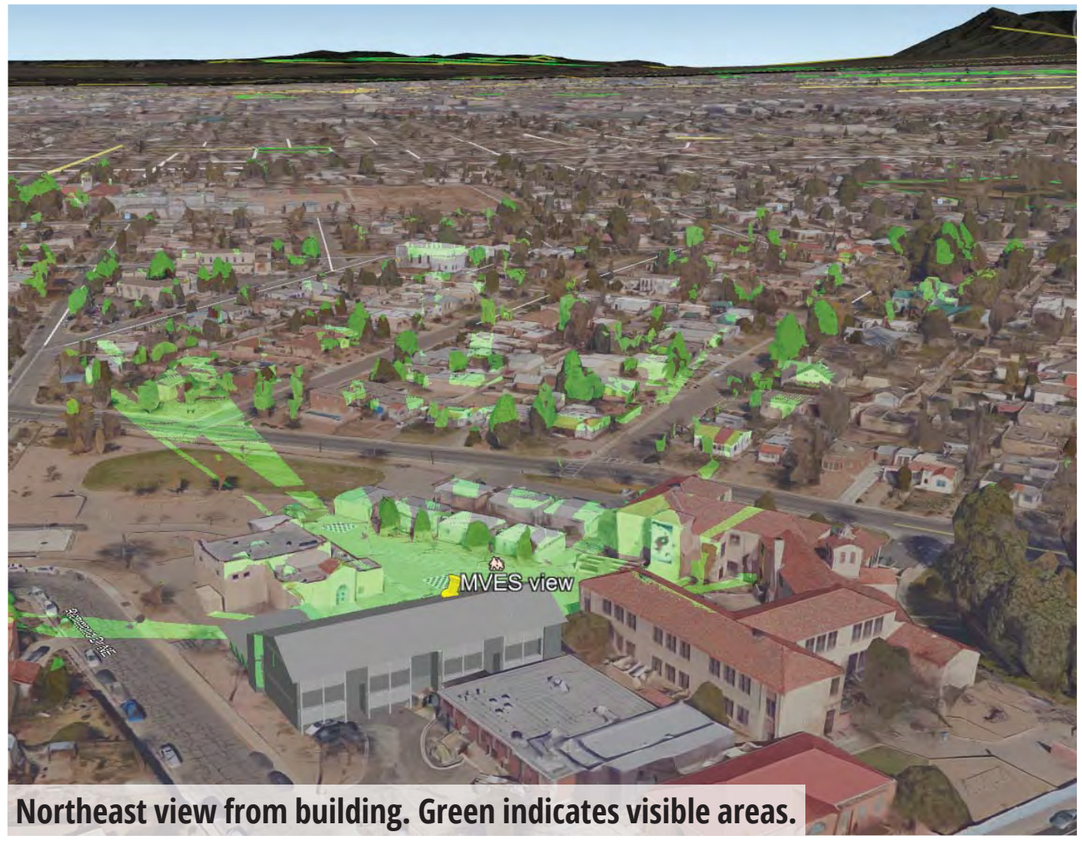
Human Health

Significance

Occupant experience can be enhanced through the preservation of view corridors.

Evaluating site design to enhance aesthetics, promote outdoor activity and social interaction can lead to an increase in overall productivity and wellbeing of site users.

Identifying populations that could be vulnerable to onsite pollution will allow for the mitigation and placement of structures that could be exposed to air, noise and water pollution.



Northeast view from building. Green indicates visible areas.

Aerial Image Credits: Google

View Corridors: When the site build out is complete, students will have quality views of play areas to the north and east. The south side of the building is currently being treated as back of house and will not have access to quality views. In addition view limiting screens are being proposed to mitigate solar glare and heat gain.

Proximity of Vulnerable Populations: Not applicable.

Adjacent Physical Activity Opportunities: The University of New Mexico and MVES playground is adjacent to campus and the playing fields located on campus.

Proximity to Major Sources of Air Pollution: The site is not in proximity to any known sources of air pollution.

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Climate Assessment

SUGGESTED PASSIVE DESIGN STRATEGIES

COOLING SEASON	% of the year effective
Sun Shading on Windows	27%
Natural Ventilation w/ Night Flush	18%

HEATING SEASON	% of the year effective
Internal Heat Gain	23%
Passive Solar Direct Gain	26%

Purpose of the Climate Assessment

The goal of this early design evaluation is to understand building orientation, general glazing and opening locations, and building shape as a first measure towards minimizing Annual Energy Use while supporting occupant comfort and long-term maintenance considerations.

To meet this goal, this report explores the following:

- Passive optimization of thermal comfort conditions related to climate zone
- Daylight optimization measures
- Energy optimization measures

This analysis is based upon preliminary assumptions for the project and will evolve as information becomes available.

Next Steps:

1. Determine predicted energy use with the project-based energy model. Expand evaluation to include HVAC details. Continue to consider wind patterns and integrate optimal daylight design.
2. Identify energy generation potential from on-site systems (photovoltaics).
3. Discuss mechanical system selection and ventilation strategies with the engineering team.
4. Coordinate envelope systems and fenestration with the architect.

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Climate

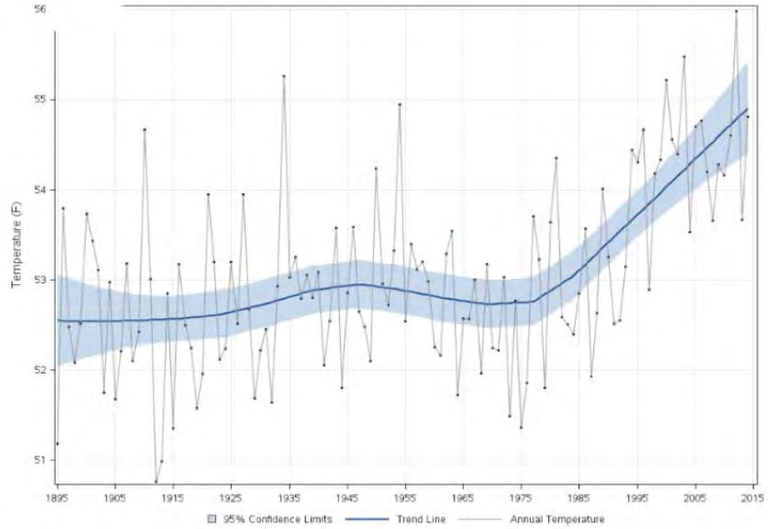
Significance

Understanding average monthly temperature fluctuations can be used to determine the location of vegetation and shaded areas.

For each month of the year this chart shows the diurnal (24 hour) average data for each hour of each month. It shows the average Dry Bulb Temperature (upper red curve) and average Wet Bulb Temperature (lower red curve) against a grey bar that represents the comfort range as defined on the Criteria Screen, all in degrees F (degrees C).

The temperature for every hour of the day throughout the year is shown in light blue underlain behind the average dry bulb temperature curves.

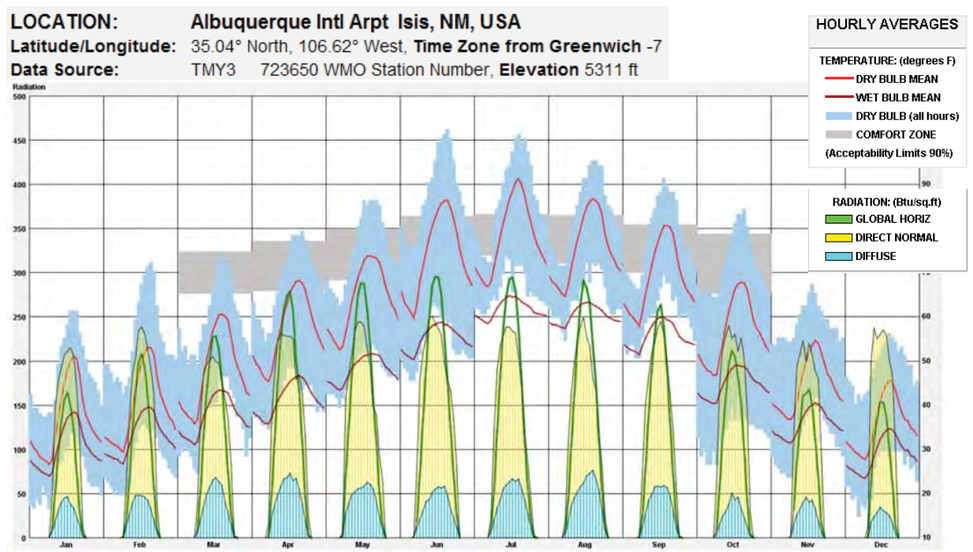
Annual Mean Temperature



Mean Temperature Range Data Acquired from Climate Consultant, Albuquerque TMY3

This chart shows the annual mean temperatures for New Mexico from 1895-2015, and charts the upward trend seen starting around 1975 that continues today.

Seasonal Temperature Range



Diurnal Temperature Range Data Acquired from Climate Consultant, Albuquerque TMY3

This chart shows a range of temperature tracking metrics in relation to the comfort zone (grey region). Albuquerque is in a heating dominated climate as it experiences more hours below the comfort zone than hours above it.

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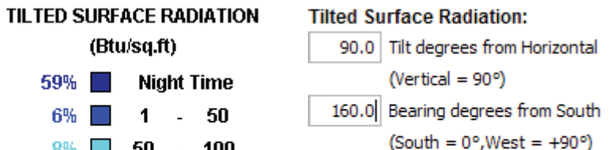
Climate

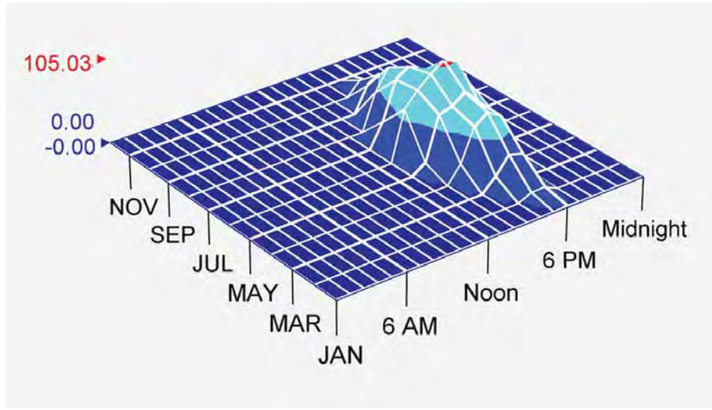
Significance

Incorporating identified seasonal sunlight intensity and solar exposure into the early design phase can increase thermal comfort and reduce energy usage.

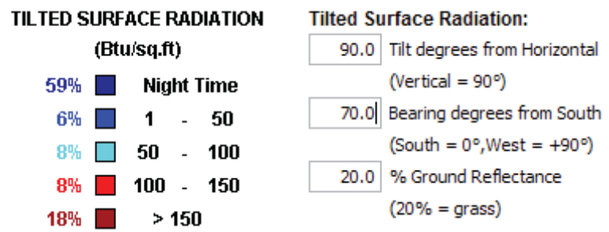
Solar Exposure

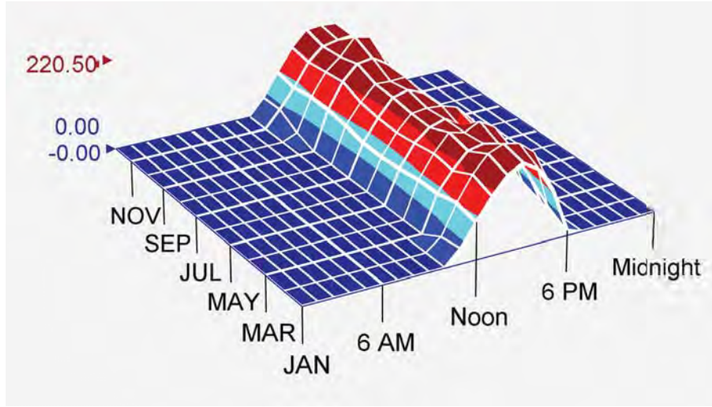
North-Northwest



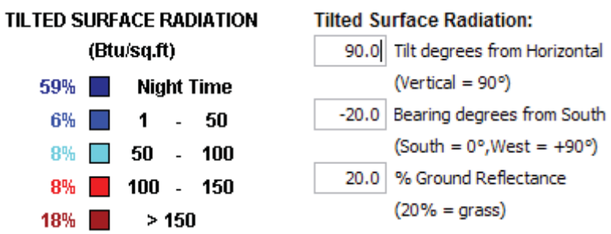


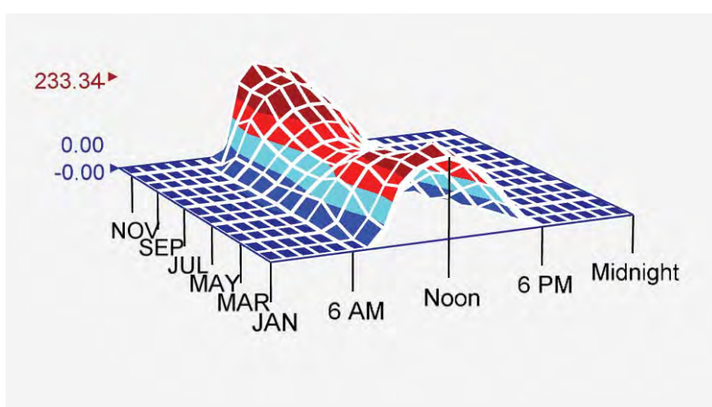
West-Southwest





South-Southeast



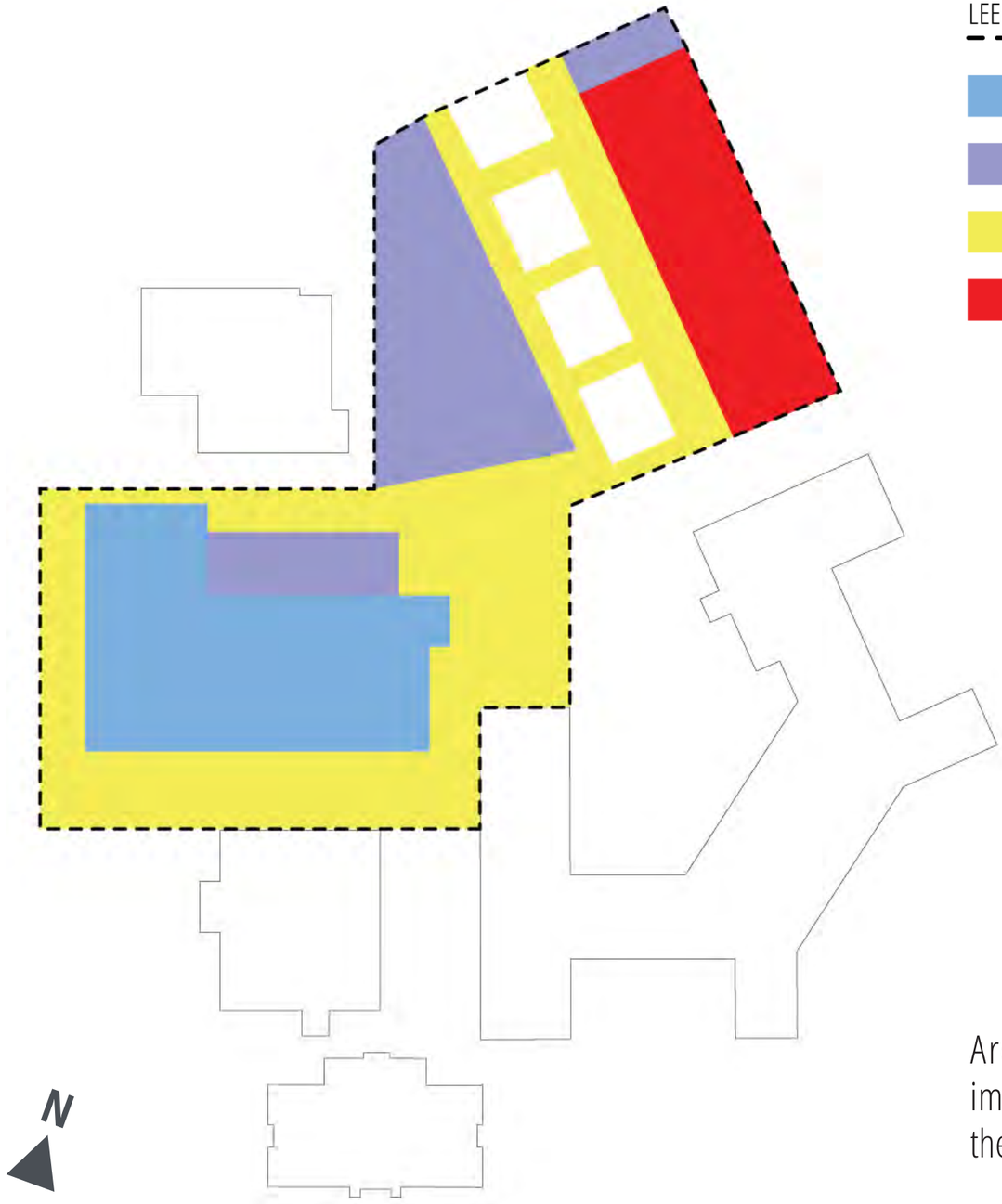


Climate

Significance

Reflectance of surrounding hardscape can dictate the potential for heat island effect and allow the incorporation of early design changes to mitigate it. Include pedestrian-oriented hardscape with elements that accommodate outdoor social and/or physical activities.

Heat Island Potential



Areas of heat island impact are identified on the site plan.

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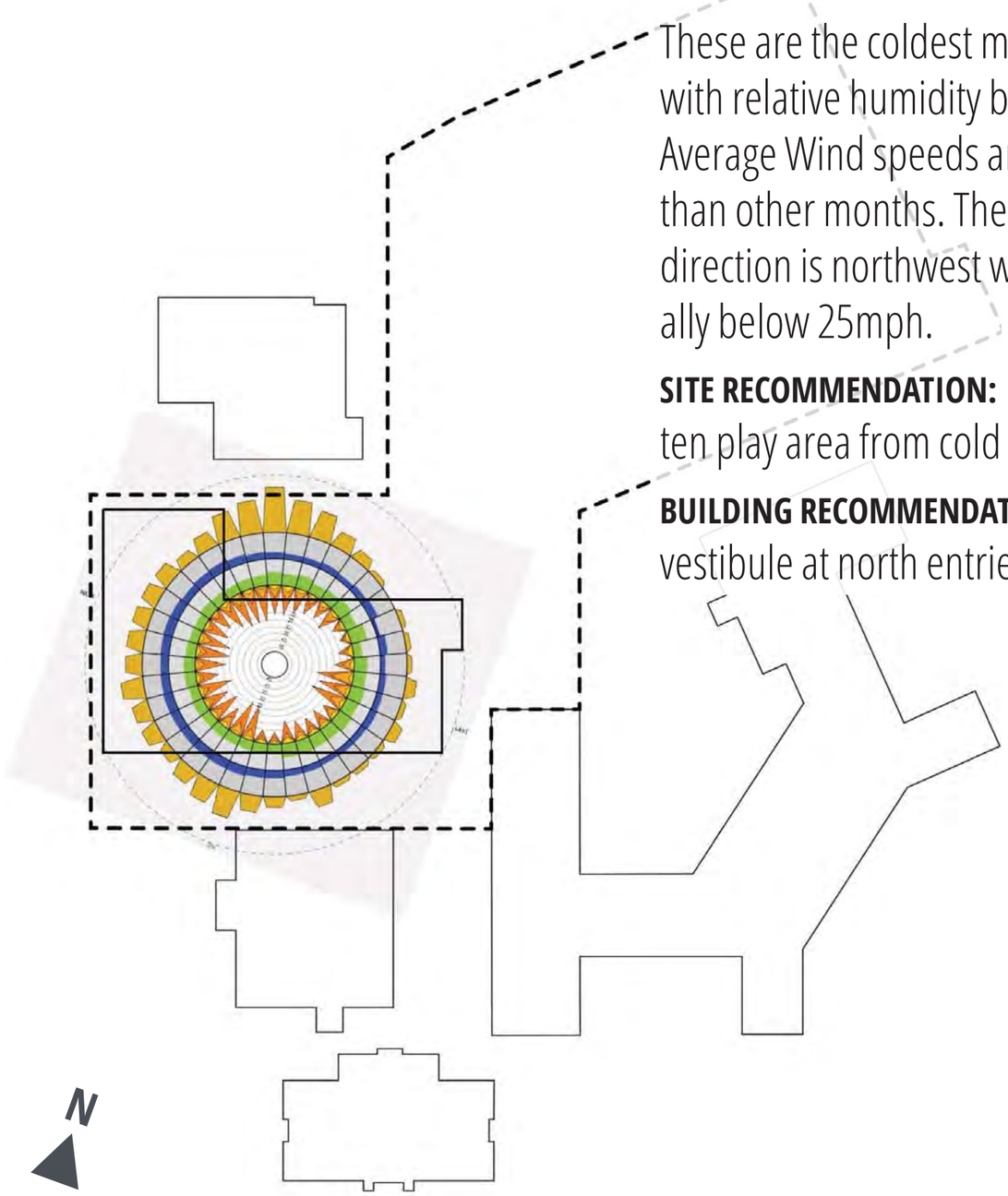
Wind

The Wind Wheel displays for each wind direction the Wind Velocity and Frequency of Occurrence along with concurrent average Dry Bulb Temperature and Relative Humidity.

The outer dashed ring represents 10% of annual daylight hours that wind comes from each direction. On the next ring the height and color of the bars shows the average temperature of the wind coming from that direction (light blue is in the comfort zone, blue is cool or cold, and red is warm or hot). The next smaller ring shows average humidity (light green is comfortable, yellow is dry, and dark green is humid).

The innermost circle shows the wind velocities that come from each direction; the tallest brown triangle is the maximum velocity for that period, medium brown is the average velocity, and the smallest light brown triangle is the minimum velocity.

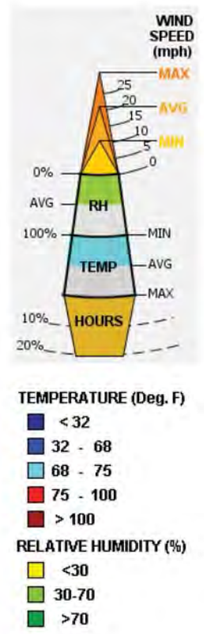


December – February Wind Wheel

These are the coldest months of the year with relative humidity between 30-70%. Average Wind speeds are generally less than other months. The dominant wind direction is northwest with gusts generally below 25mph.

SITE RECOMMENDATION: Protect kindergarten play area from cold winter winds.

BUILDING RECOMMENDATION: Provide vestibule at north entries.



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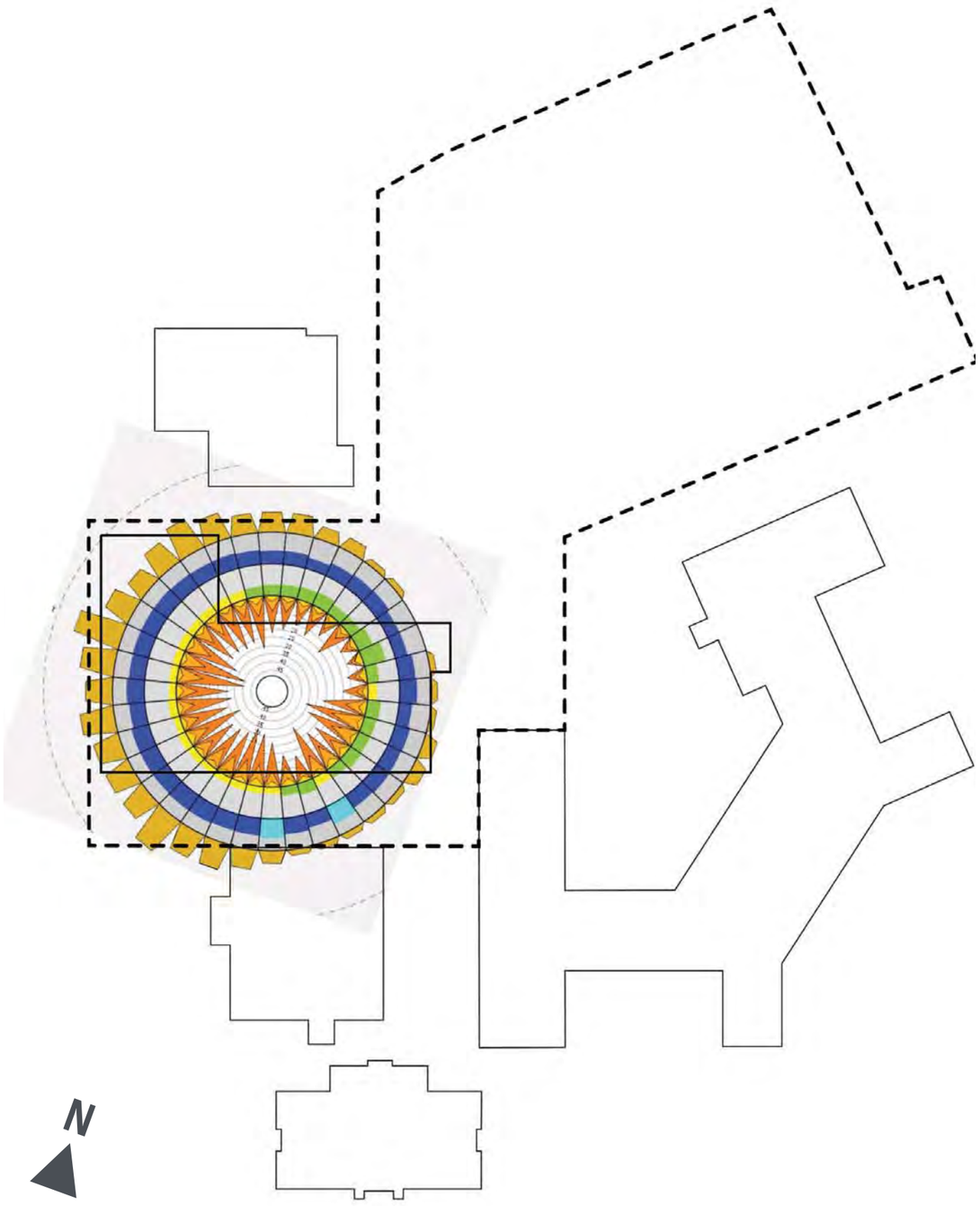
Wind

March – May Wind Wheel

These months are mild with daytime temperatures starting to enter the optImal range for human comfort. Relative humidity ranges from comfortable (30-70%) to dry (less than 30%). These months experience the highest average wind speeds and strongest gusts. The dominant wind direction is west with gusts exceeding 40mph coinciding with periods of lowest humidity during these months.

SITE RECOMMENDATION: Low water use plantings at west side.

BUILDING RECOMMENDATION: Cool temperatures with low humidity present opportunities for natural ventilation during these months; consider higher wind pressure from west.



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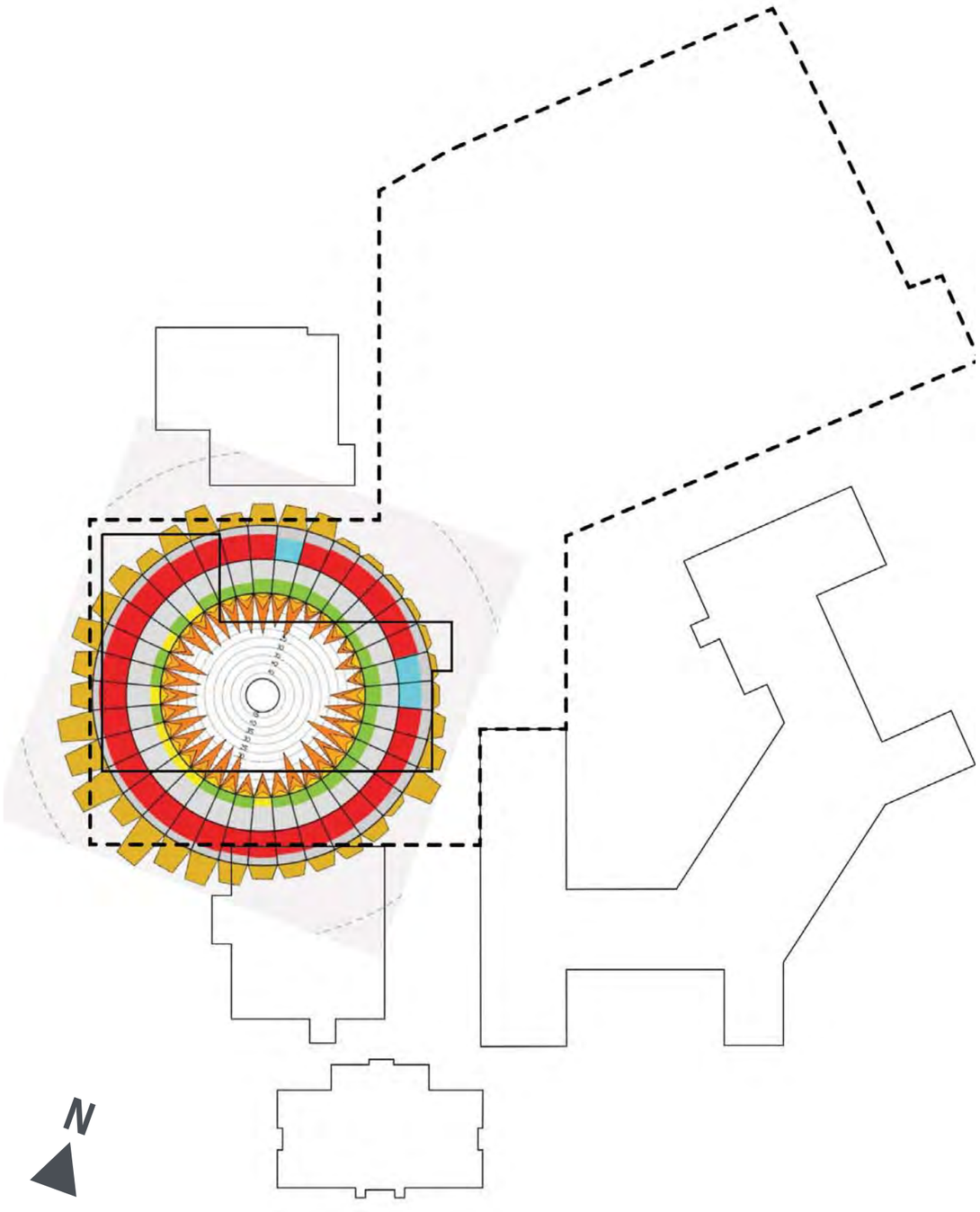
Wind

June - August Wind Wheel

These are the hottest months of the year with daytime temperatures generally higher than the range for human comfort. Relative humidity is mostly in the range of comfortable (30-70%). The dominant wind direction is southwest with variable direction maximum gust speeds of 25-30mph.

SITE RECOMMENDATION: Shade and evaporative cooling to extend thermal comfort range.

BUILDING RECOMMENDATION: Shade.



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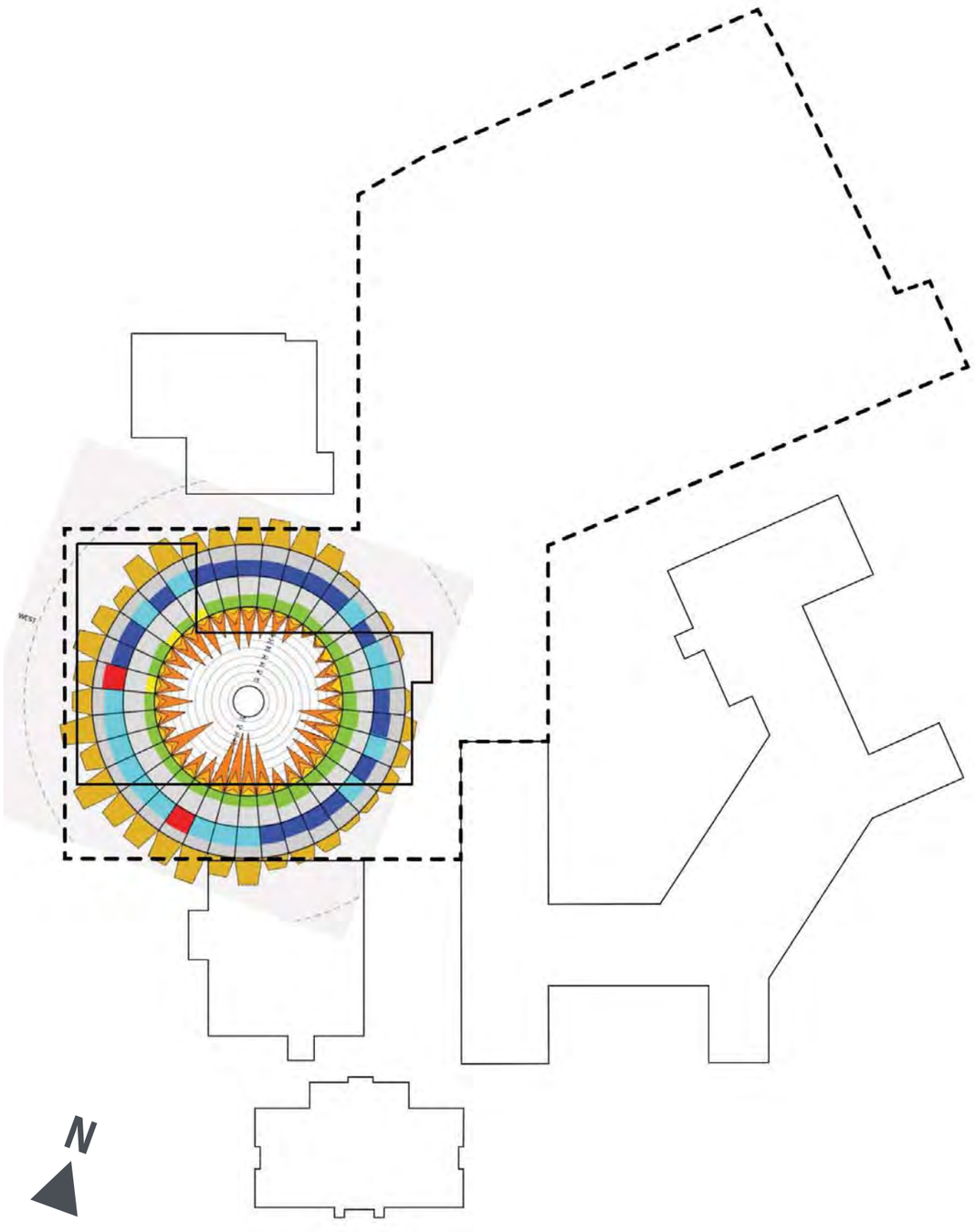
Wind

September - November Wind Wheel

These months are characterized by generally mild temperatures trending a bit warmer in September and colder in November. Humidity is typically in the range of comfortable (30-70%). Wind direction is variable with the highest average occurrence out of the east at 15mph. The strongest wind gusts occur from the south-southeast reaching 35-40mph.

SITE RECOMMENDATION: Protect outdoor play areas from strong south winds.

BUILDING RECOMMENDATION: Cool temperatures with low humidity present opportunities for natural ventilation during these months; consider higher wind pressure from south and west.



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Water Use Assessment

Purpose of the Water Assessment

The team conducted an initial water assessment for demand and supply based on schematic drawings received on September 13, 2017.

The demand components evaluated include indoor fixture use and outdoor irrigation needs. Process water use for appliances and equipment will be evaluated as information becomes available.

Four supply sources were considered – rainwater, greywater, municipal non-potable water and equipment condensate. Rainwater collection was deemed the only viable supply source to offset potable water needs for landscape irrigation. Collection from the roof of the school addition has the potential to provide 51,746 gallons per year (based on average monthly rainfall data).

The goal for this project is to reach a minimum of 40% indoor water savings, and a minimum of 50% outdoor water savings to meet the APS requirement for LEEDv4 projects.

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Water Assessment Summary

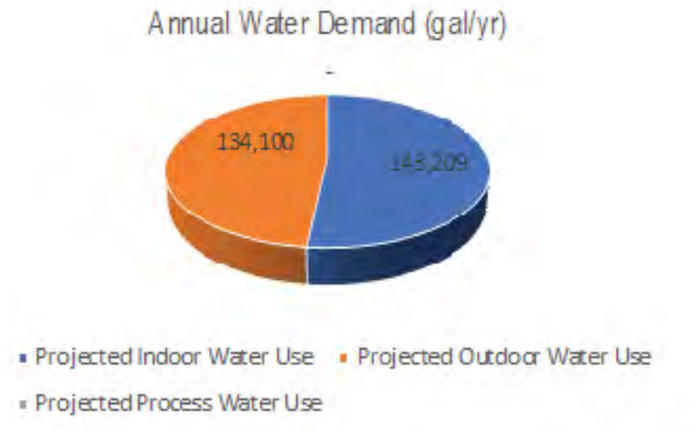
In total, the estimated demand calculated is 277,309 gallons per year based on our recommended strategies — 143,209 gallons per year for indoor water use and 134,100 gallons per year for outdoor water use.

The baseline indoor water use calculation is based upon 212 students, 17 staff, and 4 visitors, usage of 11,934 gallons per month.

The baseline outdoor water use calculation is based upon a landscape area of 9,588 sf, usage of 11,175 gallons per month.

DEMAND

Projected Indoor Water Use	143,209 gal/yr
Projected Outdoor Water Use	134,100 gal/yr
Projected Process Water Use	-
Total Estimated Demand	**277,309 gal/yr**

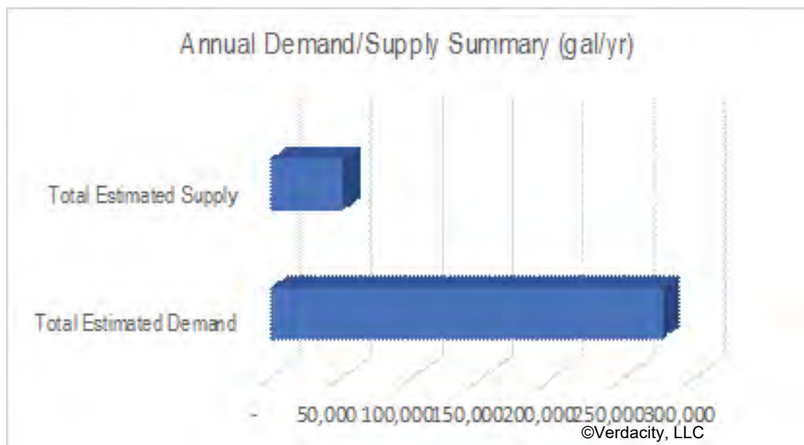


SUPPLY

Rainwater	51,746 gal/yr
Graywater	-
Equipment Condensate	-
Total Estimated Demand	**51,746 gal/yr**

SUMMARY

Total Estimated Demand	**277,309 gal/yr**
Total Estimated Supply	**51,746 gal/yr**



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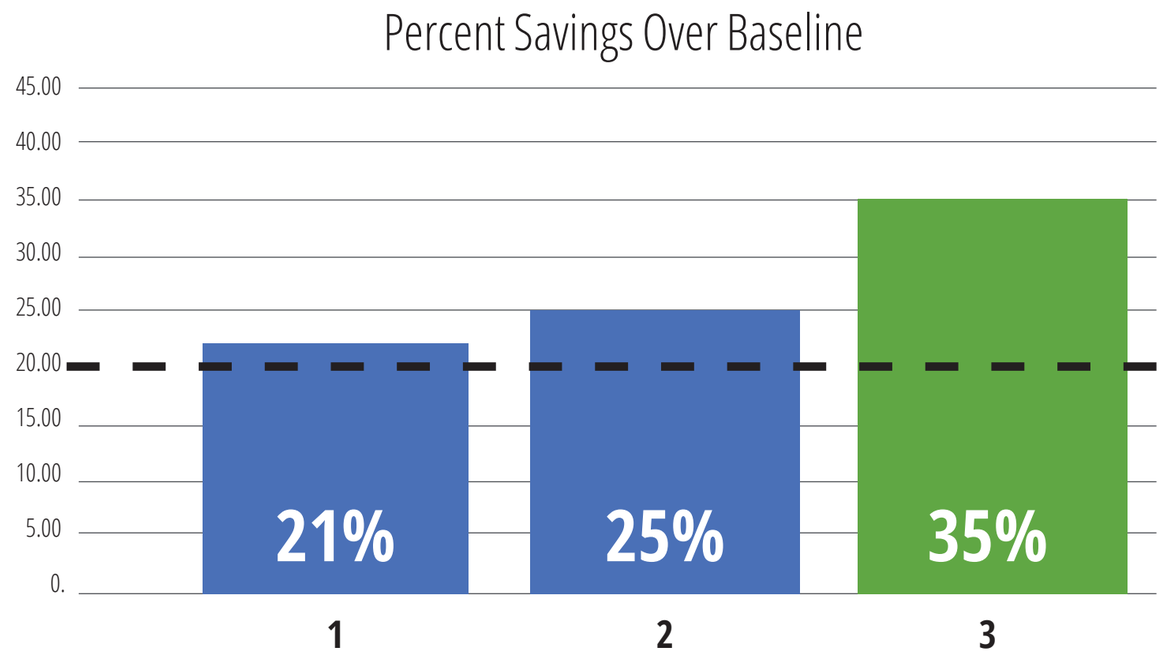
Projected Indoor Water Use

The calculations shown here estimate that kindergarden students and staff will not have access to restrooms with urinals, and upper level male students will have access to urinals.

Fixture flow rates were selected based upon systems approved by the APS Maintenance & Operations Department.

ASSUMPTIONS
Students (K 80, K+132): 212
Staff: 17
Vistitors: 4
Baseline Water Usage: 220,689 gallons per year



DESIGN EVALUATION 1

W/C	1.28 GPF
Urinal	0.5 GPF
Lavatory	0.5 GPM
Kitchen Sink	1.5 GPM
Shower	1.5 GPM
Est. Usage:	174,660 gal/yr

Savings Over Baseline: 20.86%

Meets LEED prerequisite: Y

LEED points: 0

DESIGN EVALUATION 2

W/C	1.28 GPF
Urinal	0.125 GPF
Lavatory	0.5 GPM
Kitchen Sink	0.5 GPM
Shower	1.5 GPM
Est. Usage:	164,985 gal/yr

Savings Over Baseline: 25.24%

Meets LEED prerequisite: Y

LEED points: 1

Recommended Strategy

DESIGN EVALUATION 3

W/C	1.28 GPF
Urinal	0.125 GPF
Lavatory (w/aerator)	0.35 GPM
Kitchen Sink	0.5 GPM
Shower	1.5 GPM
Est. Usage:	143,209 gal/yr

Savings Over Baseline: 35.11%

Meets LEED prerequisite: Y

LEED points: 3

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LEED Site Diagram

SS Credit - Open Space

Provide outdoor space at least 30% of the total site area. (30% = 15,220 sqft)

Designate 25% of the outdoor space as vegetated. (25% = 3,805 sqft)

Include pedestrian oriented hardscape with elements that accommodate outdoor social and/or physical activities.

Include gardens with a diversity of vegetation types that provide year-round visual interest.

ASSUMPTIONS
LEED Project Boundary: 50,732 sf
Vegetated Open Space: 9,588 sf

LEED BOUNDARY

- Building Footprint
- Open Space- Hardscape
- Open Space- Vegetated
- Vegetated

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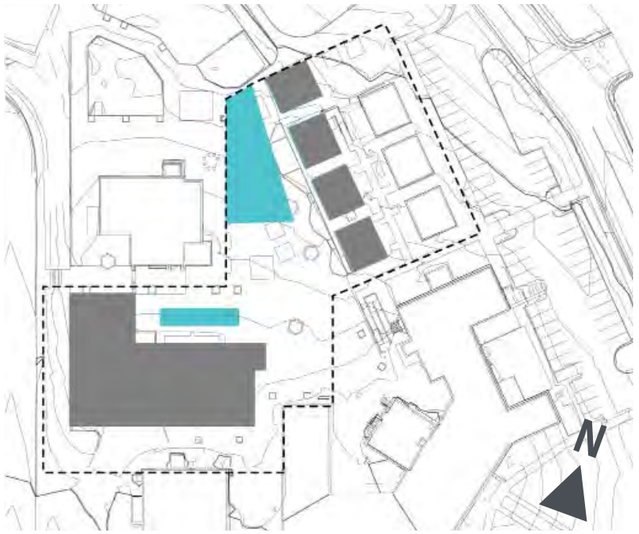
Projected Outdoor Water Use

Landscape Evaluation #1
Protect or Restore Area Requirement

DESIGN EVALUATION 1

Estimated Landscape Area[1]	15,5220 sf
Peak Watering Month[2]	July
ETo Value[3]	7.17 in/mo
Average Rainfall[4]	0.90 in/mo
Annual Baseline Usage	68,019 gal/mo



Landscape Evaluation #2
Open Space Area Requirement

DESIGN EVALUATION 2

Open Space Area[1]	3,805 sf
Peak Watering Month[2]	July
ETo Value[3]	7.17 in/mo
Average Rainfall[4]	0.90 in/mo
Annual Baseline Usage	17,005 gal/mo

Landscape Evaluation #3
Proposed Area Requirement

DESIGN EVALUATION 3

Open Space Area[1]	9,588 sf
Peak Watering Month[2]	July
ETo Value[3]	7.17 in/mo
Average Rainfall[4]	0.90 in/mo
Annual Baseline Usage	42,849 gal/mo

Recommended Strategy

1 These calculations are based upon recommended restoration area.
2 Calculation Methodology: LEEDv4 Outdoor Water Use Calculator (standard for Albuquerque).
3 Data acquired from the www.worldclimate.com for Albuquerque, NM and "Rainfall-Evapotranspiration Data" from Toro Company.
4 For this calculation, landscape areas for each vegetation type is assumed, and to be used for design purposes only.

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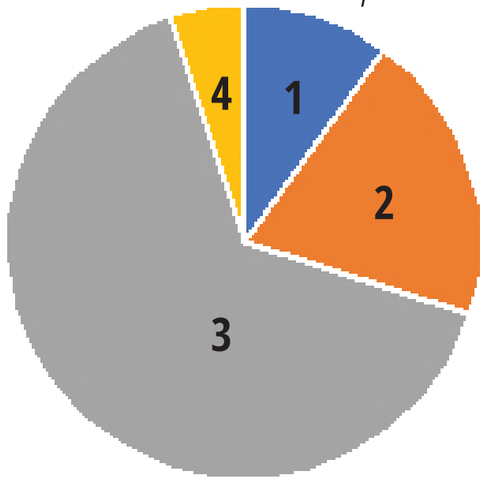
Projected Outdoor Water Use

Landscape Evaluation #1

Protect or Restore Area Requirement



DESIGN EVALUATION 1

1	Trees, med water (10%)	1,522 sf
2	Shrubs, low water (20%)	3,044 sf
3	Groundcover, low water (65%)	9,8936 sf
4	Turfgrass, low water (5%)	761 sf
	Softscape, non-vegetated	-
	Permeable hardscape	-
	Irrigation Type	Drip/Spray
	Est. Usage:	23,339 gal/mo

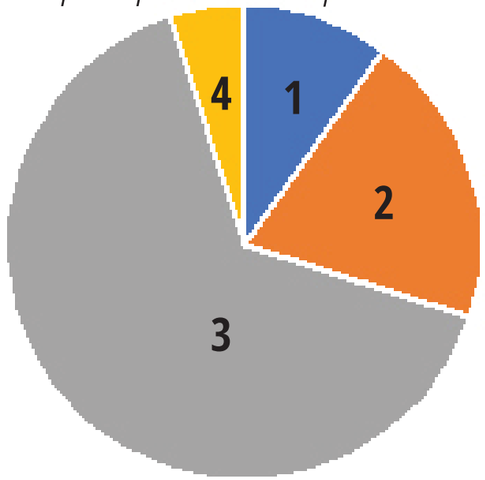
Savings Over Baseline: 66%

Meets LEED prerequisite: Y

LEED points: 1

Landscape Evaluation #2

Open Space Area Requirement



DESIGN EVALUATION 1

1	Trees, med water (10%)	380 sf
2	Shrubs, med water (20%)	761 sf
3	Groundcover, low water (65%)	2,473 sf
4	Turfgrass, low water (5%)	190 sf
	Softscape, non-vegetated	-
	Permeable hardscape	-
	Irrigation Type	Drip/Spray
	Est. Usage:	7,289 gal/mo

Savings Over Baseline: 57%

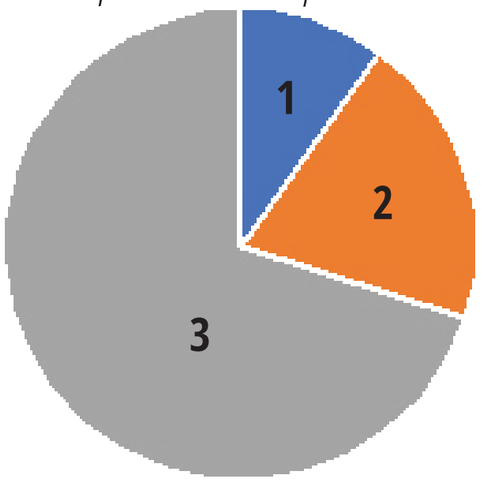
Meets LEED prerequisite: Y

LEED points: 1

Recommended Strategy

Landscape Evaluation #3

Proposed Area Requirement



DESIGN EVALUATION 1

1	Trees, low water (10%)	959 sf
2	Shrubs, low water (20%)	1,918 sf
3	Groundcover, low water (70%)	6,712 sf
	Turfgrass, low water	-
	Softscape, non-vegetated	-
	Permeable hardscape	-
	Irrigation Type	Drip/Spray
	Est. Usage:	11,175 gal/mo

Savings Over Baseline: 74%

Meets LEED prerequisite: Y

LEED points: 1

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