Central High School Relocation Study

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ENVIRONMENTAL IMPACT ANALYSIS
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Disclaimer

The environmental impact assessment is intended to identify potential tradeoffs for the decision-making process. The US Green Building Council’s Leadership in Energy and Environmental Design program for schools is used to compare various site options. The LEED guide is not the only metric for sustainability, nor does the author imply that she has the authority to determine the points awarded at any particular site. Information on potential human health hazards is strictly conceptual and a Phase I and II ASTM Environmental Site Assessment should be performed to determine actual conditions at the selected site.
Executive Summary

The Champaign Unit 4 School District is currently considering options for the future of the two high schools, Central and Centennial. The district will likely remodel or rebuild one or both of the high schools. Many sites throughout the Champaign area have been suggested for a new school to replace Central.

Schools have a profound impact on the sustainability of our community because many students and adults spend most of their weeks there. Some aspects of sustainability are related to location, thus thinking about the environmental aspects of various sites can help the District prioritize. Many organizations such as the US Green Building Council and the Environmental Protection Agency have created guides for green schools.

Sustainable schools can not only improve the livability of a community and create a better learning environment; they also offer opportunities for students to learn about their interactions with the natural and built environment. Conserving water and energy resources and using renewable energy are important aspects of a green school. Thinking about land use, context, and transportation efficiency contribute to sustainable siting. Materials and waste management is an aspect of environmental impact that largely does not depend on the school’s location. Avoiding exposure to health hazards in the outdoor and indoor environments is also a key consideration.

We can leave a legacy to our children and grandchildren by incorporating sustainable strategies in the planning for a new high school. As the conversation about school siting continues, the community should discuss these pros and cons of resource use, sustainable siting, materials management, and human health.

Scenario Summaries

While an Environmental Site Assessment should be completed for the final site of the school, some basic land use information generated using Google Maps and the City of Champaign’s most recent Comprehensive Plan\(^1\) and conceptual information about sustainable school design can assist with identifying some of the issues that may be present at each of the potential school sites.

South Fringe

The south fringe sites would likely not use water efficiently due to the area of landscaping. The Windsor Road site borders a large pond and stream but other retention areas would have to be constructed. Energy conservation might be more costly if the building is more spread out (possible due to the large acreage), but possibilities for installation of renewable energies would be better. Soils on the sites are good for agriculture, thus other lands would be a higher priority for development. There are some neighborhoods and amenities near the sites, but development is unlikely to happen on the east side of the sites because the University uses that land for research. Transportation emissions would likely be higher than current levels. The sites are surrounded by a mix of light industrial, residential, and agricultural land uses. The area to the north of the sites is the University Research Park and could potentially generate a limited amount of pollution. Land to the east is permanent University agricultural research land and could produce pollen, dust, or pesticides that might irritate some people. Land to the

Solon Tract

The Solon site would likely not have very efficient usage of water resources due to the amount of landscaped area. Flooding could potentially be a problem as a stream flows through the site. Energy conservation might be more costly if the building is more spread out (possible due to the large acreage), but possibilities for installation of renewable energies would be better. Care is needed to preserve possible habitat areas around the stream but could be an educational resource. As a development-locked agricultural tract, use of this site for a school makes much more sense than use of relatively undisturbed agricultural areas. The livability of neighborhoods around the site would likely increase. Emissions from transportation would be higher than currently but lower than fringe sites. The site is in a residential area so exposure to industrial activity is likely to be limited. A petroleum storage facility is located about a mile upwind from the site. Other industrial uses are located to the north near Interstate 72. Major roads such as Kirby and Duncan, as well as Interstate 57 contribute to air pollution in the area. Interstate 57 would also have some hazardous material transportation risks.

Country Fair

Country Fair would likely be more water efficient because landscaped areas would be smaller. Because the building would likely be three or four stories, energy conservation measures would be easier to achieve. The site has less capacity for investment in on-site renewable energy. As an infill site, it avoids the use of sensitive natural lands or agriculturally productive soils, and replacement of some paved areas of the site with green space might actually improve stormwater management of the area. Connections to existing neighborhoods and amenities could be of benefit to area residents. Transportation emissions would likely be similar to the current level at Central. Some parts of the site or buildings could possibly be reused in the construction of school facilities. The site is surrounded by a mix of residential, commercial, and industrial land uses. A few sources of air pollution are located within one mile of Country Fair, including a metal alloy casting company and the Kraft Foods factory. Other light industrial areas exist to the north and west that could potentially produce some pollution. Major roads such as Mattis, Springfield, and University also generate significant air pollution immediately adjacent to the site. Trucks entering or exiting Interstate 72 could pose some hazardous material transport risks. Some remediation of the land may be necessary due to previous land uses. A gas station is located on the northeast corner of the site and a dry cleaning business is located on the west side of the site, both of which might require remediation.
**Northwest Fringe**

The northwest fringe sites would likely not use water efficiently due to the size of landscaped areas. Energy conservation might be more costly if the building is more spread out (possible due to the large acreage), but possibilities for installation of renewable energies would be better. Soils on the sites are good for agriculture, thus use of the land is less of a priority.

Resident in the Boulder Ridge subdivision would benefit from the new school but few other amenities exist and future neighborhoods are unlikely due to the terrain to the north and west. Transportation emissions would likely be high. The sites are proximal to residential areas to the south and a planned light industrial area to the northeast. Land to the north and west of the sites is likely to remain agricultural for a long time due to the impracticalities of installing sewers in those areas. Although industrial pollution is unlikely to be significant, it is possible that dust, pesticides, or pollen from agricultural activities could be irritating for those susceptible to asthma or allergies. Interstate 57 is the only major road currently with significant traffic near the northwest fringe sites, thus automobile pollution may be minimal. With the construction of a school, however, there would likely be significant traffic on Duncan and Cardinal. The Wabash Rail line passes along the northeast edge of the Boulder Ridge sites and could be a slight risk for hazardous material transport, although train traffic along the line is low.

**North Fringe**

The north fringe sites would likely have a higher usage of water resources due to the large landscaped areas. A large pond already exists on the Lange site but this feature could not be used for retention. Energy conservation might be more costly if the building is more spread out (possible due to the large acreage), but possibilities for installation of renewable energies would be better. All four sites have good soils for agricultural purposes, thus use of these sites is not as preferable as an infill site. Some amenities exist around the sites and the livability of a few small neighborhoods would increase, but many new homes would have to be built to create a thriving neighborhood. Transportation emissions would likely be high at the north fringe sites. The Ponder-Moore site is located near a mix of residential, commercial and industrial uses. The Apollo industrial subdivision and future industrial development to the east and northeast of the school site could potentially generate some pollution. Exposure may be reduced somewhat as the prevailing winds generally come from the west. A small industrial and office complex is located directly south of the Lange site but would likely not generate a lot of pollution that would impact the northern fringe sites. Some land to the north of the city will likely remain agricultural for many years, thus dust, pesticides, or pollen could be an issue for some people. Pollution from roads such as Olympian, Prospect, Market, and Interstate 57 would influence the air quality of the north fringe sites. The north sites have very low hazardous material transport risks, with the exception of the Lange site which abuts Interstate 57 for a short distance.
The Champaign Unit 4 School District is currently considering options for the future of the two high schools, Central and Centennial. The district will likely remodel or rebuild one or both of the high schools. Many sites throughout the Champaign area have been suggested for a new school to replace Central.

Environmental sustainability is a key goal for many individuals and communities today, including our own community. As foundational components of society, the schools will have an influence on both the physical sustainability of Champaign and Savoy, as well as future citizens’ understanding of sustainable concepts:

“Strategies to reduce the negative impact of human activity on the natural world begin with education. School leaders can be instrumental in expanding public awareness of sustainability by providing students positive examples of the cohabitation of natural and built environments. Energy-efficient school buildings can serve as models and laboratories for teaching conservation principles through integrated, project-based curriculum.”

The location of a new or remodeled school building will have an impact on families served by the District, as well as the larger community, especially in terms of environmental consequences. Using well-recognized guides on sustainable schools as a metric for comparison, the Environmental Impact Assessment of the Central High School Relocation Study examines the potential differences between sites in resource efficiency, sustainable siting, materials and waste management, and exposure to health hazards.

Green Schools: A Review of the Literature

Planning for sustainable schools is becoming easier as numerous organizations, including the US Environmental Protection Agency (EPA), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the US Green Building Council’s Leadership in Energy and Environmental Design (USGBC LEED), the Council for Educational Facility Planners International (CEFPI), and even the Illinois State Board of Education (ISBE) have developed recommendations for the design and planning of energy efficient and sustainable educational facilities. For example the ISBE states that healthy, high-performing schools will protect the environment by “using environmentally responsive site planning, reducing water and energy use and promoting renewable energy.” By examining guidelines for environmentally friendly schools, we can determine planning priorities for a high-performance school of the future.

LEED for Schools

The LEED for Schools rating system provides the most comprehensive and quantifiable analysis of the sustainability of school buildings. Although it is possible for a school to earn recognition on the LEED scale while neglecting major aspects of sustainability, a school that met all criteria would likely have a very low environmental impact. The LEED for Schools rating system uses a 100-point scale to score new and remodeled school buildings on various aspects of sustainability (described in more detail throughout the analysis). “The intent is to

4. Ibid. IL Capital Development Board.
promote healthful, durable, affordable, and environmentally sound practices in building design and construction” by weighting the “potential environmental impacts and human benefits of each” strategy. The LEED system is the most-recognized green building rating system in the US and sometimes funding sources or governmental jurisdictions require certain levels of LEED certification.

**US EPA School Siting Guidelines**
The US EPA’s School Siting Guidelines is a resource to help school districts and community members evaluate “environmental factors to make the best possible school siting decisions. The special vulnerabilities of children and considerations for children’s health underpin the recommendations.” The guide focuses on decisions throughout the school facility planning process, such as determining whether a new building is needed, whether a green building is a good choice, environmental health and safety risks, and transportation implications.

**Advanced Energy Design Guide for K-12 School Buildings**
The Advanced Energy Design Guide for K-12 School Buildings “was developed by a diverse group of industry experts to provide innovative and proven concepts for energy-efficient buildings, while concentrating on best business practices and reasonable construction costs.” It focuses strictly on energy aspects of school design, but also discusses other benefits such as improved learning environments, enhanced environmental curricula, reduced operating costs, and lower construction costs.

**Schools for Successful Communities**
Schools for Successful Communities is a guide developed by the Council for Educational Facility Planners, International and the US EPA that focuses on benefits of thinking about Smart Growth when planning for school facilities. The guide “presents examples of supportive state and local policies, as well as case studies from around the country that show how community-centered schools and the planning process used to design and build these schools have improved education and fostered more livable places.”

**Illinois Resource Guide for Healthy, High Performing School Buildings**
The Illinois Resource Guide for Healthy, High Performing School Buildings is a state-specific guide that offers advice on incorporating aspects of sustainability into school buildings, with case studies of in-state schools that have completed similar projects. It is intended to help “Illinois school administrators, school board members, and other key decision-makers learn the principles of healthy school design so they can engage in a meaningful dialogue with their design team about the plans for their new school.”

5. Ibid. LEED for Schools.
6. Ibid. US EPA.
7. Ibid. ASHRAE.
8. “Smart growth means building urban, suburban and rural communities with housing and transportation choices near jobs, shops and schools. This approach supports local economies and protects the environment.” http://www.smartgrowthamerica.org/what-is-smart-growth
10. Ibid. IL Capital Development Board.
Scenarios
The Board of Education is currently considering five major options for school sites, within which some options have more than one parcel of land available (see Figure 1).

1. South Fringe
A greenfield development option where nearly all athletic facilities could be located on site. The land is currently used for agricultural research. Located approximately three-and-a-half miles from the city’s core. Both tracts are 60 acres.

2. Solon Tract
A greenfield tract located within the urbanized area. The site is 80 acres in size and is surrounded by residential areas. It is also proximal to Centennial High School, thus facility sharing and transportation optimization might be possible. The site is approximately three miles from the city’s core.

3. Country Fair
An option for redevelopment of a commercial area located within the heart of the community. The proximity of this particular location to Centennial High School presents some options for continuing to share facilities, as well as optimizing transportation. Total site area is approximately 40 acres.

4. Northwest Fringe
A greenfield development option where nearly all athletic facilities could be located on site. The site is currently used for agriculture and is surrounded by a mix of housing and agricultural land. Located approximately three miles from the city’s core. The two Voightlander tract options are 70 acres and overlap, thus they are only considered one site in this analysis.

5. North Fringe
A greenfield development option where nearly all athletic facilities could be located on site. The sites are currently agricultural land and area surrounded by a mix of land uses. Located approximately three miles from the city’s core. The Lange tract is 70 acres, the Faucett and Ponder-Moore tracts are 60 acres, and the Lo tract is 72 acres.
Resource Efficiency

Using limited natural resources efficiently is critical for both climate change and environmental sustainability and is one of the most common aims for sustainable schools. A major goal of ISBE’s Healthy, High Performing Schools is to “reduce operating costs” by “designing the building through an integrated approach where efficient systems work together.”11 About 25 percent of energy use attributable to people in developed countries is used for heating and cooling and other electricity, thus designing higher-efficiency buildings can have a big impact on carbon emissions.12 “By using energy efficiently and lowering a school’s energy bills, millions of dollars each year can be redirected toward improving facilities, increasing teachers’ salaries, or providing educational resources. Strategic up-front investments in energy efficiency provide significant long-term savings.”13 The LEED for Schools rating system allocates 44 percent of its points to efficient use of water and energy resources.

Water Resources

Stewardship of water resources will help to ensure healthy ecosystems and the survival of the human species. East-central Illinois receives ample rainfall each year and has a good aquifer, but pressures on available water supplies are likely to increase in the future. School occupants use water frequently, thus installing and providing information about efficient fixtures can help to educate them and may have an impact on choices they make in their own homes. Choosing water-efficient fixtures is a prerequisite and eleven percent of the points are related to water in the LEED system. Options for compliance include water-efficient landscaping design, reuse of graywater, reduction of wastewater, and reduction of process water usage. Water efficiency measures “can reduce a school’s water usage by 30 percent or more. These improvements can lower a school’s operating expenses” and “there is a strong potential that the value of these savings will rise over time, especially as water becomes increasingly scarce and more expensive.”14 Conserving water resources is an option at any of the sites, but may be more difficult at sites with larger landscaped areas.

While not discussed much in the LEED guide, stormwater management is also an important environmental consideration. In order to allow the aquifer to recharge and to prevent flooding downstream, it is desirable to reduce the amount of stormwater discharge from a developed site. The City of Champaign limits the amount of discharge to 0.18 cubic feet per second per acre of land, thus the amount of stormwater detention that each site needs will vary. They also plan to institute a stormwater utility fee based on the amount of impervious land (land where water cannot soak into the ground). Using porous pavements, green roofs, or rain gardens would help to mitigate these impacts. Some sites already have existing water features, but care must be taken to provide additional storage to avoid overwhelming existing streams or ponds.

11. Ibid. IL Capital Development Board.
13. Ibid. ASHRAE 2011.
14. Ibid. IL Capital Development Board
Energy Conservation

Energy conservation has a “double” impact on a school facility’s carbon footprint because some of the energy generated to heat and power the building is lost in transmission or production; conserving energy is better than using renewable energy sources. A prerequisite for the LEED program is building commissioning, which optimizes the operation of the building envelope and equipment to ensure that performance meets design goals, with an additional point for advanced commissioning strategies. The building must also meet a minimum level of energy efficiency, and an additional 19 percent of the LEED points may be earned for higher efficiencies. Developing a measurement and verification plan can help to ensure ongoing high performance.

Designing an efficient building shell is also “an important component of building a durable school, one that is designed to have the longest possible lifespan and to reduce operations and maintenance costs over the long term.”\(^{15}\) Most of the energy in a building is lost through the exchange of temperatures through its exterior; 90 percent is typically lost through the roof.\(^{16}\) While most building layouts can be designed for a desired level of energy efficiency by increasing the amount of insulation in the walls or roof, costs may be higher for buildings with more exterior area (more spread out buildings). Achieving energy efficiency in a four-story building will be easier than in a two-story building because the roof area will be considerably smaller.

Geothermal heat pumps are also a common method of using energy more efficiently in buildings today. Several Unit 4 Schools have recently had this technology installed. Vertical wells approximately 300 feet deep are drilled in a grid pattern near the school building. A network of refrigerant pipes runs through these wells, which allows the heating and cooling system to take advantage of the more constant temperature of the ground underneath the surface rather than the huge differences between indoor and outdoor air temperatures.\(^{17}\) Using a geothermal heat pump can result in about a 50 percent savings in heating and cooling costs, with an investment payback time of six to seven years.\(^{18}\) For the size high school building that Unit 4 is considering, approximately 400 wells would be needed, spaced at 18 feet apart in a grid pattern, resulting in a land use of approximately three acres.\(^{19}\) A geothermal system could be installed underneath a parking lot or athletic field, so cost differences between sites would be minimal.

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15. Ibid. IL Capital Development Board
16. Based on April 25, 2012 discussion with BLDD Architects Sam Johnson and Mark Ritz.
18. Ibid. discussion with BLDD.
19. Ibid. discussion with BLDD.
Renewable Energy
Generating or using renewable energy will also help to limit the school’s emissions. Up to 7 percent of the LEED points may be earned for providing up to 13 percent of energy using renewable sources. While these types of investments may be prohibitively expensive for a school district, points may also be earned by signing contracts with green energy producers. “Renewable energy systems reduce overall operating expenses by capturing and utilizing the free benefits available from the immediate environment” and can be a great educational tool for instructors. A school with a larger roof area would be able to accommodate more solar panels. A larger site might also provide the opportunity to install a wind turbine in the future, if zoning allows.

Sustainable Siting
Green schools are not only efficient in and of themselves but contribute to the community’s environmental impact. Recent urban development patterns have left many people disillusioned with their surroundings. As centers of community activity, schools can have an influence on the development of surrounding neighborhoods. They can continue to produce “nightmare” landscapes, or they can be catalysts for community engagement and stability.

A sustainable school “should be located on a site that helps reduce a school’s energy needs, minimizes adverse impacts on the local environment, and serves as an amenity for the surrounding community.” Choosing and developing a site in a sustainable way can have an enormous impact on the sustainability of a school. The LEED for Schools rating system allocates 24 percent of its points to criteria in the “Sustainable Sites” category. Creating a master site plan will help to ensure that the site remains beneficial even in the future if expansion or additional facilities are needed.

Some aspects of a sustainable site are not location-specific. One LEED prerequisite is a construction pollution plan to limit soil erosion that could lead to air and water pollution. Another strategy is to reduce heat island effect by shading parking areas and providing roofs with solar panels, vegetation, or low solar reflectance.

Land Use
Selecting a site with limited environmental impact should involve consideration of the value of that land as wildlife habitat or for agricultural production. With the global population growing rapidly and the trend towards using food crops for energy, farmland will be an increasingly important resource. When developing the site plan, setting aside some land for habitat preservation

20. Ibid IL Capital Development Board.
21. "Ever-busy, ever-building, ever-in-motion, ever-throwing-out the old for the new, we have hardly paused to think about what we are so busy building, and what we have thrown away. Meanwhile, the everyday landscape becomes more nightmarish and unmanageable every year." Kunstler, James Howard. The Geography of Nowhere: The rise and decline of America’s man-made landscape. Simon & Schuster, 1993.
22. Ibid IL Capital Development Board
23. LEED 2009 for Schools New Construction and Major Renovations Rating System
or restoration will have ecosystem benefits and could also serve as an educational resource. Vegetated open space can help to reduce stormwater impacts and provide recreational areas. Reducing light pollution can positively benefit nocturnal habitats. Six percent of the LEED points are allocated to habitat and farmland protection and stormwater management. Additionally, the District must be sure to comply with all Illinois regulations on land use, including the Farmland Preservation Act, Interagency Wetlands Policy Act, Illinois Natural Areas Preservation Act, Endangered Species Protection Act, Illinois State Agency Historic Resources Act, and Archaeological and Paleontological Resources Protection Act. Although it is highly likely that any of the school sites under consideration will eventually be developed due to growing population in the Champaign area, choosing to build on an infill site will help to preserve natural and productive lands as long as possible and make use of spaces that are currently underutilized.

**Context**

The urban context of a site is important. “Schools should be located in environments that contribute to the livability, sustainability and public health of neighborhoods and communities,” according to the EPA’s School Siting Guidelines. LEED for Schools designates four percent of its points for sites that are built on previously developed land and surrounded by dense residential, commercial, and institutional developments. An additional percentage point can be earned by allowing joint usage of athletic facilities, the building, or parking areas.

As noted in the Social Impact Analysis, infill sites or remodeling projects have more access to existing amenities and populations. While amenities and neighborhoods will develop around a fringe school site, some activity may be displaced from existing urban areas, resulting in inefficient use of space within the community. Moreover, the livability and public health aspects of existing neighborhoods may decrease as families with school-age children must spend more time and resources to get to school.

**Transportation Efficiency**

Transportation efficiency is a critical component of a sustainable school. In the twenty-first century, people are increasingly concerned about emissions of pollutants and their impacts on climate change. For a typical person in a developed country, transportation emissions make up roughly one-third of her carbon footprint. Ensuring that a school has easy access to public transportation, as well as usable walking and bicycling routes can significantly reduce transportation emissions while also increasing the independence of students. Limiting parking capacity can encourage students and staff to use alternative transport or carpool. Approximately nine percent of the LEED credits relate to transportation efficiency.

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Based on the quantity of vehicle miles traveled from the Transportation Impact Analysis, the approximate total annual emissions levels can be compared. Data on emissions of local vehicles were provided by the Champaign County Regional Planning Commission (see Table 1).\textsuperscript{26} Passenger cars and trucks have the highest level of emissions in all scenarios. Currently, the approximate total annual emissions of carbon dioxide equivalent are 480 tons for Central and 333 tons for Centennial. Emissions levels would be similar for Country Fair, or about 475 tons. Emissions would likely be slightly higher at the Solon site with about 634 tons, and significantly higher for fringe sites with at least 926 tons (see Figure 1). If sustainability is a priority for the local community in the future, emissions for school transportation are an important consideration in the decision-making process.

Regardless of site location, incentivizing usage of fuel efficient personal vehicles or using higher efficiency school buses can also have a positive impact. ISBE advocates the use of cleaner school buses because “children are especially sensitive to diesel emissions because their respiratory systems are still developing and they have a faster breathing rate.” Other strategies include “reducing school bus idling, retrofitting existing buses with devices that reduce pollution and/or using cleaner-burning fuel. Reducing school bus idling also saves money on fuel and maintenance costs.”\textsuperscript{27}

### Table 1: Emissions of local vehicles in grams of carbon dioxide equivalent

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>CO$_2$e g/mi</th>
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<tr>
<td>Passenger Car</td>
<td>434</td>
</tr>
<tr>
<td>Passenger Truck</td>
<td>643</td>
</tr>
<tr>
<td>Transit Bus</td>
<td>1,306</td>
</tr>
<tr>
<td>School Bus</td>
<td>1,020</td>
</tr>
</tbody>
</table>

Source: Data provided by the Champaign-Urbana Urbanized Area Transportation Study of the Champaign County Regional Planning Commission.

### Figure 1: Transportation Emissions (tons CO2)

Materials and Waste Management

The initial construction of a school facility is a resource-intensive process, thus choosing lower impact materials can limit the embodied energy in the building. Encouraging the reuse and recycling of resources will lower the amount of energy used to produce new goods. Thirteen percent of the points from LEED for Schools are designated for “Materials and Resources.”

Reusing an existing structure is an excellent means to conserve material. Reuse of other materials reduces “impacts associated with the extraction and processing of virgin resources.”\textsuperscript{28}

\textsuperscript{26} Data provided by Eric Hansen, Champaign County Regional Planning Commission

\textsuperscript{27} Ibid. IL Capital Development Board.

\textsuperscript{28} Ibid. LEED 2009
or recycling demolition and construction debris, using recycled content, choosing materials generated regionally, using rapidly renewable products or certified wood products are other strategies for conservation of materials in the construction phase. ISBE states that:

“The mining, harvesting and production of certain building materials can pollute air and water, destroy habitats and deplete natural resources. Transporting building products long distances also contributes to pollution and energy waste. Careful selection of materials can reduce or eliminate these problems, resulting in a school that not only contributes to the health and well-being of its occupants but also helps the environment.”

While Unit 4 is no longer considering remodeling the current building as a high school, reusing the building for other purposes would still have a positive impact. It is possible that one or more structures on the Country Fair site could be repurposed as part of the school facility, particularly a parking area.

Other aspects of materials and waste management are less related to location. A prerequisite of the LEED for Schools system is collection and storage of recyclables in the building’s operation but it does little else to address resource use in a school after its construction. Intentionally choosing the products that are used in the school from year to year and managing waste effectively will have a large impact on a school’s carbon footprint over its operational life. Minimizing the distances that supplies and waste are transported will help to curtail the associated transportation emissions. The production and transportation of food and material resources account for almost 40 percent of the energy attributable to persons in developed countries. Strategies such as procuring food from local producers and using electronic versions of textbooks can help to reduce use of material resources. Composting food and landscape waste can reduce waste streams and lower hauling costs.

**Exposure to Health Hazards**

Environmental sustainability concerns not only impacts on plants and animals, but also impacts on humans. People are sensitive to many substances that may be present in the air, water, or land. Health should be a consideration both in the siting and design of a school building because both outdoor and indoor environments can contribute to risks.

**Siting and Outdoor Environment**

Although no sites are without risk, it is important to assess potential problems when choosing a site so that the District can take appropriate measures to reduce those risks ahead of time. Avoiding or fully remediating site contamination problems is critical, especially because children may be more sensitive to exposure to hazardous substances. The EPA recommends that “The environmental review process should be rigorous, thorough and well-documented, and include substantive and ongoing meaningful public involvement.”

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29. Ibid. IL Capital Development Board.
30. Ibid. USEPA 2011
All sites should be evaluated for proximity to hazards on nearby land. Industrial activities may generate air pollution that could have health effects for people using the school. Air pollution can contribute to more frequent asthma attacks and susceptibility to respiratory ailments in the short term and could have longer-term impacts as well. Automobile pollution can also be problematic and steps should be taken to reduce school-generated traffic and idling near the building. Proximity to major roads can increase students’ risk for asthma and other chronic respiratory problems.31

Infill sites may potentially have more contamination problems as land has already been used for urban development purposes in the past. If contamination exists, the site will have to be remediated. A Phase I and Phase II Environmental Site Assessment as described by ASTM32 can help determine the scope of remediation and is a prerequisite for LEED certification.

While most sites are not already seriously contaminated, some locations may be at an increased risk for hazardous material spills due to proximity to major transportation routes. If an accident resulting in a chemical spill occurred on a transportation route adjacent to a school site, consequences could be serious. Although the risk for such an incident is extremely low, the school district would likely want to keep a buffer around the transport route and have an evacuation plan.

Indoor Environments

Planning for a healthy indoor environment is not site-specific but is also very important because students and faculty spend roughly 20 to 25 percent of their week there when school is in session. One of the guiding principles of the EPA’s School Siting Guidelines is that “safe and healthy environments are integral components of the education process.”33 A major goal for Healthy, High-Performing Schools is to “improve the learning environment” by providing “natural daylighting, acoustical comfort and superior indoor air quality” which can “decrease student and staff absenteeism and increase test scores.”34 Moreover, schools should “support health and safety” by “creating a school that supports the environmental, nutritional and physical well-being of students and staff.”35 Focusing on human interactions with the school will ensure that it is a successful learning environment long into the future.

Indoor environmental quality is very important in a school facility as it can impact the teaching and learning capabilities of the occupants.36 The LEED for Schools rating system allocates 19 percent of its points to indoor environmental quality. Minimum indoor air quality performance, control of tobacco smoke, and acoustical performance are LEED prerequisites. Monitoring of outdoor air delivery, increasing ventilation, controlling indoor air quality during construction,

34. Ibid. IL Capital Development Board.
35. Ibid. IL Capital Development Board.
36. Ibid. ASHRAE 2011
using low emissions materials, controlling particulates and chemicals in the building, allowing occupant control of lighting systems and thermal comfort, designing and reevaluating thermal comfort after occupancy, providing daylight and views, enhancing acoustical performance, and preventing mold are all strategies that can contribute to the quality of indoor environments.

Conclusion

Environmental sustainability is a goal of the local community and a high school is an integral part of the plan. Up front decisions, including the site chosen, will have a large impact on the operational sustainability of the school. Resources such as the LEED for Schools rating system offer guidance on aspects of the site and building that will contribute to its efficient use of resources, sustainable siting, choice of materials, and avoidance or management of human health hazards.

Each site has positive and negative aspects in relation to environmental sustainability. Sites with more land may be less efficient in terms of resource usage, but the possibility to generate renewable energies would be higher. The infill sites are better in terms of land use, context, and minimization of transportation emissions. Material reuse might be an option at the Country Fair site. Infill sites may have more exposure to industrial activity, but some industrial land uses were located near all of the sites. Exposure to air pollution from major roads is likely to be problematic at all sites, although it could be worse at sites directly bordering freeways. Some sites border hazardous material transport routes, thus a chemical spill emergency plan would be necessary.

Considering environmental impacts, in addition to social, transportation and fiscal impacts will produce a more robust solution to the school siting dilemma. In addition to reducing a school’s impact on the environment, a sustainable school has the potential to influence generations of students and their families to make green choices in their own lives. Building systems and their surroundings (either natural or urban) can be used as a teaching tool for a range of disciplines, from literature to sciences. As the education commissioner for the UK’s Sustainable Development Commission stated,

“Climate change is not only a concern to children and young people, it has the potential to undermine their future prosperity and life chances. Reducing school carbon emissions now, enabling schools to prepare themselves for future climate change impacts, and preparing young people to take action in their personal and professional lives, must all be critical goals for schools.”

Because climate change impacts are unknown and relatively delayed, an investment in a sustainable school may be the best kind of legacy we can leave for our children.

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