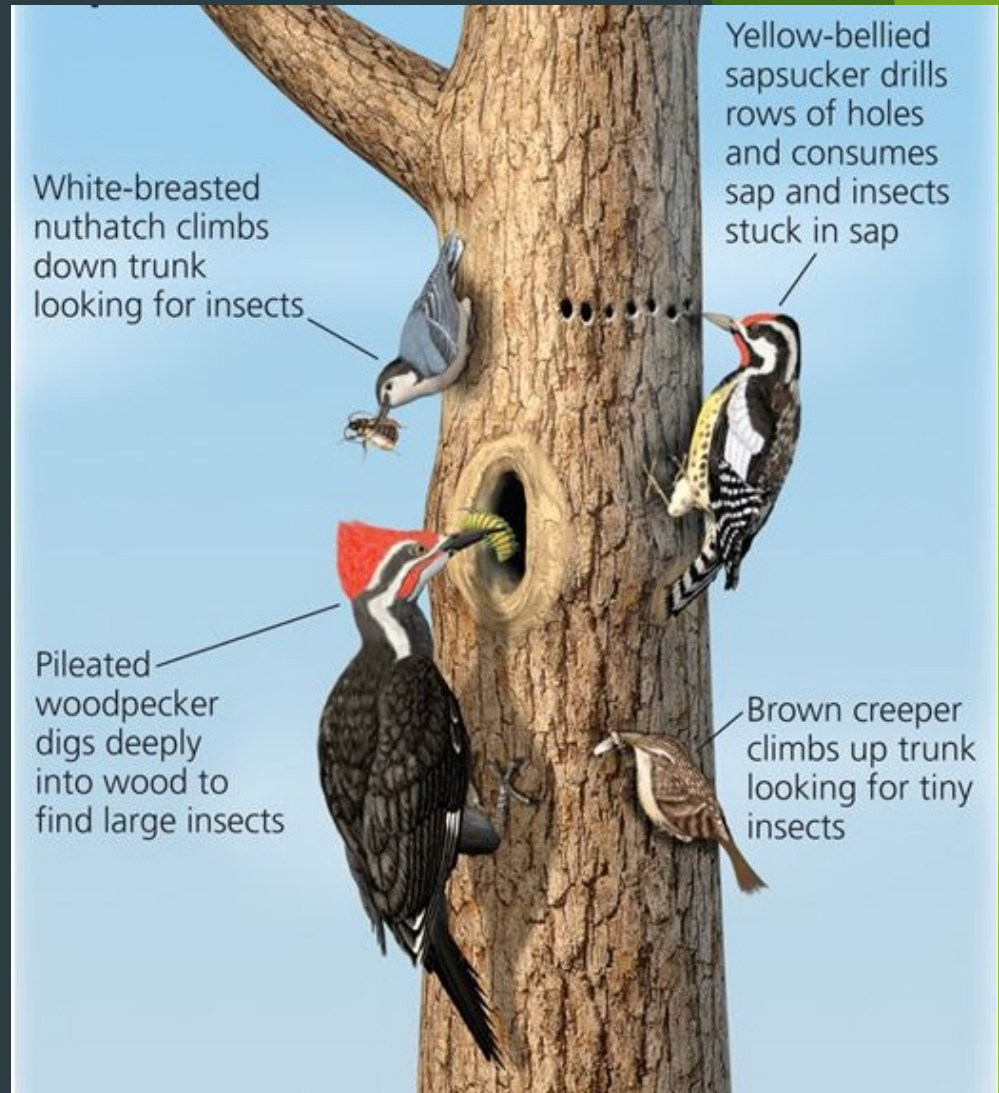


Next Generation Science Standard: Making the Most of Your Outdoor Space

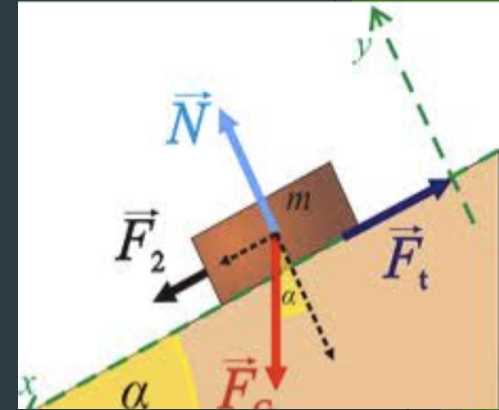


Next Generation Science Standards (NGSS)

- ▶ *In 2011, Iowa representatives worked with 26 other states to develop the Next Generation Science Standards*
- ▶ *Experts surveyed industry, colleges, and science and engineering practitioners to better understand what skills graduates were lacking. Areas included:*
 - ▶ *Science literacy*
 - ▶ *Ability to read and interpret data, graphs, charts, maps*
 - ▶ *Ability to work together in a group setting and problem solve.*
- ▶ *New Science Standards were adopted by Iowa State Board of Education in 2015*
- ▶ *To better prepare students, NGSS learning is based on a 3-D Learning Plan that includes:*

4 Core Ideas or Discipline Specific Areas

1. Physical sciences
2. Life sciences
3. Earth and space sciences
4. Engineering and Technology



7 Crosscutting Concepts

1. Cause and Effect
2. Structure and Function
3. Systems and System Models
4. Scale, Proportion, and Quantity
5. Stability and Change
6. Energy and Matter
7. Patterns



8 Science and Engineering Practices

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations and Designing Solutions (Engineering)
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

What the “New” Core Looks Like - 3-D Learning

K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

Students who demonstrate understanding can:

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.** [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]
- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.** [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.** [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]
- K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*** [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none">▪ Use a model to represent relationships in the natural world. (K-ESS3-1) <p>Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none">▪ Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1) <p>Engaging in Argument from Evidence Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <ul style="list-style-type: none">▪ Construct an argument with evidence to support a claim. (K-ESS2-2) <p>Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.</p> <ul style="list-style-type: none">▪ Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)	<p>LS1.C: Organization for Matter and Energy Flow in Organisms</p> <ul style="list-style-type: none">▪ All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1) <p>ESS2.E: Biogeology</p> <ul style="list-style-type: none">▪ Plants and animals can change their environment. (K-ESS2-2) <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none">▪ Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) <p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none">▪ Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2),(K-ESS3-3) <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none">▪ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to K-ESS3-3)	<p>Patterns</p> <ul style="list-style-type: none">▪ Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) <p>Cause and Effect</p> <ul style="list-style-type: none">▪ Events have causes that generate observable patterns. (K-ESS3-3) <p>Systems and System Models</p> <ul style="list-style-type: none">▪ Systems in the natural and designed world have parts that work together. (K-ESS2-2),(K-ESS3-1)

Example

ICCSD and others have adopted the use of the Full Option Science System (FOSS) Kits. These kits are designed with NGSS in mind and are designed or can be modified for different grade levels.

These Kits commonly include a well “scaffolded” teaching plan

- Students read or watch a video about a scientific topic.
- Students review a map, graph or chart and interpret data
- Students work together to identify solution to problem

FOSS Modules

In order to view FOSS modules appropriate for your school, select your location from the menu.

Click on a module name from the table below to view more details.

FOSS National K-8 Scope and Sequence (Next Generation Edition)

Grade	Physical Science	Earth Science	Life Science
8	Gravity and Kinetic Energy* Waves*	Planetary Science	Human Systems Interactions* Heredity and Adaptation*
7	Chemical Interactions	Earth History	Populations and Ecosystems
6	Electromagnetic Force* Variables and Design* ³	Weather and Water	Diversity of Life
5	Mixtures and Solutions	Earth and Sun	Living Systems
4	Energy	Soils, Rocks, and Landforms	Environments
3	Motion and Matter	Water and Climate	Structures of Life
2	Solids and Liquids	Pebbles, Sand, and Silt	Insects and Plants
1	Sound and Light	Air and Weather	Plants and Animals
K	Materials and Motion	Trees and Weather	Animals Two by Two

So how do you design your curriculum to meet the 3-D model?

Let's Look at just one Student Learning Objective:

K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

Don't Forget you have to include:

Science and Engineering Practices

- Developing and using models
- Analyzing and interpreting data
- Engaging in argument from evidence
- Obtaining evaluating and communicating information

Cross Cutting Concepts

- Patterns
- Cause and Effect
- Systems and System Models

Disciplinary Core Ideas

- Organization for matter and energy flow in organisms
- Biogeology
- Natural Resources
- Human Impacts on Earth Systems
- Developing Possible Solutions

How can we easily do this?

Research Shows that Outdoor Learning Can Improve:

- ▶ Physical Health
- ▶ Psychological Health
- ▶ Emotional Health
- ▶ Ecological Literacy
- ▶ Science Achievement

You Might Not have access to this
But you can make use of:



You Might Not have access to this
But you can make use of:

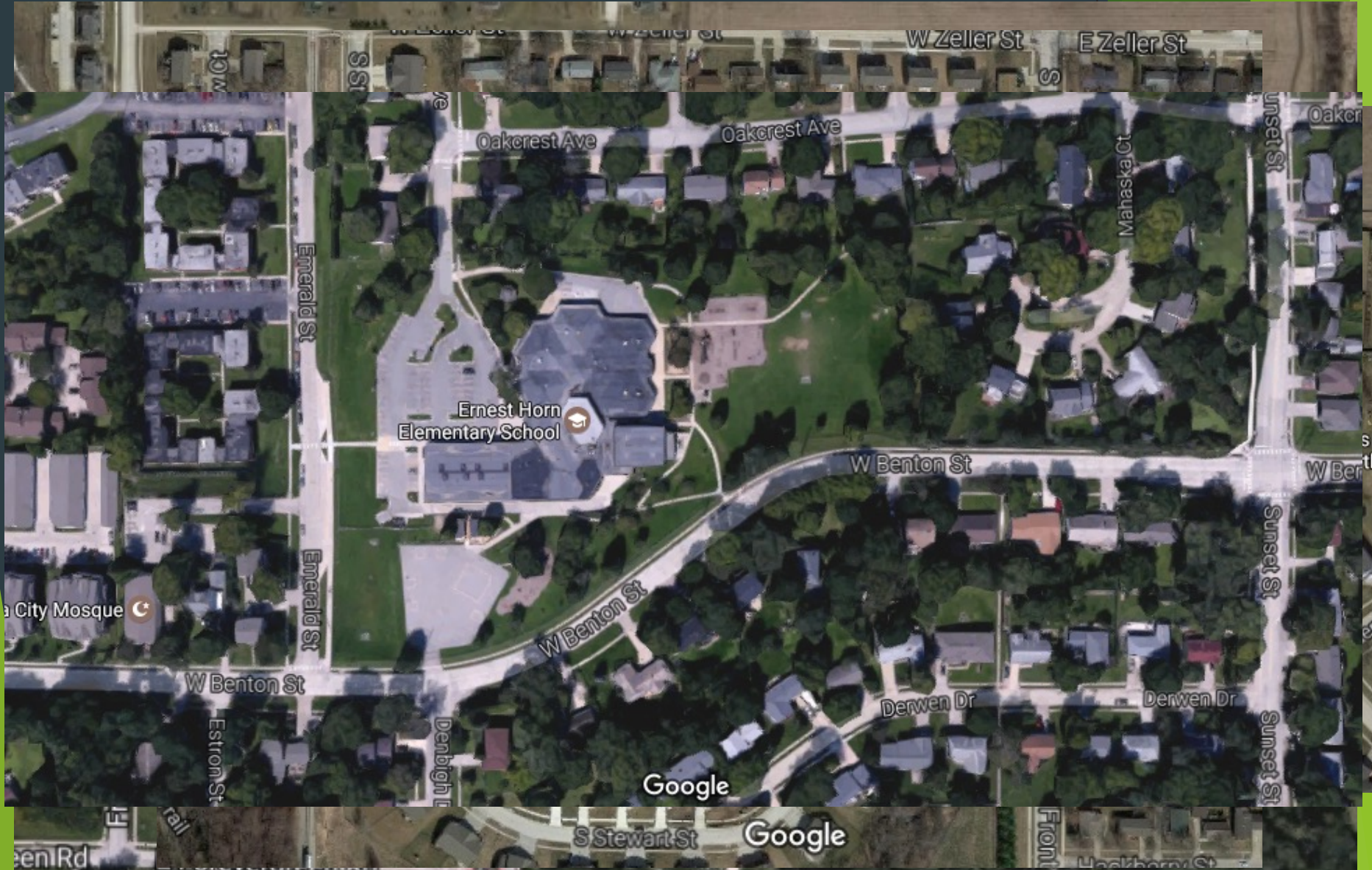


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Since this is what we are dealing with



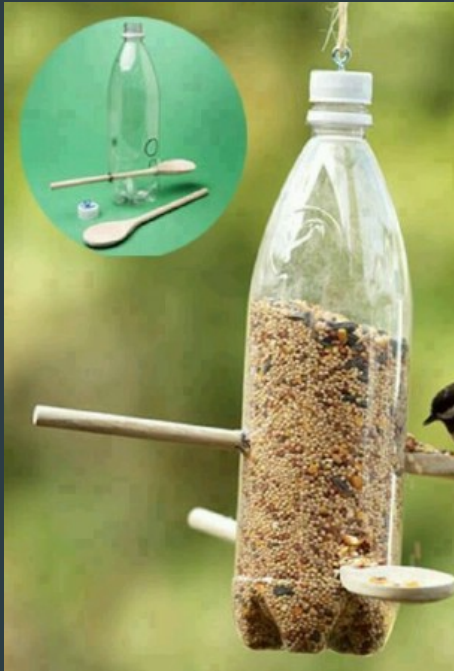
See the Big Picture - Anything within walking distance?



What assets can you find ?



What assets could be installed?

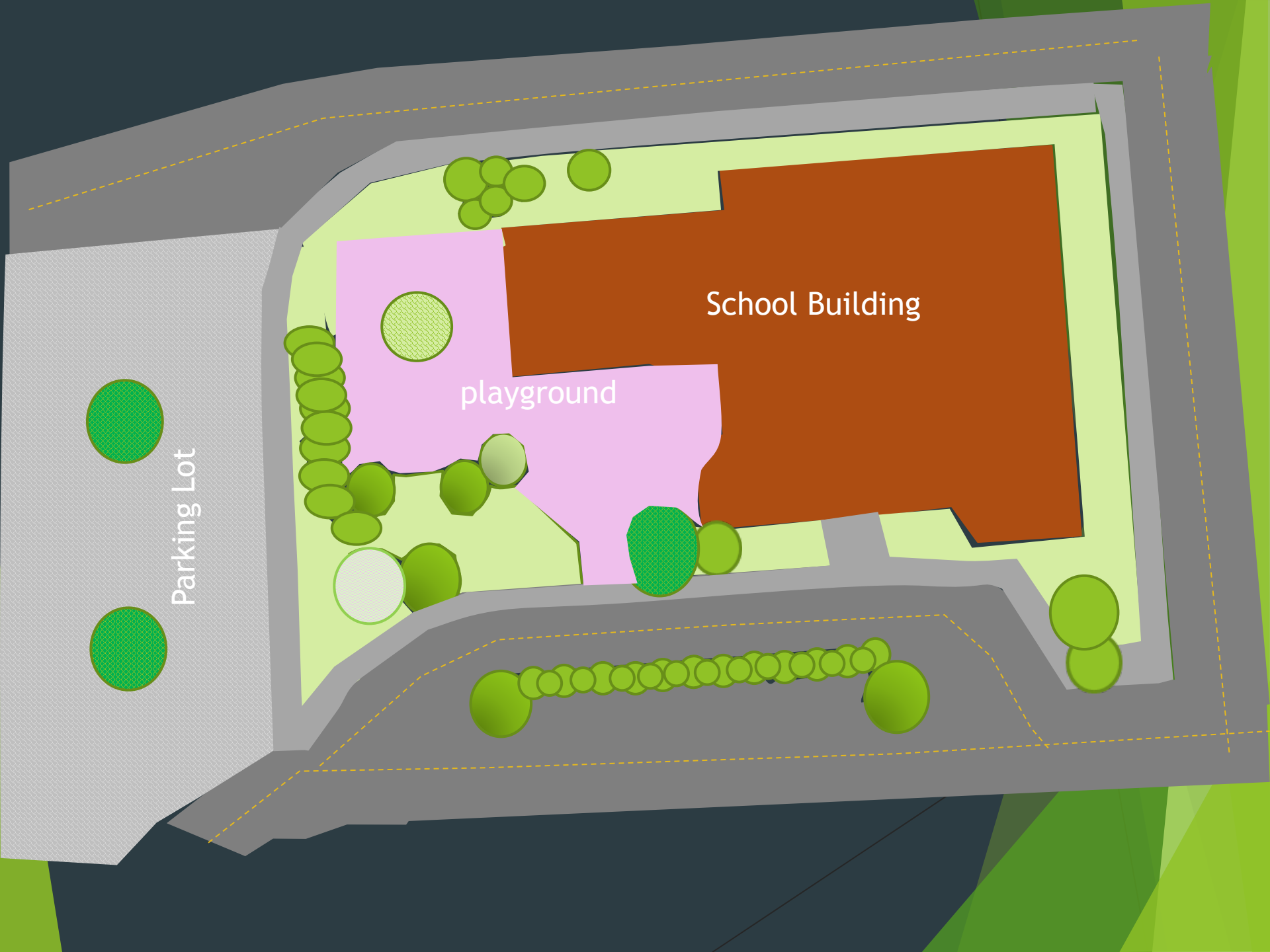


The Natural and Artificial
Ways to Manage
Landscapes – How can
these improve your
curriculum?



New Designs and Advocacy for Change





School Building

playground

Parking Lot

For more information

www.iowacore.gov

www.nextgenscience.org/iowa

<https://www.teachingchannel.org/videos/next-generation-science-standards-achieve>

Thank you to Rita Martens
Administrative Consultant
Bureau of Standards and Curriculum
Iowa Department of Education
E-mail: rita.martens@iowa.gov