EE 11 Crosswalk

PLEASE NOTE:

- The bulleted items found in the EE Guidelines are exemplars of the ideas above. As such the state document was determined to have alignment if the at least some the standards reflect the big ideas above the bulleted items. The bullets were used as guidance.
- Maine Learning Results in BLACK are from the Science and Technology Standards.
- Maine Learning Results in GREEN are from the Social Studies Standards.
- Links to the Mathematics and ELA were noted but specific language was left out pending the final drafts of the core standards in these areas.
- Standards from Career and Education Development are specifically noted.
- Alignment to the Maine Standards is understood unless otherwise noted.

EE Guidelines - Grade 11		Maine Learning Results (MLR
A) Questioning—Learners are able to develop, modify, clarify, and explain questions that guide environmental investigations of various types. They understand factors that influence the questions they pose. • Articulate environmental phenomena or topics to be studied at scales ranging from local to global. • Pose a research question and hypothesis, identifying and defining key variables. For example, develop hypotheses about land use in a region by drawing on maps, newspaper articles, databases, and personal observations. • Identify historical and current ideas and beliefs—for example, about the environment, human perceptions of the environment, or the nature of knowledge—that inform their questions.		**Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** a. Identify questions, concepts, and testable hypotheses that guide scientific investigations. **Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.** a. Identify new problems or a current design in need of improvement.
B) Designing investigations—Learners know how to design		**Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations,**

investigations to answer particular questions about the environment. They are able to develop approaches for investigating unfamiliar types of problems and phenomena. • Select appropriate means of inquiry, including scientific investigations, historical inquiry, and social science observation and research. • Select and develop appropriate problem solving strategies for conducting environmental investigations. • Incorporate a wide range of tools and technologies as appropriate, including complex maps, measurement instruments and processes, and computer-based analysis.		**including experiments guided by a testable hypothesis.** b. Design and safely conduct methodical scientific investigations, including experiments with controls. **Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.** b. Generate alternative design solutions. c. Select the design that best meets established criteria.
C) Collecting information—Learners are able to locate and collect reliable information for environmental investigations of many types. They know how to use sophisticated technology to collect information, including computer programs that access, gather, store, and display data. • Use basic sampling techniques such as spatial sampling and random sampling. Evaluate when these techniques are appropriate. • Apply data collection skills in field situations, such as interviewing community members about environmental concerns or sampling water in a local stream. • Gather information from a variety of sources including historical sites, censuses, tax records, statistical compilations, economic indicators, interviews or surveys, geographical information systems, and other data banks. • Adjust information collection strategies to compensate for potential bias in information sources. • Perform basic statistical analyses to describe data using quantitative measures such as mean, median and		**Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** c. Use statistics to summarize, describe, analyze, and interpret results.

mode.		
D) Evaluating accuracy and reliability—Learners can apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources. • Identify logical errors and spurious statements in everyday situations such as political speeches about the environment or commercial advertising. • Look for and explain flaws such as faulty or misleading use of statistics, misrepresentation of data that is presented graphically, or biased selection of data to support a claim. For example, analyze the public debate over an environmental issue. Examine speeches, advertisements, news releases, and pamphlets put out by groups on various sides of the issue. • Explain why some research results are judged to be more credible than are others. Consider factors such as possible sources of bias in interpretation, funding sources, and research procedures.		ELA **Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.** f. Evaluate the solution to a design problem and the consequences of that solution. **Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** e. Use a variety of tools and technologies to improve investigations and communications.
E) Organizing information—Learners are able to organize and display information in ways appropriate to different types of environmental investigations and purposes. • Attend to details such as the type and accuracy of data, scale, accuracy of representation, and ease of interpretation. • Evaluate the strengths and weaknesses of the particular means of presentation for different purposes. • Work with technology designed to relate and display data, such as database and mapping software. • Integrate and summarize information using a variety of media ranging from written texts to graphic representations, and from audiovisual materials to maps and computer-generated images.		**Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** c. Use statistics to summarize, describe, analyze, and interpret results. **Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.** g. Present the problem, design process, and solution to a design problem including models, diagrams, and demonstrations.
F) Working with models and simulations—Learners are	√-	Mathematics

able to create, use, and evaluate models to understand environmental phenomena. • Use algebraic and geometric models to represent processes or objects such as movement along earthquake fault lines, traffic flows, or population growth. • Use computers to create models and simulations. For example, project the effects of habitat fragmentation on species diversity, the air-quality effects of a new factory, the economic impacts of proposed water quality rules, or the visual changes a new housing development will make on the landscape. • Compare the applicability of models for particular situations, considering the models' assumptions as one factor. Explain how a single model may apply to more than one situation and how many models may represent a single situation. • Evaluate and report the limitations of models used.		**Students evaluate the effectiveness of a *model* by comparing its predictions to actual observations from the physical setting, the living environment, and the technological world.**
G) Drawing conclusions and developing explanations— Learners are able to use evidence and logic in developing proposed explanations that address their initial questions and hypotheses. • Use basic statistical analysis and measures of probability to make predictions and develop interpretations based on data. • Differentiate between causes and effects and identify when causality is uncertain. • Speak in general terms about their confidence in proposed explanations as well as possible sources of uncertainty and error. Distinguish between error and unanticipated results in formulating explanations. Consider the assumptions of models and measuring techniques or devices as possible sources of error. • Identify what would be needed to reject the proposed explanation or hypothesis. • Based on experience, develop new questions to ground further		**Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.** f. Recognize and analyze alternative explanations and *models* using scientific explanations and *models* using scientific criteria. g. Communicate and defend scientific ideas. **Students use a systematic process, tools and techniques, and a variety of** **of materials to design and produce a solution or product that meets new needs or improves existing designs.** **materials to design and produce a solution or product that meets new needs or improves existing designs.** f. Evaluate the solution to a design problem and the consequences of that solution. g. Present the problem, design process, and solution to a design

inquiry. For example, draw on the results of a stream-monitoring project to develop questions that guide an investigation into water quality issues in the community or the watershed.		problem including models, diagrams, and demonstrations.
Strand 2.1–The Earth as a Physical System Guidelines: A) Processes that shape the Earth—Learners understand the major physical processes that shape the Earth. They can relate these processes, especially those that are large-scale and long-term, to characteristics of the Earth. • Relate different types of climate to processes such as the transfer of heat energy, wind and ocean currents, and the cycling of water. • Use examples such as the El Niño effect or the Santa Ana winds to illustrate how changes in wind patterns or ocean temperatures can affect weather in different parts of the world. • Explain distinctive landforms in terms of the physical processes (particularly those related to changes in the Earth's crust or long-term processes such as erosion) that shaped them. • Describe possible relationships between surface water and ground water. For example, create a model or a cross-sectional drawing that shows surface- and groundwater flows in a local drainage. Explain why surface and ground water are related in these ways.		**Students describe and analyze the biological, physical, energy, and human influences that shape and alter Earth Systems**. a. Describe and analyze the effect of solar radiation, ocean currents, and atmospheric conditions on the Earth's surface and the habitability of Earth. c. Describe and analyze the effects of biological and geophysical influences on the origin and changing nature of Earth Systems. d. Describe and analyze the effects of human influences on Earth Systems.
B) Changes in matter—Learners apply their understanding of chemical reactions to round out their explanations of environmental characteristics and everyday phenomena. • Explain everyday chemical reactions such as burning fossil fuels, photosynthesis, or the creation of smog in terms such as the release or consumption of energy, the products of these reactions, and how these	√-	**Students describe the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy.** b. Describe how the number and arrangement of atoms in a molecule determine a molecule's properties, including the types of bonds it makes with other molecules and its mass, and apply this to predictions about chemical reactions. c. Explain the essential roles of carbon and water in life processes.

products may be involved in further chemical reactions and/or affect biogeochemical cycles. • Explain the chemical components of biological processes such as photosynthesis, respiration, nitrogen fixation, or decomposition, and how biological and physical processes fit in the overall process of biogeochemical cycling. • Explain why elements cycle through the biosphere at different rates, describing influences on reaction rates. (Oxygen and nitrogen cycle quickly, for example, while phosphorus tends to be released from its immobile form more slowly, depending upon factors such as soil acidity.)		e. Describe factors that affect the including concentration, pressure, temperature, and the presence of molecules that encourage interaction with other molecules). f. Apply an understanding of the factors that affect the rate of chemical reaction to predictions about the rate of chemical reactions. g. Describe nuclear reactions, including fusion and fission, and the energy they release.
C) Energy—Learners apply their knowledge of energy and matter to understand phenomena in the world around them. • Compare different means of generating electricity (such as coal-burning plants, nuclear fusion reactors, wind, geothermal, and hydropower) in terms of the transformation of energy among forms, the relationship of matter and energy, and efficiency/production of heat energy. • Explain differences in conductivity among materials and relate these ideas to real-world phenomena. • Compare the efficiency of various types of motors or heating systems. • Use the laws of thermodynamics to explain why natural systems need a certain amount of energy input to maintain their organization.	√-	**Students describe the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy.** g. Describe nuclear reactions, including fusion and fission, and the energy they release. J. Describe how in energy transformations the total amount of energy remains the same, but because of inefficiencies (*heat*, sound, and vibration) useful energy is often lost through radiation or conduction. k. Apply an understanding of energy transformations to solve problems.
Guidelines: **A) Organisms, populations, and communities—**Learners understand basic population dynamics and the importance of diversity in living systems. • Discuss the relationship of habitat changes to plant and animal populations. Consider such factors as variations in habitat size,		**Students describe and analyze the evidence for relatedness among and within diverse populations of organisms and the importance of biodiversity**. a. Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to

fragmentation, and fluctuation in conditions such as pH, oxygen, available light, or water level. For example, describe the effects of a lake's eutrophication on plant, insect, bacteria, and fish populations. • Discuss some of the ways in which populations can change over time, using ideas such as cyclic fluctuations, equilibrium, and coupled oscillations. Evaluate influences on population growth rate, including reproductive strategies and resource limitations. • Explain how diversity of characteristics among organisms of a species increases the likelihood of the species surviving changing environmental conditions. • Explain how variation among species in a system increases the likelihood that at least some species will survive changes in environmental conditions.		survive in a changing environment. d. Analyze the effects of changes in biodiversity and predict possible consequences. **Students describe and analyze the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change.** b. Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic fluctations and apply that knowledge to actual situations. c. Explain the concept of *carrying capacity* and list factors that determine the amount of life that any environment can support.
B) Heredity and evolution—Learners understand the basic ideas and genetic mechanisms behind biological evolution. • Describe the mechanisms of natural selection, incorporating factors such as genetic variation, the effect of inherited characteristics on individual survival and reproduction within a given environment, and the effects of environmental change. • Use the theory of natural selection and concepts such as mutation, gene flow, and genetic drift to account for the adaptation of species to specific environments. • Explain the idea that the more biological diversity there is today, the more there may be in the future. Offer examples of exceptions to this general rule, and use it to help explain past mass extinctions.		**Students describe the interactions between and among species, populations, and environments that lead to natural selection and evolution.** a. Describe the premise of biological evolution, citing evidence from the fossil record and evidence based on the observation of similarities within the diversity of existing organisms. b. Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation. c. Explain why some organisms may have characteristics that have no apparent survival or reproduction advantage. d. Relate structural and behavioral adaptations of an organism to its survival in the environment. **Students examine the role of DNA in transferring traits from generation to generation, in differentiating cells, and in**

		evolving new species. a. Explain some of the effects of the sorting and recombination of genes in sexual reproduction. d. Describe the possible causes and effects of gene mutations.
C) Systems and connections—Learners understand the living environment to be comprised of interrelated, dynamic systems. • Apply the concepts of ecosystem and ecoregion to organize the multitude of relationships among organisms and environments encountered in earlier studies. • Discuss the interactions among organisms and their environments. Explain ecosystem change with respect to variables such as climate change, the introduction of new species, and human impacts; and explain processes such as desertification and soil formation as mechanisms for such change. • Describe succession in ecosystems and their constituent plant and animal communities. Illustrate this idea with examples such as the slow transformation of a volcanic island from barren rock to rain forest as initial plant colonizers create conditions favorable to other species, or the more rapid changes that occur after beavers dam a stream. • Describe how adding a species to, or removing one from, an ecosystem may affect other organisms and the entire system.		**Students identify and analyze examples of constancy and change that result from varying types and rates of change in physical, biological, and technological systems with and without *counterbalances*.**
D) Flow of matter and energy—Learners are able to account for environmental characteristics based on their knowledge of how matter and energy interact in living systems. • Illustrate how energy for life is provided primarily by		**Students describe and analyze the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change.** c. Explain the concept of *carrying capacity* and list factors that determine the amount of life that any environment can support.

continual inputs from the sun, captured by plants through photosynthesis and converted into carbon-based molecules. Describe exceptions such as geothermal and natural nuclear energy. • Trace the flow of matter and energy through living systems, and between living systems and the physical environment. For example, show how oxygen is released to the atmosphere by the interaction of plants, animals, and non-living matter in the carbon cycle. Or use the carbon cycle to explain the existence of fossil energy sources. • Explain how the abundance and distribution of living organisms are limited by the available energy and certain forms of matter such as water, oxygen, and minerals.		d. Describe the critical role of photosynthesis and how energy and the chemical elements that make up molecules are transformed in ecosystems and obey basic conservation laws.
Strand 2.3–Humans and Their Societies Guidelines: **A) Individuals and groups—**Learners understand the influence of individual and group actions on the environment, and how groups can work to promote and balance interests. • Predict how the environmental effects of their personal actions might change over time. Consider variables such as technological advances, lifestyle changes, or taking on such roles as business owners, employees in various careers, or parents. • Analyze how the actions of societal organizations such as businesses or community groups may have environmental consequences and other impacts that go beyond the intended aims of the group. • Describe how particular groups meet or balance individual needs, group goals, and the common societal good. Use examples such as conservation organizations, organizations of professionals in environmental or resource management fields,		D1d offers weak alignment; no strong connection with individuals and groups on the environment (or like issue).

community associations, or business groups.		
B) Culture—Learners understand cultural perspectives and dynamics and apply their understanding in context. • Analyze how cultural change and altered views of the environment are related. For example, discuss how the shift away from a largely rural society to a predominantly urban one may influence changing perceptions of the environment. • Recognize diverse cultural views about humans and the environment. Anticipate ways in which people from different cultural perspectives and frames of reference might interpret data, events, or policy proposals. • Describe and compare historical and contemporary societal strategies for adapting to environmental or social change while preserving and transmitting culture. For example, describe ways resource dependent communities (those whose economies traditionally relied on activities such as mining or timber harvest) work to maintain their identities in the face of mine closures or declining timber harvests.		Some limited connections include B3b, C2c, D1c. But better options include those below for the impact of cultural perspective. **D2: Students understand geographic aspects of unity and diversity in Maine, the United States, and the world, including Maine Native American communities.** b. Analyze the dynamic relationship between geographic features and various cultures, including the cultures of Maine and other Native Americans, various historical and recent immigrant groups in the United states, and other cultures in the world. **E1: Students understand major eras, major enduring themes, and historic influences in United States and world history, including the roots of democratic philosophy, ideals, and institutions in the world.** d. Analyze and critique varying interpretations of historic people, issues, or events, and explain how evidence is used to support different interpretations.
C) Political and economic systems—Learners understand how different political and economic systems account for, manage, and affect natural resources and environmental quality. • Explain the development of economic systems using the economic idea of scarcity and the geographic idea of uneven distribution of resources. • Compare the U.S. political and economic systems with other types of systems, focusing on how the systems govern the use of natural resources, control production and		**B3: Students understand political and civic aspects of unity and diversity in Maine, the United States, and the world, including Maine Native Americans.** b. Analyze the political structures, political power, and political perspectives of diverse cultures including those of Maine and other Native Americans, various historical and recent immigrant groups in Maine and the United States, and those of various world cultures. **C2: Students understand economic aspects of unity and**

consumption, and protect environmental quality. • Evaluate the environmental and societal costs and benefits of allocating goods and services in different ways (e.g. through public or private sectors). For example, explain problems such as over-fishing, overgrazing, and deforestation considering what can happen to resources that are commonly owned and openly accessible. Or examine successful common property management systems that promote sustainable use of resources. • Explain current and historical environmental issues in terms of political and economic ideas. For example, analyze the role of private property rights and the concept of general welfare in shaping decisions about the use and protection of wetlands in the United States. • Evaluate the structure and functions of the United Nations and its agencies in addressing global environmental issues.		**diversity in Maine, the United States, and the world, including Maine Native American communities.** b. Compare a variety of economic systems and the economic development of Maine, the United States, and various regions of the world that are economically diverse. c. Analyze wealth, poverty, resource distribution, and other economic factors of diverse cultures, including Maine Native Americans and other Native Americans, various historical and recent immigrant groups in Maine and the United States, and various world cultures.
D) Global connections—Learners are able to analyze global social, cultural, political, economic, and environmental linkages. • Explain regional and national economic specialization and international trade in terms of uneven distribution of resources and differing costs of producing similar goods (due to factors such as climate, labor costs, and energy costs). • Describe global connections in systems such as the economy, transportation, and communication. Evaluate the effects of changes in these systems on communities and the environment on a global scale. Consider instances in which global linkages are strong, and in which they are relatively weak. • Evaluate the connections among interests, decisions, and actions taken at the individual, community,		Interesting – there are lots of the components (D1a, C1f, C2c, B3b) for the "global connections" as described above there's no outcome in MLRs that tasks students to analyze the linkages in a global context.

regional, national, and global levels. Consider their effect on global issues such as human rights, economic development, health, resource allocation, and environmental quality. For example, examine the influence of factors such as consumer preferences, U.S. foreign policy, international treaties and governing bodies, international nongovernmental organizations, and corporate operations on agricultural practices in developing nations.		
E) Change and conflict—Learners understand the functioning of public processes for promoting and managing change and conflict, and can analyze their effects on the environment. • Explain how public decision-making about the environment takes into account (or fails to account for) uneven distribution of, or different types of, costs and benefits; future or distant consequences; and difficulties assessing the value of certain costs or benefits such as ecosystem services or clean air. • Evaluate the role of social, political, and economic institutions in the United States in managing change and conflict regarding environmental issues. Account for the influence of institutions such as the legal system and property rights as well as organizations such as banks, nonprofit groups, corporations, and special interest groups. • Evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nations. Look particularly at the effects of these forces on the control of natural resources. For example, examine the origins and effects of international treaties and accords on whaling or commercial fishing. • Evaluate various governmental and non-governmental strategies for promoting social change. For example,		This is a complex outcome and while some components are included in MLRs, there is no clear alignment.

trace the strategies used by different groups to reduce energy use in the U.S.		
Strand 2.4–Environment and Society Guidelines: **A) Human/environment interactions—**Learners understand that humans are able to alter the physical environment to meet their needs and that there are limits to the ability of the environment to absorb impacts or meet human needs. • Evaluate ways in which technology has changed humans' ability to alter the environment and its capacity to support humans and other living organisms. Consider technologies that have had impacts learners see as positive, as well as negative. • Analyze specific examples of environmental change in terms of qualitative and quantitative costs and benefits for different groups of people and specific species or ecosystems. • Describe factors that limit the physical environment's capacity to support particular types of human activity such as suburban development, flood control, or particular agricultural practices. • Evaluate the cumulative effects of human actions on a specific species or environmental system, such as a stream or a watershed. • Use the concepts of carrying capacity and ecological footprint to analyze the sustainability of current trends in world population growth and natural resource consumption.		**D1: Students understand the geography of the United States and various regions of the world and the effect of geographic influences on decisions about the present and future.** d. Evaluate the impact of change, including technological change, on the physical and cultural environment. **D2: Students understand geographic aspects of unity and diversity in Maine, the United States, and the world, including Maine Native American communities.** a. Analyze geographic features that have impacted unity and diversity in the United States and other nations and describe their effects. b. Analyze the dynamic relationship between geographic features and the various cultures, including the cultures of Maine and other Native Americans, various historical and recent immigrant groups in the United States, and other cultures in the world.
B) Places—Learners understand "place" as humans endowing a particular part of the Earth with meaning through their interactions with that environment. • Analyze how places change over time as the physical		**D1: Students understand the geography of the United States and various regions of the world and the effect of geographic influences on decisions about the present and future.**

environment changes and as human use and perceptions change. For example, examine the effects of automobiles and the interstate highway system on different places. • Explain the importance of places to human identity. For example, discuss changes in land use and personal and community identity that occur in a rapidly growing town or city, or one in which the economy has stagnated. • Describe how regions change over time, examining factors such as human migration and population change, technological change, environmental degradation, and seismic activity. For example, trace the causes of the desiccation of the Aral Sea and the changes it has prompted in that region of Russia.		a. Explain that geography includes the study of physical, environmental, and cultural features at the local state, national and global levels and helps people to better predict and evaluate consequences of geographic influences. d. Evaluate the impact of change, including technological change, on the physical and cultural environment. **D2: Students understand geographic aspects of unity and diversity in Maine, the United States, and the world, including Maine Native American communities.** b. Analyze the dynamic relationship between geographic features and the various cultures, including the cultures of Maine and other Native Americans, various historical and recent immigrant groups in the United States, and other cultures in the world.
C) Resources—Learners understand that the importance and use of resources change over time and vary under different economic and technological systems. • Explain differences in the consumption of resources among nations using factors such as population size, cultural practices, and varied geographic or economic distribution of resources. • Describe how changes in technology alter the use of resources. Illustrate with examples such as the ability to harvest timber on steep slopes using helicopters or building technologies that incorporate nontraditional or recycled materials. • Evaluate public policies related to resource use. Consider variables such as their impacts on the resource and short- and long-term economic effects. For example, anticipate the relationship between water use and the growth of a city like Las Vegas, Nevada, which is in a		**C1: Students understand the principles and processes of personal economics, the role of markets, the economic systems of the United States, and other economic systems in the world, and how economics serves to inform decisions in the present and future.** e. Analyze economic activities and policies in relationship to freedom, efficiency, equity, security, growth, and sustainability. **C2: Students understand economic aspects of unity and diversity in Maine, the United States, and the world, including Maine Native American communities.** c. Analyze wealth, poverty, resource distribution, and other economic factors of diverse cultures, including Maine Native Americans and other Native Americans, various historical and recent immigrant groups in Maine and the United States, and various world cultures.

desert area that receives only four inches of rainfall per year. • Identify ways in which various resources can be recycled and reused. Evaluate the viability of recycling based on economic and technological factors, spatial variables such as distance from recycling facility to markets, and possible future developments. For example, discuss factors that influenced the development of the steel or plastics recycling industry in the United States.		**D1: Students understand the geography of the United States and various regions of the world and the effect of geographic influences on decisions about the present and future.** c. Analyze local, national, and global geographic data on physical, environmental, and cultural processes that shape and change places and regions.
D) Technology—Learners are able to examine the social and environmental impacts of various technologies and technological systems. • Explain how social and economic forces influence the direction of technological development, and how technologies shape societal values and beliefs. For example, consider the ability to build large dams for water storage or hydropower, or the social impact of the first photos of the Earth from space. • Using examples of particular technologies (such as genetic manipulation or cyanide heap leach gold mining) or technological systems (such as modern agriculture or energy production and use), discuss the social and environmental costs, benefits, risks, and possibilities associated with technologies through which humans shape and control their environment. • Discuss ways in which technological advances have lessened the adverse environmental impacts of human activities.		**D1: Students understand the geography of the United States and various regions of the world and the effect of geographic influences on decisions about the present and future.** d. Evaluate the impact of change, including technological change, on the physical and cultural environment. **Students describe the role of science and technology in creating and solving contemporary issues and challenges.** a. Explain how science and technology influence the *carrying capacity* and sustainability of the planet. c. Explain how ethical, societal, political, economic, religious, and cultural factors influence the development and use of science and technology.
E) Environmental issues—Learners are familiar with a range of environmental issues at scales that range from local to national to global. They understand that these scales and issues are often linked.		**Students describe the role of science and technology in creating and solving contemporary issues and challenges.** a. Explain how science and technology influence the *carrying capacity* and sustainability of the planet. b. Explain how ethical, societal, political, economic, and cultural

• Evaluate a range of costs and benefits of particular policies that affect the environment. For example, consider the effects of free trade agreements on the ability of signatory nations to protect the environment, or examine the effects of programs for trading "pollution credits" among companies. • Place local issues in the context of broader or larger scale issues, drawing parallels, and noting important similarities and differences. Use the broader issue to point to important local dynamics or perspectives of which to be aware. For example, consider local air pollution problems in the context of larger issues such as global climate change or acid precipitation in other parts of the country. • Identify links among issues, for example the relationships among traffic congestion, poor air quality, and suburban sprawl. Explain key relationships among technological, social, ecological, economic, and other aspects of issues.		factors influence personal health, safety, and the quality of the environment. c. Explain how ethical, societal, political, economic, religious, and cultural factors influence the development and use of science and technology. Again there are components of this in MLR but the alignment falls short of understanding "that these scales and issues are often linked."
Strand 3– Skills for Understanding and Addressing Environmental Issues Strand 3.1–Skills for Analyzing and Investigating Environmental Issues Guidelines: **A) Identifying and investigating issues—**Learners apply their research and analytical skills to investigate environmental issues ranging from local issues to those that are regional or global in scope. • Define and clearly articulate issues to be investigated. Characterize the issue considering factors such as connections with other issues, the pervasiveness of its effects, whether it is a long-term issue or one that is motivated by a sudden change or crisis, and whether it is unique to a particular area.		Social Studies – no alignment

• Identify key individuals and groups involved. Identify different perspectives on the issue and approaches to resolving it. Discuss assumptions and goals that underlie each position. • Examine contextual elements that shape the issue and alternative courses of action. Use these to identify relevant historical antecedents or contemporary parallels to the selected issue. For example, in studying questions surrounding the preservation of natural areas in Central America, students may look for similar issues in other developing nations, regions where people maintain traditional or subsistence uses of the land, or areas with similar governmental regimes. • Investigate the issue as well as similar issues and proposals using secondary sources of information. • Where needed, conduct original research, applying research methods from the natural and social sciences. For example, survey a community about an environmental issue using a random sample or test soils for the presence of contaminants.		
B) Sorting out the consequences of issues—Learners are able to evaluate the consequences of specific environmental changes, conditions, and issues for human and ecological systems. • Evaluate the consequences of an environmental issue. For example, bring to bear historical perspectives, an understanding of the impacts of different technological developments, and knowledge of similar issues. • Discuss the social, political, economic, and ethical implications of environmental issues. For example, trace the root causes of a community's solid waste problem and the effects of the problem and likely consequences of siting a		Social Studies – no alignment **Students describe the role of science and technology in creating and solving contemporary issues and challenges.** a. Explain how science and technology influence the *carrying capacity* and sustainability of the planet. b. Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety, and the quality of the environment.

landfill in different areas for different groups of people. • Project the likely consequences for specific human and environmental systems of failure to resolve the issue. • Use the idea of cumulative effects to explain why one set of environmental changes or human actions cannot be considered in isolation from others.		
C) Identifying and evaluating alternative solutions and courses of action—Learners are able to identify and propose action strategies that are likely to be effective in particular situations and for particular purposes. • Synthesize different perspectives, types of data, and means of analysis to propose solutions to environmental issues. • Apply knowledge of functional relationships, modeling, and statistical analysis to evaluating issues and different approaches to resolving them. For example, do basic traffic flow analyses to project the likely affects of commercial developments at the outskirts of town and evaluate alternative solutions such as widening roads, providing bus service, or changing the location of the development. Predict other likely consequences of different approaches to resolving projected traffic problems associated with the new stores. • Evaluate proposed solutions using gauges such as likely impacts on society or the environment and likely effectiveness in resolving the issue. Use methods such as cost/benefit analysis, cumulative effects analysis, environmental impact analysis, ethical analysis, and risk analysis. Describe the strengths and weaknesses of each method, considering the main ideas behind each approach including which effects are important to look at and which values or societal goals it tries to protect.		**Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.** a. Identify new problems or a current design in need of improvement. b. Generate alternative design solutions. c. Select the design that best meets established criteria. d. Use *models* and simulations as prototypes in the design planning process. e. Implement the proposed design solution. f. Evaluate the solution to a design problem and the consequences of that solution. g.Present the problem, design process, and solution to a design problem including models, diagrams, and demonstrations.

• Define and provide examples of citizen action appropriate to proposed solutions.		
D) Working with flexibility, creativity, and openness— While environmental issues investigations can bring to the surface deeply held views, learners are able to engage each other in peer review conducted in the spirit of open inquiry. • Question, offer alternative explanations, and defend interpretations in group discussions. • Understand and explain the importance of such characteristics as honesty, openness, skepticism, and suspending judgment in the process of building knowledge. • Discuss when and how characteristics such as openness and decisiveness are valuable in addressing environmental issues.		**Career and Education Development – no alignment** **A2: Students make individual and collaborative decisions on matters related to social studies using relevant information and research, discussion, and ethical reasoning skills.** a. Develop individual and collaborative decisions/ plans by considering multiple points of view, weighing pros and cons, building on the ideas of others, and sharing information in an attempt to sway the opinions of others.
Strand 3.2–Decision-Making and Citizenship Skills Guidelines: **A) Forming and evaluating personal views—**Learners are able to communicate, evaluate, and justify their own views on environmental issues and alternative ways to address them. • Articulate a position on an environmental issue. Justify the position based on an analysis of information from a variety of sources, personal beliefs and values, and clear reasoning. • Evaluate personal beliefs and values using criteria such as personal wellbeing; social and environmental welfare; economic vitality; and concern for other living beings. • Articulate elements of their own environmental ethic and discuss whether personal positions on issues are consistent with this ethic. • Consider viewpoints that differ from their own, and		**A1a, offers weak alignment but as noted in the grade 8 guidelines the MLRs do not ask students to evaluate the personal beliefs and values – it's far more research-driven.**

information that challenges their position. Evaluate whether and how such information might affect their views.		
B) Evaluating the need for citizen action—Learners are able to decide whether action is needed in particular situations and whether they should be involved. • Evaluate whether action is warranted in specific situations, accounting for factors such as available evidence about the issue and proposed solutions; the scale of the issue; legal, social, economic, and ecological consequences; and alternatives to citizen action. • Evaluate whether personal involvement in particular actions is warranted, considering factors such as their own values, skills, resources, and commitment. • Communicate decisions clearly, articulating well-reasoned arguments supporting their views and decisions.		**See notes on grade 8 document – A3 in MLRs does not ask students to evaluate whether personal involvement is warranted.**
C) Planning and taking action—Learners know how to plan for action based on their research and analysis of an environmental issue. If appropriate, they take actions that are within the scope of their rights and consistent with their abilities and responsibilities as citizens. • Develop plans for individual and collective action involving groups such as a small group of classmates, a school club, a community organization, or a church. Include clear reasons and goals for action. In planning, refer to their knowledge of a range of citizen action strategies and the results of their environmental issue investigations. • Develop action plans based on an understanding of the complexity of the issue. Set realistic goals and include measures of success consistent with their abilities and the capacities of the groups involved. • Decide whether their plan should be implemented immediately or at another time, modified, or abandoned; and carry through with action when		**A3: Students select, plan, and implement a civic action or service-learning project based on a community, school, State, national, or international asset or need, and evaluate the project's effectiveness and civic contribution.**

appropriate.		
D) Evaluating the results of actions—Learners are able to evaluate the effects of their own actions and actions taken by other individuals and groups. • Discuss the intended and unintended effects of citizen actions on specific environmental issues. Consider the apparent effects of citizen action on the environment, the political situation, and the individuals involved. Illustrate with examples such as a demonstration at a nuclear test facility, a local watershed festival, or a citizen lobbying effort against proposed environmental regulations. • Analyze their own actions, evaluating apparent effects in terms of learners' goals, ethics, and broader societal goals. Develop a "lessons learned" document or presentation. • Account for some of the difficulties they encounter in evaluating the results of their actions.		Again see notes in Grade 8 document. **A3: Students select, plan, and implement a civic action or service-learning project based on a community, school, State, national, or international asset or need, and evaluate the project's effectiveness and civic contribution.**
Guidelines: **A) Understanding societal values and principles—** Learners know how to analyze the influence of shared and conflicting societal values. • Identify shared political values and principles that unite U.S. citizens and analyze conflicting views about their meaning and application. For example, examine conflicting views about how to protect general welfare and private property rights in a specific land-use decision where a lawsuit has been filed alleging a "taking" of private property rights by the government. • Analyze how societal institutions, such as banks, corporations,		**B1: Students understand the ideals, purposes, principles, structures, and processes of constitutional government in the United States and in the American political system, as well as examples of other forms of government and political systems in the world.** c. Explain how and why democratic institutions and interpretations of democratic ideals and constitutional principles change over time. **B2: Students understand the constitutional and legal rights, the civic duties and responsibilities, and roles of citizens in a constitutional democracy and the role of citizens living**

nonprofit organizations, lobbying groups, government agencies, and the courts, embody and perpetuate certain societal values and principles. • Describe and suggest ways that individuals can work to change how societal institutions function and, consequently, to change their environmental impacts.		**under other forms of government in the world.** e. Evaluate how people influence government and work for the common good including voting, writing to legislators, performing community service, and engaging in civil disobedience.
B) Recognizing citizens' rights and responsibilities— Learners understand the importance of exercising the rights and responsibilities of citizenship. • Evaluate conflicts between individual rights and other societal interests such as a healthy environment. Discuss when individuals' civic obligations require them to subordinate their personal interests or desires to the public good. • Explain the importance and evaluate the usefulness of civic dispositions such as trust, patience, self-discipline, respect, and open-mindedness to individuals and to society. • Explain the influence of citizen action and public opinion on particular policy decisions that affect the environment. • Reflect on the impact of citizen participation— particularly learners' own—on public concerns related to the environment and on the community.		**B2: Students understand the constitutional and legal rights, the civic duties and responsibilities, and roles of citizens in a constitutional democracy and the role of citizens living under other forms of government in the world.** a. Explain the relationship between constitutional and legal rights, and civic duties and responsibilities in a constitutional democracy. e. Evaluate how people influence government and work for the common good including voting, writing to legislators, performing community service, and engaging in civil disobedience.
C) Recognizing efficacy—Learners possess a realistic self-confidence in their effectiveness as citizens. • Evaluate the extent to which individual and group action creates change, meets individual needs, and promotes the common good. • Identify ways in which learners, individually and collectively, are able to help maintain environmental quality and resolve problems and issues. Provide examples from the range of communities (e.g., family, club or group, school, town, state, nation, world) in which learners see themselves as members.		Social Studies? – no alignment **Career and Education Development- no alignment**

D) Accepting personal responsibility—Learners understand that their actions can have broad consequences and accept responsibility for recognizing those effects and changing their actions when necessary. • Evaluate the effects of their actions (and the actions of the larger social groups of which they are part) on the environment, other humans, and other living things. • Explain ways in which the decisions of one generation create opportunities and impose constraints for future generations. Illustrate this idea with examples from the past, and incorporate it into their analyses of issues. • Evaluate the importance of fulfilling personal responsibilities for themselves, society, and the environment. • Demonstrate a willingness to work individually and collectively toward the resolution of environmental issues and to participate thoughtfully and effectively in environmental decision-making.		**Career and Education Development – weak alignment** **Students demonstrate behaviors that reflect positive *interpersonal skills* and evaluate successful strategies that improve positive *interpersonal skills* in ways that lead to success in a variety of school, work, and community settings.** a. Getting along with others b. Respecting diversity c. Working as a member of a team d. Managing conflict e. Accepting/giving/using constructive feedback f. Accepting responsibility for personal behavior g. Demonstrating ethical behavior h. Following established rules/etiquette for observing/listening i. Demonstrating safe behavior j. Dealing with peer pressure **B2: Students understand the constitutional and legal rights, the civic duties and responsibilities, and roles of citizens in a constitutional democracy and the role of citizens living under other forms of government in the world.** e. Evaluate how people influence government and work for the common good including voting, writing to legislators, performing community service, and engaging in civil disobedience.