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**food and fibre: years 7 and 8**

The following table identifies how the key aspects of understanding food and fibre production are evident in content descriptions from across the Australian Curriculum Version 9.0. From this information, teachers can develop a sequential program for learning about food and fibre by connecting the key aspects of learning with learning area and subject-specific content descriptions.

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| Years 7 and 8 | | | |
| Key aspect 1: Sustaining life | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * researching current information on animal welfare when designing an animal shelter or researching intellectual property or the significance of offshore manufacturing in a country in Asia when designing a 3D printed product |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * investigating techniques used by land managers for managing and reducing bushfires in forests, for example techniques used by local First Nations Australians or smart technologies such as Internet of Things (IoT) sensors, artificial intelligence, cameras and drones |
| **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * analysing traditional First Nations Australians’ food and fibre sources for potential species that offer benefits in sustainability, such as conserving water use and resources needed for processing * outlining physical and chemical characteristics of soil and their effects on plant growth when producing food and fibre products, for example comparing the effect on soil characteristics of different farming practices |
| **Knowledge and understanding**  Technologies context: Materials and technologies specialisations | analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions  AC9TDE8K06 | * investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres * investigating a broad range of technologies – tools, equipment, processes, materials, systems and components − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability * considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and a country in Asia; the properties of textile fibres and fabrics that determine end use in a range of settings such as architecture, medicine, sport and automotive * explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber * investigating carbon fibres (reinforced polymers) and graphite fibres which are strong, stiff, lightweight material used in specialised high-performance products, for example on the design of sporting equipment |
| **Digital Technologies** | **Processes and production skills**  Producing and implementing | implement, modify and debug programs involving control structures and functions in a general-purpose programming language  AC9TDI8P09 | * reading and interpreting an existing program and modifying the code to change functionality and fix errors, for example taking existing code for a weather forecasting app that includes temperatures and improving the output to include extra information such as rainfall, UV levels and air quality * writing a program that receives data from the environment to change the program behaviour, for example reading moisture level data from a soil sensor and switching on the watering system |

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| **Science – Year 7** | **Science understanding**  Biological sciences | investigate the role of classification in ordering and organising the diversity of life on Earth and use and develop classification tools including dichotomous keys  AC9S7U01 | * observing and identifying the similarities and differences of particular features within and between groups of organisms * creating and modifying a dichotomous key to classify organisms into groups and groups within groups * naming and classifying species using scientific conventions from the Linnaean hierarchical classification system, such as kingdom, phylum, class, order, family, genus, species * considering the reasons for classifying living things, such as identification and communication * examining how biological classification has changed over time through improvements in microscopy * investigating First Nations Australians’ systems of classifying living things and how these systems differ from those used by contemporary science |
| use models, including food webs, to represent matter and energy flow in ecosystems and predict the impact of changing abiotic and biotic factors on populations  AC9S7U02 | * analysing food webs to show feeding relationships between organisms in an ecosystem and the role of microorganisms * modelling how energy flows into and out of an ecosystem via the pathways of food webs * predicting the effects on local ecosystems when living things such pollinators or predators are removed from or die out in an area * examining how events such as seasonal changes, destruction of habitat or introduction of a species impact abiotic and biotic factors and cause changes to populations * investigating First Nations Australians’ responses to invasive species and their effect on food webs that many communities are a part of, and depend on, for produce and medicine * considering how First Nations Australians’ fire management practices over tens of thousands of years have changed the distribution of flora and fauna in most regions of Australia |
| **Science understanding**  Earth and space sciences | model cyclic changes in the relative positions of the Earth, sun and moon and explain how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides  AC9S7U03 | * examining the effect of the gravitational attraction of the moon and the sun on Earth's oceans and describing how the relative positions of the moon and sun with respect to Earth result in tidal variations * researching knowledges held by First Nations Australians regarding the phases of the moon and the connection between the lunar cycle and ocean tides * investigating First Nations Australians’ calendars and how they are used to predict seasonal changes |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 8** | **Knowledge and understanding**  Landscapes and landforms | the interconnections between human activity and geomorphological processes, and ways of managing distinctive landscapes  AC9HG8K04 | * identifying the interconnections and effects of erosion and sedimentation produced by human activities on the quality of the environment; for example, the effects of overuse of tourist tracks in bushland or the effects of land-clearing for the production of palm oil in Indonesia and Malaysia * explaining the interconnections and effects of mining, quarrying and urban development on the quality of the environment; for example, the interconnections of the quality of the environment and uranium mining in Kakadu, urban development in Singapore or the extension of land area in Tokyo Bay * explaining the effects of river regulation, including dams, locks, channel straightening and drains, on the quality of riverine and wetland environments; for example, the Three Gorges Dam on the Yangtze River in China, or dams and weirs on the Murray–Darling River system * identifying the contribution of the knowledges of First Nations Australians to the use and management of distinctive landscapes; for example, Indigenous Peoples’ Knowledge (IPK) incorporated into modern management of diverse landscapes and landforms such as Kakadu National Park, Uluru, the Great Barrier Reef and the Snowy Mountains |
|  | **Knowledge and understanding**  Changing nations | strategies to manage the sustainability of Australia’s changing urban places  AC9HG8K09 | * examining a strategy used by local, state or national governments to manage projected population growth in one of Australia’s cities or regional urban centres, and identifying implications for sustainability (environmental, economic and social factors) and liveability |
|  | **Skills**  Concluding and decision-making | identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts  AC9HG8S05 | * proposing individual action and supporting the proposal with reasons; for example, reducing waste going to landfill, especially toxic e-waste causing degradation of landscapes, or reducing the large and expanding urban footprint by decreasing the consumption of energy resources as well as eating, working and buying locally * proposing collective action and supporting the proposal with reasons; for example, promoting community awareness of the effects of human–environmental change on significant Australian landforms such as Uluru and the Great Barrier Reef, or encouraging the development of urban and peri-urban agriculture * evaluating the effectiveness of a strategy in relation to environmental, economic and social factors * reflecting on personal values and attitudes and how these influence explanations of potential outcomes; for example, applying sustainable design principles to urban redevelopment projects that provide green, open spaces for citizens |

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| Years 7 and 8 | | | |
| Key aspect 2: Valuing resources | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * investigating traditional and contemporary design and technologies, including from countries across Asia, and predicting how they might change or be sustained in the future in response to technological, environmental or economic change, for example the production of contemporary textile designs using traditional batik techniques and modern dyes in Indonesia |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * investigating techniques used by land managers for managing and reducing bushfires in forests, for example techniques used by local First Nations Australians or smart technologies such as Internet of Things (IoT) sensors, artificial intelligence, cameras and drones * investigating traditional, contemporary and emerging design and technologies, including from a country in Asia, and the need for more sustainable patterns of living, and predicting how they might change in the future in response to social, technological, environmental or economic change, for example the diversity of house design or waste management practices |
| **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * analysing traditional First Nations Australians’ food and fibre sources for potential species that offer benefits in sustainability, such as conserving water use and resources needed for processing * comparing land and water management methods in contemporary Australian food and fibre production with a country in Asia, for example comparing the use of robotics, drones, global positioning system (GPS) technologies, minimum-tillage cropping, water-efficient irrigation and smart farm monitoring and controlling systems for increasing efficiency of farm operations and crop protection, and the impact of cash crops versus staples on social sustainability * investigating how animal and plant crops are grown and the ethical and sustainable techniques used to increase food production, for example comparing the use of herbicides or medicines when producing food and fibre products and recognising the need to increase food production using cost-efficient, ethical and sustainable production techniques |
|  | **Knowledge and understanding**  Technologies context: Materials and technologies specialisations | analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions  AC9TDE8K06 | * investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres * investigating a broad range of technologies – tools, equipment, processes, materials, systems and components − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability * considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and a country in Asia; the properties of textile fibres and fabrics that determine end use in a range of settings such as architecture, medicine, sport and automotive * explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber * investigating carbon fibres (reinforced polymers) and graphite fibres which are strong, stiff, lightweight material used in specialised high-performance products, for example on the design of sporting equipment |
|  | **Processes and production skills**  Evaluating | develop design criteria collaboratively including sustainability to evaluate design ideas, processes and solutions  AC9TDE8P04 | * re-evaluating, iterating and modifying design processes to improve efficiency and increase production, for example when mass producing a product for an enterprise or improving sustainability |
| **Digital Technologies** | **Processes and production skills**  Producing and implementing | implement, modify and debug programs involving control structures and functions in a general-purpose programming language  AC9TDI8P09 | * reading and interpreting an existing program and modifying the code to change functionality and fix errors, for example taking existing code for a weather forecasting app that includes temperatures and improving the output to include extra information such as rainfall, UV levels and air quality * writing a program that receives data from the environment to change the program behaviour, for example reading moisture level data from a soil sensor and switching on the watering system * writing a program that contains nested control structures to perform more complicated branching and decisions, for example using an IF statement inside a loop to count the warm days from an array containing temperature data only when the temperature for each day is more than 20 degrees Celsius |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 7** | **Knowledge and understanding**  Water in the world | classification of environmental resources and the way that water connects and changes places as it moves through environments  AC9HG7K01 | * explaining the environmental, economic or social effects of water as it connects places; for example, the environmental effects of water diversion in the Snowy Mountains, the economic effects of irrigation in the Ord River or the social effects of the Mutitjulu Waterhole connecting Australian First Nations Peoples in Central Australia |

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|  |  | the location and distribution of water resources in Australia, their implications, and strategies to manage the sustainability of water  AC9HG7K02 | * representing the location of Australia’s water resources, such as surface water and groundwater * describing the distribution of Australia’s water resources, and its implications for people; for example, limited access to water for people in rural and remote places and its implications * identifying the causes of variability in water resources or water scarcity; for example, an absolute shortage of water (physical cause), inadequate development of water resources (economic cause), or the ways water is used (such as farming, industry, drinking, washing or watering) * explaining the factors that contribute to variability in water resources or water scarcity; for example, location, climate, topography, seasonality or evaporation * examining why water is a difficult resource for communities to manage and sustain; for example, because of its shared and competing uses, and variability of supply over time * examining how a strategy may manage the sustainability of water resources; for example, recycling (“grey water”), stormwater harvesting and re-use, desalination, inter-regional transfer of water and trade in virtual water, and reducing water consumption |
| the economic, cultural, spiritual and aesthetic value of water for people, including First Nations Australians  AC9HG7K03 | * examining and comparing places in Australia and a country in Asia that have economies and communities based on irrigation; for example, rice production in the Murrumbidgee Irrigation Area in New South Wales and the Mekong Delta in Vietnam |
| **Skills**  Concluding and decision-making | draw conclusions based on the analysis of the data and information  AC9HG7S04 | * drawing on the results of an analysis and using at least one of the concepts of place, space, environment, interconnections, sustainability, scale or change as an organiser to respond to a question; for example, using an analysis of the distribution of water resources to form conclusions about the sustainability of farming, or an analysis of the location of services to form conclusions about interconnections between people, place, environment and liveability * explaining the impacts of a geographical phenomenon or challenge on people, places and environments; for example, impacts of water scarcity on individuals, communities and government, or the impacts of declining water quality on people and the liveability of places |
|  | **Skills**  Communicating | create descriptions, explanations and responses, using geographical knowledge and methods, concepts, terms and reference sources  AC9HG7S06 | * constructing an explanation, using research findings to support ideas; for example, data on water usage over time and at different places; information about liveability indexes for different places in Australia and Europe * developing conclusions, using geographical methods to represent data and information; for example, a map showing water usage and a map indicating water scarcity in Australia; a map representing places where liveability is difficult and dangerous due to environmental factors |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 8** | **Skills**  Questioning and researching using geographical methods | develop questions for a geographical inquiry related to a phenomenon or challenge  AC9HG8S01 | * developing questions to investigate why a geographical phenomenon has changed or why a challenge may arise; for example, “How does urban development affect the sustainability of wetlands?”, “Why is biodiversity declining in urban places?” |
| **Skills**  Concluding and decision-making | draw conclusions  based on the analysis of the data and information  AC9HG8S04 | * explaining reasons for decisions and choices; for example, reflecting on research findings or data analysis of the impacts of geomorphological hazards or urbanisation to identify and explain significant impacts on people, places and environments |

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|  |  | identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential  impacts  AC9HG8S05 | * proposing individual action and supporting the proposal with reasons; for example, reducing waste going to landfill, especially toxic e-waste causing degradation of landscapes, or reducing the large and expanding urban footprint by decreasing the consumption of energy resources as well as eating, working and buying locally * proposing collective action and supporting the proposal with reasons; for example, promoting community awareness of the effects of human–environmental change on significant Australian landforms such as Uluru and the Great Barrier Reef, or encouraging the development of urban and peri-urban agriculture * evaluating the effectiveness of a strategy in relation to environmental, economic and social factors * reflecting on personal values and attitudes and how these influence explanations of potential outcomes; for example, applying sustainable design principles to urban redevelopment projects that provide green, open spaces for citizens |

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| Years 7 and 8 | | | |
| Key aspect 3: Designing solutions and meeting challenges | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * comparing the design and production of products, services and environments in Australia and a country in Asia by identifying needs and new opportunities for design and enterprise, for example design, promotion and marketing of a Western Australian wheat variety especially bred and grown for the making of udon noodles in Japan * researching the rights and responsibilities of those working in design and technologies occupations, for example taking into account First Nations Australian protocols and Indigenous cultural and intellectual property rights * analysing the ethical and social requirements when designing solutions for cultural groups including their involvement and consultation, for example designing a solution with community members from other cultural backgrounds or those who usually communicate in a language other than English |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, accessibility guidelines, control systems or biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products * considering factors that impact on innovation, for example developing novel ideas, responding quickly to change, creating a point of differentiation, adding value for society, reducing costs and improving efficiency |
| **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * investigating different animal nutrition strategies such as grazing and supplementary feeding, and their effects on quality when producing food and fibre products, for example meat tenderness, wool-fibre diameter (micron), milk fat and protein content |
| **Knowledge and understanding**  Technologies context: Materials and technologies specialisations | analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions  AC9TDE8K06 | * investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres * investigating a broad range of technologies – tools, equipment, processes, materials, systems and components − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability * considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and a country in Asia; the properties of textile fibres and fabrics that determine end use in a range of settings such as architecture, medicine, sport and automotive * explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber |
| **Processes and production skills**  Investigating and defining | analyse needs or opportunities for designing, and investigate and select materials, components, tools, equipment and processes to create designed solutions  AC9TDE8P01 | * considering community needs when identifying opportunities for designing, for example gardens for a community centre, cost-effective food service for a sport club * experimenting with traditional and contemporary technologies when developing designs, and discovering the advantages and disadvantages of each approach, for example comparing a hand-sewn product with one produced using a sewing machine * investigating emerging technologies and their potential impact on design decisions, for example flame-retardant fabrics, self-healing materials, virtual reality or aquaponics * examining, testing and selecting a variety of suitable materials, components, tools and equipment for each design project, for example the durability differences between natural hardwood and plantation softwood timbers, which determine their suitability for interior or exterior use * analysing the viability of using different techniques and materials in areas considered remote, isolated areas or less developed countries and selecting appropriate materials to acknowledge sustainability needs by using life cycle thinking |
| **Processes and production skills**  Generating and designing | generate, test, iterate and communicate design ideas, processes and solutions using technical terms and graphical representation techniques, including using digital tools  AC9TDE8P02 | * using a variety of strategies such as brainstorming, sketching, 3D modelling and experimenting to generate innovative design ideas to present to others * developing models, prototypes or samples using a range of materials, tools and equipment to test the functionality of ideas * producing annotated concept sketches and drawings, using technical terms, scale, symbols, pictorial and aerial views to draw environments; production drawings, perspective drawings, orthogonal drawings; patterns and templates to explain product design ideas * documenting and communicating the generation and development and selection of design ideas for an intended audience, for example developing a digital portfolio with images and text which clearly communicate each step of a design process |
| **Processes and production skills**  Producing and implementing | select, justify and use suitable materials, components, tools, equipment, skills and processes to safely make designed solutions  AC9TDE8P03 | * developing innovative ways of manipulating technologies by comparing and choosing the most appropriate options to design a solution using traditional or contemporary materials, components, tools, equipment and techniques and considering alternatives including emerging technologies that could be substituted to reduce waste or time * practising techniques to improve expertise, for example handling animals, cutting and joining materials such as metal, textiles, timber * developing technical production skills (techniques) and safe independent inclusive working practices to produce quality solutions designed for sustainability * identifying and managing risks in the development of various projects, for example working safely, responsibly, cooperatively and ethically on design projects; assessing and responding to uncertainty and risk in relation to long-term health and environmental impacts, for example ensuring appropriate personal protective equipment (PPE) is worn or that ventilation is appropriate where solvents, glues or 3D printers are used * considering how to improve technical expertise required to use tools or equipment needed to design a solution, for example using an online tutorial to learn to use software for design or production |
| **Processes and production skills**  Evaluating | develop design criteria collaboratively including sustainability to evaluate design ideas, processes and solutions  AC9TDE8P04 | * developing design criteria collaboratively to evaluate designed solutions in terms of accessibility, aesthetics, functionality and sustainability, for example recording design goals from people interviewed as prospective users of the finished product, service or environment or including life cycle assessment criteria * re-evaluating, iterating and modifying design processes to improve efficiency and increase production, for example when mass producing a product for an enterprise or improving sustainability * evaluating designed solutions and processes and transferring new knowledge and skills to future design projects, for example considering project planning skills learnt in producing an engineered product and using them in future projects |
| **Processes and production skills**  Collaborating and managing | develop project plans to individually and collaboratively manage time, cost and production of designed solutions  AC9TDE8P05 | * interpreting drawings to plan resources and production steps needed to produce products, services or environments for specific purposes, for example identifying resource requirements from specifications on a labelled drawing and collaboratively developing a detailed procedure * identifying risks and how to minimise them, organising time, evaluating decisions and managing resources to ensure successful project completion, for example using digital tools to keep track of tasks, resources, expenses and deadlines * investigating the time needed for each step of production, for example estimating time allocations on a planning template for the different stages of the design process needed to produce a clock, acoustic speaker or desk lamp using prior knowledge, research and testing |
| **Digital Technologies** | **Processes and production skills**  Producing and implementing | implement, modify and debug programs involving control structures and functions in a general-purpose programming language  AC9TDI8P09 | * writing a program that contains nested control structures to perform more complicated branching and decisions, for example using an IF statement inside a loop to count the warm days from an array containing temperature data only when the temperature for each day is more than 20 degrees Celsius |
| **Processes and production skills**  Collaborating and managing | select and use a range of digital tools efficiently and responsibly to share content online, and plan and manage individual and collaborative agile projects  AC9TDI8P12 | * collaborating effectively online using cloud storage, for example setting up and managing a shared space in an online repository to co-develop content for an app which presents and checks safety aspects of working in a specific setting such as a kitchen, lab, workshop or greenhouse * determining and recording the tasks, responsibilities and timeframes for a collaborative project, for example using a spreadsheet to record tasks and their sequence, critical dates and who is responsible for each task so a project can be finished on time |
| **Science – Year 7** | **Science as a human endeavour**  Use and influence of science | examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations  AC9S7H03 | * investigating how scientific knowledge that larger reserves are better for maintaining ecosystem function might interact with competing viewpoints, values and interests for land use when planning ecological reserves * examining how laboratory-grown meat might reduce impact on ecosystems and considering any social, ethical and economic implications of developing laboratory-grown meat for wide consumption * examining how the use of desalination plants to produce fresh water has impacted marine ecosystems where the desalination plants are located * investigating the contributions of First Nations Australians’ knowledges in the identification of medicinal properties of endemic plants and the ethical, environmental, social and economic implications of others using these knowledges * investigating the ethical, environmental, social and economic implications of proposed scientific responses that involve cross-cultural partnerships and build on First Nations Australians’ land management techniques |
| **Science – Year 8** | **Science as a human endeavour**  Use and influence of science | examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations  AC9S8H03 | * exploring how the development of biodegradable materials has led to more sustainable packaging and reduction in landfill |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 7** | **Knowledge and understanding**  Water in the world | the location and distribution of water resources in Australia, their implications, and strategies to manage the sustainability of water  AC9HG7K02 | * representing the location of Australia’s water resources, such as surface water and groundwater * describing the distribution of Australia’s water resources, and its implications for people; for example, limited access to water for people in rural and remote places and its implications * identifying the causes of variability in water resources or water scarcity; for example, an absolute shortage of water (physical cause), inadequate development of water resources (economic cause), or the ways water is used (such as farming, industry, drinking, washing or watering) * explaining the factors that contribute to variability in water resources or water scarcity; for example, location, climate, topography, seasonality or evaporation * examining why water is a difficult resource for communities to manage and sustain; for example, because of its shared and competing uses, and variability of supply over time * examining how a strategy may manage the sustainability of water resources; for example, recycling (“grey water”), stormwater harvesting and re-use, desalination, inter-regional transfer of water and trade in virtual water, and reducing water consumption |
| the causes and impacts of an atmospheric or hydrological hazard, and responses from communities and governments  AC9HG7K04 | * explaining the environmental processes that cause a hazard, such as drought, storms, tropical cyclones or floods * explaining how the impacts of a hazard on people and the environment are influenced by environmental, social or economic factors * identifying examples of responses to a hazard from the community and the government at the local scale, and identifying practices that increased effectiveness * reflecting on the principles of prevention, mitigation and preparedness in responses from the community and the government to explain how the impact of a hazard can be reduced |
| **Skills**  Questioning and researching using geographical methods | develop questions for a geographical inquiry related to a phenomenon or challenge  AC9HG7S01 | * developing questions to investigate why a geographical phenomenon has changed or a challenge may arise; for example, the causes of water scarcity in different places, or measuring the liveability of a place and the factors affecting the liveability of a place * planning an investigation of a geographical phenomenon or challenge being studied, using digital planning tools; for example, analysing statistics on variation in water quantity and quality over time in Central Australia, or using fieldwork to survey perceptions of the liveability of a local place |
| collect, organise and represent data and information from primary research methods, including fieldwork and secondary research materials, using geospatial technologies and digital tools as appropriate  AC9HG7S02 | * collecting relevant secondary research materials, such as print and online publications, photographs and images, using advanced search functions; for example, “allintitle: community opinion on water scarcity in Australia” or “Australia’s most liveable city” * representing spatial distribution of different types of geographical phenomena by constructing appropriate maps at different scales that conform to cartographic conventions, for example using computer mapping to show the spatial distribution of impacts of hydrological hazards on environments |

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|  | **Skills**  Interpreting and analysing geographical data and information | interpret and analyse geographical data and information to identify similarities and differences, explain patterns and trends and infer relationships  AC9HG7S03 | * explaining patterns and trends; for example, using graphs, weather maps and satellite images to examine the temporal and spatial patterns of a selected hydrological hazard |
| **Skills**  Concluding and decision-making | draw conclusions based on the analysis of the data and information  AC9HG7S04 | * drawing on the results of an analysis and using at least one of the concepts of place, space, environment, interconnections, sustainability, scale or change as an organiser to respond to a question; for example, using an analysis of the distribution of water resources to form conclusions about the sustainability of farming, or an analysis of the location of services to form conclusions about interconnections between people, place, environment and liveability * explaining the impacts of a geographical phenomenon or challenge on people, places and environments; for example, impacts of water scarcity on individuals, communities and government, or the impacts of declining water quality on people and the liveability of places |
| identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts  AC9HG7S05 | * proposing individual action in response to a geographical phenomenon or challenge and supporting the proposal with reasons; for example, reducing the individual water footprint; walking, cycling or using public transport for a more environmentally liveable place * reflecting on the influence of personal values and attitudes on explanations of potential impacts; for example, the effects of personal factors such as availability of technology and infrastructure on what is perceived as a liveable place; conflicting cultural and economic uses of water by people |

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|  | **Skills**  Communicating | create descriptions, explanations and responses, using geographical knowledge and methods, concepts, terms and reference sources  AC9HG7S06 | * constructing an explanation, using research findings to support ideas; for example, data on water usage over time and at different places; information about liveability indexes for different places in Australia and Europe * developing conclusions, using geographical methods to represent data and information; for example, a map showing water usage and a map indicating water scarcity in Australia; a map representing places where liveability is difficult and dangerous due to environmental factors |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 8** | **Knowledge and understanding**  Landscapes and landforms | the causes and impacts of a geomorphological hazard on people, places and environments, and the effects of responses  AC9HG8K05 | * examining the environmental, economic or social impacts of a hazard at the local scale; for example, where people choose to live; the negative consequences for human wellbeing including loss of industry and unemployment; and lack of infrastructure and resources to prepare and respond to hazards * reflecting on observations of a location where the environment has been altered by human activities to explain how the change has heightened the impact of a hazard * reflecting on the principles of prevention, mitigation and preparedness to explain how the harmful effects of a hazard can be reduced by the implementation of a management strategy |
| **Skills**  Questioning and researching using geographical methods | develop questions for a geographical inquiry related to a phenomenon or challenge  AC9HG8S01 | * developing questions to investigate why a geographical phenomenon has changed or why a challenge may arise; for example, “How does urban development affect the sustainability of wetlands?”, “Why is biodiversity declining in urban places?” |

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|  |  | collect, organise and represent data and information from primary research methods, including fieldwork and secondary research materials, using geospatial technologies and digital tools as appropriate  AC9HG8S02 | * comparing findings from primary research methods, including fieldwork, with those from secondary research materials for relevance and reliability; for example, comparing field sketches showing the impact of a geomorphological hazard with newspaper reports on the extent of damage; comparing survey and interview data about people’s perception of their suburb with a government report on the impacts of urbanisation |
| **Skills**  Interpreting and analysing geographical data and information | interpret and analyse geographical data and information to identify similarities and differences, explain patterns and trends and infer relationships  AC9HG8S03 | * inferring relationships from data and information collected during primary research; for example, using observations, field sketches, field measurements, questionnaires or interviews to explain the distribution of population in your local area and suggesting possible causes, effects and trends |
| **Skills**  Concluding and decision-making | draw conclusions based on the analysis of the data and information  AC9HG8S04 | * explaining reasons for decisions and choices; for example, reflecting on research findings or data analysis of the impacts of geomorphological hazards or urbanisation to identify and explain significant impacts on people, places and environments |
| identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts  AC9HG8S05 | * proposing individual action and supporting the proposal with reasons; for example, reducing waste going to landfill, especially toxic e-waste causing degradation of landscapes, or reducing the large and expanding urban footprint by decreasing the consumption of energy resources as well as eating, working and buying locally * proposing collective action and supporting the proposal with reasons; for example, promoting community awareness of the effects of human–environmental change on significant Australian landforms such as Uluru and the Great Barrier Reef, or encouraging the development of urban and peri-urban agriculture * evaluating the effectiveness of a strategy in relation to environmental, economic and social factors * reflecting on personal values and attitudes and how these influence explanations of potential outcomes; for example, applying sustainable design principles to urban redevelopment projects that provide green, open spaces for citizens |
| **Skills**  Communicating | create descriptions, explanations and responses, using geographical knowledge and methods, concepts, terms and reference sources  AC9HG8S06 | * constructing an explanation, using research findings to support ideas, such as the causes and effects of a geographical phenomenon or challenge, and reinforcing knowledge and understanding of the interconnections between people, places and the environment * developing a response, using representations of data and information to support actions and conclusions, such as a map showing the location of iconic landforms or a flow map showing the international movement of refugees |

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| Years 7 and 8 | | | |
| Key aspect 4: Economy | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * investigating traditional and contemporary design and technologies, including from countries across Asia, and predicting how they might change or be sustained in the future in response to technological, environmental or economic change, for example the production of contemporary textile designs using traditional batik techniques and modern dyes in Indonesia |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * investigating traditional, contemporary and emerging design and technologies, including from a country in Asia, and the need for more sustainable patterns of living, and predicting how they might change in the future in response to social, technological, environmental or economic change, for example the diversity of house design or waste management practices * investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, accessibility guidelines, control systems or biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products * considering factors that impact on innovation, for example developing novel ideas, responding quickly to change, creating a point of differentiation, adding value for society, reducing costs and improving efficiency |

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|  | **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * comparing land and water management methods in contemporary Australian food and fibre production with a country in Asia, for example comparing the use of robotics, drones, global positioning system (GPS) technologies, minimum-tillage cropping, water-efficient irrigation and smart farm monitoring and controlling systems for increasing efficiency of farm operations and crop protection, and the impact of cash crops versus staples on social sustainability * investigating how animal and plant crops are grown and the ethical and sustainable techniques used to increase food production, for example comparing the use of herbicides or medicines when producing food and fibre products and recognising the need to increase food production using cost-efficient, ethical and sustainable production techniques * outlining physical and chemical characteristics of soil and their effects on plant growth when producing food and fibre products, for example comparing the effect on soil characteristics of different farming practices * investigating different animal nutrition strategies such as grazing and supplementary feeding, and their effects on quality when producing food and fibre products, for example meat tenderness, wool-fibre diameter (micron), milk fat and protein content * recognising the importance of food and fibre production to Australia’s food security and economy, including exports and imports to and from countries across Asia, for example exports of Tasmanian Candy Abalone (wild-caught dried abalone) |
|  | **Knowledge and understanding**  Technologies context: Materials and technologies specialisations | analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions  AC9TDE8K06 | * investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres * investigating a broad range of technologies – tools, equipment, processes, materials, systems and components − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability * considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and a country in Asia; the properties of textile fibres and fabrics that determine end use in a range of settings such as architecture, medicine, sport and automotive * explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber |
| **Digital Technologies** | **Processes and production skills**  Acquiring, managing and analysing data | analyse and visualise data using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends  AC9TDI8P02 | * visualising multidimensional data by choosing appropriate graphs, for example a scatter plot of food prices and sales, coloured by each food’s sugar content, or diagrams such as a social network diagram and maps of crime rates by location to reveal trends, outliers or other information |

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| **Humanities and Social Sciences (HASS) – Geography**  **Year 7** | **Knowledge and understanding**  Water in the world | classification of environmental resources and the way that water connects and changes places as it moves through environments  AC9HG7K01 | * explaining the environmental, economic or social effects of water as it connects places; for example, the environmental effects of water diversion in the Snowy Mountains, the economic effects of irrigation in the Ord River or the social effects of the Mutitjulu Waterhole connecting Australian First Nations Peoples in Central Australia |
| the causes and impacts of an atmospheric or hydrological hazard, and responses from communities and governments  AC9HG7K04 | * explaining the environmental processes that cause a hazard, such as drought, storms, tropical cyclones or floods * explaining how the impacts of a hazard on people and the environment are influenced by environmental, social or economic factors * identifying examples of responses to a hazard from the community and the government at the local scale, and identifying practices that increased effectiveness * reflecting on the principles of prevention, mitigation and preparedness in responses from the community and the government to explain how the impact of a hazard can be reduced |
| **Skills**  Questioning and researching using geographical methods | develop questions for a geographical inquiry related to a phenomenon or challenge  AC9HG7S01 | * developing questions to investigate why a geographical phenomenon has changed or a challenge may arise; for example, the causes of water scarcity in different places, or measuring the liveability of a place and the factors affecting the liveability of a place * planning an investigation of a geographical phenomenon or challenge being studied, using digital planning tools; for example, analysing statistics on variation in water quantity and quality over time in Central Australia, or using fieldwork to survey perceptions of the liveability of a local place |

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| **Humanities and Social Sciences (HASS) – Geography**  **Year 8** | **Knowledge and understanding**  Changing nations | strategies to manage the sustainability of Australia’s changing urban places  AC9HG8K09 | * examining a strategy used by local, state or national governments to manage projected population growth in one of Australia’s cities or regional urban centres, and identifying implications for sustainability (environmental, economic and social factors) and liveability |
| **Skills**  Concluding and decision-making | draw conclusions based on the analysis of the data and information  AC9HG8S04 | * explaining reasons for decisions and choices; for example, reflecting on research findings or data analysis of the impacts of geomorphological hazards or urbanisation to identify and explain significant impacts on people, places and environments |
| identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts  AC9HG8S05 | * proposing individual action and supporting the proposal with reasons; for example, reducing waste going to landfill, especially toxic e-waste causing degradation of landscapes, or reducing the large and expanding urban footprint by decreasing the consumption of energy resources as well as eating, working and buying locally * proposing collective action and supporting the proposal with reasons; for example, promoting community awareness of the effects of human–environmental change on significant Australian landforms such as Uluru and the Great Barrier Reef, or encouraging the development of urban and peri-urban agriculture * evaluating the effectiveness of a strategy in relation to environmental, economic and social factors * reflecting on personal values and attitudes and how these influence explanations of potential outcomes; for example, applying sustainable design principles to urban redevelopment projects that provide green, open spaces for citizens |

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| Years 7 and 8 | | | | |
| Key aspect 5: People | | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * comparing the design and production of products, services and environments in Australia and a country in Asia by identifying needs and new opportunities for design and enterprise, for example design, promotion and marketing of a Western Australian wheat variety especially bred and grown for the making of udon noodles in Japan * researching the rights and responsibilities of those working in design and technologies occupations, for example taking into account First Nations Australian protocols and Indigenous cultural and intellectual property rights * analysing the ethical and social requirements when designing solutions for cultural groups including their involvement and consultation, for example designing a solution with community members from other cultural backgrounds or those who usually communicate in a language other than English |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * investigating techniques used by land managers for managing and reducing bushfires in forests, for example techniques used by local First Nations Australians or smart technologies such as Internet of Things (IoT) sensors, artificial intelligence, cameras and drones * investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, accessibility guidelines, control systems or biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products |
| **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * analysing traditional First Nations Australians’ food and fibre sources for potential species that offer benefits in sustainability, such as conserving water use and resources needed for processing * comparing land and water management methods in contemporary Australian food and fibre production with a country in Asia, for example comparing the use of robotics, drones, global positioning system (GPS) technologies, minimum-tillage cropping, water-efficient irrigation and smart farm monitoring and controlling systems for increasing efficiency of farm operations and crop protection, and the impact of cash crops versus staples on social sustainability * investigating how animal and plant crops are grown and the ethical and sustainable techniques used to increase food production, for example comparing the use of herbicides or medicines when producing food and fibre products and recognising the need to increase food production using cost-efficient, ethical and sustainable production techniques |
| **Knowledge and understanding**  Technologies context: Materials and technologies specialisations | analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions  AC9TDE8K06 | * investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres * investigating a broad range of technologies – tools, equipment, processes, materials, systems and components − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability * considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and a country in Asia; the properties of textile fibres and fabrics that determine end use in a range of settings such as architecture, medicine, sport and automotive * explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber |
| **Science – Year 7** | **Science understanding**  Earth and space sciences | model cyclic changes in the relative positions of the Earth, sun and moon and explain how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides  AC9S7U03 | * examining the effect of the gravitational attraction of the moon and the sun on Earth's oceans and describing how the relative positions of the moon and sun with respect to Earth result in tidal variations * researching knowledges held by First Nations Australians regarding the phases of the moon and the connection between the lunar cycle and ocean tides * investigating First Nations Australians’ calendars and how they are used to predict seasonal changes |
| **Science as a human endeavour**  Use and influence of science | examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations  AC9S7H03 | * investigating how scientific knowledge that larger reserves are better for maintaining ecosystem function might interact with competing viewpoints, values and interests for land use when planning ecological reserves * examining how laboratory-grown meat might reduce impact on ecosystems and considering any social, ethical and economic implications of developing laboratory-grown meat for wide consumption * examining how the use of desalination plants to produce fresh water has impacted marine ecosystems where the desalination plants are located * investigating the contributions of First Nations Australians’ knowledges in the identification of medicinal properties of endemic plants and the ethical, environmental, social and economic implications of others using these knowledges * investigating the ethical, environmental, social and economic implications of proposed scientific responses that involve cross-cultural partnerships and build on First Nations Australians’ land management techniques |
| **Science – Year 8** | **Science as a human endeavour**  Use and influence of science | examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations  AC9S8H03 | * exploring how the development of biodegradable materials has led to more sustainable packaging and reduction in landfill |
| **Humanities and Social Sciences (HASS) –  Geography**  **Year 7** | **Knowledge and understanding**  Water in the world | classification of environmental resources and the way that water connects and changes places as it moves through environments  AC9HG7K01 | * explaining the environmental, economic or social effects of water as it connects places; for example, the environmental effects of water diversion in the Snowy Mountains, the economic effects of irrigation in the Ord River or the social effects of the Mutitjulu Waterhole connecting Australian First Nations Peoples in Central Australia |
| the location and distribution of water resources in Australia, their implications, and strategies to manage the sustainability of water  AC9HG7K02 | * representing the location of Australia’s water resources, such as surface water and groundwater * describing the distribution of Australia’s water resources, and its implications for people; for example, limited access to water for people in rural and remote places and its implications * identifying the causes of variability in water resources or water scarcity; for example, an absolute shortage of water (physical cause), inadequate development of water resources (economic cause), or the ways water is used (such as farming, industry, drinking, washing or watering) * explaining the factors that contribute to variability in water resources or water scarcity; for example, location, climate, topography, seasonality or evaporation * examining why water is a difficult resource for communities to manage and sustain; for example, because of its shared and competing uses, and variability of supply over time * examining how a strategy may manage the sustainability of water resources; for example, recycling (“grey water”), stormwater harvesting and re-use, desalination, inter-regional transfer of water and trade in virtual water, and reducing water consumption |
| the economic, cultural, spiritual and aesthetic value of water for people, including First Nations Australians  AC9HG7K03 | * examining and comparing places in Australia and a country in Asia that have economies and communities based on irrigation; for example, rice production in the Murrumbidgee Irrigation Area in New South Wales and the Mekong Delta in Vietnam |
| the causes and impacts of an atmospheric or hydrological hazard, and responses from communities and governments  AC9HG7K04 | * explaining the environmental processes that cause a hazard, such as drought, storms, tropical cyclones or floods * explaining how the impacts of a hazard on people and the environment are influenced by environmental, social or economic factors * identifying examples of responses to a hazard from the community and the government at the local scale, and identifying practices that increased effectiveness * reflecting on the principles of prevention, mitigation and preparedness in responses from the community and the government to explain how the impact of a hazard can be reduced |
| **Skills**  Questioning and researching using geographical methods | develop questions for a geographical inquiry related to a phenomenon or challenge  AC9HG7S01 | * developing questions to investigate why a geographical phenomenon has changed or a challenge may arise; for example, the causes of water scarcity in different places, or measuring the liveability of a place and the factors affecting the liveability of a place * planning an investigation of a geographical phenomenon or challenge being studied, using digital planning tools; for example, analysing statistics on variation in water quantity and quality over time in Central Australia, or using fieldwork to survey perceptions of the liveability of a local place |
| **Skills**  Concluding and decision-making | draw conclusions based on the analysis of the data and information  AC9HG7S04 | * drawing on the results of an analysis and using at least one of the concepts of place, space, environment, interconnections, sustainability, scale or change as an organiser to respond to a question; for example, using an analysis of the distribution of water resources to form conclusions about the sustainability of farming, or an analysis of the location of services to form conclusions about interconnections between people, place, environment and liveability * explaining the impacts of a geographical phenomenon or challenge on people, places and environments; for example, impacts of water scarcity on individuals, communities and government, or the impacts of declining water quality on people and the liveability of places |
| identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts  AC9HG7S05 | * proposing individual action in response to a geographical phenomenon or challenge and supporting the proposal with reasons; for example, reducing the individual water footprint; walking, cycling or using public transport for a more environmentally liveable place * reflecting on the influence of personal values and attitudes on explanations of potential impacts; for example, the effects of personal factors such as availability of technology and infrastructure on what is perceived as a liveable place; conflicting cultural and economic uses of water by people |
| **Humanities and Social Sciences (HASS) – Geography**  **Year 8** | **Knowledge and understanding**  Landscapes and landforms | the interconnections between human activity and geomorphological processes, and ways of managing distinctive landscapes  AC9HG8K04 | * identifying the interconnections and effects of erosion and sedimentation produced by human activities on the quality of the environment; for example, the effects of overuse of tourist tracks in bushland or the effects of land-clearing for the production of palm oil in Indonesia and Malaysia * explaining the interconnections and effects of mining, quarrying and urban development on the quality of the environment; for example, the interconnections of the quality of the environment and uranium mining in Kakadu, urban development in Singapore or the extension of land area in Tokyo Bay * explaining the effects of river regulation, including dams, locks, channel straightening and drains, on the quality of riverine and wetland environments; for example, the Three Gorges Dam on the Yangtze River in China, or dams and weirs on the Murray–Darling River system * identifying the contribution of the knowledges of First Nations Australians to the use and management of distinctive landscapes; for example, Indigenous Peoples’ Knowledge (IPK) incorporated into modern management of diverse landscapes and landforms such as Kakadu National Park, Uluru, the Great Barrier Reef and the Snowy Mountains |
|  |  | the causes and impacts of a geomorphological hazard on people, places and environments, and the effects of responses  AC9HG8K05 | * examining the environmental, economic or social impacts of a hazard at the local scale; for example, where people choose to live; the negative consequences for human wellbeing including loss of industry and unemployment; and lack of infrastructure and resources to prepare and respond to hazards * reflecting on observations of a location where the environment has been altered by human activities to explain how the change has heightened the impact of a hazard * reflecting on the principles of prevention, mitigation and preparedness to explain how the harmful effects of a hazard can be reduced by the implementation of a management strategy | |