

Earth & Environmental Science marking guide and response

External assessment

Combination response (103 marks)

Assessment objectives

This assessment technique is used to determine student achievement in the following objectives:

1. describe and explain the use of renewable and non-renewable resources and the cause and impact of Earth hazards and global climate change
2. apply understanding of use of renewable and non-renewable resources and the cause and impact of Earth hazards and global climate change
3. analyse evidence about the use of renewable and non-renewable resources and the cause and impact of Earth hazards and global climate change to identify trends, patterns, relationships, limitations or uncertainty
4. interpret evidence about use of renewable and non-renewable resources and the cause and impact of Earth hazards and global climate change to draw conclusions based on analysis.

Note: Objectives 5, 6 and 7 are not assessed in this instrument.

Purpose

This document consists of an EAMG and a sample response.

The EAMG:

- provides a tool for calibrating external assessment markers to ensure reliability of results
- indicates the correlation, for each question, between mark allocation and qualities at each level of the mark range
- informs schools and students about how marks are matched to qualities in student responses.

The sample response:

- demonstrates the qualities of a high-level response
- has been annotated using the EAMG.

Mark allocation

Allow FT marks — refers to 'follow through', where an error in the prior section of working is used later in the response, a mark (or marks) for the rest of the response can be awarded so long as it still demonstrates the correct conceptual understanding or skill in the rest of the response.

Where a response does not meet any of the descriptors for a question or a criterion, a mark of '0' will be recorded.

Where no response to a question has been made, a mark of 'N' will be recorded.

External assessment marking guide

Paper 1 — Multiple choice

| Question | Response |
|----------|----------|
| 1 | C |
| 2 | B |
| 3 | A |
| 4 | A |
| 5 | D |
| 6 | A |
| 7 | A |
| 8 | D |
| 9 | D |
| 10 | C |
| 11 | D |
| 12 | C |
| 13 | A |
| 14 | B |
| 15 | D |

Paper 1 — Short response (35 marks)

| Q | Sample response | The response: | Notes |
|----|--|--|--|
| 16 | a) The location with the greatest flood risk is D. This is because it is a relatively flat area without much deep-rooted vegetation, and has a high water table. | <ul style="list-style-type: none"> • states location as D or B [1 mark] • provides a justification for stated location [1 mark] • provides a second justification for the stated location [1 mark] • provides a third justification for the stated location [1 mark] | <p>Justifications for location D are:</p> <ul style="list-style-type: none"> – flat area – grassland / lack of deep-rooted vegetation – small depth to water table. <p>Justifications for location B are:</p> <ul style="list-style-type: none"> – depth to water table is the lowest – urban setting does not allow water to run off easily – run-off will be greater due to steeper slope – larger volume of water trapped in urban setting. |
| | b) Planting deep-rooted trees would lower the ground water table and reduce water run-off during future flooding events. | <ul style="list-style-type: none"> • states a strategy [1 mark] • explains how the strategy would reduce further flooding [1 mark] | <p>Strategies for location D may include:</p> <ul style="list-style-type: none"> – using deep-rooted pasture species – or other suitable response consistent with a reasonable understanding. <p>Strategies for location B may include:</p> <ul style="list-style-type: none"> – construction of flood levees to redirect water flow away from low lying areas – drainage infrastructure to remove run-off from low lying urban areas – construction of green areas to allow water infiltration – or other suitable response consistent with a reasonable understanding. |

| Q | Sample response | The response: | Notes |
|----|--|--|---|
| 17 | <p>Land clearing releases stored carbon dioxide into Earth's atmosphere, negatively impacting the biosphere.</p> <p>It does this by releasing carbon dioxide gas as a waste product of cellular respiration during decay of organic matter.</p> <p>Carbon dioxide gas increases the heat trapped by Earth's atmosphere, leading to an increase in global atmospheric and ocean temperatures.</p> <p>Greater levels of CO₂ in the atmosphere will also increase acidification in Earth's oceans, while land clearing reduces oxygen released into the atmosphere through photosynthesis and reduces the capacity of the biosphere to store atmospheric CO₂.</p> | <p>for explaining how land clearing can influence climate change:</p> <ul style="list-style-type: none"> • identifies that land clearing increases atmospheric CO₂ [1 mark] • explains how land clearing increases atmospheric CO₂ [1 mark] <p>for impacts:</p> <ul style="list-style-type: none"> • identifies a subsequent impact [1 mark] • identifies a second subsequent impact [1 mark] • identifies a third subsequent impact [1 mark] | <p>Impacts on Earth's biosphere may include:</p> <ul style="list-style-type: none"> - impacts on surface air temperatures - impacts on ocean temperatures - increases in ocean acidification - or other suitable response consistent with a reasonable understanding. |

| Q | Sample response | The response: | Notes |
|----|---|---|--|
| 18 | a) Grass species 1 and 2 have been negatively affected. Original distributions for species 1 and 2 were 15% and 21% respectively. By December 2019, species 1 decreased to 11% and species 2 decreased to 13%. | <ul style="list-style-type: none"> states grass species 1 and 2 are negatively affected [1 mark] identifies supporting evidence [1 mark] | |
| | b) Monitoring site 3 is where the data for average distribution and abundance of native plant species was recorded. This is due to the decrease in pH values recorded at site 3 over the monitoring period, in contrast to the pH values for the other sites as seen in Stimulus 2. Grass species 1 and 2 could not tolerate increasing soil acidity, while grass species 3, and woody and annual weeds were favoured as evident in Stimulus 3. | <ul style="list-style-type: none"> states site 3 [1 mark] states a decrease in pH for site 3 from the Stimulus 2 in contrast to other pH measurements from other sites [1 mark] identifies the two species that were negatively influenced by decreasing pH and which species were positively influenced evident in Stimulus 3 [1 mark] | The drop in pH values for site 3 is more significant than the drop in pH values for site 4, as the availability of major and minor elements would be significantly reduced at pH values less than 5.0. |

| Q | Sample response | The response: | Notes |
|----|---|---|--|
| 19 | <p>a) The data demonstrates that the yield for hydroponic lettuce is much greater than the yield for lettuce grown by conventional methods.</p> <p>The data demonstrates that the water use for hydroponic lettuce is much smaller than the water use for lettuce grown by conventional methods.</p> <p>It also shows, however, that the energy use for hydroponic lettuce is much greater than the energy use for lettuce grown by conventional methods.</p> <p>Using the evidence collected, growing hydroponic crops in the future could help to provide a sustainable footprint by reducing the area of cropland required to produce food. However, the energy demand for growing hydroponic crops needs to be reduced.</p> | <ul style="list-style-type: none"> • contrasts <ul style="list-style-type: none"> – yield [1 mark] – water use [1 mark] – energy use [1 mark] • states a conclusion that considers yield, water use and energy use [1 mark] | |
| | <p>b) Using a renewable source of energy, like solar power, would reduce the production of CO₂ from burning fossils fuels and therefore improve sustainability.</p> | <ul style="list-style-type: none"> • states a renewable energy source [1 mark] • describes how the identified method could reduce the ecological footprint [1 mark] | <p>Renewable energy sources may include:</p> <ul style="list-style-type: none"> – solar – hydroelectricity – wind – or other suitable response consistent with a reasonable understanding. |

| Q | Sample response | The response: | Notes |
|----|---|---|--|
| 20 | <p>a) Blue swimmer crabs: Commercial catch 2.4 Kt in 2008 Commercial catch 1.9 Kt in 2017</p> $\frac{2.4 - 1.9}{2.4} \times 100\% = 20.83\%$ <p>Spanner crabs: Commercial catch 1.7 Kt in 2008 Commercial catch 1.0 Kt in 2017</p> $\frac{1.7 - 1.0}{1.7} \times 100\% = 41.18\%$ <p>The commercial catch for spanner crabs has shown a greater percentage decline.</p> | <ul style="list-style-type: none"> • identifies 2008 catch and 2017 catch for blue swimmer crabs [1 mark] • calculates percentage change [1 mark] • identifies 2008 catch and 2017 catch for spanner crabs [1 mark] • calculates percentage change [1 mark] • contrasts the percentage change in crab species caught from 2008 to 2017 [1 mark] | <p>Allow FT marks for errors in calculation of percentage change.</p> <p>Accept answers correctly rounded to the nearest whole per cent or any number of decimal places.</p> <p>Alternative working:</p> $100\% - \frac{1.9}{2.4} \times 100\% = 20.83\%$ $100\% - \frac{1.0}{1.7} \times 100\% = 41.18\%$ |

| Q | | Sample response | The response: | Notes | |
|----|----|--|---|-------|--|
| 20 | b) | <p>The stock status of the spanner crab species is depleting and at current levels of harvesting would be unsustainable. The stock status of the blue swimmer crab species would be sustainable.</p> <p>Spanner crab species depletion could be attributed to several factors:</p> <ul style="list-style-type: none"> • it takes longer for female spanner crabs to reach maturity (Stimulus 6) compared to blue swimmer crabs • spanner crabs lay fewer eggs than blue swimmer crabs (Stimulus 6) • there has almost been a twofold decline in population numbers for spanner crabs compared to blue swimmer crabs between 2008–17 (Stimulus 5). <p>The choice of commercial fishing gear is most likely to affect the numbers of potential mature female crabs, because the management methods (Stimulus 7) in Queensland fisheries are similar for both species.</p> | <ul style="list-style-type: none"> • draws a valid conclusion about the stock status of each crab species • identifies 2 pieces of evidence for each crab to support the conclusion | 6 | <p>Possible evidence may include:</p> <ul style="list-style-type: none"> – spanner crabs take longer to grow to harvesting size – or other suitable response consistent with a reasonable understanding. |
| | | | <ul style="list-style-type: none"> • draws a valid conclusion about the stock status of both crab species • identifies 2 pieces of evidence to support 1 conclusion and 1 piece of evidence to support the other conclusion | 5 | |
| | | | <ul style="list-style-type: none"> • draws a valid conclusion about stock status of both crab species • identifies 1 piece of evidence to support 1 conclusion and 1 piece of evidence to support the other conclusion <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • draws a valid conclusion about the stock status of both crab species • identifies 2 pieces of evidence to support 1 conclusion | 4 | |
| | | | <ul style="list-style-type: none"> • draws a valid conclusion about the stock status of both crab species • identifies 1 piece of evidence to support 1 conclusion <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • draws a valid conclusion about the stock status of 1 crab species • identifies 2 pieces of evidence to support the conclusion | 3 | |

| Q | | Sample response | The response: | | Notes |
|----|----|---|---|---|--|
| | | | <ul style="list-style-type: none"> draws a valid conclusion about the stock status of both crab species <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> draws a valid conclusion about the stock status of 1 crab species identifies 1 piece of evidence to support the conclusion | 2 | |
| | | | <ul style="list-style-type: none"> draws a valid conclusion about the stock status of 1 crab species | 1 | |
| | | | <ul style="list-style-type: none"> does not satisfy any of the descriptors above. | 0 | |
| 20 | c) | <p>For spanner crabs:</p> <ul style="list-style-type: none"> impose temporary closures in the fishery where spanner crabs are harvested to allow greater opportunity for egg production to increase number of female crabs reaching sexual maturity impose a catch limit to allow greater opportunity for a larger number of female crabs to reach sexual maturity. | <ul style="list-style-type: none"> identifies and explains a way to improve the sustainability of a crab species [1 mark] identifies and explains a second way for improving sustainability of a crab species [1 mark] | | <p>Ways to improve the blue swimmer crab's sustainability may include:</p> <ul style="list-style-type: none"> impose temporary closures in the fishery where blue swimmer crabs are harvested to allow greater opportunity for egg production to increase number of female crabs reaching sexual maturity impose a total allowable catch limit to allow greater opportunity for a larger number of female crabs to reach sexual maturity or other suitable response consistent with a reasonable understanding. <p>Ways to improve the spanner crab's sustainability may include:</p> <ul style="list-style-type: none"> impose bag limits impose possession limits or other suitable response consistent with a reasonable understanding. |

Paper 2 — Short response (38 marks)

| Q | Sample response | The response: | M | Notes |
|---|---|--|---|--|
| 1 | a) Introduced pest species: feral rabbits Feral rabbits can outcompete native species for sources of food. They can quickly increase in population size compared to other species in the ecosystem. | <ul style="list-style-type: none"> states an introduced pest species states 2 reasons it is classified as a pest | 3 | Introduced pest species may include: <ul style="list-style-type: none"> cane toads camels European carp goats or other suitable response consistent with a reasonable understanding. Reasons may include: <ul style="list-style-type: none"> reduction in biodiversity erosion of landscape reduction in resources available to native species pollution of waterways introduction of disease change in bushfire regime rapid increase in population or other suitable response consistent with a reasonable understanding. |
| | | <ul style="list-style-type: none"> states an introduced pest species states 1 reason it is classified as a pest | 2 | |
| | | <ul style="list-style-type: none"> states an introduced pest species <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> states 1 reason a species could be classified as a pest | 1 | |
| | | <ul style="list-style-type: none"> does not satisfy any of the descriptors above. | 0 | |

| Q | Sample response | The response: | M | Notes |
|---|--|--|---|---|
| | <p>b) Anthropogenic activity: Land clearing</p> <p>Positive influences:</p> <ul style="list-style-type: none"> • can increase available carrying capacity of animals on a property and boost animal production for an animal enterprise • exposes fertile soil for crop production, increasing the overall productivity of the land for a local enterprise • allows urbanisation of an area. <p>Negative influences:</p> <ul style="list-style-type: none"> • decreases biodiversity of ecosystems • can cause soil erosion if not managed sustainably, leading to further problems for natural ecosystems • destroys habitats of native species, e.g. koalas. | <ul style="list-style-type: none"> • states a positive influence [1 mark] • states a second positive influence [1 mark] • states a third positive influence [1 mark] • states a negative influence [1 mark] • states a second negative influence [1 mark] • states a third negative influence [1 mark] | | <p>Influences must be relevant to the identified activity.</p> <p>Other case studies may include:</p> <ul style="list-style-type: none"> - species removal - integrated pest management - dryland salinity - mining - or other suitable response consistent with a reasonable understanding. |
| 2 | <p>a) The stimulus indicates that a La Niña event occurred between April 2010 and April 2011. Positive SOI values were recorded across this time.</p> | <ul style="list-style-type: none"> • states La Niña [1 mark] • states positive SOI values [1 mark] | | |
| | <p>b) The SOI is calculated based on the difference in air pressure between locations on either side of the Pacific Ocean, which is a result of the drivers of ocean currents, such as sea surface temperature and trade winds. The fall of the SOI around May and June 2011 could be due to temporary local weather conditions that reduce pressure, such as cyclones.</p> | <ul style="list-style-type: none"> • explains calculation of SOI [1 mark] • states May–June 2011 as the pattern [1 mark] • suggests a cyclone as the cause for the pattern [1 mark] | | |

| Q | Sample response | The response: | Notes |
|---|---|---|---|
| 3 | a) <i>Aedes aegypti</i> mosquitoes complete their first full life cycle in 5 days at ~24 °C The model shows that the mosquito completes their lifecycle in 10 days at 12.5 °C Therefore, the increase in temperature required is 11.5 °C. | <ul style="list-style-type: none"> correctly identifies the temperatures for 5-day and 10-day life cycles [1 mark] determines the increase in air temperature [1 mark] | <p>For temperature for 5-day life cycle, accept 23 – 24 °C inclusive.</p> <p>For temperature for 10-day life cycle, accept 12 – 13°C.</p> <p>Allow FT marks for initial error in temperature. (Allow a range of 10 – 12°C for calculation).</p> |
| | b) If average temperatures rise by 2 °C, the time required for <i>Aedes albopictus</i> to complete its life cycle will be reduced in areas of current distribution. The distribution area of the mosquito will be altered, because temperature changes will mean that different areas will have more or in some cases less suitable temperatures for optimal speed of life cycle (reproductive maturity) and subsequently changes in time between each generation, as seen in Stimulus 2, i.e. the length of the lifecycle decreases with increased air temperatures. | <ul style="list-style-type: none"> states that an increase in temperature will shorten the reproductive cycle in existing areas [1 mark] justified by identifying two points on the graph demonstrating a decrease in the length of the gonotrophic cycle with increasing temperature [1 mark] predicts that the <ul style="list-style-type: none"> population will increase in existing areas [1 mark] distribution area will change across a larger area [1 mark] | |
| 4 | a) Turbidity ponds allow suspended particles in water to sink and be separated out. Water without the sediments can be removed from the top of the settling pond. | <ul style="list-style-type: none"> states the process of settling [1 mark] describes removal of clear water [1 mark] | |
| | b) The mine site turbidity management strategy was effective throughout the years of its operation because the turbidity never reached the environmental protection limit, only reaching the warning level of 8 NTU three times. Additionally, after the mine was closed, the turbidity returned to the baseline values of approximately 2–3 NTU, indicating the environment is no longer affected by the mine activity. | <ul style="list-style-type: none"> concludes that the strategy was effective [1 mark] states that turbidity <ul style="list-style-type: none"> did not exceed the environmental protection limit [1 mark] only exceeded the internal measure 3 times [1 mark] returned to baseline after mine closure [1 mark] | |

| Q | Sample response | The response: | Notes | |
|--|--|---|--|---|
| 5 | a) Eutrophication would occur because nutrients from the sewage spill, especially nitrogen and phosphorus, would promote algal growth. Over time, this would develop into an algal bloom. When the algae die, they decompose and produce a high level of organic matter, which sinks. This would increase the amount of sediment and reduce the amount of sunlight available to aquatic plants. This would then reduce photosynthesis and cause dissolved oxygen levels to decrease, resulting in the death of aquatic flora and fauna species. Eutrophication would have occurred in the creek because water sample analysis in Stimulus 4 indicates the conditions that arise as a result of eutrophication (i.e. an initial increase in suspended solid levels and decrease in dissolved oxygen levels. Eutrophication would have occurred approximately 2 km downstream from where the truck overturned. Eutrophication has occurred there because this is where both dissolved oxygen levels have decreased as a result of the algal bloom and suspended solid levels have increased. | For identifies stages of eutrophication | Stages of eutrophication include: • increased nutrient levels lead to algal growth and algal bloom • algal death leads to high levels of sediment in the water and large numbers of bacterial decomposers • high levels of sediment reduce photosynthesis • reduced photosynthesis and/or increased activity of bacterial decomposers leads to decreasing oxygen levels in the water. For the location of eutrophication, – for the starting point accept 2 km – for the finishing point accept EITHER 3 km OR 7 km OR 8 km | |
| | | • states 4 stages of eutrophication | | 4 |
| | | • states 3 stages of eutrophication | | 3 |
| | | • states 2 stages of eutrophication | | 2 |
| | | • states 1 stage of eutrophication | | 1 |
| | | • does not satisfy any of the descriptors above. | | 0 |
| | | For explaining why eutrophication has occurred | | |
| | | • provides a correct explanation using data from Stimulus 4 | | 2 |
| | | • provides a correct explanation | | 1 |
| | | • does not satisfy any of the descriptors above. | | 0 |
| | | For location of eutrophication | | |
| | | • accurately infers the location of eutrophication • states 2 reasons to support the inference | | 3 |
| | | • accurately infers the location of eutrophication • states 1 reason to support the inference | | 2 |
| | | • accurately infers the location of eutrophication | | 1 |
| • does not satisfy any of the descriptors above. | 0 | | | |
| b) The release of water would dilute and disperse the sewage. This would mean that the concentration of nitrates and phosphates in any one place would be decreased. The dispersal of solids would reduce the impact on photosynthesis due to suspended material in the water. | • proposes 3 ways water quality could improve | 3 | | |
| | • proposes 2 ways water quality could improve | 2 | | |
| | • proposes 1 way that water quality could improve | 1 | | |
| | • does not satisfy any of the descriptors above. | 0 | | |

Paper 2 — Extended response (15 marks)

| Q | Sample response | The response: | Notes | | |
|---|-----------------|--|---|---|---|
| 6 | a) | <p>The decision is justified because most of the earthquakes happen on the northern side of Puerto Rico, closest to the plate boundary. Ponce, being on the southern side of the island, has a reduced likelihood of earthquake damage because the city is further from the likely epicentres of future earthquakes.</p> <p>Mayagüez is very close to the epicentre of one of the largest recorded earthquakes (B6) and one that created the largest tsunami recorded in Puerto Rico.</p> <p>There is a higher probability of structural damage occurring on the western side of the island for any future earthquakes, based on locations of past epicentres. The shallower nature of these earthquakes means they will be stronger, according to Stimulus 6, which means that there would be more damage to buildings and life.</p> <p>The more recent earthquake data suggests there is a smaller probability of structural damage occurring in Ponce, because deeper earthquakes are lower on the Richter scale and are therefore less damaging (Stimulus 5 & 6).</p> <p>Most of the earthquakes that expose the southern coastline have a deeper focus (e.g. D9, E9, I8, J8), which means that they are less likely to create tsunamis.</p> | <p>For justification based on sound reasons, referring to:</p> | <p>Reasons for the decision may include:</p> <ul style="list-style-type: none"> • earthquake intensity, e.g. identifying that most of the earthquakes that expose the southern coastline have a deeper focus and be lower on the Richter scale, and therefore have less impact on life and property • earthquake location/depth, e.g. <ul style="list-style-type: none"> - identifying that most earthquakes occur north and west of the island - identifying the smaller magnitude of recent earthquakes near the southern side of the island - describing the reduced likelihood of earthquake damage in Ponce, as the city is further from the likely epicentres of future damaging earthquakes - description of how Mayagüez is very close to the epicentre of one of the largest of the recorded earthquakes • tsunami risk, e.g. <ul style="list-style-type: none"> - identifying that earthquakes to the northwest of Mayaguez are shallower and therefore more likely to produce tsunamis - identifying that most of the earthquakes that expose the southern coastline have a deeper focus - explaining that a deeper focus is less likely to create tsunamis • analysis of other risks, e.g. <ul style="list-style-type: none"> - explaining the risk of structural damage and to life if the Department of Civil Defence was built in Mayagüez, due to the increased likelihood of being close to any future earthquakes, based on locations and strength of past epicentres (Stimulus 5 & 6) | |
| | | | <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | | 4 |
| | | | <ul style="list-style-type: none"> • any 3 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | | 3 |
| | | | <ul style="list-style-type: none"> • any 2 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | | 2 |
| | | | <ul style="list-style-type: none"> • any 1 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | | 1 |
| | | | <ul style="list-style-type: none"> • does not satisfy any of the descriptors above. | | 0 |
| | | | <p>For use of sound evidence from stimulus to support the reasons about:</p> <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | | 4 |

| Q | Sample response | The response: | | Notes |
|---|-----------------|---|---|-------|
| | | <ul style="list-style-type: none"> • any 3 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | 3 | |
| | | <ul style="list-style-type: none"> • any 2 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | 2 | |
| | | <ul style="list-style-type: none"> • any 1 of <ul style="list-style-type: none"> - earthquake intensity - epicentre location / depth - tsunami risk - analysis of other risks | 1 | |
| | | <ul style="list-style-type: none"> • does not satisfy any of the descriptors above. | 0 | |

| Q | Sample response | The response: | Notes |
|---|-----------------|--|--|
| 6 | b) | <p>Design considerations for a new Department of Civil Defense building would include being located at least 15 m above sea level to be at least two times higher than the highest recorded tsunami run-up, or being located away from any drainage canals or water courses that could funnel a potential tsunami towards the building. Other considerations may include a seawall defence to impede and reduce the forward strength of a potential tsunami, a reinforced concrete building rather than timber and masonry-framed building, to better withstand any potential magnitude 8 earthquake, having foundations on solid rock to avoid the liquefaction caused by any potential magnitude 8 earthquake, being low-rise to prevent natural resonance of earthquakes collapsing the building, and having seismically damping foundation footings to reduce structural stresses on the building.</p> | <p>Design considerations may include:</p> <ul style="list-style-type: none"> location, e.g. foundations on solid rock to avoid the liquefaction, avoid drainage canals or water courses that could funnel a tsunami, height above sea level higher than the highest recorded tsunami run-up defence, e.g. a seawall defence to reduce the forward strength of a potential tsunami building material, e.g. use of a reinforced concrete building building height, e.g. the design needs to be low-rise to prevent natural resonance of earthquakes collapsing the building to withstand any potential magnitude 8 earthquake other design considerations, e.g. seismically damping foundation footings to reduce structural stresses. <p>Accept the naming and related distinguishing feature of any other valid design consideration consistent with a reasonable understanding of the question and the stimulus.</p> |
| | | <p>Names:</p> | |
| | | <ul style="list-style-type: none"> any 4 design considerations relating to: <ul style="list-style-type: none"> location defence building material building height other design considerations | 4 |
| | | <ul style="list-style-type: none"> any 3 design considerations relating to: <ul style="list-style-type: none"> location defence building material building height other design considerations | 3 |
| | | <ul style="list-style-type: none"> any 2 design considerations relating to: <ul style="list-style-type: none"> location defence building material building height other design considerations | 2 |
| | | <ul style="list-style-type: none"> any design consideration relating to: <ul style="list-style-type: none"> location defence building material building height other design considerations | 1 |
| | | <ul style="list-style-type: none"> does not satisfy any of the descriptors above. | 0 |
| | | <p>States a distinguishing feature of:</p> | |
| | | <ul style="list-style-type: none"> any 3 of the named design considerations relating to: <ul style="list-style-type: none"> location | 3 |

| Q | Sample response | The response: | Notes |
|---|-----------------|---|-------|
| | | <ul style="list-style-type: none"> - defence - building material - building height - other design considerations | |
| | | <ul style="list-style-type: none"> • any 2 of the named design considerations relating to: <ul style="list-style-type: none"> - location - defence - building material - building height - other design considerations | 2 |
| | | <ul style="list-style-type: none"> • any named design considerations relating to: <ul style="list-style-type: none"> - location - defence - building material - building height - other design considerations | 1 |
| | | <ul style="list-style-type: none"> • does not satisfy any of the descriptors above. | 0 |



© State of Queensland (QCAA) 2020

Licence: <https://creativecommons.org/licenses/by/4.0> | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. |

Attribution: © State of Queensland (QCAA) 2020