

Mark Scheme (Results)

January 2017

NQF BTEC Level 1/Level 2 Firsts in
Construction and the Built
Environment

Unit 11: Sustainability in Construction
(21635E)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1	<p>One Mark for each correct answer:</p> <p>B Use of silencers E Maintenance of machinery</p>	(2)

Question Number	Answer	Mark
2	<p>One mark for giving one way the use of modern fuel-efficient vehicles and plant can help sustainability.</p> <p>Any one from:</p> <ul style="list-style-type: none"> • Reduction in emissions (1) • Reduction in use of fossil fuels (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
3	<p>One mark for each correct answer:</p> <p>A Correct storage of fuels and chemicals D Relocation of animal habitats</p>	(2)

Question Number	Answer	Mark
4 (a)	<p>One mark for giving each way to reduce land contamination from construction work.</p> <p>Any two from:</p> <ul style="list-style-type: none"> • Waste treatment (1) • Correct waste disposal (1) • Minimisation by washing out cement plant and equipment/use of settlement tanks (1) <p>Accept any other appropriate answer.</p>	(2)

Question Number	Answer	Mark
4 (b)	<p>One mark for identifying an alternative way of disposing of waste materials.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Incineration (1) ● Specialist disposal (1) ● Dumping at sea (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
4 (c)	<p>Award one mark for giving one type of environmental damage that may be caused by the transportation of waste to landfill sites.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Air pollution (1) ● Dust (1) ● Noise disturbance (1) ● Damage to roads (1) <p>Accept any other appropriate answer. Do not accept – things fall from vehicles.</p>	(1)

Question Number	Answer	Mark
5	<p>Award one Mark for each correct answer:</p> <p>B Noise reduction equipment C Wheel cleaning facilities</p>	(2)

Question Number	Answer	Mark
6(a)	<p>Award one mark for identifying one construction timber-based product other than SIPS.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Recycled particleboard sheets (1) ● OSB (1) ● Tiles (1) ● Eco-joists (1) ● Engineered joists (1) ● Timber framing (1) ● Cedar boarding/shingles (1) ● Plywood (1) ● Chipboard (1) ● Blockboard (1) ● Hardboard (1) ● MDF (1) ● Joinery product (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
6(b)	<p>Award one mark for identifying each advantage of structural insulated panels (SIPS). Up to two marks.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Strong (1) ● Pre-insulated (1) ● High insulation values from a thin panel (1) ● Short construction time (1) ● High level of air tightness (1) ● Reduced cold bridging (1) ● Usable roof space (1) ● Can have a variety of finishes (1) ● Less waste on site (1) <p>Accept any other appropriate answer. Do not accept Insulation on its own without reference to an advantage of SIPS.</p>	(2)

Question Number	Answer	Mark
7	<p>A linked response that makes reference to any two of the following points. Up to two marks for an explanation.</p> <p>Any one from the following explanations:</p> <ul style="list-style-type: none"> ● Raise the floor level/building on stilts (1) so it is above the predicted flood level (1) ● Use of water resistant materials/electrics fitted above flood level (1) so if it floods the building is not damaged (1) ● Creation of a physical barrier (1) to prevent the flood water reaching the building (1) ● Strong external walls (1) to withstand flood water/floating debris (1) <p>Accept any other appropriate answer. Do not accept build on higher ground</p>	(2)

Question Number	Answer	Mark
8	<p>Award one mark for naming one insulation product made from recycled materials.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Recycled glass mineral wool/fibreglass (1) ● Recycled plastic bottles (1) ● Cellulose insulation/Recycled newspaper (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
9	<p>Award one mark for giving one type of community liaison.</p> <p>Any one from:</p> <ul style="list-style-type: none"> ● Developing good relations with neighbours (1) ● Listen to neighbours' views (1) ● Use of leaflets/newsletters (1) ● Public notices (1) ● Website (1) ● Public meetings (1) ● School safety visit (1) ● Surveys (1) <p>Accept any other appropriate answers.</p>	(1)

Question Number	Answer	Mark
10	<p>Award one mark for each way low embodied energy construction materials help sustainability. Up to two marks.</p> <p>Any two from:</p> <ul style="list-style-type: none"> ● Reduces the use of finite fuels/energy (1) ● Reduces air pollution from burning fuels (1) ● Reduces CO₂ emissions from burning fuels (1) ● Enables the construction of low carbon buildings (1) ● Materials are generally recyclable (1) <p>Accept any other appropriate answers.</p>	(2)

Question Number	Answer	Mark
11 (a)	<p>Award one mark for identifying the element of a building that straw bales are typically used to construct.</p> <p>Any one from:</p> <ul style="list-style-type: none"> • Walls/External walls/Internal walls (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
11 (b)	<p>Award one mark for identifying one technique of building with straw bales.</p> <p>Any one from:</p> <ul style="list-style-type: none"> • Lapping the bales (1) • A method of pegging/connecting the bales/staking (1) • Infill panels (stacking) (1) <p>Accept any other appropriate answer.</p>	(1)

Question Number	Answer	Mark
11 (c)	<p>A linked response that makes reference to any two of the following points. Up to two marks for each explanation.</p> <p>Any two from the following reasons:</p> <ul style="list-style-type: none"> • An agricultural by-product/waste product/natural material (1) low embodied energy material/has not used finite resources to produce/renewable (1) • Achieve a very high resistance to the passage of heat (1) thus provides very good insulation (1) • Are fully biodegradable (1) no issues with disposal at the end of the life of the building (1) • Generally available locally (1) less emissions from transport (1) <p>Accept any other appropriate answers. Do not accept made with less harmful substances</p>	(4)

Question Number	Answer	Mark
12	<p>A linked response that makes reference to any two of the following points. Up to two marks for each explanation.</p> <p>Any two from the following explanations:</p> <ul style="list-style-type: none"> • Grey water is not potable/fit for human consumption/drinkable/contaminated (1) so drinking water supply will still need to be provided (1) • Grey water is not suitable for washing/showering/bathing (1) so a source of clean water is required (1) • A grey water system requires a volume of waste water/limited supply may be available (1) so is dependent on primary supply of water (1) • A commercial venture needs a reliable source of water for use in leisure and recreation facilities (1) that cannot be grey water (1) <p>Accept any other appropriate answer. Do not award a second mark for why grey water is contaminated Do not accept grey water is not filtered/treated fully</p>	(4)

Question Number	Answer	Mark
13	<p>Award 1 mark for naming each water saving fittings that could be installed in Building 2. Up to two marks.</p> <p>Any two from:</p> <ul style="list-style-type: none"> • Push type taps (1) • Low volume flush toilets/dual flush toilets (1) • Shower/Tap flow restrictors (1) • Eco shower heads (1) • Electronic sensor tabs (1) <p>Accept any other appropriate answer.</p>	(2)

Question Number	Answer	Mark
14	<p>Award one mark for stating each feature of trussed rafters used in Building 2.</p> <p>Any two from:</p> <ul style="list-style-type: none"> • Lightweight (1) • Timber (1) • Triangulated framework (1) • Metal nail plate connectors (1) • Computer designed (1) • Limit useable roof space (1) • Smaller sections of timber/economic use of materials (1) • Made to fit the house (1) <p>Accept any other appropriate answers.</p>	(2)

Question Number	Answer	Mark
15	<p>A linked response that makes reference to any two of the following points. Up to two marks for an explanation.</p> <p>Any one from the following explanations:</p> <ul style="list-style-type: none"> • Eco-joists are capable of spanning longer distances found in Building 2 (1) have a leaner construction/superior strength to weight ratio/less raw material content (1) • Traditional timber joists at the length required in Building 2 need large timber sections (1) which could result in additional material being used/increased weight for transportation (1) <p>Accept any other appropriate answers.</p>	(2)

Question Number	Answer	Mark
16	<p>A linked response that makes reference to any two of the following points. Up to two marks for an explanation.</p> <p>Any one from the following explanations:</p> <ul style="list-style-type: none"> ● The front of the house faces north/does not face the sun (1) so the panels would receive little or no direct sunlight/panels need sunlight to produce maximum electricity (1) ● Less available roof area at front/way the roof is shaped (1) so fewer panels can be fitted (1) <p>Accept any other appropriate answers.</p>	(2)

Question Number	Answer	Mark
17	<p>A linked response that makes reference to any two of the following points. Up to two marks for each explanation.</p> <p>Any two from the following explanations:</p> <ul style="list-style-type: none"> ● Cavity wall insulation (1) to reduce the heat loss through the walls (keep heat in) (1) ● Insulation within the roof (1) to reduce the heat loss through the ceilings (keep heat in) (1) ● Change the light bulbs for low energy units (1) to reduce electricity usage (1) ● Replace/update the existing central heating boiler (with a CHP unit)(1) as this will be more efficient/ reduce gas use (1) <p>Accept any other appropriate answers.</p> <p>Do not accept:</p> <ul style="list-style-type: none"> ● items with a long payback period e.g. solar panels/ground source heat pump / wind turbines/ Triple glazing ● lower heating costs 	(4)

Question Number	Indicative content	Mark
18	<p>Discussion on how the construction and fittings to Building 1 and Building 2 will affect the ongoing running costs of each building.</p> <p>The discussion must be based on the information in the scenarios and not on supposition where there is no related evidence in the scenario.</p> <p>Points to consider are:</p> <p>Building 1</p> <ul style="list-style-type: none"> ● Little or no insulation in walls or roof to prevent heat loss which results in higher heating cost ● Windows are double glazed which will prevent some heat loss ● Little external decoration required – gutters will require painting from time to time ● External window surfaces and fascia can be washed down ● Boiler is old and likely to be inefficient. Replacement would be energy efficient and saving in gas would be likely to pay back the cost of the new boiler ● Gutters will need cleaning out from time to time. <p>Building 2</p> <ul style="list-style-type: none"> ● Well insulated floors, roof, walls, windows so heat loss should be low ● Combined heat and power unit will be energy efficient and will make a small contribution to the electrical energy used ● Fascias will need to be washed down The window frames will require re-staining ● The rendered walls will require painting from time to time ● Gutters will need cleaning out from time to time. <p>Model Level 3 response:</p> <p>The two buildings are very different, and their ongoing running costs will vary.</p> <p>Building 1 has very little insulation within it so it will lose a lot of heat, which will increase the energy required to heat the building. Building 2 is well insulated, with insulation in the floors, external walls and the roof. This high level of insulation will reduce the heat loss and</p>	(8)

	<p>keep the energy requirement to heat the building to a minimum. Building 1 has double glazed windows and Building 2 has triple glazed windows which will help to reduce heat loss from the windows.</p> <p>Building 1 has an old gas boiler which will be inefficient and use more gas than a modern fuel efficient condensing boiler. Building 2 has an efficient boiler. This is also fitted with a small generator that runs off the waste heat and will make a small contribution to the electricity needs of the building.</p> <p>Both properties will require some external maintenance. Windows will need to be cleaned from time to time. The PVC window frames of Building 1 and the PVC soffits and fascias of Building 2 can also be washed. Building 1 will require the concrete gutters painting every few years. Gutters to both properties will need cleaning out from time to time to remove leaves and other debris. Building 2 has stained timber window frames and painted rendering which will both require maintenance every few years.</p> <p>Over the medium to long term the owners of the buildings may want to carry out redecoration or refurbishment works by replacing the kitchens, bathrooms or other fixtures and fittings.</p> <p>Accept other appropriate answers.</p>	
Level	Descriptor	
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0 0 marks	No rewardable material.	
1 1-3 marks	A few points identified, or one point described. The answer is likely to be in the form of a list. Only one viewpoint considered. Points made will be superficial/generic and not applied/directly linked to the situation in the question. Shows a basic understanding of sustainability issues.	
2 4-6 marks	Some points identified, or a few points described. Consideration of more than one viewpoint but there will be more emphasis on one of them. The answer is unbalanced. Most points made will be relevant to the situation in the question, but the link will not always be clear. Shows a good understanding of sustainability issues.	
3 7-8 marks	Range of points described, or a few points explained in depth. Most sides of the case are considered and the answer is well-balanced, giving weight to all viewpoints. The majority of points made will be relevant and there will be a clear link to the situation in the question. Shows a developed understanding of sustainability issues.-	

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