**NZQA**

**Approved**

Achievement standard: 91356 Version 3

Standard title: Develop a conceptual design for an outcome

Level: 2

Credits: 6

Resource title: Embracing sustainability

Resource reference: Generic Technology VP-2.3 v2

Vocational pathway: Construction and Infrastructure

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-91356-02-8252 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

Vocational Pathway Assessment Resource

Achievement standard: 91356

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Resource reference: Generic Technology VP-2.3 v2

Vocational pathway: Construction and Infrastructure

Learner instructions

# Introduction

This assessment activity requires you to develop a conceptual design for a small sustainable building such as a holiday bach or a utility shed used in a fishing/hunting environment.

You are going to be assessed on how you develop a justified conceptual design for a small sustainable building.

The following instructions provide you with a way to structure your work to demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them if necessary to suit their learners.

# Task

## Brief

Familiarise yourself with the following starting brief provided by your assessor/educator.

The small sustainable building (technological outcome) must:

* be constructed from natural building materials (for example clay, wood, stone, straw)
* include one source of renewable energy (solar, wind or water power).

You will need to refine the brief as you develop your conceptual design. (This brief refinement is not assessed.)

## Developing potential conceptual designs

* Use research, including analysing existing outcomes, to produce some design ideas for your small sustainable building.
* Carry out ongoing exploration and evaluation of your design ideas to determine their suitability for including in your conceptual designs. Make sure you refer to your developing brief when making decisions.
* Further develop your acceptable design ideas to produce some conceptual designs that could potentially address your brief.

## Evaluating conceptual designs

Evaluate your conceptual designs by:

* gathering and considering evidence from:
	+ ongoing research
	+ ongoing functional modelling (to explore all aspects of the conceptual designs, including technical feasibility and social acceptability)
	+ ongoing stakeholder feedback (for example builders and/or representatives who support environmental sustainable buildings; suppliers of natural building supplies and renewable energy materials)
* combining the evidence gathered to draw conclusions and make decisions (synthesising).

## Communicating the final conceptual design

Select the conceptual design that you consider best addresses your brief:

* Communicate your final conceptual design in such a way that you clearly describe how your proposed small sustainable building has the potential to address your final brief.
* Describe in detail how the small sustainable building will look and function. To do this, you could use sketches, diagrams, technical drawings, scale models, computer simulations, written descriptions, details of materials/components and/or assembly instructions.

## Potential fitness for purpose

Substantiate the outcome’s potential fitness for purpose. That is, use your synthesised evidence to support the likelihood of your proposed small sustainable building addressing your brief.

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Assessor/Educator guidelines

# Introduction

The following guidelines are supplied to enable assessors/educators to carry out valid and consistent assessment using this internal assessment resource.

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity requires learners to develop a justified conceptual design for a small sustainable building that has the potential to be fit for purpose. For example, the small sustainable building is made from natural building materials (such as wood, clay, stones, straw) and uses at least one source of renewable energy (solar, wind or water power).

# Conditions

This is an individual assessment activity.

For this assessment resource, a brief has been provided. Alternatively the brief could be developed entirely by the learner and confirmed by the assessor/educator.

# Resource requirements

Assessors/educators must either provide a brief as a starting point or confirm that a learner has developed one that is suitable. The brief must allow for a range of designs and include the purpose and probable attributes of the outcome.

Learners will require:

* internet and library access
* access to the specified environment for the proposed technological outcome
* access to existing outcomes
* access to a camera for capturing evidence
* resources for functional modelling and the development of conceptual designs (for example clay, paint, 3D modelling software).

# Additional information

Technology Online (<http://technology.tki.org.nz>) includes two explanatory papers (in the Curriculum Support section) that offer guidance that aligns with the requirements of this standard. They are:

* technological modelling (includes explanations of functional modelling)
* outcome development and evaluation.

# Assessment schedule: Generic Technology 91356 - Embracing sustainability

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner develops a conceptual design for a small sustainable building by:* establishing potential conceptual designs for a small sustainable building through generating and evaluating design ideas that are informed by research, including the analysis of existing outcomes

For example: The learner analyses a range of existing small sustainable buildings and decides on a utility shed used for fishing/hunting. The internet is used to research natural building materials and examples of renewable energy sources. The learner uses this information to sketch a range of different design ideas for a small utility shed that addresses the brief. This includes an emphasis on the impact it will have on the local environment (size, power usage) and what natural building materials will increase its sustainability. From that, the learner establishes some potential conceptual designs, using evidence from research and functional modelling, including feedback from stakeholders to evaluate design ideas.* using evidence from research and functional modelling, including feedback from stakeholders, to evaluate conceptual designs

For example:The learner uses Google SketchUp to draw some initial conceptual designs. These are used to talk to a local builder who is familiar with sustainable buildings and a focus group of targeted users (i.e. local fishing/hunting club members). As a result of feedback, the learner reduces the environmental impact of the utility shed by reducing its size and adding an alternative renewable energy source. Changes are also made to the building materials of the preferred conceptual design.* selecting and communicating the final conceptual design for a small sustainable building

For example:The learner presents the final conceptual design using suitable media. Sketches of various designs are completed and an explanation is given as to why the small sustainable building (a utility shed used for fishing/hunting) is designed that way.* explaining the small sustainable building’s potential fitness for purpose

For example:The learner’s explanation shows how the conceptual design could be used with the target audience, e.g. using CAD (computer aided design) the learner demonstrates how the utility shed could be successful in a fishing/hunting environment, using all natural building materials and renewable energy sources.*The above expected learner responses are indicative only and relate to only part of what is required.* | The learner develops a refined conceptual design for a small sustainable building by:* establishing potential conceptual designs for a small sustainable building through generating and evaluating design ideas that are informed by research, including the analysis of existing outcomes

For example: The learner analyses a range of existing small sustainable buildings and decides on a utility shed used for fishing/hunting. The internet is used to research natural building materials and examples of renewable energy sources. The learner uses this information to sketch a range of different design ideas for a small utility shed that addresses the brief. This includes an emphasis on the impact it will have on the local environment (size, power usage) and what natural building materials will increase its sustainability. From that, the learner establishes some potential conceptual designs, using evidence from research and functional modelling, including feedback from stakeholders to evaluate conceptual designs.* ongoing exploration and evaluation of design ideas to determine their suitability for inclusion in conceptual designs

For example: The learner sketches a range of different designs for a small utility shed to be used in a fishing/hunting environment, and gives reasons for how these would address the brief. These designs are informed from evaluation of research (e.g. the learner researches and evaluates a range of existing designs for a small sustainable building and comes up with a layout for a utility shed that takes into consideration the environment and what renewable energy source would best suit it i.e. solar panels) and existing sustainable building ideas, e.g. the learner found on the internet the concept of eco-friendly buildings that are taking advantage of natural building materials to reduce their environmental impact and documents these findings. Ongoing exploration and evaluation of design ideas are carried out to determine their suitability for inclusion in conceptual designs. The learner emails a number of architects that specialise in sustainable buildings to gain a range of views and to collect some ideas. This helps the learner to understand what is possible in sustainable buildings and what is realistic. The learner also tests design ideas with stakeholders who have specific knowledge of a building’s requirements (i.e. a local builder and members of the local fishing/hunting club). As a result some changes are made to reduce the utility shed’s environmental impact by adjusting its size, layout requirements and adding in another alternative renewable energy source.* using evidence from ongoing research and functional modelling, including feedback from stakeholders, to evaluate conceptual designs

For example:The learner sketches a range of ideas using Google SketchUp and after consultation with stakeholders refines design ideas and makes adjustments. The learner consulted again with a builder to ensure the technical feasibility of the designs was correct.* selecting and communicating the final conceptual design for a small sustainable building

For example:The learner presents the final conceptual design using suitable media. Sketches of various designs are completed and an explanation is given as to why the small sustainable building (a utility shed used for fishing/hunting) is designed that way.* explaining the small sustainable building’s potential fitness for purpose

For example:The learner’s explanation shows how the conceptual design could be used with the target audience, e.g. using CAD (computer aided design) the learner demonstrates how the utility shed could be successful in a fishing/hunting environment, using all natural building materials and renewable energy sources.*The above expected learner responses are indicative only and relate to only part of what is required.* | The learner develops a justified conceptual design for a small sustainable building by:* establishing potential conceptual designs for a small sustainable building through generating and evaluating design ideas that are informed by research, including the analysis of existing outcomes

For example: The learner analyses a range of existing small sustainable buildings and decides on a utility shed used for fishing/hunting. The internet is used to research natural building materials and examples of renewable energy sources. The learner uses this information to sketch a range of different design ideas for a small utility shed that addresses the brief. This includes an emphasis on the impact it will have on the local environment (size, power usage) and what natural building materials will increase its sustainability. From that, the learner establishes some potential conceptual designs, using evidence from research and functional modelling, including feedback from stakeholders to evaluate conceptual designs.* ongoing exploration and evaluation of design ideas to determine their suitability for inclusion in conceptual designs

For example:The learner sketches a range of different designs for a small utility shed to be used in a fishing/hunting environment, and gives reasons for how these will address the brief. These designs are informed from evaluation of research (e.g. the learner researches and evaluates a range of existing designs for a small sustainable building and comes up with a layout for a utility shed that takes into consideration the environment and what renewable energy source would best suit it i.e. solar panels) and existing sustainable building ideas, e.g. the learner found on the internet the concept of eco-friendly buildings that are taking advantage of natural building materials to reduce their environmental impact and documents these findings. Ongoing exploration and evaluation of design ideas are carried out to determine their suitability for inclusion in conceptual designs. The learner emails a number of architects that specialise in sustainable buildings to gain a range of views and to collect some ideas. This helps the learner to understand what is possible in sustainable buildings and what is realistic. The learner also tests design ideas with stakeholders who have specific knowledge of a building’s requirements (i.e. a local builder and members of the local fishing/hunting club). As a result some changes are made to reduce the utility shed’s environmental impact by adjusting its size, layout requirements and adding in another alternative renewable energy source.* synthesising evidence from ongoing research and functional modelling, including feedback from stakeholders, to evaluate conceptual designs

For example:The learner looks at a range of different sustainable buildings designed by architects as well as those being developed by individuals looking to reduce their costs and reliance on mainstream infrastructure. The advantages and disadvantages of each of these sustainable buildings are considered as well as various stakeholders’ requirements. A range of different ideas that would meet the issue and the brief, are sketched. These sketches are shown to two architects from different sustainable building firms who give feedback on the design of the utility shed and its specifications. Modifications are made based on their feedback. The learner makes changes to the designs (such as including alternative renewable energy sources and trialling possible natural building materials) and creates a scale model to ensure the technical feasibility and layout of the design was correct. Photographs of the scale model are emailed to an architect to gain feedback and further adjustments are made to the designs.* selecting and communicating the final conceptual design for a small sustainable building

For example:The learner presents the final conceptual design using suitable media. Sketches of various designs are completed and an explanation is given as to why the small sustainable building (a utility shed used for fishing/hunting) is designed that way.* substantiating the small sustainable building’s potential fitness for purpose

For example:The learner justifies that the small sustainable building (utility shed) will be able to be used successfully in a fishing/hunting environment due to its use of natural building materials and renewable energy sources. The learner also explains how the utility shed could be adapted to numerous environments successfully (i.e. a utility shed for camping) due to its size, adaptability of the layout and its minimal cost to run reducing the need to rely on local infrastructure.*The above expected learner responses are indicative only and relate to only part of what is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.