



Department of
Primary Industries

Tocal Virtual Farm

and the 2017 Technology Mandatory syllabus
NSW DPI Schools Program

www.dpi.nsw.gov.au



Author: Jo Hathway (Project Officer School programs, NSW DPI Orange).

Editors and Advisors: Michelle Fifield (Education Officer Schools, NSW DPI Orange) and Meg Dunford (Project Officer School programs, NSW DPI Tocal College)

Disclaimer: This resource is produced for use by NSW HSC Agriculture teachers and students. The information contained in this resource is based on knowledge and understanding at the time of writing (August, 2018). However, because of advances in knowledge and technology, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information. To the extent permitted by law, NSW Department of Industry excludes all liability for any direct or indirect losses, damages, costs or expenses, incurred by, or arising by reason of, any person using or relying on this document (in part or in whole) and any information or material contained in it. Recognising that some of the information in this document is provided by third parties, the State of New South Wales, the author and the publisher take no responsibility for the accuracy, currency, reliability and correctness of any information included in the document provided by third parties. NSW Department of Industry expressly disclaims responsibility for any error in, or omission from, this report arising from, or in connection, with any of the assumptions being incorrect or otherwise.

Copyright

© State of NSW through the Department of Industry 2018, except where indicated otherwise. This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International \(CC BY-NC 4.0\)](https://creativecommons.org/licenses/by-nc/4.0/). Under this license the material is available for free use and adaption. Educators may use, share, adapt, and republish material from the resource. You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. (<https://creativecommons.org/licenses/by-nc/4.0/>)

| | |
|---|----|
| Total Virtual Farm and the 2017 Technology Mandatory syllabus | 4 |
| Glossary | 6 |
| Agricultural technologies design portfolio | 7 |
| Consider the Tocal Virtual Farm. | 9 |
| The property | 9 |
| History | 10 |
| Physical and biological resources on the farm | 11 |
| Landscapes | 11 |
| Tocal property map | 12 |
| Enterprises | 13 |
| Site investigations | 14 |
| Sustainability | 15 |
| Reflection: | 18 |
| Soils (optional activity) | 19 |
| Water quality (optional activity) | 19 |
| Technology in farming | 20 |
| Alternative enterprises for Tocal | 21 |
| Enterprise 1: | 22 |
| Enterprise 2: | 24 |
| Enterprise 3: | 26 |
| Enterprise 4: | 28 |
| Decision: | 30 |
| Calendar of operations | 32 |
| Evaluation: | 33 |
| Careers | 34 |
| Appendix | 35 |
| Syllabus content | 35 |

Information for teachers

Tocal is a 2200 hectare property in the NSW Hunter Valley managed by the NSW Department of Primary Industries. Farm enterprises on Tocal include commercial dairy, beef, egg, bee, stock horse and sheep.

We are fortunate to have access to a great deal of information about the property which we used to create the Tocal Virtual Farm. The combination of production data, spatial data and virtual reality 360 videos gives students virtual access to the Tocal farm.

Tocal farms are increasingly active on the Tocal College social media platform search on #totalfarms to see their recent posts of Facebook and Instagram.

Syllabus context – Agriculture and Food Technologies

The Tocal Virtual Farm provides students with detailed and immersive experiences of commercial beef, dairy and egg production as well as horse and sheep breeding enterprise, providing a context for completing the agricultural outcomes in the Agriculture and Food Technologies component.

The work that students put into this component of the syllabus can be used as a basis for completing the food technologies outcomes. For example, if students investigate the possibility of growing citrus fruit on Tocal they can then look at the nutritional value of that fruit, the impact on nutrition of cooking the fruit, and also how to change a cake recipe to contain less sugar.

Digital technologies outcomes can be delivered in combination with this project. For example if students were to propose an aquaponics enterprise on Tocal they can look at the food technologies outcomes as they have in the citrus example. They can also go on to plan, build, code and test the reticulation system.

Resource description

This workbook includes an investigation of agriculture on Tocal and can be completed by students using the Tocal Virtual Farm.

Field work

The site investigation activities are very similar to the work book that students complete when they visit the property for field work.

If you have access to another property or rural area near your school you could complete activities like the site sketches in the field however they are easily completed by moving around or zooming in on the aerial imagery.

To add value to your students' learning you could also complete the soils and water testing activities that are marked as optional in the workbook.

Completing the mapping exercise

The mapping exercise can be completed on a number of platforms using the Tocal Virtual Farm. We have made some basic Tocal spatial data available for you to download and distribute to students to form the basis of their maps.

Tocal spatial data <https://www.tocal.nsw.edu.au/tocals-new-e-farm>

ESRI have made ArcGIS available for educational use so you can request a free licence for this purpose. Students will need to set up an account.

ESRI ArcGIS for schools <https://esriaustralia.com.au/gis-for-schools>

Google MyMaps is another option. Students will also need to create an account for this platform.

Google My Maps <https://www.google.com/maps/about/mymaps/>

Glossary

| Term | Definition |
|------------------------------|--|
| ABARES | Australian Bureau of Agricultural and Resource Economics and Sciences |
| Agriculture | The science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, fibre, fuel and other products. |
| Consumer | People who buy and use a product to satisfy their needs or wants, for example people buying fruit to consume or eat. |
| Economy | Financial measure of business success. |
| Enterprise | A business or company intended to create income – in this document we specifically mean an agricultural business. |
| Extensive agriculture | A type of farming characterised with growing animals or plants over large areas of land or at low stocking rates. Extensive farming systems characteristically have lower inputs of labour and feed and lower production per unit area, as compared to intensive agriculture systems. |
| Industry | Production activities associated with a particular product or range of products |
| Intensive agriculture | A type of farming characterised with growing animals or plants at high stocking rates and densities. Intensive farming systems characteristically have higher inputs of labour and feed and high production per unit area, as compared to extensive agriculture systems. |
| Irrigation | Irrigation is the artificial supply of water to soil and plants to increase growth. |
| Management | <i>Management</i> involves activities surrounding organising and co-ordinating a plan or strategy to accomplish an objective. Things that are managed or controlled in agricultural management are resources: money and finances, natural resources such as soil and water, technology, labour, animals and plants and humans. |
| NSW DPI | New South Wales Department of Primary Industries |
| Primary Industry | Industries including mining, agriculture and forestry, which are concerned with obtaining or providing natural raw materials for conversion into commodities and products for the consumer. |
| Product | |
| Producer | A person who produces goods, products or services. Farmers are producers. |
| Spatial data | Recording and conveying geographic data, including location or extent, of features within a location |
| Sustainability | An approach to farming which produces profitable high quality products without depleting or degrading the environment or natural resources, for example soil and water. |
| System | A set of units that interact, react and depend on themselves and the living and nonliving parts of an environment, for example a natural ecosystem. In agriculture a farm system consists of many interacting units such as plants, animals, climate, soil, weeds, pest and diseases and management practices which operate within a boundary. |

Agricultural technologies design portfolio

View this thought-provoking video <https://www.youtube.com/watch?v=jxiYsgyn1yU>

Write down what you think the video is about:

.....

.....

.....

How does it make you feel about the future? Why?

.....

.....

.....

Discuss your responses with the rest of the class. Did other people think like you? Were there different ideas? Why could this be the case?

.....

.....

With this video in mind consider the following statistics about food security and the future of food production from the Food and Agriculture Organization of the United Nations (<http://www.fao.org/3/a-i6887e.pdf>).

- The World's population is expected to grow to 9.7 billion by 2050 (currently 7.5 billion). Check it right now here: http://www.theworldcounts.com/counters/shocking_environmental_facts_and_statistics/world_population_clock_live
- Two thirds of the world is expected to live in urban areas.
- Climate change is a threat to cropping, livestock production and fisheries.

So what is going to need to change in the future? And who is part of the solution?

.....

.....

Where are we now?

View the ABARES website. <http://www.agriculture.gov.au/abares/>

How valuable is food and fibre production to Australia’s economy? Consider both the economic value of the agricultural commodities and employment statistics.

.....
.....
.....

What are the most valuable industries?

.....

View the AgriFutures website <https://www.agrifutures.com.au/>

Identify some of the emerging trends in rural industries that AgriFutures are currently considering? Explain.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

If you have an interest in a particular industry, search their [Rural Research and Development Corporation](#) website for emerging trends and future predictions.

Do you think that food and fibre production is a future focussed career?

Will the demand for food and fibre continue into the future and are there technological innovations still to be designed in this industry? If your answer is yes to either of these, keep reading...

Consider the Tocal Virtual Farm

The property

Tocal covers 2200 hectares and contains a range of natural ecosystems, from rainforest remnants and wetlands, to dry sclerophyll forests.

Annual rainfall

Mean = 972 mm, Median = 749 mm.

Soils

Soils form a complex pattern across the property. This can be simplified by looking at the soil landscapes, that is the uplands or hills with erosional soil landscapes, the floodplain with alluvial (made up of materials left by rivers) soil landscapes, the midslopes with colluvial (loose earth accumulated at the base of a hill usually moved by gravity) soil landscapes and the vestigial soil landscapes that remain as evidence of volcanic activity. Each of the soils represents different production and management opportunities.

Beef

Beef cattle are run over an area of 1790 hectares, made up of prime pasture, medium pasture and poor pasture land as well as bushland. The average herd size is 1100 head – ranging between 800 and 1400 depending on the time of the year and seasonal conditions. The breeding herd averages 550 Brangus cows and four Angus, eight Brangus and two Charolais bulls. Our main market is the sale of weaners on local stores market – around 450 head per year.

Dairy

The Dairy covers an area of 260 hectares. The herd is 360 head (mainly Holsetein Fresian) of which approximately 220 are milked twice daily. Our average weekly production is 28-32,000 litres/week.

The pasture on the dairy is Kikuyu based, oversown in early autumn with ryegrass, white cover and red clover with some chicory and plantain and fertilised with N+P+K regularly as well as selective use of nitrogen and poultry litter. Some paddocks are limed.

Eggs

Free-range eggs are produced under contract to Pace Farms on an area of 86 hectares. The hens are housed in five sheds covering an area of 8,762m². The sheds have the capacity to house 90,000 hens and we currently run Isa Brown hens. The hens have access to 15 hectares for free ranging.

Sheep

Tocal runs a self-replacing Dohne flock of 300 ewes on an area of 100 hectares. This is a demonstration flock used for student training. The flock produces over 1 tonne of wool per year as well as prime lambs. The sheep are guarded by a Maremma dog named Dunedoo.

Horses

Australian Stock Horses are bred at Tocal for student training and stock work. At any one stage Tocal will have over one hundred horses on the property from young foals, yearlings, breakers, work plant horses and broodmares. Foaling begins around August and the foals are weaned and handled at 5 months.

Property details

| | |
|-------------------|--|
| Property Name | |
| Location | |
| Owners / managers | |

History

(see the Cultural Heritage story map)

Tocal is on the lands of which Aboriginal people/s?

.....

Why was Tocal such a valuable location for them?

.....

.....

Who was the first land grant given to? And how much land was granted?

.....

How did Tocal come to be an agricultural college run by the NSW government?

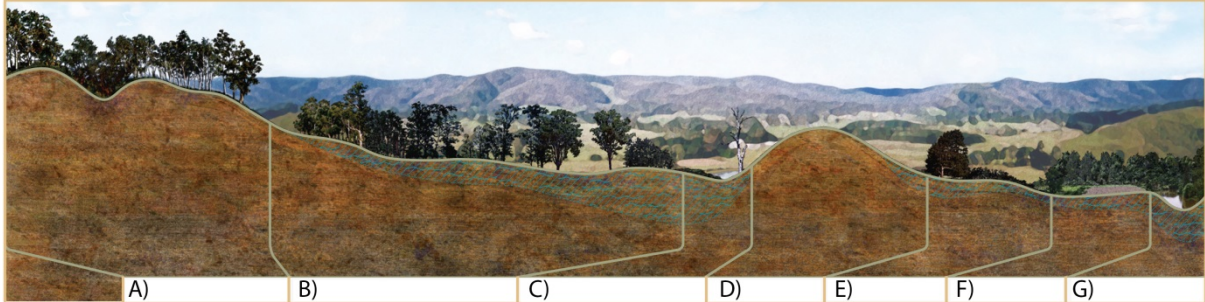
.....

.....

Physical and biological resources on the farm

Landscapes

(see the Topographic Landscapes on Tocal story map)



Label the topographic landscapes of Tocal in the transect A)-G) and describe their landuse.

Landscape

Landuse

A.....A.....

B.....B.....

C.....C.....

D.....D.....

E.....E.....

F.....F.....

G.....G.....

Tocal property map

Indicate on the map where the different farm enterprises are run and the topographic landscapes. Include a key.

Tocal Property and Farms



Enterprises

| | Size | Production | Pasture/vegetation | Water | Infrastructure | Staff |
|--------|------|------------|--------------------|-------|----------------|-------|
| Beef | | | | | | |
| Dairy | | | | | | |
| Eggs | | | | | | |
| Sheep | | | | | | |
| Horses | | | | | | |

This information is available in the story maps, the Tocal Property and Farms document and also the VR experiences available through our YouTube channel – all links available on <https://www.dpi.nsw.gov.au/education-and-training/tocal-virtual-farm>

Site investigations

Using the Tocal story map choose three sites to investigate.

Click on a paddock and zoom into a site in that paddock.

Site/paddock name:

Date:.....

Paddock size:

Enterprise:

Slope (use the topographic landscapes to help you decide)

Can you see evidence of erosion? Yes No

Is water available?(can be seen on the aerial image) Yes No

How is it provided?

Dam River Trough

Is there irrigation in this paddock? Yes No

Notes:

.....
.....

Site/paddock name:

Date:.....

Paddock size:

Enterprise:

Slope (use the topographic landscapes to help you decide)

Can you see evidence of erosion? Yes No

Is water available?(can be seen on the aerial image) Yes No

How is it provided?

Dam River Trough

Is there irrigation in this paddock? Yes No

Notes:

.....
.....

Site/paddock name:

Date:.....

Paddock size:

Enterprise:

Slope (use the topographic landscapes to help you decide)

Can you see evidence of erosion? Yes No

Is water available?(can be seen on the aerial image) Yes No

How is it provided?

Dam River Trough

Is there irrigation in this paddock? Yes No

Notes:

.....
.....
.....

Sustainability

(see the Property section of the Tocal Property and Farm document for this information)

List the six categories that the key management goals fall under:

1.

2.

3.

4.

5.

6.

Why are the following factors important aspects of ecological management on farms?

Weather and Climate

.....
.....
.....

Soils

.....
.....
.....

Water

.....
.....
.....

Vegetation and weeds

.....
.....
.....

Organisms – native and pest species

.....
.....
.....

Pollution control

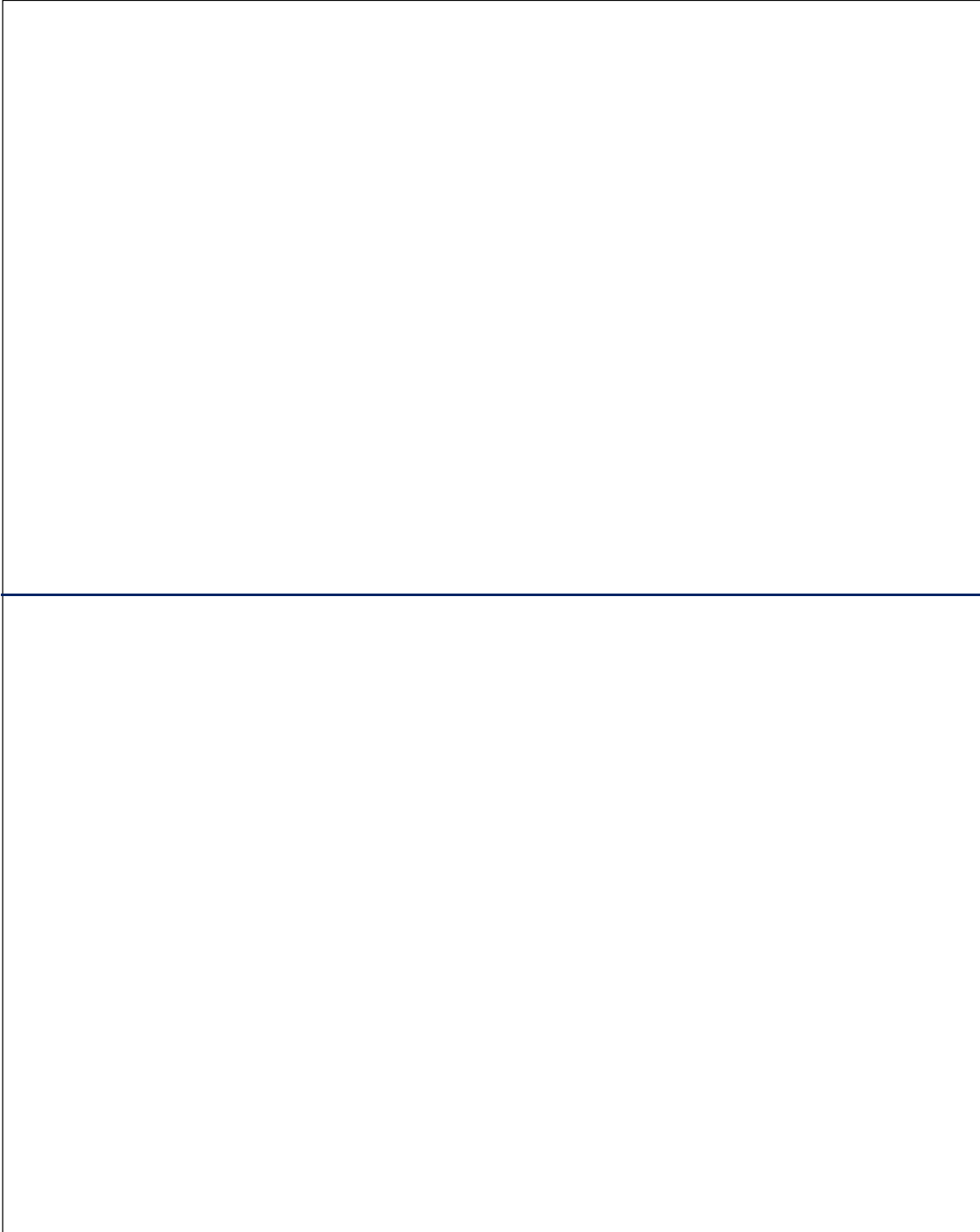
.....
.....

What are the potential sources of pollution?

- | | |
|---------|---------|
| 1. | 4. |
| 2. | 5. |
| 3. | |

Site sketch

Draw a comparison between two different sites that you can see on the aerial imagery. You may choose to compare a site with high levels of infrastructure with a farm landscape or compare the dairy landscape to an area at the back of the property that is closer to a natural state.

A large empty rectangular box for drawing a site sketch, divided into two horizontal sections by a blue line. The top section is approximately 30% of the total height, and the bottom section is approximately 70% of the total height. The box is intended for a hand-drawn comparison of two sites based on aerial imagery.

Label the sites and annotate your sketch with notes about the different features on the sites.

Reflection:

What surprised you in your investigation of the Tocal farms and why?

.....

.....

.....

.....

.....

What's the most important thing you learned from this activity and why do you think so?

.....

.....

.....

.....

.....

What do you want/need to learn more about and how will you do it?

.....

.....

.....

.....

.....

Soils (optional activity)

Site name: Date and Time

| | | | |
|---------------------|-------------------------------|---|--------------------------------------|
| | Poor | Fair | Good |
| pH | pH5 or lower | pH 5.5 | pH 6 to 7 |
| Ground cover | Less than 50% | 50-75% | More than 75% |
| Infiltration | More than 7 minutes | 3 to 7 minutes | Less than 3 minutes |
| Compaction | Wire probe will not penetrate | Wire probe penetrates to less than 20cm | Wire probe easily penetrates to 20cm |

Colour of surface layer: subsoil:

Texture of soil:..... subsoil:

Comments and Observations:

.....

.....

Water quality (optional activity)

Site name: Date and Time

Last rainfall: within 24 hrs 1-7 days more than 7 days

Type of rainfall: light medium heavy

Test results:

| | | | | | |
|----------------------------|-------|--------------|--------------|-----------|------|
| Air temperature | | | | | |
| Water temperature | | | | | |
| | Poor | Good | Ideal | Good | Poor |
| pH | <6 | 6-7 | 7 | 7-8 | >8 |
| | | | | | |
| | Poor | Fair | Good | Very good | |
| Salinity (µS/cm) | >800 | 400 - 800 | <400 | | |
| Turbidity (NTU) | >30 | 15-30 | | ≤10 | |
| Available phosphate (mg/L) | ≥0.45 | 0.15 - <.045 | 0.06 - <0.15 | <0.06 | |

Comments and Observations:

.....

.....

Technology in farming

Research three new innovations in agriculture and describe how they are helping to make farming more efficient.

Device / innovation:

How does it make farming more efficient and/or sustainable?

.....
.....
.....
.....
.....

Device / innovation:

How does it make farming more efficient and/or sustainable?

.....
.....
.....
.....
.....

Device / innovation:

How does it make farming more efficient and/or sustainable?

.....
.....
.....
.....
.....

Alternative enterprises for Tocal

Your job now is to identify four new options for food or fibre production on Tocal. You should include two emerging industries like hemp or pomegranate production or a staple product with long term industry acceptance like rice or wheat (look further afield than just these four there are many more alternatives).

Research the growing requirements for the products, what does it need in terms of soil, water, climate, equipment and personnel. Consider also the possible social licence issues associated with the industry. Tocal is quite close to Paterson and rural community of approximately 350 people and is surrounded by many small rural landholders. Consider whether the enterprise you are researching is likely to cause conflict with surrounding residents.

The NSW Department of Primary Industries provides information about gaining approval for intensive industries as well as a guide to which enterprises may need approval from Council.

https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0008/194399/preparing-development-application-intensive-agriculture-nsw.pdf from.

Tocal includes land in both Dungog Shire Council and the Maitland City Council so you may need to check both of their websites as well.

What are the four enterprises you will research?

1.
2.
3.
4.

Record your findings on the following pages.

Enterprise 1:

Growing requirements

Soil:

.....
.....

Is this the same as the soil on Tocal? Yes No

Water:

.....
.....
.....

Available on Tocal? Yes No

Would it involve irrigation? This could limit where it can be produced. Yes No

Climate (rainfall, temperature, frost resistance etc):

.....
.....
.....

Does Tocal have a suitable climate? Yes No

Topography (slope, aspect etc):

.....
.....
.....

Does Tocal have a suitable area? Yes No

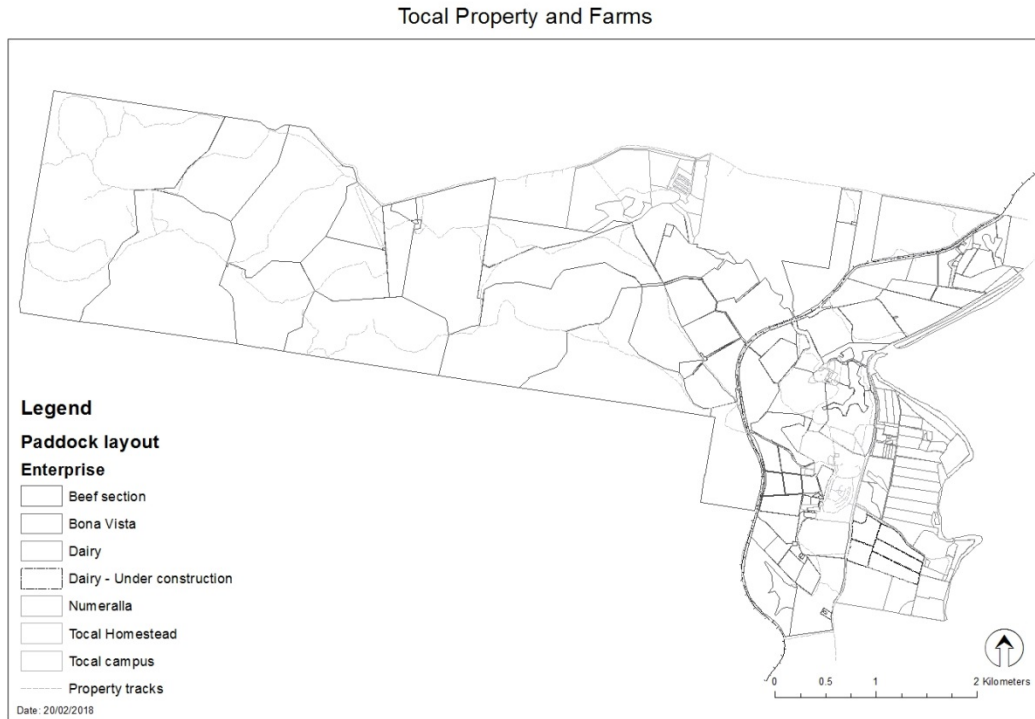
Equipment / Personnel:

.....
.....
.....
.....

Available on Tocal? Yes No

Is there a suitable site for it on Tocal? Yes No

If yes, mark it on this map



Does you need to gain approval to produce this on Tocal? Yes No

Who from?

.....

Is it an option for an alternative enterprise on Tocal? Yes No

Enterprise 2:

Growing requirements

Soil:

.....
.....

Is this the same as the soil on Tocal? Yes No

Water:

.....
.....
.....

Available on Tocal? Yes No

Would it involve irrigation? This could limit where it can be produced. Yes No

Climate (rainfall, temperature, frost resistance etc):

.....
.....
.....

Does Tocal have a suitable climate? Yes No

Topography (slope, aspect etc):

.....
.....
.....

Does Tocal have a suitable area? Yes No

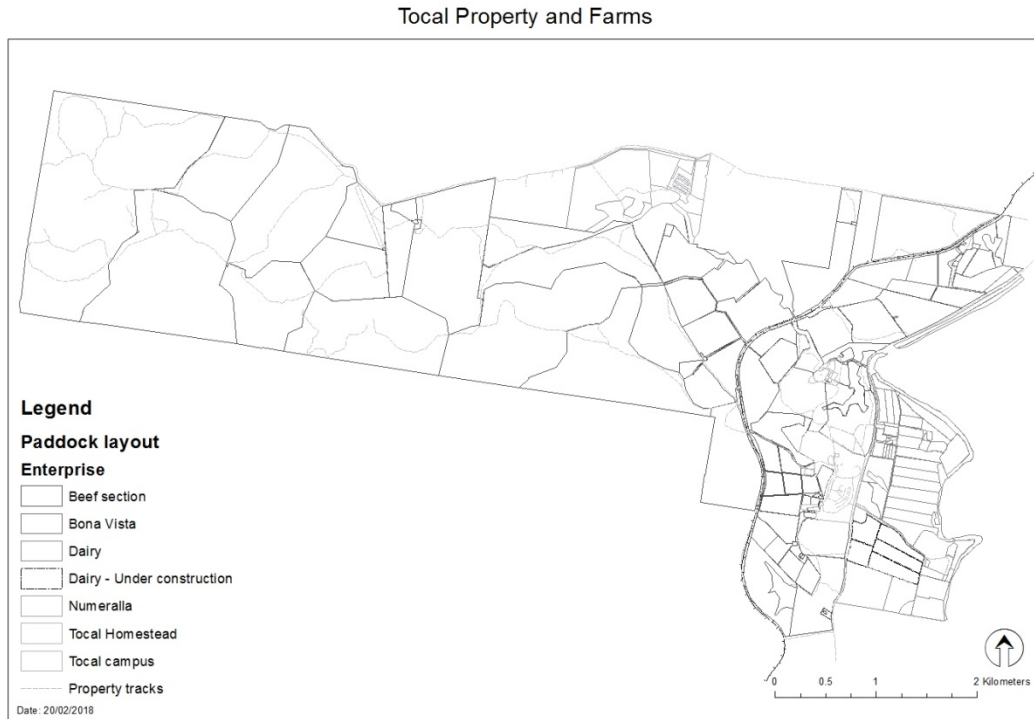
Equipment / Personnel:

.....
.....
.....
.....

Available on Tocal? Yes No

Is there a suitable site for it on Tocal? Yes No

If yes, mark it on this map



Does you need to gain approval to produce this on Tocal? Yes No

Who from?

.....

Is it an option for an alternative enterprise on Tocal? Yes No

Enterprise 3:

Growing requirements

Soil:

.....
.....

Is this the same as the soil on Tocal? Yes No

Water:

.....
.....
.....

Available on Tocal? Yes No

Would it involve irrigation? This could limit where it can be produced. Yes No

Climate (rainfall, temperature, frost resistance etc):

.....
.....
.....

Does Tocal have a suitable climate? Yes No

Topography (slope, aspect etc):

.....
.....
.....

Does Tocal have a suitable area? Yes No

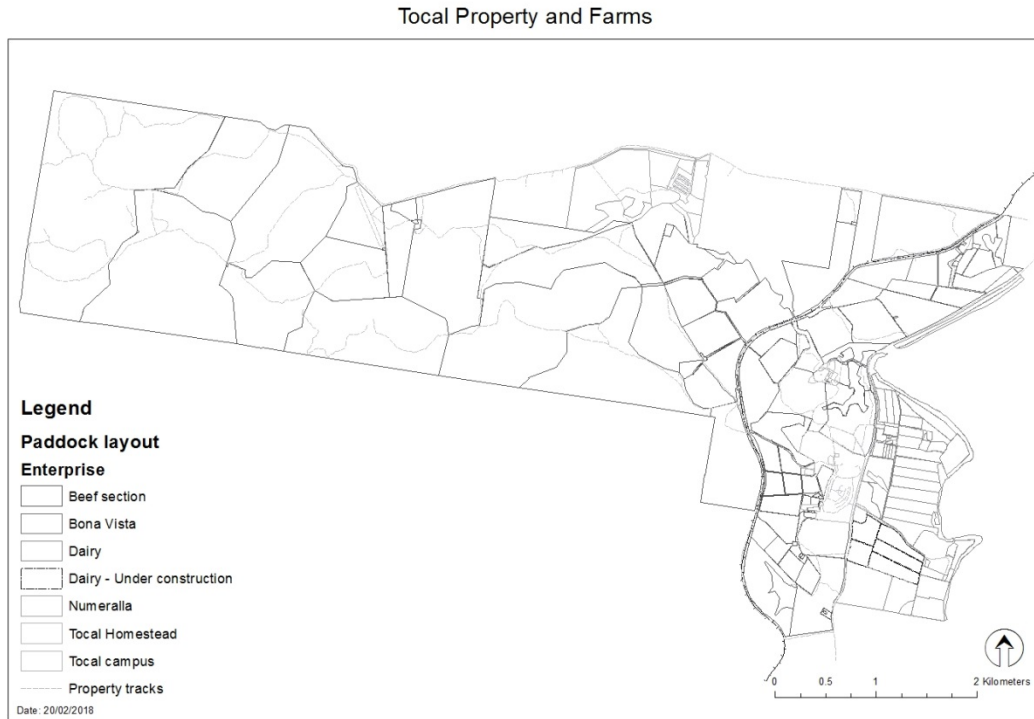
Equipment / Personnel:

.....
.....
.....
.....

Available on Tocal? Yes No

Is there a suitable site for it on Tocal? Yes No

If yes, mark it on this map



Does you need to gain approval to produce this on Tocal? Yes No

Who from?

.....

Is it an option for an alternative enterprise on Tocal? Yes No

Enterprise 4:

Growing requirements

Soil:

.....
.....

Is this the same as the soil on Tocal? Yes No

Water:

.....
.....
.....

Available on Tocal? Yes No

Would it involve irrigation? This could limit where it can be produced. Yes No

Climate (rainfall, temperature, frost resistance etc):

.....
.....
.....

Does Tocal have a suitable climate? Yes No

Topography (slope, aspect etc):

.....
.....
.....

Does Tocal have a suitable area? Yes No

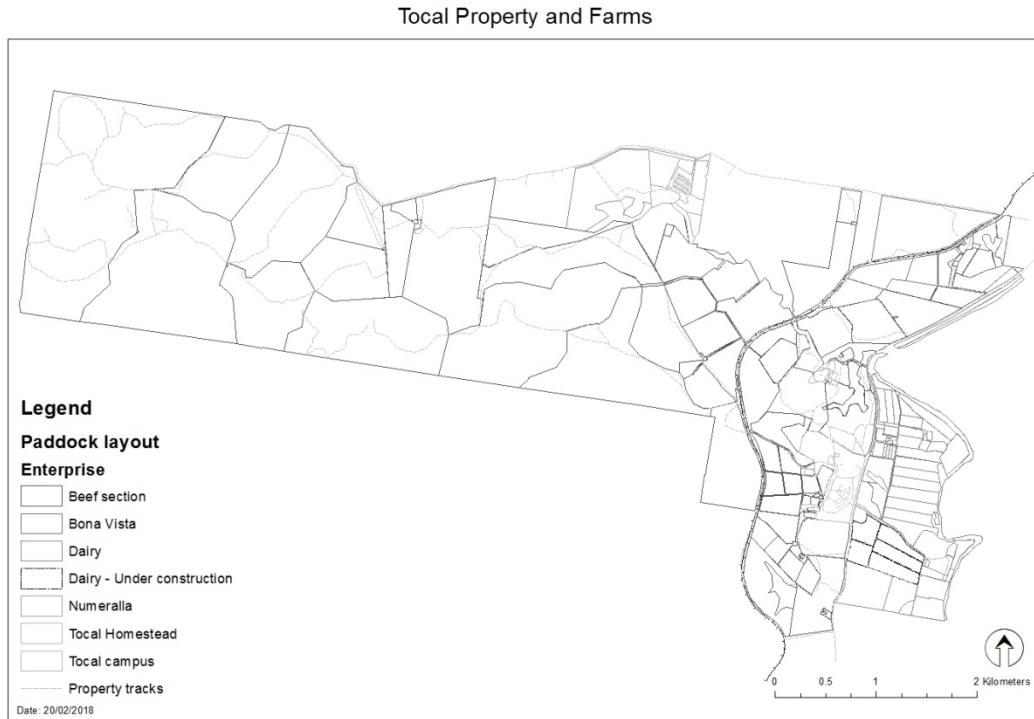
Equipment / Personnel:

.....
.....
.....
.....

Available on Tocal? Yes No

Is there a suitable site for it on Tocal? Yes No

If yes, mark it on this map



Does you need to gain approval to produce this on Tocal? Yes No

Who from?

.....

Is it an option for an alternative enterprise on Tocal? Yes No

Once you have completed your research choose one of the enterprises to pursue.

If none of the products you investigated are suitable you will need to consult with other students to choose an appropriate alternative.

Decision:

Is there an available space for it? How do you know?

Contact the organiser of a local or school garden or public space to see what process they follow when they would like to make changes to the space. Is there a committee that discusses these? What factors do they take into consideration?

Notes from discussion:

.....
.....
.....
.....
.....
.....
.....

Who would you need to discuss this with if you decided you wanted to try your new enterprise on Tocal? See the People section of the Tocal Property and Farm document.

.....
.....
.....
.....

Assuming you have negotiated with staff and gained approval to develop this new enterprise on Tocal you now need to plan for its establishment and what is required to ensure its success.

What will need to be done to the site to ensure success?

Are there any earthworks required? Do you need to install any infrastructure? eg irrigation, sheds, stock yards, fencing

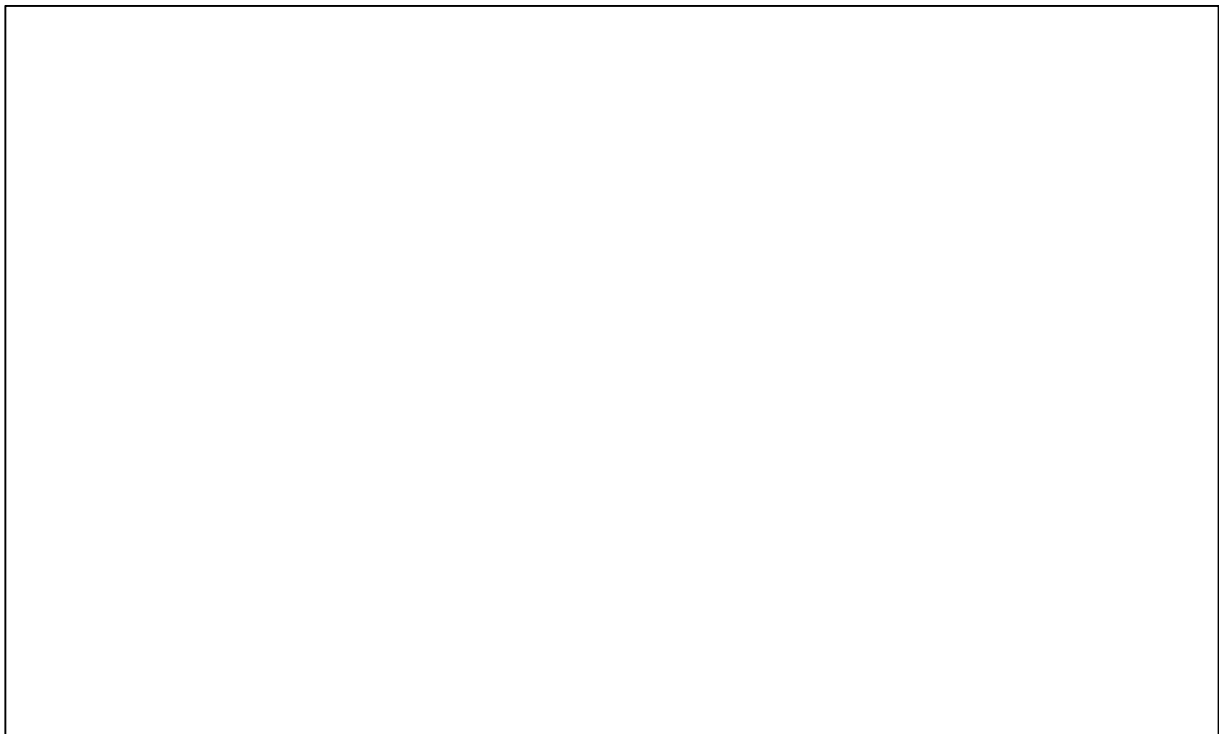
.....

.....

.....

.....

Sketch a plan of the site



Map your enterprise

Using mapping software that is available in your school or one of the online mapping platforms (including Google My Maps or ESRI Story Maps) map your enterprise on a map of Tocal. The boundary and paddock layers, amongst others, are available to download from <https://www.tocal.nsw.edu.au/tocals-new-e-farm>.

Include notes about the suitability of the site and any preparation works that are required on the map.

Provide a link to your map here.

Note: you will need to either make it public or share your map with your teacher to enable them to view and assess it.

Calendar of operations

To complete the planning process consider the first twelve months of your new enterprise, what will need to be done? eg if you are planning fruit trees what do they require throughout the year? You may need to prune or fertilise the trees. At what stage will you plant them? If you plant young (tubestock) how long will it be before you can expect fruit? If you plant mature trees, how much more money will the establishment cost be?

Plan the next twelve months on the calendar. For longer term production you need to plan further than establishment in the first 12 months so use the second calendar for what you will need to do throughout the year once the enterprise is established and productive (give an indication of which year that will be eg citrus fruit may not production fruit for five years so the second calendar is year 5)

| Year 1 | | Activities | | | |
|-----------|--|------------|--|--|--|
| Month | | | | | |
| January | | | | | |
| February | | | | | |
| March | | | | | |
| April | | | | | |
| May | | | | | |
| June | | | | | |
| July | | | | | |
| August | | | | | |
| September | | | | | |
| October | | | | | |
| November | | | | | |
| December | | | | | |

| Year | Activities | | | | |
|------------------|------------|--|--|--|--|
| Month | | | | | |
| January | | | | | |
| February | | | | | |
| March | | | | | |
| April | | | | | |
| May | | | | | |
| June | | | | | |
| July | | | | | |
| August | | | | | |
| September | | | | | |
| October | | | | | |
| November | | | | | |
| December | | | | | |

Evaluation:

What did you learn about agricultural industries and food and fibre production that you think everybody should know?

.....

.....

.....

What technology is involved in this product and how is it changing the industry ?

.....

.....

.....

Careers

What do you think the future holds for this industry?

.....
.....
.....

What skills do you think you would need to be able to run this enterprise successfully?

.....
.....
.....
.....
.....

Check out <http://www.careerharvest.com.au/> for more information about the skills and careers in agriculture.

Notes:

.....
.....
.....
.....
.....

Appendix

Syllabus content

Syllabus content included in this project is marked in black – other content would need to be addressed separately.

Identifying and defining

Students:

- investigate the importance of food and fibre production to Australia’s food security and economy including Asia’s imports and exports (ACTDEK029) 🌐 🌱 🌿
- investigate how food and fibre production is managed in environments as a system and how sustainability can be improved, for example: (ACTDEK032) **ST** 🌱 🌿
 - plants and/or animal species grown in managed environments
 - land management by Aboriginal and/or Torres Strait Islander Peoples
 - boundaries, inputs, outputs, processes and feedback occurring in a managed environment
- evaluate environments that have been designed in consultation with community groups, for example: 🌱 🌿
 - a bush tucker garden
 - a school or community garden
- investigate the characteristics and properties of a variety of nutritious foods, for example: **CT**
 - high in fibre, eg fruits and vegetables
 - high in protein, eg meat and meat alternatives
- explore the nutritional needs of a group of people, eg adolescents, toddlers **CT** 🌐 🌱
- develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031) **DT ST** 🌱 🌿 🌱 🌿

Researching and planning

Students:

- design and plan a product associated with agricultural production (ACTDEP036) **DT ST** 🌱 🌿 🌱 🌿
- research legal and ethical requirements associated with agricultural production, eg keeping animals 🌐 🌱 🌿

- investigate ideal conditions for growth and development of an agricultural plant or animal (ACTDEK032) **ST** ⚙️ 🖨️
- develop a schedule or calendar for ongoing care of a plant or animal species associated with an agricultural project (ACTDEP039) **ST** ↕️ 🗓️ 🖨️
- acquire and interpret data, for example: (ACTDIP025, ACTDIP026) **CT ST** 🖨️ 📊
 - local environmental and/or physical conditions, eg rainfall, temperature
 - nutrition information panels, eg saturated fat, sugar content
- plan nutritious dish(es) to suit a group within society, for example: **DT** ⚙️ 🌐 🗓️ ✨
 - high calcium and iron for adolescents
 - food for cultural celebrations
- identify a range of food preparation techniques and analyse the impact on nutrient value (ACTDEK033) **CT** ⚙️ 🖨️ 🎓
- investigate and communicate how a recipe can be improved to enhance nutritional value, and justify the recipe adjustment, for example: (ACTDEP039) **DT** ⚙️ 🗓️ 📊 🗓️
 - using wholemeal flour instead of white flour for increased dietary fibre

Producing and implementing

Students:

- produce and implement an agricultural project and/or produce nutritious food (ACTDEP039) **DT** ↕️ ⚙️ 🗓️ ✨
- select, justify and use a range of appropriate tools and techniques in an agricultural project and/or food preparation (ACTDEK037) **DT ST**
- identify and apply safe and ethical work practices, for example: **DT** 🗓️ 🗓️ ✨
 - correct use of tools and equipment
 - food safety and hygiene practices

Testing and evaluating

Students:

- evaluate the effectiveness and suitability of choices made during the development and production of the solution
- assess the solution against the predetermined criteria ⚙️