

TreeFarmer

- Treefarmer has been developed with Forest Growers Levy funds for free use by all New Zealand Small Scale Forest Growers. This web tool is intended to provide knowledge and awareness of forest operations and improve forest investment outcomes. In future we hope it will be used to deliver research results to Small Scale Forest Growers in a practical spatial platform. The development of the tool has been guided by an industry steering group.
- These notes relate to version 1.0 and aimed at getting novice decision support users started.
- The tool is developed to provide you with awareness of decisions needed at forest establishment and harvest. It provides indicative costs and yields for a range of species and tending options. It also gives limited harvest planning functionality with indicative results of costs. It does not provide full operational plan nor replace the need to involve professional forest consultants and harvest planners.
- TreeFarmer will help you determine the woodlot area, its productivity by species and estimate roading, harvesting, and transport costs based on terrain and your input information.
- This application is only intended to improve woodlot owner knowledge of issues at establishment and prepare them for questions that arise at harvest.
- It also provides a checklist of factors to print and tick off completed items.
- Further development is occurring allowing the landowner to store the analysis they have completed and perhaps return later to try other scenarios. This is still work in progress.
- For further information will be available from Forest Growers Research at: <https://fgr.nz/>

Access

See below a link for the public demo site. Note that this site is just for testing at this stage.

<https://treefarmer.fgr.nz/>

The tool can be also run-on late model Android phones.

Tutorial

Start up

On clicking the web link (it may need Ctrl + click from this document), you first see an introductory screen with a short explanation about Treefarmer. Click “Continue” to start the main interface. The interface is simply a map and options for “Planting trees” or “Tree Harvesting”. Each option will allow you to choose “Inputs” or “Estimated Costs”.

Mapping tools

Symbols in the top left of the screen allow zoom in and out with “+” and “-”, plus change the map to full screen (the four-arrow symbol) to explore the map layers manually by holding the left mouse button down and dragging the map like a rug by moving the mouse. Click the reverse four arrows button, or Esc on your keyboard to get out of Full Screen view.

Symbols in the top right of the map, but below where you enter your address, are short cuts for mapping actions and are explained if you hover your mouse symbol over them.

At the top left of the screen is the Zoom Level. Try zooming in and out with the wheel on your mouse or use the + or – buttons. Again, click and hold on the map with the Hand symbol and drag it like a rug to move about in the map or use the arrow keys on your keyboard.

Map Layers

The list of Map Layers on the left of the screen operate at different levels of Zoom, typically greater than Zoom Level 10. This necessary to improve the loading speed of the layers and may get changed from time to time and this will depend on the speed users are experiencing. As you go above the Zoom level a layer begins to be displayed, the Layer name goes from grey to black. Once it has turned black, if you then hover your mouse over the layer, it will tell you what Zoom Level it operates at.

Tip: Try Zooming in to level 15 then run your mouse down over the Layers, this will quickly inform you of the Zoom range you will need to operate at to see the layer displayed.

If you wish to see more of the layer when displayed, turn on Full Screen using the Four arrow symbol.

At the top of the Map Layer list are the Productivity surfaces. Click the + symbol for the list to be expanded, then click the layer you wish to see. When they display, a Layer opacity bar occurs at the top left. Click and hold the round symbol on the bar and drag it left and right to alter opacity. This will help you see what underlies the colour changes. On the bottom right is the map legend giving the range of values represented by each colour.

Find your property.

Get started by navigating to your property, enter your street address in the search box at top right. It will begin to offer a list of suggested similar addresses below the box, to shortcut the process, you can click on any that are your address. The map will then Zoom to that address (stopping at Level 16) and you will need to adjust the Zoom level to suit the extend of your property you wish to examine. By default, the “Land Parcels (LINZ) layer is left on and give you the legal boundaries of all properties.

The aerial imagery you will get is the latest complete national set provided by Land Information NZ (LINZ). This may consist of a patchwork of photos from different times, hence, show colour changes between images because of seasons. Aerial imagery will be updated by LINZ from time to time and without notice. You may wish to turn off the “Basemap: Aerials (LINZ)” to see the older underlying aerial imagery available. Also turn on the “Basemap: Street (OSM)” (Open Street Map) to get street names and street numbers.

Infrastructure

Roads and Street names, property numbers, aerial imagery, powerlines, streams, ground slope, NES_PF erosion risk, road metal quarries can be seen by turning all layers off except the Basemap: Streets (OSM) at the bottom. NB: Aerial imagery may not be the very latest and can vary in quality across the country. You may get later imagery in Google Earth that is helpful.

Planting Trees

Inputs

Step 1 is Map Search. This is covered in the Find your Property section, above

Step 2 is Draw Woodlot Boundary.

Move to the area of your property you are considering planting and Zoom in so that the area is magnified and filling most of the screen. Then by clicking “Use Area Drawing Tool” the drawing tool is activated and you can use your mouse to click on the corners and angles of the paddock or area you wish to plant. It’s best

to Click in a clockwise direction. When the boundary you are forming is one step away from the starting point, double click the last point. This will close the boundary. You can also press Enter on your keyboard at this point if it's easier.

The "Woodlot Boundary" table will now be showing that gives the area and label this "Woodlot 1". The blue map symbol allows you to move the map back to the woodlot at any time.

The next input required is the "Vegetation/Land cover (%)". First click on the up & down arrow symbols in the box that currently displays "Pasture". This brings up a pick list of different ground cover conditions. Click on one, then click the "+" symbol to the right. An input box is created, enter the percentage of ground cover you estimate. Use the aerial photography to help. If that land cover is less than 100%, click the Up/down arrows in the next box, below, select another land cover and enter the % cover. Repeat this for each land cover present to achieve 100%. Without 100% the calculations will not proceed. If you wish to delete and landcover click on the red "-" beside the box.

Species Options

Next, click the box beside the species you wish to test as an option. If you want to you can test all of them.

Next, click the arrows in the "Tending options" boxes that currently show "Plant & Leave".

Select one of the three options for tending. This will affect costa and yields.

Next set the age for harvest for each species. Currently a range between 10 years and 50 years is allowed.

Next, for species we do not currently have a productivity layer (i.e. Poplar), please enter your estimated site index value (Height of top 100 trees/ha at age 20 years, the range allowed is 16m to 34m). If in doubt consult the NZ FFA web site or a Poplar expert.

Next click "Calculate costs". This will take to the Estimated Costs table to review results.

Use the bar at the bottom of the table to move the right-hand information into view.

Results and Print/Save options

The calculations may take a few seconds or more depending on the size of the woodlot area and the number of species chosen. A table of results will appear on the right side of the screen, and this has scroll bars to view more of the results that are not on the screen. Click on the bottom scroll bar and drag it to the right, you should be able to see Costs, Standing volume, and Carbon values for each species selected.

To see more, click "Print Results" in top right of the screen. This loads a preview of results, probably as two pages that you may need to scroll down to see using grey vertical bar in middle of screen. Under the "Destination" options (Top Right) you can select your printer (e.g., EPSON L365) and then the Print button at the bottom, or Save as PDF, e.g., store the file. Storing the file requires you to navigate to the folder you want to use for this result. A stored file allows you to view the results later and expand the viewing.

To change the inputs selections or add another woodlot go back up and click on "Inputs" (the "Reset" button currently is not enabled). This will allow you to use the Area Drawing Tool or change land cover, species and tending options. Then click "Calculate Costs" again.

Tree Harvesting

Inputs

Drawing roads and woodlot boundaries on the map

The drawing tool is a little tricky at first, it is best to turn off the "Land Parcels Layer" while you use it, as it keeps getting activated while you try to click on the road

Click on "Use Line Drawing Tool" tool then location where you want to start the road. Move to the first corner (vertex) of the road then click again, repeat this to locate the full extent of access road or track to cart the logs out. When finished, double click the last vertex or it may be easier to use Enter on the keyboard.

Locate the stand you wish to harvest by using the woodlot boundary tool. Click on the tool then along the stand boundary and complete a full loop back to the start. Double click or use Enter to finish. Multiple scenarios can be tested.

Both roads and boundaries can be changed. Click on the line to activate the vertices, then hover over the one you want to grab, when you get a hand and finger symbol click the left mouse and it will become enlarged and change to a cross, you can then drag it into a new position.

Once you have edited a vertex, you can easily return and move it again. Halfway between vertices is a larger dash mark, click on this and it will change to new vertex and can then be shifted. The end of a road line can be extended as a straight line and then can have many intermediate vertices added to make corners, etc. When all edits are done, click "Recalculate" and the line will be redrawn, and costs will change.

You can click on the drawing and move the whole thing. This can allow you to test harvesting costs in many locations on the farm quickly by moving a block (or polygon) to different locations and Recalculating.

Road types

There are three options under "Select Roding Type".

Roads for use by logging trucks need to be wider, straighter, with less than 7° incline, and generally require metal and adequate culverts. These are the most expensive type but allow all weather logging. If the total access road distance suits a Forwarder (approximately less than 600m) and you have chosen to have an unmetalled Forwarder track (incline 15° or less) this option is costed at 55% of a Trucking road. If the access for the Forwarder follows a well-formed existing farm track, this option is costed at 25% of a Trucking road. Choosing to use a Forwarder may incur an extra cost of \$6 /t for the extra equipment. This cost has created the option to look at the trade-off between building truck roads and using Forwarders on cheaper tracks.

Additional inputs

After clicking on "Calculate" you are taken to the Additional Inputs options.

Here you can set the age of the woodlot (this has no impact in the current version) also set the estimated merchantable volume per ha, this affects costs per tonne.

The proportion of the harvest area that will be harvested in summer can also be set. Set to 100% (Harvest completed in one summer) this reduces harvest costs by 5% because of few delays from rain.

Carting distance for road metal or aggregate also influences roding costs. Answer yes or no to "is there a source of suitable road metal within 20-30km?" Answering yes reduces Truck road costs by \$6,000/km.

If you change any of the above, click Recalculate before viewing results.

Tips

- Treefarmer can run multiple roding scenarios. You need to Recalculate each time changes are made. You can have multiple woodlot scenarios.
- You can link two or more small woodlots together by a thin strip (including the neighbours woodlot if that is convenient) to make it one larger harvest block, i.e., assuming you would harvest several small blocks at the same time once the equipment is on site.
- Then assuming the harvest is completed, try enlarging the planted area to take in more adjacent land and look at the roding cost reductions to see how beneficial that might be.
- A key metric to watch is the Total at the bottom of the Total Estimated Costs Table. By assuming an average log price (approximately \$140/t for pruned stands and \$120/t for unpruned) you can quickly subtract the total harvest costs to get a net profit figure estimate. E.g. with harvest costs of \$75/t and you are harvesting a pruned and thinned stand with average delivered price of \$140/t the net return per tonne is \$65 multiplied by the merchantable volume per ha (say 550) gives a net return of

\$35,750/ha. Put another way, if the harvest volume on your site is approximately 550t/ha for a pruned and thinned stand and you wish to make \$35,000 net/ha, the total harvest and transport costs must be approximately \$75/t or less.

- View the “Helpful Checks” (top right of the screen) to get a check list of 20+ things to consider that may have an impact on your harvest. Many also have links to web site that provide answers and more information
- The Farm Forestry Species selection tool can also be reached from a link at the top right of the screen. To use it you simply select the site factors that represent your planting site, and it will remove species from a starting list that do not meet the criteria. It is possible to have a site that no species suit.

Output

Click on “Print Results” and “Helpful Checks”, both are printable and can be saved to a file on your computer. Also, the NES_PF maps can be printed. Using the “Generate Report” option and selecting to have the Erosion or Fish Spawning (or both) report, click “Submit” and a report is built and a “Download report” option appears, this will give you a PDF report on the screen that can be printed or downloaded to your PC.

Improvements

Comments on improvement are welcome and are best communicated by email please.

Further development is planned subject to Forest Grower Levy Trust funding next year. Costs and spatial layers will be updated when data is available. Layers provided as web services (e.g., LINZ) are the latest currently available on the day of usage and are subject to change.

Group tutorials or demonstrations can be arranged by the product manager via Zoom as required.

THANK YOU FOR USING TREEFARMER.

FEEDBACK IS WELCOME

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