Prospect 3

mapmaker.com

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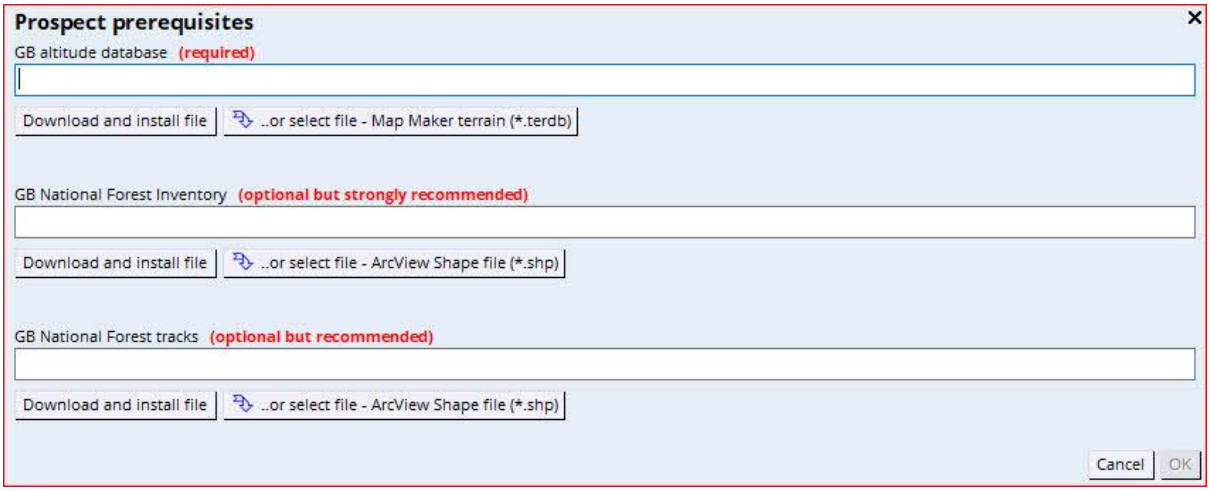
Contents

First-time setup

Before Prospect can be used it requires some data. As a minimum it requires the altitude data that is used to create the terrain model. If this data has not already been pre-installed by your system administrator then when you first attempt to start Prospect this dialogue box appears:



The “GB altitude database” is a file called “GBterrain.terDb”. If you have already downloaded it then use the “..or select file button – Map Maker terrain (*.terDb)” to select the file. Otherwise, use the “Download and install file” – this is a large file so it will take a few minutes.

Optionally you can also install the GB National Forest Inventory and the GB National Forest tracks files. These can be omitted or installed later but we recommend installing these from the outset.

Note to system administrators: if you want to pre-install these files then see the final section for the appropriate file locations

Projects

Static and temporal

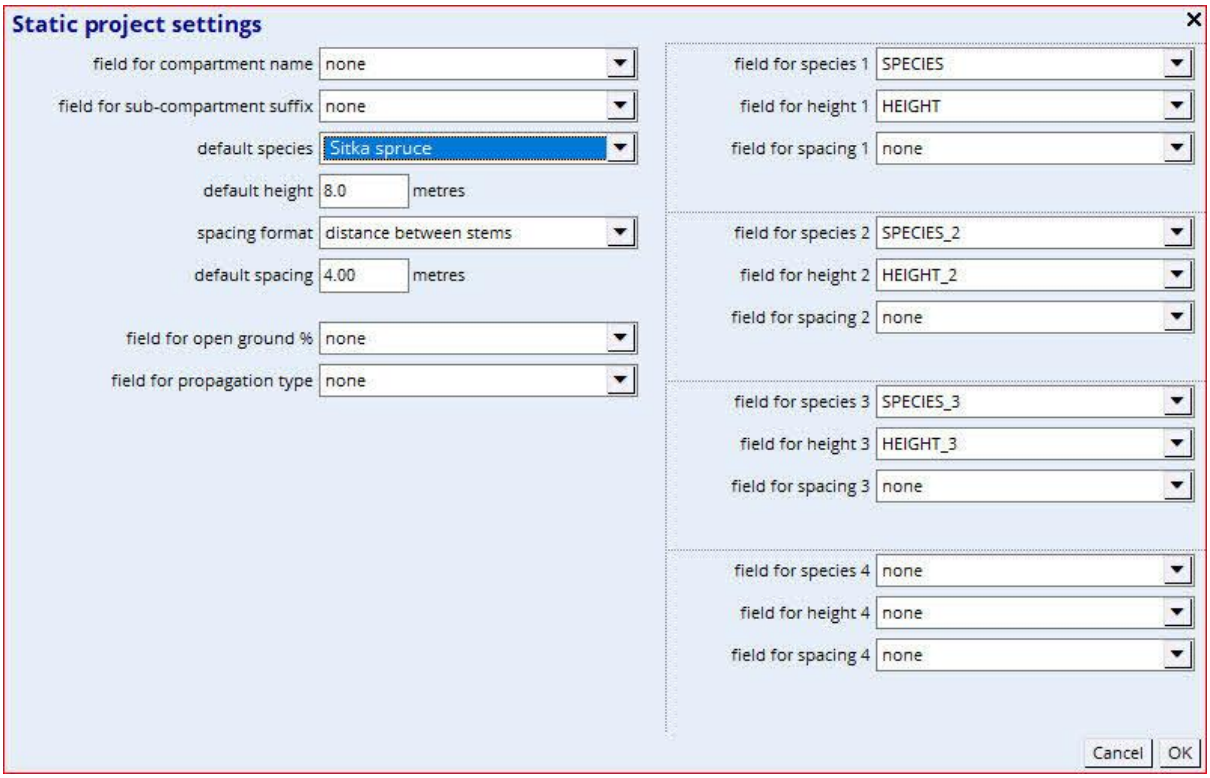
In Prospect you can create two types of project: static and temporal. A static project is used to display the state of a woodland at one fixed point in time. A temporal project can show how a woodland develops over a period of time. By specifying a year a temporal project will display its state at that year.

Typically a static project will be used at an early design stage where you require quick results while a temporal project will be used to explore a more fully worked out design.

Create new project – Static map based on woodland polygons

When you click on this menu item you are invited to choose a file of polygons. The file can either be an ESRI Shape file (*.shp) or a Map Maker DRA file. If you choose the ESRI shape file you must ensure that the accompanying DBF and SHX files are present.

After you select the file this dialogue box appears:



If your polygon file contains data fields they can be used to specify attributes for the woodland sub-compartments. If there are fields for species, height, and spacing you can choose fields for up to four different components for each sub-compartment. If the program detects fields with obvious sounding names – like “species2” – then it will automatically select them, but you can change these choices if you wish. If there are no

fields it does not matter since you can enter data in the program and/or select a default species, height, and spacing.

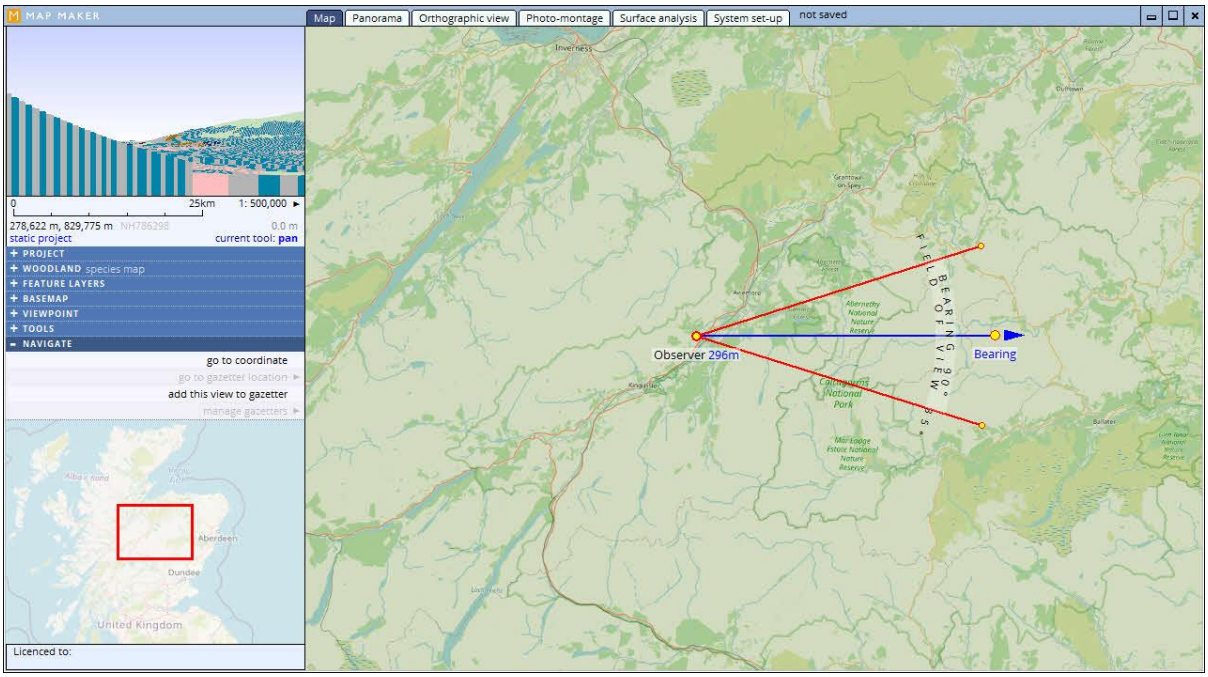
The optional “field for open ground” allows you to specify a field containing a percentage value for open ground. Open ground is discussed below in the section on “woodland character”.

The optional “field for propagation type” allows you to specify whether a compartment contains woodland with natural regeneration or planted trees. The field, if used, should contain “0” for natural regeneration, “1” for a plantation.

Once you have chosen the fields, if any, click on OK and the woodland will be displayed over a base map using the settings defined under “System set-up – Default base map for new projects” – typically this might be Ordance Survey Open Map.

Create new project – Empty static map

While most users will start from an existing file of woodland polygons, you have the option of starting from a blank sheet and creating the compartments from scratch within Prospect. When you click on “Project – Create new project – Empty static map” the map opens up showing a large area centred on your last location.



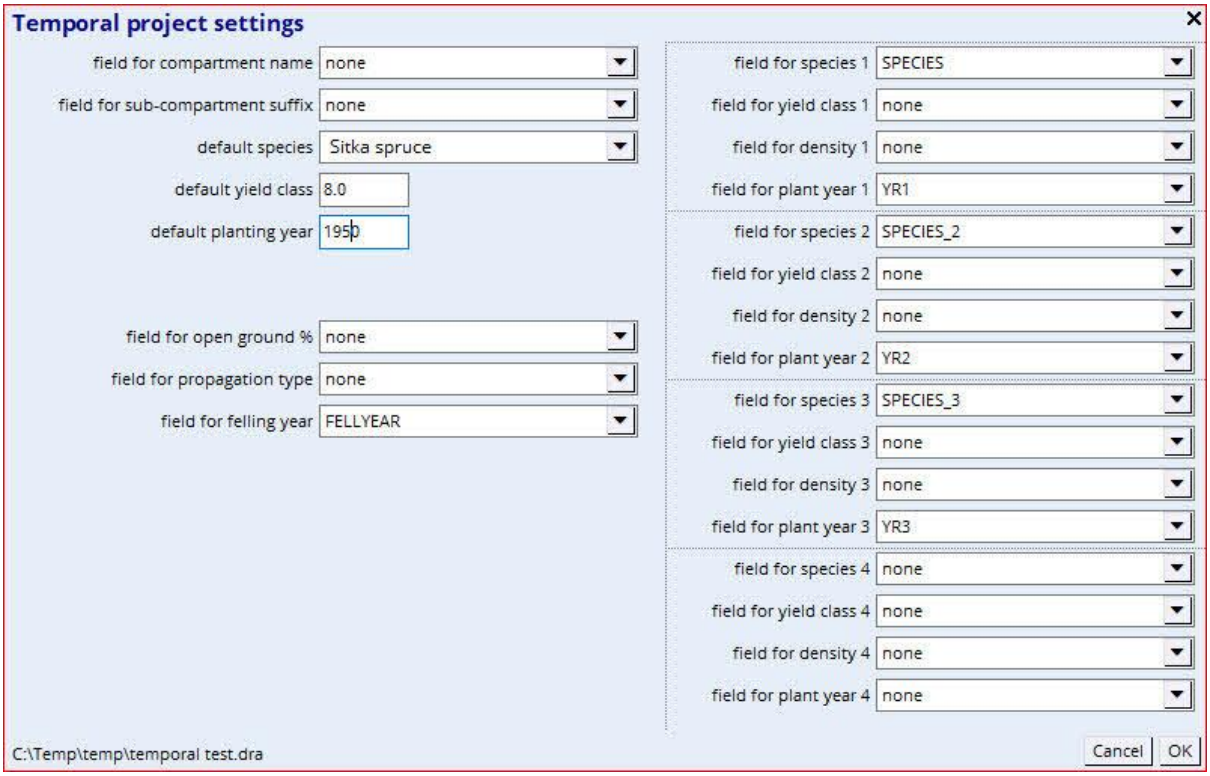
Using the navigation tools (see below) you can move around the map to your new project’s location and change to an appropriate scale.

Create new project - Temporal project based on woodland polygons

The procedure for creating a temporal project from an existing file of polygons is similar to that for a static project. You are invited to choose a file of polygons. The file can

either be an ESRI Shape file (*.shp) or a Map Maker DRA file. If you choose the ESRI shape file you must ensure that the accompanying DBF and SHX files are present.

After you select the file this dialogue box appears:



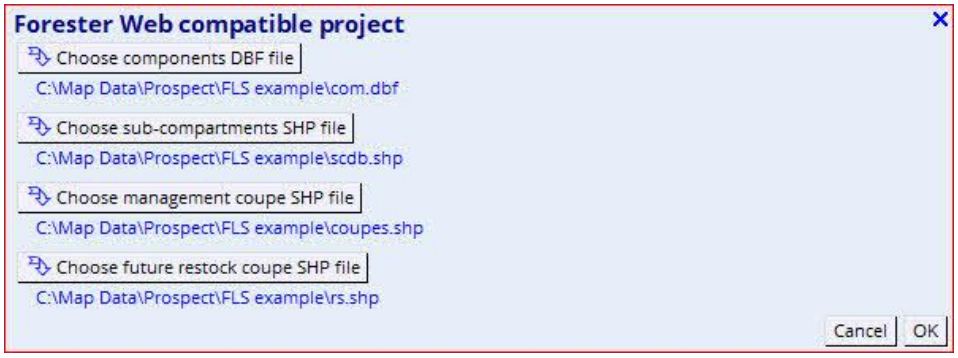
The dialogue box is like that for a static project except that each component has a field for the "plant year" and there is a field for the "felling year", and values for the default planting year and yield class. If your file does not contain fields for planting and felling years it does not matter, since you can enter planting and felling values within Prospect.

Create new project – Empty temporal project

As with static map, you have the option of creating an empty temporal map and creating the compartments from scratch within Prospect. When you click on "Project – Create new project – Empty temporal map" the map opens up showing a large area centred on your last location.

Create new project – Temporal project from "Forester Web" files

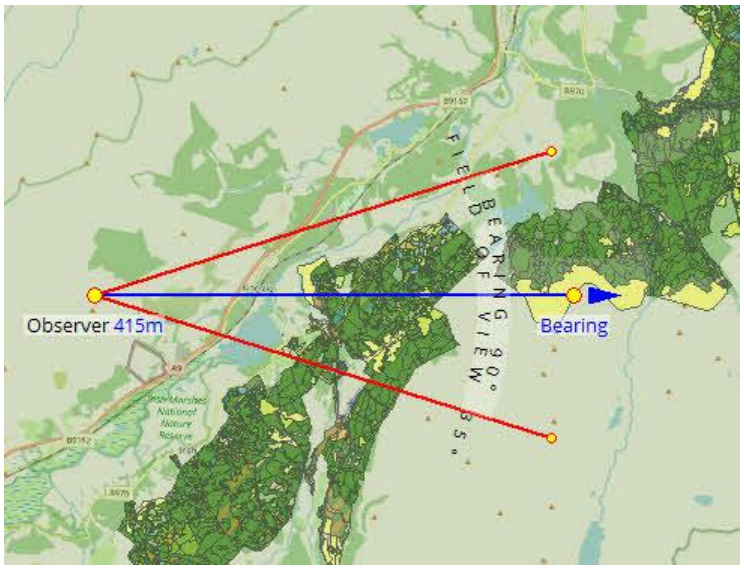
"Forester Web" is an ESRI based GIS system with a number of predefined layers. By exporting data from four of these layers as ESRI Shape files (*.shp), the data can be imported into Prospect with the sub-compartments populated with the relevant data. When you click on the menu a dialogue box appears asking for you to select the four files:



The first of the four is not actually a shape file but just the DBF file which accompanies the components shape file, the shape file itself is redundant. The remaining three, for sub-compartments, management coupes, and future restock coupes are shape files. These must all be accompanied by their corresponding DBF and SHX files. Once all four files are selected click on OK and the woodland map is generated.

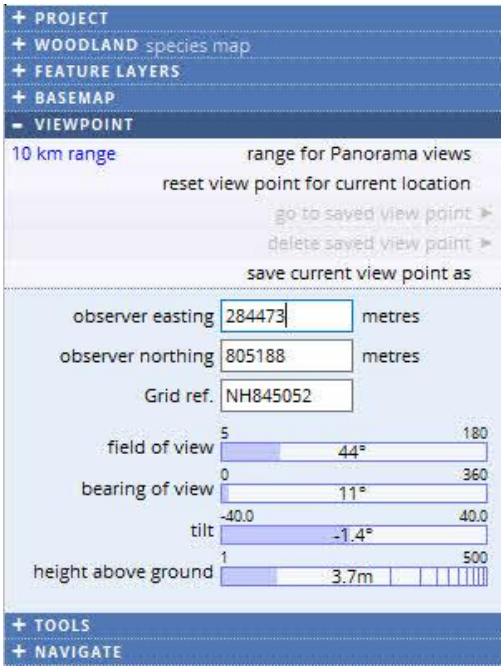
The viewpoint

When a new project is first displayed a default viewpoint is created. The location, bearing, and field-of-view is shown on the map:



The location of the observer can be changed by dragging the small circle. The direction of the view – the bearing – can similarly be dragged. The field-of-view – the angular width of the view – can be modified by dragging either of the two small circles at the ends of the two red arms. Alternatively, right click anywhere on the map, with any tool selected, and the viewpoint will be relocated to that position and will look towards the current centre of the map.

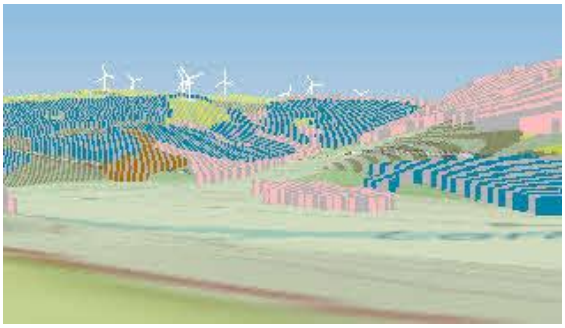
You can also edit these values manually in the “Viewpoint” panel. There are two additional values for the “tilt” (the tilt of the “camera” backwards or forwards) and the “height above ground”, which refers to the height of the observer above the ground at the observer’s coordinate.



Once you have the viewpoint as you want it then you can save it using the “Save current view point as” menu item. You can create several named viewpoints within one project.

In some circumstances, particularly with a large woodland, you may find that your viewpoint has disappeared off the edge of the map. In such circumstances you can click on “Reset view point for current location” which brings the view point back into view where you can adjust it.

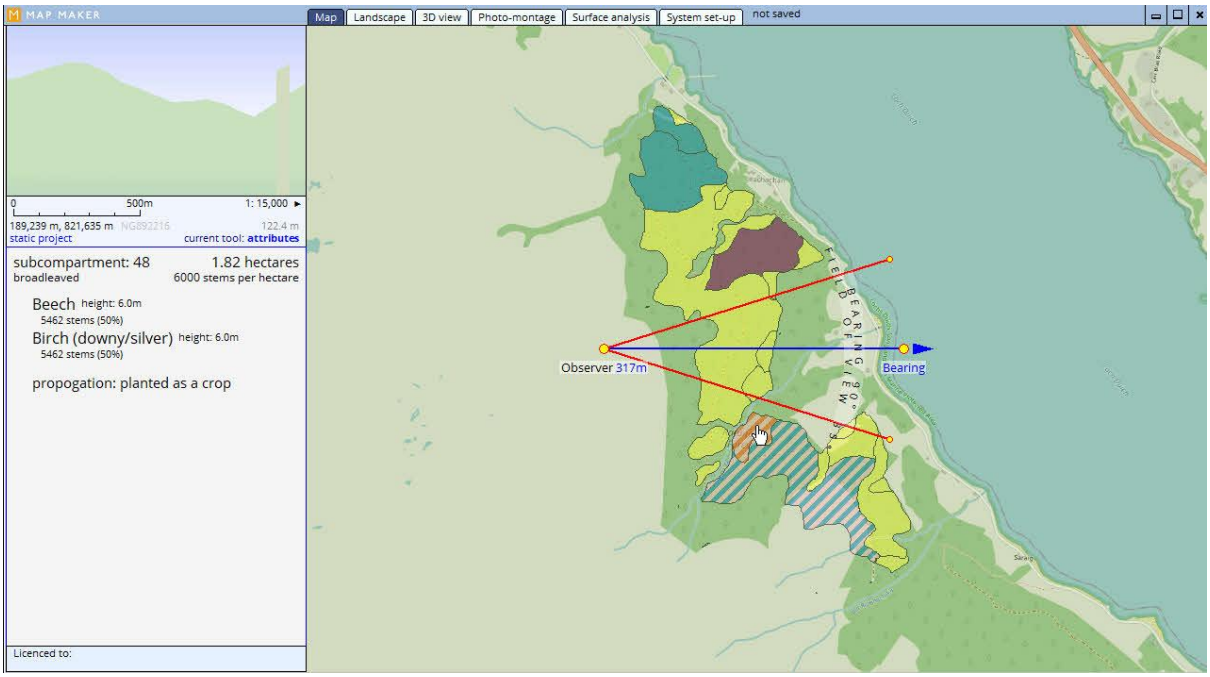
As you edit the view point the resulting view is previewed in the small guide image in the top left:



This image can be dragged – left and right, up and down – to change the bearing and the tilt of the view. Using the mouse wheel, with the cursor over the image, the field of view can be changed.

Viewing the attributes of subcompartments

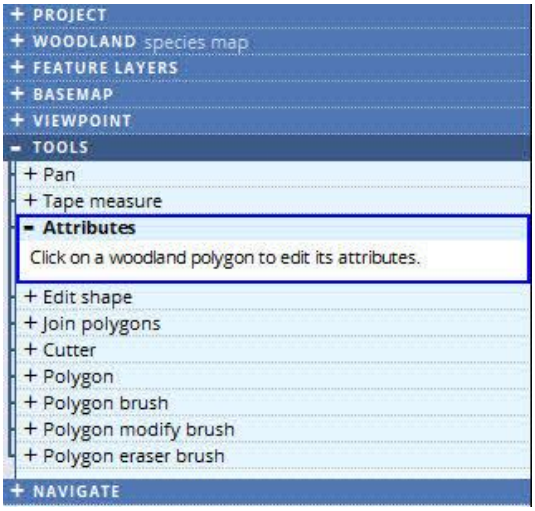
Where a subcompartment has more than one species it is shown on the map as striped, the width of the stripes being in proportion with the species mix. As you move the cursor over the woodland polygons on the map, the attributes of the polygon under the cursor are shown on the left in an information panel.



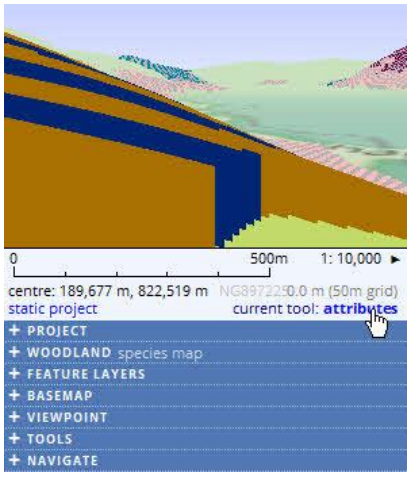
If you are displaying the National Forest Inventory then as the cursor passes over an Inventory compartment its attributes are displayed but this time the information panel has a pale green background.

Editing attributes in a static project

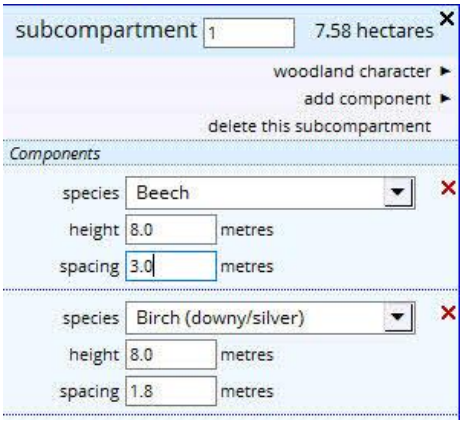
It may be that your original file contains all of the information that you need about species, height etc, in which case you can ignore this section on editing attributes. But if you need to modify attributes then open the Tools section and click on “Attributes”



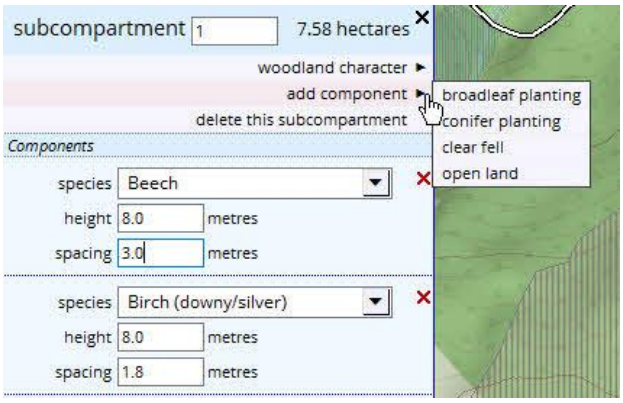
Tip: If you click to the right of "current tool" on the scale panel the selected tool will toggle between the "pan" tool and the "attributes" tool.



With the attributes tool selected click on any of your woodland subcompartments.



In this example the subcompartment has two components – Beech and Birch. If you wish to add a third component you place the cursor over “add component”. A short menu opens up offering the choice of broadleaf or conifer planting, clear fell, or open land.



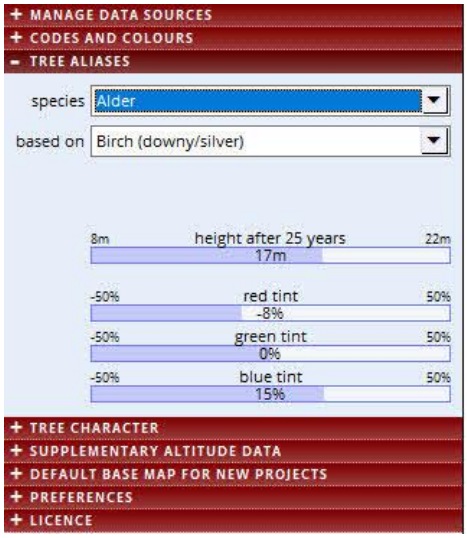
To remove a component click on its red X.

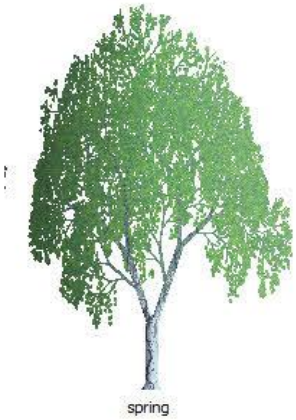
Tree and woodland character

The character of a woodland is determined by the mix of species, the age of the trees and the density of the planting. But there are additional factors which can modify the character.

Tree alias

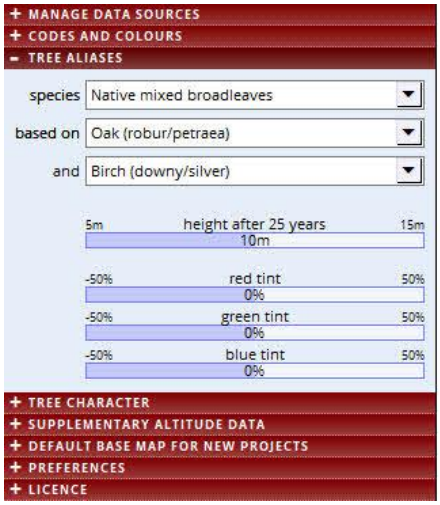
There are dozens of different tree species which can be found in a woodland. Prospect has images for the most common species. Another less common species is portrayed by using the image for the common species which it most closely resembles. Under “System set-up – Tree alias” you can select which species to base another species on.

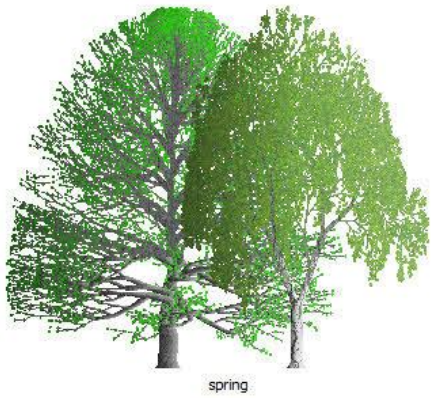




Here we have selected Birch as a surrogate for Alder. However we can make some minor modifications - specifying the typical height reached after 25 years, and modifying the colour by adjusting the red, green and blue tints.

Some “species” are mixtures, in which case two species can be used to represent the mix:

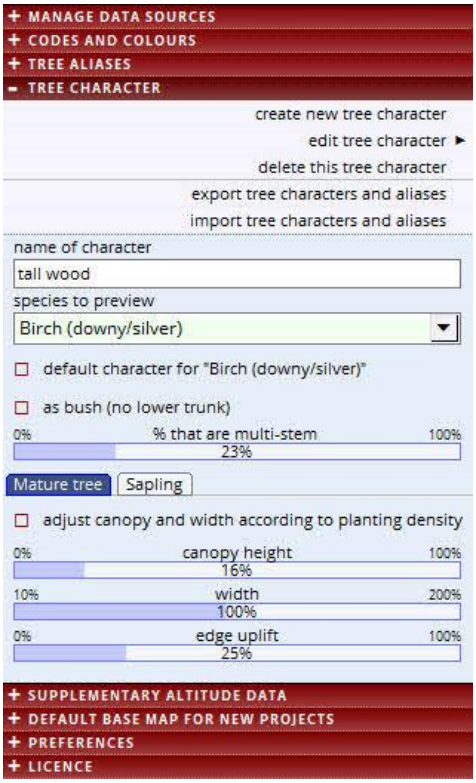



spring

Tree character

Clearly different species look different from each other, but also one species can look different depending on the circumstances. An isolated tree standing on its own in a field will look different to a tree which forms part of a densely packed woodland. Prospect lets you define different tree characters – one “character” may apply to various species.

Under “System set-up – Tree character” you can create and edit tree characters:



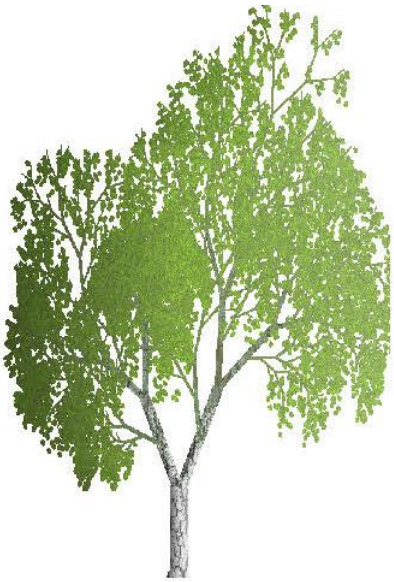
A “tree character” can then be applied to a component of a sub-compartment. Below is a stand of Birch using the default tree character – in other words, unmodified:

Unmodified Birch plantation

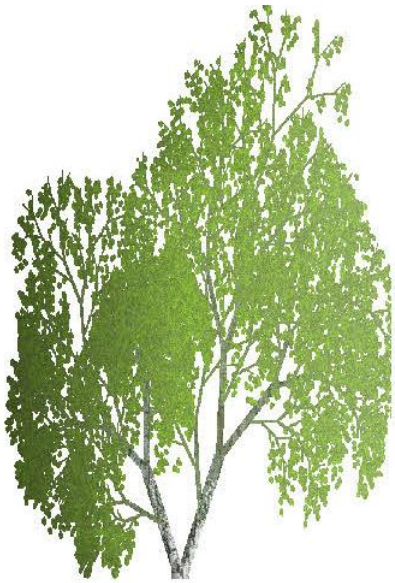
However, if the tree character is modified by setting the “% that is multi-stem” to 50% the image changes:

50% multi-stem

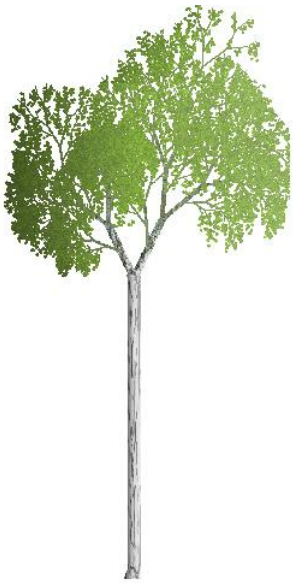
If the “as bush” box is ticked then the lower trunk, beneath the tree’s canopy, is omitted so that the branches spring from the ground:



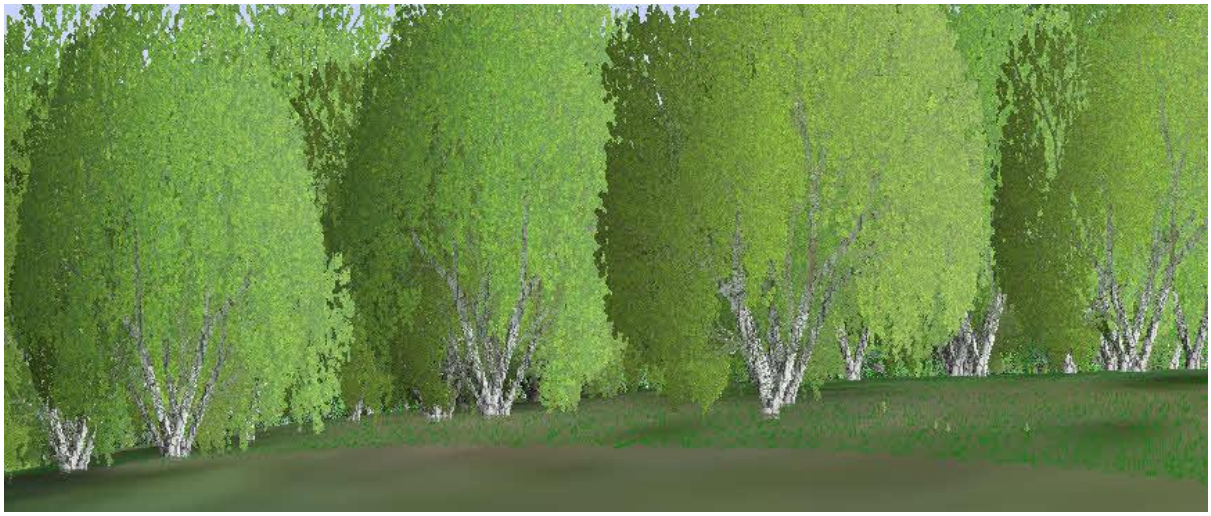
As tree



As bush



elevated canopy height



Plantation as bushes

The three slider controls for “canopy height”, “width”, and “edge uplift” can be adjusted to create tree images better suited to denser plantations where the trees are competing for light. Increasing “edge uplift” means that the outer branches sag less toward the ground but tend more upwards.

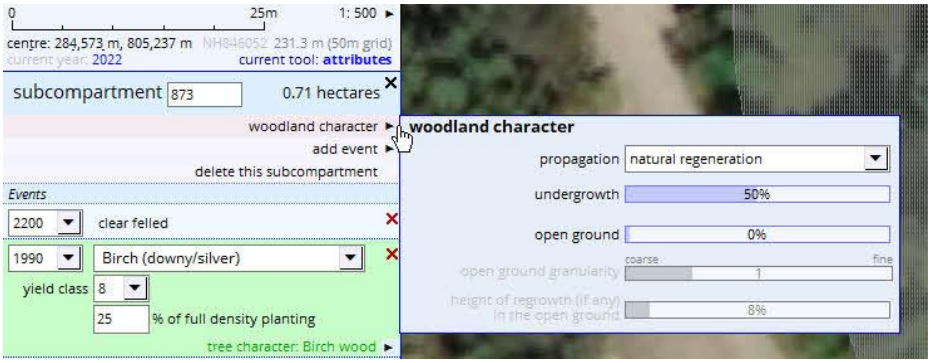
Plantation with multi-stem trees, increased canopy height, decreased width, and extra edge uplift

For each tree character you can specify the “canopy height”, “width”, and “edge uplift” both for the mature tree and the sapling. You can also specify the “age of maturity”. For trees with ages between one year and the age of maturity the canopy height, width, and edge uplift are adjusted along a sliding scale between the setting for “sapling” and “mature tree”:

Typically, as here, the sapling has narrower width and greater edge uplift.

Woodland character

The “tree character” settings described above can be applied across all subcompartments and all projects. In addition there are character settings which apply to the individual subcompartment. Back on the main “Map” page, select the “attributes” tool and click on a subcompartment to select it. The top item of the subcompartment’s menu displays the “woodland character” box:



By default “propagation” is set to “plantation” but you can select “natural regeneration”:

Propagation set to “natural regeneration”

Now the “panorama” image displays each component with trees of a variety of ages and heights. In the case of a temporal project the ages range up to the full age of the component.

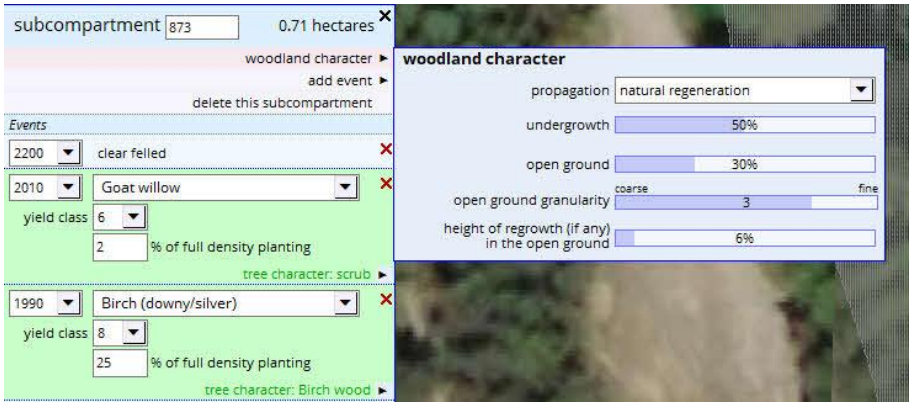
In addition, in the “woodland character” box you can specify a density of undergrowth – by default this is zero percent. The image below shows 50%:

Natural regeneration with 50% undergrowth

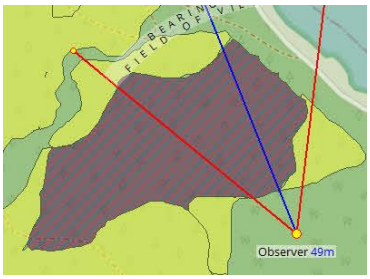
Natural regeneration with two components and 50% undergrowth

Open ground

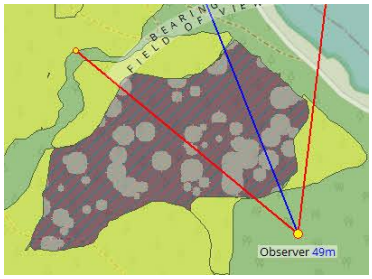
By default “open ground” is set to zero, but if you select another percentage value then the trees in the compartment will be interspersed with small clearings. If, as in the example below, the open ground percentage is set to 30% then the combined area of the clearings will amount to 30% of the total area of the compartment.



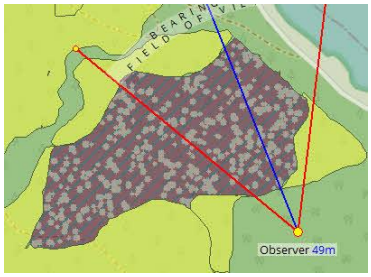
By setting a value for “open ground granularity” you can specify whether there are a few large clearings or many small clearings.



No open ground



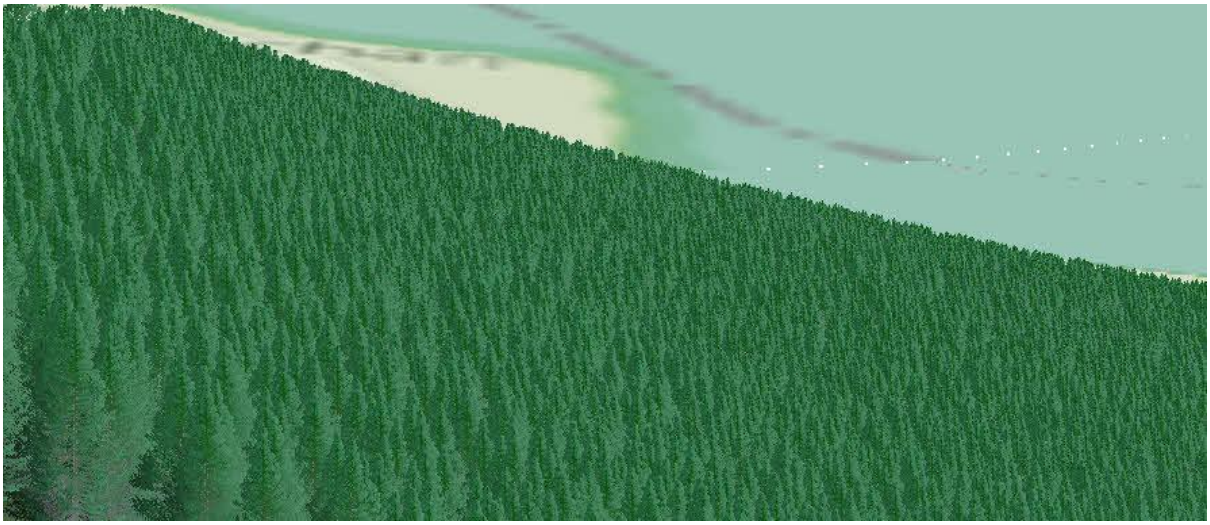
30% open ground with a medium-coarse granularity of 1



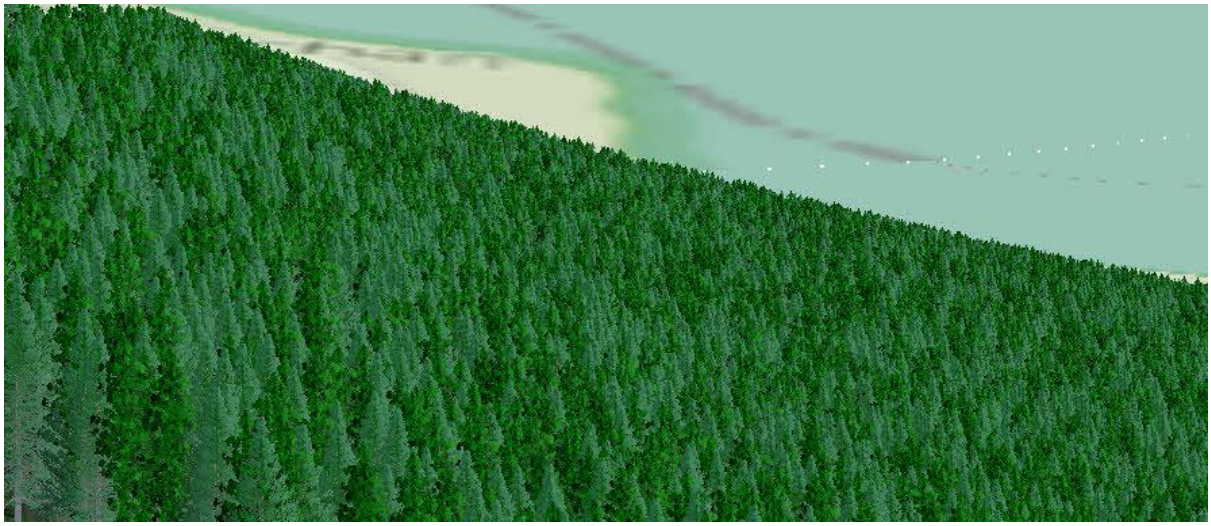
30% open ground with fine granularity of 4

Finally, you can specify whether the open ground is entirely open or whether there is regrowth of small trees in the clearing and, if so, the maximum height of the small trees relative to the height of the main trees in the compartment.

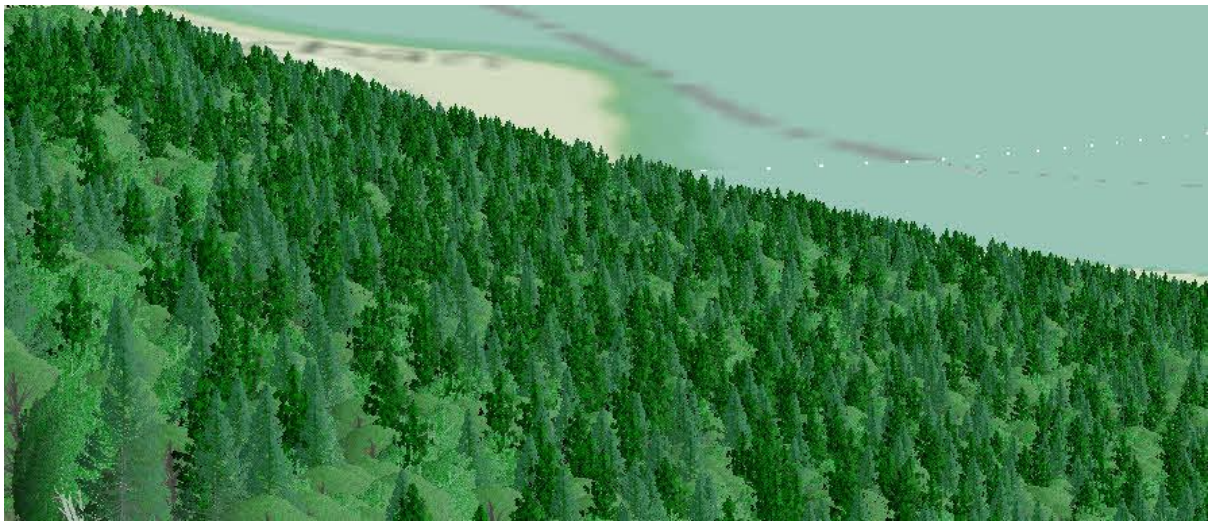
The following images demonstrate how the “woodland character” can be modified.



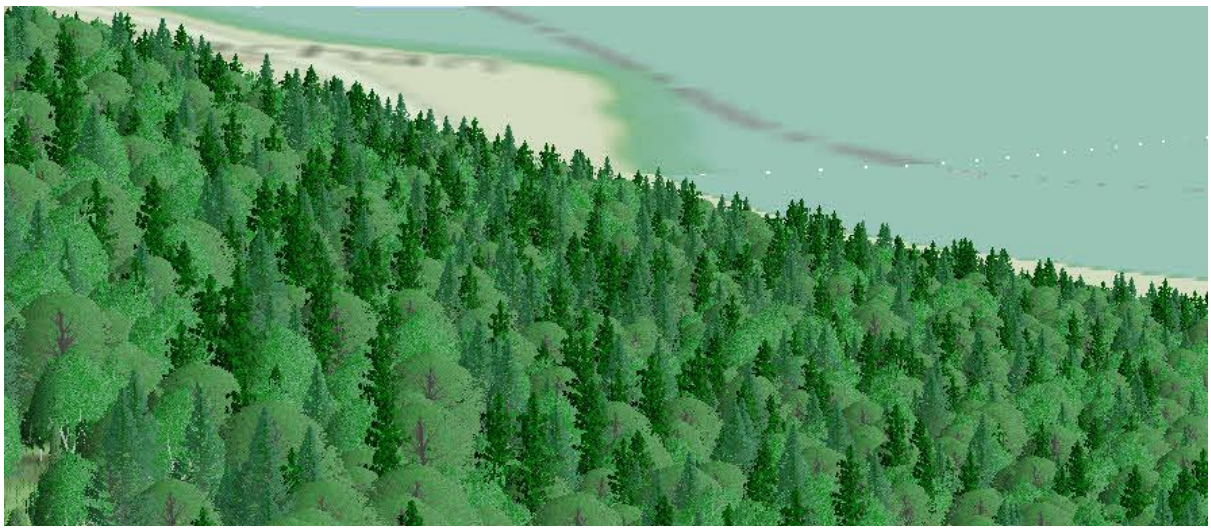
A mono-crop of Sitka Spruce with the propagation set to “plantation”.



A mixed conifer plantation.

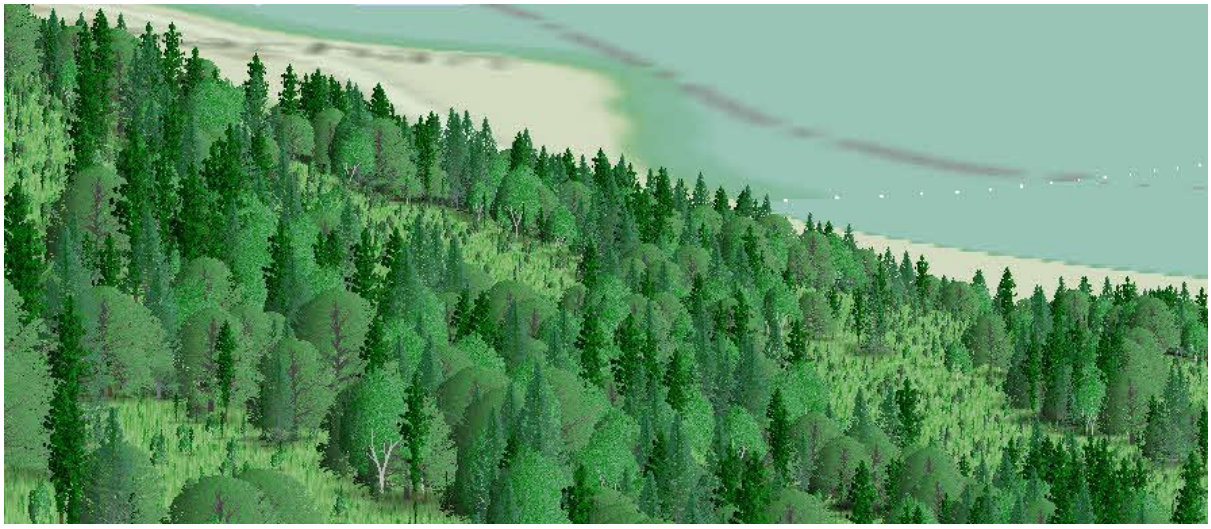


A plantation of native mixed broadleaves with mixed conifers

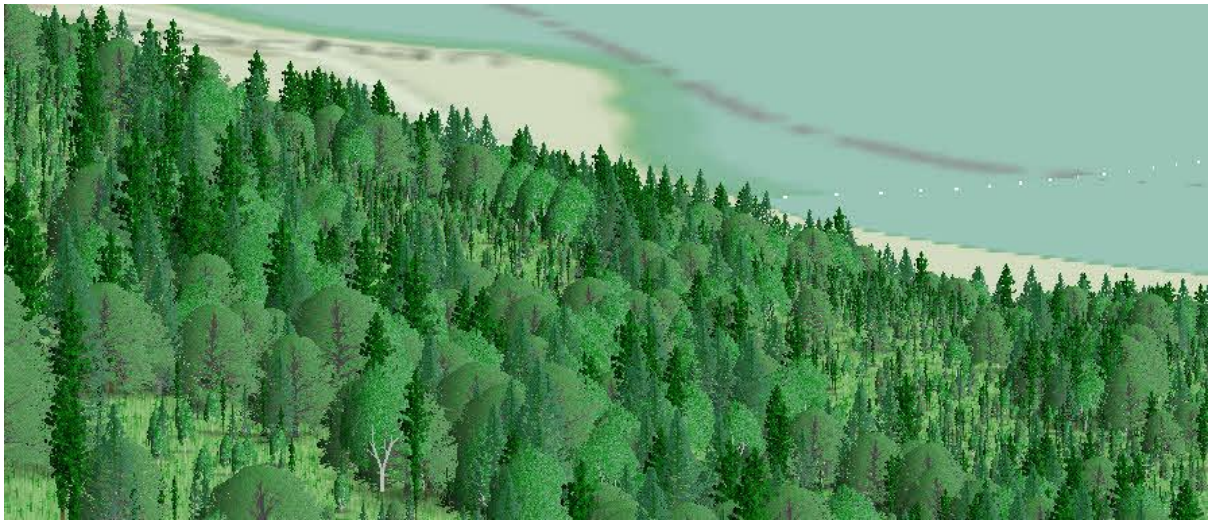


Mixed broadleaves with mixed conifer with natural regeneration (i.e. a greater variety of heights)

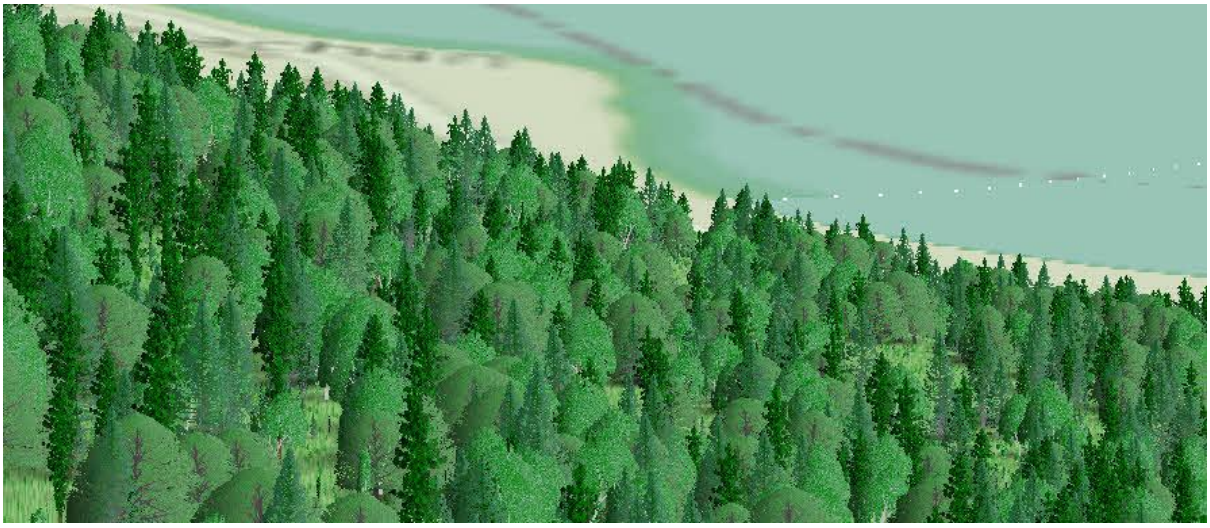
Mixed broadleaves with mixed conifer with natural regeneration with 35% open ground set to a medium-coarse granularity (1).



Mixed broadleaves with mixed conifer with natural regeneration with 35% open ground set to a medium-coarse granularity (1), with regrowth in the open ground set to 15%.



Mixed broadleaves with mixed conifer with natural regeneration with 35% open ground set to a medium-coarse granularity (1), with regrowth in the open ground set to 30%.



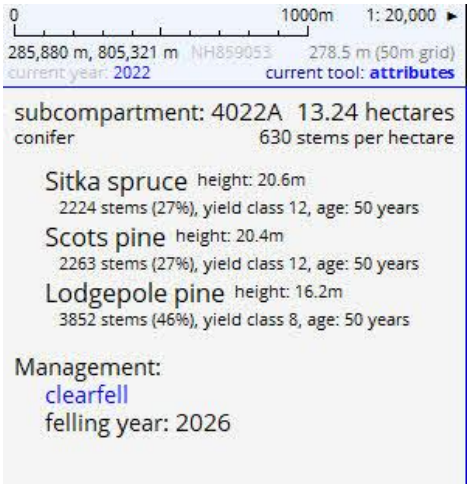
Mixed broadleaves with mixed conifer with natural regeneration with 35% open ground set to fine granularity (4).

By mixing species, tree ages, and tree character you can create multi-layered woodland with low-growing species below the raised canopy of another species.

Natural regeneration with two components, undergrowth, multi-stems, and 30% open ground

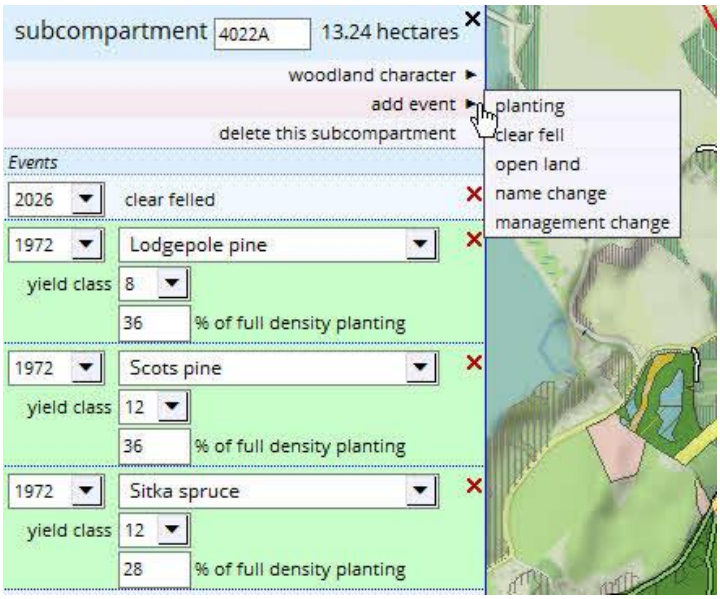
Editing attributes in a temporal project

As with a static project, placing the cursor over a subcompartment will cause its attributes to be displayed in an information panel:



In the scale panel above, the current year is displayed, the current year determining the age and height of the trees listed in the information panel.

If you now click on the subcompartment, as with the static project, you can edit its attributes:

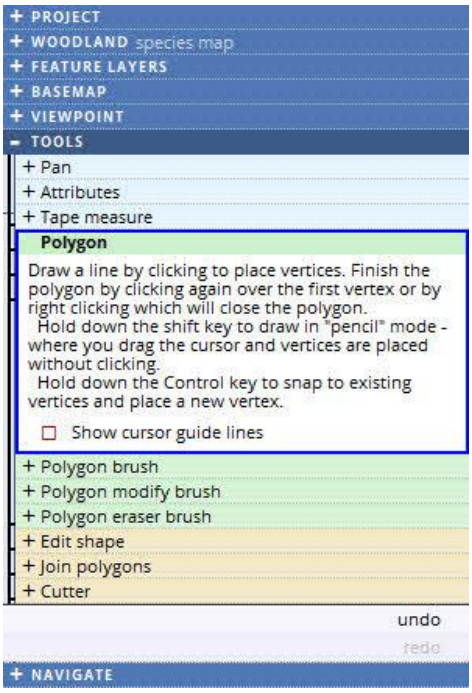


Unlike the static project, the subcompartment is not described in terms of components but as a series of events. In this case, three planting events in 1972 followed by a clearfell in 2026. You can use the “add event” menu to create a new event, or use the red crosses to delete events.

As with the static project the “woodland character” can be specified.

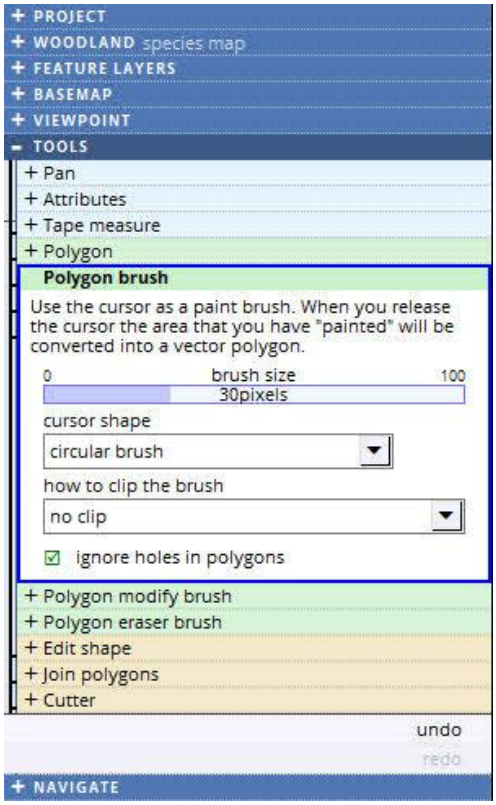
Creating and editing subcompartment polygons

Many users of Prospect import all of their woodland polygons from a separate GIS program. However, there are tools in Prospect which allow you to create and spatially edit polygons.



The “polygon” tool is a familiar drawing tool where vertices are added by clicking on the map. To close (finish) a polygon either click again over the first vertex or right click.

More generally useful are the three brush tools:



The “polygon brush” is used to draw polygons with a paint-brush tool. Unlike a conventional paint-brush the end result is a “vector” polygon – that is an area defined by the coordinates of its vertices rather than a raster area defined by pixels. The advantage of a vector polygon is that its shape is independent of scale and it is data which can be exported to a shape file.

You can specify a size for the brush and its shape. By default the brush is circular but you can use a square or triangular brush where you need to get into sharp corners.

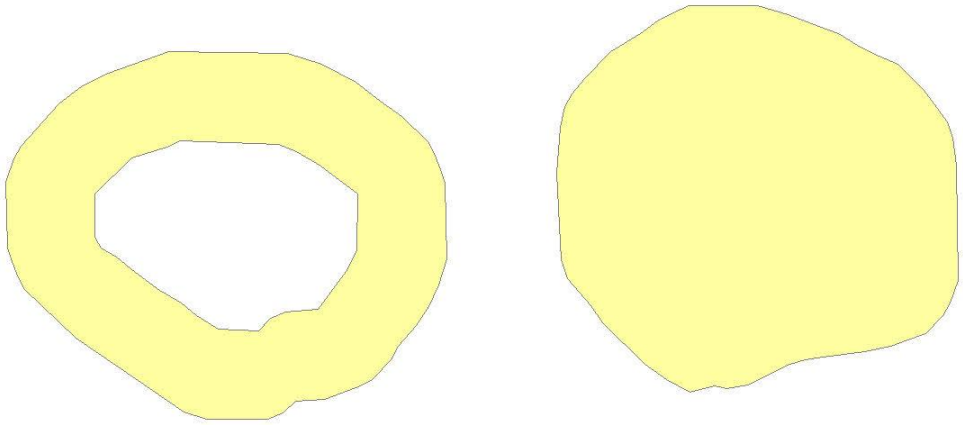
You can choose to clip the area drawn by the brush. By default there is “no clip” meaning that you can draw anywhere. If your new polygon overlaps with an existing woodland polygon then the area of the overlap is deleted from the existing polygon .

If you set the clip to be “clip inside one polygon” then if you start your new polygon inside of an existing subcompartment then the new polygon will be clipped so that its extent does not go outside of the existing polygon. In effect this allows you to sub-divide an existing subcompartment.

If you choose “clip inside all polygons” then the new polygon will not fall outside of the existing extent of the woodland but you will be able to create a new polygon which spans across two or more of the existing subcompartments.

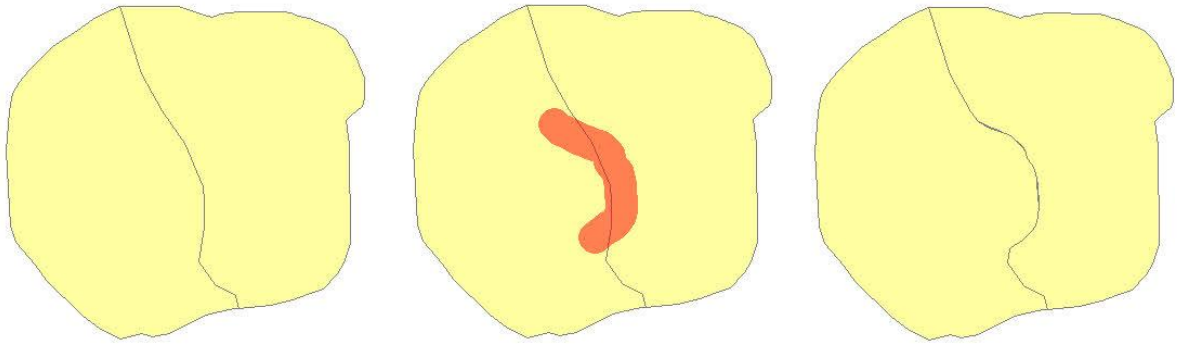
Finally, if you select “clip to the outside of the polygons” then any existing subcompartments will be untouched but you will be able to add a new polygon to the outer boundary of the woodland.

If “ignore holes in polygons” is not ticked then when you draw a polygon as a loop then the resulting polygon has a hole in the middle, like the left-hand image below. If the box is ticked then the hole is automatically filled.



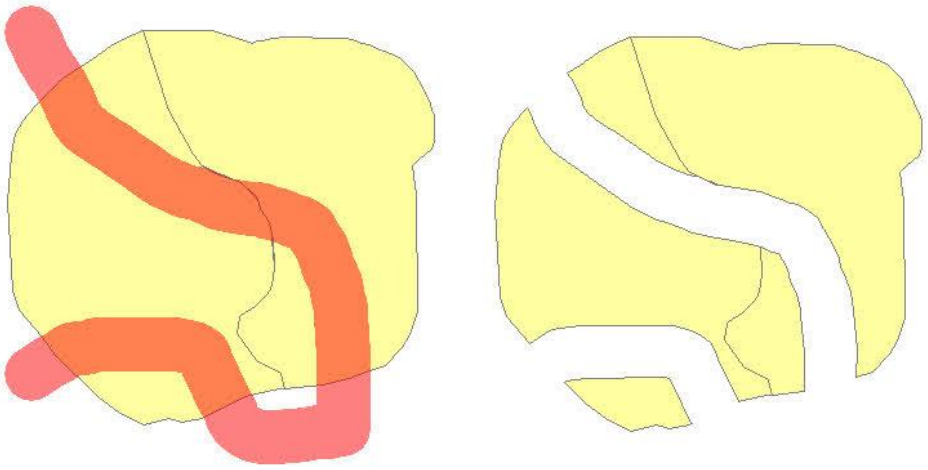
Note that even with “ignore holes in polygons” not ticked you can still draw a solid polygon but you have to manually fill it in as with a paint brush.

The second brush tool is the “polygon modify brush”.



If you start the brush inside of an existing polygon and then move the brush so that it goes outside of the existing polygon then when you release the mouse button the existing polygon will be modified to include the new area. If the new area overlaps any other polygons then those polygons will have the area of overlap removed.

The third brush tool is the “polygon eraser brush”.



Start the brush anywhere and draw a path. Any subcompartment which overlaps with the path will have the area of overlap removed.

Use the “Edit shape” tool to move individual vertices. Place the cursor over a vertex then press the mouse button down and drag the vertex. If you want to introduce a new vertex, place the cursor over a line segment and click and drag. To delete a vertex, place the cursor over the vertex then press the “Delete” key *(you do not need to press down the mouse button*).

If, with the “Edit shape” tool selected, you click inside a polygon then it puts it into “edit mode”. This means:

a) You can move the whole polygon by dragging any point inside the polygon.

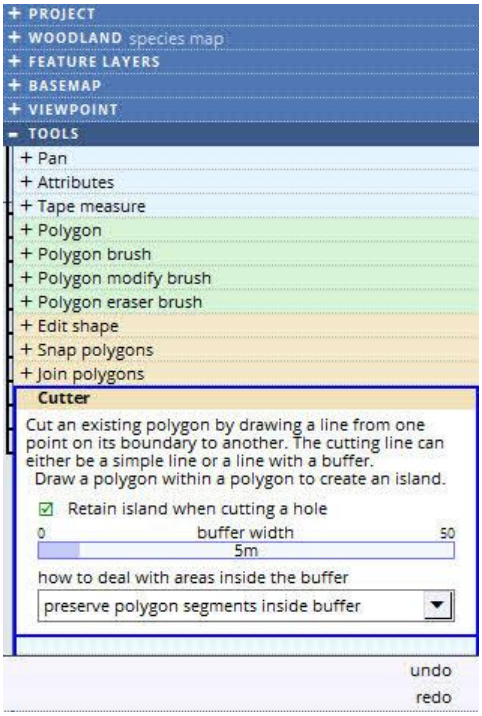
b) You can move boundary vertices without moving the vertices of any adjacent polygon.

c) You can delete the polygon by pressing the “Delete” key.

The “Snap polygons” tool is used to tidy the boundary between two more or less adjacent polygons. Click and hold down in one polygon then move the cursor into the second polygon which you want to snap to. Release the mouse button and the first polygon is snapped to the second.

The “Join polygons” tool is used to merge two adjacent polygons. Click and hold down in one polygon the move the cursor into the second polygon which you want to absorb into the first. Release the mouse button and the polygons are merged.

The “Cutter” tool is used to sub-divide polygons. Its simplest use is to divide a polygon in two by clicking first on the boundary of the polygon and then clicking to place vertices on a line crossing the polygon until you once again reach the boundary. When you click on the boundary the cut is implemented.



The cutter tool can be used to cut a hole in an existing polygon. If the box “Retain island when cutting a hole” is ticked then performing an island cut creates a new polygon from the space in the hole.

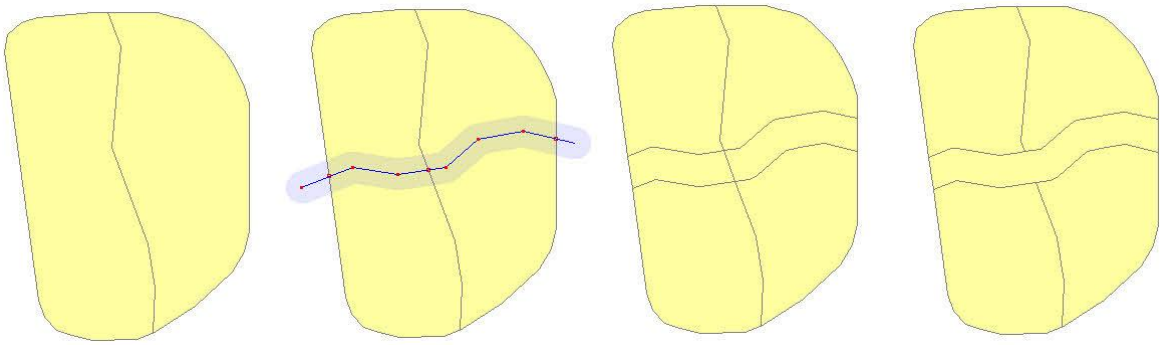
By default the cutting line has no width, it simply creates a division between two adjacent areas. However you can also specify a buffer width in which case the cut has a width like you may have when drawing the space for a road or a fire break.

When using a buffer there are three options for “how to deal with areas inside the buffer”:

1. “Preserve polygon segments inside buffer”, in which case for each polygon that is cut the area that is formed within the buffer is preserved as a separate new polygon.

2, “Merge polygon segments inside buffer”, so that where a cutter crosses two or more polygons the area s inside the buffer are merged to form a new polygon.

3. “Delete polygon segments inside buffer”, in which case the buffer acts like the “polygon eraser brush” except that its width is specified in metres on the ground rather than in pixels on the screen.

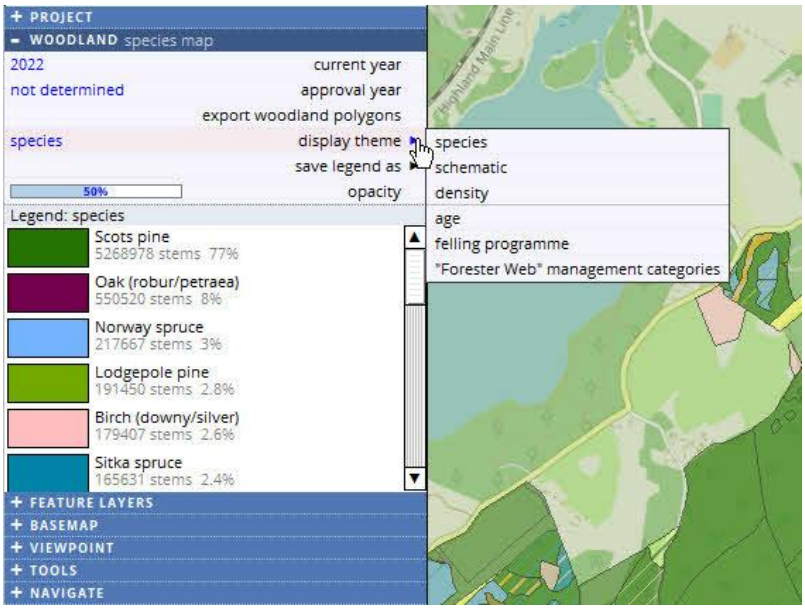


Two adjacent polygons *cutter with buffer* *preserve segments* *merge segments*

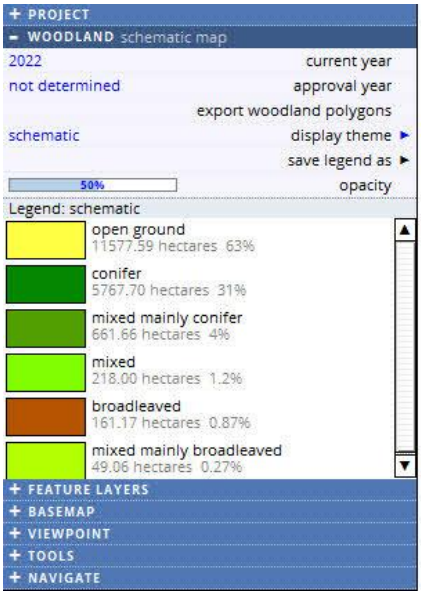
The Woodland panel

The Woodland panel is used to determine how the woodland should be portrayed. The first two items, “current year” and “approval year”, are only available for temporal projects. The “current year” determines the state of each subcompartment given the sequence of events specified for it. The “approval year”, if specified, will determine the starting point for felling phases. If no approval year is given then the “current year” will be used as the approval year.

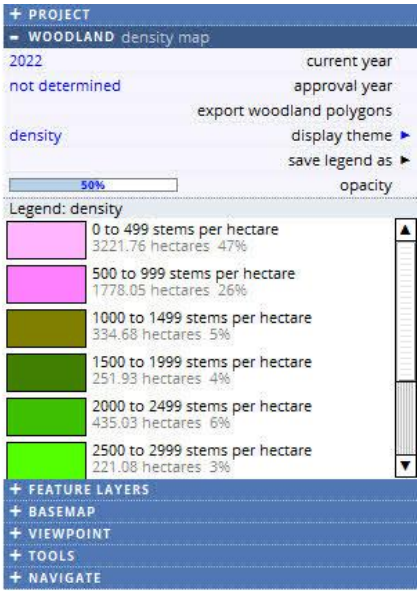
The “export woodland polygons” simply allows you to save the woodland to an ESRI Shape file or a Map Maker DRA file, so that it can be used in other GIS software.



The “display theme” menu has three options for a static project and an additional three for a temporal project. The options common to static and temporal projects are “species”, “schematic” and “density”.



Schematic

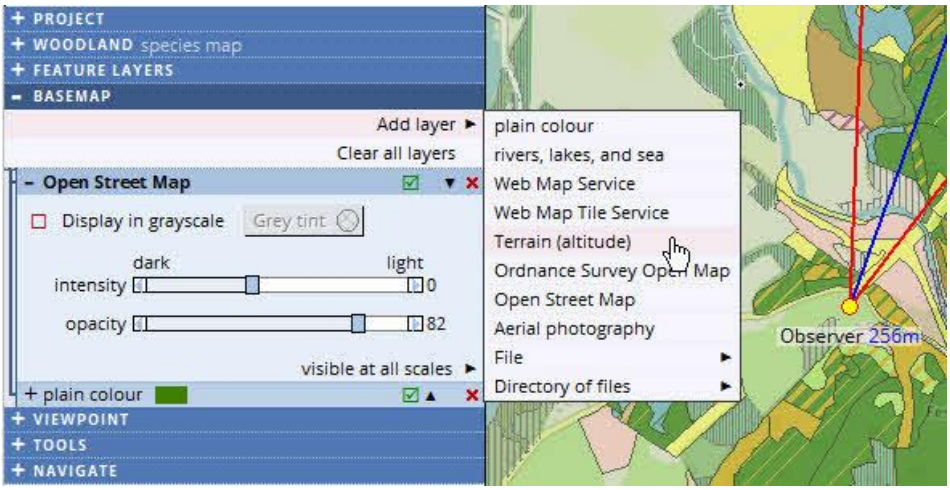


Density

Using “save legend as” you can save the current legend either as an image or as a text list.

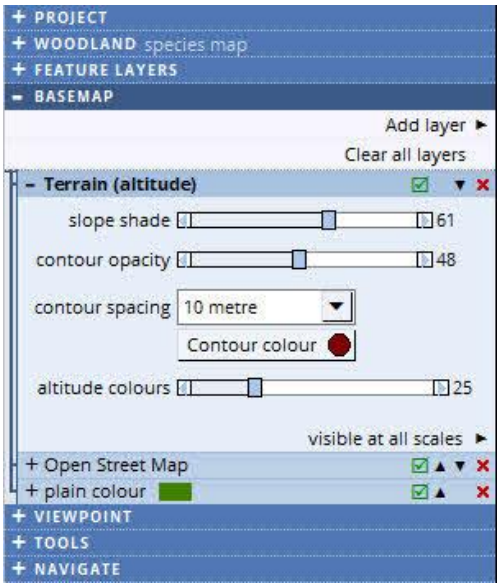
Base map

As well as your woodland polygons the map will usually have other layers to give context. In Prospect these are split up into the “basemap” and “feature layers”. The basemap typically consists of one or more layers for which there is national coverage and so can be used in any project. By default a new project starts with the layers specified in “System set-up – Default base map for new projects”. The settings for each layer can be accessed by clicking on the caption bar for each layer.



Here you can see that the intensity of the Open Street map layer has been set to less than 100% to allow the green colour of the layer below to shine through and give a green tint to the base map.

Using the “add layer” menu different types of base map layer can be included. For instance the altitude data can be used to generate slope shading, contours, and altitude colours:



When you use “add layer” the new layer is added to the top of the pile. Using the small black up and down arrows you can change the order of the layers. Or, you can click on the green tick to temporarily hide a layer. Clicking on the red “X” deletes the layer.

With the exception of layer types “plain colour”, “file” and “directory of files” you need to configure the source of the data (Open Street Map and Ordnance Survey Open Map are pre-configured but can be altered). To do the configuration go to the “System set-up” page (see below).

Feature layers

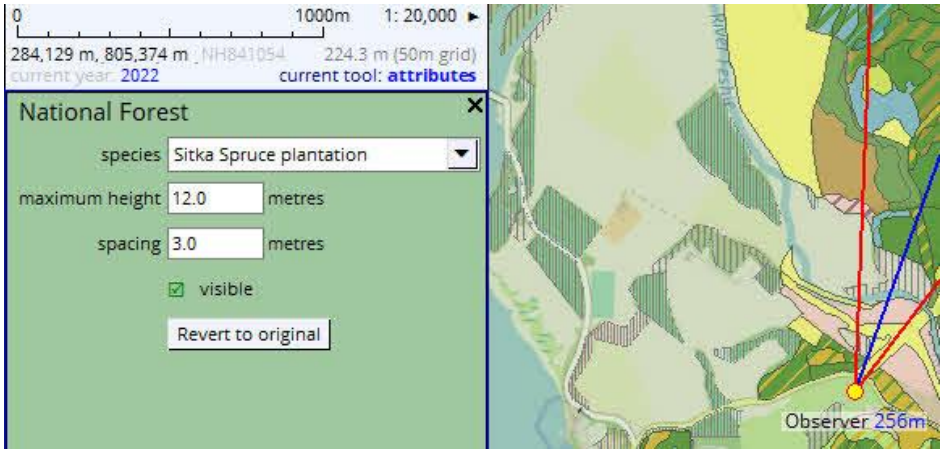
Feature layers are layers which are more likely to contain information specific to one project. The Feature layers sit on top of the base map.

National Forest Inventory

Usually the most important of the feature layers is the National Forest Inventory. This is included as a feature layer rather than a basemap layer because you can edit it.

> ***Note***: If the National Forest Inventory is not installed see System set-up – Manage data sources.

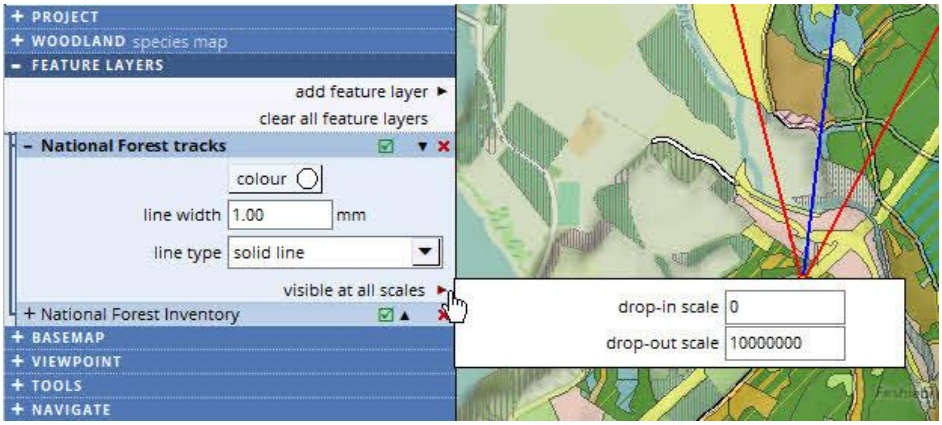
Having included the National Forest inventory as a feature layer, you can choose the "attribute" tool and click on one of the Inventory polygons. Now you edit its settings in the left hand panel:



The options available are less than for the project woodland but sufficient to modify the appearance of the compartment in the 3D visualization. One option is to un-tick the "visible" box which will then cause the polygon to be omitted from the 3D view.

National Forest Tracks

The National Forest Tracks are a companion to the National Forest Inventory.



As with all the feature layers, and basemap layers, you can specify “drop-in” and “drop-out” scales meaning that the layers will only be visible on the map when the scale is equal to or greater than the drop-in scale and less than the drop-out scale.

Context woodlands

“Context woodlands” are typically used to correct for omissions or errors in the National Forest Inventory. If need be context woodlands can be used instead of the National Forest Inventory. A context woodland is created from a file of polygons (ESRI shape file or Map Maker DRA file). The file should contain fields for the species name, the height, and, optionally, the spacing.

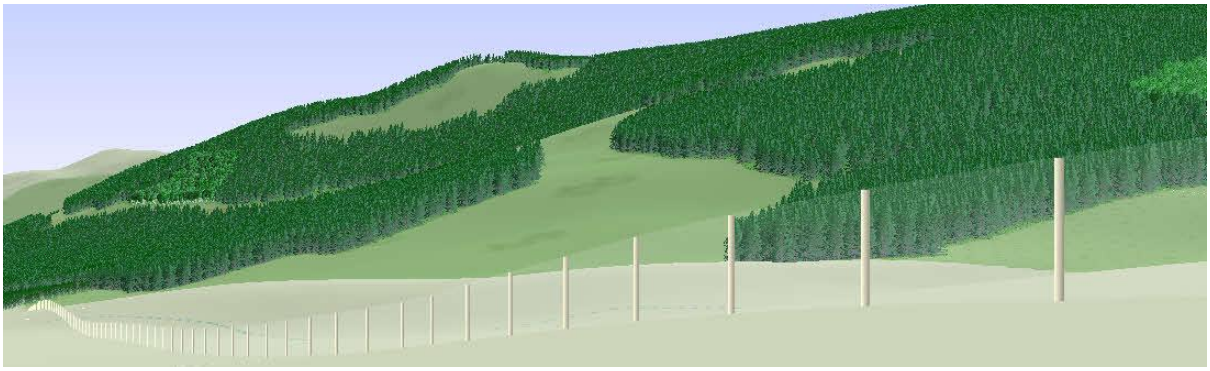
> ***Hierarchy of subcompartments***
>
> Where you have your woodland, and the National Forest Inventory, and maybe context woodlands there is a hierarchy of subcompartments. At the bottom there is the National Forest Inventory. If a context woodlands polygon overlaps one or more polygons in the National Forest Inventory then it is takes precedence over the polygons in the National Forest Inventory. Similarly if subcompartments in your woodlands file overlap either the National Forest Inventory polygons, or those in context woodlands, then the subcompartments in your woodlands file take precedence.

Roads and tracks

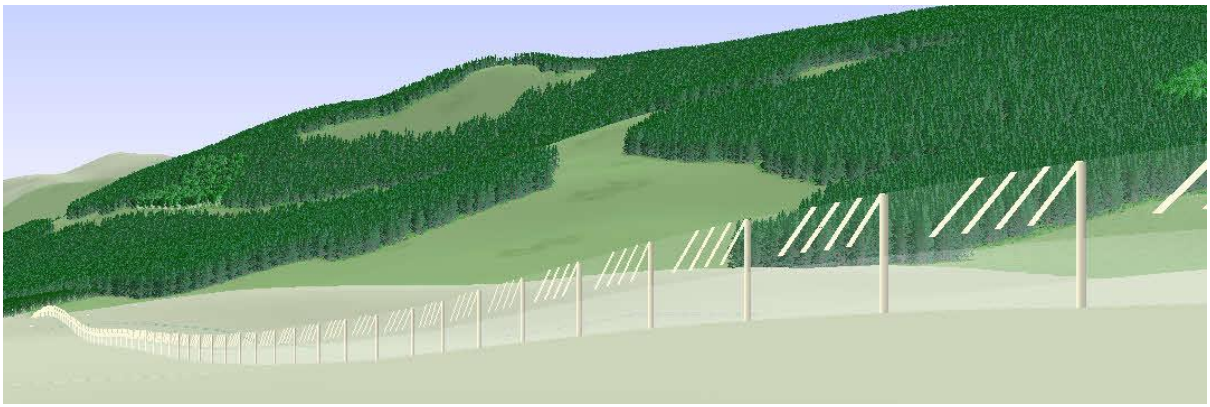
A file of lines (ESRI shape file or Map Maker DRA file) can be selected and used for roads. You can specify a width in mms on the map, and a colour. The coloured line will be bounded by two thin black lines.

Deer fence

A file of lines (ESRI shape file or Map Maker DRA file) can be selected and used for deer fences. As well as specifying the height of the fence and the post spacing for the three-dimensional view you can choose to have both bird protection (drops) and rabbit protection.

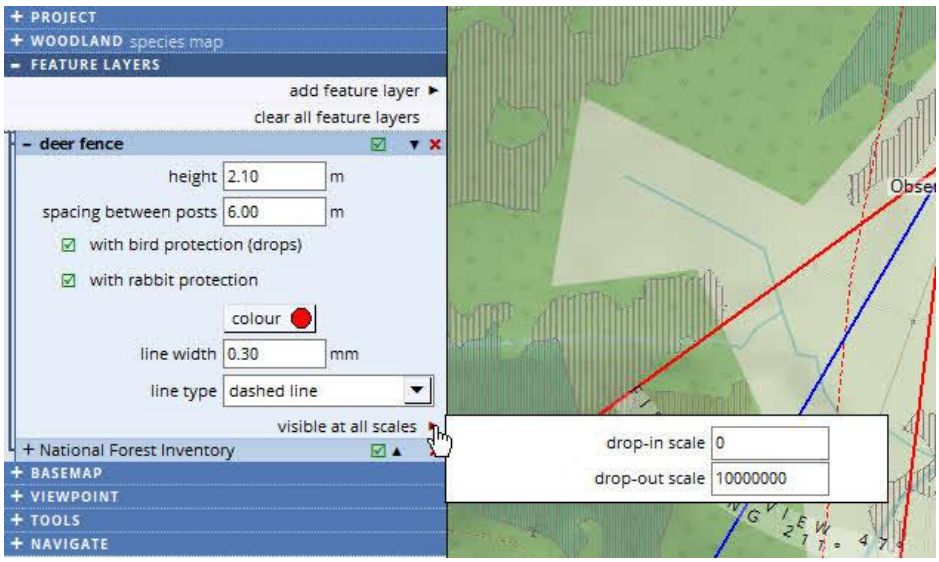


Deer fence

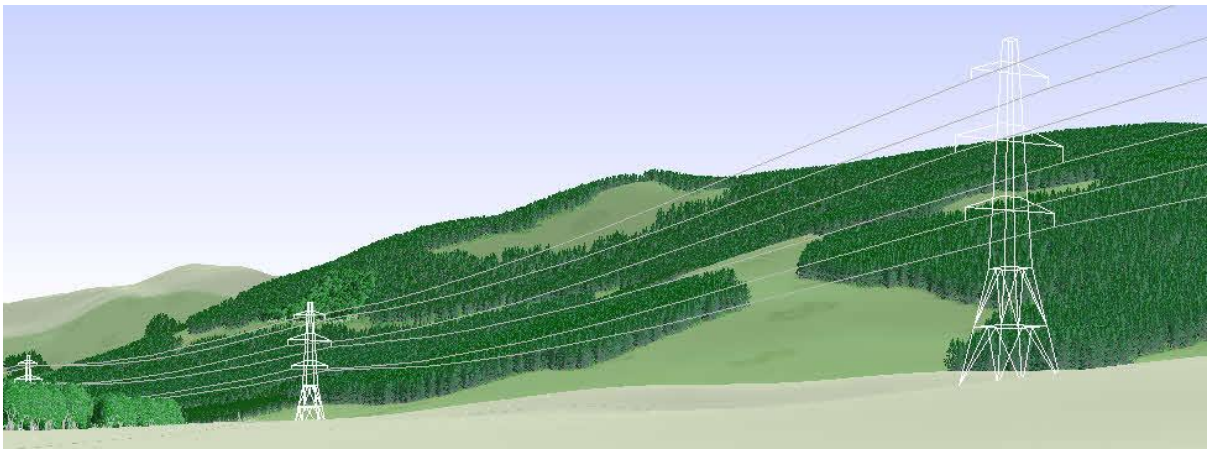


Deer fence with bird and rabbit protection

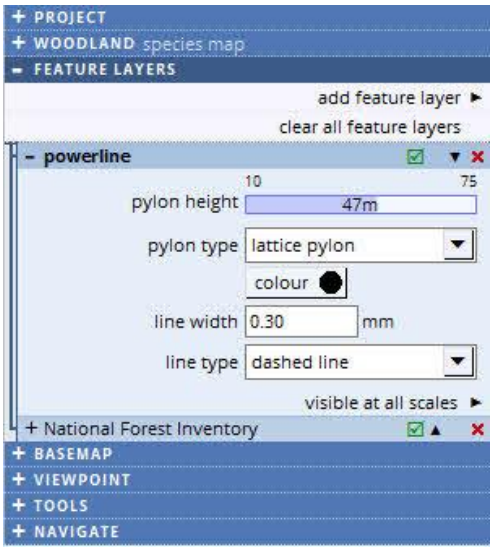
In addition you can specify the line style and colour for the deer fence on the map.



Powerline



A file of lines (ESRI shape file or Map Maker DRA file) can be selected and used for power lines.



As well as specifying the pylon height you can choose between the conventional lattice pylon and the more modern “tee-shaped” pylon.

Note that the colour, as well as the “line width” and “line type” refer to how the power line is shown on the plan, not in the panorama view.

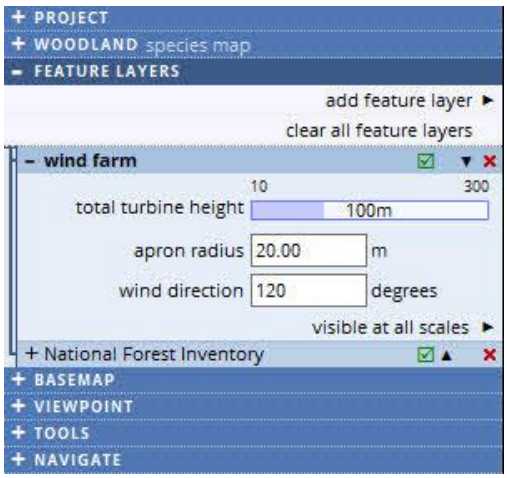
Points

A “points” layer can be used for placing simple symbols (circles, squares, triangles, and stars) on point locations such as gates, fire points, bridges etc. One symbol is applied to all the points in the layer. Note that unlike the other feature layers a points layer sits on top of the project woodlands. Also, note that point layers are only shown on the map, not on the panorama view.

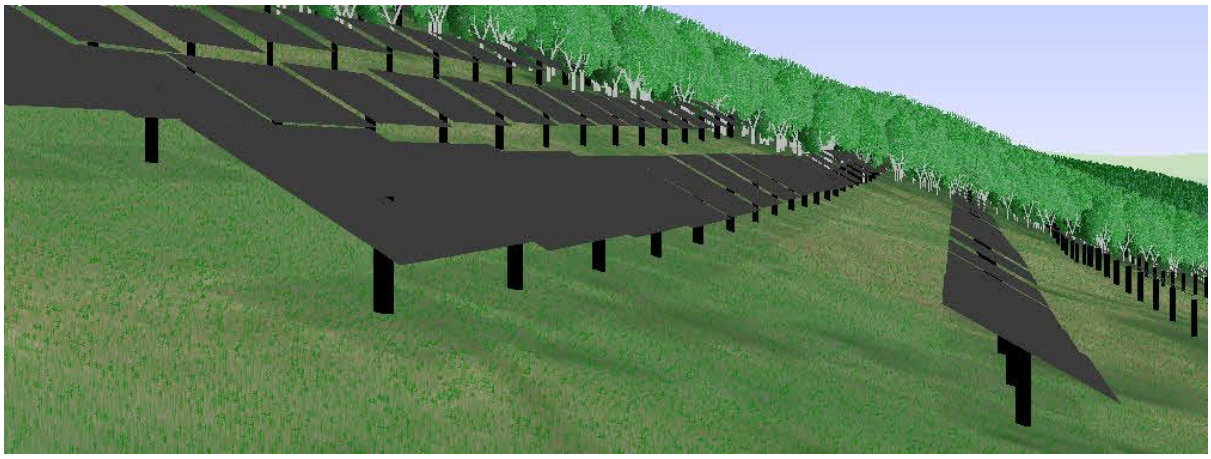
Wind farm

A wind farm is specified by selecting a file of points (ESRI shape file or Map Maker DRA file) where each point defines the location of a turbine. If the file also contains line objects then the lines are treated as access roads (note that ESRI shape files can only contain one object type so this option only applies to Map Maker DRA files).

For the wind farm layer as a whole you can specify the total turbine height – that is the height of the hub plus the radius of the rotors. You can also specify the "apron radius" which is used to carve out a space free of trees around the base of each turbine. The "wind direction" can be adjusted if required to clarify the panorama view.

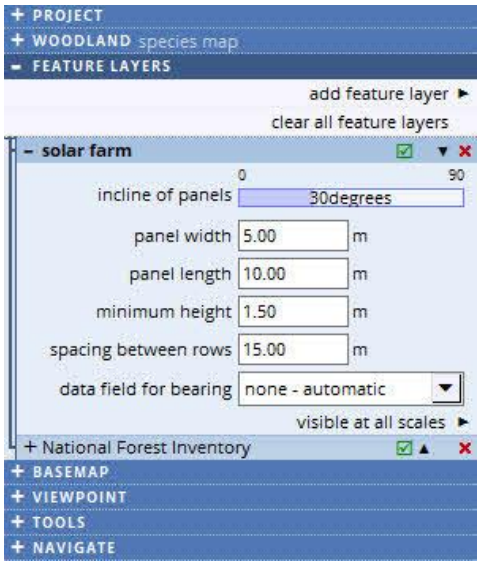


Solar farm



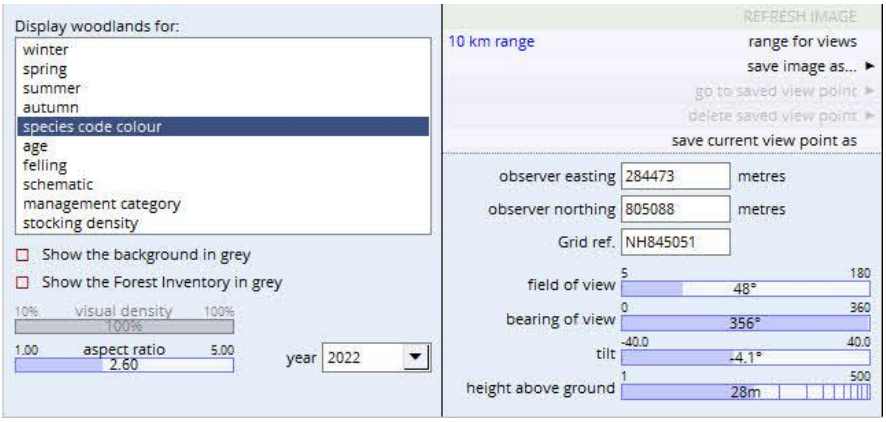
A file of one or more polygons (ESRI shape file or Map Maker DRA file) can be used to define a solar farm. Each polygon describes the bounds of a group of solar panels. Prospect automatically populates each polygon with panels using criteria for panel size and spacing.

You can use a data field in your polygon file to specify the bearing which each set of panels faces, but if you do not specify a data field then the program assigns a value based on the average direction of the slope of the land within the polygon.

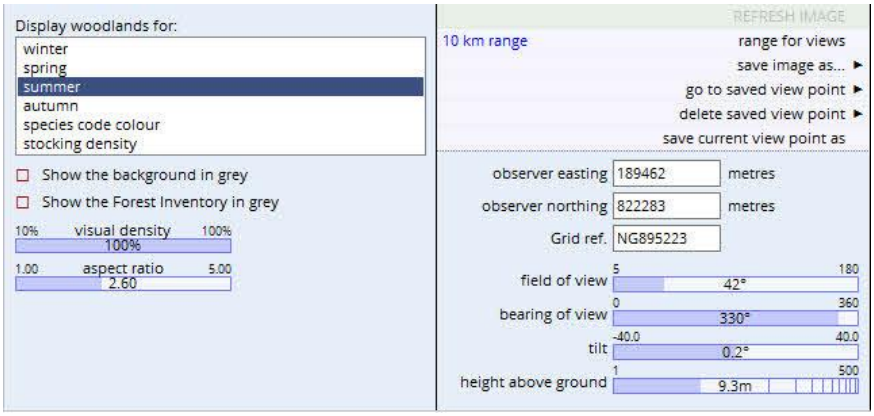


Panorama

On the Panorama page the options available depend on whether the project is temporal or static:



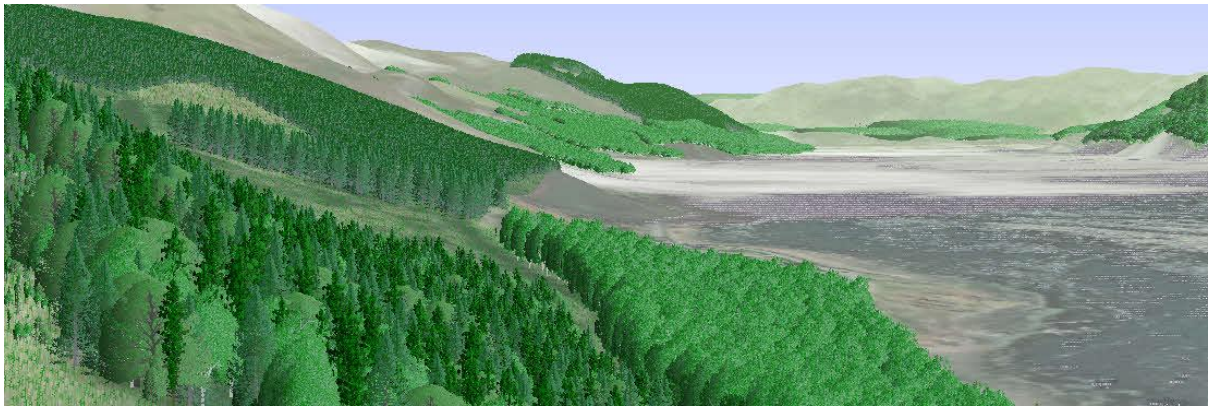
The panorama controls for a temporal project



The panorama controls for a static project

The controls to determine the viewpoint are the same as those found on the Map page. In addition to using these numerical viewpoint controls you can also drag the main image left and right, and up and down, to alter the bearing and tilt, as well as using the mouse wheel to alter the field of view.

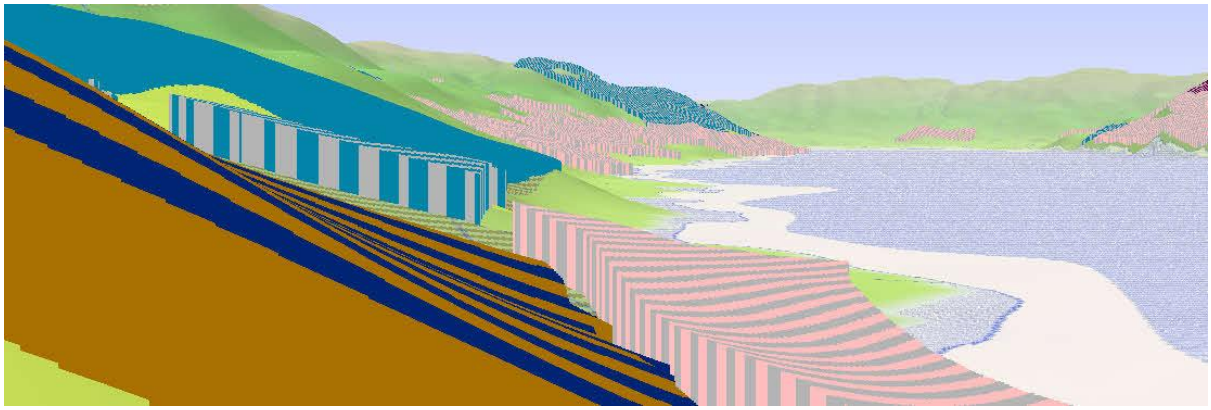
The display themes are also the same but in addition you have the options for winter, spring, summer and autumn. When any of these four seasonal themes is selected the panorama uses tree images to produce a naturalistic view:



A summer image using aerial photography as the base map

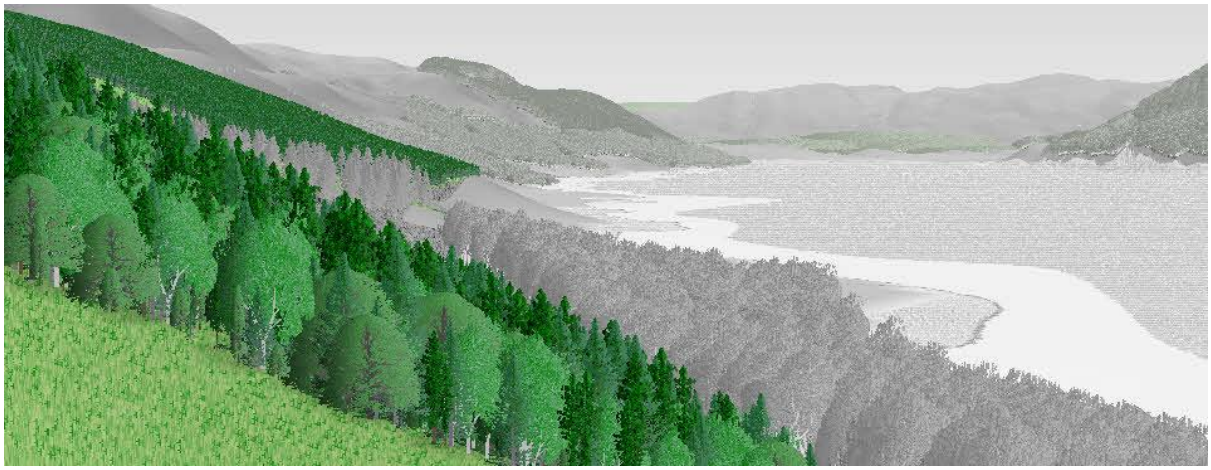
A summer image using the water layer with the terrain layers altitude colours and slope shading

When using any of the non-seasonal themes the woodland is displayed as blocks draped over the landscape:



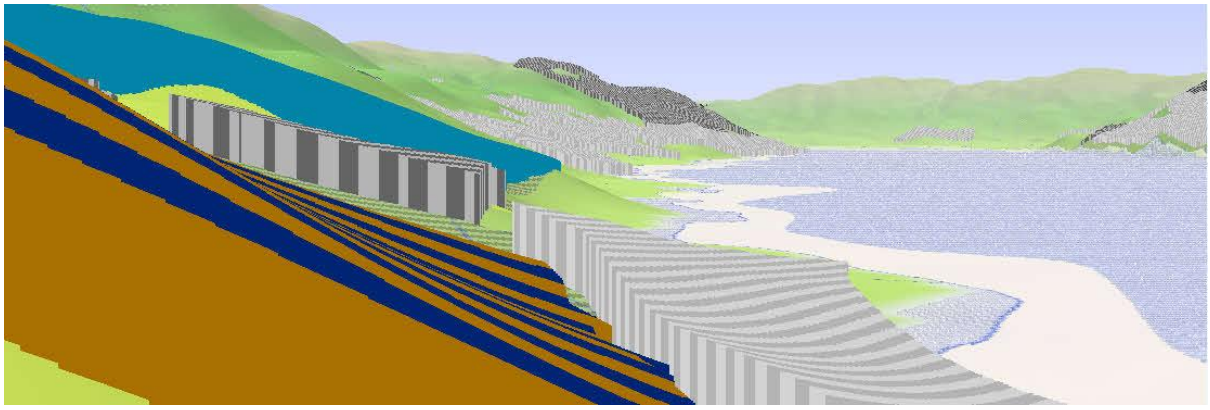
A species code image with the water layer with the terrain layers altitude colours and slope shading

One of the options is to “Show the background in grey”. If this is selected then the only elements which are shown in colour are your woodland polygons:



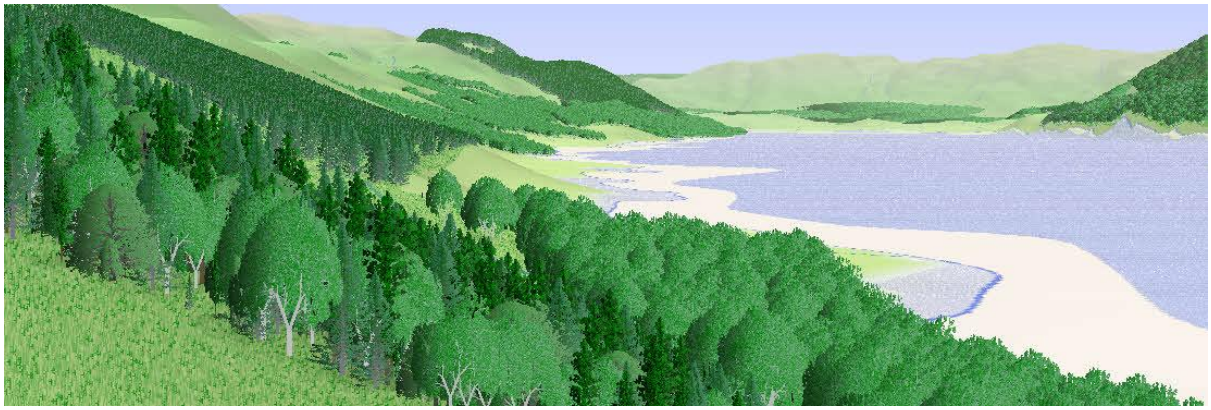
"Show the background in grey"

Another option is "Show the Forest Inventory in grey" in which case Forest inventory woodland, and any other context woodlands, are shown in grey:



"Show the Forest Inventory in grey"

When using the seasonal views (the views with trees rather than blocks) you have the option of reducing the "visual density". This artificially reduces the density of trees to exaggerate the visual effect of low density planting:



Visual density set to 50%

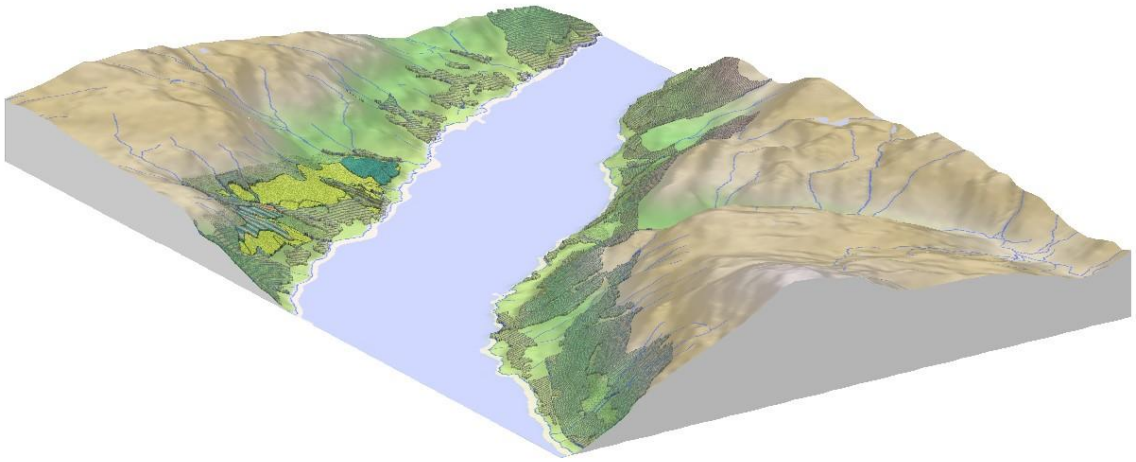
The “Range for views” is, by default, set to 10km. This means that the base map gradually fades out until it reaches this range. The shape of the terrain can still be seen for more distant locations, up to 80 km, but the details will not be visible. You can specify a greater range but the redrawing time will be longer. Conversely, specifying a shorter range can speed up redrawing.

The “Save image as” menu item allows you to save the panorama to a BMP, TIF, or JPG file. It allows you to specify a width in pixels so allowing you to create an image which is not constrained by the resolution of the screen. That said, it is sensible to not specify too large an image – for instance a width of 3000 pixels will be sufficient for most purposes.

If your project includes a wind farm layer then you can also save the view as an “animated GIF” file, meaning that you can create an image for use on a web page which shows the rotors of the wind turbines revolving. These images are limited to a width of 800 pixels.

Orthographic view

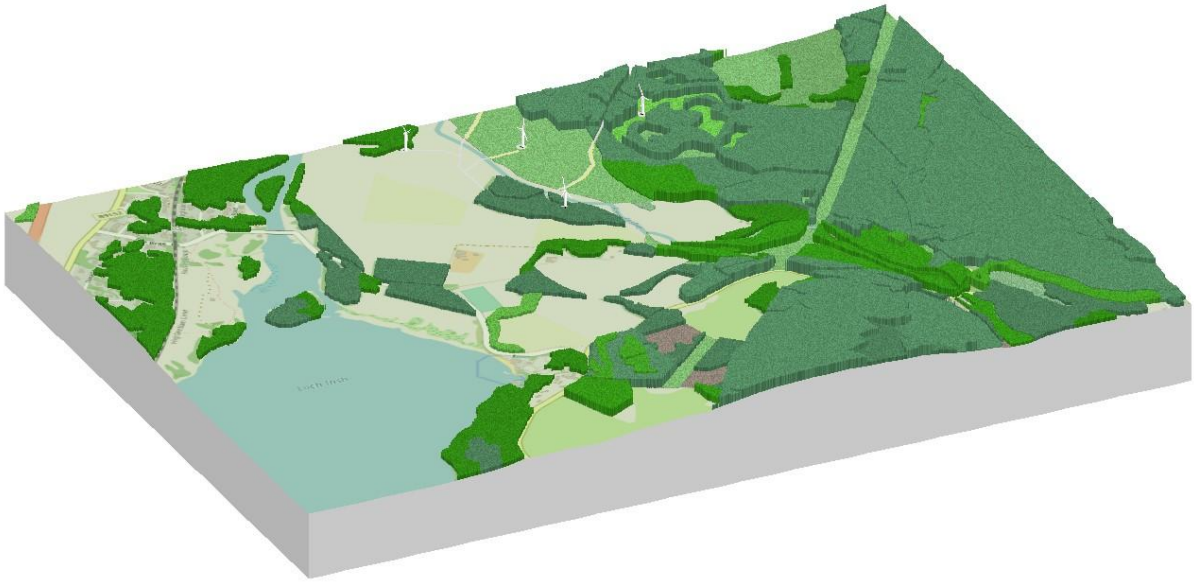
The “Orthographic view” displays a 3D representation of the area currently shown on the map page.



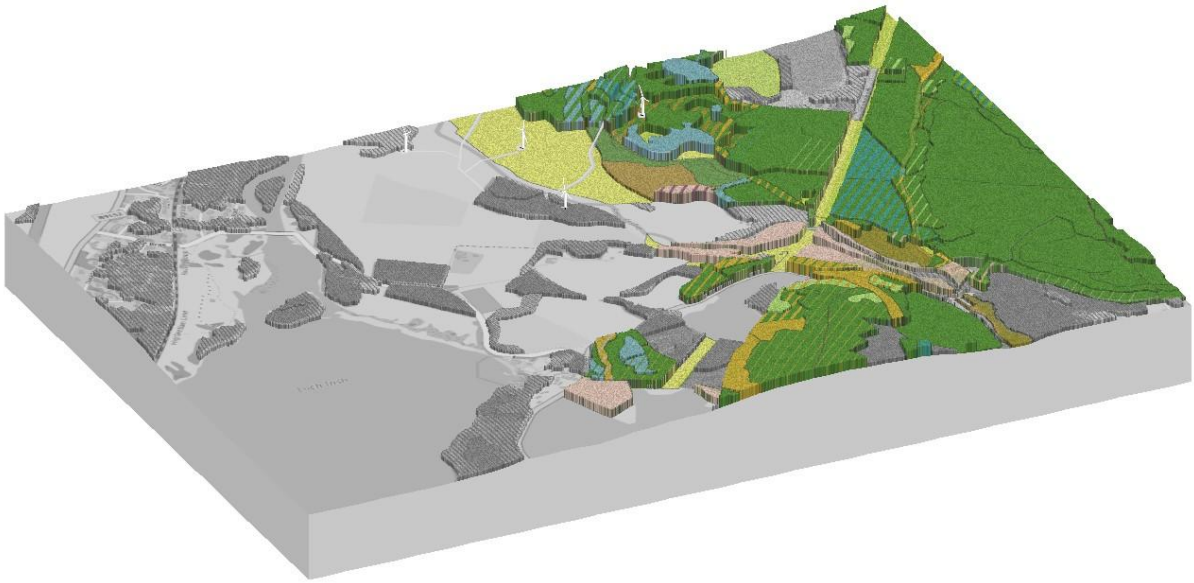
Using the mouse you can drag the image to revolve it or to change the tilt. There is also a plus and minus button which can be used to zoom in and out.

By default the colours used on the orthographic image are taken from those used on the “Map” page’s image, typically using code colours for tree species:

However, if you tick the box “Use natural colours” then the code colours are replaced with shades of green:



By ticking the box “Use grey background”, as with the panoramic view, you can highlight your woodlands in colour against a grey context:



As with the panorama view, the orthographic image can be saved at a higher resolution than that of the screen. If your project contains a wind farm layer then the image can be saved as an animated GIF file.

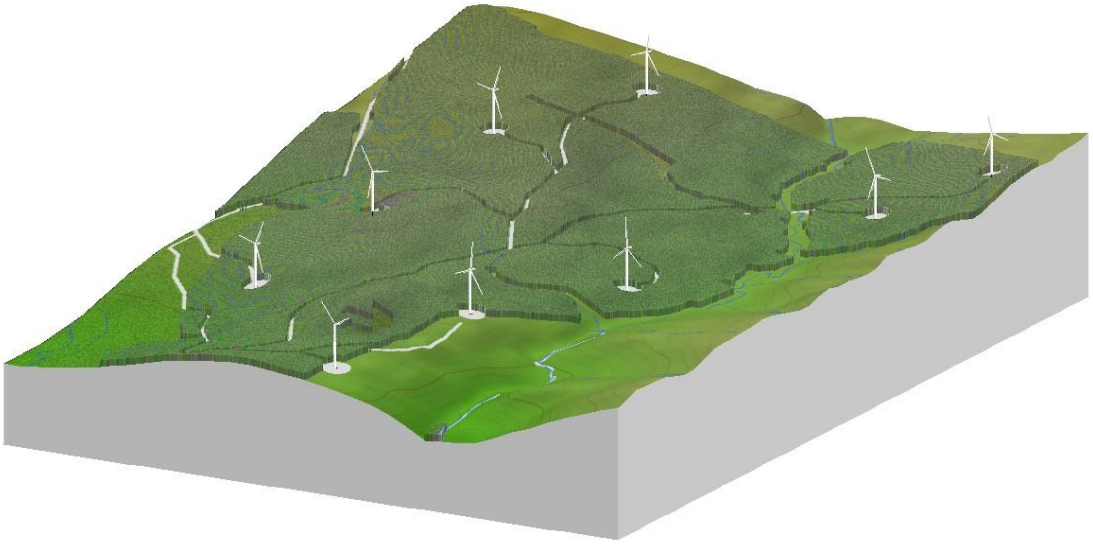
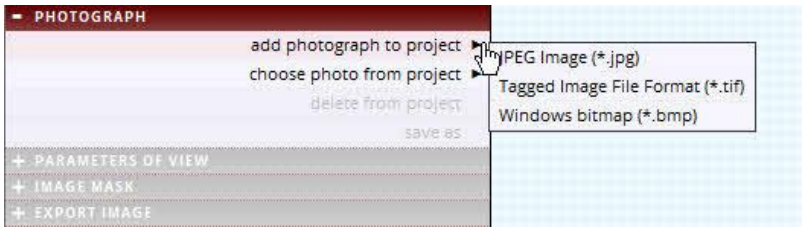


Photo-montage

The photo-montage function allows you to superimpose your woodlands, and wind farms, onto photographs. You first need to select a photograph to import into the project:



The maximum size of photograph is 4000 pixels across. If your photograph is larger than this then Prospect first shrinks the image before adding it to the project. Once a photograph has been added to a project then it can be selected from the "choose photo from project" menu. Note that a copy of the photograph is stored in the project file so you no longer need the original photograph file.

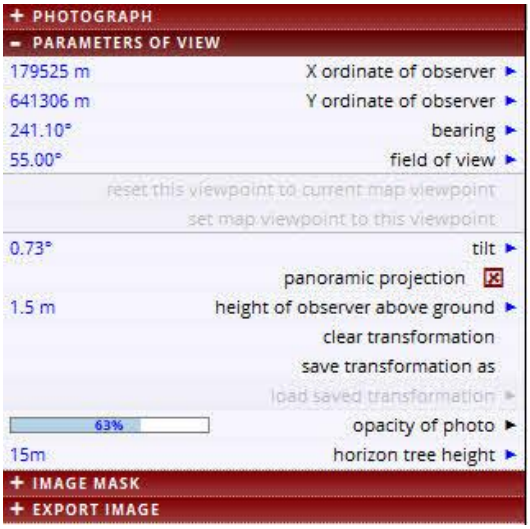
Parameters of view

Having selected a photograph it is necessary to match the features in the photograph with the shape of the terrain. A semi-transparent image of the photograph is superimposed over a representation of the terrain.

Before starting you should know:

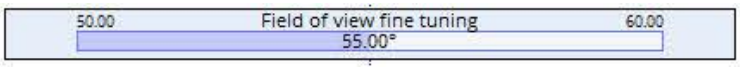
- The coordinates of your viewpoint.
- The approximate compass bearing of the centre of the photograph.
- A rough idea of the angular horizontal "field of view" of the photograph – for instance a traditional 35mm camera with a standard 50mm lens has a horizontal field of view of approximately 40 degrees.

If your photographs viewpoint is already the viewpoint identified on the "Map" page then these values are applied automatically, otherwise they can be entered on the "parameters of view" panel:

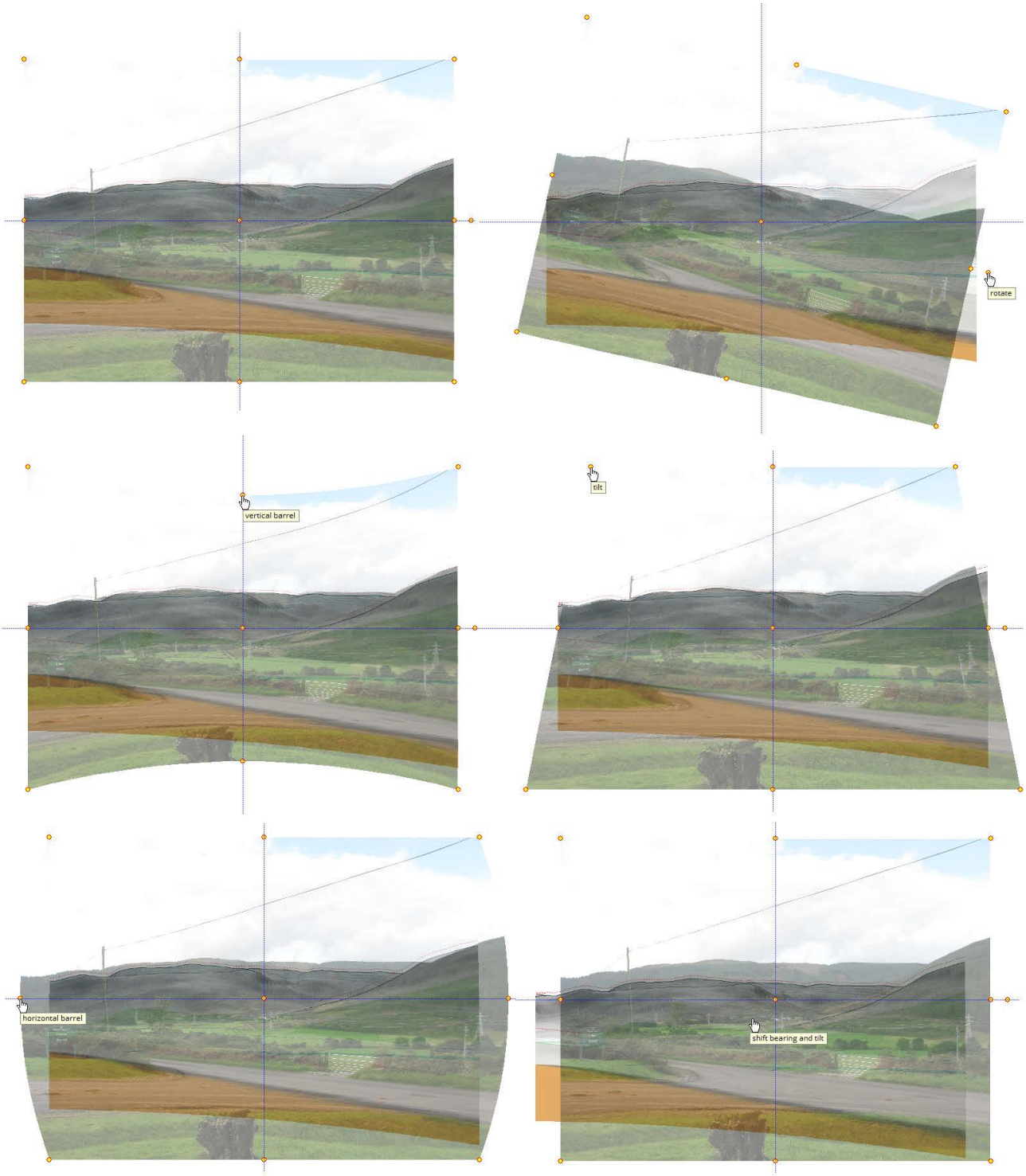


Typically, your photograph will be a normal point and click image which is a "perspective" view. However, in some circumstances you may have a panoramic photograph created by a camera, or phone, that allows you to physically turn the camera to create a very wide angle view. In this case you should tick the "panoramic projection" tick-box.

The bearing of the photograph can be adjusted by placing the cursor over the yellow spot on the centre of the photograph and then dragging the underlying image of the surface left or right until the horizontal centre of the photograph appears to correspond with the surface image. The field of view can be modified using the fine adjustment at the top of the screen:



All camera lenses suffer from distortions, particularly wide angle lenses. Also few photographs are precisely level. To accommodate these effects the photograph can be manipulated to make a better fit with the surface image. There are various yellow dots on the photograph which can be dragged:



Note that the surface image is showing the height of the ground. Frequently what you are seeing on the horizon is not the ground but the tops of trees. What you are trying to achieve is a match between the ground on the photograph and the ground on the surface image. For this reason a red dotted line is shown on the horizon which indicates the height of trees at that distance.

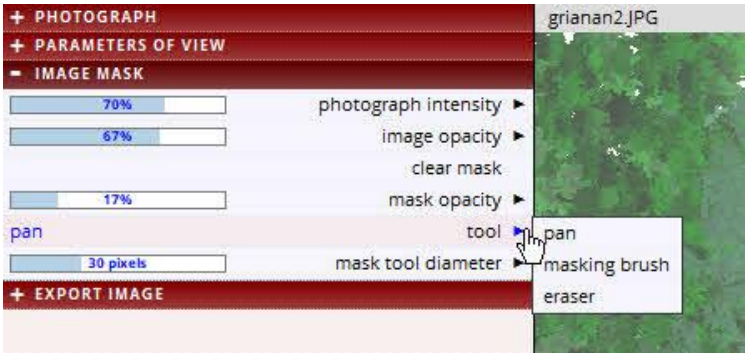
You can specify what height to use for the tree height by adjusting the value of “horizon tree height”.

Image mask

Having matched the photograph with the surface you can now superimpose your woodlands (and/or windfarms). Open the “image mask” panel and you will see the woodlands superimposed in a semi-transparent fashion.

However, as in this example , though the trees are in the right place the picture is not correct since foreground features, such as the hedge, have been unnaturally obscured. It is necessary to create a “mask” which masks out elements of the image which you can see should appear behind features in the photograph.

The “image mask” panel had three tools:



These tools, pan, masking brush, and eraser, can be selected from the menu or else you can right click on the image to step through the three options.

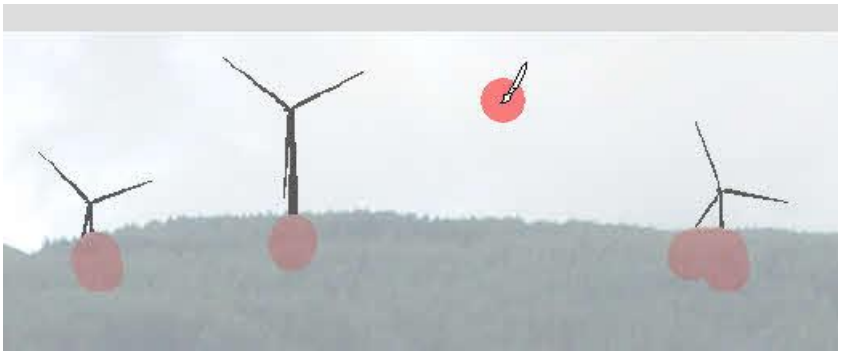
If you select the “masking brush” tool you will see that the cursor is centred on a red circle which indicates the current size of the “brush”. Click and drag to paint with the brush. The areas where the mask has been drawn will appear in translucent red and you will see that in those areas the image of the trees has been removed and the original photograph can be seen. Note that in the final image the red of the mask will not show.

In this case the mask has been drawn a little too large, so select the “eraser” tool. It appears as a yellow circle around the cursor. Click and drag to remove areas of the red mask:

The diameter of the both the masking brush and the eraser can be modified to enable you to edit fine detail.

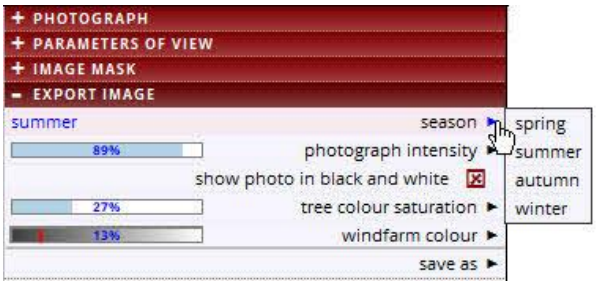
With features on the horizon, such as wind farms, the wind turbine may not look correct relative to the horizon if there are trees on the horizon:

If you are uncertain if a feature is beyond the horizon or slightly in front of it you can check the actual distance by placing the cursor over the feature and reading the distance in the top right of the screen. If you then do the same with a nearby part of the hillside you can compare the distances. If, as in this case the turbines really are over the horizon you can use the masking tool to tidy the image:

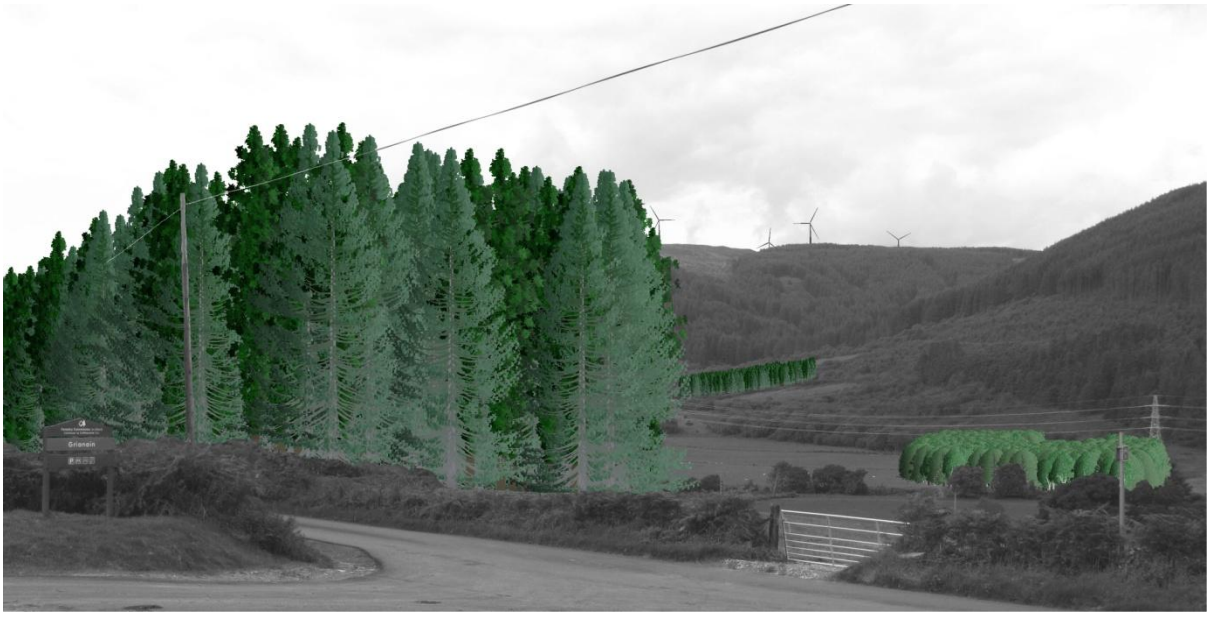


Export image

Before saving the final image to a file you can make some presentational adjustments:



Apart from choosing the season the intensity of the photograph can be reduced or you can choose to make the photo black-and-white so that the new woodlands can be easily distinguished:



You can adjust the “tree colour saturation”. If the photograph has rather dull colours it can help to reduce the colour saturation of the trees in order to make them blend in more realistically with the photograph.

If you have windfarm turbines, in some situations you may want to use their true white colour, but if the turbines are on the horizon against a nearly white sky, it can be better to use a dark colour to emphasize the silhouette, as in this example:


Grianain

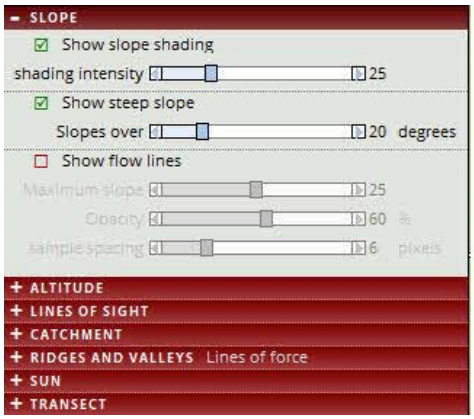
Surface analysis (add-on)

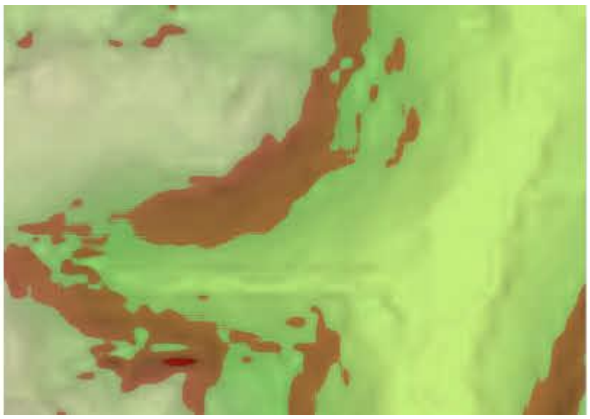
The “Surface analysis” module is an add-on to Prospect and will only be available if your licence includes the add-on, or if you are still in the demo period.

The area analysed is the area defined by your “Map” page. Several different analyses can be carried out, either individually or in combinations.

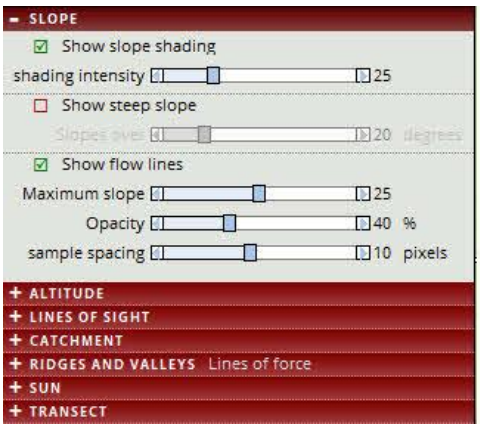
Slope

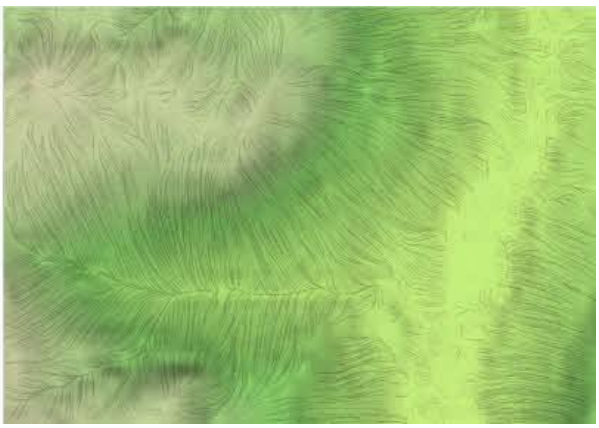
The “Slope” analysis can be used simply to shade the surface in proportion with its slope, or you can define an angle as a minimum for “steep slopes”, then areas with a slope at or above this angle are shaded in red:





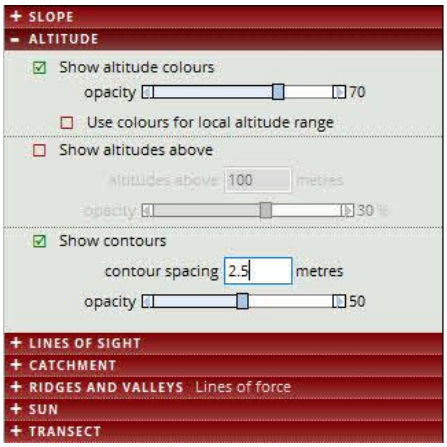
You can also “Show flow lines”. These give an approximate indication how water will run off the hillside but also can be a good way of displaying slope which can be more intuitive than conventional contours.

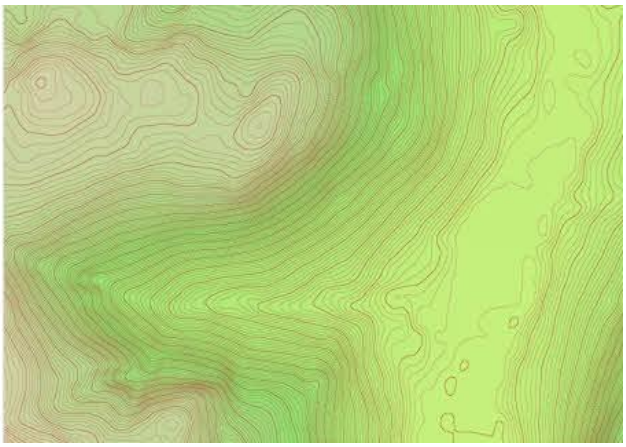




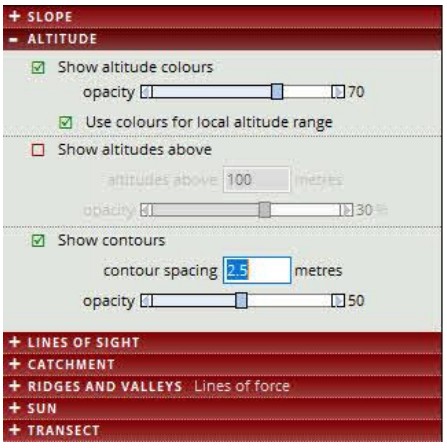
Altitude

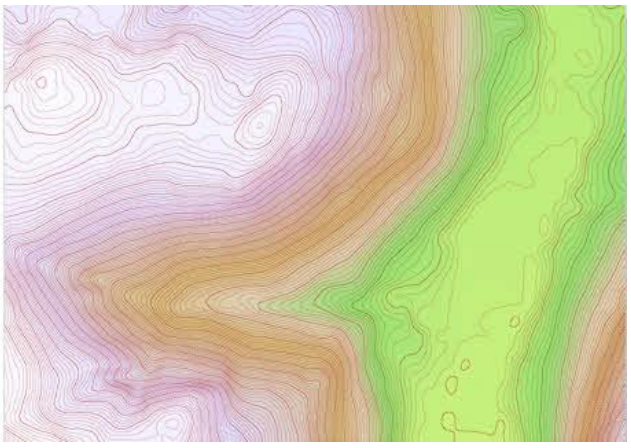
"Show altitude colours" applies a cartographic spectrum of colours from a light green for low altitudes, though browns to a blue-ish white for high altitudes:





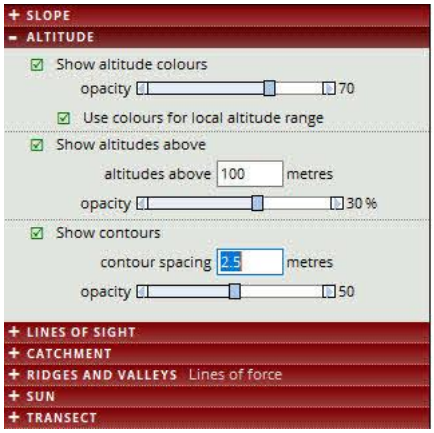
If you select the option "Use colours for local altitude range" then the spectrum is adjusted to span just the range of altitudes in the current map, this has the effect of emphasising the altitude range but means that it is not immediately comparable with other maps with different altitude ranges:

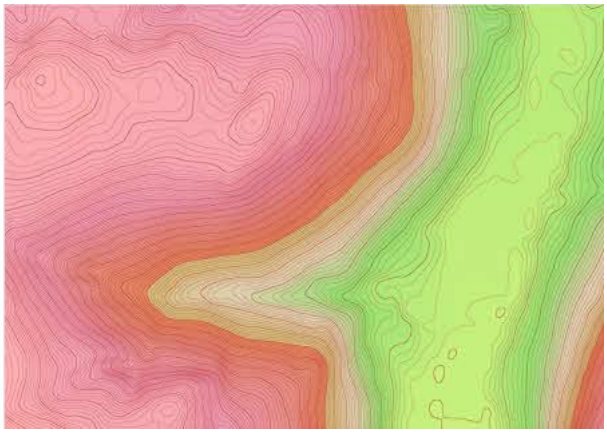




The "Show contours" option uses the specified contour spacing. Every fifth contour is drawn with a heavier line to enhance intelligibility.

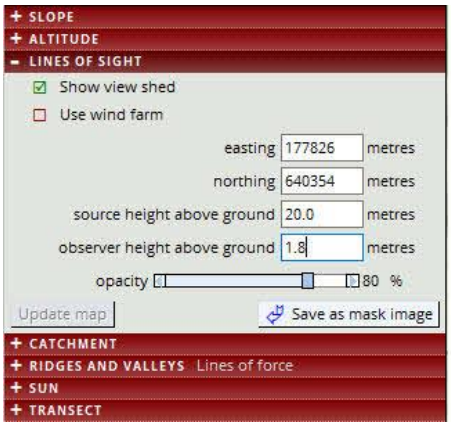
The "Show altitudes above" option is used with a specified altitude to show all those areas above that altitude in red:

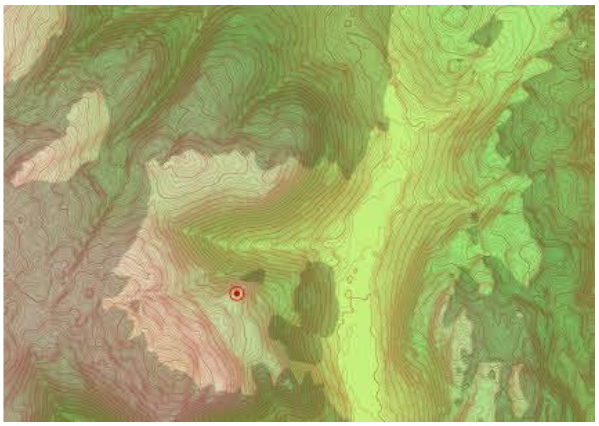




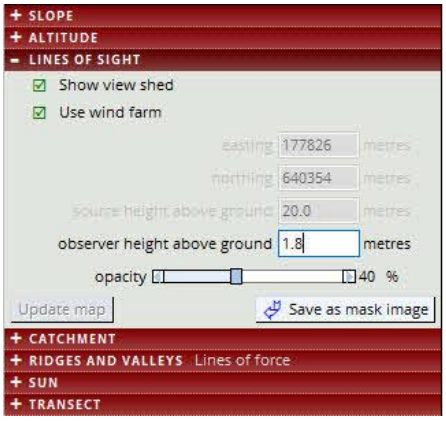
Lines of sight

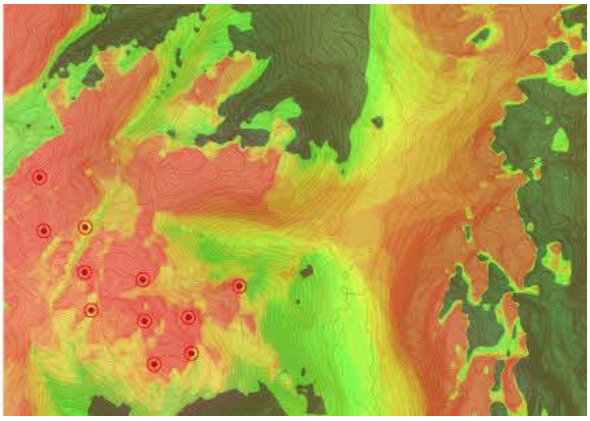
The “Lines of sight” function can either be used for a single point object, such as a transmission tower, or for a wind farm group of turbines. When “Show view shed” is ticked you can click on the map to locate the object of concern – or you can enter coordinates numerically in the easting and northing fields. The use the “source height above ground” field to specify the objects height relative to the ground height. Finally, specify the height of an observer – imagine the observer walking all over the map so the “lines of sight” are from an observer of the specified eye height at any location on the map. Click on “Update map” and the “view shed” is drawn. In the case of a single object the areas where the top of the object is not visible are shaded grey.





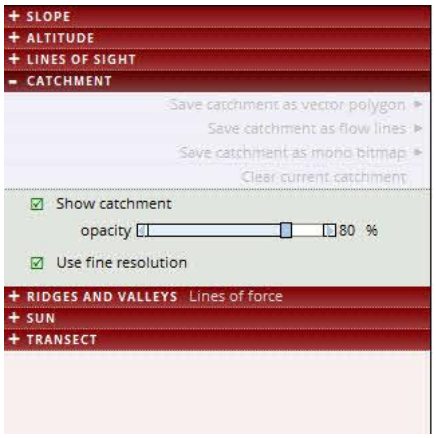
If your project contains a wind farm layer then the “use wind farm” option is available. If you do use the wind farm then all the information about the location and height of the turbines is already specified in the wind farm layer so the “easting”, “northing” and “source height above ground” fields are all greyed out. In the resulting map, as above, areas where no turbines are visible are shaded grey. The height of the turbine is considered as the height of the hub plus the radius of the rotor blades. Where the top of one or more turbines are visible the map is coloured, ranging from green where just one turbine is visible to red where all of the turbine are visible:

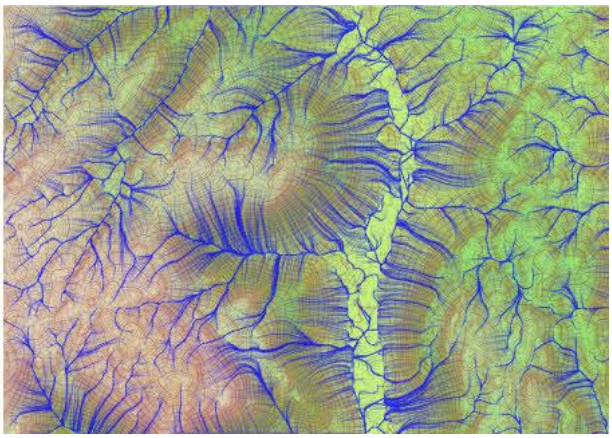




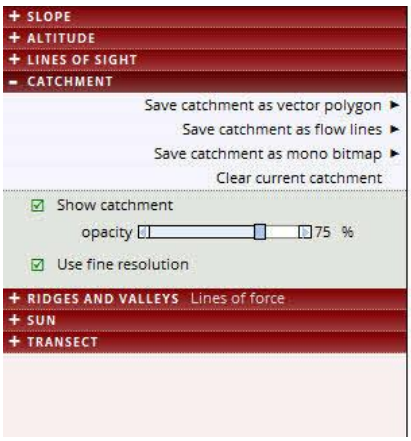
Catchment

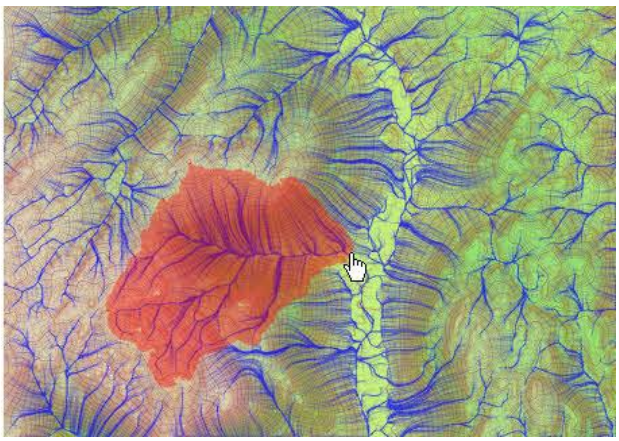
With “Show catchment” selected the map displays a set of lines that approximate to the flow lines of water down the surface – assuming uniform surface conditions.



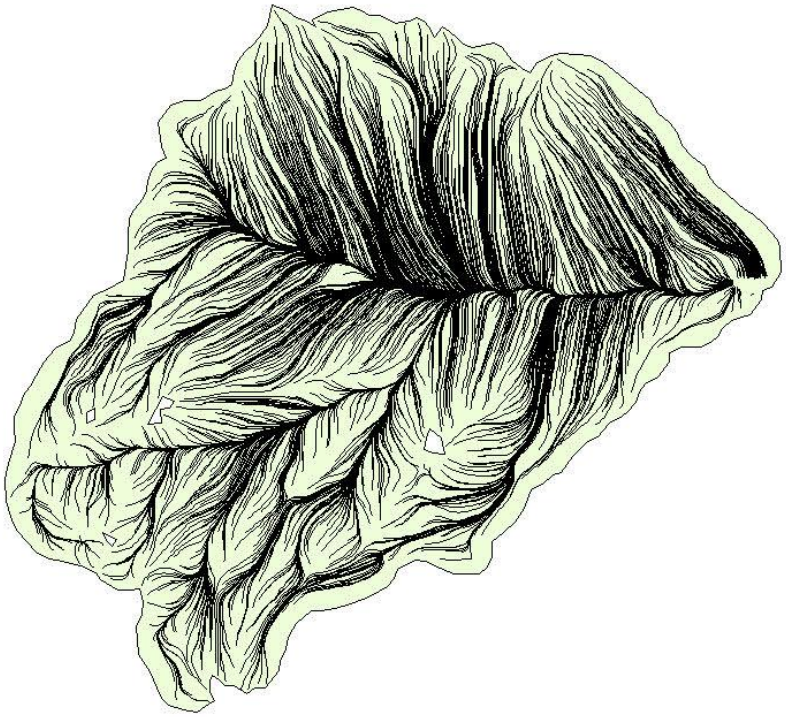


Having generated the catchment lines you can click anywhere on the map and the catchment zone upstream from that point is shown:



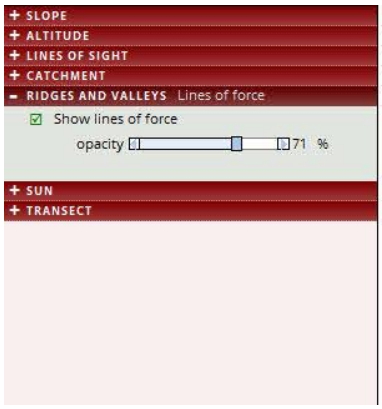


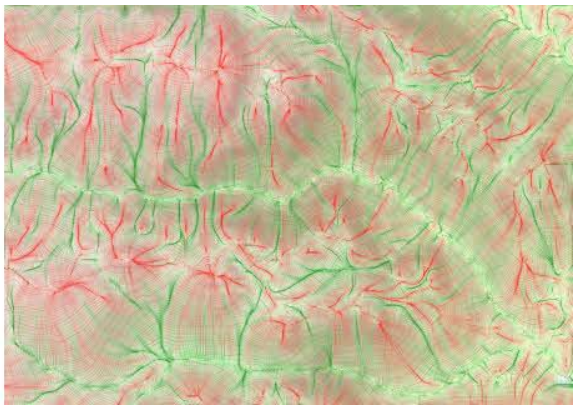
The catchment area can then be saved to a separate file: as a polygon, a set of flow lines, or as a bitmap:



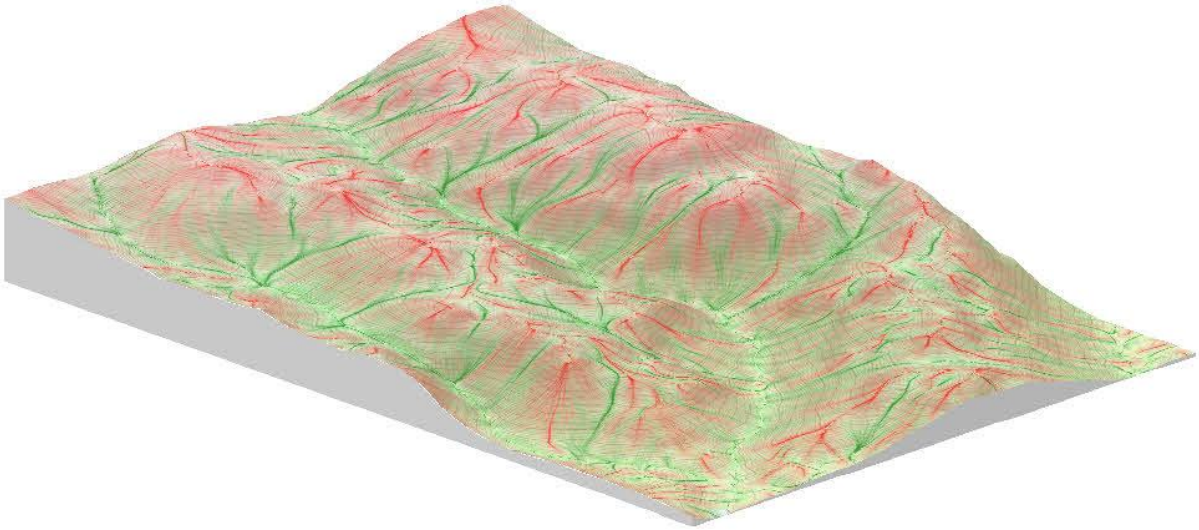
Ridges and valleys – Lines of Force

"Lines of force" are sometimes used to emphasize landscape form, conventionally with red lines to pick out ridges and green lines for valley bottoms. This function automates this process:



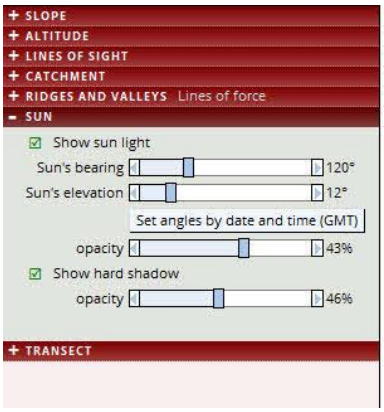


As with all of the functions in the Analysis section, you can view the surface using the "3D-view" tab, for instance:



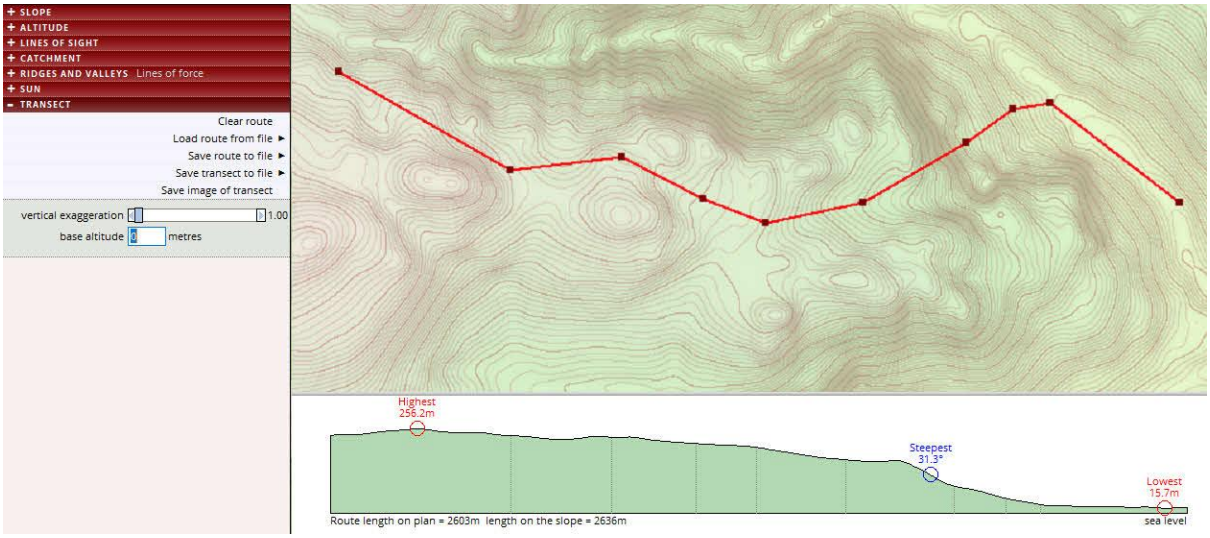
Sun

The “Sun” function is used to assess the exposure of locations to sunlight. If the “Show hard shadow” is not ticked then the image shows shading in proportion to the surface’s angle to the suns rays. If “Show hard shadow” is ticked then areas which are overshadowed by the terrain are shown in deep shadow:



Transect

The “Transect” function allows you draw a route, or import a route from a file, across the terrain and see the cross section along the route.



The cross section identifies the steepest part of the route as well as the highest and lowest points. You can move vertices on the route by dragging them, or introduce new vertices by dragging on a line segment. To delete a vertex place the cursor over the vertex and press the “Delete” key.

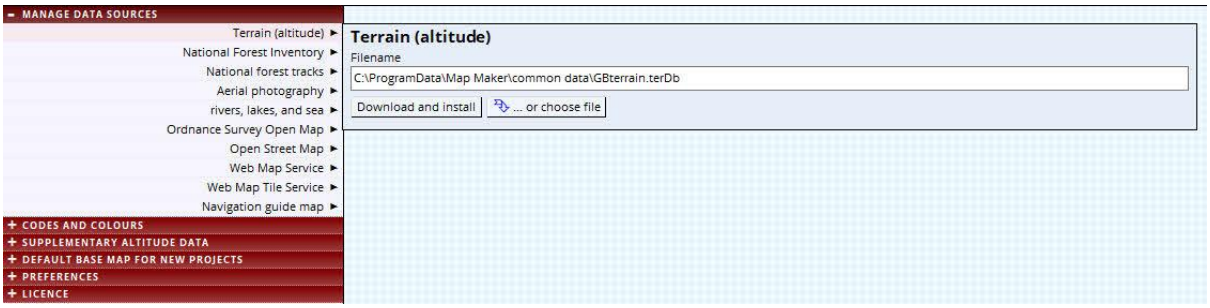
System set-up

The “system set-up” is for settings which do not apply to a particular project but apply to the use of Prospect on your machine.

Manage data sources

There is a variety of data sets which can be used in a Prospect project which are not part of the woodland data. The most important of these is the altitude data that describes the three-dimensional shape of the terrain.

The terrain data for Great Britain is stored in a single file called “GBterrain.terDb”. If it is not already installed then it can be downloaded from the Map Maker web site by clicking on the “Download and install” button. If it is already on your machine, or your server, then use the “..or choose file” button to select it.



The “National Forest Inventory” and the “National Forest tracks” are not essential but we recommend using them as they can be useful “feature layers” in projects. As with the terrain, the files can be downloaded from the Map Maker web site using the “Download and install” button. If you already have the relevant shape files they can be selected using “..or choose file”.

The remaining datasets are those which can be used as base map layers.

If you wish to use **Aerial photography** you have three options:

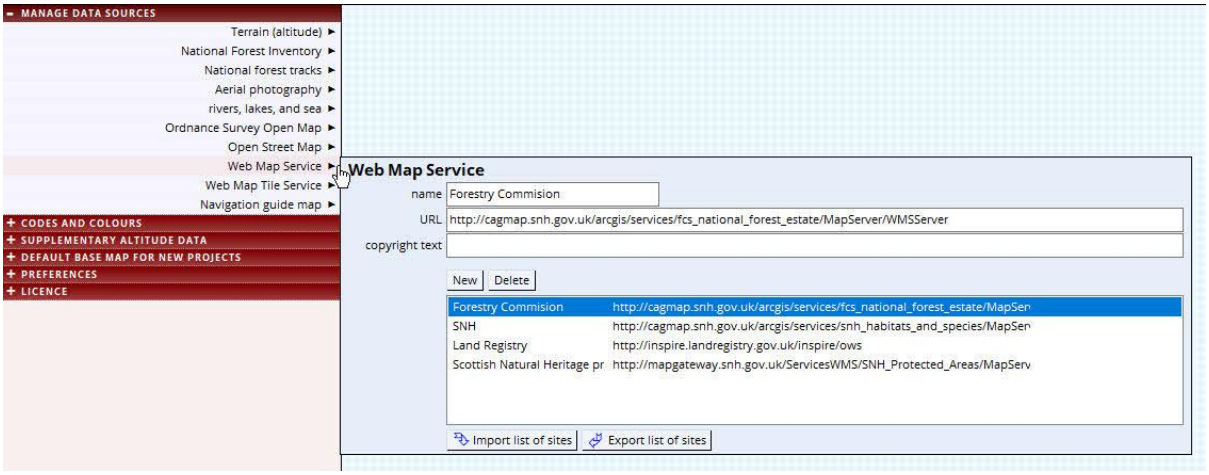
- **Use Web Map Tile Service (WMTS).** This is the recommended option. If you choose this option then you need to specify the URL of a Web Map Tile server. The URL must use the so-called “restful protocol”. There are a number of sites publicly available but they may be subject to copyright restrictions. It is the user’s responsibility to ensure that these are complied with.
- **Use single ECW image.** If you already have aerial photography in the form of an ECW file then this can be selected.
- **Use directory of image tiles (jpg, tif, or ecw).** If you have calibrated jpg or tif tiles, or a number of ecw files (these are always calibrated) then the directory can be selected.

The “**rivers, lakes, and sea**” dataset is an extract from the Ordnance Survey’s “zoomstack” dataset. It can be downloaded and installed from the Map Maker web site. It can be useful to use with terrain shading where you are not also using a map, such as Open Street Map, or Ordnance Survey OpenMap, as a background.

“**Ordnance Survey Open Map**” uses a predefined URL which does not have a key, meaning it does not make use of the most detailed data (i.e. MasterMap). If you have your own URL with a key then you may prefer to use that.

“**Open Street Map**” also uses a predefined URL. With both Open Street Map and Ordnance Survey Open Map you can specify a period of days after which tiles should be refreshed, in case there have been updates.

You can specify a **Web Map Service (WMS).** To use WMS requires a consistently reliable web connection and Web Map service which is reliable. You can specify any number of WMS sites. Click on the “New” button then give the site a name and the appropriate URL. If need be you can enter a copyright text.

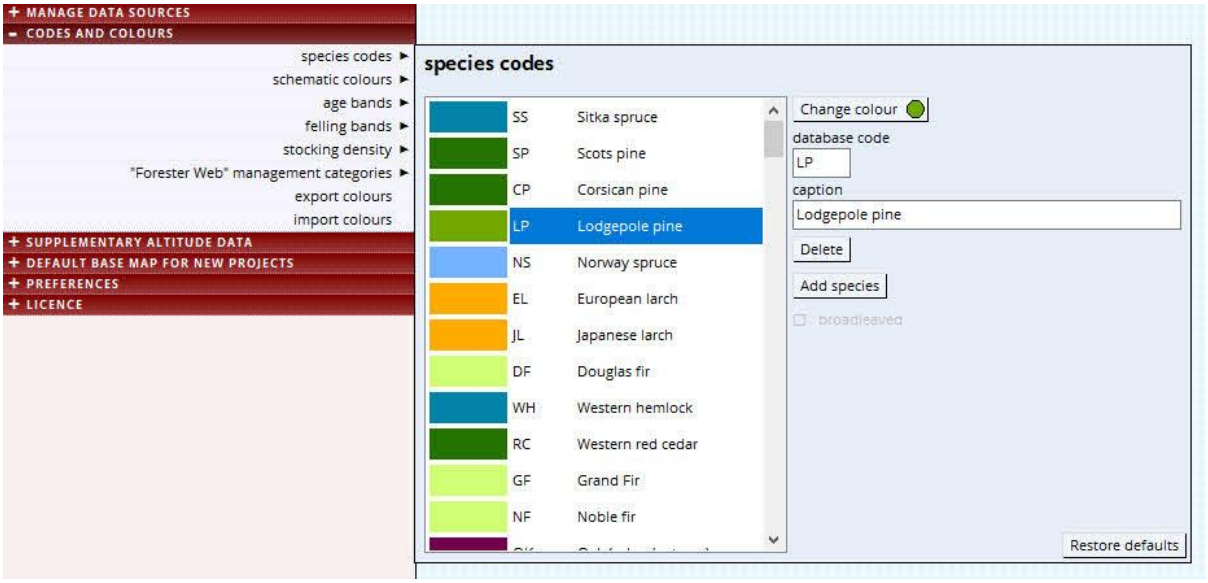


Similarly you can use a **Web Map Tile Service (WMTS)**. An advantage of using WMTS rather than WMS is that the downloaded tiles are stored in a database file so next time the map is drawn the downloaded tile is used rather than the tile being downloaded again. With WMS the image has to be downloaded every time it is redrawn.

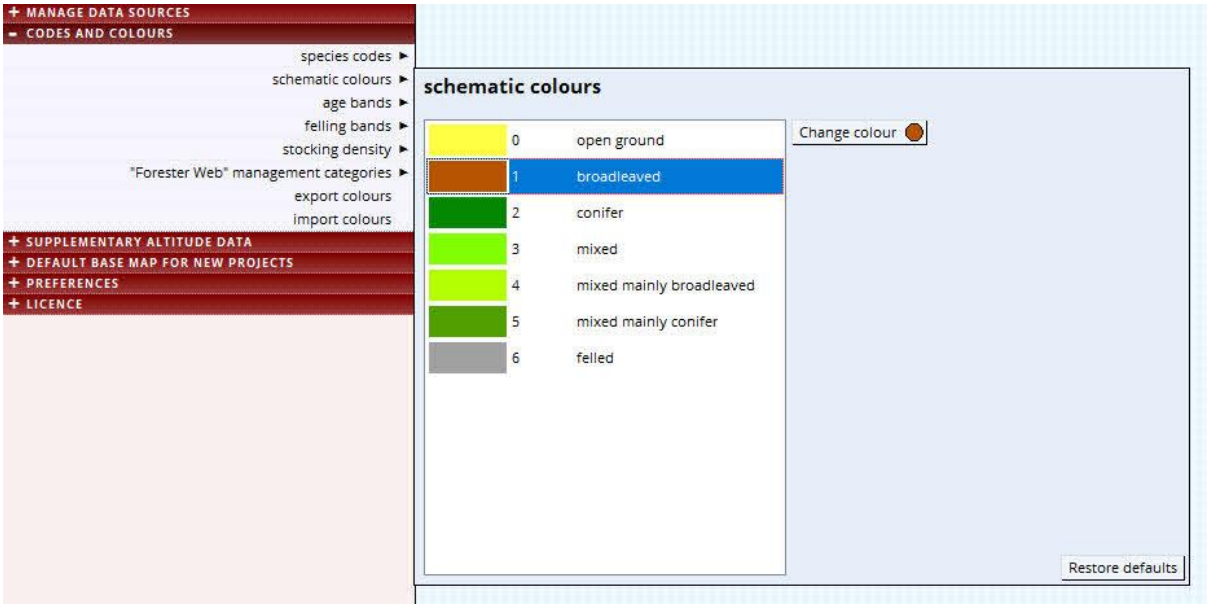
Finally, the Navigation Guide Map settings allow you to specify what kind of background imagery is used in the guide map used in the “navigate” panel on the “Map” page. The choices are “none”, “Open Street Map”, or “Ordnance Survey Open Map”.

Codes and colours

The woodlands layer makes use of various codes and corresponding colours. Prospect is preloaded with a default set but these can be edited. For the **species codes** you can add or delete species and change a species name, colour, and database code.



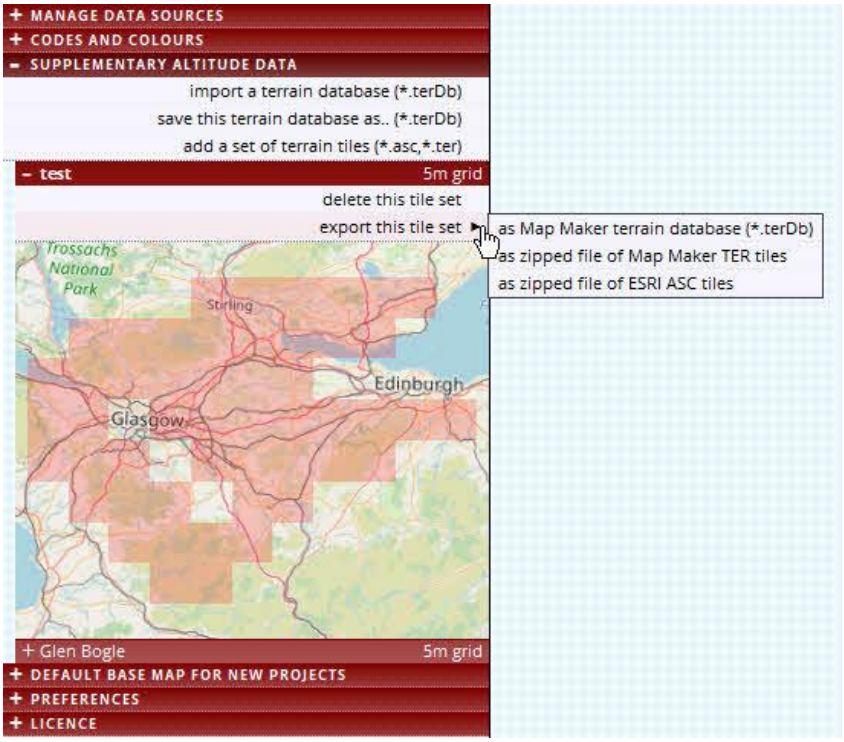
With **schematic colours** the available categories are fixed but the colours can be modified:



The same applies to **age bands**, **felling bands**, **stocking density**, and **"Forester Web" management categories**.

Supplementary altitude data

The terrain data for Great Britain uses a 50 metre grid of altitude values based on the Ordnance Survey Terrain50 dataset. However, if you have access to more detailed gridded terrain data then you can import that data. When Prospect looks for altitude values it will first look for any such imported data and only when it cannot find any will it revert to the 50 metre data.



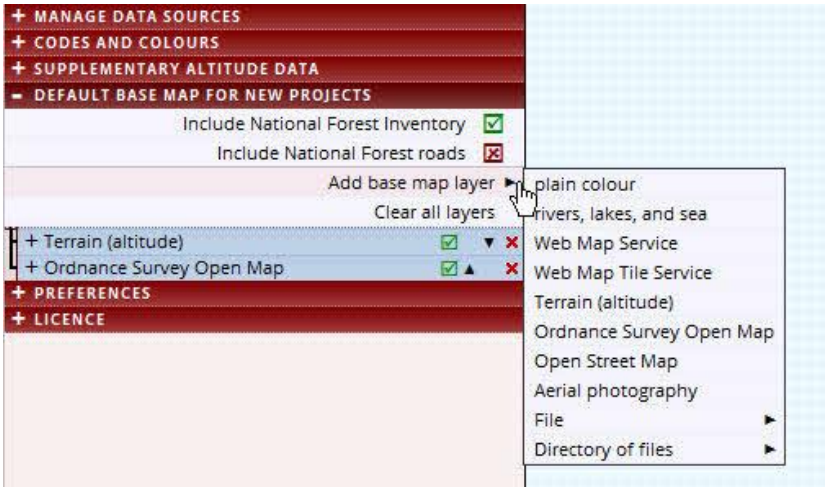
The data can either be imported as a Map Maker terrain database (*.terDb), or imported from a directory of terrain tiles, either Map Maker *.ter files or ESRI *.asc files.

Having imported a dataset a guide map displays the extent of the tiles that are in the dataset.

Default base map for new projects

When you create a new project you can save time by specifying here what should be included in every new project. If you have the National Forest inventory installed you can specify that it should be included as a feature layer.

Similarly you can include any of your available base map layer options.



Techie stuff

This section is for system administrators.

Prospect should run on any computer running Windows 10. There is no need for any special graphics card. We recommend 8Gb or more of RAM. Since this program is about creating images we recommend using an HD screen (1980 x 1080 pixels) but it will function on lower resolution displays. The amount of disk space required will depend largely on the geographical extent of the user's projects but expect to need a minimum of around 5Gb of disk space for the data.

All data in Prospect 3, other than log files, is stored in SQLite databases. Each Prospect project is a self-contained SQLite database with the file suffix "prospectDb".

The program file is called Prospect3.exe and is typically installed in:

"c:\Program Files\Map Maker\Prospect 3\"

All configuration files are stored in a sub-directory of the common app data directory, typically "c:\ProgramData\Map Maker\".

Common data

This configuration directory contains a sub-directory called "common data" which is used for large data sets shared by all users. This will automatically be created by the first user but it can be set up in advance and pre-loaded with common data, for instance:

The terrain data: "C:\ProgramData\Map Maker\common data\GBterrain.terDb"

Rivers, lakes, and sea: "C:\ProgramData\Map Maker\common data\GBwater.db"

Open Street Map cache: "C:\ProgramData\Map Maker\common data\osm.db"

Ordnance Survey Open Map cache: "C:\ProgramData\Map Maker\common data\openmap.db"

User data

For each user there is sub-directory with the same name as the Windows user name. Below this there is a sub-directory called "Prospect 3", so typically:

"c:\ProgramData\Map Maker\<user name>\Prospect 3\".

This directory contains dynamic data such as the currently opened project:

"C:\ProgramData\Map Maker\<user name>\Prospect 3\current.prospectdb"

In the event of a bad failure where Prospect will not even open the first thing to try is deleting this file.

Below this directory there is a sub-directory called “log” and beneath that another called “archive”, e.g.

“C:\ProgramData\Map Maker\<user name>\Prospect 3\log\”.

“C:\ProgramData\Map Maker\<user name>\Prospect 3\log\archive\”.

These directories are all created automatically when the program is first run by the user.

A log of the last run session is in:

“c:\ProgramData\Map Maker\<user name>\Prospect 3\log\log.txt”.

Time-stamped logs of all session in the previous 30 days, including the most recent session, is stored in the archive directory.

Appendix: Tree codes recognised in Prospect

SS Sitka spruce
SP Scots pine
CP Corsican pine
LP Lodgepole pine
NS Norway spruce
EL European larch
JL Japanese larch
DF Douglas fir
WH Western hemlock
RC Western red cedar
GF Grand Fir
NF Noble fir
OK Oak (robur/petraea)
BE Beech
BI Birch (downy/silver)
PO Hybrid poplar
IAR Italian alder
CAR Common alder
GAR Grey alder
RAR Red alder
AR Alder
VAR Green alder
FAM White ash
FAN Narrow-leafed ash
AH Ash
FPE Red ash
FOR Oriental beech
BPA Paper-bark birch
SBI Silver birch
PBI Downy birch
XBI other birches
HBM Hornbeam
BOX Box
WCH Wild cherry/gean
BCH Bird cherry
PSP Blackthorn
XCH other cherry spp
HCH Horse chestnut
SC Sweet chestnut
SEM Smooth-leaved elm
WEM Wych elm
EEM English elm
EM Elm
EGU Cider gum
ENI Shining gum
XEU other Eucalyptus
HAZ Hazel
HOL Holly species
SLI Small-leaved lime
CLI Common lime
LLI Large-leaved lime
LI Lime
FM Field maple
AMA Big leaf maple
NOM Norway maple
SY Sycamore
ASA Silver maple
RAN Raoul/rauli
RON Roble
NPU Lenga
XNO other Nothofagus
QAL White oak
ROK Red oak
QCE Turkey oak
QFR Hungarian oak
QIL Holm oak
SOK Sessile oak
QPU Downy oak
QPY Pyrenean oak
POK Pedunculate/common oak
XOK other oak spp
XB other broadleaves
MB Mixed broadleaves
XPL Plane spp
LPL London plane
WPO White poplar
GPO Grey poplar
BPO Black poplar
XPO other poplar spp
ASP Aspen
HAW Hawthorn species
CAP Crab apple
WHI Whitebeam
ROW Rowan
WST Wild service tree
TUL Tulip tree
COV Shagbark hickory
JNI Black walnut
JRE Common walnut
XWA other walnut
WWL White willow
GWL Goat willow
SCI Grey willow
CWL Crack willow
XWL other willows
CAT Atlas cedar
LCD Cedar of Lebanon
XCD other Cedar
LC Lawsons cypress
LEC Leyland cypress
ESF European silver fir
RF Red (pacific silver) fir
BMF Bornmullers fir
GKF Grecian fir
NMF Nordmann fir
XF other firs (Abies)
XL other larches
HL Hybrid larch
XC other conifers
MC Mixed conifers
PAR Armand's pine
PAY Mexican white pine
PBR Calabrian pine
PEL Slash pine
PKO Korean pine
PMO Western white pine
BIP Bishop pine
AUP Austrian pine
MCP Macedonian pine
MAP Maritime pine
PDP Ponderosa pine
RAP Monterey pine
XP other pines
WEP Weymouth pine
PTA Loblolly pine
MOP Mountain pine
PWA Bhutan pine
PYU Yunnan pine
JCR Japanese cedar
RSQ Coast redwood
WSQ Wellingtonia
OMS Serbian spruce
ORS Oriental spruce
XS other spruces
YEW Yew
NMB Native mixed broadleaves
XNB Other native broadleaves
OPEN Open ground
CLEAR Clear felled