

UNIVERSITY OF SOUTHAMPTON

COMP2211: Software Engineering Group Project

RUNWAY REDECLARATION TOOL USER GUIDE

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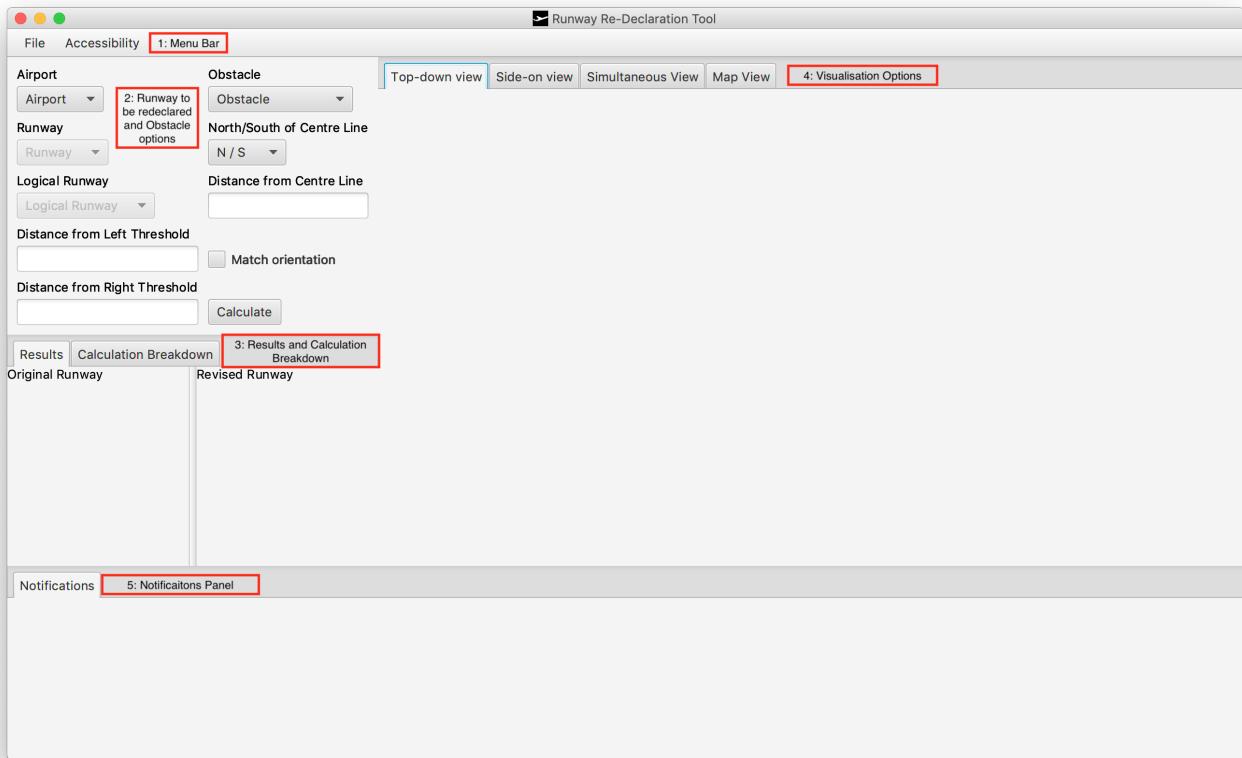
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1 Introduction

Welcome to the user guide for the **Runway Redeclaration Tool**. This tool has been developed to be used on **commercial UK airport runways** by runway personnel, providing the users an efficient calculated breakdown, redeclaration of runway parameters and visualisation of the redeclared runway in the event of an obstacle obstruction on a runway. This tool allows its users to be able to make a more informed decision with its outputs, which in turn will also ease some of their stress. (*The calculations and process used to determine and redeclare runway parameters by the tool comply with the regulations specified by the Civil Aviation Authority.*)

2 General UI Breakdown

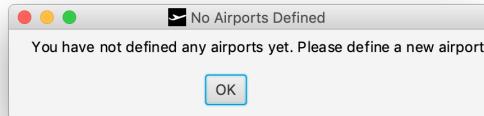
The main window of the tool is shown below with numbered annotations showing the different sections of the main window.



- 1. Menu Bar:** The user can navigate the tool through the "File" and "Accessibility" menu options. The "File" tab allows a user to define a new airport, runway or obstacle; it also allows for the importing and exporting of .xml files and the exporting or printing of a runway view. The "Accessibility" tab allows the users switch between a range of colour blind settings.
- 2. Runway and Obstacle Options:** Here the user chooses which airport, runway and logical runway is to be redeclared after choosing the obstacle obstruction and its location on the runway.
- 3. Results and Calculation Breakdown:** Here the user can choose to be shown either the parameters of the revised runway compared to it's original parameters, or a calculation breakdown of the revised runway's new parameters.
- 4. Visualisation Options:** Here the user can select how the runway visualisation is to be shown, there are four options consisting of top-down view, side-on view, simultaneous view and the map view.
- 5. Notifications Panel:** Here the user will be shown a log of notifications with timestamps, indicating actions the user has taken.

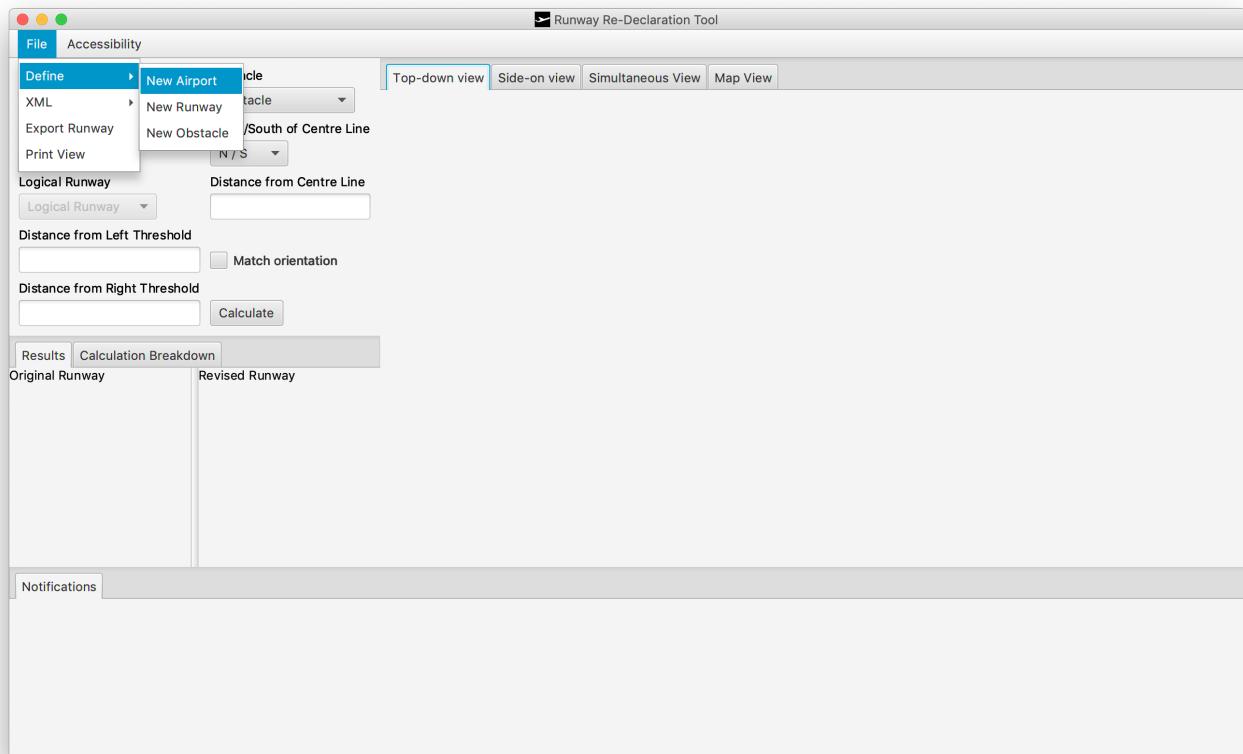
3 First Using the Tool

Upon initially opening the tool, the user is first prompted to define a new airport.

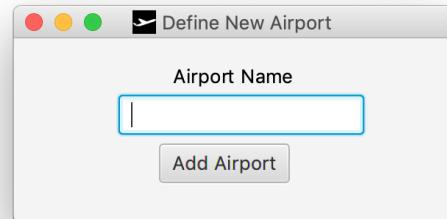


4 Defining a New Airport

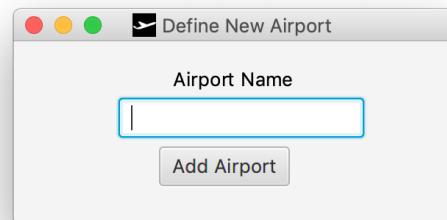
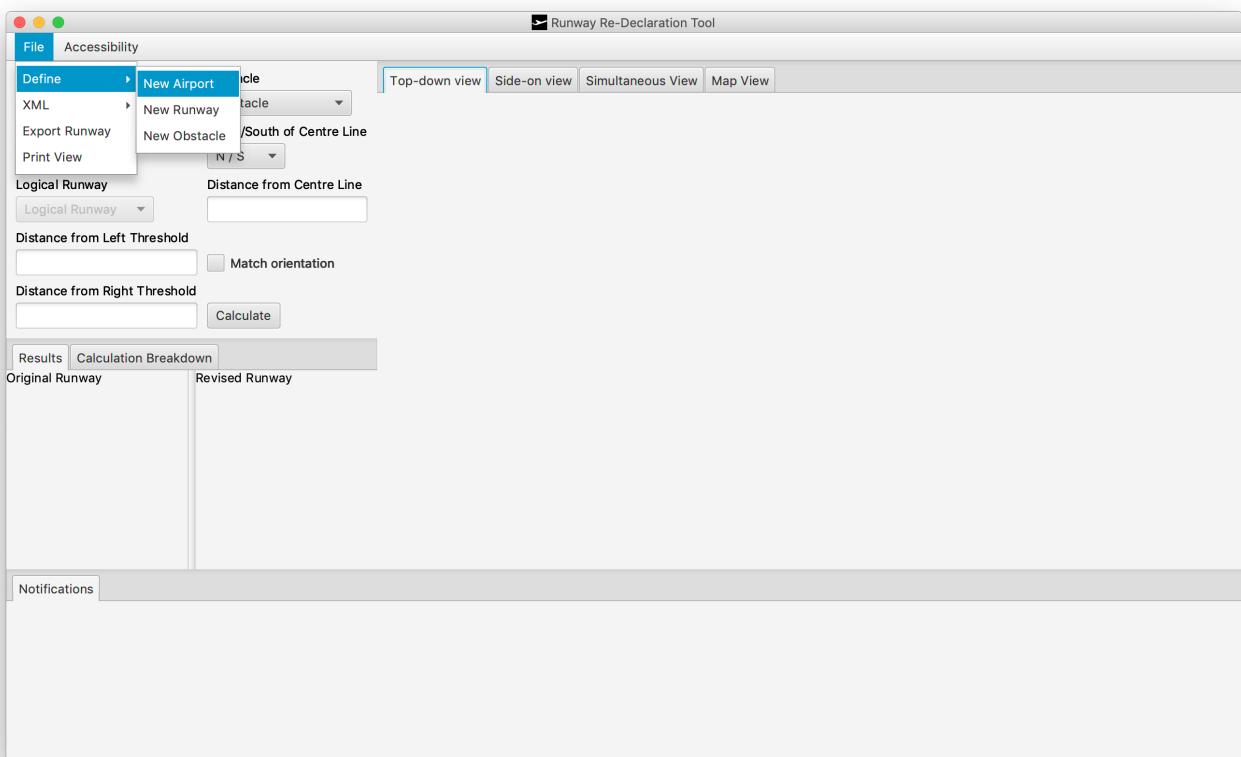
To define a new airport, the user must navigate to the "Define" option and select "New Airport" from "File" in the menu bar. Once at the "Define New Airport" window, the user must enter the name of the airport they wish to define.



New Airport Menu Option

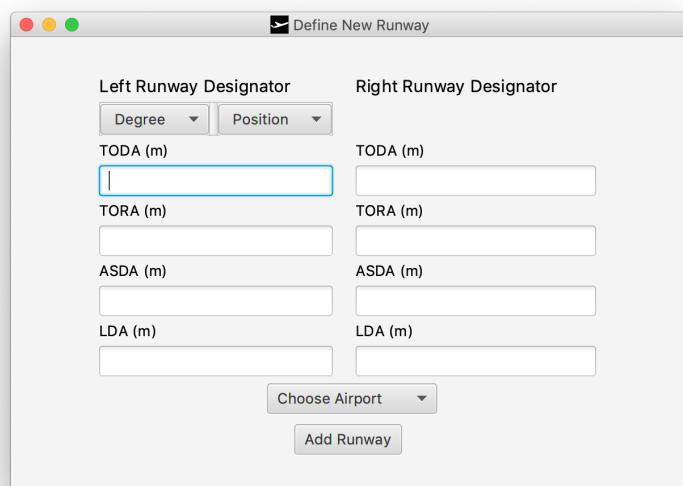
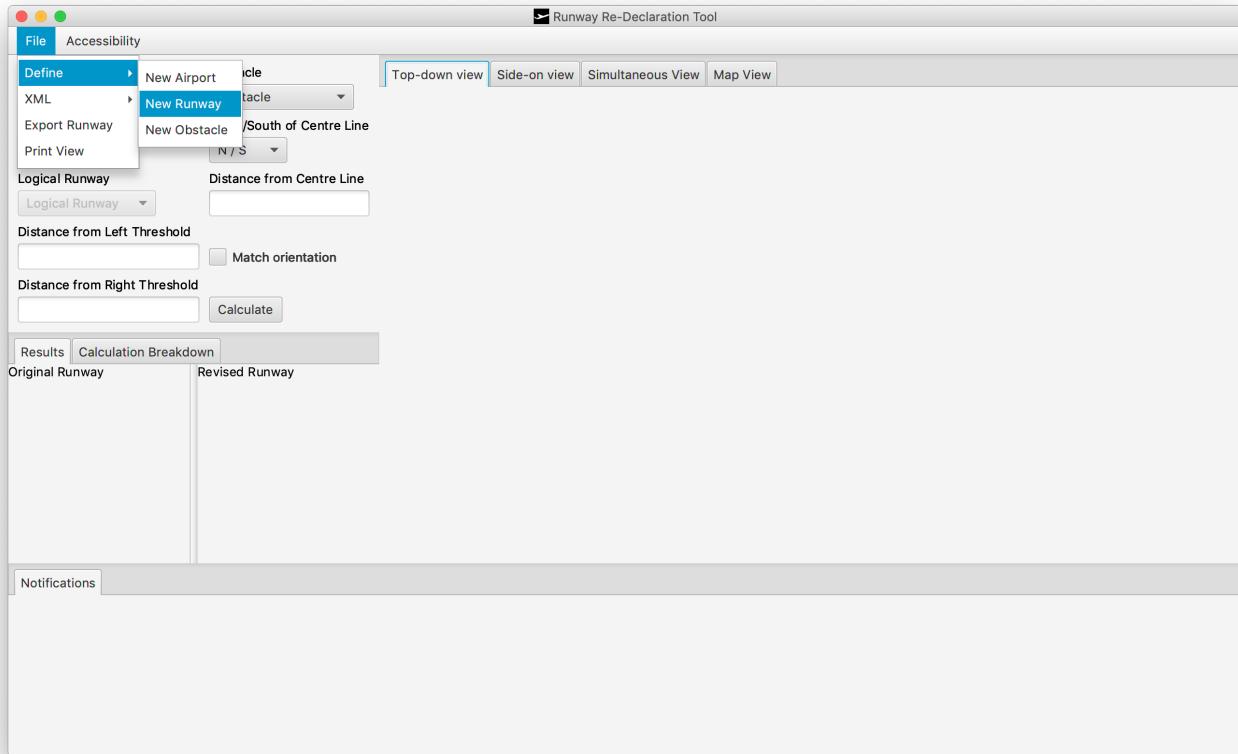


New Airport Definition Window



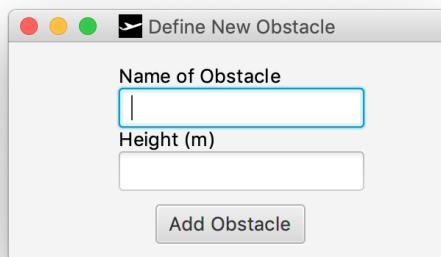
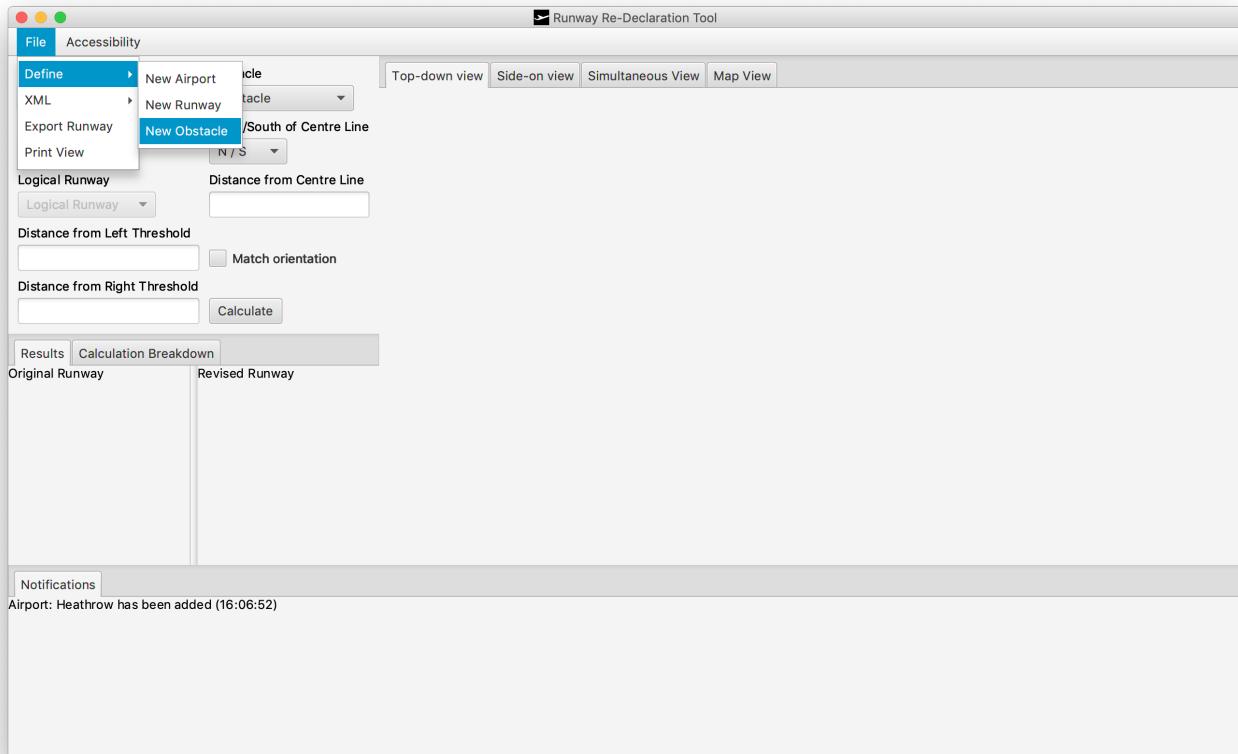
5 Defining a New Runway

To define a new runway, the user must navigate to the "Define" option and select "New Runway" from "File" in the menu bar. Once at the "Define New Runway" window, the user must select the airport they wish to add the runway to, the degree and position of the "Left Runway Designator" from the drop down menus and then fill in the runways' parameters.



6 Defining a New Obstacle

To define a new obstacle, the user must navigate to the "Define" option and select "New Obstacle" from "File" in the menu bar. Once at the "Define New Obstacle" window, the user must enter the name of the new obstacle they wish to define and the height (in metres) of the obstacle.



7 Redeclaring a Runway

To redeclare a runway, the user must input the airport of the runway, the runway and the logical runway they wish to redeclare, as well as the obstacle obstruction and it's position on the runway, and then press **"Calculate"**. The **"Match orientation"** checkbox automatically rotates the visualised runway strip to match it's compass heading.

Airport Heathrow	Obstacle Obstacle1(12m)
Runway 09L/27R	North/South of Centre Line N
Logical Runway 09L	Distance from Centre Line 0
Distance from Left Threshold -50	<input type="checkbox"/> Match orientation
Distance from Right Threshold 3546	<input type="button" value="Calculate"/>

8 Results and Calculation Breakdown

The **"Results"** tab shows the user a data comparison of the redeclared runways new paramaters and it's original parameters. The **"Calculation Breakdown"** tab shows a breakdown of the calculations used to obtain the new parameters of the redeclared runway.

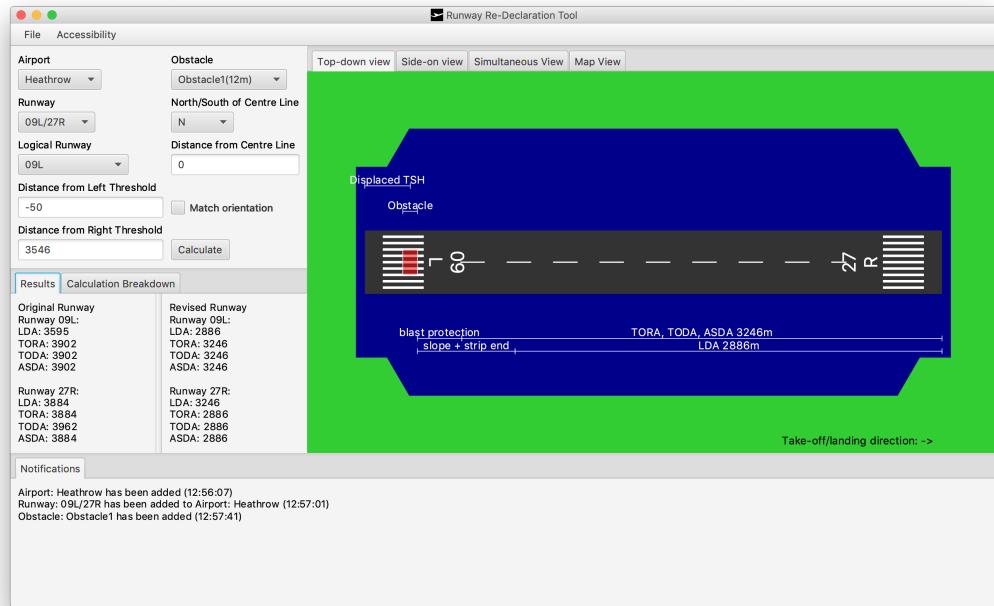
Results		Calculation Breakdown
Original Runway Runway 09L: LDA: 3595 TORA: 3902 TODA: 3902 ASDA: 3902	Revised Runway Runway 09L: LDA: 2886 TORA: 3246 TODA: 3246 ASDA: 3246	Runway 09R: LDA: Original LDA (3595) - Distance From Threshold (-50) - Slope Calculation (600) - Strip End (60) = 2886 TORA: Original TORA (3902) - Blast Allowance (300) - Distance From Threshold (-50) - Displaced Threshold (307) = 3246 TODA: Revised TORA (3246) + Clearway (0) = 3246 ASDA: Revised TORA (3246) + Stopway (0) = 3246
Runway 27R: LDA: 3884 TORA: 3884 TODA: 3962 ASDA: 3884	Runway 27R: LDA: 3246 TORA: 2886 TODA: 2886 ASDA: 2886	Runway 27L: LDA: Distance From Threshold (3546) - RESA (240) - Strip End (60) = 3246 TORA: Distance From Threshold (3546) - Slope Calculation (600) - Strip End (60) = 2886 TODA: Revised TORA (2886) = 2886 ASDA: Revised TORA (2886) = 2886

Results Data Comparison

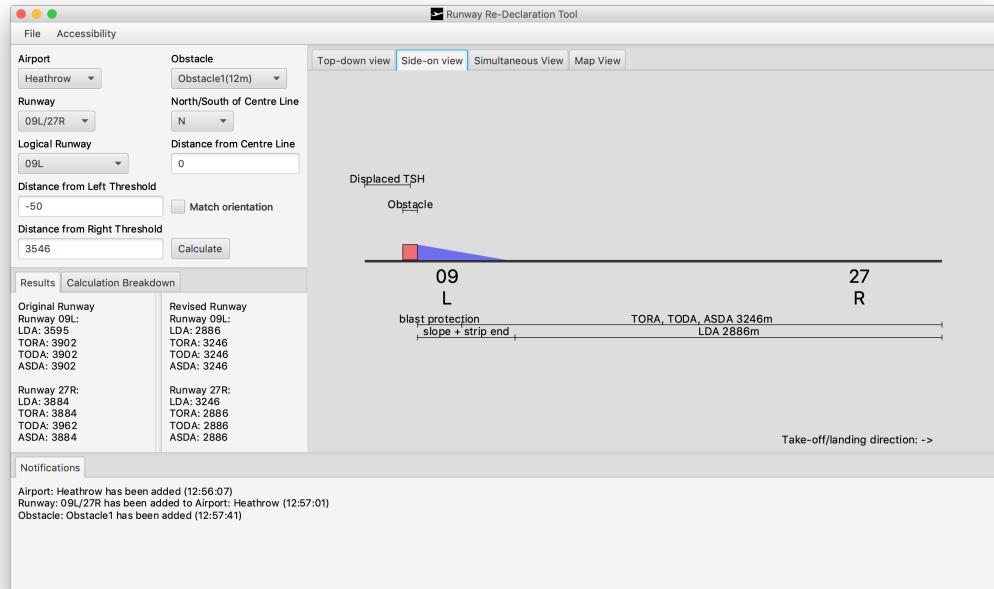
Calculation Breakdown

9 Visualisations

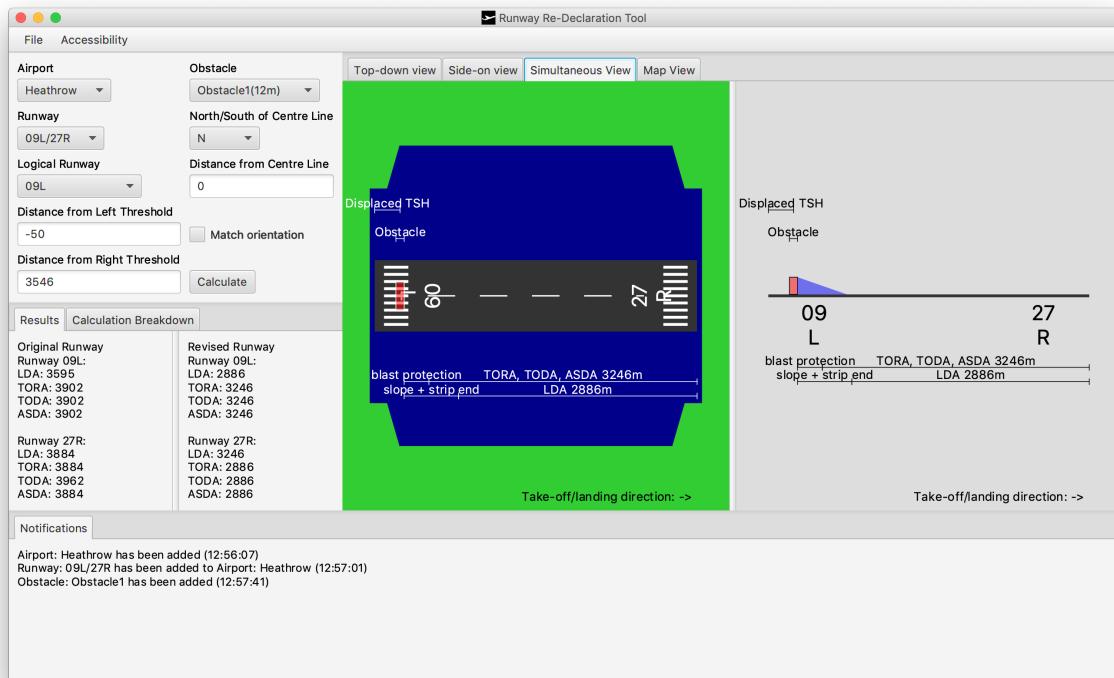
Once a runway has been redeclared after pressing "Calculate", the new reddeclared runway is shown to the user via a visual representation. The visualisations tab allows the user to select a visualisation option of their choice to visualise the redeclared runway.



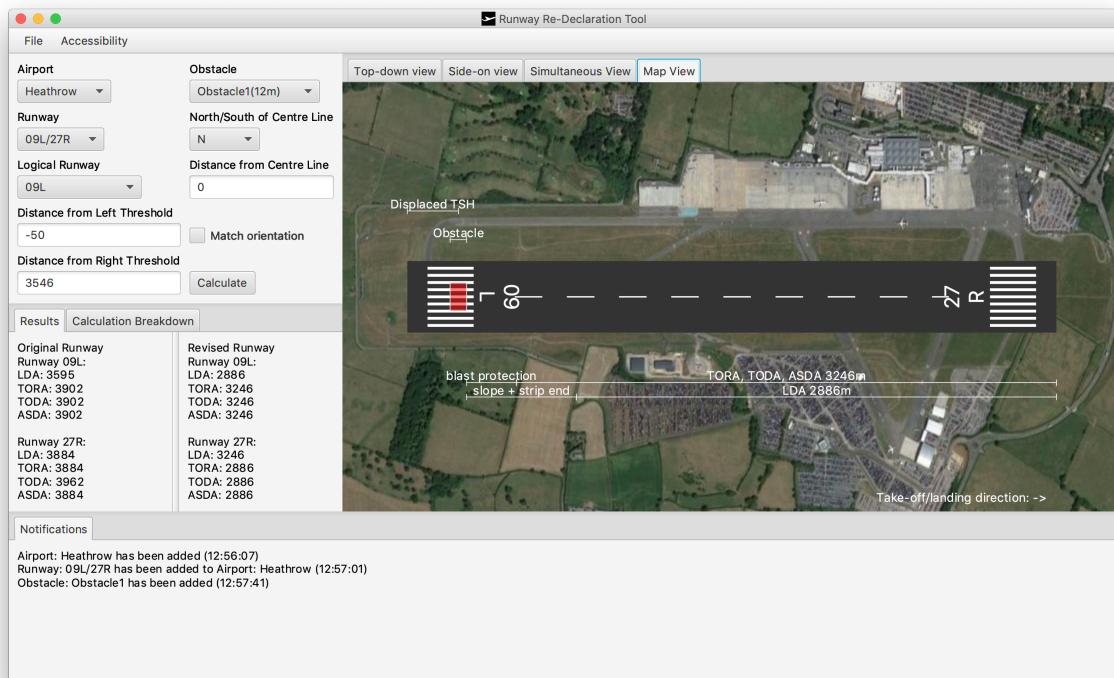
Top-down view



Side-on view



Simultaneous view

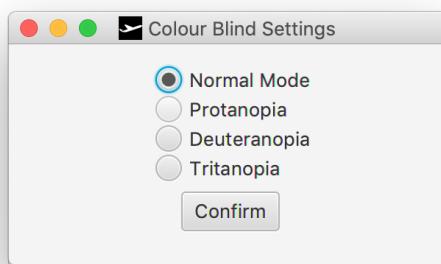
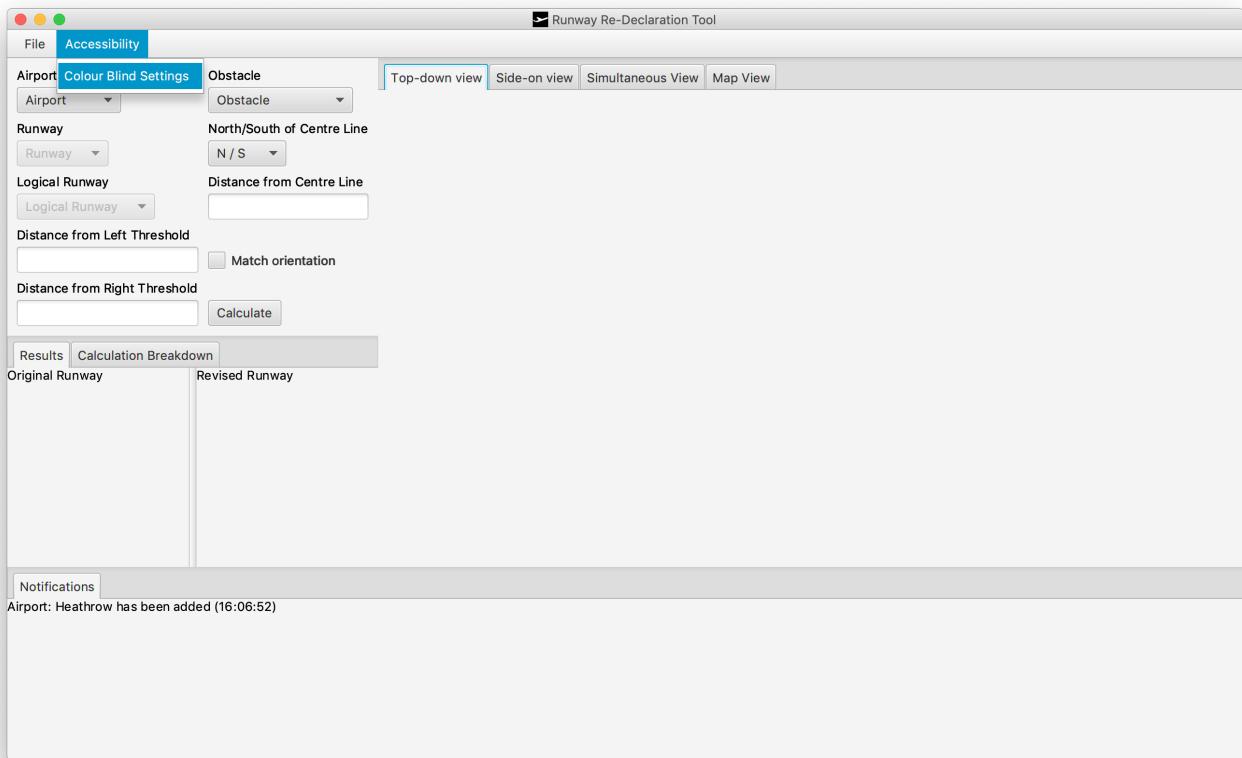


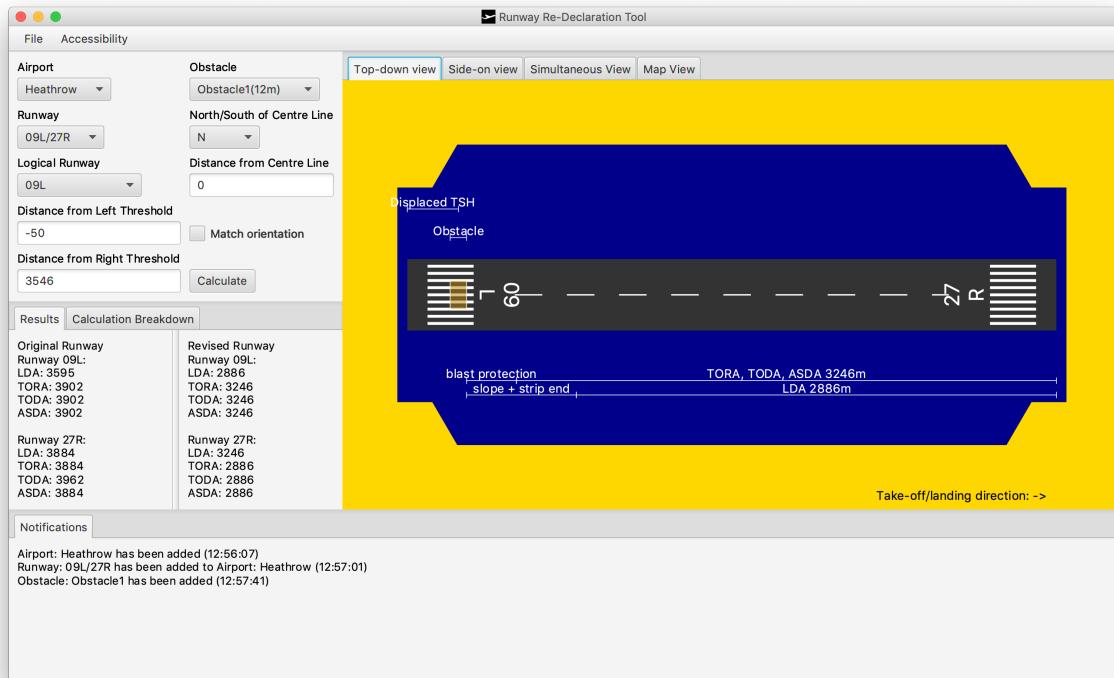
Map view

9.1 Accessibility

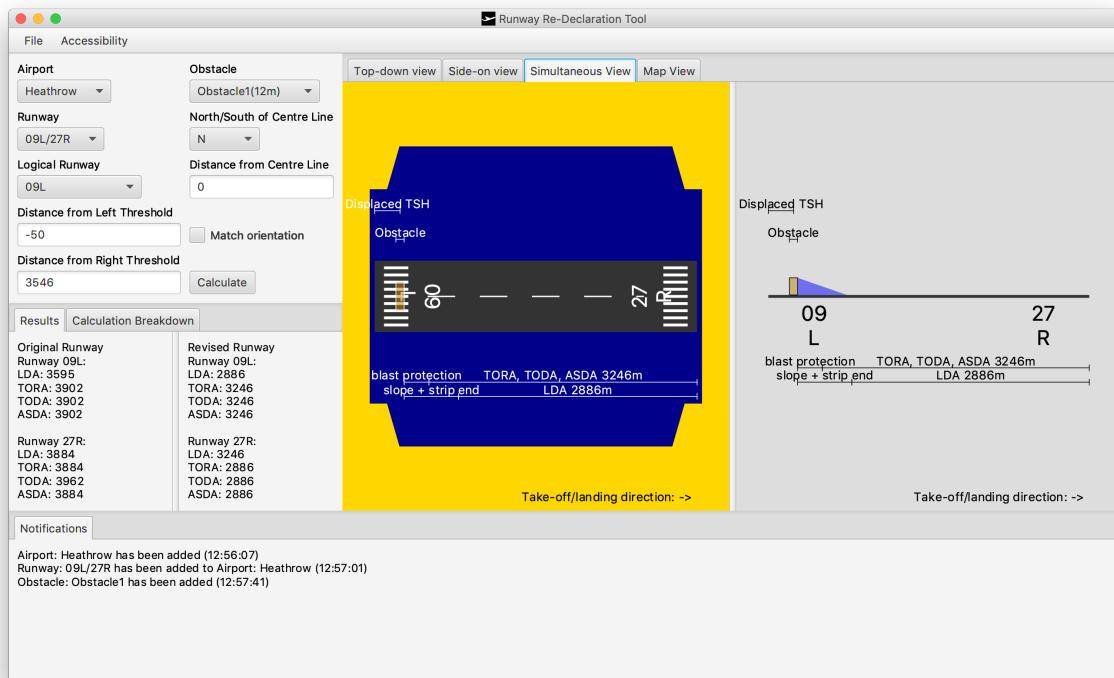
9.1.1 Colour Blind Settings

The tool includes 4 different colour schemes in order to help accommodate different types of colour blind users. The colour schemes being **Normal Mode**, **Protanopia**, **Deuteranopia** and **Tritanopia**. These colour schemes can be chosen after the user navigates to "Colour Blind Settings" accessed through the "Accessibility" option on the menu bar.

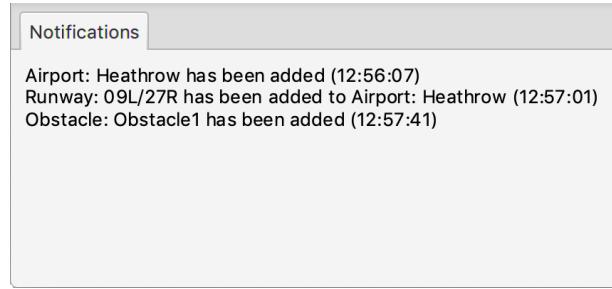




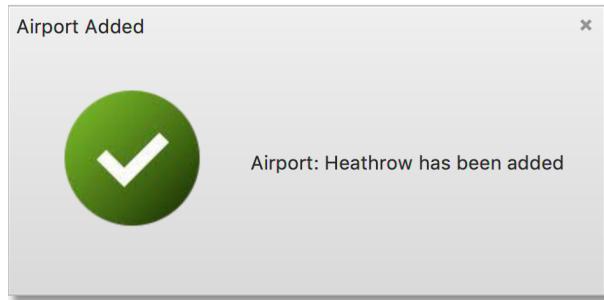
Example of the Protanopia Colour Scheme shown on a Top-down view visualisation



Example of the Protanopia Colour Scheme shown on a Simultaneous view visualisation



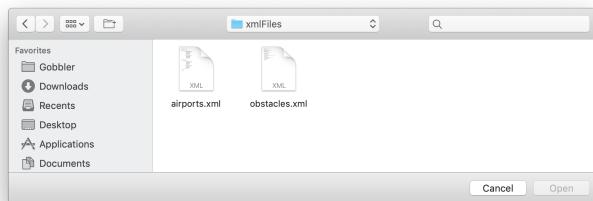
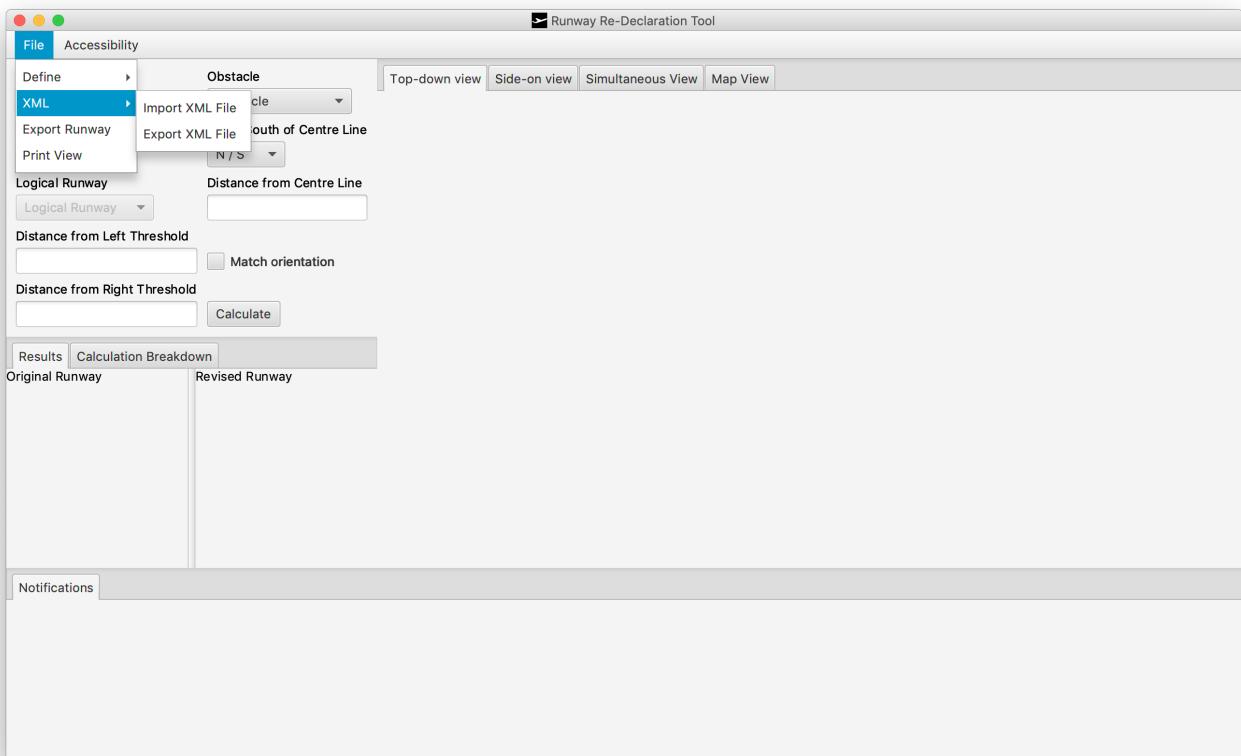
9.2 Notification Pop Ups



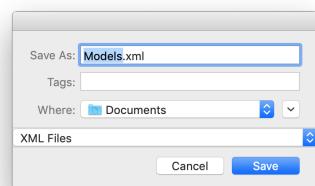
10 XML Files

The user may choose to import and export **.xml** files. Importing **.xml** files allows the user to import airports and obstacles that may have already been predefined elsewhere. Exporting **.xml** files allows the user to export the airports and obstacles they have already defined within the tool.

To import or export **.xml** files the user must navigate "XML" option and select "**Import XML File**" or "**Export XML File**" from "**File**" in the menu bar.



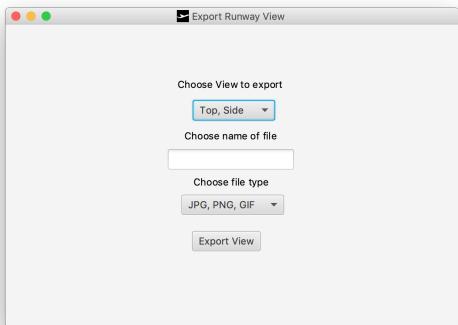
Importing XML Files



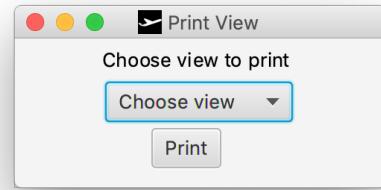
Exporting XML Files

11 Exporting and Printing Runway View

The user may choose to export the runway visualisation chosen as a .jpg, .png or .gif file or may choose to print off the visualisation chosen. The "Export Runway" and "Print View" options can be accessed through the "File" option on the menu bar.



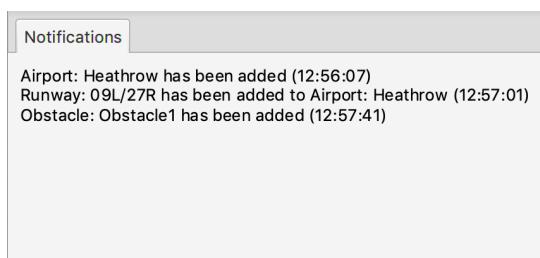
Export Runway View



Print Runway View

12 Notifications

The notifications panel found at the bottom of the tool's interface shows a log of notifications that are time stamped indicating actions the user has taken. Notification pop ups occur at the bottom right of the tool once the user has successfully taken an action using the tool, these pop ups disappear after a few seconds.

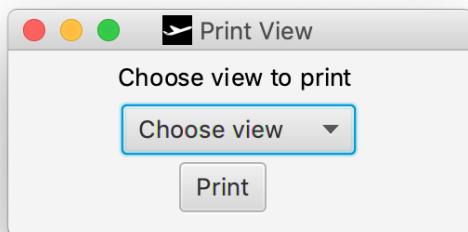


Notifications Log



Notification Pop Up

13 Printing Runway View



14 FAQ

1. **Q.** Can a new airport be defined with a name that is already in use? **A.** No, whenever defining a new airport it has to have its own unique name and one that is not already in use.
2. **Q.** Can any numbers be used for the measurements when defining a new runway? **A.** No, firstly, only positive values are allowed and the measurements inputted have to follow the specification. For an example, the value of ASDA has to be greater than TORA .
3. **Q.** Why are there two new logical runways when a new runway has been defined? **A.** Each runway has two logical runways, for example, if you were to create 01L its 180 degree counterpart 19R will also be created.
4. **Q.** Can an obstacle with the same name be added more than once? **A.** Yes, an obstacle with the same name can be added multiple times, provided its dimensions are different from the already defined obstacle.
5. **Q.** Can a logical runway be added to an airport with an identical runway that already exists? **A.** No, the user cannot add the same runway to an airport more than once.
6. **Q.** Is there a limit for the dimensions of an obstacle? **A.** Yes, any new obstacle defined must have a height of more than 0m and less than 101m.
7. **Q.** How should I place an obstacle that occurs before the left threshold? **A.** To place an obstacle that occurs before the left threshold you should input the distance of the obstacle from the left threshold as a **negative integer value** e.g. -50 would place an obstacle 50 metres before the left threshold.
8. **Q.** How should I place an obstacle that occurs after the right threshold? **A.** To place an obstacle after the right threshold you should input the distance of the obstacle from the right threshold as a **negative integer value** e.g. -50 would place an obstacle 50 metres after the right threshold.

15 Known Issues

1. If an obstacle is too close to a runway threshold, the distance from threshold marker will overlap with the obstacle marker on the runway visualisation.
2. A runway visualisation may be incorrectly represented if the input data passed as the runway redeclaration calculation parameters are "physically impossible". In these cases, the tool should instead throw an error and not display the results/visualisation until it has been rectified.