

Diligence for Excel™



Software Manual

Diligence version 3



Clicking the item of interest from the 'Contents' list will navigate directly to the relevant chapter / page.

Contents

Diligence for Excel™	1
Software Manual	1
Overview & Scope	7
Installation	7
System Requirements	8
Error Handling; Required Excel Setting	9
Access to the VB Project	11
Manual Calculation	12
Large Worksheet Warnings (Duration & Memory Limits)	14
Diligence File Size Limit: Implications on Support	16
Hyperion™ or FactSet™ Functionality: Implications on Support	18
Working with Workbooks & Environments Containing Macros	18
Version & Licensing Information	20
Compliance Functions	21
The Table of Contents (ToC) Worksheet	22
Installing a Table of Contents	22
Simple ToC Example	23
Understanding the ToC's Automated Fields	25
File Complexity	25
Visible Worksheets	25
Hidden Worksheets	29
Links & References to Other Files or Data	29
Run-Time References	31
Access to VB Project Denied	31
Macros & VBA	32

Standard vs. Extended Table of Contents	34
Completing the ToC's User-Defined Sections.....	35
Automatic Recording of Structural Changes	46
ToC User-Field Changes Logged	52
Workbook Structure or Content Changes Logged	49
Advanced ToC Usage.....	53
Mandatory ToC Fields.....	53
Table of Contents Userform Options.....	53
Option to Record Structural Changes	56
File Size & Processing Time	58
Location of the Table of Contents Worksheet.....	59
Removing the Table of Contents Worksheet.....	59
Limitations, Issues & Tips.....	60
VBA is Password Protected.....	60
File Structure Protected	61
Read-Only Files.....	61
Hidden Protected Formulae	62
Formulae Referencing Other Workbook: Open vs. Closed Files ...	63
Tests for Non-Compiled Workbooks and File Corruption.....	64
Too Many Cell Formats.....	66
Other Limitations & Issues	67
FAQ.....	69
Professional Tips	70
Table of Contents: Further Reading & Associated Articles.....	71
Full List of ToC Fields	71
Workbook, Worksheet & Formula Complexity Algorithms	75
Typical workbook complexity scores	76
Formula Map	80
Creating A Formula Map	80

Map a Single Worksheet or All Populated Worksheets	81
Simple Formula Map Example	82
Understanding the Formula Map	82
Formula Map Key	84
Using a Formula Map as Test Evidence	85
Additional Details	86
Formula Map Options	86
Formula Map Batch Processing	88
Limitations.....	90
Most Asked Questions.....	91
Professional Tips	91
Analyse Workbook.....	92
Summary Sheet	94
ToC Sheet	95
Health and Risk Sheet.....	95
Noteworthy Sheet	97
Dependencies Sheet.....	104
Formulas Sheet & Formulas by Region Sheet	107
Governance Functions	113
My Inventory	113
Recent Files.....	115
Encrypted File List	118
Limitations.....	118
Enhanced-Search	119
Protect Worksheets	123
Unprotecting Worksheet(s).....	125
Diligence Protection & Unprotection Methodology	125
Archive File	126
Archive Options.....	130

Archiving Files with Event Macros.....	131
Archiving Files with Sheet AutoFilters	131
Governance Report.....	132
The Governance Report Summary Sheets	132
Latest Version Worksheet	133
Links Worksheet.....	133
References Worksheet	133
Changes Worksheets.....	133
Timeline Timesheet.....	133
Raw Data Worksheet.....	133
Comparison Functions	134
Comparing Cell Contents	134
Cell Comparison Options.....	136
Tips & Tricks	137
Comparing Worksheet Structure	139
Using the Function	140
Comparing Links, Macros & File Statistics.....	143
My Diligence	145
My Info Tab.....	145
My Inventory Tab.....	146
Utilities Tab.....	147
Unhide Everything.....	147
Clean Unused Ranges.....	147
Sanitise a workbook	149
Remove Superfluous Styles	150
Number by Colours	153
Data Retrieval Utility	154
Options Tab.....	154
Personal Information.....	154

Reporting Path	155
Logo.....	155
Contact Information Tab	156
5-Minute Guide Tab	156
Support & Self-Help Checks	157
Try it in a new instance of Excel	157
Are other addins or programs causing the problem?	157
Switch it off and on again!.....	157
Superfluous Styles?	158
Does the workbook compile?	159
Corrupted file?	160
Disable Macros / Macro Security Settings	161
Addendum	164
Limitations, Issues & Known Anomalies & Errors.....	164
General Limitation: Workbooks containing ‘Event’ macros	164
General Limitation: User Defined Functions.....	164
Limitation: Recent File List	165
Known Issue: Recent File List: Addins will not open when double- clicked from the recent file list.	166
Foreign Language Considerations.....	166
Training.....	166

Overview & Scope

Spreadsheet Due Diligence is essential in modern business. Diligence for Excel is a spreadsheet compliance and governance system & methodology based around Excel software on the Windows platform. This document covers usage of the Diligence for Excel software from a user viewpoint. Please see our training, reference and discussion material for details on how to best use the features described to help meet your particular organisation's spreadsheet compliance and governance policies.

Installation

We are very proud of our philosophy of non-interference, and for this reason Diligence for Excel is entirely self-contained. That is to say whilst Diligence is a fully functioning enterprise level solution, no system, or license, or user information is hidden or written to the registry, and the system can be removed in its entirety by simply removing the specific folder and sub-folders of its installation.

Three installation styles are available.

- Excel Consultant (No installation required)
- Single User Installation (Installed to separate PCs)
- Multi User Installation (Installed and accessed on a common server)

Each client individually dictates the installation type and whether or not users can delete their user data and/or Diligence installation.

Please consult your IT department or line manager for which particular installation and rights you possess. If you have not yet installed Diligence for Excel, please discuss with us which one is most suitable for your organisation, and also see the separate specific installation documentation.

System Requirements

The Diligence toolkit is a single Excel addin containing the ribbon and some small caller routines. It is supported by library files and templates required for each function. Diligence supports the following Excel versions on any appropriate Windows platform.

- Excel 2007 (32 bit)
- Excel 2010 32 bit / 64 bit
- Excel 2013 32 bit / 64 bit
- Excel 2016 32 bit / 64 bit

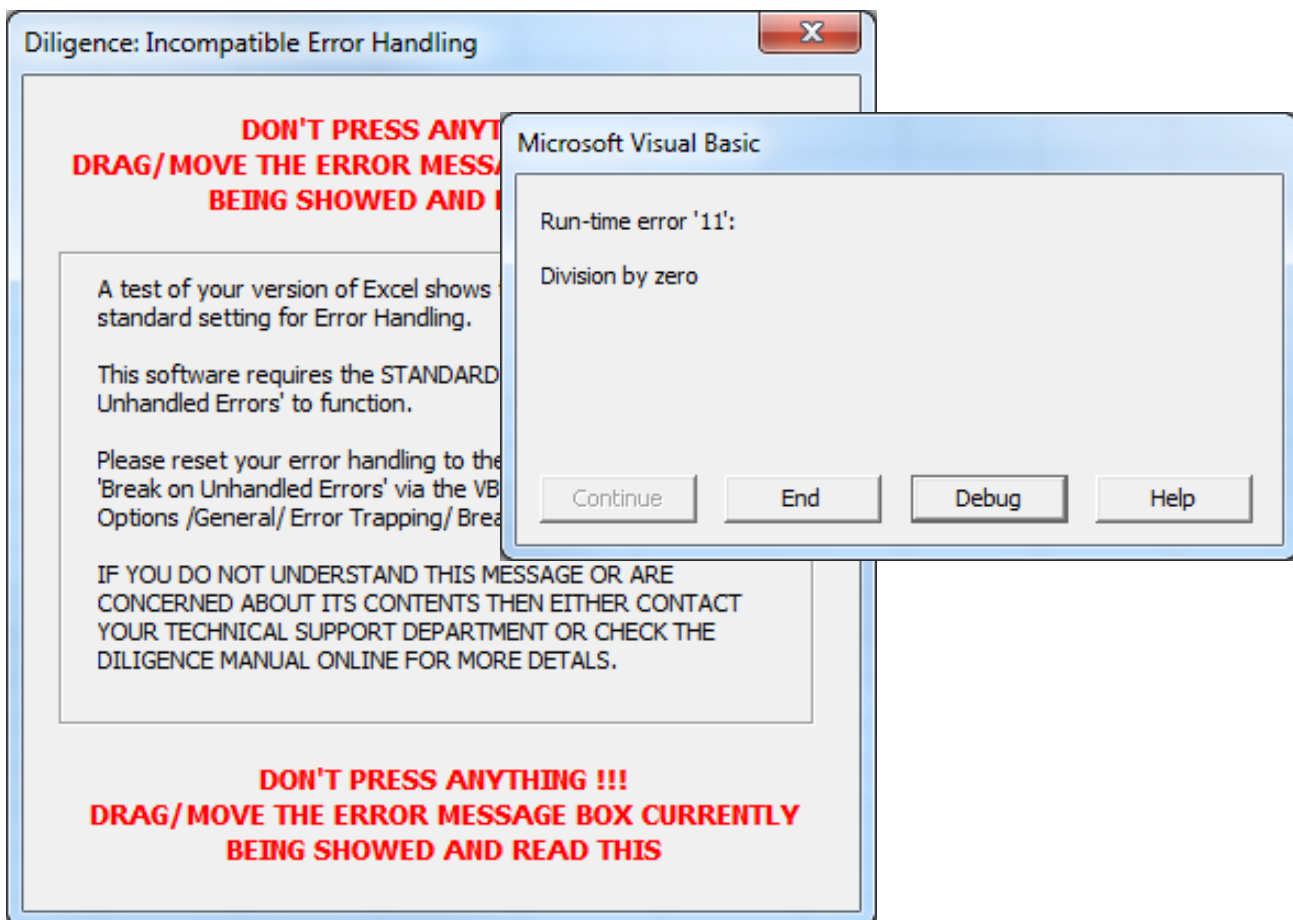
The system has a low overhead and therefore has no specific memory or processor requirements, although please be aware that analysis of large and/or complex workbooks may require significant time and proportion of available resources.

Error Handling; Required Excel Setting

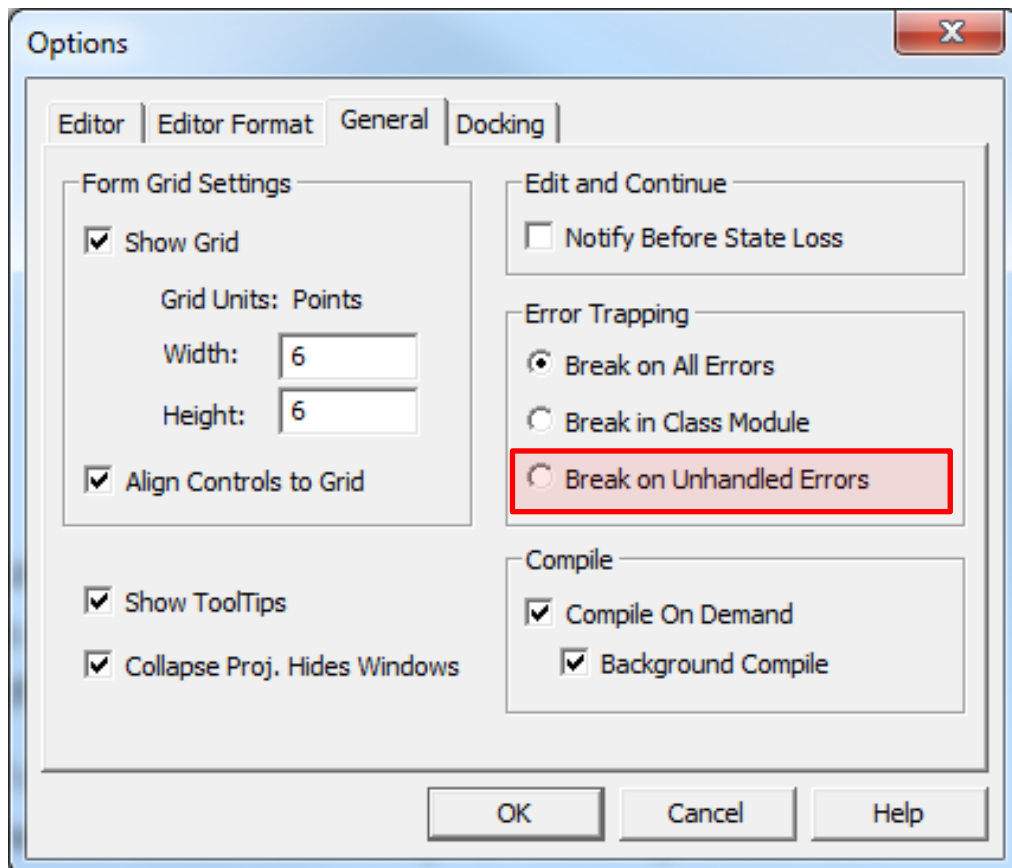
To function, Diligence requires the standard Excel Error Handling setting of 'Break on all Errors'. This is because Diligence checks the existence of various files and Excel objects about which it doesn't know the details in advance, and then handles any errors generated by the objects automatically.

The required setting is the default Excel setting, but it is sometimes changed by Excel developers or experts, usually whilst testing VBA/macros.

Diligence checks this setting when any Diligence ribbon button is pressed. If this setting is not as required, an alert is displayed as a userform, and due to the nature of Excel, a standard Excel (unhandled) error message is displayed on top....



Diligence cannot continue until this setting has been changed, which can be (re)set via the Visual Basic Editor either by pressing Alt-F11 from within Excel or (if available) from the 'Visual Basic' button on Excel's 'Developer' Tab by pressing Tools / Options / General ...



Access to the VB Project

Several of Diligence for Excel's key functions undertake thorough analysis of Excel workbooks. In order to check links, references and macros the system requires access to the VB Project, which is a setting in Excel's Options.

Diligence will still function without VB Project access, but the system's compliance functions will not be able to deliver the full level of detail necessary for most spreadsheet policies & any complexity scores will likely be elevated due to Diligence 'assuming the worst' for any aspect of the file it has been denied from analysing.

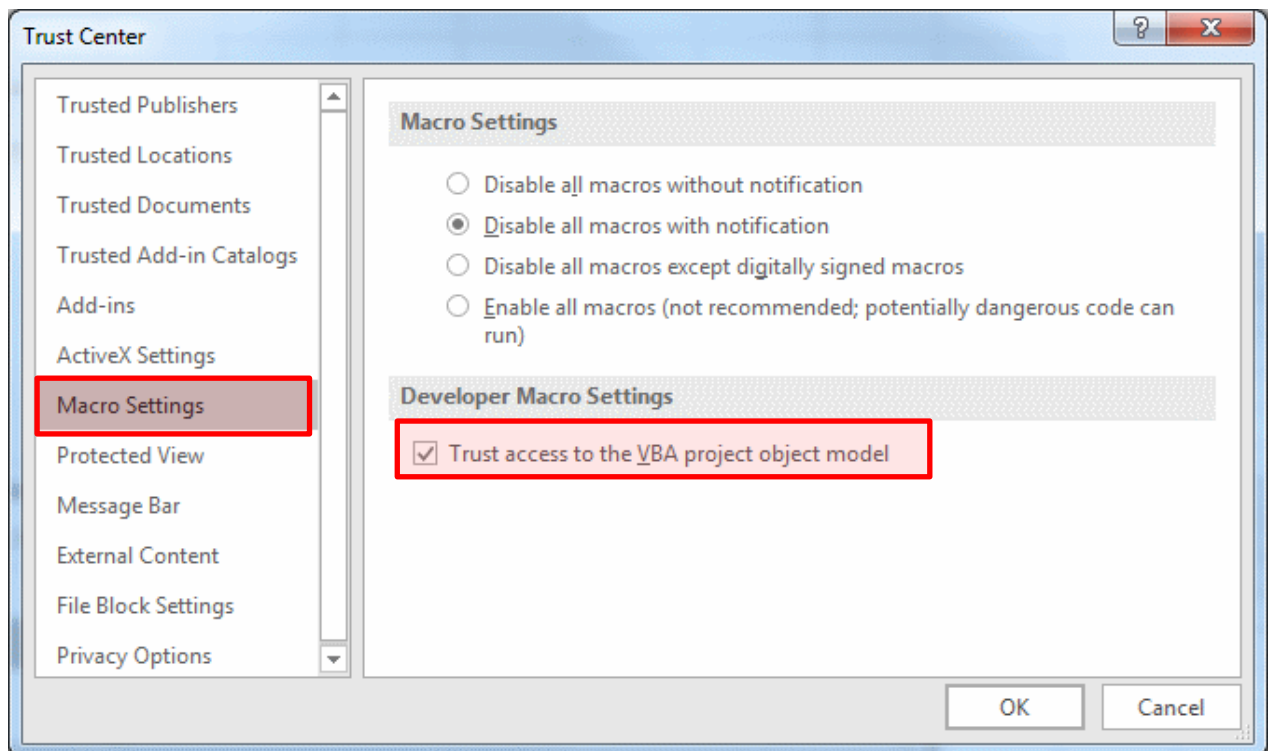
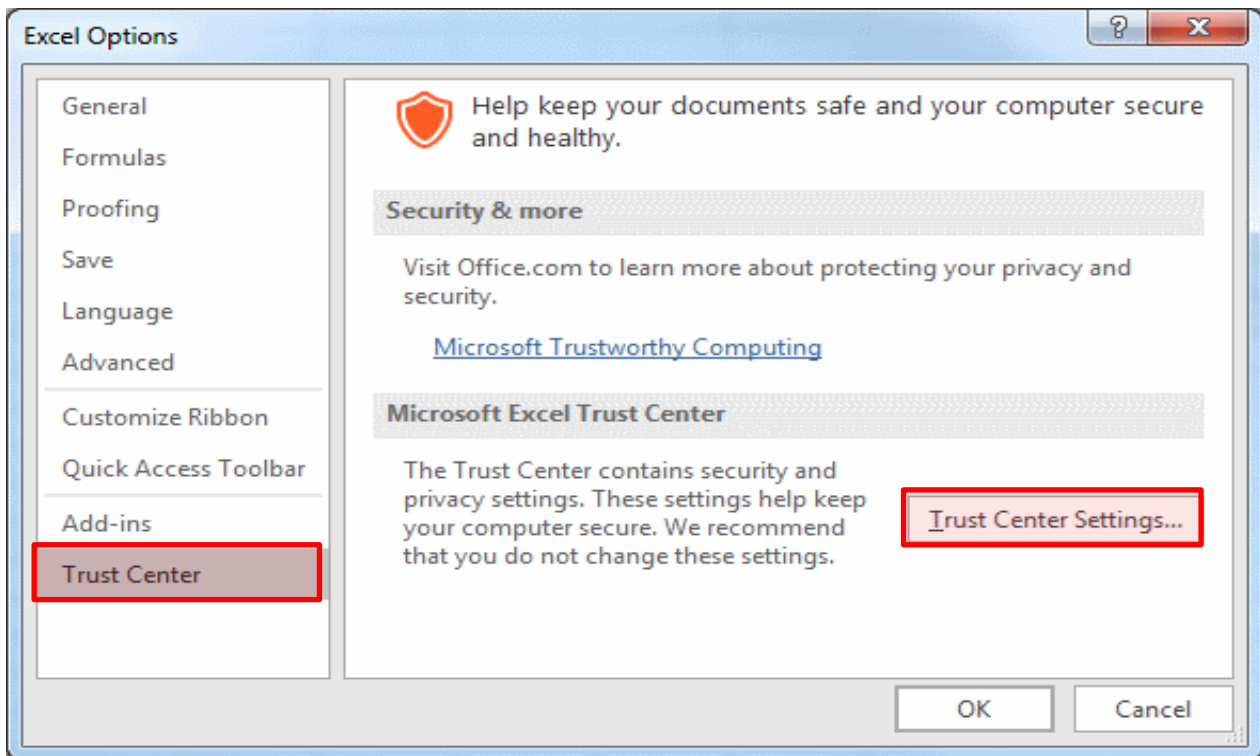
A warning is displayed by the system if access is currently denied.

Please be aware the option to change access may be greyed out (unavailable) in some organisations.

To check access to the VB Project (*Excel 2010 shown*) ...

- From the Excel ribbon ...Press 'File' / 'Options'
- Press Trust Center (on the left) then 'Trust Center Settings'
- Press Macro Settings (on the left) then check the 'Trust access to VB Project'

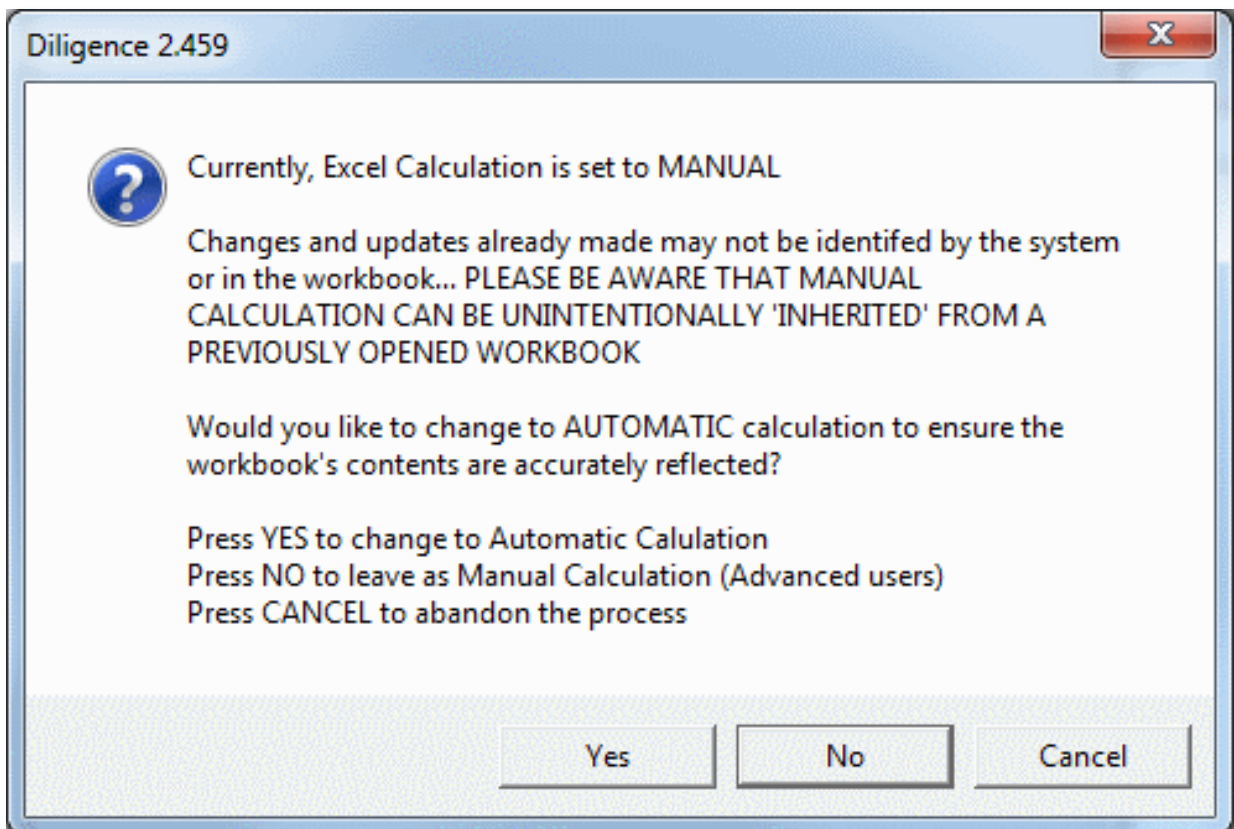
A graphical illustration is shown on the next page, which may differ slightly according to the Excel version being used.



Manual Calculation

Many advanced users work with Manual Calculation. Diligence operates perfectly well in this mode, however there is a possibility that some results, such as search parameters and snapshots of data may behave unexpectedly.

For this reason, Diligence will alert the user to the use of Manual Calculation before performing any functions. The user may choose to leave the calculation method untouched (No), switch to Automatic Calculation (Yes) or Cancel the request.

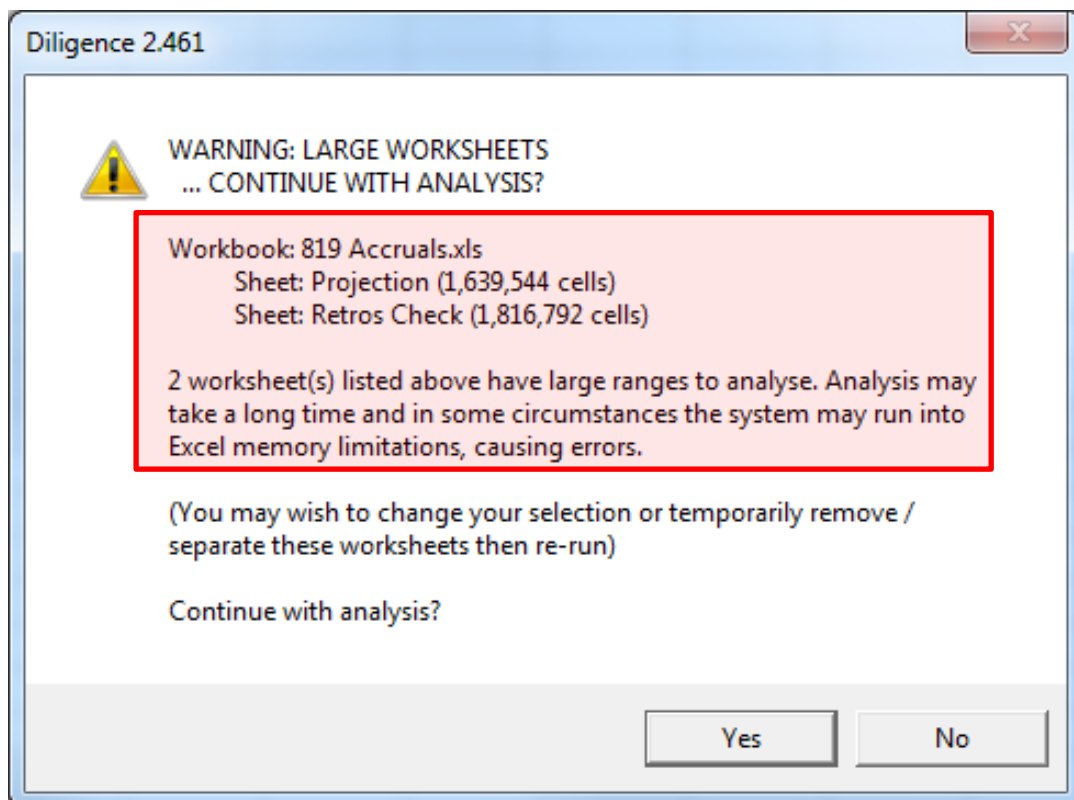


Large Worksheet Warnings (Duration & Memory Limits)

Several of Diligence's core functions require detailed analysis at cell level.

For large worksheets, this represents a technical challenge in terms of time taken and memory usage. Diligence is optimized to work efficiently with large data ranges, but the sheer quantity of cells often means that the function will take a significant amount of time to process, and in extreme circumstances may run into memory limitations.

Without pre-processing the worksheet contents, which in itself is time consuming, it is not possible to accurately predict the overhead of a large worksheet, but Diligence attempts to alert the user when there is a *possibility* of a problems occurring, a sample of which is below



This message is displayed before processing the function to give users the chance to opt out of the function.

Q. What should a user do if they receive this message?

Initially: Nothing! Press 'Yes' ... at least at first! (see below for support implications on massive files)

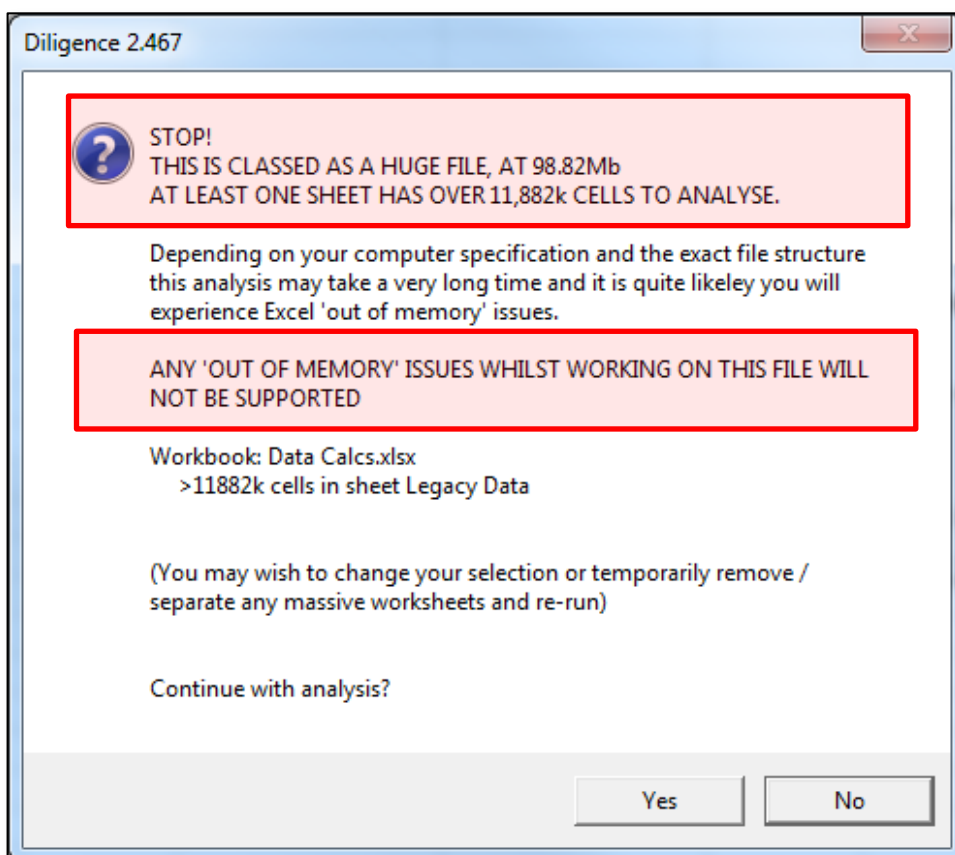
However, as users become more familiar with their own workbooks, computer speed and Diligence's analysis techniques they will be able to take a view on whether or not to heed the used sheet size warnings. Options to be considered include running the file 'overnight' or temporarily removing the large sheets.

Diligence File Size Limit: Implications on Support

Where there is a high probability that the user will run into memory limitations a further warning is issued. This occurs if either of the following facts are detected ...

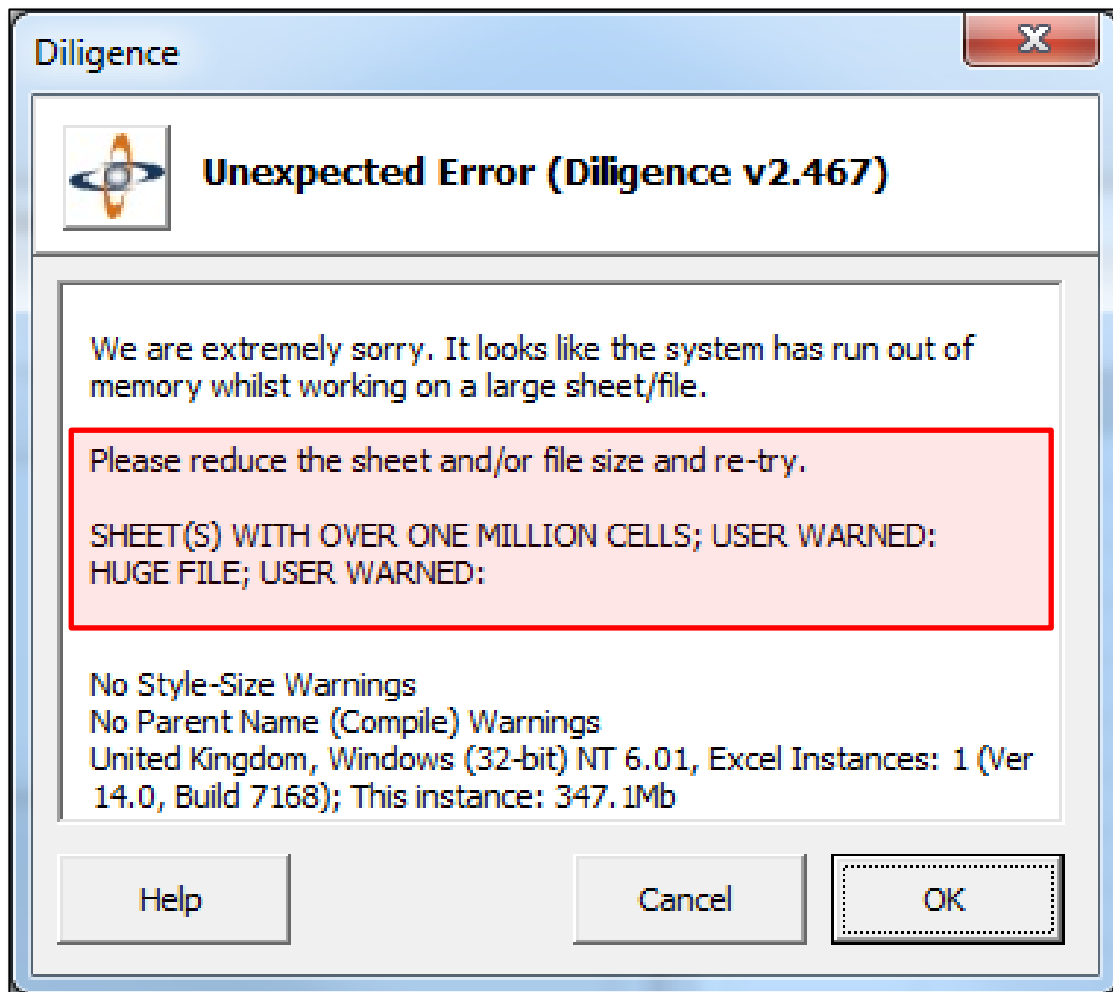
- A used range consisting of over one million cells in any worksheet
- The file size exceeds 16Mb

It is not possible to work out the memory requirement for any file in advance of the analysis because the figure depends on several factors only discoverable during the analysis itself, including the number of separate contiguous regions, the number, size, complexity and distribution of formulas and the number of linked files and errors. The likelihood of memory errors also depends on the computer being used (especially its RAM), the Excel version, which other programs & Excel files are running, and current memory 'leakage' within the active instance of Excel.



Users are, of course, free to proceed with the analysis, however any out-of-memory errors reported by Excel will result in the user being requested to reduce the file and/or worksheet size.

Please be aware that for obvious reasons, problems arising from lack of memory are **NOT SUPPORTED**



Hyperion™ or FactSet™ Functionality: Implications on Support

Hyperion and FactSet have the ability to interfere with Diligence analysis. It is highly recommended that any files that reference Hyperion or FactSet or include their data are opened with macros disabled and analysed on a PC without access to their references.

Please contact us for advice if you are having difficulty with analyzing these workbooks, however be aware that we are unable to guarantee a full resolution for reasons outside of our control, and for this reason these files are specifically NOT supported by Diligence for Excel.

Working with Workbooks & Environments Containing Macros

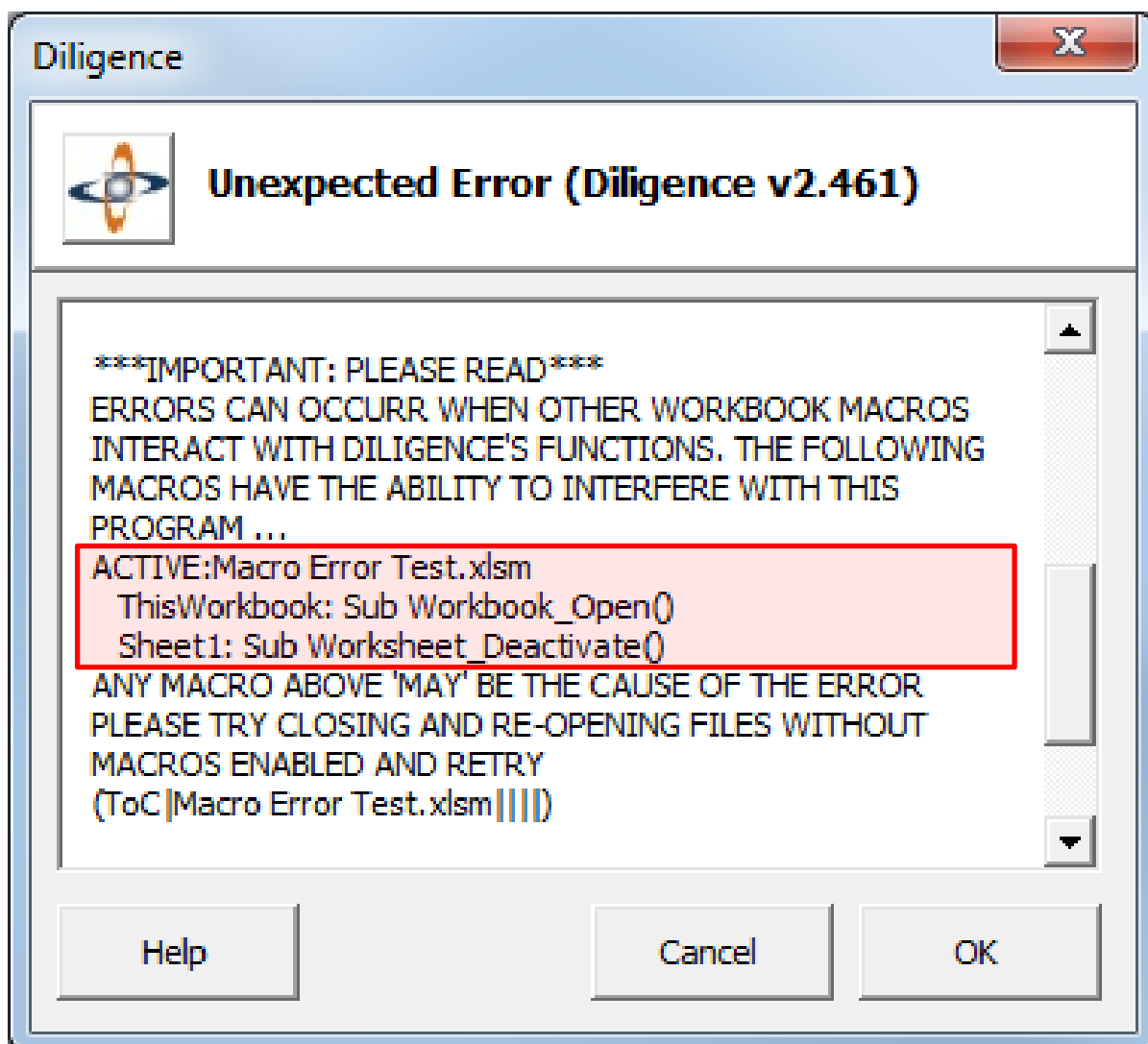
It is acknowledged that many workbooks, addins, references and third party application contain macros. Diligence works perfectly well with most files that contain code or macros, but users should observe the following...

User workbooks may contain completely proper and valid macros that execute when certain events take place, such as when a user activates another workbook or a worksheet loses focus. These macros may accidentally (or purposefully) interfere with Diligence's normal operations.

Deliberately, Diligence operates totally within the confines of Excel and is therefore subject to restrictions and events controlled by Excel ...some programs circumvent, ignore or manipulate these restrictions and have the ability to interfere with Diligence's normal operations.

If Diligence encounters an error, it attempts to record the names of any macros that might have effected its operation (see fabricated example below) however this may not always be possible, especially with third party programs that deliberately withhold their details.

If in any doubt, close and re-open the workbook being analysed with macros disabled.



Version & Licensing Information (About button)

The software version number, license details and the user's name employed by the system can be viewed by pressing the 'About' button on the right-hand side of the Diligence ribbon.

Instructions on sending support requests for your particular organisation and the addin file location are also shown.

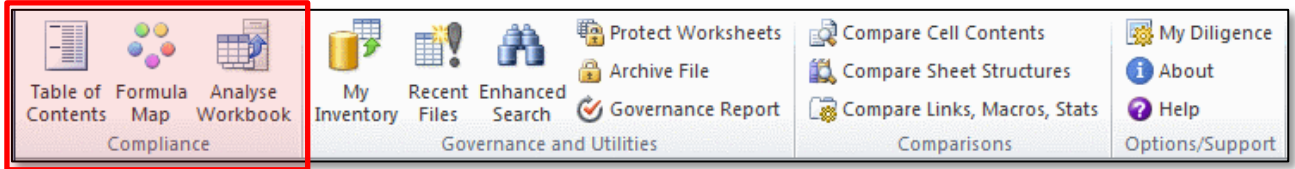
An alert message box is displayed if any Diligence function is used, when the license expiry date falls within the following three 3 months.



Diligence licenses are granted on a 'per user' basis, defined as a single username within an organisation. Users are permitted to install and/or use the software on multiple hardware instances (for example a PC, a thin client PC and a laptop) on a single license.

Compliance Functions

Diligence's first three functions help meet requirements to check, validate, snapshot, document and approve workbooks.



File Owner	Alternative Contact	Department	File Commonly Known As	File Categorisation	File Complexity
			E.g. Weekly Summary		0.0 / 10
File Purpose E.g. The purpose of the spreadsheet is to take financial data from the monthly income spreadsheet, copy and paste the income data into the monthly income spreadsheet, and then generate the monthly summary report.					
Instructions for Use					
Data Source Description	Sales This Month	USA	Canada	Europe	Total
Manual Entry	Bonds	=Data!C3	=Data!D3	=Data!E3	=SUM(C3:E3)
Intra-Department	Equities	=Data!C4	=Data!D4	=Data!E4	=SUM(C4:E4)
Inter-Department	Interest	=Data!C5	=Data!D5	=Data!E5	=SUM(C5:E5)
External	Other	=Data!C6	=Data!D6	=Data!E6	=SUM(C6:E6)
Output (if applicable) E.g. Entire file or Data Sheet	Gross	=SUM(C3:C6)	=SUM(D3:D6)	=SUM(E3:E6)	=SUM(C7:E7)
3 Visible Worksheets					
Sheet Name	Tax	0.1	0.22	0.15	
(Click to navigate directly to sheet)	Net	=C7*(1-C9)	=D7*(1-D9)	=E7*(1-E9)	=SUM(C10:E10)
Sheet1					
Sheet2		Empty			
Sheet3		Empty			
No Hidden Worksheets					
No References or Links to Other Files					
No Macros / VBA					
Testing or Approval Strategy	E.g. This Results m				
Test Evidence Location					
File Archive Location					
Structural Change History					
ID / Date on or before	Item				
23-Jan-16	Workbook				

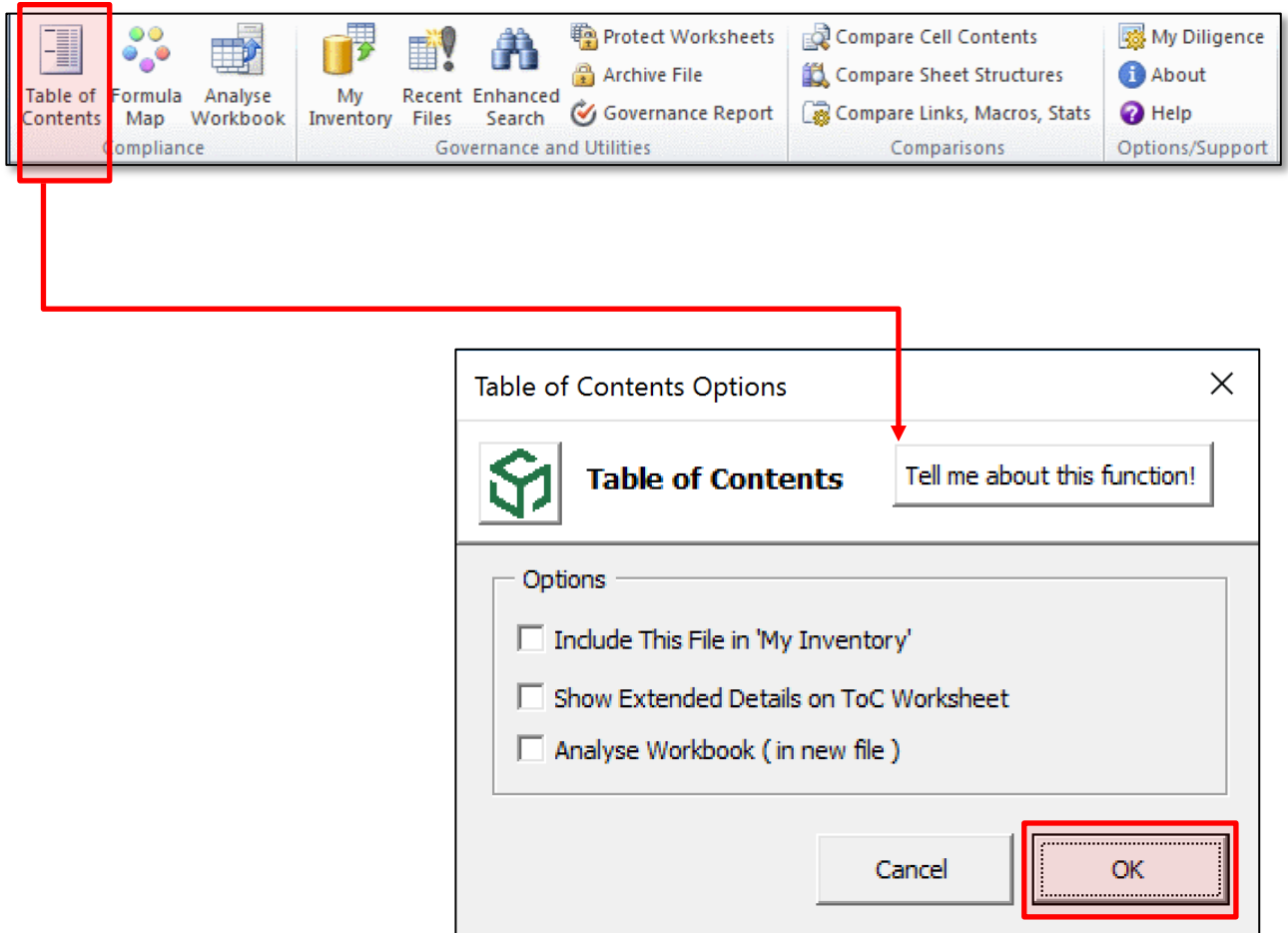
Kingston Smith		Diligence File Analysis	
Helping clients succeed		Date: 6 Feb 2016	
File Name	Demo.xlsm		
File Size	5.22 Mb		
File Owner	John Smith, J.Smith@DiligenceForExcel.com		
Author	John Smith, J.Smith@DiligenceForExcel.com		
Created	27-Apr-12		
Importance	Unspecified		
Visible Worksheets	9 (plus ToC Sheet)		
Hidden Worksheets	129		
Overall Complexity Score	8.5 / 10		
Cells with Formulas	8,679		
Cells with Numbers	12,511		
Cells with Text	30,277		
Macros/VBA	4525 Lines (Displayed in 'modVBA' of this file)		
References	2		
Most Complicated Formula	at Demo6, cell I16... =VLOOKUP(ROUNDDOWN(((SUMPRODUCT()))),VLOOKUP(ROUNDUP(((SUMPRODUCT())))))		
Comments			

The Table of Contents (ToC) Worksheet

The Table of Contents worksheet (ToC) is the cornerstone of the Diligence methodology. It is a standard worksheet that gives users key information about their file, and holds important details about the workbook that is used to record and show how the file changes over time. The sheet can be visible to aid with workbook understanding, or hidden, if the user prefers.

Installing a Table of Contents

A Table of Contents (ToC) can be installed onto any Excel file by pressing the 'Table of Contents' button on the Diligence ribbon, and then pressing 'OK' from the resultant userform. If no ToC currently exists then one will be added, and if a ToC already exists then it will be updated.




Simple ToC Example

Below is an example of a Table of Contents worksheet produced for an empty workbook.

The grey and white coloured cells are automatically created and populated by Diligence; they describe the physical contents and attributes of the workbook.

The lemon coloured cells are user-defined fields which can (optionally) be populated by the user to aid with compliance and documentation.

		Table of Contents Last ToC update 9 Feb 2017 <small>Use the Diligence ribbon to refresh. Last update:< 10 secs For extra information on using this ToC go to DiligenceForExcel.com</small>			File (Size) Book2 (0.1Mb) Location	
File Owner	Alternative Contact	Department	File Commonly Known As	File Categorisation	File Complexity	
John		Accounts	<i>E.g. Weekly Summary</i>		0.0 / 10	
File Purpose	<i>E.g. The purpose of the spreadsheet is to take financial data from the monthly income spreadsheet, and income data streams from Finance to calculate current tax liability.</i>					
Output (If applicable)	Audience (If applicable)	Run Frequency	Run Date or Time	Last Approved Date	Last Approved By	File Approvals
<i>E.g. Entire file or Data Sheet</i>	<i>E.g. Finance Director</i>		<i>E.g. 1st of Month</i>			
3 Visible Worksheets						
Sheet Name <small>(Click to navigate directly to sheet)</small>	Complexity Score	Formulae	Formulae Protected	Size <small>(Rows x Columns)</small>	Notes or Description <small>(Optional input by user)</small>	
Sheet1				Empty		
Sheet2				Empty		
Sheet3				Empty		
No Hidden Worksheets						
No References or Links to Other Files						
No Macros / VBA						
Structural Change History					Lifetime of Changes	Unlimited
ID / Date on or before	Item	Item Name		Action	Initials / Add Comment	
09-Feb-17	Workbook	Table of Contents created				

The 'Structural History' section at the very bottom of the sheet is a placeholder for the list of structural changes to the file which will be automatically recorded each time the ToC is refreshed.

It is important to remember that the ToC is a snapshot of the workbook contents at the time the ToC was created or last run.

Changes made since the ToC was last updated will not be reflected in the automated fields of the ToC or structural history until the ToC is next updated.

Understanding the ToC's Automated Fields

Much of the ToC is created or updated automatically, based on the contents of the file, the methods by which the file reaches out to other files or programs and the file's complexity or features. These fields are coloured grey or white and are not editable by the user.

File Complexity

This is a number between 0 (empty workbook) and 10 (highly complex workbook). The key driver for the file complexity score is the complexity of the individual worksheets, but other factors such as the number of hidden sheets, links, references and macro code are also taken into account. More details on how the figure is calculated and typical scores can be found in the 'Further Reading' section of this chapter.

Visible Worksheets

This section lists all the visible worksheets within the file and has several fields per sheet ...

44 Visible Worksheets					
Sheet Name <i>(Click to navigate directly to sheet)</i>	Complexity Score	Formulae	Formulae Protected	Size <i>(Rows x Columns)</i>	Notes or Description <i>(Optional input by user)</i>
Drilldown	7.0/10	✓	No	155 x 124	
Map	4.5/10			1 x 1	
data_Questions	3.0/10			141 x 21	

Sheet Name

The sheet name as specified on the worksheet's tab. The text is also a hyperlink which means users can click the worksheet name and jump straight to that sheet. This can be a useful navigation aid in workbooks with numerous worksheets.

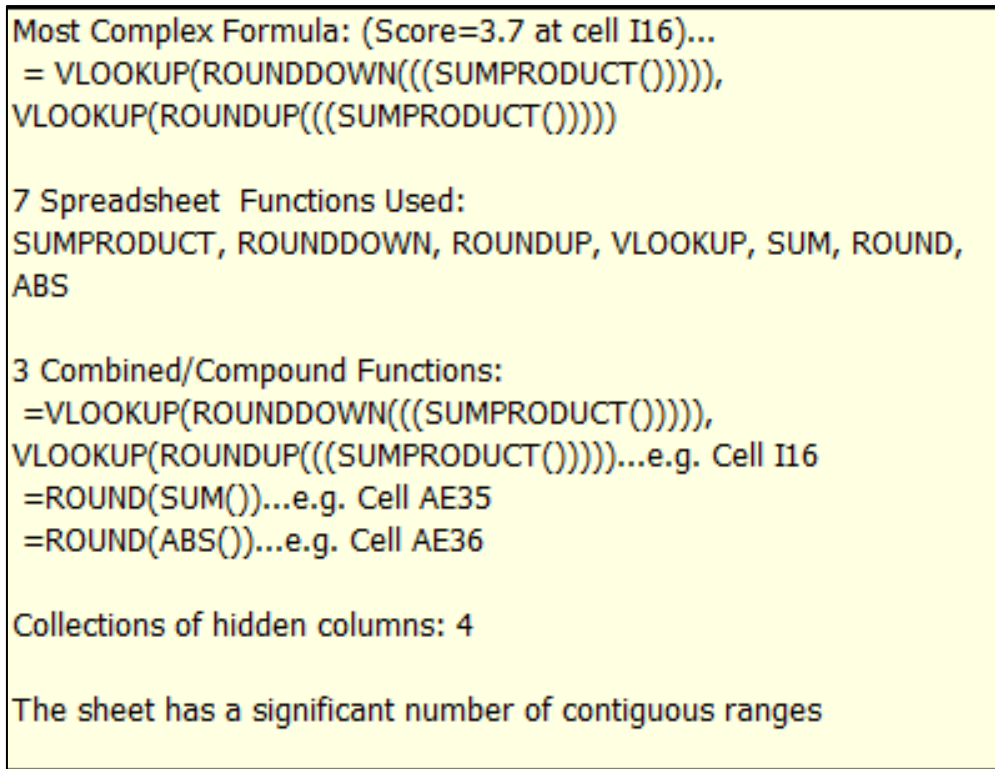
Complexity Score

A figure between 1 and 10 representing the overall complexity of the worksheet, where 1 is the least complex and 10 the most complex. A cell note (the red marker in the top right hand corner of the cell) indicates items of interest that have contributed to the complexity score, such as complicated formulas and links to other worksheets. Empty worksheets do not have a complexity score.

See the 'Further Reading' section of this chapter for a full list of the factors used to calculate the Worksheet Complexity score.

Any worksheets found to have a significant contributory factor to its complexity will have a cell note. This may be useful for a user to ascertain immediate areas of concern.

Below is a typical example of (fairly complicated) automated sheet-complexity score cell note ...

A screenshot of a cell note with a yellow background and a black border. The text inside the note is as follows:

Most Complex Formula: (Score=3.7 at cell I16)...
= VLOOKUP(ROUNDDOWN(((SUMPRODUCT())))),
VLOOKUP(ROUNDUP(((SUMPRODUCT()))))

7 Spreadsheet Functions Used:
SUMPRODUCT, ROUNDDOWN, ROUNDUP, VLOOKUP, SUM, ROUND,
ABS

3 Combined/Compound Functions:
=VLOOKUP(ROUNDDOWN(((SUMPRODUCT())))),
VLOOKUP(ROUNDUP(((SUMPRODUCT()))))...e.g. Cell I16
=ROUND(SUM())...e.g. Cell AE35
=ROUND(ABS())...e.g. Cell AE36

Collections of hidden columns: 4

The sheet has a significant number of contiguous ranges

Any cell note may contain one or more of the following comments ...

- A list of the Excel functions and any User Defined Functions (UDFs) used in the sheet. If there are complex formula, then the most complex formula with its complexity score is included. An example of where the formula can be found is indicated.
- Where nested formulae are used, these are shown in addition to the formulae, for example IF(, SUM(, IF(SUM))) but, for brevity these details do not contain the formulas themselves, just the Excel function used. E.g. SUM() not SUM(\$A1:\$A2)
- Where combined or compound formulae are used, up to 5 (the most complex) are displayed.
- If there is more than three 'ranges' of hidden rows or columns
- If there are more than 10 contiguous ranges of data

Formulae

Ticked if the worksheet contains formulae.

If any formulas evaluate to an error, or design issues or anomalies are found the tick is coloured red, and a cell note indicates areas of interest, for example

3 cells showing as an error:
 2 #DIV/0! at cell AE35,AE36
 1 #N/A at cell AC26

30 cells showing potential design issues...
 2 instances of a number in a formula:
 '100': 2 instances at cell I16, I17.

10 or more cells or ranges of cells not included in any formula
 (Header or title perhaps?) Examples around C17

Any cell note will contain one or more of the following comments ...

- Cells that evaluate to an error (#N/A, #DIV/0!, #NAME?, #REF, #VALUE!, #NULL!, #NUM!) are highlighted and the sheet name is displayed in red.
- Worksheet Design, Anomalies & Cell Contents
- Inconsistent Formulae, such as if a formula cell is sandwiched between two cells with the same formula.
- Numbers Formatted as Text
- Number in a Formula. If a formula contains both a function AND a number (E.g. Sum(A:A)*1.2) this is considered to be bad practice (The number 1.2 should ideally be in its own cell)
- Duplicated Formula: If a series of cells contain two formulae that are precisely the same, e.g. SUM(A:A) this is highlighted. If they should be the same, best practice suggests one should refer to the other rather than both be calculated.
- Last Rows or Columns in a Pre-2007-Excel Spreadsheet: Formulae calculating cell references on or approaching the limitations of old format Excel files (256 columns, 65536 rows) are highlighted in case those formulae need updating.
- External References and Personal Network Drives
- Cells that contain links to other files. Special notice is taken of files located on a 'C:\' drive, and corporate users can specify an additional drive (E.g. 'G:\' or 'H:\Personal') which will also be highlighted in the links section as being potentially unavailable to all users.

Formulae Protected

This pertains to formulas 'Protected' using Excel's 'Protect Sheet' function. The field can contain one of three options ...

- No None of the formulas are protected.
- X of X E.g. 45 of 100, some of the formulas are protected.
- Yes All formulas on the worksheet are protected.

No differentiation is made as to whether the protection includes a password or which protection options have been selected.

The field on this row is left blank if the sheet contains no formulas.

Size

The number of rows by the number of columns, defined by the top left populated cell to the bottom right populated cell. If applicable a cell note indicates how many rows and/or columns are hidden or zero height/width.

Hidden Worksheets

This section is identical in content to the Visible worksheets section above, but no hyperlink is included on the worksheet name (i.e. you cannot navigate to the worksheet)

This list will also include 'Very Hidden' worksheets (hidden via the VB Editor or code) indicated by a cell note.

Links & References to Other Files or Data

Dependencies on other program files and/or workbooks and/or data tables are listed in this section, starting with a title that includes the total number of links and references.

2 Links or References to Other Files	
msado21.tlb	REFERENCE to C:\Program Files (x86)\C...
Account Planner.xls	\\Mybooklive\Documents and Settings\smi

Where the dependency is defined as a programmatic reference, such as a .dll, .exe or .xlam add-in then the file location starts with the phrase 'REFERENCE to'.

Where Diligence has assessed that there is a likelihood of VBA requesting information from a database table, the name of the probable table is listed, together with the identity of the routine and code module.

1 Link, Reference or Database Table	
Table: tblFO_Data"	Possible database table reference in macro

Please note Diligence is unable to ascertain with certainty whether the VBA is pointing to a database table. Database Table entries are listed as indicative only.

Where the dependency is a direct link, such as a formula, to another file then just the file path and name are listed. Where possible an example of where the link is used in the file is displayed as a cell comment, such as the comment example below.

Account Planner 60815a.xls found in named range 'Account View'!list_ABC

Please note that it may not always be possible to give an example of a linked file location. Links can be made (often accidentally) to objects and properties. In addition, links to hidden, protected cells cannot be ascertained.

No testing is undertaken on the existence of, or access to the linked file. Broken links are identified on the 'Health and Risk' sheet of the File Analysis Report.

Run-Time References

Where Diligence has access to the VBA, the code is analysed for the creation or manipulation of references created by code. If it is deemed this occurs, then a red message **Reference added at runtime ??** together with the module, function name and suspected line of code are indicated on the ToC (as below). Due to the many ways in which VBA can be written, this reference is indicative only.

1 Link or Reference to Another File	
msxml6.dll	REFERENCE to C:\Windows\System32\ms...
Also: Reference added at Runtime ??	AddDatabaseData, ThisWorkbook... ThisWo

Access to VB Project Denied

If the system has not been given access to the workbook's VB Project, then references and database tables will not be available in this section; Formula-links to other workbooks will still be listed where applicable.

A message similar to the one below will be displayed on the ToC. See 'Access to VB Project' section at the start of this document for more details.

Links & References	
Unknown Number of References	Access to VBProject Denied
VBA/Macros/User-Defined-Functions have not been reviewed: Access to VB	

Macros & VBA

Where the system has access to the VB Project this section will list any macros or VBA included anywhere in the file (Worksheets, Modules, Class Modules & Workbook)

If Access to the VB Project is denied, a warning will be displayed ...

VBA/Macros/User-Defined-Functions have not been reviewed: Access to VBProject denied.				
Routine	Hard Coded	Location	Lines of Code	Description (Optional input by user)

If applicable the number of routines and lines of code are shown within the header title, followed by a list of each routine with their additional fields. ...

Macros / VBA: 189 routines, 2,490 lines of code.				
Routine	Hard Coded	Location	Lines of Code	Description (Optional input by user)
Workbook_Activate		ThisWorkbook	16	
Workbook_BeforeClose	✓	ThisWorkbook	5	Written by Andy (Ja
SetRegionalVersion		ThisWorkbook	79	

Routine

The Function or Subroutine name as specified in the VB Project.

Hard Coded

A macro is defined as being hard coded if changes to the structure of the worksheet or workbook may necessitate changes to the macro. For example, if a macro sums the values in cells A1:A5 then if a row is inserted at row 4, a hard-coded macro will not reflect that change.

Please note it is not possible to ascertain whether a macro is hard coded with absolute certainty and this field is indicative only.

Special attention should always be paid to macros created using Excel's Macro Recorder, which are usually hard coded.

Location

The name of the 'object' that contains the routine. This field can have one of three entries

- 'ThisWorkbook' (a generic container named in the VBE)
- The name of the container worksheet
- The name of the container module, class module or userform.

Lines of Code

Excludes lines dedicated to comments.

Descriptions

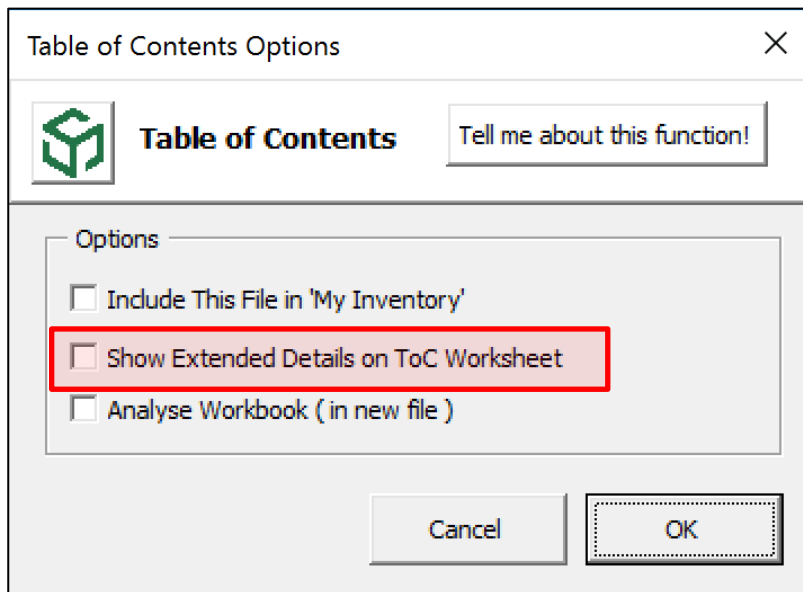
This is a user defined field, however when the ToC is first created or if the description is empty, any comments between the routine/function name and the start of the code are copied to this field. For example, the comment (in green) below will have been automatically copied into the macro 'Description' above.

```
Private Sub Workbook_BeforeClose(Cancel As Boolean)
    'Written by Andy (Jan 2014)
    Sheets("NoMacros").Visible = True
    Sheets("NoMacros").Activate
End Sub
```

Standard vs. Extended Table of Contents

Unless specified by the company, a standard set of fields are shown to each user. However, some companies, or individual users within any company may wish to show an extended set of fields.

Users may toggle between the two settings from the ToC userform ...



The additional fields are simply hidden rows, and are shown/hidden according to the check box.

The extra available fields (rows) relate to Instructions for file use and data inputs, as shown below

Instructions for Use	<i>E.g. Either the location of the instructions document, such as 'See Instr actual instructions on how to complete the report.</i>	
Data Source Descriptions	Required	Details (if applicable)
Manual Entry		<i>E.g. Month/Year, BoE Interest Rate, Sick Days etc.</i>
Intra-Department		<i>E.g. Weekly Management Summary etc.</i>
Inter-Department		<i>E.g. Monthly Summary from Finance, Attendance Report fro</i>
External		<i>E.g. Bloomberg, BoE Risk Summary etc.</i>

Completing the ToC's User-Defined Sections

When a new table of Contents is created, a complete set of user-defined fields are created for the user to complete if desired or required by policy.

User-editable cells are coloured lemon, and can be filled or amended at any time.

In keeping with the Diligence policy of non-interference, Diligence does not enforce the completion of any user defined cell at any time, even if the field is mandatory in your particular organisation's spreadsheet policy. This also enables a user to insert a ToC, then re-visit it at a later date to complete any required additional user-defined fields.

For ease of use, many of the user-defined fields include example text of what should be entered. These examples are presented in grey text on the standard lemon background, as shown below...

File Purpose	<i>E.g. The purpose of the spreadsheet is to take financial streams and calculate current tax, plus trend analysis on working day of each month.</i>
Instructions for Use	<i>E.g. Either the location of the instructions document, such as actual instructions on how to complete the report.</i>

The text will automatically revert to the standard colour (black) when the text is changed.

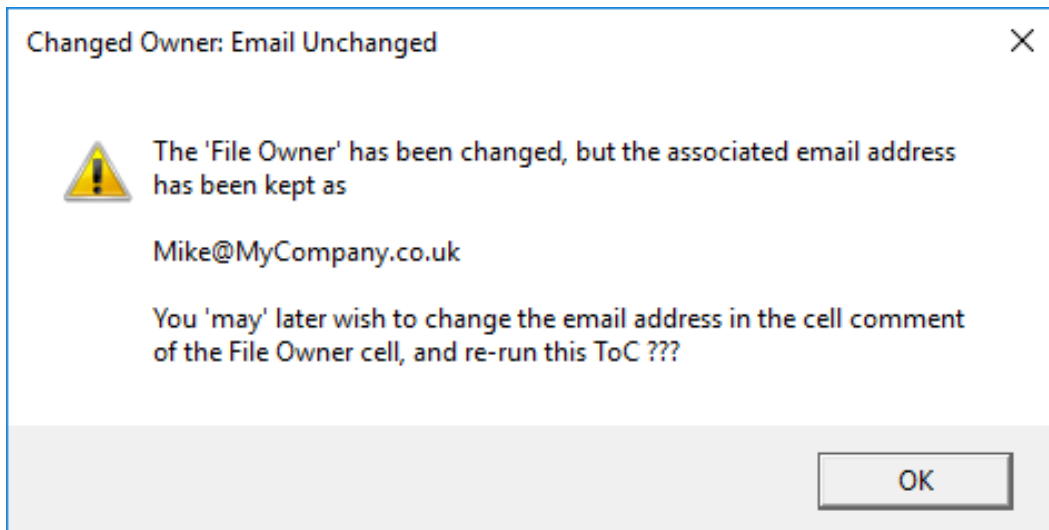
Mandatory Fields

Some companies have defined some or all of the user defined fields as mandatory, for example an alternative contact name. If these have been specified, then the relevant fields are indicated in red until they have been user-populated.

File Owner

When first created, or if this field is blank, then the name of the user as defined in the 'My Diligence' options is entered into this cell. In addition, a cell note is created with the owner's specified email address.

These details can be changed at any time, but if the File Owner is changed and the email address is not changed, then the next time the ToC is updated, an alert will appear similar to that shown below highlighting to the user that the owner and email may now not match. Users are advised to amend the email address to coincide with the file owner as soon as possible.



Alternative Contact

This should be the name and/or email of the person to whom questions should be directed about the file, should the file owner be unavailable.

Department

This is a drop down list as specified by your organisation. By default, the department name as specified in the 'My Diligence' option for the file owner is entered.

The department list is not user editable. Please contact us if you require amendments.

The Department name can be overwritten by the user with any text, however this will result in the department name being highlighted in Amber, as shown below...

Department	File Commonly Known As
Fireworks Dep't	E.g. Weekly Summary
Select from the dropdown list Select Department	

File Commonly Known As

This is the colloquial name of the file, as would commonly be referred to in the office or department. For example, 'Monthly Managers Report' or 'Weekly Finance File'

File Categorisation

This is a drop-down comprising the three levels of importance that can be designated to each file. By default, the three options are ...

- 1. Critical
- 2. Important
- 3. Non-Important

These names represent the three levels of governance and compliance requirements that need to be applied in the organisation. Please note that the actual name/phrases are specified by each organisation and so may differ from those shown, but will always start with 1,2 or 3. The list is not user editable and no alternative may be entered by the user.

Please contact us if you require different descriptive names.

If this field is left blank, it is reported as 'Unspecified' in any governance or management information report.

Please see your own company's documentation for what compliance and governance procedures are associated with each file categorisation.

File Purpose

A brief summary of the purpose, justification or reason that this file is used.

Instructions for Use (Extended ToC only)

For a complicated file, this is likely to be a reference to the location of the instruction documentation, however for less complex files this field should hold brief but meaningful instructions on what steps are required to update or run the report or file.

Data Sources (Extended ToC only)

All spreadsheets should have at least one data source. For companies the various data sources can be divided into four distinct categories...

- Manual Entry

Data that is entered by hand. For example, holiday dates or sick days.

- Intra-Department

Data that is copy/pasted or linked, or otherwise acquired from files or workbooks inside the user's department. For example, a Personnel List in an HR Department.

- Extra-Department

Data that is copy/pasted or linked, or otherwise acquired from files or workbooks inside the user's company but outside of their department. For example, a Personnel List from the HR department when the file is based in the Accounts department.

- External

Data sources acquired from outside the company, such as stock prices or interest rates.

Data Source Descriptions	Required	Details (if applicable)
Manual Entry	No	
Intra-Department	Yes	Takes sales figures from the Managers weekly s
Inter-Department	Yes	
External	Yes	Competitors share prices from Bloomberg and int

For each of these categories, the user should select Yes or No from the 'Required' dropdown, and enter brief details of the source(s). The example above indicates that the file has one inter-department data source, and two external data sources.

Output

The aspect or part of the file required or consumed by other users should be entered into this field. Typical examples could be the identity of a particular figure, a print off of sheet x, or the entire workbook.

Audience

The specific names or generic job titles of the people and/or departments and/or companies that consume the data. Alternatively, this field could reference the location of a distribution file.

Run Frequency

A drop-down to indicate the approximate number of times in any given time period that the file is updated or run, not just opened. The list is not user editable.

Approvals Fields (Extended ToC only) ...

Most company compliance and governance procedures will contain a minimum frequency that important spreadsheets need to be re-approved as 'fit for purpose'. The three following fields relate directly to this requirement, and should be viewed in conjunction with the 'Testing or Approval Strategy' and 'Test Evidence Location' fields towards the bottom of the ToC.

Last Approved Date (Extended ToC only)

The date (d mmm yyyy format) that the file was last officially approved.

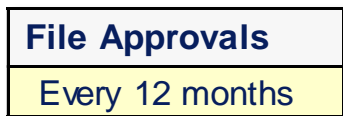
Last Approved By (Extended ToC only)

The name (not position) of the owner or manager that made the approval.

File Approvals

Select from the drop-down list the frequency at which the file needs to be (re)approved.

To help users remember that an approval is required shortly, a coloured title is used when the 6 month or 12 month frequencies are selected. The file approvals title changes colour from White to Amber 30 days before approval and to Red if the approval becomes overdue.



The following logic is used to colour the title ...

Approval Frequency	Days since last approved	Title Colour
6 Months	>182 Days	Red
	=>152 Days	Amber
	< 152 Days	White
12 Months	>365 Days	Red
	=>335 Days	Amber
	<335 Days	White
Any other Frequency	Any	White

Worksheet Notes or Description

This field is available for each visible, hidden or very hidden worksheet and is used to describe the contents of the sheet.

Testing or Approval Strategy (Extended ToC only)

This should contain details on the strategy used to validate the correctness of the data and what steps are taken to ensure the correctness of any changes. For large or complex files this may be a reference to a testing document.

Test Evidence Location (Extended ToC only)

Auditors will usually want to see documentary evidence, including screenshots and comments, of the testing undertaken after a structural change has been made. The location (path and file name(s)) of the evidence should be recorded here.

File Archive Location (Extended ToC only)

This is the file path where any archives for this file should be stored.

If this field is populated with a valid, accessible location, this path location is also used by the Diligence Archive function to store archives.

File ID (Extended ToC only)

The unique file ID is used to track the file within Diligence.

File ID	SmithJ160131.122418
----------------	---------------------

Users often change the name of a file, for example to reflect the date of a report. The unique ID enables Diligence to ascertain that the file has changed name, and evaluate it correctly in any inventory and governance reports.

Initially the unique ID is assigned the value of the user's name plus the date & time of its creation, but any unique text and/or numerical value is valid.

You will not normally need to change the default (unique) File ID value unless you ‘split’ the file into two or more ‘trackable’ files.

If a new file is created on the basis of an existing file that already contains a ToC, then ideally the ToC sheet should be deleted in the second file and a new ToC created.

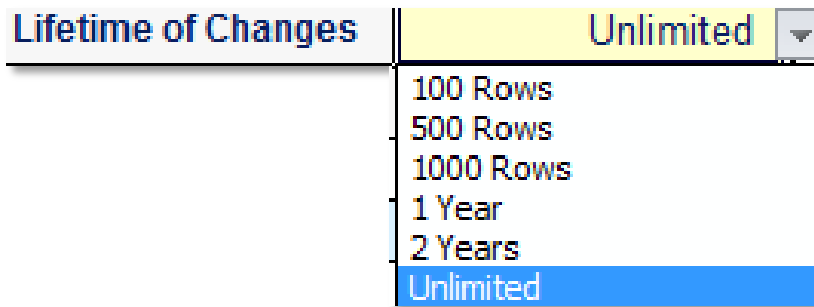
However, should it be desirable to keep the existing ToC (for example to preserve previous change history) then the unique ID should be changed to a new, unique value by the user.

For example, the File ID SMITHK.160131.122418 could be changed to SMITHK.Report1

Failure to maintain a unique code for each file will result in unexpected governance and compliance reports and an incorrect inventory.

Lifetime of Changes

By default, structural changes are stored indefinitely (Recorded as 'Unlimited' on the ToC). However, for practical reasons users may choose to limit the number of changes or length of time the changes are recorded by selecting one of the alternatives from the drop down.



If a 'Lifetime of Changes' change is made, then that fact is also recorded as a change, as shown

Structural Change History		
ID / Date on or before	Item	Item Name
020: 02-Feb-16	Table of Contents	Lifetime of Log

For formal audit purposes, any recorded 'Change in Lifetime' setting change is NOT deleted for 7 years, irrespective of any setting chosen by the user.

The new Lifetime selection will be applied, and any appropriate records deleted (starting with the oldest), the next time the ToC is updated.

Structural Change History

A small comment or 'initials' field is assigned to every structural change row. This is commonly used by the file owner or approver to indicate that they have acknowledged and accepted the change. See below for more details on the change history.

Automatic Recording of Structural Changes

Diligence records structural and other important changes to any spreadsheet containing a Table of Contents worksheet every time the ToC is updated by the user.

Notes of the changes are placed at the top of the 'Structural Change History' section of the worksheet, deleting the oldest changes if required. (See Lifetime of Changes.

The summary information gathered during the previous ToC is compared to the current file contents, and a change is logged whenever the following changes are detected...

- A worksheet is added, deleted, renamed or its visibility changed.
- Worksheet contents change (See below for more details).
- Macros or VBA is added, deleted, renamed or changed.
- The file name or path is changed.
- Links or References are added, deleted or renamed.
- Key User Defined fields in the ToC (e.g. Owner or Archive Location) are changed. See below for exact field list.

Worksheet Content Changes

When a Table of Contents is created, Diligence separates non-blank cells into four sections

- Cells containing a formula (Formula Cells)
- Cells containing a number and formatted as a date or time (Date Cells)
- Non Date-Cells, containing a number (Numeric Cells)
- Cells containing text or a mixture of text and numbers (Text Cells)

When Diligence detects changes to the number or contents of any of these cell groups it records a single line change record summarizing the change(s). For brevity, each change is limited to a single line of text on the worksheet, with the information also shown as a cell comment where the text does not comfortably fit on a single line, for example ...

Structural Match, but different sheet names, ranges and/or values are being referenced. New Internal Worksheet Source: Sheet3.

or ...

1 more formula cell. 2 more numeric cells, & possible changes to other numeric cells. New Formula: NOW().

- In all instances where a new or deleted formula is identified, the formula is indicated in the cell comment.
- In all instances where a new internal worksheet reference is used or deleted the sheet (or if applicable the range name) is identified in the cell comment.
- In all instances where a new reference to another workbook is used or deleted the workbook, and the worksheet/named range is identified in the cell comment.

The following example of changes within a single workbook as shown in Excel and its associated cell comment shows a host of changes being identified, and approaches the limit of the number of changes that would be shown....

1 more formula cell, & possible changes to other f ...

1 more formula cell, & possible changes to other formula cells. 1 less text cell & possible changes to other text cells. Same count of numeric cells, but one or more values have changed. 1 more date cell, & possible changes to other date cells. New Formula: COUNT(), SUM(). Removed Formula: SUMIF(). New Internal Worksheet Source: Sheet2. Removed Internal Worksheet Source: Sheet3. New External Worksheet Source: [Book10]Sheet1. Removed External Worksheet Source: [Book8]Sheet1.

Workbook Structure or Content Changes Logged

When changes are found, and logged, an incremental change ID and the update date are recorded, together with the details of the change. One row is added to the list for each change found.

If no structural changes are identified, then this is also recorded, for auditing purposes.

The example below shows that on the first update occasion (at the bottom), no changes were found, and on the other two ToC update occasions, a single recordable update was found and logged.

Structural Change History			
ID / Date on or before	Item	Item Name	Action
065: 05-Oct-15	Worksheet	datadump uk	1 more hidden column (1 in tot
064: 05-Mar-15	Worksheet	HealthCheck	Same cell-count. Formula (and
063: 17-Feb-15	Workbook	ToC Refreshed	No reportable changes

The name of the user that ran the update and the time of the update are recorded in a cell note on the ID/Date field.

Background Colour

The background colour alternates between blue and white. Each time the ToC is updated the alternative colour is used for all the changes logged.

Font Colour

More important structural changes such as new worksheets or changed formulas are displayed in red text. Less critical changes such as the number of hidden columns or a change in owner name are displayed in black. A full list of red / black change-items follows.

Depending on the company's specific compliance procedures and the importance setting of the file, red and/or black text items may denote that testing, approval and/or a comment on the change is mandatory.

Tier 1- Changes (Red)

The following changes are listed in red text. These items are usually advised to be worthy of comment and/or testing by the spreadsheet owner...

- A worksheet is added, deleted, renamed or its visibility changed.
- Macros or VBA is added, deleted, renamed or changed.
- A link or reference to another workbook is added, deleted or renamed.
- Change in the number of formulas, numeric, text or date cells.
- New or deleted references to internal or external worksheets.
- Changes in the structure of formula cells, for example SUM() changed to SUMIF()
- New formulas used or formulas deleted.
- Structure of Pivot Table has changed

Tier-2 Changes (Black)

The following changes are shown in black text, and may or may not be worthy of comment and/or testing by the file owner...

- The file name or path is changed.
- A link or reference to a sheet within the workbook is added, deleted or renamed.
- Content changes to existing worksheet data, numerical or date cells. For example, 3 changed to 4, or March 1999 changed to April 1999
- Changes in worksheet formula ranges or constants, for example Sum(3,4,5) to Sum(4,5,6) or SUM(Data!A1:B2) to SUM(Data!A1:B100)
- The hiding or un-hiding of rows and/or columns.
- Insertion or deletion of blank rows and/or columns.
- The moving of cells where the general structure of the worksheet has not changed.
- Key User Defined fields in the ToC (e.g. Owner, Archive Location) are changed. The full list of fields is defined below.

Tier-3 Changes (Not recorded)

The following changes are not recorded...

- Worksheet formatting changes.
- The addition, change or deletion of shapes, graphs, cell comments or other objects.

ToC User-Field Changes Logged

In addition to changes to the workbook contents, if certain fields are changed by the user on the Table of Contents sheet, these are also recorded. The following user-specified field changes are noted together with their previous values...

- File Owner
- File Owner's Email
- Alternative Contact
- File Name
- File Path
- Department
- File Description
- File Instructions
- File Categorisation
- Archive Location
- File Last Reviewed
- File Run Frequency
- File Last Approved By
- File Diligence ID
- Lifetime of Changes

Advanced ToC Usage

Mandatory ToC Fields

To assist with internal compliance, your company may have insisted on the mandatory completion of certain user-defined fields, such as an alternative contact name, or when the spreadsheet was last approved.

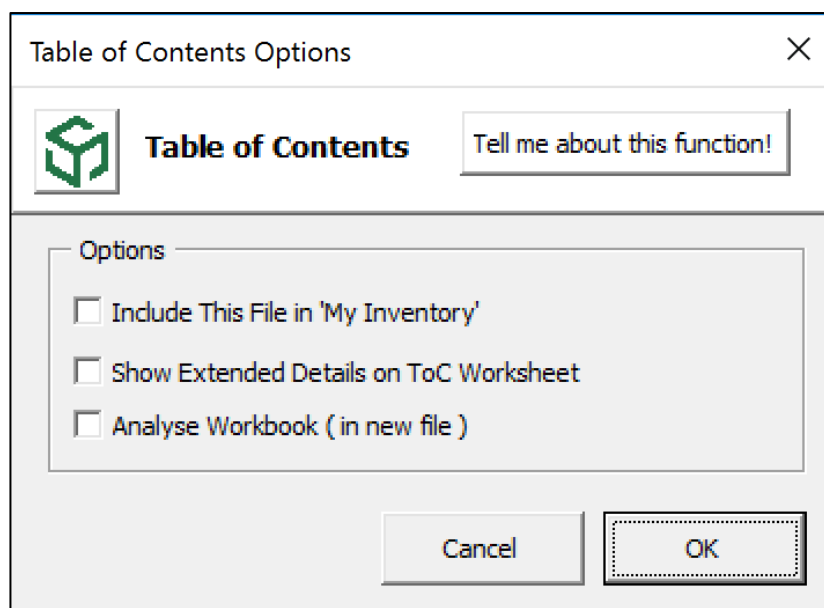
When this has been specified, these mandatory field names will appear in red until they have been completed. In the example below 'File Owner', 'Alternative Contact' & 'File Categorisation' have been designated as mandatory fields, with two of three fields incomplete, and showing in red.

File Owner	Alternative Contact	Department	File
Dave Smith		IS	E.g.

Contact Diligence to invoke this feature on any required ToC fields within your organisation.

Table of Contents Userform Options

When the Table of Contents button in the Diligence ribbon is pressed, a userform is displayed. Normally a user can simply press the 'OK' button to create or update a ToC on the active workbook, however three options are available...



Include This File in 'My Inventory'

If checked, when a ToC is added or updated, that workbook is automatically included in the user's inventory.

If left unchecked then the decision to include, preserve or remove the file from the inventory is specified by the user option in 'My Diligence' / 'My Inventory'

Analyse Workbook

In addition to the ToC, a full, extended workbook analysis will be created in a separate file.

See 'Analyse Workbook' for more details.


Show Extended Details on the ToC Sheet

The sections marked in red, below, represent the ‘Extended user defined details’. These fields offer additional compliance information and can be displayed or hidden via the ToC options userform.

Some users prefer the cleaner ‘feel’ of the ToC with the extra fields hidden for normal operation, and show the extended fields only when required. Toggle the option at any time a ToC is the active sheet to show or hide these extended details.

The default setting for this option has been decided by your organisation and cannot be changed.

For security purposes these fields have been designed to only be hidden/shown via the ToC options form and not manually.

		<h3>Table of Contents</h3> <p>Last ToC update 23 Jan 2016 <small>Use the Diligence ribbon to refresh. Last update: 10 secs For extra information on using this ToC go to</small></p>			File (Size) Book1 (0.1Mb) Location	
File Owner	Alternative Contact	Department	File Commonly Known As	File Categorisation	File Complexity	
			<i>E.g. Weekly Summary</i>		0.0 / 10	
File Purpose	<i>E.g. The purpose of the spreadsheet is to take financial data from the monthly income spreadsheet, copy and paste the income data streams and calculate current tax, plus trend analysis on the past 5 years data. Output is provided to the Finance Director on the third working day of each month.</i>					
Instructions for Use	<i>E.g. Either the location of the instructions document, such as 'See Instructions.docx situated in the same folder as this report' or the actual instructions on how to complete the report.</i>					
Data Source Descriptions	Required	Details (if applicable)				
Manual Entry		<i>E.g. Month/Year, BoE Interest Rate, Sick Days etc.</i>				
Intra-Department		<i>E.g. Weekly Management Summary etc.</i>				
Inter-Department		<i>E.g. Monthly Summary from Finance, Attendance Report from HR etc.</i>				
External		<i>E.g. Bloomberg, BoE Risk Summary etc.</i>				
Output (If applicable)	Audience (If applicable)	Run Frequency	Run Date or Time	Last Approved Date	Last Approved By	File Approvals
<i>E.g. Entire file or Data Sheet</i>	<i>E.g. Finance Director</i>		<i>E.g. 1st of Month</i>			
3 Visible Worksheets						
Sheet Name <small>(Click to navigate directly to sheet)</small>	Complexity Score	Formulae	Formulae Protected	Size <small>(Rows v Columns)</small>	Notes or Description <small>(Optional input by user)</small>	
Sheet1				Empty		
Sheet2				Empty		
Sheet3				Empty		
No Hidden Worksheets						
No References or Links to Other Files						
No Macros / VBA						
Testing or Approval Strategy	<i>E.g. This report must produce the same tax liability as the Finance Report & the same income as the Monthly Director's Report. Results must be verified over two different quarters to ensure there are no rounding issues.</i>					
Test Evidence Location						
File Archive Location					File ID	John160123.171619
Structural Change History					Lifetime of Changes	Unlimited
ID / Date on or before	Item	Item Name	Action		Initials / Add Comment	
23-Jan-16	Workbook	Table of Contents created				

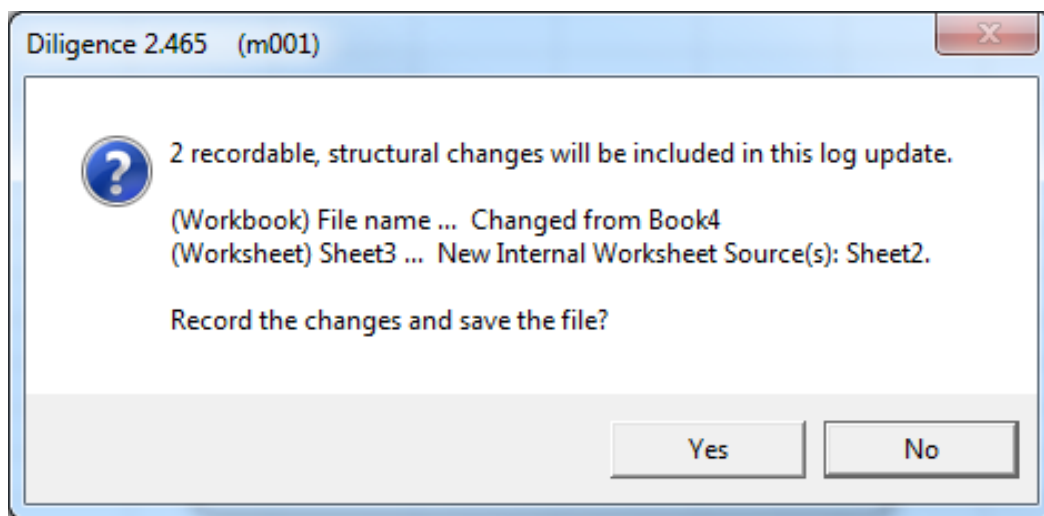
Option to Record Structural Changes

By default, Diligence will automatically save the file once a ToC has been updated. This is by design and ensures that the changes are logged on the file.

However, it is possible to use Diligence to simply 'check' whether any structural changes have been made to a file, by disregarding its findings after performing the function.

This may be desirable, for example when extra formulas have been added to a file to test a scenario, and subsequently deleted. You can use the Diligence ToC to check that all the added formulae were successfully removed.

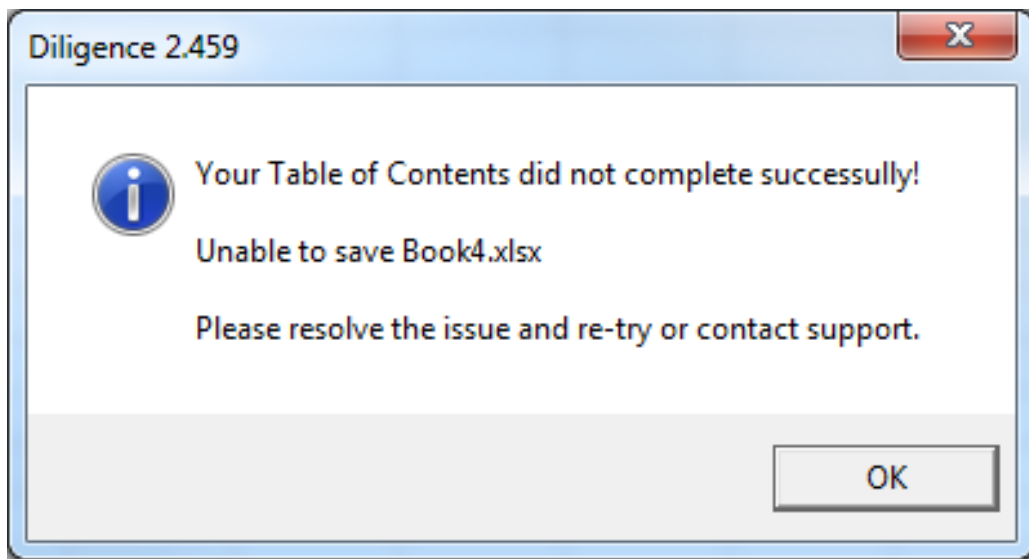
To offer this choice, once Diligence has finished its analysis, a userform similar to that displayed below will be shown, giving the user three options ...



- YES: Record any changes on the worksheet and save the file. (Default)
- NO: Discard the findings. Do not amend the file.

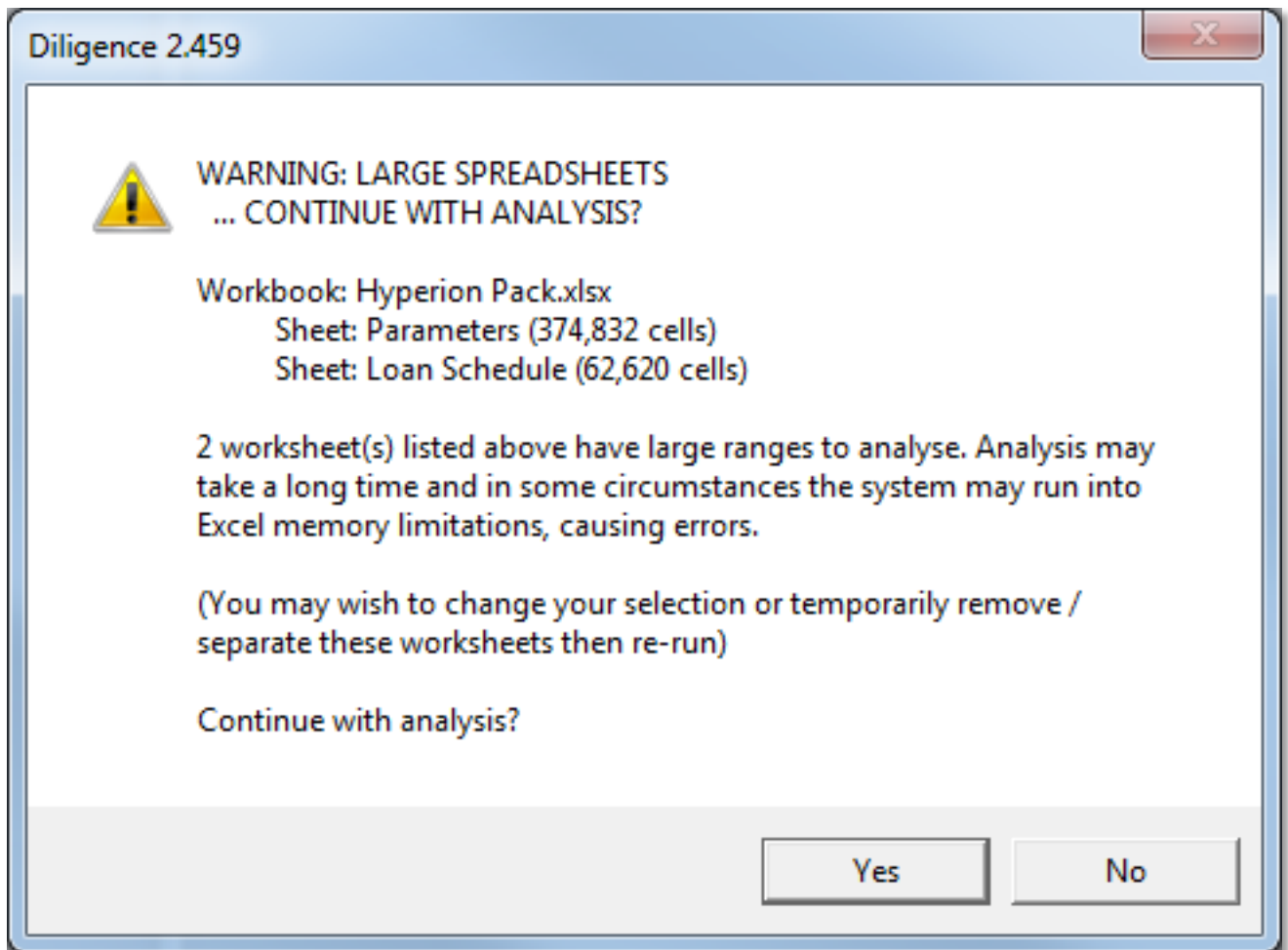
Please note this option is not displayed where there is currently no ToC on the workbook or the file has never been saved. In this situation, the ToC is automatically added/updated to the file and, if possible, saved.

Note that if the file is read-only or in a read only path, then Diligence will be unable to save the file. If this occurs the changes will be sent to the file but an error message similar to that below will be displayed.



File Size & Processing Time

There is no limit to the size of worksheets being analysed, however a warning is issued when one or more worksheets exceeds a used range in excess of 50 000 cells. The warning gives the user the opportunity to cancel the instruction, as in the example below warning the user of two large worksheets in the file ...



The actual time taken to analyse worksheets varies considerably based upon the number and type of formulas and the sheet's overall complexity, together with the computer and memory/processing resources available.

As an order of magnitude expect a small worksheet to take a few seconds, a medium worksheet 10-20 seconds and a complex sheet about a minute. Extremely large and complex worksheets can take an hour or more.

Location of the Table of Contents Worksheet

By default, the ToC is entered as the first visible worksheet on the file. However, full system functionality is retained if the sheet is hidden or moved by the user. Users are free to move, hide or 'very-hide' the ToC at any time.

Removing the Table of Contents Worksheet

The ToC can be removed by any user at any time using the same method as other worksheets. No legacy of its previous existence will remain on the workbook.

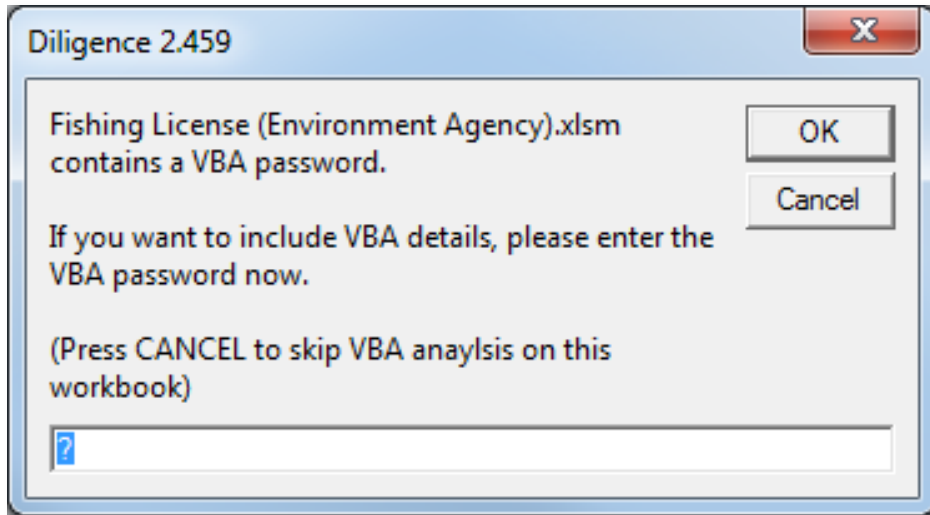
If the ToC is first saved before removal, it can be re-inserted (copied back) at a later date and the ToC subsequently updated to expose any structural changes. This can be useful if a user wants to 'silently' uncover changes being made by other users, or if there is a need to have multiple 'start points' for any change analysis. For example, one ToC updated yearly for audit purposes, and one update quarterly for change analysis.

Please be aware that a workbook can only have one ToC sheet at any given time.

Limitations, Issues & Tips

VBA is Password Protected

If the VBA of the source file is password-protected, then the user will be prompted for the password, similar to the example below ...



If the user does not know (or chooses not to enter) the password, then a confirmation user form will be shown ...

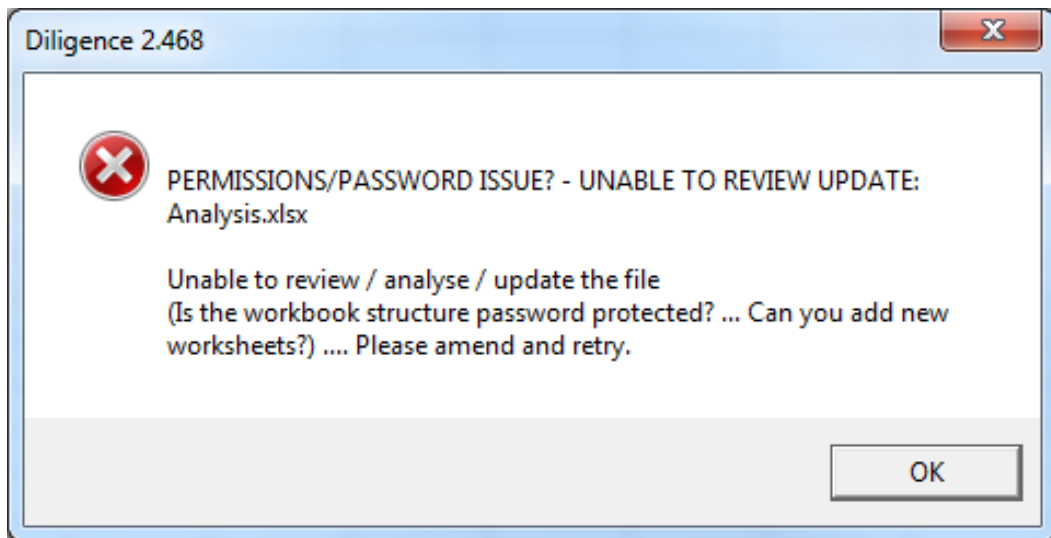


If the user continues without entering the password, then a note is made in the Structural Change History section that the VBA was not assessed.

Structural Change History			
ID / Date on or before	Item	Item Name	Action
045: 31-Jan-16	VBA	Unchecked. No Access/Password	Macro

File Structure Protected

If the workbook structure is protected without a password, then Diligence will unprotect the workbook and enter the ToC. However, if the workbook structure is password protected then the following style of message will be displayed to the user, and the action terminated.



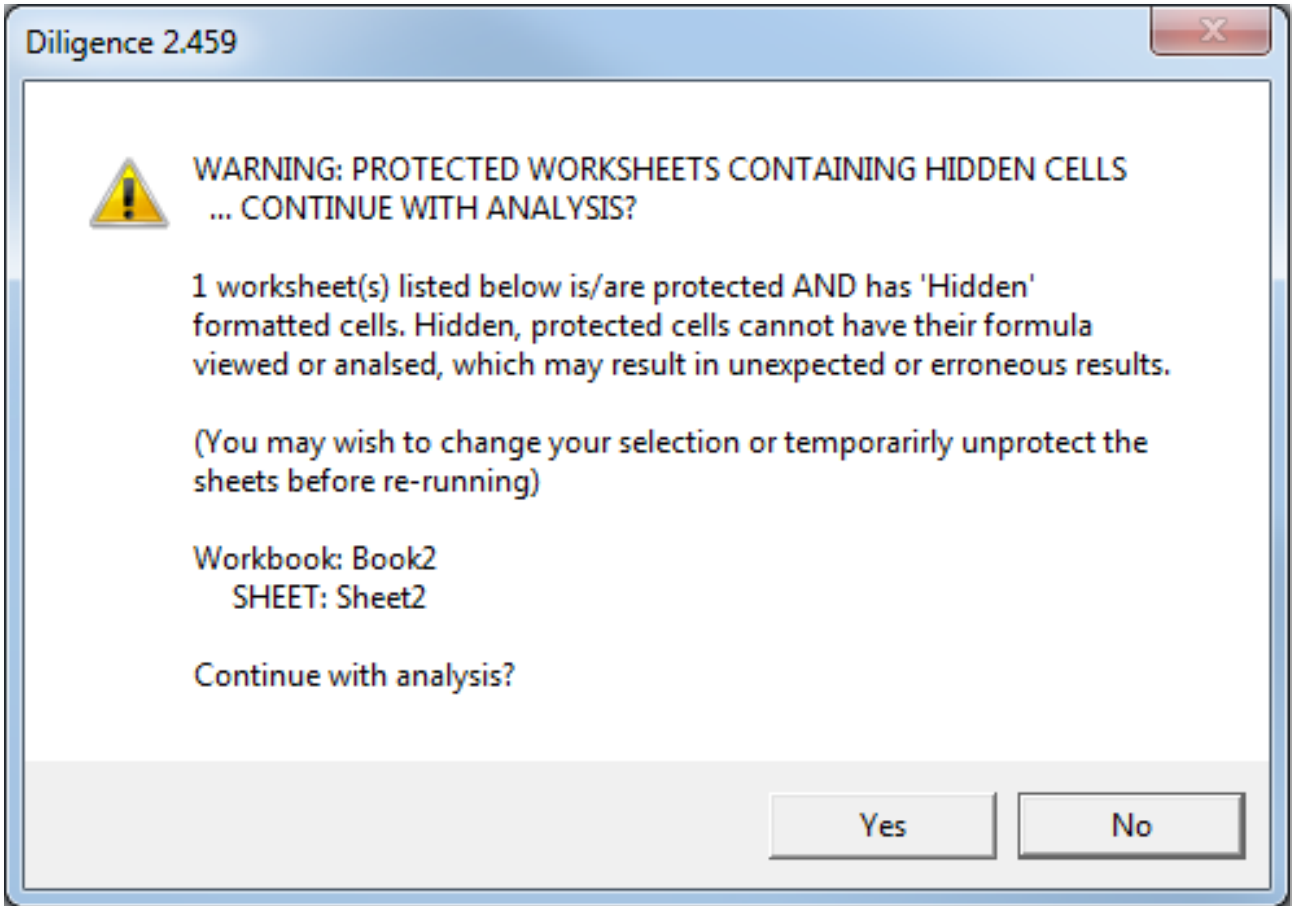
Read-Only Files

Read only file cannot have a Table of Contents sheet added or updated. Users can still create a Workbook Analysis report which will include a new (or updated) Table of Contents sheet within the report.

Hidden Protected Formulae

When cells have been hidden AND the worksheet has been protected to prevent cell changes, then Excel denies all requests by another Excel file, such as Diligence to query its contents or formula.

If this scenario is encountered, then the user is presented with a userform explaining the limitation, and where it has occurred, for example ...



If the user opts to continue, then the Structural Change History will reflect that these cells could not be assessed, similar to the entry on the second row below ...

Structural Change History			
ID / Date on or before	Item	Item Name	Action
002: 25-Jan-16	Worksheet	Sheet1	1 fewer text item
001:25-Jan-16	Worksheet	Sheet1	1 HIDDEN / PROTECTED CELL:

Formulae Referencing Other Workbook: Open vs. Closed Files

When formulas referencing external formulas are included in a file, the formula itself changes if the file is closed or open ...

For example, with Book4 opened, a formula might look like ...

```
=[Book4.xlsx]Test1!$B$4
```

But with Book4 saved and closed, the exact same formula might show ...

```
= 'C:\Users\John\Documents\[Book4.xlsx]Test1!$B$4
```

Depending on when the ToC is run, the recorded formula may therefore be stored differently. In these cases, the ToC will show the following message (assuming no other changes)

All structures match, but different sheet names/ranges are being referenced: Formula results likely to differ.

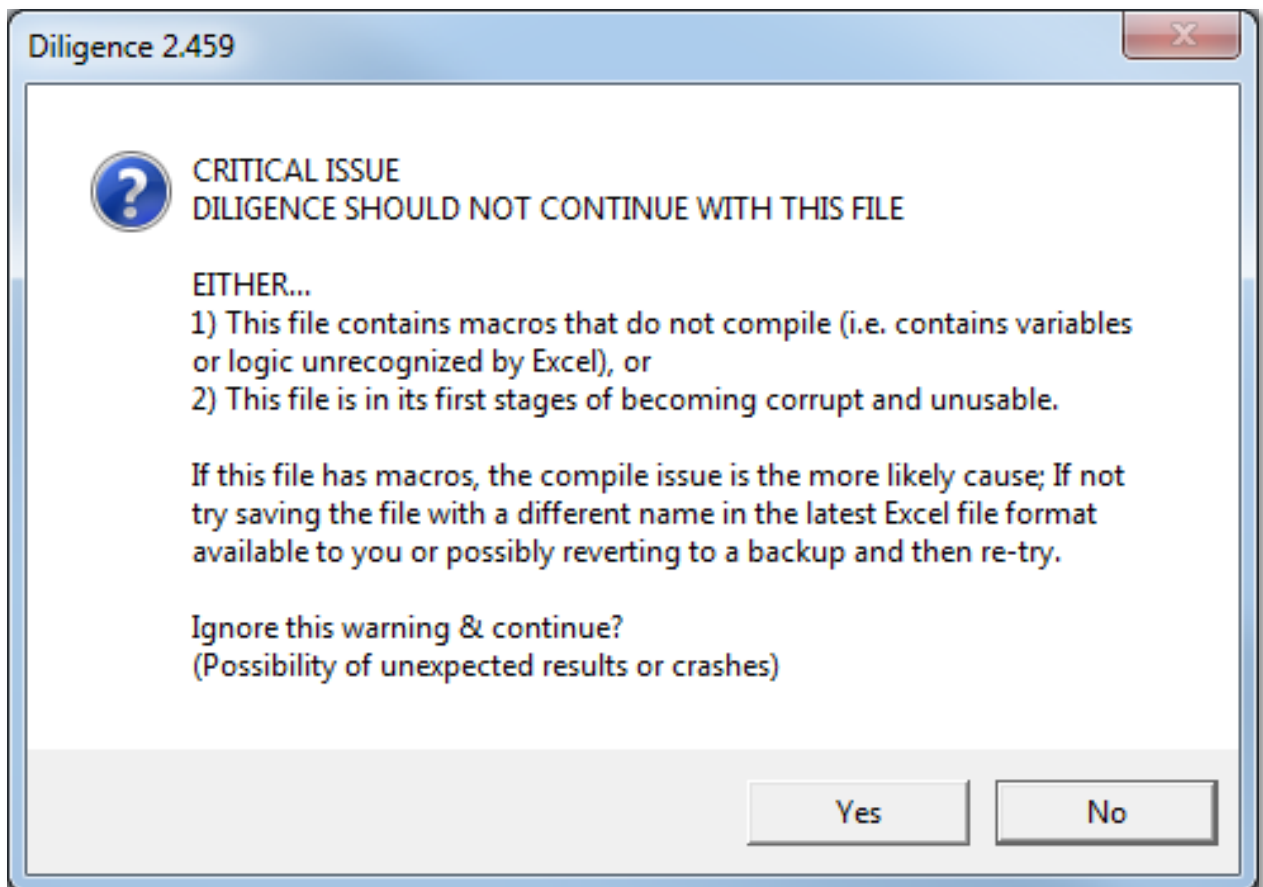
Tests for Non-Compiled Workbooks and File Corruption

Diligence queries Excel about the file(s) upon which it is working.

If Excel fails to answer Diligence's 'questions', then Diligence cannot accurately complete all of its tasks. In some situations, it cannot proceed at all.

Apart from password protected hidden cells, and denial of Access to the VB Project (covered separately above) the most common reasons for failure to ascertain information are non-compileable and/or corrupt files.

Diligence tests for these scenarios in a number of ways in an attempt to anticipate them. If any file fails these tests a warning is issued to the user, similar to that below ...

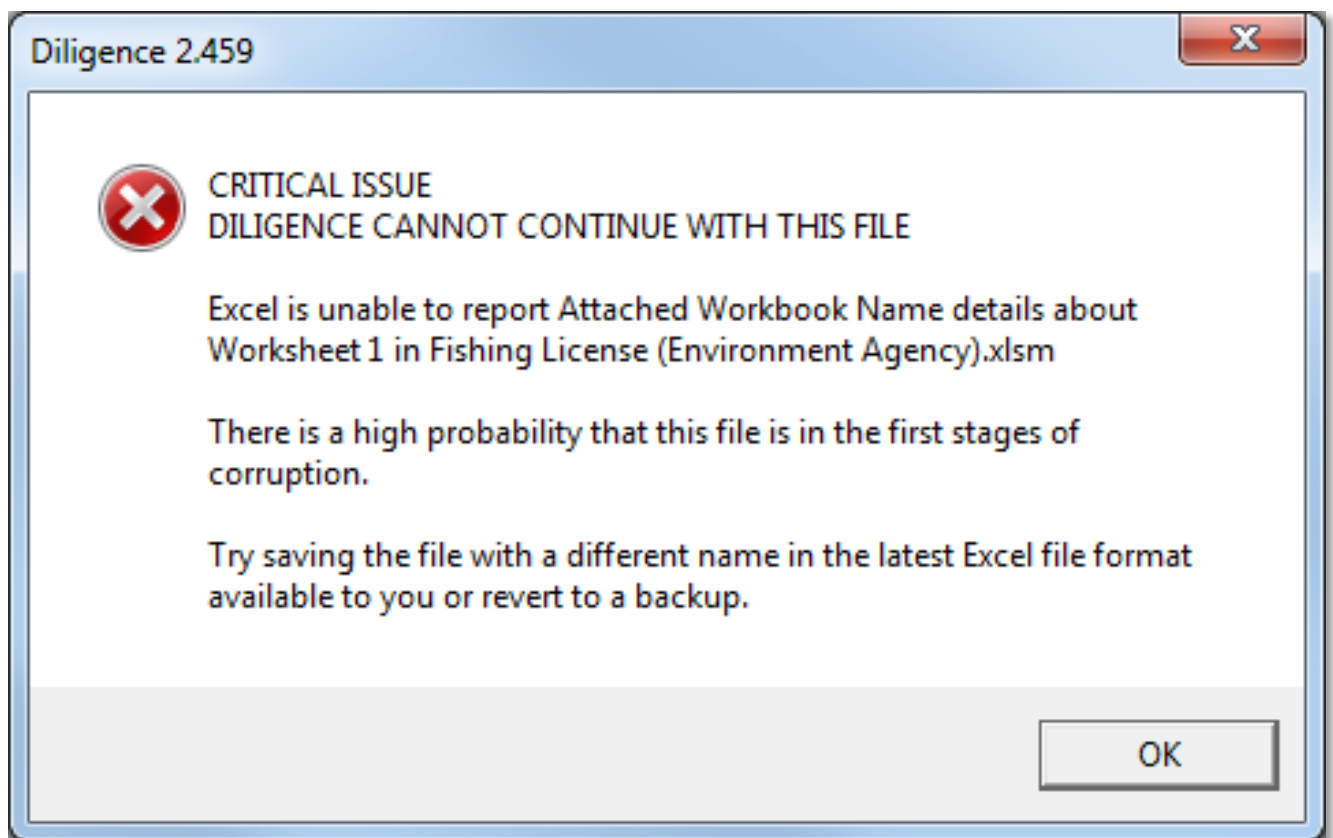


If the user receives this warning they are strongly advised to take the action recommended, which is to say compile the file manually to resolve any errors, and/or save the file to the latest file format, and/or revert to a backup.

However, it is accepted that these options are not always available and the user has the option to ignore the warning (by pressing 'Yes' on the above form)

In many cases the file problems will not impact the Diligence process, but should the user choose to ignore the warning, a record that a warning was issued is kept for the duration of the Excel session and will be included in any Diligence error logs.

On some occasions, however, it is known that the system will be unable to continue with the file. In this case a warning similar to that shown below is displayed to the user ...

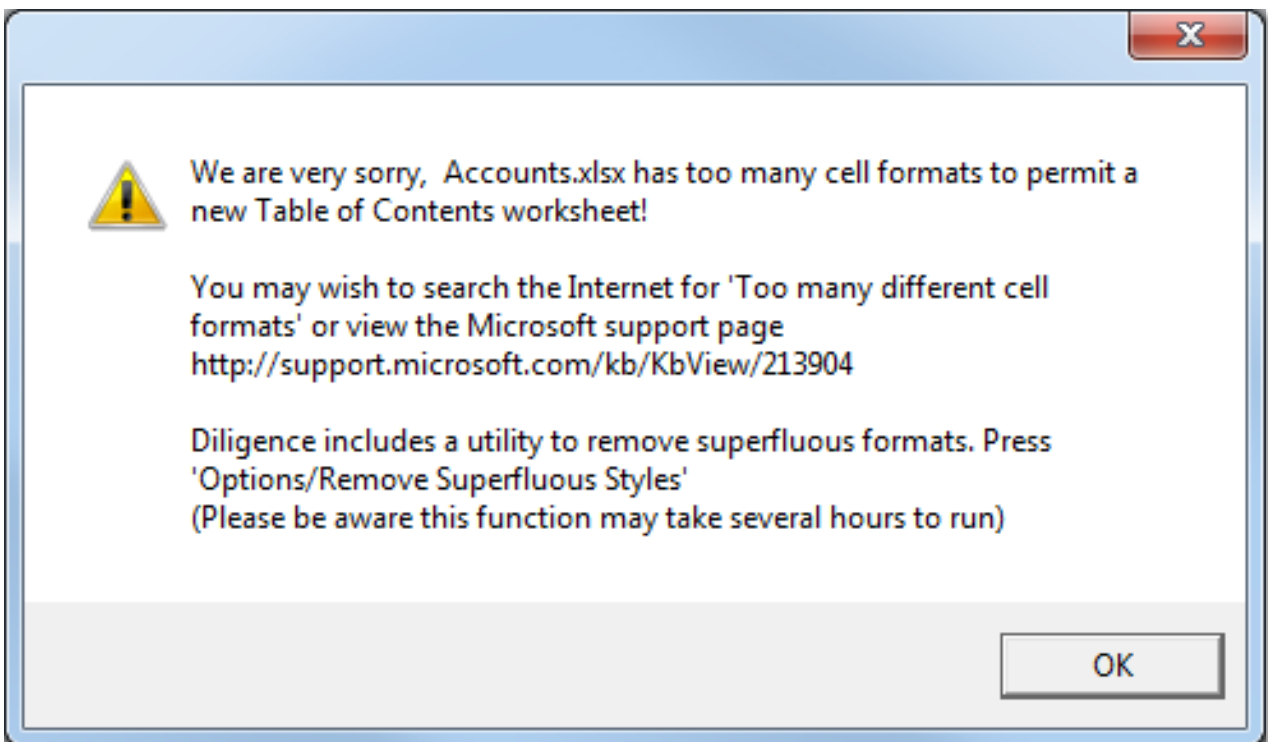


Too Many Cell Formats

Due to a legacy Excel issue dating back to Excel 2003, some workbooks cannot accept a new worksheet because it would exceed Excel's style limitation.

This is anticipated by Diligence, and users are alerted to the problem. Diligence also contains a utility to remove superfluous styles. (see 'My Diligence / 'Utilities')

Search 'Excel too many cell formats' for much more information on this problem.

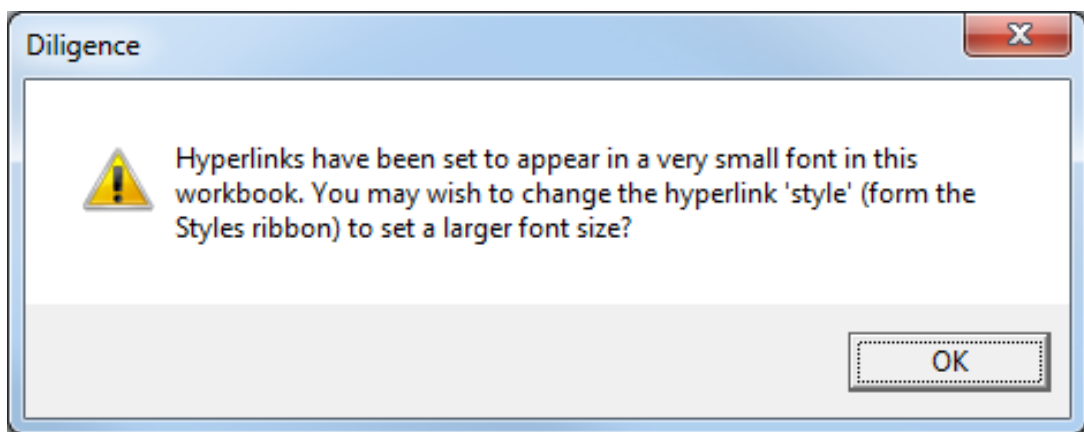


Other Limitations & Issues

Hyperlink Font Size

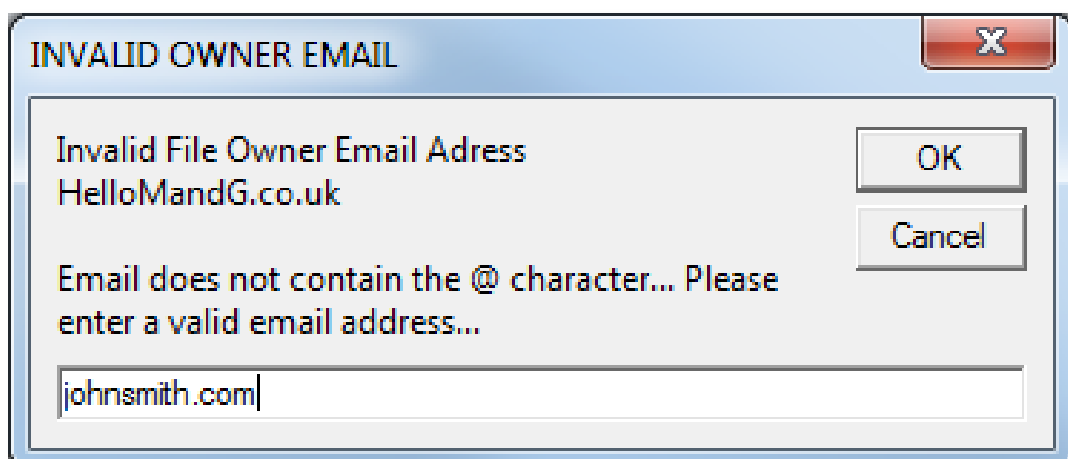
In rare situations Diligence may be unable to set the hyperlink font size and colour. This is an issue outside of Diligence's control and there is currently no plan to address the problem further.

However, if the font size makes the hyperlinks (to the visible worksheets) too small then a message is issued to the user, similar to that shown below. In this case if the user deems the size/colour unacceptable the hyperlink font will need to be changed manually.



Invalid email address

If an invalid email is detected in the file owner field, then a userform is displayed and the issue must be corrected before a ToC is created or updated.



Also ...

- Changes to Comments, Text Boxes, Charts, Shapes and other objects are not recorded on the ToC.
- A Table of Contents cannot be added to a Diligence Summary report.
- Diligence will not assess and/or report on more than 99 contiguous ranges per worksheet.
- Diligence will not record more than 99 references to other workbooks or program files or databases.

FAQ...

My file is extremely confidential...Is it safe to have a ToC?

It is entirely safe. The ToC contains a snapshot (metadata) of the file's contents when the ToC was last updated. The names of the worksheets, names of any macros, and names of any links or references to other files are logged and displayed, but no cell formulas, contents or comments are stored.

Does the ToC monitor what changes I make?

No. The ToC is completely benign. It only compares the current workbook contents to its previous summary when the ToC is updated.

How often should I update the ToC?

As a minimum, it is recommended that the ToC is updated whenever important changes have been made to the file, such as after a design change or changes to accommodate new data, although many users update the ToC after each cycle of the report, to check that no changes have been made.

In addition, if key user-defined fields on the ToC have been amended a warning is displayed in red, just below the company logo on the ToC ...

“Some Important User-Specified Details Have Been Amended on This Table of Contents Sheet: Please Re-Run the ToC From The Diligence Ribbon To Log These Changes”

Can the ToC be updated automatically?

It is against the ethos of the Diligence system to take control of users' files and update (and hence record) changes on an automated basis. However, on request we can provide users with a small macro that can be attached to any Excel file that will automatically update the ToC. Please contact us for more details.

Professional Tips

- The ToC can be a useful aid to prove to auditors that no structural changes have been made in a file. something that is otherwise quite difficult.
- Sheet names in the Visible Worksheets section are also hyperlinks. Click the name to navigate directly to the worksheet.
- If you find that the ToC is logging numerous changes each time it is run, and the worksheet is becoming clogged with information consider limiting the number of changes recorded by selecting an appropriate option from the 'Lifetime of Changes' dropdown at the top right of the 'Change History' section.
- The length of time last taken to create(update) the ToC is shown just under the 'Last ToC Update' date at the top of the ToC worksheet.
- Legacy sheets such as Excel 4 Macro Dialog & Macro Sheets, plus dedicated Chart sheets are not analysed on the ToC, but are listed in red text at the top of the Visible Worksheet section.
- If a ToC is created on a previously unsaved file, then by default it will not be saved into the user's inventory, even if the user's default setting is to save all ToC files to the inventory. This is because it would have a fairly meaningless title (e.g. Book2.xlsx) and it is unlikely that the file with that name would/could ever be re-opened.
- Some (lemon) user entries may have multiple lines of data entered, and the text will appear to be truncated. This can be resolved by clicking the Table of Contents option on the ribbon. Diligence will resize the appropriate rows automatically (The ToC function does NOT have to be run)

Table of Contents: Further Reading & Associated Articles

Full List of ToC Fields

Workbook Summary Information

1. *File Name, Path and Size.*
2. *File Complexity Score.*
3. *Number of Visible and Hidden Worksheets.*
4. *Number of Macros/User Defined Functions & Lines of Code.*
5. *Number of Links & References to Other Files.*
6. *List of Excel Legacy Worksheets, e.g. Excel 4 Macro Sheets.*

Worksheet Summary Information

For each worksheet ...

7. *Worksheet Name (with hyperlink to jump straight to visible sheets).*
8. *Visibility Status (Visible, Hidden or Very Hidden).*
9. *Overall Complexity Score.*
10. *Used Sheet Size (Rows x Columns).*
11. *Number of Hidden Rows and Columns.*
12. *Whether or not the sheet contains Formulas.*
13. *If / How many Formulas are Protected.*
14. *List of Other Files Referenced.*
15. *List of Worksheets within the File Referenced.*
16. *List of Functions Used e.g. SUM(), IF(), VLOOKUP()*
17. *List of Compound Functions Used. E.g. SUM(IF(VLOOKUP)))*
18. *Number & Location of any Cell Errors. E.g. #REF(), #NA()*
19. *Num' & Location of 'Orphan' num's (not included in any formula).*
20. *Num & Location of Value Cells that may be Overwritten Formulas.*
21. *Num' & Location of Cells Containing Numbers Formatted as Text.*

22. *Number & Location of Cells that have an Inconsistent Formula.*
23. *Location & Complexity Score of Sheet's most complex function.*
24. *Number & Location of Cells Containing 6 or More Functions.*

Please note that many of the formula details are not overtly displayed, but contained in a cell comment. You can read more about why these are highlighted in the Workbook Analysis section.

Links & References

(Requires Access to VB Project)

For each link or reference to another file or program ...

25. *Link or Reference Name & Path*
26. *Example of Cell That Uses the Reference (if possible).*
27. *Database Tables mentioned in VBA.*

Macros & User Defined Functions (UDFs)

(Requires Access to VB Project)

For each macro or UDF ...

28. *Name & Worksheet / Module Location.*
29. *Lines of Code, excluding comments.*
30. *Hard-Coded Line Warning (Hard coded macros may need to be changed with the sheet structure).*
31. *Macro Description (If available).*

Workbook History

Each time the Table of Contents is updated one Change History Row is created, indexed and appended at the base of the Table of Contents sheet for each of the following changes...

- 32. Worksheet Added, Deleted, Renamed or Visibility Changed.*
- 33. Worksheet Formulas Added, Deleted or Changed.*
- 34. Values Added, Deleted or Changed (excludes Formula results).*
- 35. Hidden Rows or Columns Changed in a Worksheet.*
- 36. Macros Added, Deleted, Renamed or Changed.*
- 37. File Name or Path Changed.*
- 38. Key User Defined Table of Contents sheet' Data Changes (E.g. Owner, Archive Location)*
- 39. Links or References Added, Deleted or Renamed.*
- 40. The Update Date, Time & User is also logged.*

Table of Contents Metadata

- 41. Last Table of Contents Update date.*
- 42. Time Taken for Last Update.*
- 43. User Name for Last Update.*

User Defined Data

The following fields are not populated automatically and are entirely optional within the system, although the company spreadsheet policy may mean some or all are mandatory fields.

44. *File Owner.*
45. *Alternative Contact.*
46. *Department.*
47. *Alternative/Common File Name.*
48. *Level of Importance.*
49. *Purpose of the File.*
50. *Instructions for File Use.*
51. *File Output.*
52. *Audience or Distribution List.*
53. *When and How Often the File is Run.*
54. *Approvals; Who, How Often Required and Date Last Approved.*
55. *Description of Each Worksheet.*
56. *Description of Macros*
(In-Line macro descriptions are automatically copied across if available).
57. *Testing Details or Strategy & Location of Test Evidence.*
58. *File Archive Location.*

Workbook, Worksheet & Formula Complexity Algorithms

Complexity Score Metrics

Level of Complexity is a big topic amongst Spreadsheet Auditors and Analysts. The level of spreadsheet complexity will often dictate the likelihood of an audit investigation, the level of support required or the need to fully test and document the spreadsheet.

By its very nature 'complexity' is a subjective matter, and what may be simple to one user may appear complicated to another. Diligence uses a set of standard metrics to calculate its formula, worksheet and workbook complexity results. The figures produced are therefore consistent and can be used confidently to compare one workbook against another.

This section is designed to give readers a meaningful understanding of the structure and implications of the Diligence complexity scores.

Workbook Complexity Overview

The overall workbook complexity score is a number from zero to a theoretical maximum of 10, where zero represents an empty workbook and 10 an extremely complicated workbook.

The number is calculated using an exponential method, such that the score reaches mid-levels with a small number of complicated features, but as the score approaches 10 a significant increase in complexity will result in only a small increase in the score.

The key driver for workbook complexity is the complexity of the individual worksheets, but other factors such as hidden sheets, links, references and macro code are also taken into account.

Typical workbook complexity scores

Complexity Score 9.0+

Typical example: Report with several data feeds, macros & complex functions.

It is likely that the workbook will consist of numerous worksheets containing abundant intricate formulae. Some sheets may be hidden. It may have real-time data feeds, VBA, references to extended or third party functions & links to other workbooks. It is unlikely a lay person would easily understand this workbook.

Complexity Score 7.0

Typical example: Financial report with a data feed and summary sheet

This is the level of advanced spreadsheets designed by in-house experts or third party

consultants. These workbooks may consist of numerous worksheets that are likely to

contain advanced/nested Excel Functions. It is quite possible they will include macros/VBA or enhanced functionality via addins or third party references. It would take a lay person a significant amount of time to understand this workbook.

Complexity Score 5.0

Typical example: Financial statement

This workbook is likely to contain a few data sheets with formulae. Some sheets may be hidden and there are likely to be one or two links to other files or some basic macros.

Complexity Score 3.0

Typical example: Basic expense form

This workbook is likely to contain one or two data sheets with simple data structures

and perhaps a few basic formulae. The file will not have macros, and is unlikely to have a pivot table or link to another file.

Complexity Score 1.0

Typical example: Inventory list

Single worksheet with one range of data. No formulae.

Worksheet Complexity Overview.

Individual worksheets are also given a complexity score. Unlike the overall workbook complexity score this number is a simple addition of many weighted factors, such as the number and type of formulae, the use of hidden rows, and links to other worksheets and workbooks. In reality, it is most unlikely that any one worksheet would score above 6.0. The overall workbook score is based heavily on the number and spread of the individual worksheet scores and will always be a figure the same or higher than the most complicated worksheet score. A good analogy to worksheet scores is the relevant amount of time it would take for a lay person to completely understand the working of that worksheet.

Formula Complexity Overview.

Each cell formula is also allocated a complexity score. Unlike the worksheet and workbook complexity score this figure has no upper limit, and is calculated according to the Functions used within the cell. A higher complexity score is allocated for the use of User Defined Functions (UDFs) and Array Formulas (also known as Brace or Curly Brackets Formulae) In addition, weighting is given to the level of function-nesting within the formula plus the number of additional arguments.

Example Formula Complexity Scores	Complexity Score
=IF()	1.2
=VLOOKUP()	1.5
=IF(SUM(SUM()))	2.0
=IF(ISERROR(VLOOKUP()),AVERAGE(ROUNDUP()))	6.0

A score above 6 is defined as complex for the purpose of displaying in the complexity commentary on the ToC worksheet comment and the Analysis Workbook.

Factors Used in the Complexity Scores

Factors used in the calculation of worksheet complexity...

- The number of formula cells on the worksheet
- The number of different formulae used
- The complexity of the formulae used (Including nested formulae)
- The use of array formulas
- The number of different formula groups used (e.g. Statistical, Logical, Data)

- The number and complexity of any macros or VBA attached to the worksheet
- The number and spread of hidden rows and columns
- The number of linked worksheets within the workbook
- The number of linked worksheets in other workbooks
- The number and structure of contiguous ranges within the worksheet
- The overall used range of the worksheet

Factors used in the calculation of workbook complexity...

A figure is calculated based on the three highest worksheet complexity scores, the spread of complexity scores and number of worksheets (the base score). This figure is then augmented with the following factors ...

- The number of hidden and very hidden worksheets
- The number of references to additional or third party functions (E.g. Bloomberg)
- The use of Real-Time-Data
- The amount and complexity of any macros or VBA, not included in the Worksheets above.

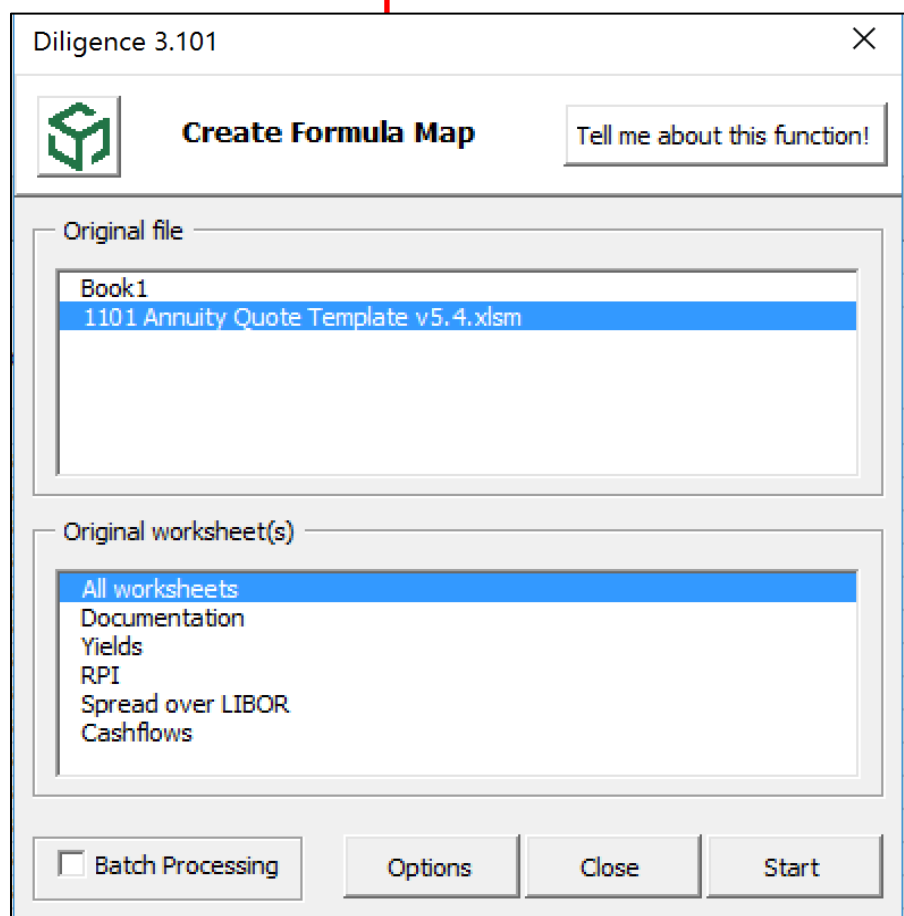
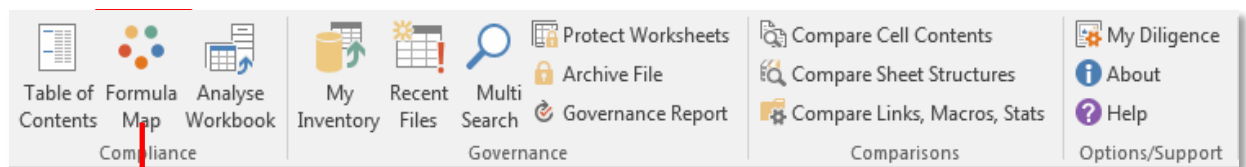
Formula Map

The Formula Map helps users understand the structure of an Excel file by colour-coding different formulas in their own colour. It is useful for exposing material errors and structural anomalies in complex spreadsheets.

Creating A Formula Map

A Formula Map can be created from any Excel worksheet or workbook by pressing 'Formula Map' on the Diligence ribbon, and then pressing 'Start' from the resultant userform.

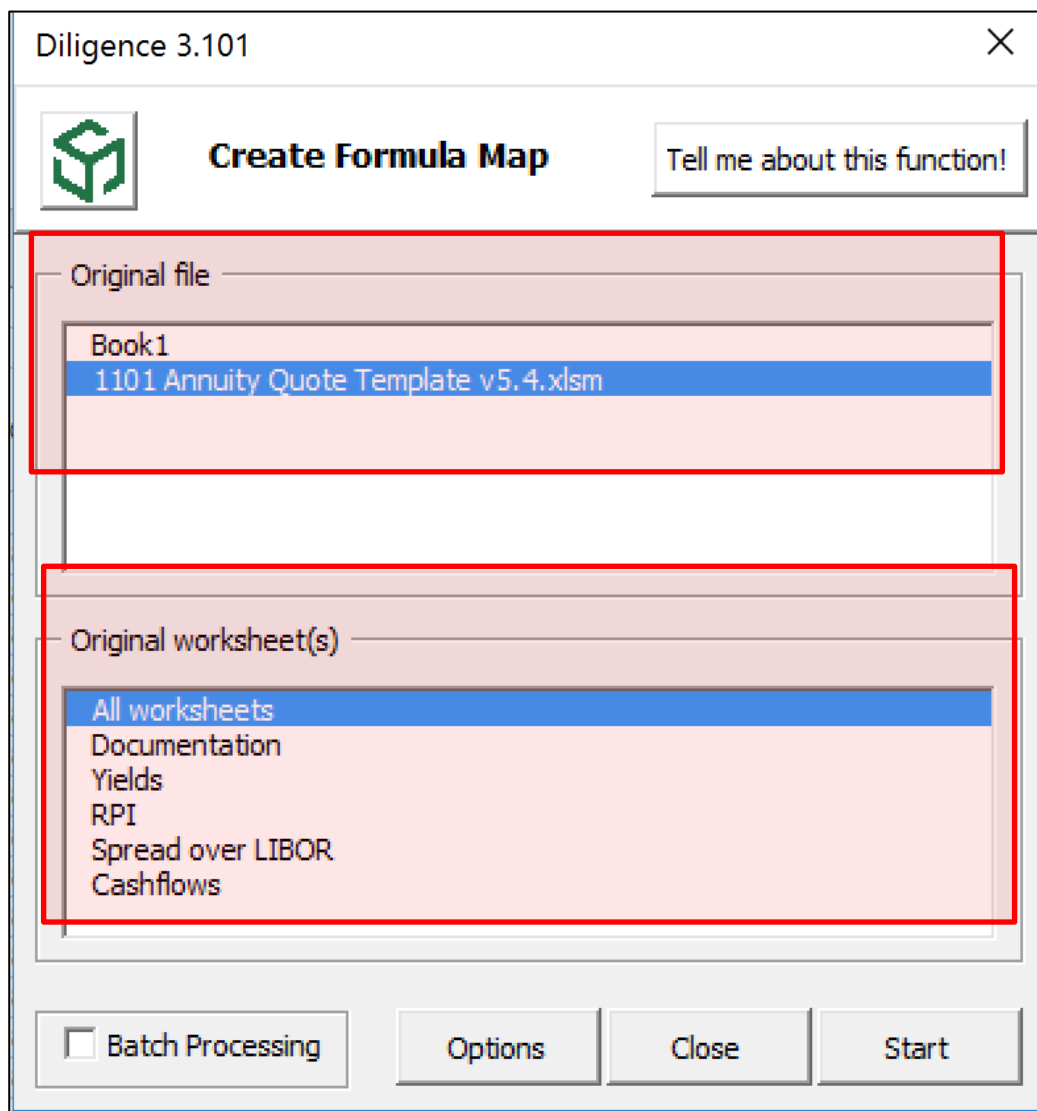
The original file is left untouched.



Map a Single Worksheet or All Populated Worksheets

A Formula Map can be created either for a single worksheet, or an entire workbook.

After selecting the required workbook in the top section of the userform, select whether to map a single worksheet or the entire workbook.




The default setting is 'All worksheets', but any single worksheets can be selected directly from the userform. This may be useful, for example, when the workbook contains one or more extremely large worksheets that have already been analysed.

Please note that workbooks or worksheets containing no data will not be shown in the lists, and will be excluded from any Map workbook.

Simple Formula Map Example

Below is an example of a simple test worksheet and its resultant Formula Map ...

Sales This Month				
	USA	Canada	Europe	Total
Bonds	2000	1000	300	3300
Equities	2100	900	400	3400
Interest	2200	800	500	3500
Other	2300	700	600	3600
Gross	8600	3400	1800	13800
Tax	10%	22%	15%	
Net	7740	2652	1530	11922



Sales This Month	USA	Canada	Europe	Total
Bonds	=Data!C3	=Data!D3	=Data!E3	=SUM(C3:E3)
Equities	=Data!C4	=Data!D4	=Data!E4	=SUM(C4:E4)
Interest	=Data!C5	=Data!D5	=Data!E5	=SUM(C5:E5)
Other	=Data!C6	=Data!D6	=Data!E6	=SUM(C6:E6)
Gross	=SUM(C3:C6)	=SUM(D3:D6)	=SUM(E3:E6)	=SUM(C7:E7)
Tax	0.1	0.22	0.15	
Net	=C7*(1-C9)	=D7*(1-D9)	=E7*(1-E9)	=SUM(C10:E10)

The main features of the map are that ...

- Original formatting & row/column sizing has been removed.
- The map displays formulas instead of formula results
- Formulas with the same 'relative' cell-references are shown in the same colour.

Understanding the Formula Map

The formula map's power is in the graphical representation of unexpected changes in formula structure.

By reviewing the different colour patterns, any user can ascertain the consistency of these formula patterns.

A well-designed worksheet is likely to have good consistency in its formula patterns, and although it is reasonable to state that pattern inconsistency is often an indicator of poor worksheet design, the patterns do NOT dictate or even suggest the correctness of the formulas used.

It can be argued that irregular formula patterns are more prone to error and these errors are far more likely to propagate over time due to the inconsistencies in the worksheet's design.

Pattern Inconsistencies Usually Indicate Poor Design OR Potential Errors

Below is a similar test sheet and map. Observe how the orange SUM() formula at Cell D7 shows its inconsistency to the others

	B	C	D	E	F
1	Last Year Sales Summary				
2		USA	Canada	Europe	Total
3	Bonds	26000	11000	2100	39100
4	Equities	18900	11700	2400	33000
5	Interest	30800	11200	5500	47500
6	Other	34500	9800	6000	50300
7	Gross	110200	48300	16000	174500
8					
9	Tax	10%	13%	16%	
10	Net	99180	42021	13440	154641

	B	C	D	E	F
1	Last Year Sales Sumr				
2		USA	Canada	Europe	Total
3	Bonds	26000	11000	2100	=SUM(C3:E3)
4	Equities	18900	11700	2400	=SUM(C4:E4)
5	Interest	30800	11200	5500	=SUM(C5:E5)
6	Other	34500	9800	6000	=SUM(C6:E6)
7	Gross	=SUM(C3:C6)	=SUM(D3:D6)+4600	=SUM(E3:E6)	=SUM(C7:E7)
8					
9	Tax	0.1	0.13	0.16	
10	Net	=C7*(1-C9)	=D7*(1-D9)	=E7*(1-E9)	=SUM(C10:E10)

Formula Map Key

The formula map uses colours and shading to highlight seven different features of the original source file ...

The diagram illustrates a spreadsheet grid with various cells highlighted in different colors and patterns. Red arrows point from descriptive boxes to these highlighted cells. The boxes describe features like 'White background, black writing', 'Grey background, orange number', 'Red Horizontal Stripes', 'Red Vertical Stripes', 'Dotted Background', and 'Formula: Any background colour'.

	A	B	C	D	E	F
1		Sales This Month				
2			USA	Canada	Europe	
3		Bonds	2000	1000	300	
4		Equities	2100	900	400	
5		Interest	2200	800	500	
6		Other	2300	700	600	
7		Gross	=SUM(C3,C5:C6)	=SUM(D3,D5:D6)	=SUM(E3,E5:E6)	
8						
9		Tax	0.1	0.22	0.15	
10		Net	=C7*(1-C9)	=D7*(1-D9)	=E7*(1-E9)	

White background, black writing
Number, Referenced by a Formula on that Worksheet

Red Horizontal Stripes
Merged Cells

Red Vertical Stripes
Cell Prefixed with an Apostrophe (Number evaluated as Text??)

Grey background, orange number
Orphaned Number (Not referenced on worksheet)

Grey background, white text
Text or Date

Formula: Any background colour
Formula: Similar structured formulae in the same region have the same colour

Dotted Background
Hidden Row or Column

For convenience, the key is also displayed on the summary sheet, presented with each Formula Map.


Using a Formula Map as Test Evidence

One of the key uses of a Formula Map is to use as part evidence that the workbook is fit for purpose, especially after a change has been made.

By default, Diligence maps each worksheet in the workbook. In addition, it also creates a summary page that can give extra summary details, and be used to comment on observations or additional evidence. The summary is on the first sheet, and the maps on subsequent worksheets.

Below, is an example of the summary, with dedicated lemon coloured cells for comments...

The Lemon coloured cells can be used to annotate the test evidence or approval at worksheet level, and for the overall workbook. The sheet is not protected, so the user may expand any row height appropriately.



Diligence Formula Map

For tips & information on using this Map go to DiligenceForExcel.com

Name

June.xlsx

Location

C:\Users\John\Documents\Diligence Dev\Training & Manuals

Map Date

5 February 2016, 11:28 am

Map Approval

Map approved by ...	Comments:
Approval date ...	

Key

White background, black writing	Number, Referenced by a Formula on that Worksheet
Grey background, orange number	Orphaned Number (Not referenced on worksheet)
Grey background, white text	Text or Date
Formula: Any background colour	Formula: Similar structured formulae in the same region have the same colour
	Hidden Row or Column
	Merged Cells
	Cell Prefixed with an Apostrophe (Possible number evaluated as Text?)

Map Summary

Go to the individual sheet tabs to see the maps

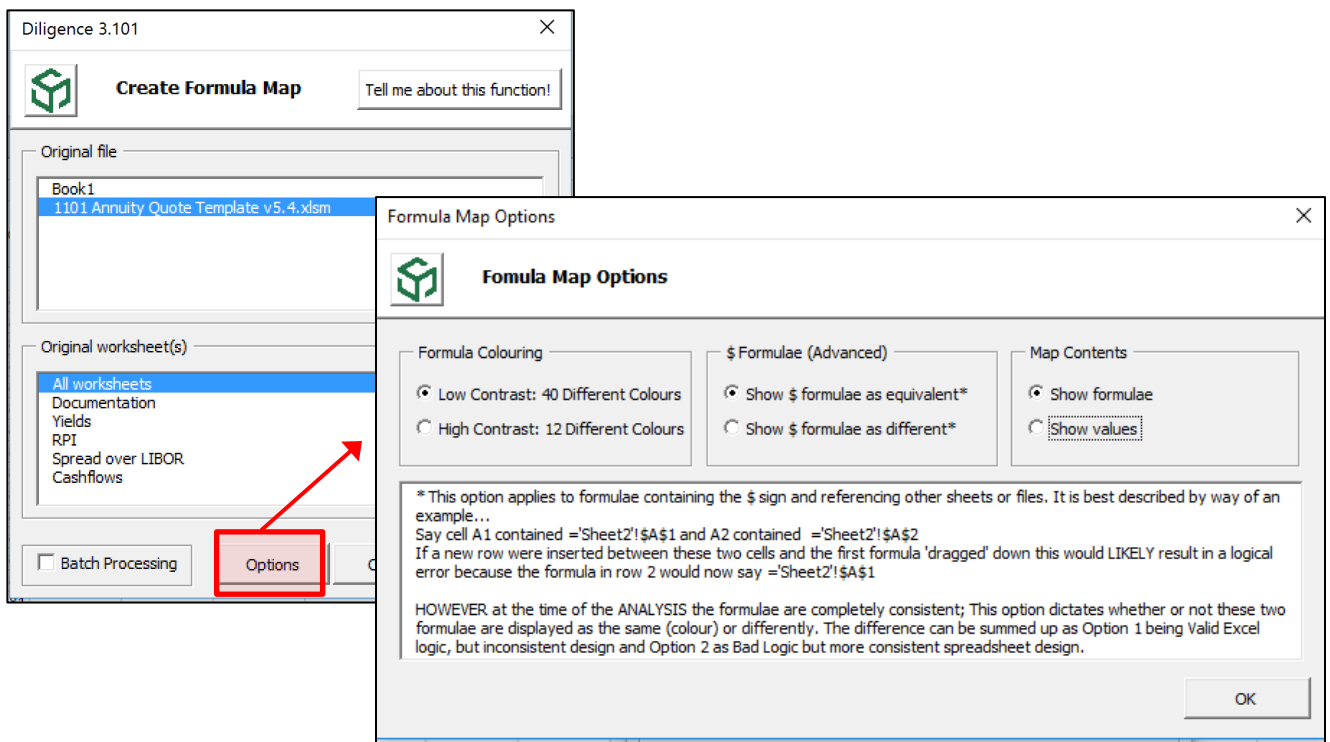
Approver's comments	Worksheet name	Used Cells (Last Cell)	Distinct Ranges	Hidden Rows	Hidden Cols	Distinct Formulae	Orphan Numbers
	Calc	60 (F10)	2	0	0	5	0
	Variance	60 (F10)	2	0	0	5	0
	Data	30 (E6)	1	0	0	1	12
	Last Year	84 (F14)	3	1	0	6	0
	All Map Examples	50 (E10)	2	1	0	3	3

Additional Details

- Worksheet Name; Entered as a Hyperlink to jump straight to that sheet's map.
- Number of Used Cells (Rows x Columns to the Last Cell) & Last Cell address.
- Distinct Ranges; The number of different contiguous ranges on the sheet.
- Number of Hidden Rows / Hidden Cols.
- Distinct Formula; The number of different formulas whose 'relative' contents differ.
- Orphan Numbers: Quantity of numeric values not referenced on the sheet.

Formula Map Options

Three options are available, which are accessed from the main Formula Map userform ...



Formula Colouring

The default selection of 40 low contrast, pastel colours can be replaced with 12 high contrast values. Please note that the 12 colour option significantly increases the probability that two adjacent formulas containing different formulas have been allocated the same colour.

\$ Option

This is a subtle option that is described in detail on the userform ...

This option applies to formulae containing the \$ sign and referencing other sheets or file. It is best described by way of an example ...

Say cell A1 contained `=Sheet2!A1` and A2 contained `=Sheet2!A2`

If a new row were inserted between these two cells and the first formula 'dragged' down this would LIKELY result in a logical error because the formula in row 2 would now say `=Sheet2!A1`

HOWEVER, at the time of the ANALYSIS the formulae are completely consistent; This option dictates whether or not these two formulae are displayed as the same (colour) or differently. The difference can be summed up as Option 1 being Valid Excel logic, but inconsistent design and Option 2 as Bad Logic but more consistent spreadsheet design.

Formulas or Values

On occasion, it may be preferable to display the cell values, as normally displayed on the standard workbook, rather than the default formulas. Note that the cell formulas still define the colour of the cells.

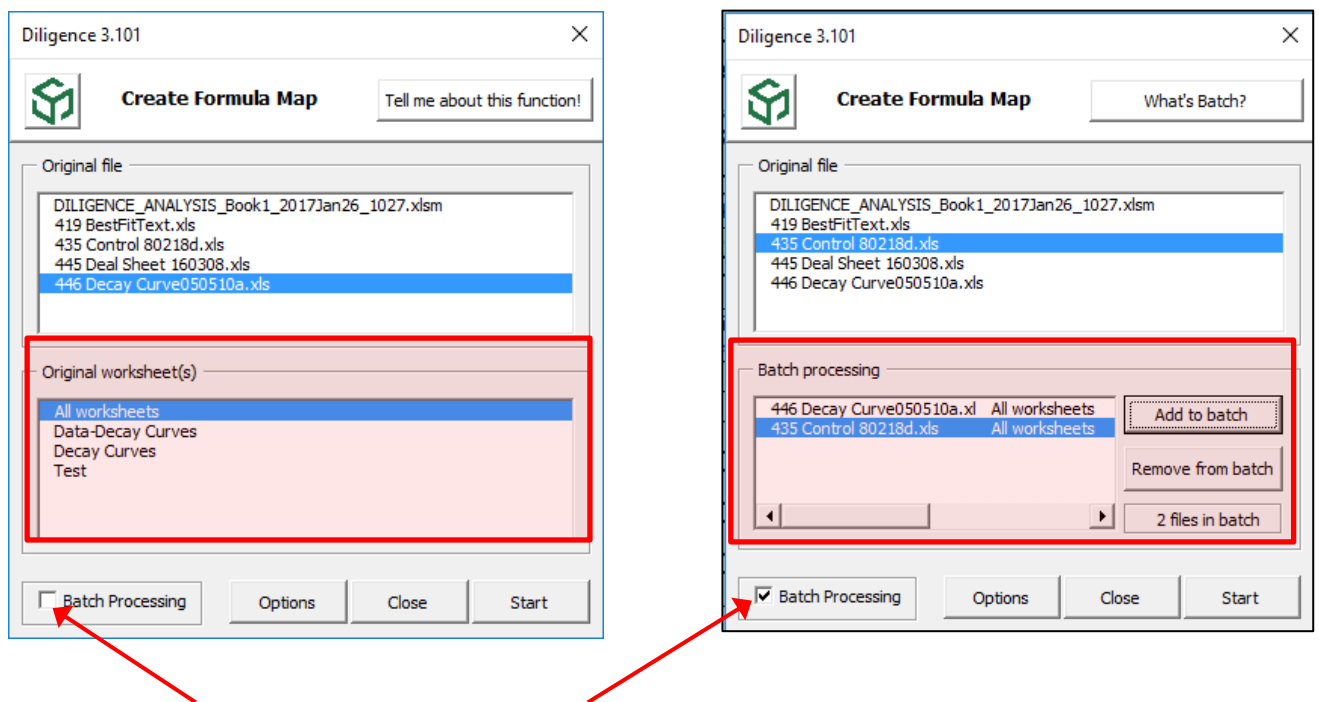
Formula Map Batch Processing

This advanced feature allows a user to create Formula Maps for multiple files unattended.

WARNING

Diligence Batch-Processing leverages the requirements on the user's PC considerably. Users are advised to build up from two or three small files to ascertain how their particular machines performs. The batch function is NOT supported by Diligence; by which we mean users encountering errors will simply be requested to create Formula Maps one at a time.

Batch Processing can be toggled On/Off via the standard Formula Map Userform



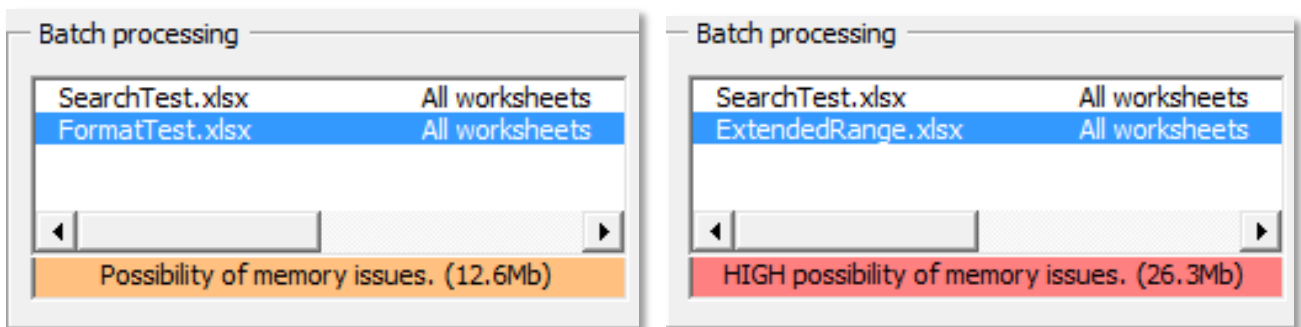
(Toggling the Batch Processing Check-Box)

Toggling results in the lower half of the userform switching between worksheet choice and the list of files selected for batch processing.

In Batch Processing Mode, all the worksheets in each chosen file are processed

When in Batch Processing mode select the relevant files one at a time from the top part of the userform then press the 'Add to Batch' button. Press the 'Start' button when all required files are listed. One report file will be created for each file selected.

An Amber warning is displayed if there are four or more files selected, or the combined selected file size exceeds 10Mb. A Red warning is displayed if there are seven or more files selected, or the combined selected file size exceeds 20Mb

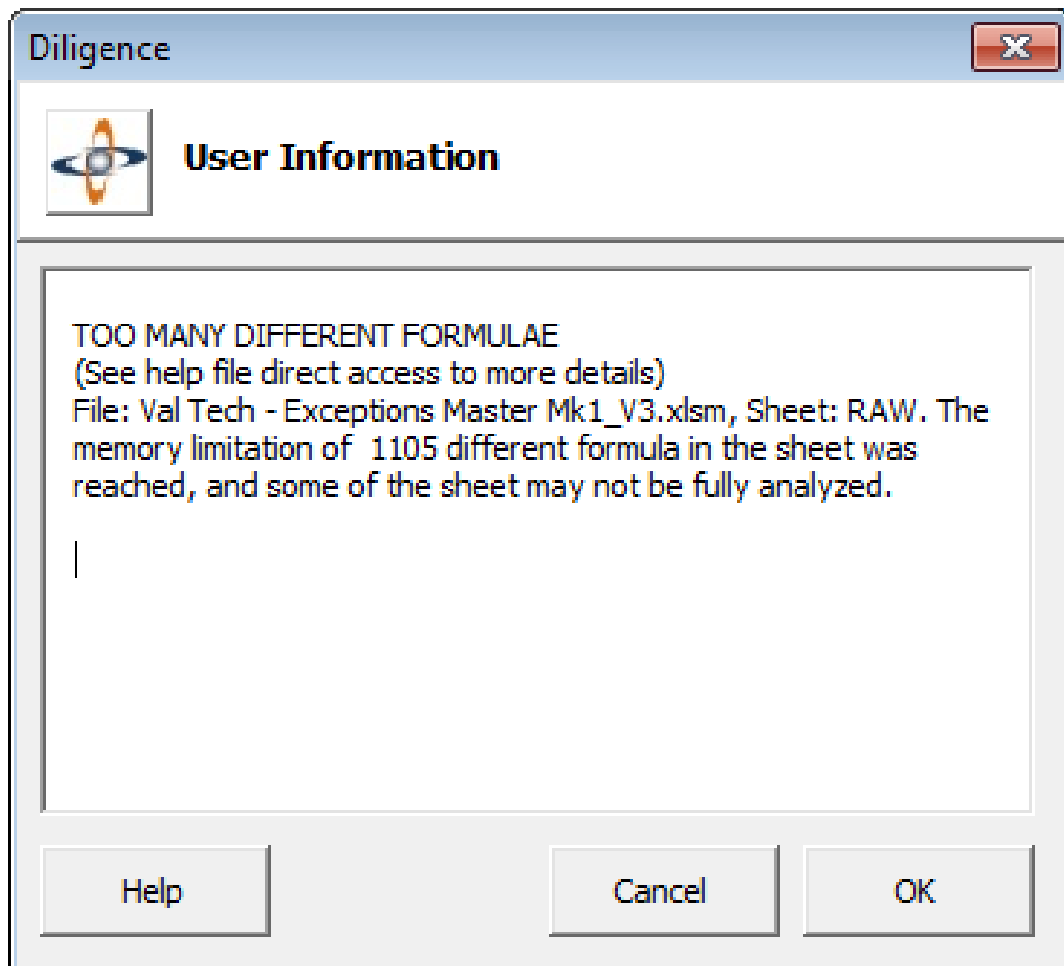


The warnings are for information only, and do not prevent execution of the function.

Limitations

Formula Maps are limited to 99 worksheets. If analysis is required on a workbook containing over 99 sheets, the file will need to be spilt into multiple workbooks.

The number of different formulas that can be ascertained on any one worksheet is limited by memory. The actual limitation is completely dependent on the computer used, and if exceeded a warning like the one below is shown...



Most Asked Questions...

Will the Formula Map find all the structural errors in my workbook?

Not necessarily. The Formula Map is just one of the tools that aids analysis of a file and there is no definitive method by which all errors can be found automatically. It is however, one of the simplest and most productive analysis and error checking tools available and would be expected to be a significant aspect of any user-driven compliance and governance policy.

How long does the Formula Map take to run?

The time taken is a direct function of the number and size of the individual worksheets, and an exponential function of the complexity of each worksheet, plus a dependency on the PC used. Relatively small and simple file usually complete in under a minute. Large and complex worksheets can easily take an hour or more.

Professional Tips

- For large or complicated workbooks, or when using the Batch Processing feature, a good speed improvement can be achieved by leaving the computer otherwise unused. I.E try and not use other programs.
- Use Excel to zoom out to see hundreds or even thousands of cells at a time, then zoom in on areas of interest.

Analyse Workbook

This function gives managers & spreadsheet experts an extended view of any spreadsheet with a wealth of useful information in a self-contained report. Used in conjunction with the Formula Map it can (and has) highlighted material errors in financial spreadsheets.

The workbook analysis function creates a dedicated report that contains analysis of all key aspects of the workbook and offers insights into areas of complexity and risk.

The function can be run via its own button, or at the same time as the Table of Contents ...

The image illustrates the workflow for running the 'Analyse Workbook' function. It shows the software ribbon with the 'Analyse Workbook' button highlighted by a red box and the number '2'. A red arrow points from this button to the 'Table of Contents Options' dialog box, which is also highlighted with a red box and the number '1'. In the dialog box, the 'Analyse Workbook (in new file)' option is checked, and the 'OK' button is highlighted with a red box. A red arrow points from the 'OK' button to the 'Diligence File Analysis' report, which is a detailed document providing various metrics about the workbook.

Table of Contents Options

Options

- Include This File in 'My Inventory'
- Show Extended Details on ToC Worksheet
- Analyse Workbook (in new file)

Cancel OK

Diligence File Analysis
Date: 6 Feb 2016

File Name	Demo.xlsm
File Size	5.22 Mb
File Owner	John Smith, J.Smith@DiligenceForExcel.com
Author	John Smith, J.Smith@DiligenceForExcel.com
Created	27-Apr-12
Importance	Unspecified
Visible Worksheets	9 (plus ToC Sheet)
Hidden Worksheets	129
Overall Complexity Score	8.5 / 10
Cells with Formulas	8,679
Cells with Numbers	12,511
Cells with Text	30,277
Macros/VBA	4525 Lines (Displayed in 'modVBA' of this file)
References	2

Most Complicated Formula at Demo6, cell I16...
=VLOOKUP(ROUNDDOWN(((SUMPRODUCT())))),VLOOKUP(ROUNDUP(((SUMPROD UCT()))))

Comments

Table of Contents

File Name	Alteration Contact	Author	File Category	File Description	File Complexity
Table of Contents					


The resultant report contains eight worksheets and one code module ...

Summary	Ley workbook details and space for user comments.
ToC	Exactly the same as a Table of Contents worksheet.
Health and Risk	RAG (Red/Amber/Green) risk on the file's contents.
Noteworthy	Items of specific risk or design interest
References	Lists inter/intra workbook dependencies
Formulas	Every different formula used in the workbook
Formulas by Region	As above, by contiguous region
Search Results	Instances of all search items, defined in 'My Diligence'
Object List	List of all comments, objects and shapes
Code Module	All macros & code contained in the workbook (Only accessible via the VB Editor)

Summary Sheet

This front-page sheet gives a simple overall summary of the workbook, including its size, author, date of creation and basic complexity metrics such as the number of formulas, lines of code and number of references to other files.

It also has space a significant dedicated to user comments or approvals for the file during its approvals process.

 Diligence File Analysis	
Date: 1 Mar 2016	
File Name	Book6
File Size	0.1 Mb
File Owner	John Smith, J.Smith@DiligenceForExcel.com
Author	John
Created	01-Mar-16
Importance	Unspecified
Visible Worksheets	3 (plus ToC Sheet)
Hidden Worksheets	0
Overall Complexity Score	0.0 / 10
Cells with Formulas	
Cells with Numbers	
Cells with Text	
Macros/VBA	No VBA/Macros
References	0
Most Complicated Formula	THE WORKBOOK CONTAINS NO CELL FORMULAE
Comments	

ToC Sheet

This sheet is identical to the Table of Contents sheet as if it were created or update directly via the Table of Contents function. See the ToC Chapter for more details.


Important Note

If the workbook being analysed already contains a Table of Contents sheet, the workbook's ToC will automatically be updated as part of the analysis function.

Health and Risk Sheet

This Red/Amber/Green (RAG) report gives users a quick visual health check on the areas of complexity and potential risk. Key aspects of the workbook are displayed, such as the number of hidden worksheets, broken links, macros, plus details at worksheet level for hidden rows & columns, cells with errors, links, formula complexity and more...

This sample shows the report as run on a blank workbook containing three blank worksheets. The areas defining workbook level information & statistics is clearly separated from the 'one-per-line worksheet information.

Diligence For Excel		Health & Risk Indicators																					
		Book2 29-Feb-16																					
Workbook Indicators										Workbook Complexity Score		.0 / 10											
File	Worksheets	VBA & Macros		Connections		Potential Issues																	
File Size	0.1 Mb	Populated	0	Macros	0	External Links	0	Broken Ranges		0													
File Format	N/A	Hidden	0	Lines of Code	0	Broken Links	0	Deprecated Sheets		0													
Shared Workbook	No	Very Hidden	0	Userforms	0	References	0	Hard Coded VBA		0													
< Expand to View Colour Thresholds																							
Worksheet Indicators	Sheet Complexity Score	Structure & Connections					Excel Functions			Potential Issues				Macros									
		Size: Rows X Cols (x1000)	Visible	Hidden Rows	Hidden Columns	Contiguous Ranges	Internal Links	External Links	Cells with Formulas	Unprotected Formulas	Functions Used	Worst Formula Score	Long/Complex Formulas	Cells with Errors	Unusual Formulas	Duplicate Formulas	Numerics, No Formula	Broken Named Ranges	Macros	Lines of Code	UDFs Used	Hard Coded	
Sheet1	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheet2	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheet3	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0	0

The Red/Amber/Green status is based on pre-defined figure for each item. The values denoting an amber or red status for workbook and worksheets status can be viewed at any time by ungrouping the rows indicated by the small '+' signs ...

Workbook Indicators		Workbook Complexity Score										.0 / 10	
File	Worksheets	VBA & Macros			Connections			Potential Issues					
File Size	0.1 Mb	Populated	0	Macros	0	External Links	0	Broken Ranges	0				
File Format	N/A	Hidden	0	Lines of Code	0	Broken Links	0	Deprecated Sheets	0				
Shared Workbook	No	Very Hidden	0	Userforms	0	References	0	Hard Coded VBA	0				

Workbook Level RAG Thresholds	Files		Worksheets			Content			Connections		Issues			
	Overall Complexity Score	File Size	Shared Workbook	Hidden	Very Hidden	Macros Count	Lines of Code	Userforms	Links	Unavailable Links	References	Broken Named Ranges	Deprecated Sheets (Count)	Hard Coded Macros
	6	1	.XLA.X	Yes	10	1	N/A	1	1	1	1	N/A	1	1
8	5	N/A	N/A	20	5	1	5	50	5	5	1	N/A	5	5

Worksheet Indicators	Structure & Connections					Excel Functions				Potential Issues					Macros							
	Sheet Complexity Score	Size: Rows x Cols (x1000)	Visible	Hidden Rows	Hidden Columns	Contiguous Ranges	Internal Links	External Links	Cells with Formulas	Unprotected Formulas	Functions Used	Worst Formula Score	Long/Complex Formulas	Cells with Errors	Unusual Formulas	Duplicate Formulas	Numerics, No Formula	Broken Named Ranges	Macros	Lines of Code	UDFs/Used	Hard Coded
RAG Threshold: Amber	5	1000	No	1	1	20	1	1	500	50%	5	5	1	1	1	1	1	1	1	1	1	1
RAG Threshold: Red	7.5	50000	V.Hid	50	20	50	5	3	5000	100%	10	25	20	50	5	5	20	5	5	100	5	3
Sheet1	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0
Sheet2	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0
Sheet3	0	0.1	Yes	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0

Noteworthy Sheet

The Noteworthy sheet is a worksheet containing a list of definite and possible errors and issues. In excess of 30 different common issues are analysed, such as numbers formatted as text and cells with the same cell and font colour, together with more complex or subtle anomalies such as VLOOKUP() formulas that rely on the range being sorted to give the correct result. For many issues, where the issue is related to a cell and if the original workbook is open, a double-click on the item will navigate the user directly to the cell in question.

The full list of items that may be highlighted when discovered is as follows ...

1. Multiple Sets of Hidden rows or columns

Any worksheet that contains more than one contiguous range of hidden rows or hidden columns.

2. External Books Referenced

Any worksheet containing an external workbook reference is indicated.

In addition, if any formulas refer to a hard-coded cell on the external worksheet, this is also indicated separately, because structural references to the source worksheet will ONLY be updated if BOTH workbooks are open when the change is made.

3. Internal Sheets Referenced

Any worksheet that contains references to other worksheets in that workbook (excludes Named Ranges) is highlighted.

4. Numerous Constructs of Formula

Worksheets containing more than 9 different constructs or 'sections' in an Excel formula are highlighted. (E.g. SUM(A1,B2b)+ 1 and SUM(A1,B2)+SUM(C3,D4) would both count as having two different constructs)

5.Numerous Formulae

Worksheets containing more than 999 formulas are highlighted.

6.Real-Time-Data (RTD) Functions

Any worksheet that contains RTD functions, such as Bloomberg, is highlighted.

7.Numerous Contiguous Ranges

Worksheets containing numerous contiguous ranges often indicate unnecessary complexity. If any worksheet contains more than 10 contiguous ranges, then this is indicated on the report.

8.Complex Formula

Any worksheet containing complex formula (defined as a score of over 3.0 on the Formula worksheet) is highlighted. The most complicated Formula is also shown on a separate line.

9.VBA/Macros

Worksheets containing associated Macros/VBA are indicated.

10.Standard Excel Errors

Where any #NA, #VALUE, #NAME, #REF, #DIV/0, #NULL and #NUM errors are on a worksheet, the quantity of each is indicated.

11.Inconsistencies (Formula to Number)

If an irregular change from a formula to a number is detected (overwritten formula?), each is highlighted for further analysis.

12.Inconsistent Format (Cell Formats)

If an irregular format is detected (such as a change to General format for one cell in a group of differently formatted cells), each is highlighted for further analysis.

13. Same cell & font colour

If a cell has the same font and background colour, it is highlighted for further analysis.

14. Format may change cell value view

Where the formatting of a cell may substantially change the view of a cell value, this is indicated. This includes the format ';;;', which hides cell contents.

15. Excessive decimal places

Cells containing over 6 decimal places are highlighted. These figures can be a significant cause of workbook size bloat and adds little or nothing to the model's accuracy.

16. Duplicate formulas

Where a duplicate formula exists on the same worksheet, this is indicated (Best practice suggests just one instance of the formula, with other cell(s) referencing that one)

17. Number in Formula

Where numbers combine with a formula (E.g. $-SUM(A1,B2) + 1$) this is indicated (Best practice suggests the value should be in its own cell)

18. Numbers Formatted as Text

Numbers formatted as Text, and therefore not included in any calculation, are indicated.

19. Pre Excel 2007 Row or Column Limits

Previously to Excel 2007, Excel was limited to 65,536 rows and 256 columns. If formula use these (or similar) row or column references it could indicate that the formula needs updating.

20. Formula Too Long

The length of the formula has exceeded Excel's limits. This often occurs after the workbook has been designed when using external references to workbooks with long path names.

21. Hidden Protected

Hidden & Protected cells cannot be analysed programmatically. These are indicated.

22. Numeric No Precedent

Numbers that are not included in any formula on the worksheet are indicated.

23. +/- Signed Formulas

Cells with formulas that start with a '+' or '-' are indicated. These may indicate incorrect assertion of formula values.

24. VLOOKUP/HLOOKUP() reliant on sort order

Any cells where FALSE is not declared as the 'RangeLookup' attribute for LOOKUP() means the formula relies on an alphabetical sort of the data, and can give unexpected results. Any instances are highlighted.

25. User Defined Functions (UDFs)

The use of any UDFs in any worksheet is indicated

26. Large Used Range

Worksheets whose used range is in excess of 100,000 cells are highlighted.

27. Broken Named Ranges

Ranges appearing as #REF! for example, a reference to a deleted worksheet.

28. Hidden Named Ranges

Names that have been hidden using code are shown (excludes those on the Diligence Table of Contents sheet)

29. Duplicate Named Ranges

Named ranges can exist in multiple locations when they have worksheet scope or a combination of workbook and worksheet scope. Whilst perfectly valid this may cause confusion to some users and lead to the incorrect instance of the name being used. A record of all names that appear more than once in the workbook where ONE of the instances is workbook scope and the other(s) instance(s) are worksheet scope are displayed.

30. Two Or More Named Ranges Referring to the Same Range

When two or more named ranges refer to the same physical range (e.g. refer to Sheet1, Cell B12) this is indicated. This practice is, in all but the most exceptional circumstances, unnecessary, and is considered bad design. It can also be confusing to a user, where only the first name is displayed in the range-name box at the top left of the screen.

31. Orphan Named Ranges (Not Being Referenced Elsewhere in the Workbook)

Named ranges that do not appear in any formula, in any macros or being used as a Cell Validation list. It is important to note that the range name could still be being used in a linked workbook, or as cell validation list (where the cell currently is currently blank), so care should be exercised before deleting the range name.

32. Named Ranges Referring to External Files

Under some circumstances, Excel is unable to break the link to any file that is referenced in a named range, so these are listed for convenience.

33. Carriage Returns or Line Feeds in Formulas

If a carriage-return or line feed is used in a formula, the aspects of the formula on subsequent lines can easily be missed by a user when checking the formula. Any instances are noted.

34. UDF Function with the same name as an Excel Function

A UDF may have been written before an Excel function was released with the same name, or may have been written in one country and used in another where that function name is used by Language-specific Excel, or a user may be attempting (unsuccessfully) to override Excel's function. Any UDF with the same name (not case specific) is noted.

35. NOW() & TODAY() Excel Functions

These are well used, perfectly reasonable Functions. However, users should understand the risks of using volatile functions, specifically with regard to audit where the resultant data may inadvertently change if the file is subsequently opened.

36. Hyperlinks

Hyperlinks to external sources are listed. Hyperlinks within the workbook are not listed.

37. #REF! in a Formula

This indicates a formula that references a cell or sheet that has since been deleted, and is usually indicative of an error or legacy formula that can be deleted.

38. Dynamic VBA Manipulation

VBA can be used to write and delete VBA. Whilst this has legitimate reasons, this is one of the riskiest aspects of VBA. Any instances of dynamic code manipulation are highlighted.

Up to 100 examples of each issue, for each worksheet, are logged on the report. When Diligence detects more than 100 instances of an issue on any worksheet, a representative sample spread evenly across the worksheet is displayed, together with a cell comment that it is an example and not the full list.

Limitations

Only the first 100 000 instances of each issue per worksheet are logged internally within Diligence, from which the 100 samples are taken. If (for example) there are 500 000 instances of a #DIV/O error, then the samples would only be taken from the first 100 000 instances found.

Dependencies Sheet

This sheet lists all the inter-workbook, worksheet-formula dependencies, and formula dependencies on other workbooks. The report can be used to show good 'flow' of data within the workbook, which would be indicated by all dependencies listed in the bottom left of the grid OR the bottom right of the grid. It also indicates to users whether the deletion of a worksheet will have any effect on other sheets within that workbook.

The report also lists the visibility of the sheet and whether or not the sheet contains its own named ranges which may have a bearing on whether or not the sheet is still required.

References to external workbook are highlighted in red, at the far right of the grid.

The report example below demonstrates that Sheet 1 has one or more formulas dependent on Sheet2, Sheet 2 has a formula dependency on Sheet3 and a formula dependency on Sheet2 of an external workbook entitled 'Data.xlsm'. Sheet3 has a similar external dependency.

Dependency Key		Dependencies							
Sheet1	Internal	Where indicated, worksheets listed do							
Sheet2	External	Book4, 25 Mar 2016							
Sheet3	Internal & External								
		Visible (Y/N)	Named Ranges (Y/N)	Worksheet Macros (Y/N)	ToC	Sheet1	Sheet2	Sheet3	[Book5]Sheet1
ToC			N	N					
Sheet1		Y	N	N		Y		Y	Y
Sheet2		Y	N	N					
Sheet3		Y	N	N					Y

IMPORTANT: See the 'Limitations' section at the end of this chapter before using the dependencies sheet as a guide to deleting unnecessary or unused legacy worksheets.

Advanced users' note: It may be deduced from this example that the file Data.xlsm was open., because if the file was closed then the full file path would be included with the file name.

On-Sheet Dependency

Formulas frequently reference data on their own sheet, (e.g. Sum(A1,B2)); these intra-sheet references are deliberately excluded from the report, and shaded grey, except where formula(s) explicitly call the worksheet, for example a =Sheet1!B23 situated on Sheet1. In addition, a cell comment will indicate this (needless) inclusion of a sheet name.

Dependencies on Named Ranges

Named ranges have either global level scope (default) or worksheet level scope. Users may be aware that if there is a dependency on a globally-scoped named range, then the worksheet on which the cells reside is NOT listed within formulas calling that range.

It is therefore important that users review named ranges for usage before deleting sheets because these will not be indicated on the report. It is for this reason that a report column indicating whether named ranges are present on the worksheet are included in the report.

Dependencies on Deleted Sheets

It is not possible to determine the name of worksheets that were referenced in a formula, once the worksheet has been deleted. Any such formulas will simply contain #REF! within their construct in place of the worksheet name. Users should invoke the standard Excel utility 'Formulas' / 'Name Manager' via the ribbon then filter for 'Names with errors' if they want to investigate this aspect of the file in more detail

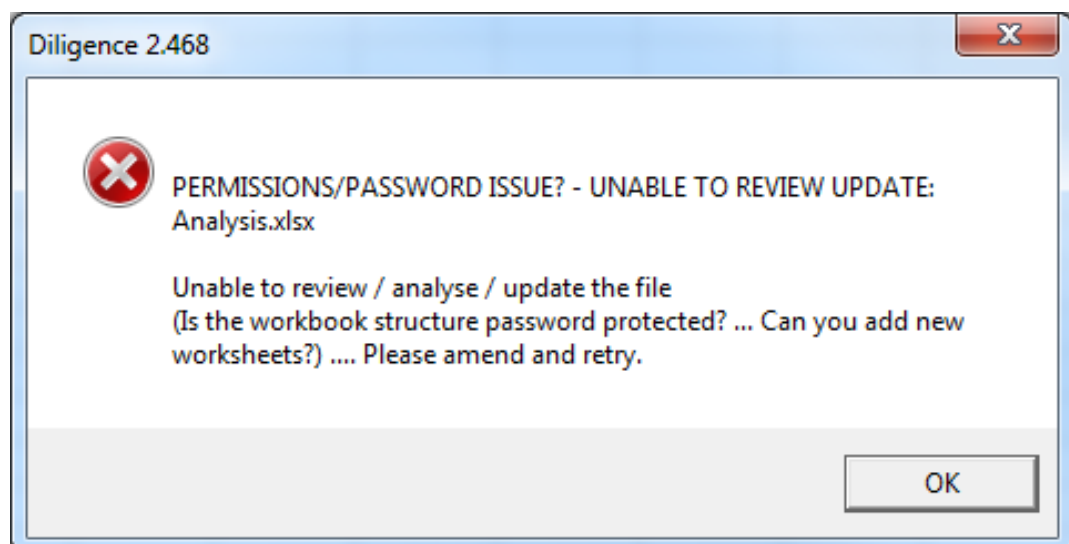
Limitations

The dependency sheet shows intra and inter worksheet/workbook formula dependencies only. It does not include dependencies on global-scope named ranges (see above), nor does it include non-formula dependencies, such as a chart title reliant on text from another worksheet, or pivot data that is a reliant on another workbook.

Any macro dependencies on worksheet data are not analysed.

File Structure Protected

If the workbook structure is protected without a password, then Diligence will unprotect the workbook and enter the ToC. However, if the workbook structure is password protected then the following style of message will be displayed to the user, and the action terminated.



Formulas Sheet & Formulas by Region Sheet

The Formula Sheet gives a complete list of unique formula structures, that is to say Formulas using exactly the same construct of functions. To enable easy comparison of formulas and better visibility of the formula logic, the formulas are primarily displayed without parameters, for example the complex formula...

**=VLOOKUP(ROUNDDOWN(((SUMPRODUCT(L8:L16,N8:N16)/100)*100),0),
 \$L\$8:\$M\$16,2)&" -
 "&VLOOKUP(ROUNDUP(((SUMPRODUCT(L8:L16,N8:N16)/100)*100),0),\$
 L\$8:\$M\$16,2)**

would be shown as ...

VLOOKUP(ROUNDDOWN(((SUMPRODUCT())))),VLOOKUP())

The number of functions used in the formula, a complexity score and the number of occurrences of the formula are also shown, together with one example of how that formula construct is used, together with its address.

Formulas	Complexity			Example				
	Formula	Funcs	Score	Qty	Sheet	Add	Chrs	Value
VLOOKUP(ROUNDDOWN(((SUMPRODUCT())))),VLOOKUP())		2	2.6	1	Data	I16	151	=VLOOKUP(ROUNDDOWN(((SUMPRODUCT(L8:L16,N8:N16)/100)*100),0), \$L\$8:\$M\$16,2)&" - "&VLOOKUP(ROUNDUP(((SUMPRODUCT(L8:L16,N8:N16)/100)*100),0), \$L\$8:\$M\$16,2)
ROUND(ABS())		1	1.5	1	MgmtReport	C4	21	=ROUND(ABS(100-C3),2)
ROUND(SUM())		1	1.3	1	MgmtReport	C3	24	=ROUND(SUM(B3/B4)*100,2)
VLOOKUP()		1	1.2	14	Statements	E32	88	=VLOOKUP(C32,'C:\Users\John\Documents\ReInsuran
HLOOKUP()		1	1.2	30	Statements	E6	87	=HLOOKUP(\$D\$3,'C:\Users\John\Documents\ReInsuran
SUMIF()		1	1.2	56	MgmtReport	I7	30	=SUMIF(\$MWI:\$MWI,I6,\$MWL:\$MWL)
COUNTIF()		1	1.2	192	MgmtReport	MWJ:	22	=COUNTIF(MWI:MWI,MWJ)
SUM()		1	1.1	19	Statements	E46	13	=SUM(E32:E45)
IF()		1	1.1	86	MgmtReport	J8	18	=IF(I7>0,I8/I7,1)
MATCH()		1	1.1	96	MgmtReport	MWN	26	=MATCH([@CATAM],MWO:MWO,0)
(SUMPRODUCT())		1	1.2	1	Data	I17	36	=(SUMPRODUCT(R8:R13,T8:T13)/100)*100

User Defined Functions (UDFs)

User Defined Functions listed in the workbook are acknowledged on the Formula Reports with the prefix ‘*UDF:’ for example, MyFunction() would be shown as ...

UDF:MyFunction()

Due to the complexities of calculating UDFs , formulas containing a UDF are always assigned a complexity score of 2.

Formulas by Region

The Formulas by Region report offers exactly the same information as the Formulas report, but each contiguous region on each worksheet contains its own list of formulas. This will often lead to duplicate lists of formulas, which can be analysed by suitably qualified persons. It can be used, for example, when different sheets should always contain the same set of formula this will highlight differences between the allegedly identical sheets.

Referenced Functions

Only Excel’s built-in functions, and those functions included in common/known external programs (such as the Bloomberg™ and THOMSON REUTERS™) are recognized. Excel functions referenced from other addins or programs will not be recognized.

Please let us know if your organization uses commercially available third party functions, and we will be happy to consider them in future releases of Diligence for Excel.

Search Results Sheet

The Search Worksheet reviews formulas, values, comments, references, macros, range names, headers, footers and objects for a predefined set of text items, such as 'C:', 'Temp' and 'Password' ...the feature leverages exactly the same functionality and displays exactly the same results as the 'Enhanced Search' function and searches for all the parameters in the user's current search parameter list, which is user editable. Please see the 'Enhance Search' function chapter for more details.

Object List Sheet

The Object List Worksheet displays the name, location and key statistics of any object residing in the workbook, such as buttons, charts, pivot caches and comments.

The complete list of objects reviewed/listed are as follows ...

- Pivot Caches
- Pivot Tables

- Embedded OLE Objects
- Linked OLE Objects
- OLE Control Objects
- Linked Pictures

- Charts
- Pictures
- Comments
- Text Boxes
- Query Tables

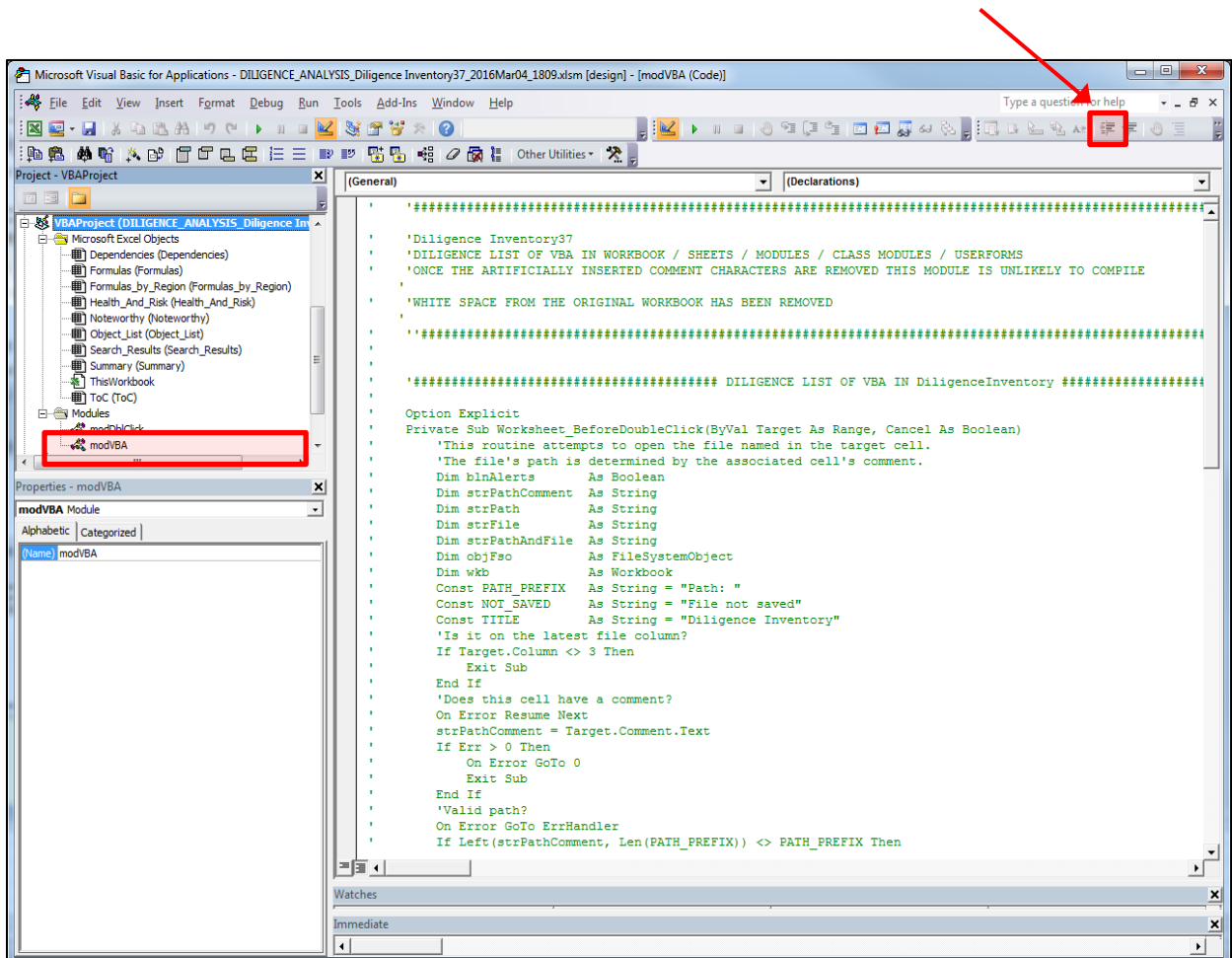
- Autoshapes
- Callouts
- Form Controls
- Lines
- Text Effects

Code Module

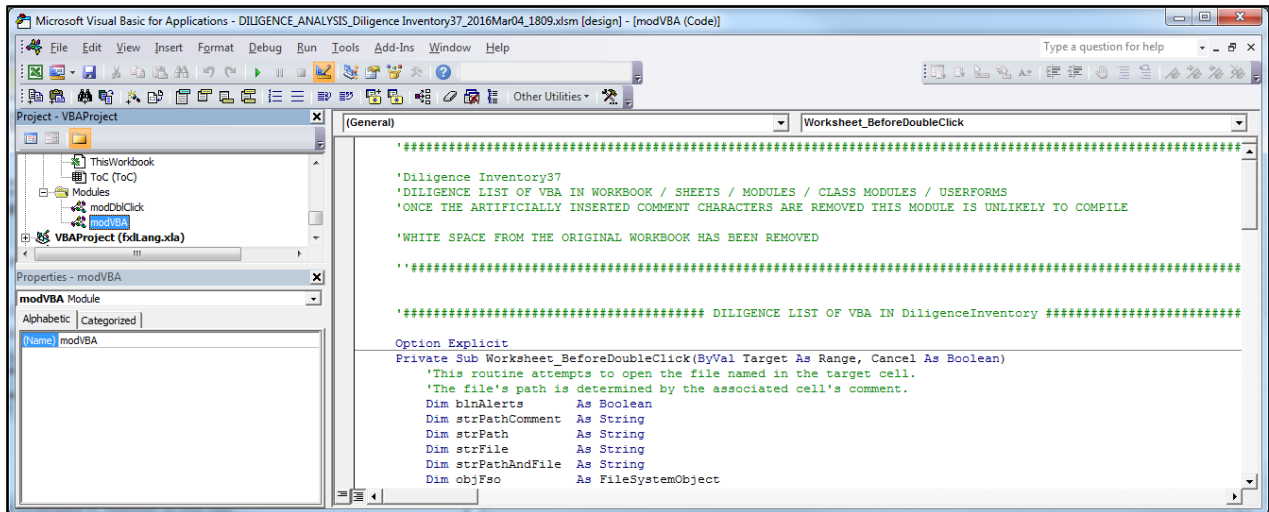
All the Macros/VBA code in one location. Any code residing in the workbook, whether it be in modules, class modules or attached to the workbook or a worksheet is listed in one logical location for perusal by suitably qualified person.

All the code is listed in the code module entitled 'modVBA' which can be accessed via the Visual Basic Editor. (Alt-F11 from within Excel)

The code has deliberately been moved to a single location to aid easier 'scanning' of the code by suitable experts. Comments have been added by Diligence to indicate the location of the code in the original workbook. Experienced users may prefer to see the code 'uncommented' so that the standard colours for comments, variables, code etc. are visible. This can be achieved quickly via the 'Edit' toolbar (if it is visible), shown by the arrow just below.



Advance users should be aware, however, that if viewed in this way (see below) it is most unlikely that the report will compile, and may result in unexpected problems, especially if the code includes event macros.



Governance Functions

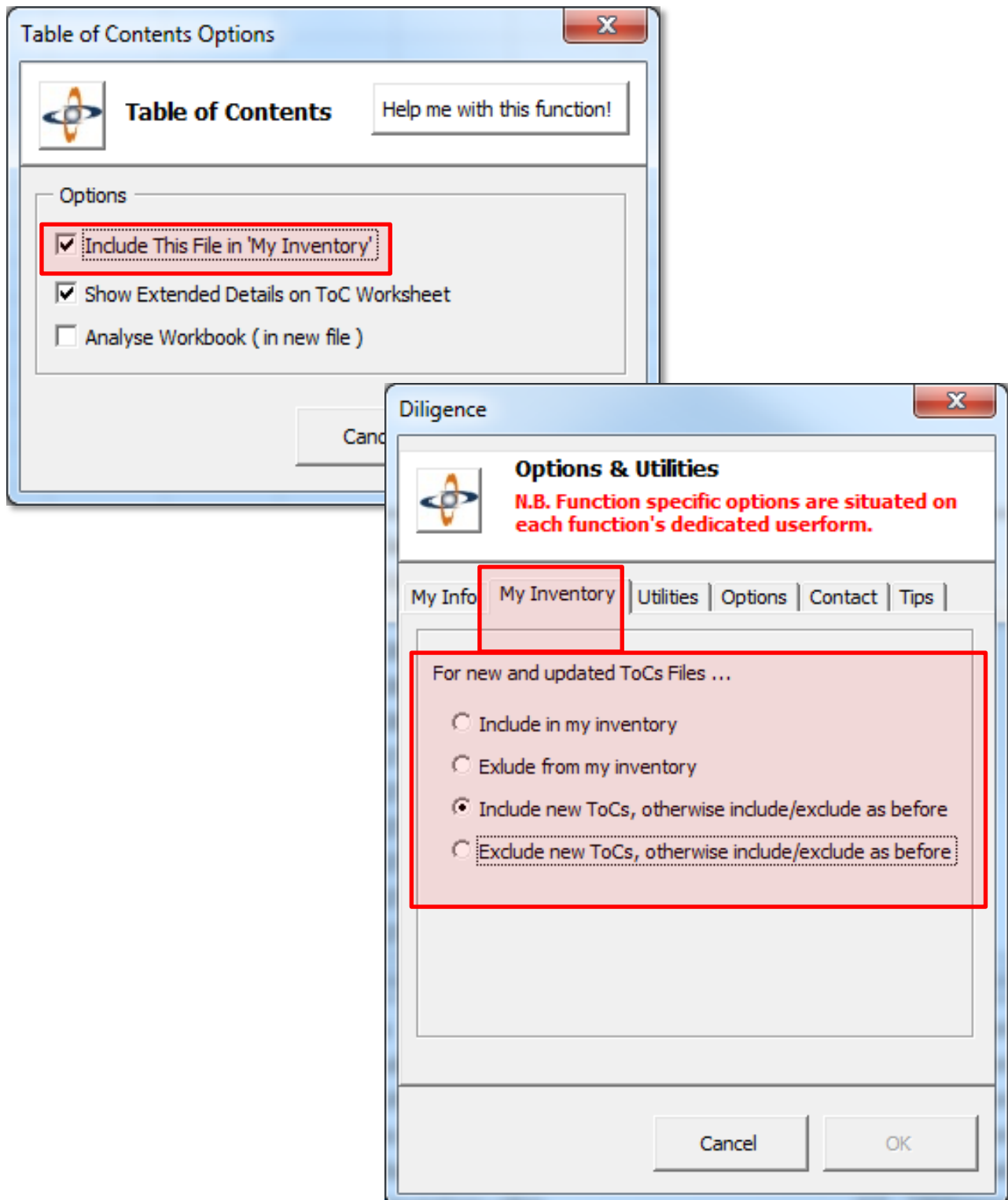
My Inventory

Press the 'My Inventory' button on the main Diligence ribbon. This report lists all the files that have been added to the user's inventory. Files can only be included in the Diligence Inventory if they possess a Diligence Table of Contents (ToC) sheet

Known As (As defined on the Table of Contents)	Latest File (Double-Click to Open File)	File ID (Generate Name)	Owner	Department	Importance Categorisation	Last ToC Update	Last Approved	Purpose
Fair Execution Monitoring	FFX Monitoring - Share C...	John1150519.142142	Ian Smith	Investment Ops	Critical	28/02/2016	01/06/2015	The purpose of this spreadsheet
N/A	SearchTest.xlsx	John151221.090707	John	Equities	Important	28/02/2016	N/A	
Master File	Master banking file v2.x	John150909.194835	John	Accounts	N/A	28/02/2016	04/05/2015	
N/A	Payfile 20140908 (No Su...	John160225.103816	John Smith	R&D	N/A	28/02/2016	N/A	
Daily Report	422 Daily Activity Report	John160227.233948	John	R&D	Important	27/02/2016	08/03/2014	
N/A	New Model_ROI_FY16_2	John150920.094901	John	AC	N/A	27/02/2016	01/12/2015	
N/A	521 Risk and Benchmark	John160227.233221	John	R&D	N/A	27/02/2016	01/01/2016	
N/A	439 CPA Business Planni	John160227.232919	John	R&D	Important	27/02/2016	N/A	
N/A	2014 forecast model.xlsx	John151005.174427	John	Payroll	N/A	27/02/2016	N/A	
N/A	ExtendedRange.xlsm	John160225.072324	John Smith	R&D	Important	27/02/2016	N/A	

One row will be listed per FileID, as defined on the ToC, and the report will contain key information on the file, including its importance categorisation, and date of last approval. Where possible the file can be opened directly by double clicking the 'Latest File' column, which includes the file's path, as a cell comment.

By default, all saved files that have a Table of Contents attached will be included in the users' inventory, however it may be desirable to exclude certain files (for example whilst testing new reports) so this can be overridden by the user, both at the point when the ToC is created as shown below left, and in the 'My Diligence' options, displayed below right ...



Recent Files

Press the 'Recent Files' button on the main Diligence ribbon. This function leverages Excel's 'Recent Files' list to display a 3-Sheet report giving an extended list of files opened by the user.

The first sheet gives a direct list of all the files that have been opened by the user. It includes the number of times the file has been opened and the File path. Double-Clicking on the path will navigate the user to the path via Windows Explorer. Double-clicking on the file will open the file directly. The date(s) on which the file was opened is available as a cell comment on the 'Opened-All-Time' column of the report. This sheet is most useful when trying to remember where a file is situated that was opened some time ago, or for basic Audit purposes.

Diligence For Excel CONSULTANT		Recent Files & Paths... Specified (Report 1 of 3)				
		Date	03/03/2016 12:14			Selected File:
ID	Last Opened Date	Opened Prev Month	Opened 3 Months	Opened All time	File Name	Path Name (Abbreviated)
2	03/03/2016	12	38	38	Fishing License (Environment Agency).xlsm	C:\Users\John\Desktop\...
3	01/03/2016	19	34	34	Diligence File Summary.xlsm	C:\...\Diligence Dev\App\...
4	01/03/2016	6	25	25	Obfuscator.xls	C:\Users\John\Documen...
5	26/01/2016	0	17	17	Diligence ToC Summary.xltx	C:\...\Diligence Dev\App\...
6	25/01/2016	0	17	17	Diligence.xlam	C:\Users\John\Documen...
7	19/02/2016	5	15	15	Diligence Search.xlsm	C:\...\Diligence Dev\App\...
8	01/03/2016	5	14	14	Book2.xlsx	C:\Users\John\Documen...
9	23/02/2016	5	14	14	Book4.xlsx	C:\Users\John\Documen...
10	26/01/2016	0	14	14	Diligence.xlam	C:\Users\John\Documen...
11	25/02/2016	3	13	13	DiligenceUtility.xlsm	C:\Users\John\Documen...
12	25/02/2016	2	13	13	Derivatives for YE2013_Template.xlsx	C:\Users\John\Documen...
13	26/01/2016	0	13	13	Invoices.xlsx	\\Mybooklive\idas\Acco...
14	26/01/2016	0	13	13	Diligence Inventory.xlsm	C:\...\Diligence Dev\App\...
15	06/02/2016	2	12	12	FormatTest.xlsx	C:\Users\John\Documen...
16	26/01/2016	0	12	12	Manager.icf	C:\...\Documents\Dilige...
17	26/01/2016	0	12	12	DiligenceTest.xlam	C:\Users\John\Documen...
18	01/03/2016	2	11	11	Diego - Forecast Acquisition_5+7_FY16 BAU.xlsx	C:\Users\John\Documen...

The second and third sheets show a list of generic file names and a list of generic path names respectively. For each of these any numbers, weekdays or months are removed from the file (or path) and replaced with # (one or more consecutive digits) and the Excel Date format letters for day and month names, and then grouped together.

This makes it very easy to identify names (paths) whose core name is always used with different identifiers, for example.

ReportV1.1.xlsx, ReportV1.3.xlsx would be shown as. ReportV#.#.xlsx

DataJan2016.xlsx, DataMar2017.xlsx would be shown as
DataMMM#.xlsx

File_Monday_Jan17.xlsm & File_Wednesday_Feb20.xlsm
FileDDD_MMM#.xlsm

The total number of that generic file name (path) is listed, and an example of a file path used by the first of the files with this structure is shown as an example

ID	Last Opened Date	Different File Names Used	Opened 3 Months	Opened All time	Generic File Name	Example of Path Name (Abbreviated)
1	03/03/2016	1	204	204	Diligence.xlsm	C:\Users\John\Documents\Diligence Dev\App\
2	04/03/2016	107	163	163	DILIGENCE_ANALYSIS_Book#_#MMM#_#.xlsm	C:\Users\John\Documents\
3	01/03/2016	10	99	99	Book#.xlsx	C:\Users\John\Documents\
4	15/02/2016	15	72	72	DILIGENCE_ToCSummary_#MMM#_#.xlsx	C:\Users\John\Documents\
5	01/03/2016	1	56	56	Manager.icf	C:\...Diligence Dev 160229\App\Diligence Corporate\
6	01/03/2016	1	55	55	Obfuscator.xls	C:\Users\John\Documents\Diligence Dev 160229\
7	26/01/2016	8	52	52	DILIGENCE_SUMMMMY_Book#_#MMM#_#.xlsm	C:\Users\John\Documents\
8	03/03/2016	1	38	38	Fishing License (Environment Agency).xlsm	C:\Users\John\Desktop\
9	01/03/2016	1	34	34	Diligence File Summary.xlsm	C:\...Diligence Dev\App\Diligence Corporate\Templates\
10	03/03/2016	33	33	33	UDA Simplification Project_Book#_v#.xlsm	UDA Simplification Project_Book2_v28.xlsm
11	09/02/2016	9	28	28	DILIGENCE_Map_Book#_#MMM#_#.xlsx	UDA Simplification Project_Book3_v6.xlsm
12	06/02/2016	28	28	28	DILIGENCE_Map_MMM_#MMM#_#.xlsx	UDA Simplification Project_Book3_v5.xlsm
13	26/01/2016	4	28	28	DILIGENCE_ANALYSIS_DILIGENCE_...an#_#_#MMM#_#.xlsm	UDA Simplification Project_Book3_v4.xlsm
14	06/02/2016	1	22	22	FormatTest.xlsx	UDA Simplification Project_Book3_v3.xlsm
15	26/01/2016	1	17	17	Diligence ToC Summary.xlsm	UDA Simplification Project_Book2_v2.xlsm
16	26/01/2016	1	16	16	Diligence Files & Paths.xlsm	UDA Simplification Project_Book2_v27.xlsm
17	19/02/2016	1	15	15	Diligence Search.xlsm	...plus 26 others

In the sample of the second worksheet of generic file names in blue, above, examples of the actual file names before being made generic are shown.

Double -clicking the generic file name will open the first generic file listed.

In the sample of the third report sheet containing generic path names in blue, below, the count of any file opened within any of the generic path(s) are shown.

Comments showing the list of files opened in any of the generic paths are indicated as a comment in the File Name column, and the actual names of all the paths conforming to the generic path name are listed in a cell comment on the path name column.

ID	Last Opened Date	Different Path Names Used	Opened 3 Months	Opened All time	Sample File Name	Generic Path Name (Abbreviated)
1	04/03/2016	1	740	740	DILIGENCE_ANALYSIS_Book8_2016Mar03_1144.xlsm	C:\Users\John\Documents\
2	03/03/2016	1	178	178	Demo.xlsm	C:\Users\John\Documents\SingleTestFiles\
3	01/03/2016	1	149	149	Diligence Structural Difference Report.xltx	C:\...\Diligence Dev\App\Diligence Corporate\
4	03/03/2016	1	140	140	Diligence.xlam	C:\Users\John\Documents\Diligence Dev\Ap
5	13/01/2016	2	82	82	License.txt	C:\Users\John\Documents\Diligence Dev\Ap
6	03/03/2016	1	66	66	Fishing License (Environment Agency).xlsm	Fishing License (Environment Agency).xlsm
7	25/02/2016	1	53	53	Copy of Manager.xlam	Book8.xlsx
8	16/02/2016	1	47	47	UK OEIC FY13- Journal Template FINAL PACK 525 FIN	Book4.xlsx
9	01/03/2016	1	43	43	references from formulas.xlsx	Fishing License (Environment Agency 2015).xlsr
10	28/02/2016	1	32	32	Ongong Invoices.xlsx	Fishing License (Environment Agency 2015).xlsr
11	25/02/2016	1	28	28	parser_formule_with_textbox_v01_2007.xlam	1415 Accounts .xlsx USETHISONE.xls
12	25/01/2016	1	17	17	Diligence.xlam	Capital One Transactions.xlsx
13	26/01/2016	2	16	16	Diligence.xlam	...plus 2 others
14	20/02/2016	3	15	15	Diligence.xlam	C:\Users\John\Documents\Diligence#\App\
15	13/01/2016	1	15	15	Book16 ARCHIVE 2016JAN5_v4.xlsx	C:\Users\John\Documents\Diligence#\App\
16	19/02/2016	1	10	10	UDA Simplification Project_Book2_v6 ARCHIVE 2016	C:\...\App\Diligence Corporate\Templates\A
17	26/01/2016	1	10	10	Obfuscator.xls	C:\Users\John\Documents\Archive\

Encrypted File List

In keeping with the Diligence philosophy of non-invasive practices, Diligence does not monitor which files are being opened by the user, but instead the list is constructed purely of the 'Recent Files' indicated by Excel when a new instance of Excel is opened. Diligence encrypts this list, appends it to any existing previous lists and saves the encrypted data to a file that provides the required functionality to the user.

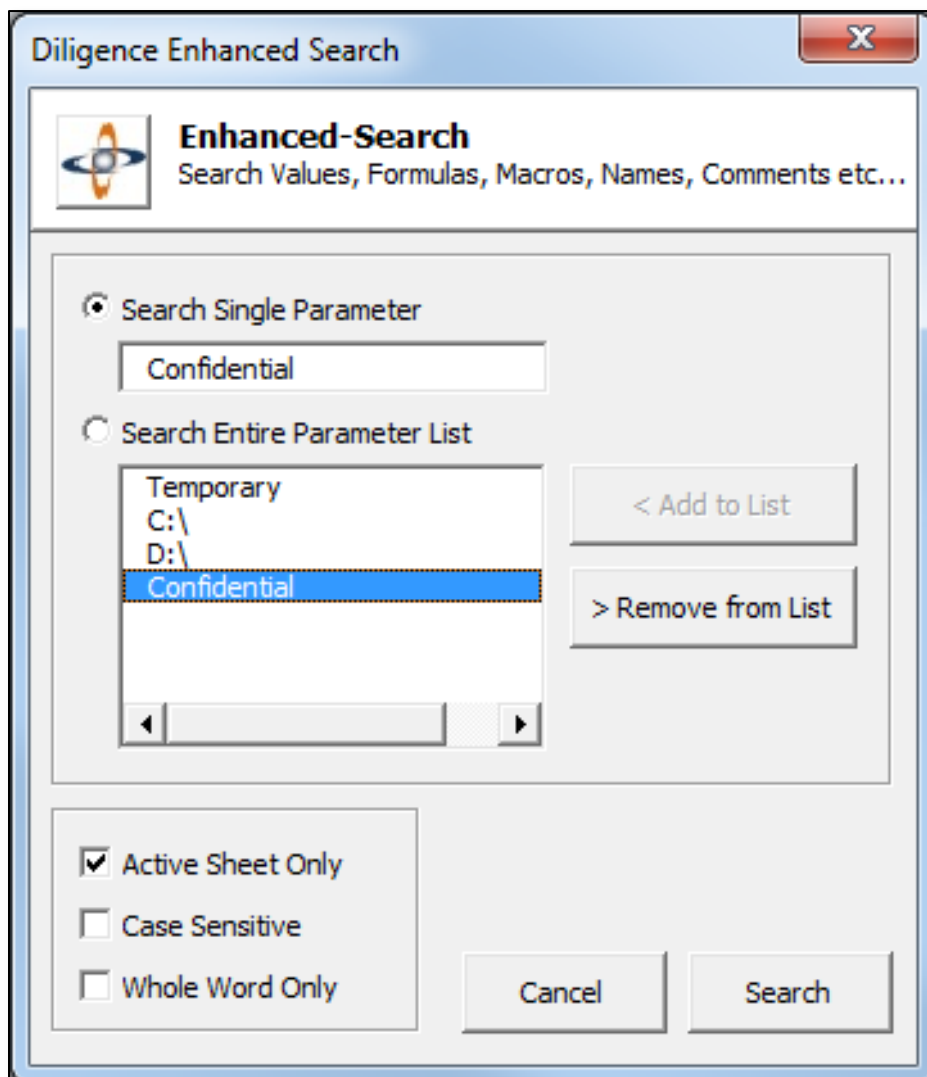
Limitations

Because Diligence relies upon Excel to provide the list of recent files, the limitations of this function primarily revolve around this functionality, the salient points are ...

- Only the last 50 files opened are recorded and available to be appended. I.e. if the user opens in excess of 50 different files before opening a new instance of Excel, only the last 50 different files will be opened.
- If the user opts to store less than recent 50 files (through Excel options) then only that number of recent files will be available to be stored.
- Files opened/saved by macros may not be saved to Excel's recent file list, depending on the structure of the code.

Enhanced-Search

Press the 'Enhanced Search' button on the main Diligence ribbon. This function searches many aspects of a workbook for one or more search parameters and displays the results in a report that enables the user to navigate back to the results.



By default, the following aspects of a workbook are analysed for matches, in all worksheets ...

- Worksheet Formulas
- Worksheet Values
- Worksheet Comments
- Worksheet Names
- Headers & Footers
- Named Ranges
- Built-In & Custom Document Properties (E.g. Author)
- Shape Names (E.g. Charts, Pictures)
- Linked & Referenced File Names & Paths*

*Linked files must be closed in order for the path name to be displayed in a formula result.

*Built-In References are ignored.

The primary user choice is between searching for the single parameter displayed in the text box, or all the parameters listed in the list box, and is selected by toggling between the two option buttons.

The initial list of search parameters is conjunction with the license holder before installation, and may differ between users. In addition, users may change their list at any time by adding adding/removing parameters. If changes are made, once the user presses 'Search' the updated list will be recorded and becomes the new default list. This list of parameters is also the set of search parameters used when a user Analyses a workbook using the Diligence analysis function.

Three further options are available

- Search the Active Sheet Only
- Make the search Case Sensitive
- Retrieve matches for whole words only

Wildcards (* and ?) are not supported in this utility. Wild card characters will be searched for literally, for example a search for A* with the 'Whole Word' search disabled would return a hit for A*C but would not return a hit for ABC.

HINT: Copy the search parameter to the clipboard before invoking the Enhanced Search function ...the copied value will be entered as the default search parameter.

After pressing 'Search' the results are returned as a worksheet ...

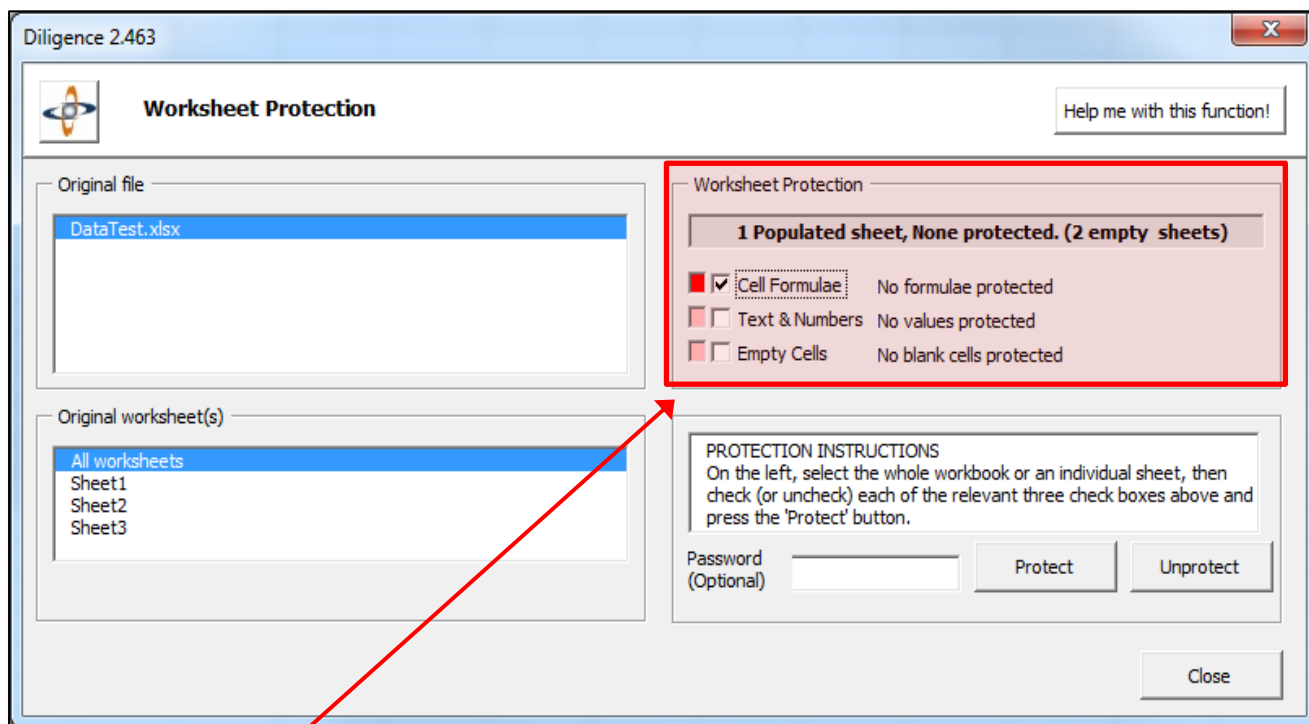
Search Parameter	Match Case	Whole Word	Object	Name	Property	Location	Entire Property Contents
C:\	FALSE	FALSE	Workbook	References	Ref. Name	stdole	C:\Windows\SysWOW64\stdole2.tlb
C:\	FALSE	FALSE	Workbook	References	Ref. Name	Office	C:\Program Files (x86)\Common Files\Microso
C:\	FALSE	FALSE	Worksheet	Sheet1	Cell Formula	B7	=C:\Users\John\Documents\[Data.xlsx]Search
C:\	FALSE	FALSE	File Ref	Data.xlsx	C:\Users\John\Docurr	File Name	C:\Users\John\Documents\
Confidential	FALSE	FALSE	Workbook	Properties	Built-In Property	Comments	COMMERCIAL CONFIDENTIAL
Temporary	FALSE	FALSE	(NO RESULTS)				

Up to 50 000 rows are returned, displaying the search parameter and search options (Case / Whole Word Match) together with the location of the find. The entire contents of the property are also listed at the right-hand side of the screen in grey, with the actual search parameter highlighted in black text.

Certain matches, such as matches found in worksheet cells, can be double clicked, whereupon the user will be navigated to the relevant object (such as the cell).

Protect Worksheets

Press the 'Protect Worksheets' button on the main Diligence ribbon. This simple utility invokes Excel's own Worksheet & Cell protection features to protect any combination of formulas, data and worksheet structure with or without passwords on any one, or all worksheets. The feature is particularly timesaving when protecting a number of worksheets simultaneously ...



Once the user has selected a valid open file and whether to protect one of all worksheets on the left-hand side of the userform, information is displayed on the three protection levels that can be selected individually or combined to form the basis of the protection.

Protect Cell Formulas

This protects any cell containing a formula, which by definition for this function is defined as any cell starting with an equals (=) sign.

Protect Text & Numbers

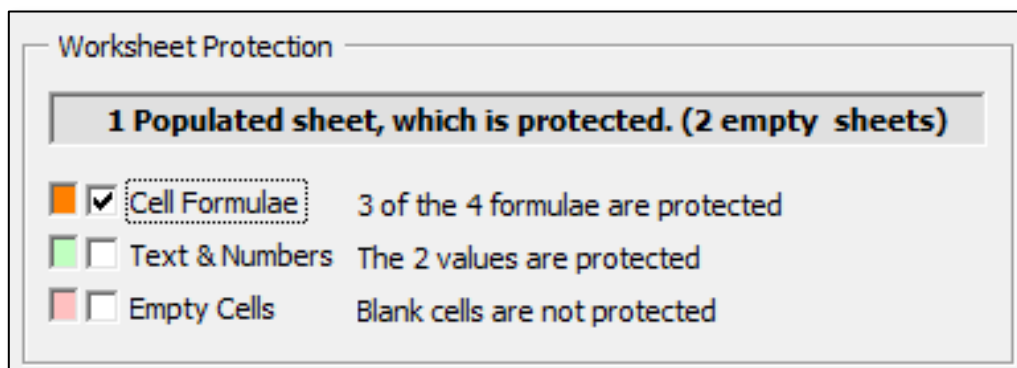
This protects any populated cell that is not categorized as a formula cell, for example Titles, Values & Data.

Empty Cells

This prevents any cell that is currently empty from being populated, and also prevents the insertion or deletion of rows & comments.

To the left of each of the three protection methods are a set of coloured boxes. Red denotes that none of the selected worksheet(s) are currently compliant with that type of protections, Amber denotes that some are protected, and green that all are protected.

Explanatory text is also shown, for example in the example below, the workbook has three worksheets of which two are empty. The populated has 4 formula cells, of which 3 are protected (amber) and 2 cells containing text or numbers, both of which are protected (green). Empty cells are currently left unprotected...



To protect the worksheet(s), the user must check the appropriate box (In the above example the user will be protecting all the formula cells). Cells being represented by boxes left unchecked will not be changed (E.g. the 2 value cells in the above example would be left protected)

Once the appropriate check boxes have been selected, the user should press the 'Protect' button.

By default, passwords are not set or requested, but may be optionally added before protecting the cells.

Hint: Users should be aware that the additional security afforded by a worksheet level password is negligible, with worksheet-password-cracker utilities available freely on the internet and crackable in seconds.

Unprotecting Worksheet(s)

Selected worksheet(s) can be unprotected by simply pressing the 'Unprotect' button. If a password was used to protect the sheet, then the password will need to be entered.

Hint: Diligence will remember any worksheet password for the duration of the session and will automatically unprotect worksheets that use the same password as any entered by the user.

When the worksheet(s) are unprotected, all 3 of the protection styles (Formula / Text / Empty Cells) are removed.

Please note any Table of Contents (ToC) sheet will be ignored by the function, and no attempt will be made to unprotect it

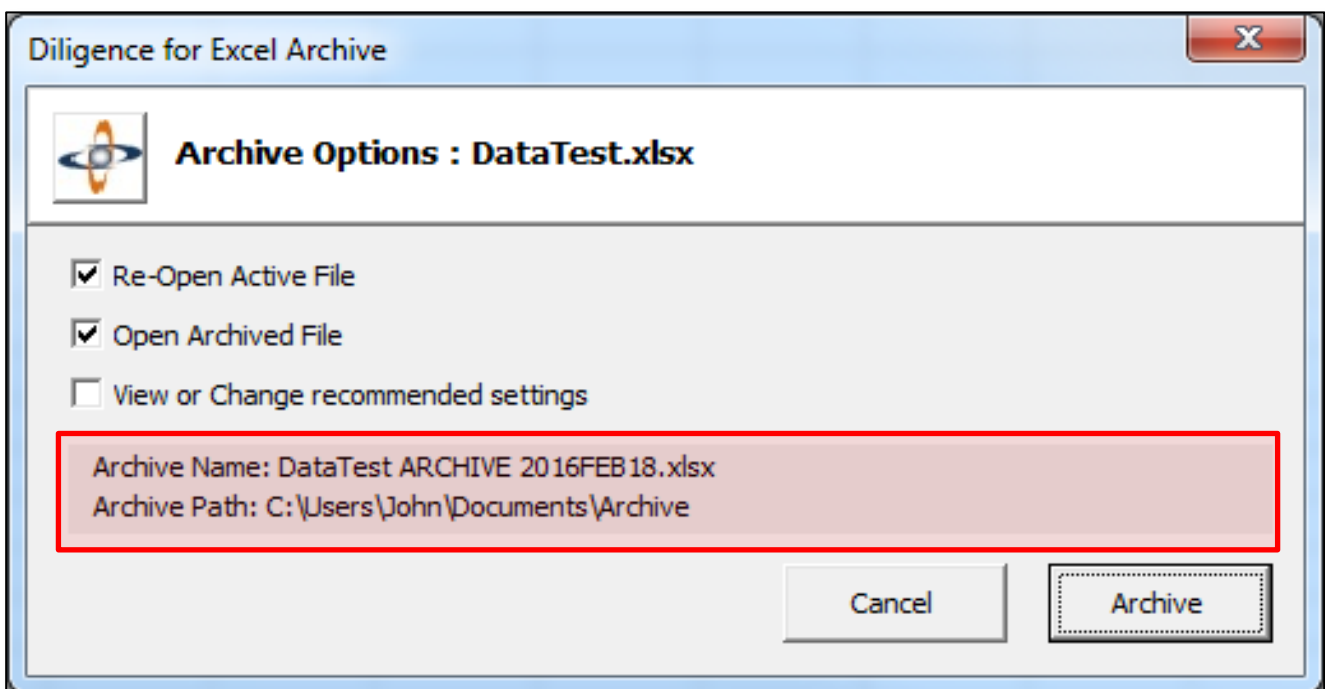
Diligence Protection & Unprotection Methodology

Diligence simply automates and leverages Excel's standard protection method, therefore any worksheet protected using Diligence can be unlocked without Diligence present on the user's machine via normal methods (i.e. Excel Ribbon / Review / Protect Sheets & Format Cells / Protection) and vice versa.

Archive File

Press the 'Archive' button on the main Diligence ribbon. This utility assists with archiving a current file, by breaking any workbook links, overwriting formulas with values, protecting the data and saving a read-only copy of the file to a defined archive folder with a single button push. This archive function is NOT a backup of the source file, but instead creates a snapshot of the current status of the workbook. In most circumstances, it cannot be reverse engineered to the original file.

Archiving can be useful for ensuring no volatile functions (such as RAND(), NOW(), TODAY(), OFFSET(), CELL(), INDIRECT(), INFO()) or links will change the workbook contents, thereby proving a workbook's definitive values at any given point in time.



The standard Archive userform has options to (re)open the original and archive files, and the expected archive file. By default, the standard archive acts under the following guidelines ...

Archive Name: The original file name appended with the word ARCHIVE and the date, for example Data.xlsx would be saved as Data ARCHIVE 2016Aug24.xlsx. If more than one archive is saved in the same location on the same day ‘_vx’ is appended where x is a version number, for example the fourth Archive for that file on that data would be Data ARCHIVE 2016Aug24_v4.xlsx

Archive Path: The following locations are attempted, in order. ...

1st The Archive Path listed on the extended section of Table of Contents sheet (Users may need to show the extended sections of the ToC via the Table of Contents function). If the named path is not available and/or does not have write permission, the user is alerted and the system saves the file in the same folder as the active file.

2nd If no ToC exists or the Archive Path is not entered, Diligence attempts to create sub-path of the active file’s path, entitled ‘Archive’. E.g. For C:\Lucy\Documents the system would attempt create a path entitled C:\Lucy\Documents\Archive

3rd If the Archive path cannot be created the system attempts to save the Archive file in the same folder as the active file.

By default, the following actions are undertaken when archiving a file ...

- The file is saved (the user is NOT prompted)
- Links to other files are broken
- Formulas are overwritten with values
- Any Auto_Open and Workbook_Open macro is renamed to prevent it running (if VB Project is enabled)
- An Archive stamp is placed on the Table of Contents sheet, if available (see below)
- All worksheets are protected with Excel's standard protection method (no password)
- The file is re-saved as an archive with the date & time included in the file name.
- The archive file is set to read only
- Both the original file and archive file are re-opened and the original file activated.

For audit purposes and to prevent changes to current cell data, the archive stamp is entered as a picture, such as in the example below. If there is a Table of Contents sheet, then a space is created at an appropriate row, otherwise the picture is placed over the cells. If the picture needs to be moved or removed, simply unprotect the sheet (Excel Ribbon / Review / Unprotect Sheet) (no password required)

Diligence For Excel CONSULTANT

Table of Contents
Last ToC update 4 Mar 2016
Use the Diligence ribbon to refresh. Last update: < 10 secs
For extra information on using this ToC go to DiligenceForExcel.com

File (Size) **Book8** (0.1Mb)
Location

ARCHIVE

Friday 4-Mar-2016 2:11 PM

DO NOT USE

File Owner	Alternative Contact	Department	File Commonly Known As	File Categorisation	File Complexity
John Smith		R&D	E.g. Weekly Summary		0.0 / 10

File Purpose E.g. The purpose of the spreadsheet is to take financial data from the monthly income spreadsheet, and income data streams from Finance to calculate current tax liability.

Output (if applicable)	Audience (if applicable)	Run Frequency	Run Date or Time	Last Approved Date	Last Approved By	File Approvals
E.g. Entire file or Data Sheet	E.g. Finance Director		E.g. 1st of Month			

3 Visible Worksheets

Sheet Name <small>(Click to navigate directly to sheet)</small>	Complexity Score	Formulae	Formulae Protected	Size <small>(Rows x Columns)</small>	Notes or Description <small>(Optional input by user)</small>
Sheet1				Empty	
Sheet2				Empty	
Sheet3				Empty	

No Hidden Worksheets

No References or Links to Other Files

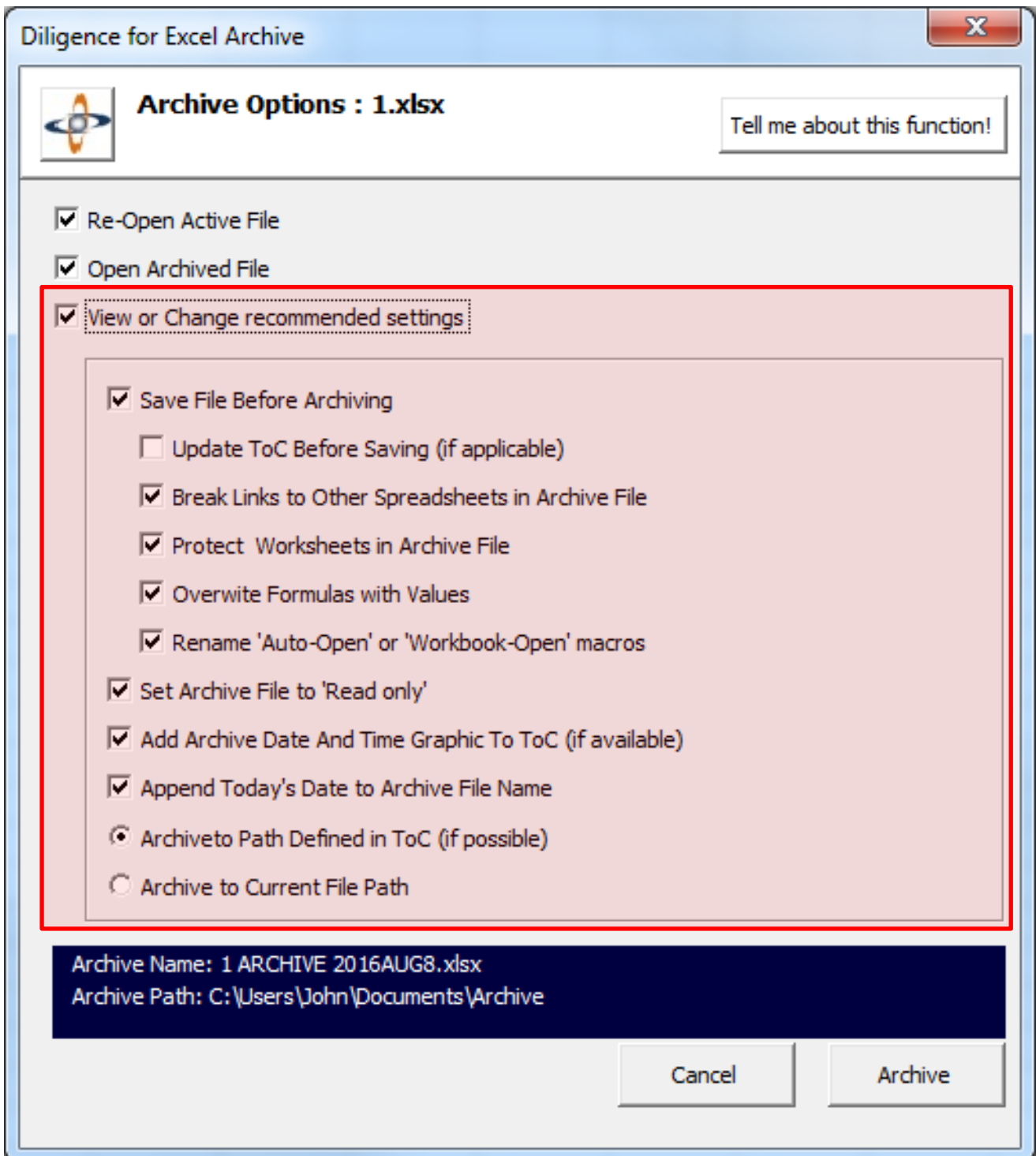
No Macros / VBA

Structural Change History Lifetime of Changes **Unlimited**

Navigation: ToC / Sheet1 / Sheet2 / Sheet3

Archive Options

Several of the default settings can be overridden by pressing the 'View or Change recommended settings' check box from the main Archive userform ...

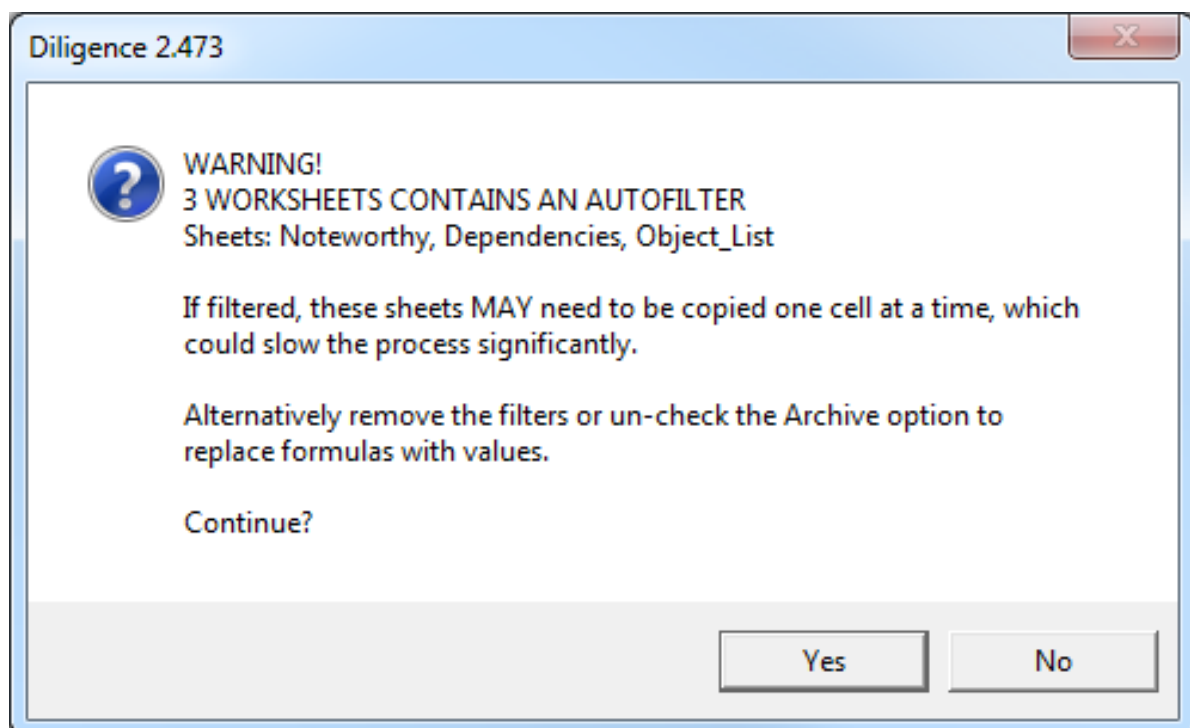


Archiving Files with Event Macros

Due to the nature of archiving, it is necessary to save, close and usually re-open the file. Workbooks that have event macros linked to any of these events are likely to disrupt the archiving process and may cause errors. If problems are encountered, it is recommended that these files are closed and re-opened with macros disabled, and then the option to NOT re-open the archive file is checked.

Archiving Files with Sheet AutoFilters

In some versions of Excel, 'Copying' then 'Pasting Values' will result in an error when working on data within an Auto-Filtered list. This means that Diligence may need to replace formulas with values at a row-by-row, or in extreme circumstances a cell by cell basis. Depending on the sheet size, this may slow down the archive process significantly. If Diligence detects filters are being used, and the user has elected to replace formulas with values, formerly a warning is issued to the user before the archiving takes place, similar to that displayed below ...




Governance Report

Press the 'Governance Report' button on the main Diligence ribbon. This report summarises key governance features of files that include a Table of Contents and have been specified as being included in the user's inventory.

The report consists of a summary page together with six additional worksheets giving more detailed information.

The Governance Report Summary Sheets

The summary sheet includes RAG indicators on six key governance statistics, and space for commentary. Level 1,2, & 3 files refer to the Importance level (e.g. Critical, Important & Non-important) whose names vary between installations.



Governance Report & Table of Contents Summary

For tips and information on using this report visit www.DiligenceForExcel.com

Run Details	Run by ...	Date ...	Dates Retrieved ...	Data Retrieved Run by ...	File Levels Retrieved ...
	John	20 Mar 2016	Last 2 years	JOHN	All Levels

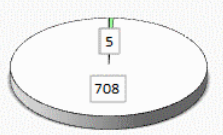
Approvals	Comments:
Summary approved by ...	
Approval date ...	

Report Contents	Comments:
Worksheet (Click to navigate)	
Latest Versions	
Timeline Report	
Links Sheet	
References Sheet	
Changes Sheet	
Raw Data	

Summary Charts Importance Levels 1 & 2 Only

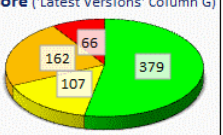
714 Different Files

Level 1 Files	1
Level 2 Files	5
Level 3 Files	0
Not Specified	708



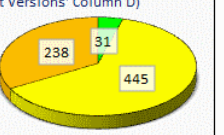
Avg. File Complexity Score ('Latest Versions' Column G)

0.0-3.9	379
4.0-5.9	107
6.0-7.9	162
8.0-10	66



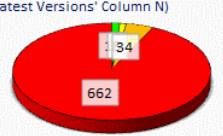
ToC Last Updated ('Latest Versions' Column D)

0-1 Months	31
1-6 Months	445
6-12 Months	238
12 Months +	0



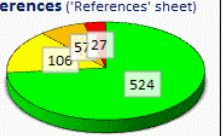
Formulas Protected ('Latest Versions' Column N)

100% Protected	10
75% - 99%	8
1% - 75%	34
None Protected	662
Data Only	0



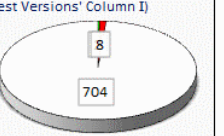
Number of Links & References ('References' sheet)

0	524
1	106
2 or 3	57
4 or more	27



Approval Next Due ('Latest Versions' Column I)

Over 1 Month	2
Within 1 Month	0
Overdue	8
Not Specified	704



Summary / Latest Versions / Links / References / Changes / Timeline / RawData

Page 132

Latest Version Worksheet

This lists key details of the latest recorded version (at the time of last ToC update) of each unique inventory file, which is defined by the FileID field on the file's Table of Contents worksheets.

Links Worksheet

This sheet lists the linked files specified in all versions of all inventory files. This may be useful when ascertaining which files are required in all the user's important files, or checking that all linked files are being held on the correct network drives.

References Worksheet

This sheet lists all the programmatic references to all inventory files. This may be useful when, for example, a new version of a dll or executable become available and the user needs to know which files will require testing.

Changes Worksheets

This sheet lists all the structural changes made for each file when the Table of Contents is run. It is effectively a cumulative list of the contents of all the changes made in all the Table of Contents worksheets for each file in the user's inventory.

Timeline Timesheet

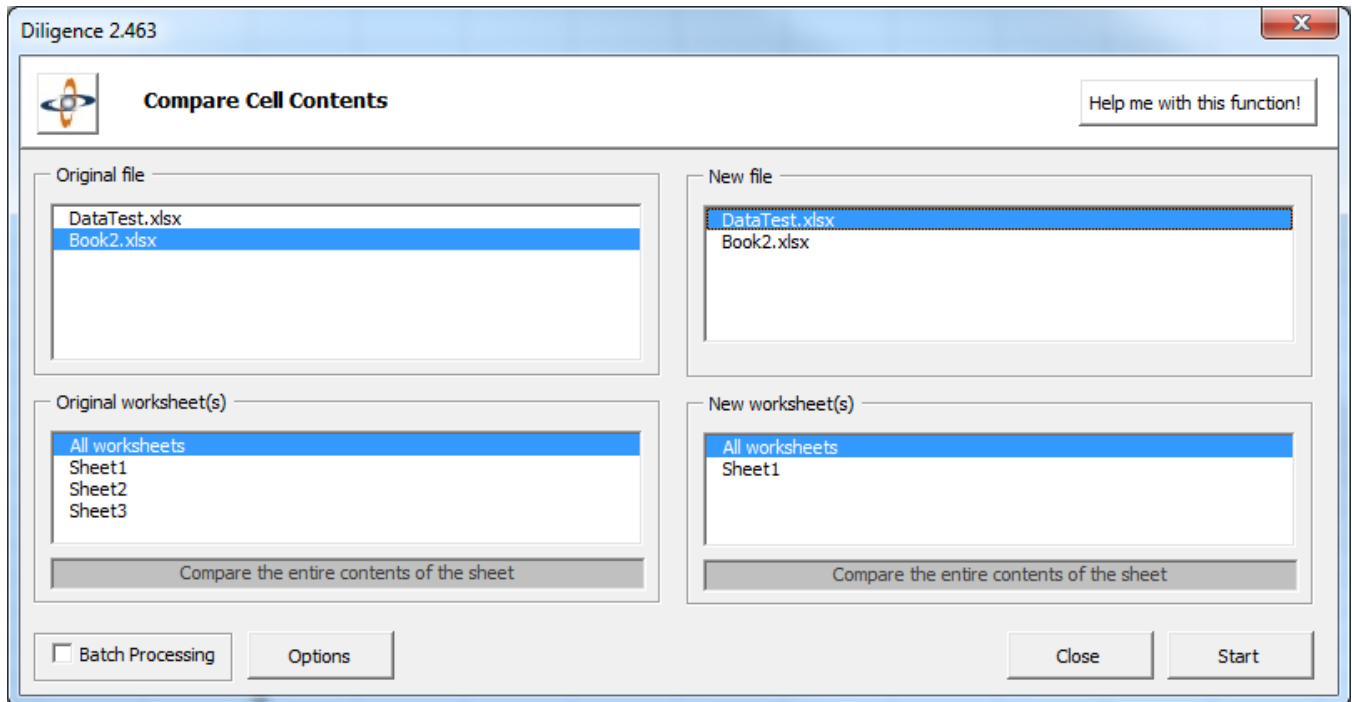
This sheet can be used to see how any one particular inventory file has changed over time in terms of its size, linked files, complexity and amount of VBA code. Select one or more combinations of the four dropdowns to view any appropriate file.

Raw Data Worksheet

This sheet lists all the user's inventory data used within the report, and can be used for broad statistical or analysis.

Comparison Functions

Comparing Cell Contents



Press the 'Compare Cell Contents' button on the main Diligence ribbon. This utility enables users to compare any two sets of data (range vs. range, sheet vs. sheet or file vs. file). The visual comparison highlights differences in values and/or formulae with numerous options to show (for example) differences above a pre-set level.

The summary page lists all the sheets and changed formulae and/or values in a single location and may be useful for recording comments or approvals. However, the most incisive details are often those contained in the change-graphic worksheets (a sample extract is shown above)

Blue Cells:

Cells whose formula and/or value has changed (The new value is displayed)

Red Cells:

Cells that were not populated in the original worksheet

White Cells:

Cells whose formula and/or value match exactly*

Yellow Rows or Columns:

Entire rows or columns that did not exist in the original worksheet.

Pink Rows or Columns:

Entire rows or columns that existed in the original worksheet but have been deleted.

Cell Comparison Options

Press the 'Options' button near the bottom left of the screen to display the cell comparison options userform ...

The screenshot shows the 'Diligence for Excel' application window with the 'Cell Comparison Options' dialog box open. The dialog is organized into several sections:

- Row & column matching:** Both 'Row matching' and 'Column matching' are set to 'Automatic'.
- Changes shown:** The 'Show formula & value changes' radio button is selected. Other options include 'Ignore changes caused by precedents', 'Show formula changes', and 'Show value changes'.
- Reporting options:** Includes checkboxes for 'Group & summarize adjacent differences' (set to 'for 3 or more consecutive rows'), 'Highlight biggest % value changes' (set to 'Top 3'), 'Highlight inverted values' (checked), 'Case sensitive text changes' (checked), and 'Omit reporting perfect sheet matches' (checked).
- Original file range:** 'Entire sheet's contents (used range)' is selected.
- New file range:** 'Entire sheet's contents (used range)' is selected.
- Reporting thresholds:** 'Report all differences' is selected. Thresholds are set to '10%' for percentage and '10000' for value.
- External formula references:** 'Compare formulae exactly as they are displayed' is selected.

Buttons for 'Options Help', 'Cancel', and 'OK' are located at the bottom right of the dialog.

Numerous useful options and option combinations are available including the ability to only indicate data that has NOT changed and only show data that has changed (say) more than 10%

Tips & Tricks

With its automated row and column matching, the Cell Comparison Utility within Diligence is simple to understand and easy to use. However, there may come a time when the results just aren't what you were expecting or you require more control over what differences are reported. This page offers tips and suggestions on comparing cells and an insight into the features of the Cell Difference Report.

Review the Data Sheets, not the Front Sheet

The front sheet on the report is useful for recording comments about any changes, but to SEE the differences, jump to the other sheets in the report, then ZOOM in and out. This will enable you to quickly locate the changed data ...(To zoom, hold the ctrl key and scroll with the mouse) ...look for the coloured cells and check out the cell comments to compare the original and new data.

Use an 'ID' Column in your Data

It's good practice to be able to uniquely identify your row (or column) of data, and the speed and accuracy of any comparison can be improved dramatically by its use. See below for details of how to create and use a simple 'ID' column, even for complex datasets.

Use the Comparison Options

There are a host of options available right out of the box when comparing data. Once you have selected your Files/Sheets to compare, press the 'Options' button at the bottom of the screen. Possibilities include selecting a specific range within each sheet to compare, only reporting differences over (say) 10%, or only reporting items that have NOT changed..... Go ahead and experiment!

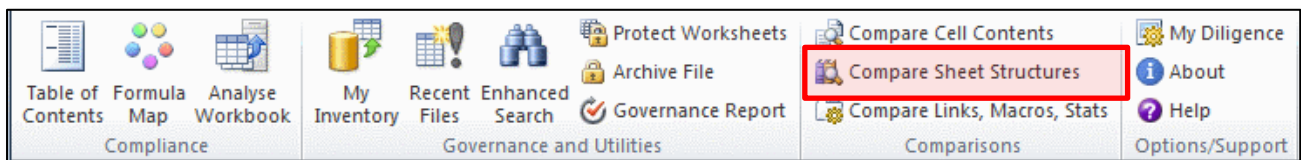
Inserting and Using an 'ID' Column

The Diligence Cell Comparison utility attempts to match rows and columns automatically. It achieves this by reviewing all the data to find any new or deleted rows, and then match the remaining rows, taking into account any data that has moved.... the more changes there are in the data, the more of a 'best guess' this becomes. The best possible way to assist Diligence in locating changes accurately is to use unique row and column headers (ID columns or ID rows).

This is often simpler than it sounds and included as part of the data by default. For example, here is some old and new sales data that naturally include an ID column, because the first column of data includes row titles that uniquely identify the data. So, for example, in the second set of data a new unique product ID (Pineapples) was added to the data...

Comparing Worksheet Structure

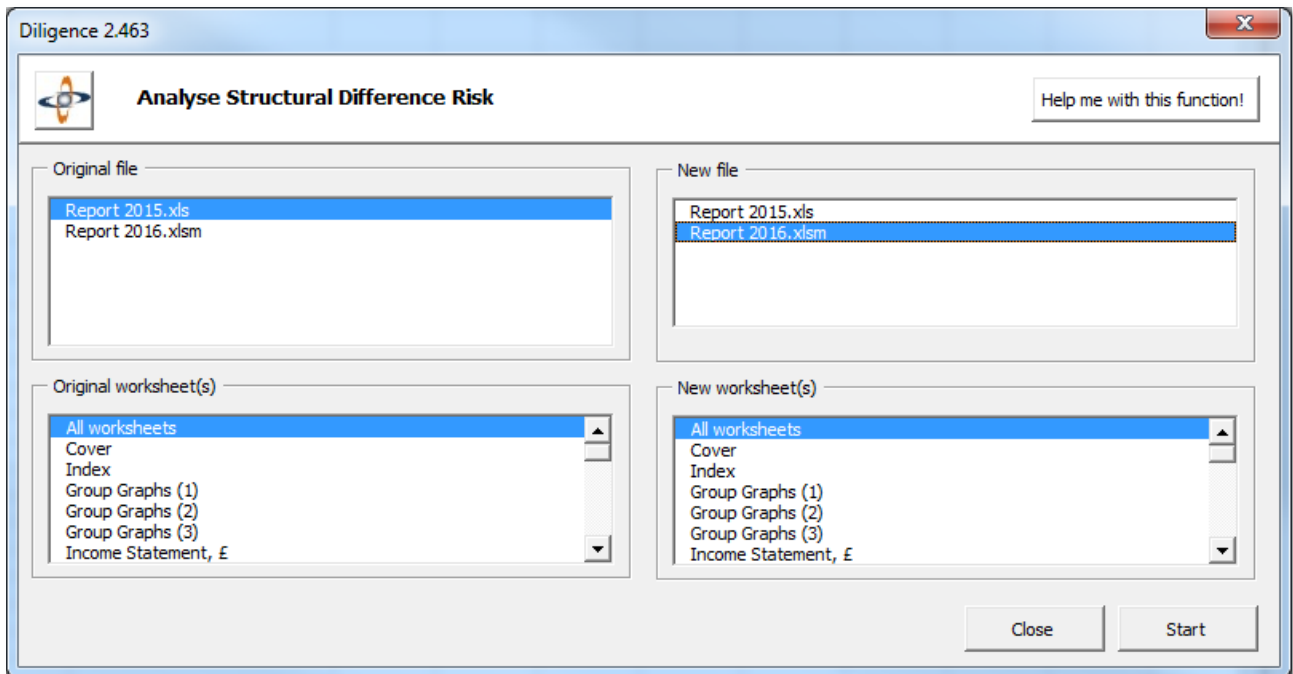
Press the 'Compare Sheet Structures' button on the main Diligence ribbon. This report can significantly aid audit approval. It is normal, and even expected for spreadsheet values to change from one year to another due to its inputs (sales figures, tax rates etc.), but this report has the ability to state simply whether corresponding sheets in any two workbooks (with or without a Table of Contents) have changed in terms of its design structure, by way of a Traffic Light (RAG) indicator



This allows the user or auditor to highlight which of the worksheets require testing, further analysis and/or explanation of why formula / structural changes have been made, which can be useful especially where no previous Table of Contents sheet has been added.

Using the Function

Open up the previous and current versions of the file, and press the 'Compare Sheet Structures' button on the ribbon. A userform showing all open workbooks that contain any data will be displayed...



The two right-hand-side list boxes of the form duplicate the two on the left-hand side. Each side shows a list of the open workbooks at the top, and the worksheets contained within the selected workbook at the bottom. In addition, there is a (default) 'All worksheets' item at the top of each list. If this is selected then Diligence will attempt to match the corresponding worksheets in the original and new files, even if the worksheet names have been changed, and report on each of the worksheet matches.

Select the original workbook on the left and the new workbook on the right. The files do not need to be in the same Excel format, for example one could be in Excel 2003 (.xls) format and the other in Excel binary (.xlsb). Then either select one worksheet from the original and one from the new file to compare, or leave both lists as 'All worksheets' and press the 'Start' button.

Where corresponding worksheets have been matched, but have different sheet name, both the old and new names are displayed (highlighted)

The change-risk level for each worksheet-pair is displayed, along with an explanation for the rating. To the left of each worksheet and at the top, lemon coloured cells are available for the user, manager or auditor to comment on the result.

In this report, any changes to the contents of the worksheets are not being assessed. It is perfectly possible for every single value in the worksheet to be different and still achieve a Green, low risk status because it is the structure of the content that is being analysed.

Example Risk Profiles ...

Low Risk (Green)

Data has been sorted or moved.

Medium Risk (Amber)

Text or headers have been changed.

High Risk (Red)

New formulas included or a set of formulae have been overwritten with fixed numbers.

This may often be one of the most time-saving and useful utilities, because this report can be used to identify just the areas where deeper analysis, testing or documentation is required.

Further reading on Due Diligence spreadsheet risk and the methodology used to ascertain the change risk between sheet-pairs is available from the following link ...

<http://arxiv.org/abs/0908.3022>

Comparing Links, Macros & File Statistics

Press the 'Compare Links, Macros, Stats' button on the main Diligence ribbon. This utility considers aspects of a workbook that are often concealed upon a preliminary investigation, but can still cause a material change to the spreadsheet's results. These are often subtle differences such as external file links, changes in named ranges and macro code.

This utility reviews (single file) or compares (any two files) these aspects and presents the results both as report and a colour coded Complete Match (Green), Partial Match (Amber) or No Match (Red)

The report comprises a savable report, such as below

Original file		New file	
Name	406 Account Planner UAT USA.xls	Name	405 Account Planner 601010 US.xls
Location	\\Mybooklive\idas\Diligence\OK for Bulk Test	Location	\\Mybooklive\idas\Diligence\OK for Bulk Test
Last saved	12-Jan-2015 14:26	Last saved	12-Jan-2015 14:26

Difference(s), approved by .	Comments:
Approval date ...	

Difference Comment	MACROS & VBA	406 Account Planner UAT USA.xls	405 Account Planner 601010 US.xls
	NUMBER OF MODULES	15	15
	NUMBER OF ROUTINES	206	214
	TOTAL LINES OF CODE	3476	3912
	TOTAL LINES OF COMMENTARY	410	425
	MODULES >		
	MODULE		
	NUMBER OF ROUTINES	5	5
	LINES OF CODE	159	238
	ROUTINES >		
	SUB- Workbook_Activate()		
	LINES OF CODE	20	22
	CODE MATCH?	4 mismatched row(s) found in multiple sections of code starting at line 6	
	SUB- Workbook_BeforeClose()		
	LINES OF CODE	7	8
	CODE MATCH?	1 difference found at code line 6 , Line= Application.ScreenUp	
	SUB- Workbook_Deactivate()		
	LINES OF CODE	3	4
	CODE MATCH?	1 difference found at code line 3 , Line= End Sub	

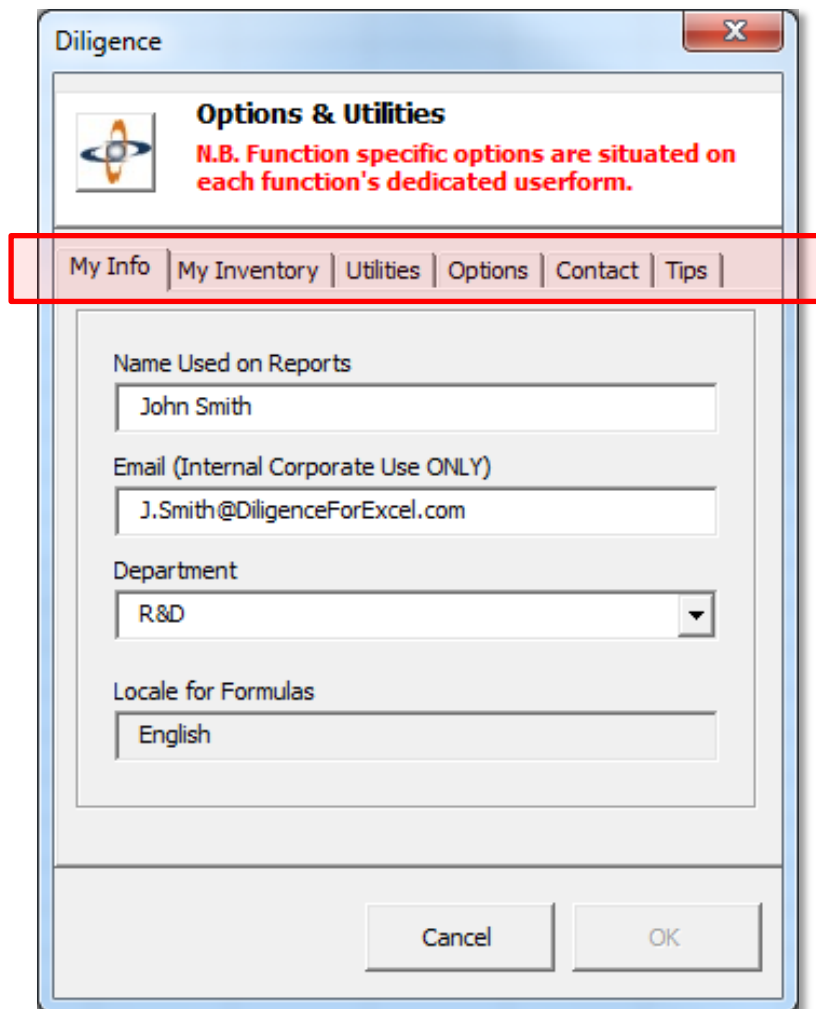
Key

- Where differences exist, a red box accompanies the difference (e.g. the visibility of a worksheet has changed)
- Where the items are identical, a green box is displayed
- Where some sub-items are identical and some sub-items have changed then an orange box is displayed (e.g. if the visibility of a sheet had changed, but the used range had stayed the same, then the overall worksheet would be shown as orange.)
- Where an item has no value, does not exist or is displayed purely for information purposes then the box is displayed as blank.

In keeping with the other Diligence reports, there is space (in yellow) for optional comments or approvals. A visual and intuitive data tree showing all the key information is also shown when the report is first created and can be re-drawn at any time by pressing the 'Recreate Metrics Tree' from the 'Advanced' userform.

My Diligence

My Diligence is set of options and functions and utilities. It consists of six tabs available from a central userform ...



My Info Tab

This allows the user to change the names used on reports, and the email and department entered by default on any new Table of Contents sheets.

If using a non-English version of Excel, and the language used is supported in the corporate license, the user may also select whether to analyse workbook functions (complexity) by assuming the formulas are in English, for example. SUMIF() or in the locale of Excel, for example. SOMME.SI()

My Inventory Tab

By default, when a user creates a ToC on a workbook, that file is added to the users' inventory, thereby providing quick access and other additional useful statistics via the My Inventory feature. These are four options that dictate how Diligence includes or excludes files from the user's inventory when they first run, or re-run a Table of Contents ...

Include in My Inventory

When a ToC is first run, it will be added to the Inventory. If a ToC is re-run, the file will be added to the inventory even if it was explicitly excluded beforehand.

Exclude from My Inventory

When a ToC is first run, it will be excluded from the Inventory. If a ToC is re-run, the file will be excluded from the inventory even if it was explicitly included beforehand. Previous version data will still be held but will not be displayed in the inventory reports.

Include New ToCs, otherwise include/exclude as before

When a ToC is first run, it will be added to the Inventory. If a ToC is re-run, the previous setting (shown or hidden) will continue to apply.

Exclude New ToCs, otherwise include/exclude as before

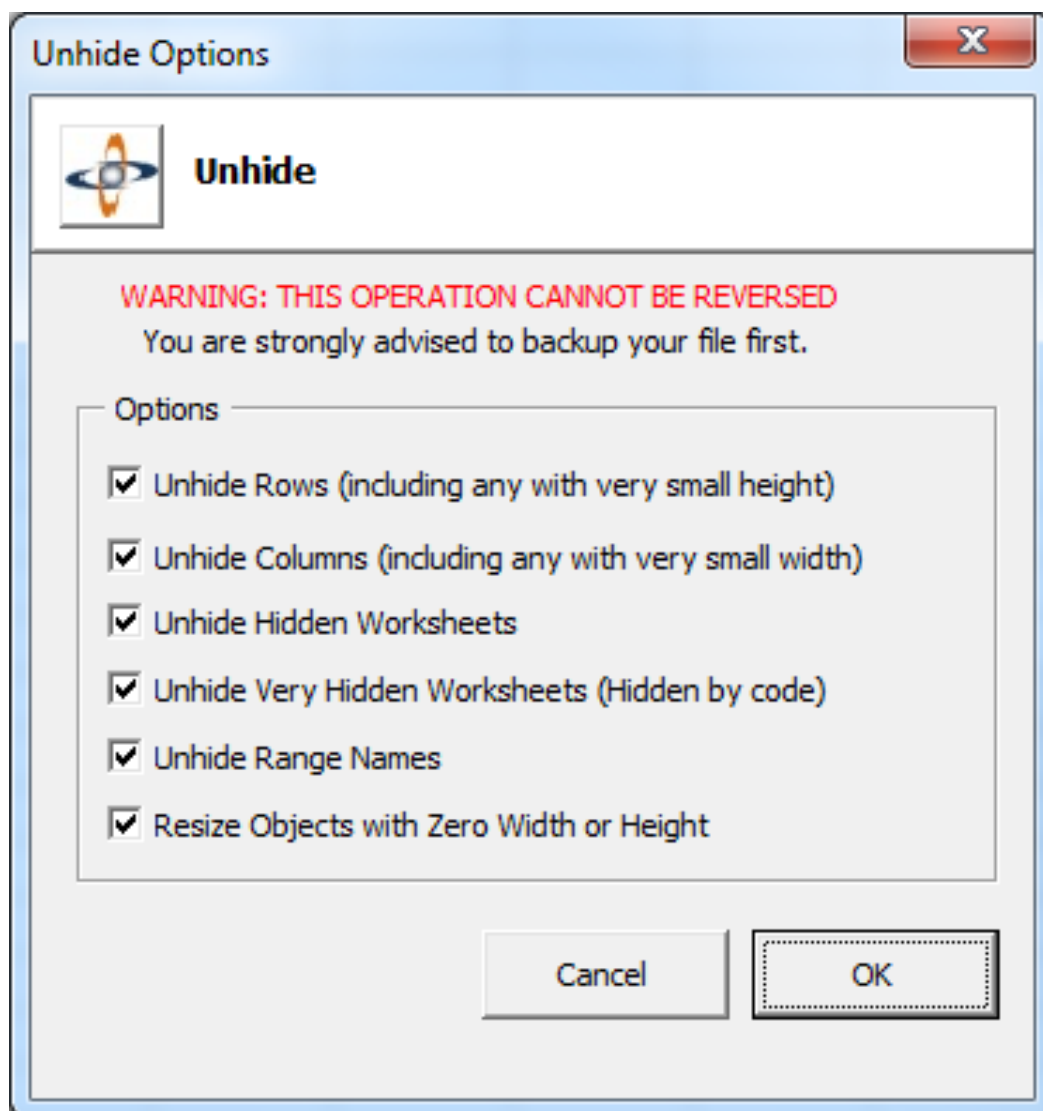
When a ToC is first run, it will not be added to the Inventory. If a ToC is re-run, the previous setting (shown or hidden) will continue to apply.

Utilities Tab

This tab consists of several Excel functions that may assist users in day-to-day operations ...

Unhide Everything

This utility un-hides hidden and very hidden worksheets, hidden named ranges, hidden (or very small) rows, columns and hidden objects.



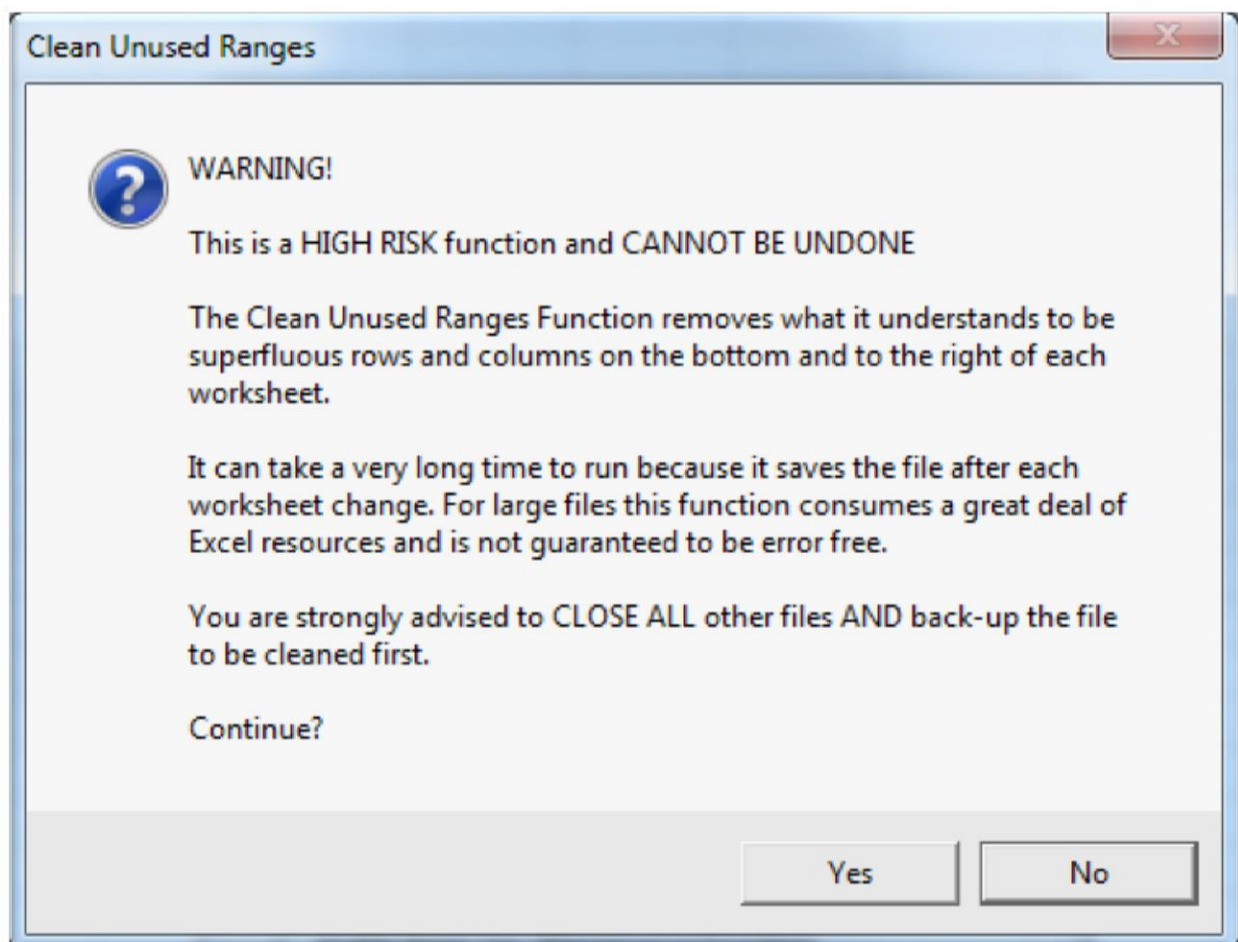
Clean Unused Ranges

This function aggressively removes all cell formatting beyond the row and column of the last populated cell, as calculated by Diligence.

Under certain circumstances, where formats have been extended past the last used cell, superfluous formatting can drastically increase the file size which can be reclaimed with this function.

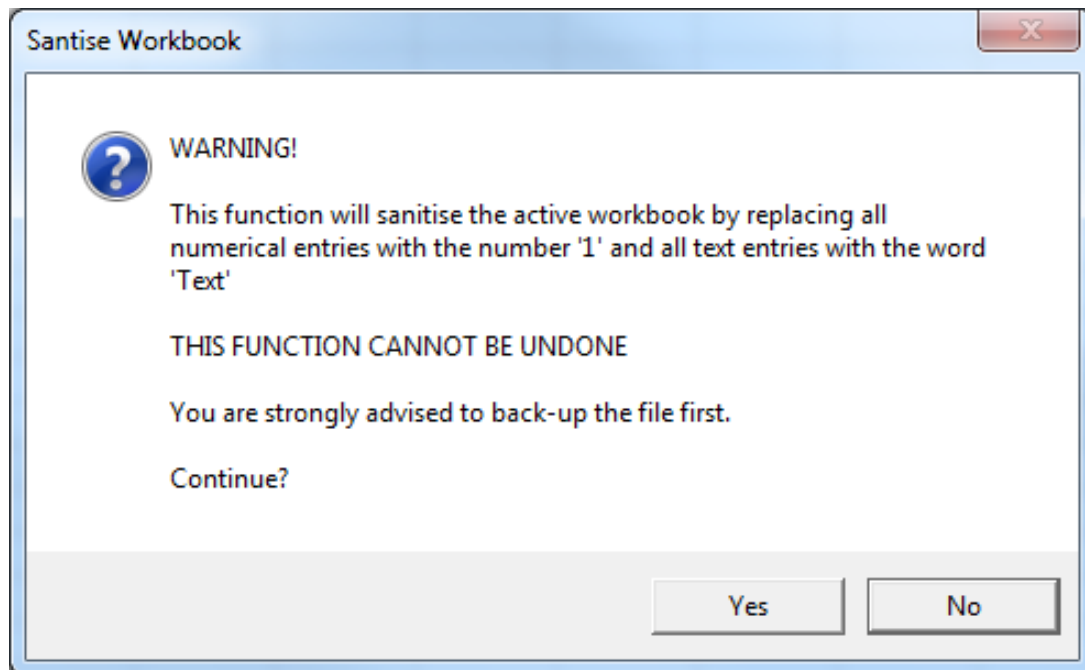
All formatting to the right and below the last cell will be lost. One row and one column's 'grace' is given (i.e. not deleted) to allow for border-formatting of any data.

Important Note: All rows and columns beyond the last used cell (with one row & one column grace) are deleted. Any objects, such as cell comments, charts or pictures beyond that range will also be deleted and the function cannot be undone. Users are required to confirm that nothing of importance lies beyond the last data cell.



Sanitise a workbook

There may be a requirement to copy or send a confidential workbook to a third party. This function replaces all numbers and text in a workbook with generic data. It thereby leaves the logic of the workbook in place whilst removing commercially sensitive data or numbers.

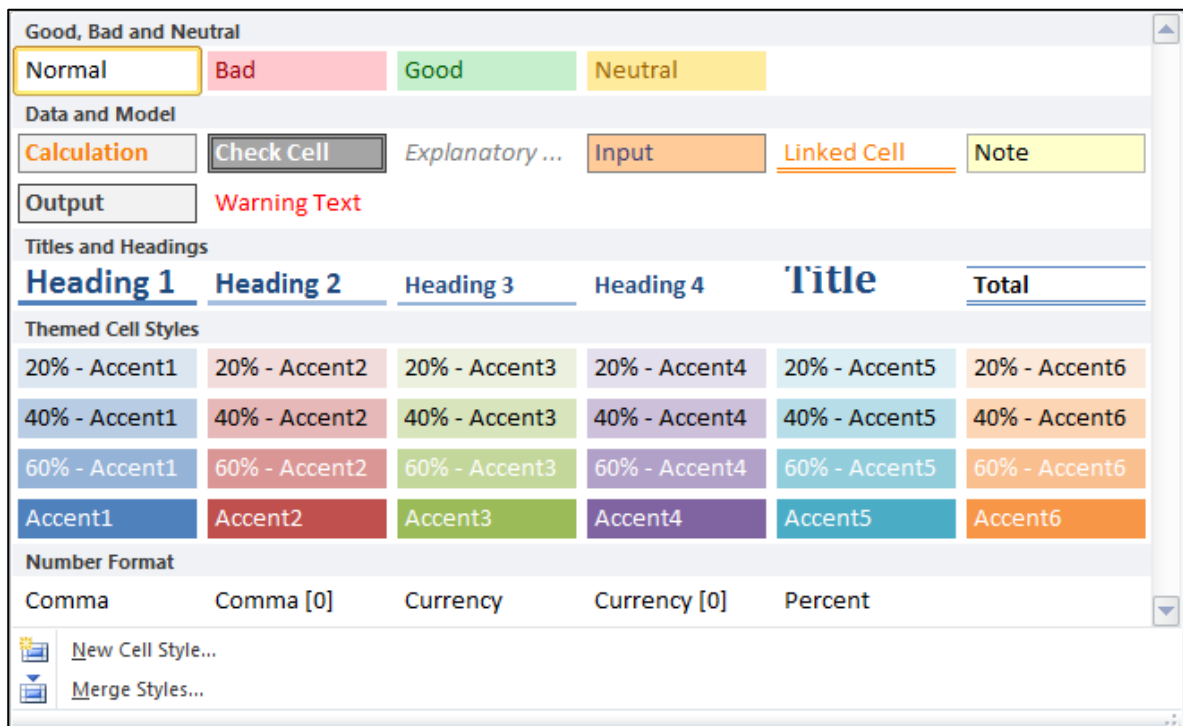


Important note: This function should not be considered commercially safe for files that include pivot tables containing sensitive data. This is because the (hidden) pivot caches are not removed, and their source data can be exported to a file by a suitable knowledgeable person.

Remove Superfluous Styles

A style is a combination of font, font size & colour, paragraph formatting, border and shading details, number format and cell protection details. Styles are available from the default Excel ribbon and are one of Microsoft Office's core personalisation methods...

Below is a list of the default styles from a new Excel 2010 file (may vary slightly) ...



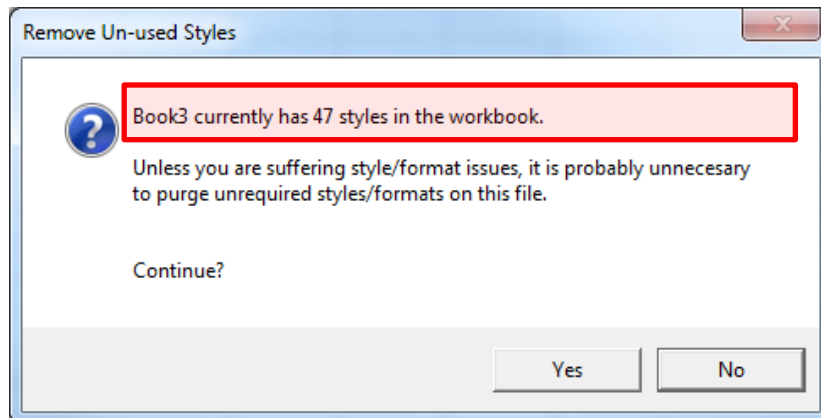
An Excel 'feature' dating back to Excel 2003 meant that styles are often inadvertently copied between spreadsheets whenever a user copies and pastes data between two workbooks. Unused styles accumulate within the workbook, and when the number approach the maximum permissible (about 64 000) problems start to occur.

More details of the problem are from Microsoft available...

<https://support.microsoft.com/en-us/kb/213904>

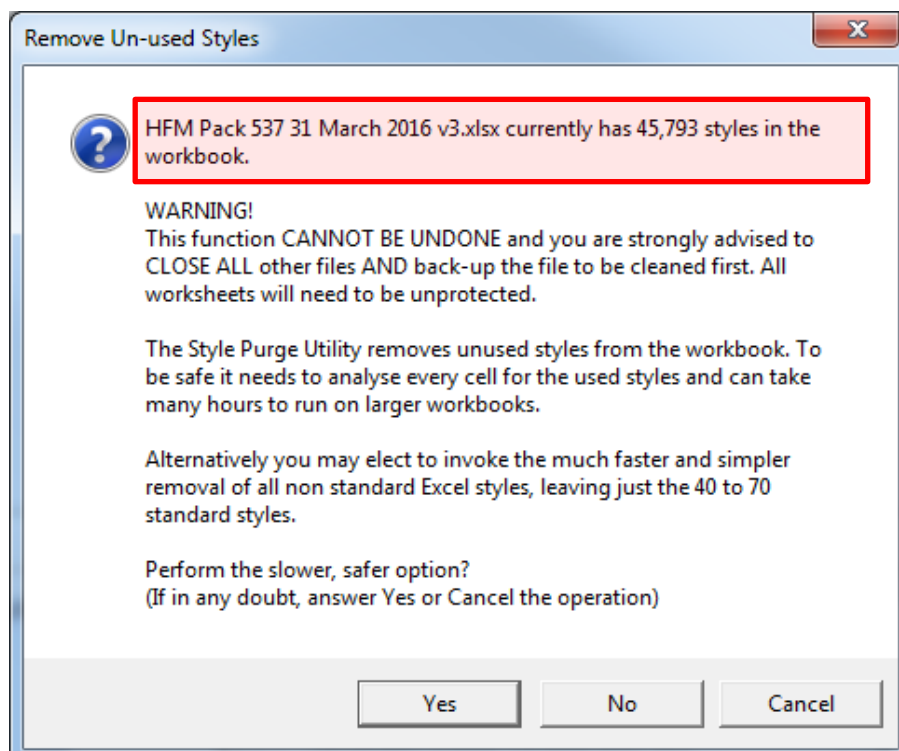
This Diligence function informs the user how many styles are in the active workbook, and offers the ability to remove any unused styles.

If the workbook contains under 200 styles the user will be presented with the following message, which usually means the process does not need to be carried out ...



If there are over 200 styles, then the user is presented with a choice of whether to perform a full analysis and deletion, or a standard deletion ...

This warning informs the user of the need to unprotect all the worksheets, and advises on a backup because the process cannot be undone. It also offers the user two choices for removal



It also offers the user two choices for removal methods ...

- **Safe Method (Yes)** : This method reviews all the cells in the workbook and compares any style used to the current list of styles. Because the entire workbook contents are reviewed this method is completely safe and will not remove any style currently in use. The length of time taken is dependent on the number of original styles and the number of cells in the used range of every worksheet. It can take several hours for large files.
- **Quick Method (No)**: This method does not review the current styles used but simply removes all styles that are not built-in to Excel's standard style list, leaving just the original 47 styles (Excel 2010). The length of time taken is solely dependent on the number of original styles.

In reality, unless the user is accustomed with changing styles to invoke format changes within the workbook, it is usually safe to simply remove all the non-standard styles, which is the faster option.

What happens if I use the quick method and it deletes some styles that are in use?

The 'style' will no longer be available. However, all the original formatting aspects of any cells using that style (e.g. font / shading / number format etc.) will be left entirely intact. The only discernable difference will be when (if) the user wants to change all the cells with that style en-masse, which will of course, no longer be possible.

Number by Colours

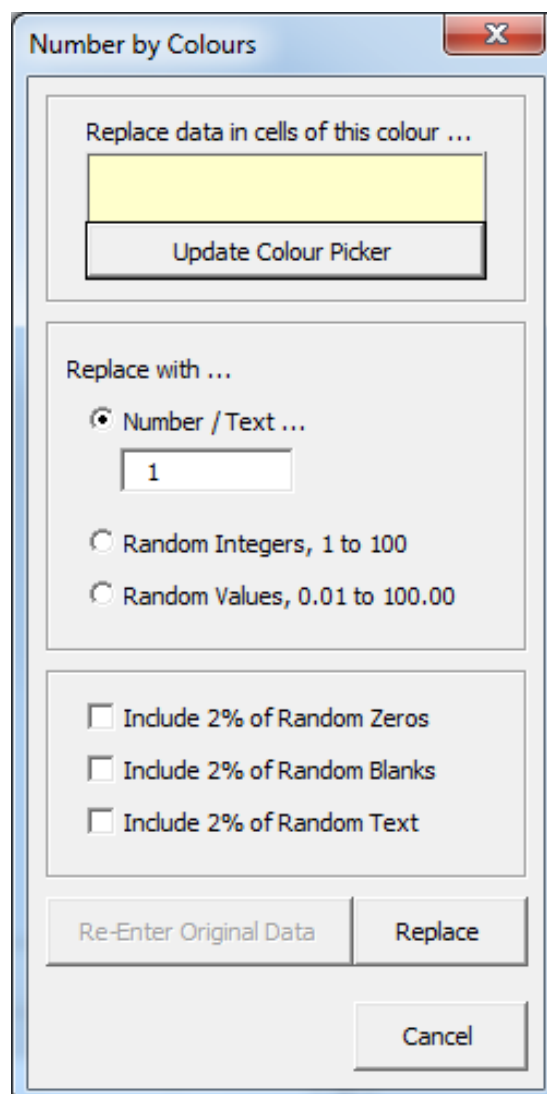
This utility is extremely useful when value-testing or stress-testing a spreadsheet.

It allows the user to enter specific random data into all cells containing data (not formulas) based on the colour of the cell.

As an example, if all data input cells are coloured in lemon, then by selecting any one of these lemon cells and invoking the function the user can change all the lemon cells to (for example) the number 1.

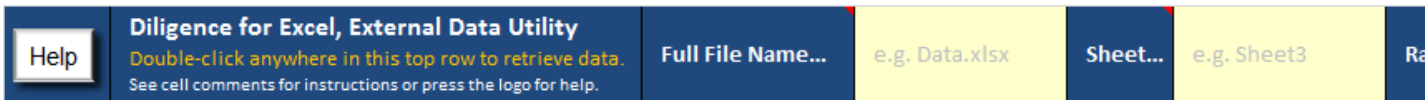
In addition, deliberate 'exceptions' can be added of Blank Cells, Zero Values or Random Text.

The user can make multiple changes to see what effect the data has on the spreadsheet. Once finished the original values can be returned.



Data Retrieval Utility

This is an experimental new utility. More information will follow. You are highly recommended NOT to use this utility except for testing purposes. Please report any issues or problems to Support@DiligenceForExcel.com



Options Tab

Personal Information

This is the information use by Diligence when logging data and producing reports.

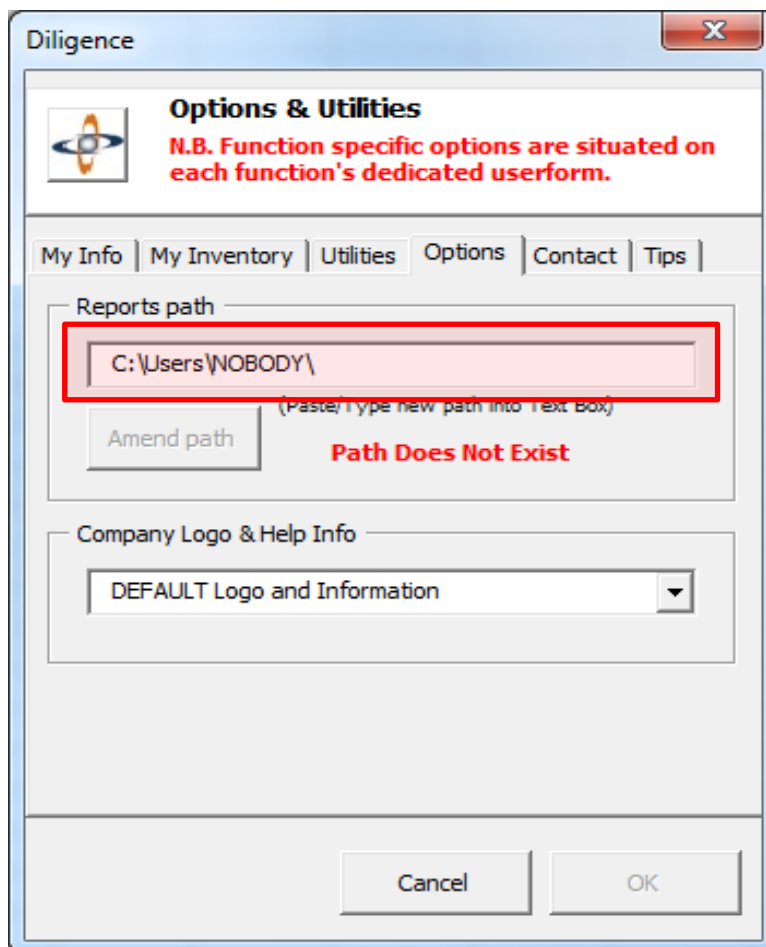
We hold our belief and policy of light-touch & non-interference VERY seriously.

NO PERSONAL INFORMATION, DATA OR SETINGS ARE PASSED OUTSIDE THE DILIGENCE INSTALLATION PATH(S) EXCEPT AT THE SPECIFIC REQUEST OF THE LICENCE OWNER.

We don't think we can be clearer than that.

Reporting Path

This is the default path to which all Diligence reports are saved. Write (or paste) the path into the text box. As the text changes Diligence looks to see if the path is available. If the path does not exist or is not available, the 'Path Does Not Exist' text is displayed and the user cannot press the OK button. Once the desired path has been entered, the user needs to press the Amend Path button, followed by the OK button.



Optionally, if the word 'SAME' is entered in the Report Path, then all files will be saved to the same path as the file being reviewed.

Logo

Some clients have chosen to add multiple logos to the application, perhaps for different legal entities or branches. If more than one log has been specified and is available, users can switch between them from the drop-down list.

Contact Information Tab

Several options to contact support or recommend improvements.

5-Minute Guide Tab

Users can specify whether the 5-minute quick start tips are shown at start-up, or show tips immediately.

Support & Self-Help Checks

Below are some checks that are useful to perform before you contact us for support, which relate to the "Three C's" (contents, connections and corruptions) of your file that are all outside of Diligence control. If you contact us it is likely that these will be the first checks that we will ask you to perform and they will often resolve the issue...

Please undertake the following actions, which are ordered according to the probability of resolving errors and ease of effort

Try it in a new instance of Excel

Start a new instance of Excel, open only the file in question and re-run the function. Is the result the same?

Are other addins or programs causing the problem?

Other addins / com-addins / dll's or other 'installed' programs may be interfering with Diligence's functionality...Open a new instance of Excel and enter 'Test' on cell A1 of a new blank workbook, then re-try the function. If it failed, the likelihood is that there is some external interference. Please contact us for advice.

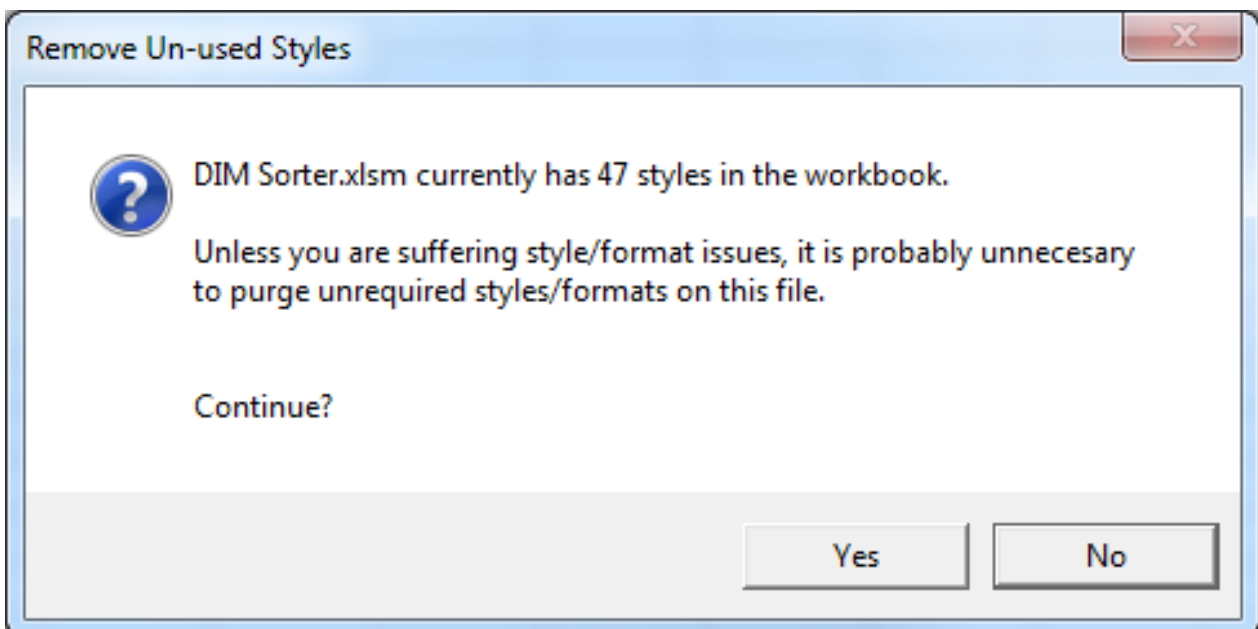
Switch it off and on again!

Yes, we know the connotations and humor attached to this well-known phrase, but both Excel, and Windows itself can get clogged up with data over a surprisingly short amount of time. Rebooting from scratch and re-trying the required function immediately will at the very least prove that memory leakage is not a contributing factor to the problem.

Superfluous Styles?

Due to a legacy Excel error, superfluous styles can build up that cause all manner of issues, eventually resulting in an unusable file. (See the 'Remove Superfluous Styles' section in the main manual for more details) From the Diligence menu select 'My Diligence' then the 'Utilities' tab and finally 'Remove Superfluous Styles'

This will initially alert the user to the number of styles being used. Any number under a few hundred is usually ok, but over this it is recommended to continue with the operation and remove the superfluous styles. Now save and retry in a new instance of Excel.

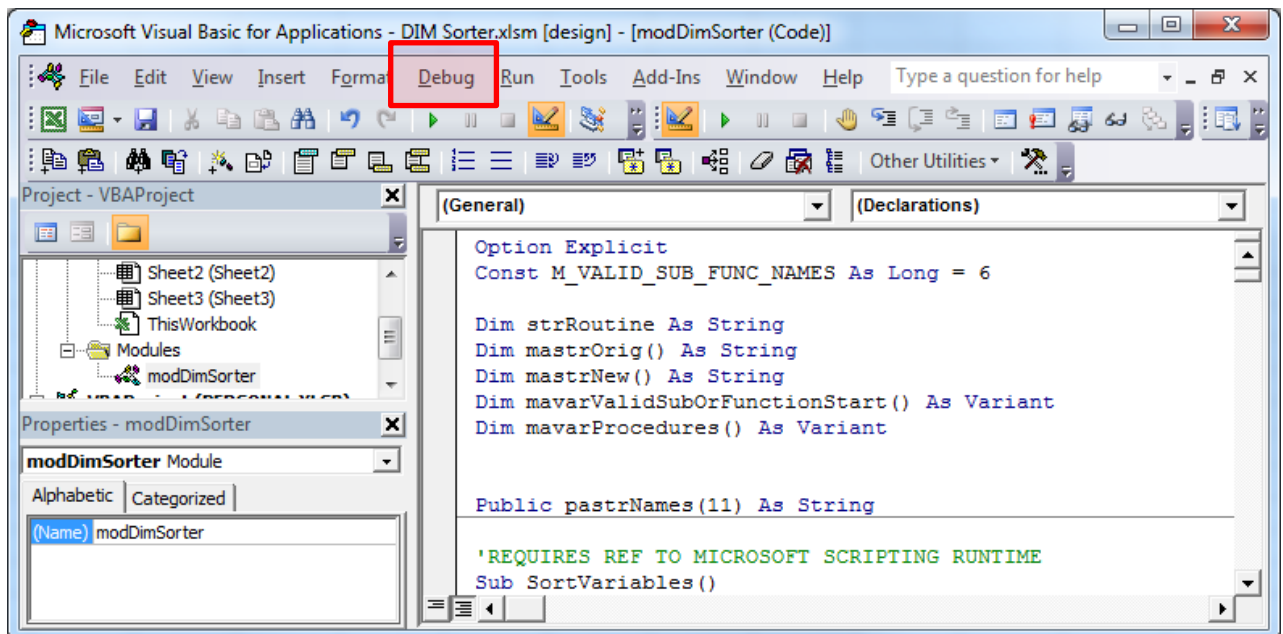


Does the workbook compile?

This checks whether there are any missing references or incompatible code within the workbook. Any anomalies can affect Excel's ability to return certain information to Diligence and hence make it impossible for Diligence to complete its function successfully.

Firstly, select the workbook in question.

Now display the VB editor by pressing the 'Alt' and 'F11' keys simultaneously. The result should be a new window that looks similar to that shown below...



Now from the Debug menu, press the first option 'Compile VBA Project' (or similar). If there are any errors displayed these are the most likely cause of the problem and should be resolved. If no message is received then it can be assumed that the file compiled without issues (This can be checked by attempting to compile a second time, where the Compile menu will be disabled)

Please note that Diligence can only assist with third-party workbook issues on a chargeable basis.

Corrupted file?

File corruptions are relatively rare in the newer xml file format (.xlsx. .xlsm. .xlsb) but more common in the older (.xls) file format, especially where the file has been saved over and over. Corruptions do not necessarily show up immediately to the users and can cause a variety of effects on calling functions such as those employed by Diligence, often resulting in errors.

Make a backup of your file and then

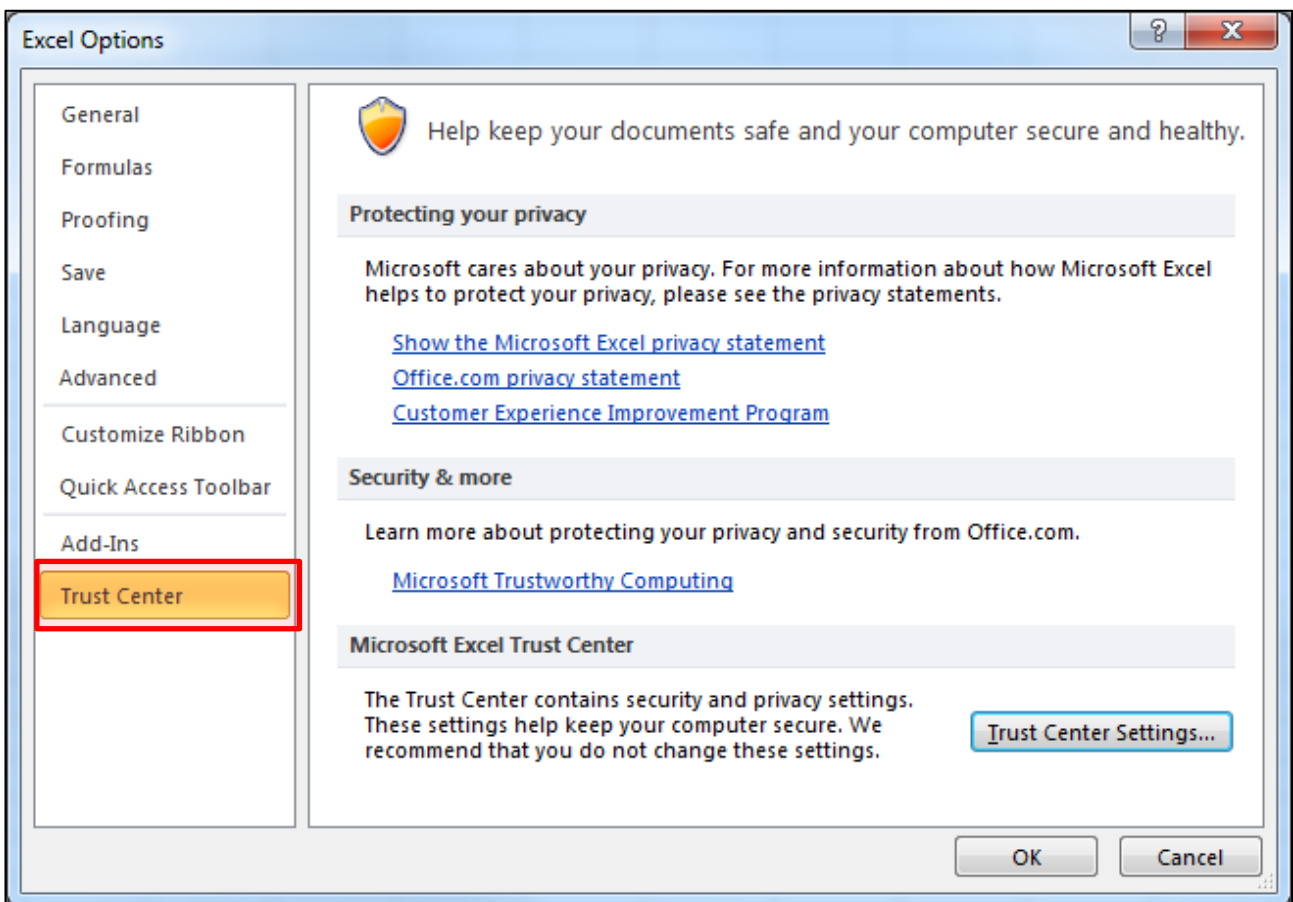
If your file is in an old file format (.xls) then save it in the newer file format (.xlsx for normal files, .xlsm for workbooks containing macros and/or .xlsb for large spreadsheets) and re-try in a new instance of Excel. If the function now works it is likely that the original file had a level of corruption and should be investigated (or the new file used henceforth).

If your file is in one of the newer .xlsx or .xlsm formats, save it as an .xlsb and re-run the function in a new instance of Excel.

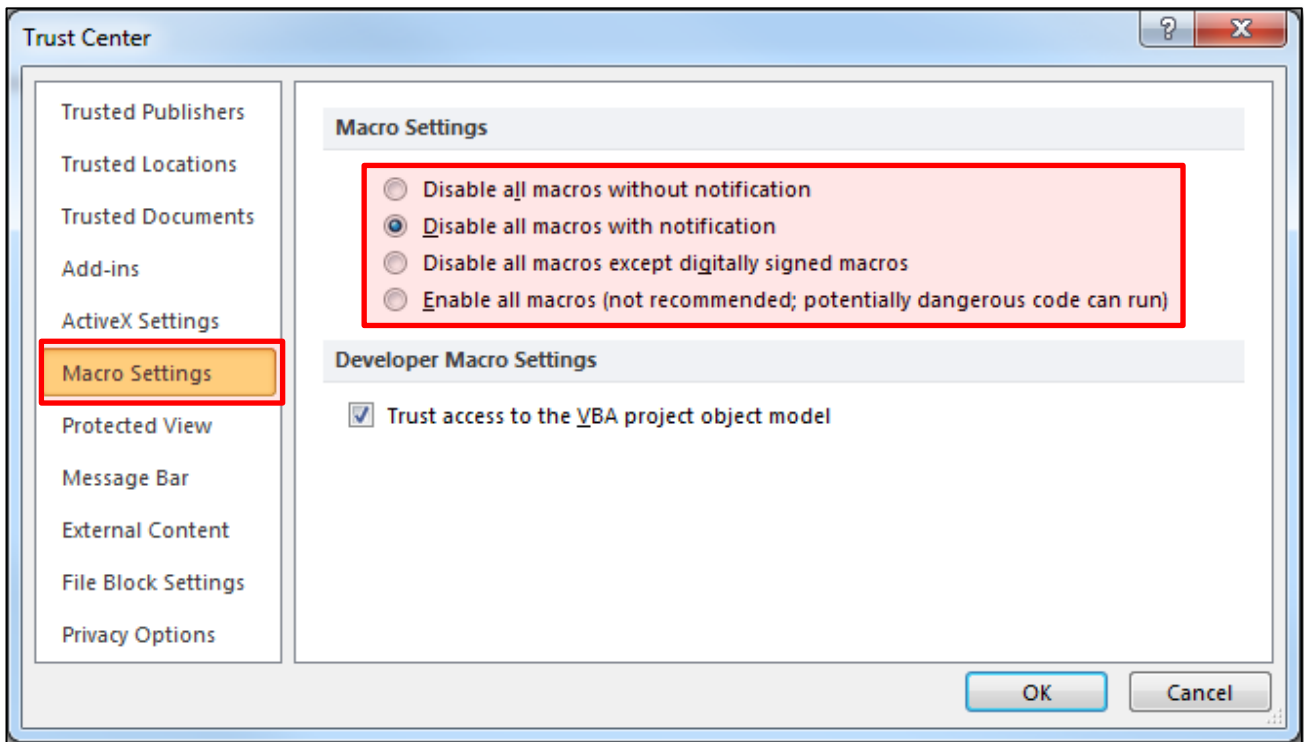
Disable Macros / Macro Security Settings

If the problem is specific to just one, or a few, but not all files, we need to know whether macros within the workbook(s) are effecting Diligence's operations. For example, code in other workbooks or addins may be 'taking over' when a new report workbook is created.

If possible, check your macro security settings, by selecting 'Trust Center' from Excel options, and then pressing 'Trust Center Settings' (note this may be disabled by your company so may not be possible for all users)

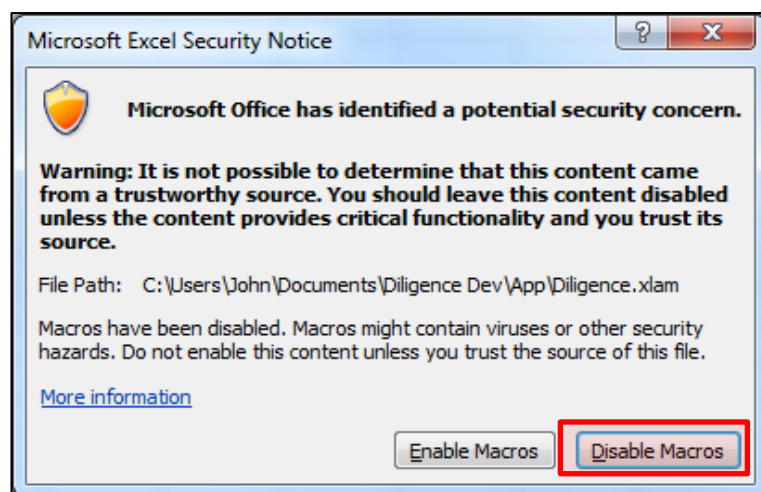


From the resultant userform, select 'Macro Settings' and ensure the option to 'Disable all macros with notification' is selected and press 'OK' if necessary.



Now open the file with macros disabled in a new instance of Excel

Close all open instances of Excel, and open one new instance. Now open the problem workbook. If the previous steps were followed and the workbook OR ANY OTHER AUTOMATICALLY OPENED WORKBOOK contains macros/VBA, a security notice will be displayed...press 'Disable Macros'. If no notice is displayed, then the workbook does not contain macros. Re-try the function.



If the function now works, it is likely the problem exists within the macro section of the workbook, or possibly other auto-opened workbooks. Diligence support 'may' be able to assist, but only if the workbook is supplied to us.

N.B. Sending files to Diligence Support

If the problem persists we will be happy to help. Diligence Support can usually respond to queries with much greater speed and accuracy when the workbook in question is sent to us. To assist with any security implications, users may choose to employ the 'Sanitise Active Workbook' utility (My Diligence / Utilities / Sanitise Active Workbook) which replaces all numbers with '1' and all text with 'Text'. See 'Sanitise Active Workbook' in the full manual for more information.

Send your file and as much additional information as possible to...
Support@DiligenceForExcel.com

Addendum

Limitations, Issues & Known Anomalies & Errors

Function-specific limitations are described in more detail in function specific chapter. Where applicable, this section only describes brief summaries and pointers to those limitations. See the chapter for more detail...

General Limitation: Workbooks containing 'Event' macros

Workbooks containing event macros linked to opening, closing or saving the workbook, or activating or deactivating worksheets are likely to interfere with many of Diligence's functions. If problems are encountered, it is recommended that these files are closed and re-opened with macros disabled.

General Limitation: User Defined Functions

The use of User Defined Functions adds a new dimension of both advantages and risks to a spreadsheet. Diligence acknowledges and records the use of all UDFs in the workbook being analysed, but UDFs can also be called from references files or a Personal Macro Recorder, for example. These external UDFs are not currently acknowledged by Diligence and will be missing from the Formula List on the File Summary Report, and the Sheet Complexity comment on the ToC.

Limitation: Recent File List

In line with the Diligence philosophy of non-interference, the recent file list (as available from within Excel) is the ONLY data source used by Diligence, and ONLY recorded when Diligence is first opened (usually when Excel is opened). A maximum of the 50 latest files are recorded by Excel, and this number can be reduced by the user in advanced settings. Therefore, if the user opens more than maximum number of recorded workbooks in any one instance of Excel, only the latest files will be recorded for the purposes of the Recent File List.

Known Issue: Recent File List: Addins will not open when double-clicked from the recent file list.

When does it Occur? When attempting to open an addin by double clicking the file from the recent files list AND the an addin with that name has already been opened during that Excel session.

What Happens?: Diligence states that the addin is already open and stops processing.

Why does it Happen?: An Excel anomaly means that the Excel reports the addin as being open when it has been closed.

Workaround: Open a new instance of Excel and retry.

Issue Status: Diligence is unable to affect the Excel function. No additional work is planned on this issue by Diligence.

Foreign Language Considerations

Diligence works within the Excel environment, meaning that it operates within the locale setting of the operating system and the installation setting in Excel.

Excel's installation language defines the function names used within Excel, for example SUMIF() in English would be SOMME.SI() in French, and this is taken to account in, for example, Formula complexity scores.

Diligence works with English, French, German, Italian & Spanish versions of Excel. Local and Office Installation languages are expected to match.

Training

We offer inclusive, tailored on-site training of Diligence for users, managers and administrators. We also offer advanced and refresher training courses and of course online / email support for any queries or issues before, during and after installation. Contact us for more details.