



LasManager

User Guide – January 2019

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1. Introduction

The LAS standard was introduced by the Canadian Well Logging Society (www.cwls.org) in 1989 to standardize the organization of digital log curve information for use on personal computers. It did this very successfully and the standard became popular worldwide. Originally aimed at oil and gas exploration, it has also become popular for use in exploration for other commodities that use digital log curve information such as coal and uranium. LAS Version 1.2 was released in 1990 and was followed in 1992 by LAS version 2.0 to address some inconsistencies. The LAS 2.0 version is viewed as a log data exchange format and remains the dominant product.

In 1999, the LAS 3.0 version was introduced to provide expanded data storage capabilities that include not only log curve data, but also core, inclinometry, drilling, formation tops and test data. LAS 3.0 is viewed as a wellbore data storage format and continues to see limited implementation. Due to its limited usage, **LasManager** currently does not support LAS 3.0, preferring to support only LAS 1.2 and LAS 2.0.

In February 2017, an update document for LAS Version 2.0 was released to make minor changes to the LAS 2.0 specifications to better reflect the technological advances made since its introduction.

LasManager validates Las files and displays their metadata so the user can easily modify it. It automatically fixes any issues that it can and also enables the user to:

- convert LAS 1.2 files to LAS 2.0 and vice versa
- wrap and unwrap Las files
- modify the start and stop depths including reversing the depth sequence in a file
- resample the curves at a different step size
- convert depths between metres and feet
- modify the NULL value
- modify the well name, logging company name, date of logging, company whose well it is, field name, location, county, state, country and unique well identifier
- modify curve names, descriptions and units
- delete curves from Las files
- filter curves
- merge multiple instances of a curve in a file to a single instance
- convert Csv files to Las and vice versa.

2. Selecting Files to be Checked and Displayed

When **LasManager** is opened or **Open** is selected from the **File** drop-down menu the Open Files window is displayed:

File Type

The File Type box allows the user to choose whether they are opening Las or Csv files. To convert one to the other, select **Save As** from the **File** drop down menu to save as the other file type.

If opening Csv files, the first line in each Csv file must include a curve name for each data column in the file. Any columns without a curve name will be ignored. It is preferable but not mandatory to also include the units and description of each curve so that they can be included in the Las file produced from the Csv file. There are two ways that the user can include units for each curve. Either by adding a full-stop and the units to each variable. For example:

	A	B	C	D	E	F	G	H	I	J	K	L
1	DEPT.M	GRDE.GAPI	CODE.G/C3	DECR.G/C3	LSDU.SDU	BRDU.SDU	CADE.MM	DENL.G/C3	DENB.G/C3	DEPO.PERC	BISI.MM	ADEN.G/C3
2	969.78	152.45	2.39	0.03	963.88	19650.49	94.72	2.37	2.32	15.48	96	2.4
3	969.77	156.86	2.39	0.02	979.09	19656.34	94.68	2.37	2.32	15.77	96	2.39
4	969.76	149.55	2.38	0.02	977.3	19744.15	94.66	2.36	2.31	16.47	96	2.37

or by adding a second header line containing the units. For example:

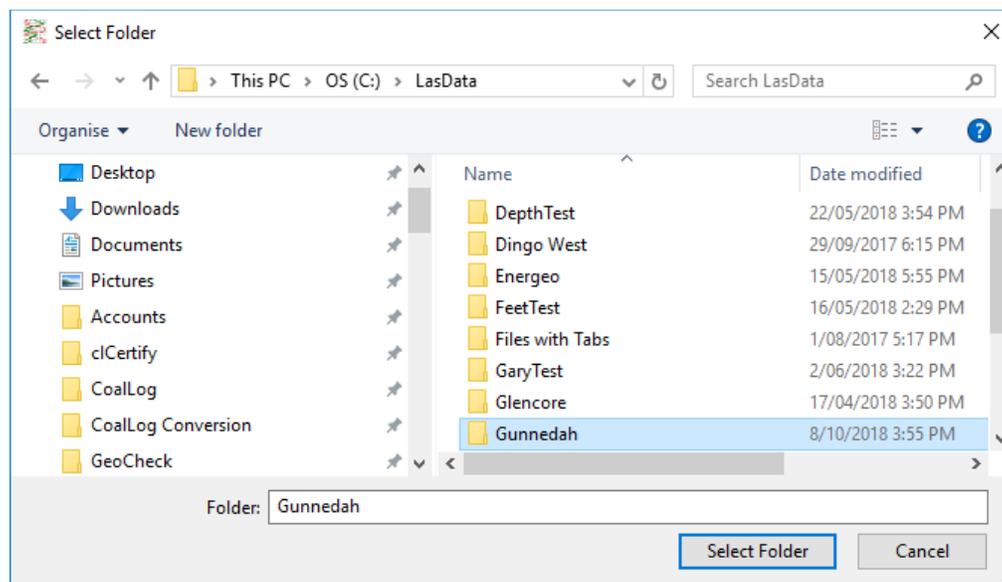
	A	B	C	D	E	F	G	H	I	J	K	L
1	DEPT	GRDE	CODE	DECR	LSDU	BRDU	CADE	DENL	DENB	DEPO	BISI	ADEN
2	M	GAPI	G/C3	G/C3	SDU	SDU	MM	G/C3	G/C3	PERC	MM	G/C3
3	969.78	152.45	2.39	0.03	963.88	19650.49	94.72	2.37	2.32	15.48	96	2.4
4	969.77	156.86	2.39	0.02	979.09	19656.34	94.68	2.37	2.32	15.77	96	2.39
5	969.76	149.55	2.38	0.02	977.3	19744.15	94.66	2.36	2.31	16.47	96	2.37

If the units are included on the second row, descriptions of each curve can be included as the third row in the file. For example:

	A	B	C	D	E	F
1	DEPT	GRDE	CODE	DECR	LSDU	BRDU
2	M	GAPI	G/C3	G/C3	SDU	SDU
3	DEPTH	GAMMA FROM DENSITY TOOL	COMPENSATED DENSITY	COMPENSATED DENSITY	LONG SPACED DENSITY	BED RESOLUTION DENSITY
4	969.78	152.45	2.39	0.03	963.88	19650.49
5	969.77	156.86	2.39	0.02	979.09	19656.34
6	969.76	149.55	2.38	0.02	977.3	19744.15

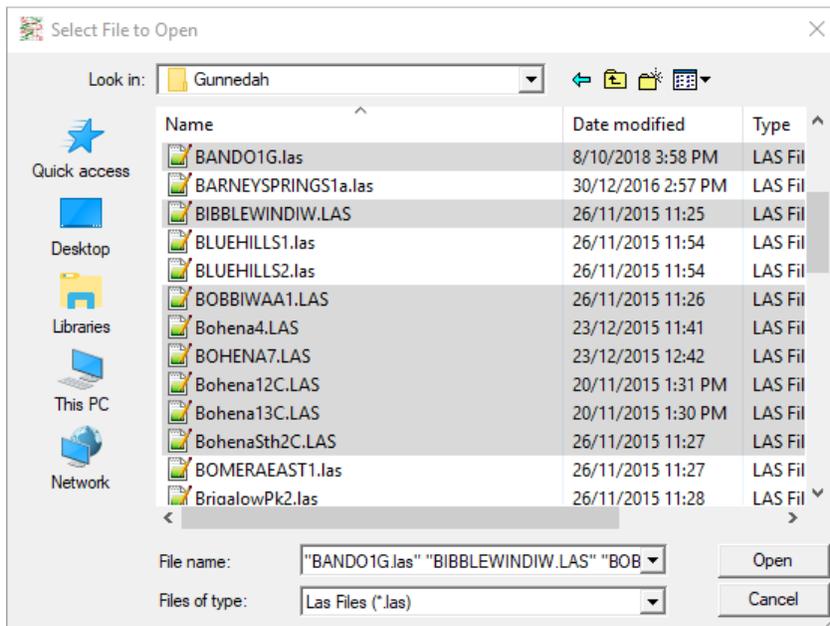
File Selection

If either of the first two options are selected, the user next selects the required folder:



Once the required folder has been selected, **LasManager** checks and displays all the appropriate files within the selected folder and if the first option *All within a specified folder and its subfolders* is selected it also checks and displays all the appropriate files in the selected folder's subfolders, the subfolders of the subfolders, the subfolders of the subfolders of the subfolders etc. If either of these options are selected LasManager does not display any files that include the string Backup in their name. To display these files, select the option *Select from a specified folder* and then select them.

If the last option *Select from a specified folder* is selected, the user next selects the required files:



Multiple files can be selected by holding down the Ctrl and/or Shift key while picking files with the mouse.

Display Curves for each File by

When displaying information for each file, **LasManager** displays a list of the curves that are included in the file. There are three possible layouts for displaying this information. The first *Column for each unique Curve Name* has a column for each curve that occurs in at least one of the selected files and then for each file a tick if it occurs in the file:

FileName	ADEN	BHTD	BHTF	BISI	BIT	BRDU	CADE	CALIPER	CALIPERL	CAPD	CGXT	CLDC	CODE
▶ BANDO1G.las	✓			✓		✓	✓						✓
BARNEYSPRINGS1a.las	✓				✓	✓	✓						✓
BIBBLEWINDIW.LAS	✓					✓	✓						✓
BLUEHILLS1.las											✓	✓	
BLUEHILLS2.las					✓						✓	✓	
BOBBIWAA1.las									✓				
Bohena4.LAS		✓	✓		✓					✓			
BOHENA7.LAS		✓	✓		✓					✓			
Bohena12C.las								✓					
Bohena13C.LAS	✓					✓	✓						✓
BohenaSth2C.las								✓					

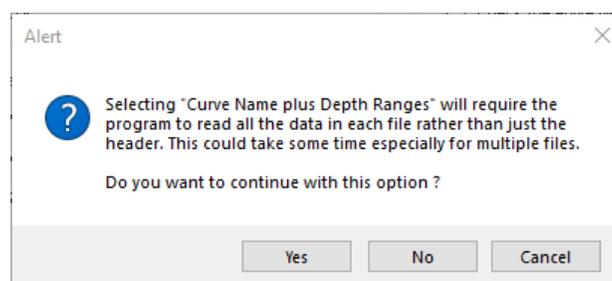
The second *Column for each Curve Column* has a column for each column in the file and displays the name of the curve in that column:

FileName	Curve1	Curve2	Curve3	Curve4	Curve5	Curve6	Curve7	Curve8	Curve9	Curve10	Curve11
BANDO1G.las	DEPT	GRDE	CODE	DECR	LSDU	BRDU	CADE	DENL	DENB	DEPO	BIS
BARNEYSPRINGS1a.las	DEPT	GRDE	CODE	DECR	LSDU	BRDU	CADE	DENL	DENB	DEPO	ADI
BIBBLEWINDIW.LAS	DEPT	GRDE	CODE	DECR	LSDU	BRDU	CADE	DENL	DENB	DEPO	ADI
BLUEHILLS1.las	DEPT	CGXT	SMTU	GRGC	CLDC	DCOR	DEN	PDPE	TR21	TR11	TR21
BLUEHILLS2.las	DEPT	DT35	TR12	TR22	TR11	TR21	HVOL	PDPE	HDEN	DCOR	CLD
BOBBIWAA1.las	DEPT	GAMMA	CALIPERL	DEN(LS)	DEN(SS)	RES(SG)	DEN(CDL)				
Bohena4.LAS	DEPT	TSS1	SPLL	SLL	DLL	PEDF	NPRL	NPRS	DEN	DCOR	DPOR
BOHENA7.LAS	DEPT	TSS1	PEDF	NPRL	NPRS	DEN	DCOR	DPOR	DPRS	BHTD	CAI
Bohena12C.las	DEPT	GAMMA	CALIPER	DEN(LS)	DEN(SS)	POR(DEN)	DEN(CDL)				
Bohena13C.LAS	DEPT	GRDE	CODE	DECR	LSDU	BRDU	CADE	DENL	DENB	DEPO	ADI
BohenaSth2C.las	DEPT	GAMMA	CALIPER	DEN(LS)	DEN(SS)	DEN(CDL)	RES	TEMP			

The third *Curve Name plus Depth Range of non-null values* has a row for each curve in each file and displays the depth of the minimum and maximum depths of non-NULL values for the curve. It also displays the number of NULL values between these minimum and maximum depths:

FileName	Curve	Min_Depth	Max_Depth	Numb_Nulls
Lynwood1.las	AVOL	0.000	716.201	79
Lynwood1.las	BHTF	0.000	694.801	56
Lynwood1.las	BIT	-1.699	716.201	0
Lynwood1.las	CADF	0.000	716.201	273
Lynwood1.las	CAPD	0.000	697.001	79
Lynwood1.las	DCOR	0.000	697.401	82
Lynwood1.las	DEN	0.000	697.401	82
Lynwood1.las	DLL	0.000	712.501	229
Lynwood1.las	DTC1	0.000	704.701	171

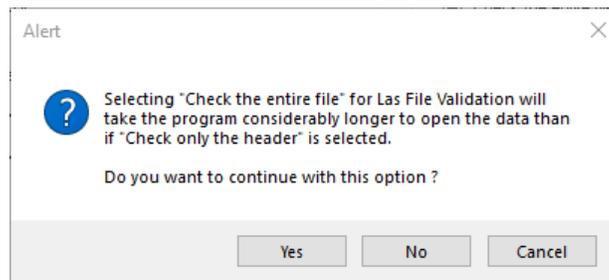
Whenever this option is selected, **LasManager** must read the entire file and warns the user that this may take some time:



With this option **LasManager** operates in a read only mode as this option is just for summarizing the data.

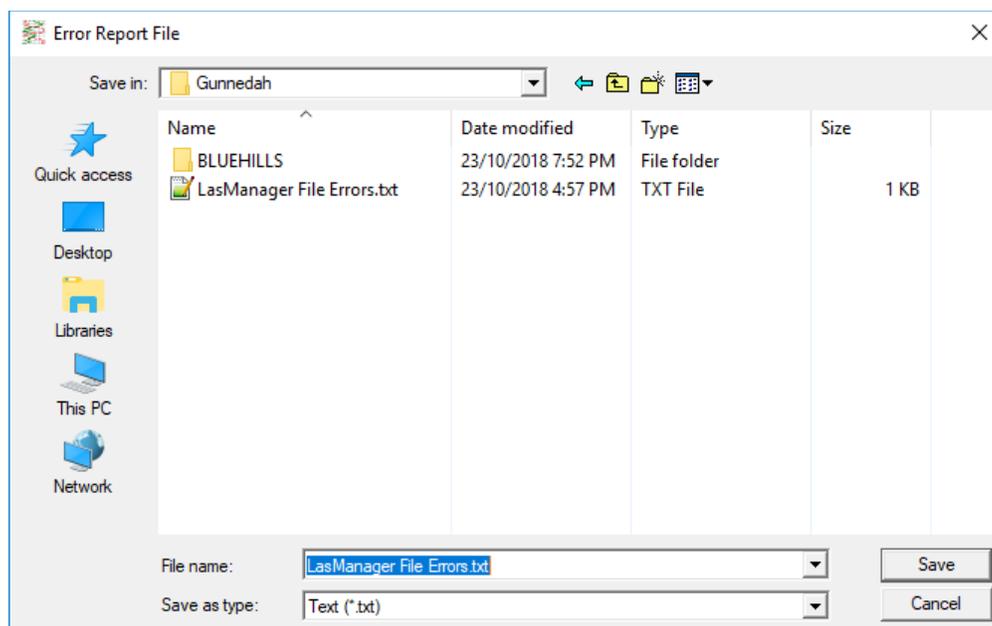
File Validation

The user can select to either *Check only the header* or *Check the entire file*. When saving files from **LasManager**, it will automatically fix many of the errors it finds. However, it only saves those files in which either it has detected an error it can fix or that the user has modified within **LasManager**. Therefore, if *Check only the header* is selected and the file contains fixable errors in the data but not in the header and no changes have been made to the file, the errors will remain as **LasManager** will not realize that it needs to save a new copy of the file. The disadvantage though of selecting *Check the entire file* is that it will take considerably longer to open the files than if *Check only the header* is selected. The program warns the user of this with the following message:

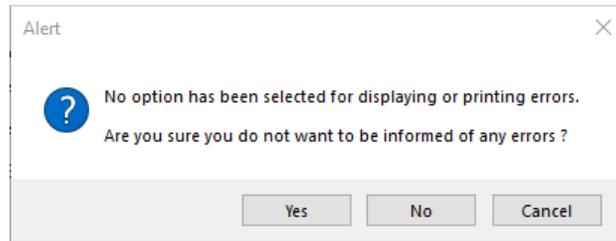


Error Messages

The user can select to have any error messages displayed on the screen or sent to a file. If the user selects to have them sent to a file, then the user will be prompted to provide a folder and file name for this file. The default is for it to create a file called *LasManager File Errors.txt* in the same folder as the files being opened:

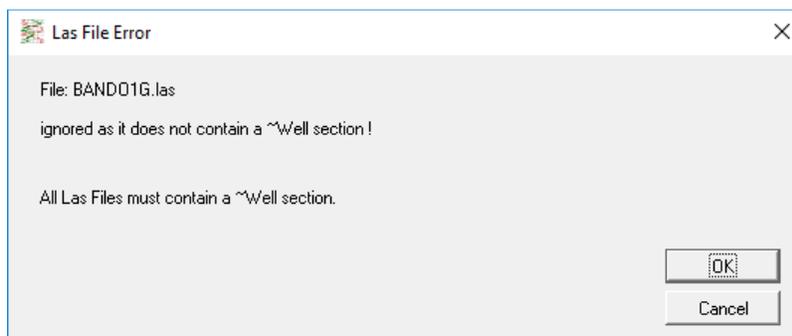


If no option is selected for communicating error messages, the following warning is given:



3. Checking and Displaying the Files

Once the files have been selected, **LasManager** reads and checks them. A warning is given if any files are missing critical items which are needed for opening the file:



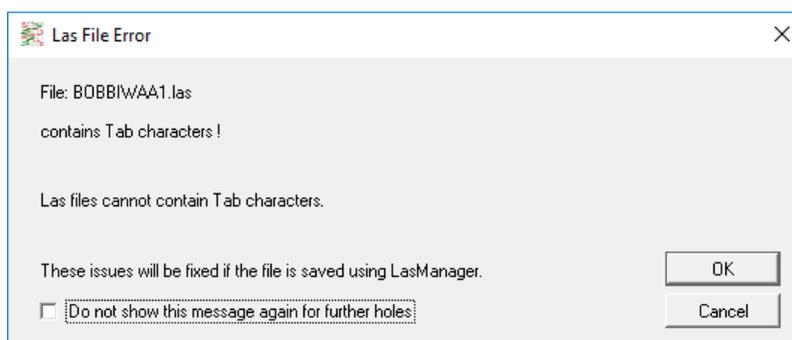
Critical items include if it does not have:

- a ~Version, ~Well, ~Curve and ~Ascii Log Data sections
- a VERS line in the ~Version section
- a WRAP line in the ~Version section
- any lines of data

or has:

- a Las version number other than 1.2 or 2.0
- a Wrap value other than YES or NO
- a zero-depth step in the data
- multiple curves with the same names and units and the multiple instances have overlapping intervals of non-NULL data

It also warns the user if it finds any non-standard features that it can fix upon saving the file:

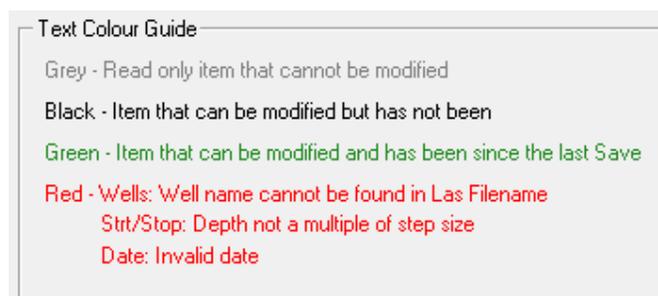


These include:

- Unix end of line markers (<LineFeed>). These are converted to Windows end of line markers <CarriageReturn><LineFeed> upon saving.
- Tab characters. These are converted to blanks upon saving.

- Non-comment lines in the ~Version, ~Well, ~Curve or ~Parameter sections that do not contain a dot delimiter and a colon delimiter somewhere after the dot delimiter. These lines will be turned into comments upon saving.
- Having DEPTH not in the first column. The DEPTH column will be moved to the first column upon saving.
- Not having a well name specified on a WELL line in the ~Well section. The user must supply this before the file can be saved.
- Not having a start depth specified on a STRT line, a stop depth specified on a STOP line or a step value on a STEP line in the ~Well section. Any of these that are missing are set with appropriate values obtained from the data.
- Not having a STRT, STOP or STEP value in the ~Well section that matches the data. These values are replaced with the appropriate values from the data.
- Having blank lines in the ~Ascii Log Data section. These are removed upon saving.
- Not having the same number of values on a line in the ~Ascii Log Data section as the number of curves specified in the header. Upon saving, additional NULL values are appended to lines having less than the required number and values are trimmed from the end of lines with more than the required number.
- Non-numeric values in the ~Ascii Log Data section. These are replaced with the NULL value upon saving.
- Multiple curves with the same name and units and no overlapping non-NULL value sections. These are merged into a single column upon saving.

After checking the files, the **LasManager** editing screen as shown on the next page is displayed. This contains two tables: a Files Table in the upper portion of the screen and a Curves Table in the bottom left portion of the screen. It also displays the following Text Colour Guide in the bottom right portion of the screen:



With the tables, the abbreviation for the column is shown at the top of the column and the full name of the column that currently has focus is displayed in the bottom left corner of the screen. For example, if the user clicks on an item in the Srvc column the description Logging Company appears in the bottom left corner of the screen.

LasManager - [Selected Files from C:\LasData\Gunnedah]

File Edit Tools Settings Help

Selected Files from C:\LasData\Gunnedah

FileName	Vers	Wrap	Well	Sirt	Stop	Step	Units	Null	Srvc	Date	Comp	Fid
BANDO1G.las	2.0 N		BANDO1G	970.0000	850.0100	-0.0100 M	-0.0100 M	-999.250	Reeves Wireline	N/A	AUSTRALIAN COALBED METHANE.	PEL 1
BARNEYSPPRINGS1a.las	2.0 N		BARNEYSPPG1A	0.0000	574.0000	0.0100 M	0.0100 M	-999.250	Weatherford	04-Mar-2009	SANTOS LTD.	GUNNE
BIBBLEWINDIW.LAS	2.0 N		BIBBLEWINDIW	889.0000	0.0000	-0.0100 M	-0.0100 M	-999.250	Reeves Wireline	13-DEC-2007	EASTERN STAR GAS LTD	NARRA
BOBBIWAA1.las	2.0 N		BOBBIWAA1	-1.3000	602.6100	0.0100 M	0.0100 M	-999.250	GSA	03/07/11	DART ENERGY	0 0
Bohena4.LAS	2.0 N		WILGA PARK # 4	722.7000	1.0000	-0.1000 M	-0.1000 M	-999.250	BPB Wireline Services	04-JAN-1999	FORCE ENERGY AUSTRALIA PTY LTD	WILGA
BOHENAT7.LAS	2.0 N		BOHENAT7	935.7000	355.9000	-0.1000 M	-0.1000 M	-999.250	BPB Wireline Services	24-DEC-1998	FORCENERGY AUSTRALIA PTY LTD	NARRA
Bohena12C.las	2.0 N		Bohena12C	-1.2200	1009.3000	0.0100 M	0.0100 M	-999.250	RUTHERFORD	07/05/07	EASTERN STAR	NARRA
Bohena13C.LAS	2.0 N		BOHENA13C	943.0000	-1.9900	-0.0100 M	-0.0100 M	-999.250	Reeves Wireline	02-OCT-2007	EASTERN STAR GAS	BOHEI
BohenaStH2C.las	2.0 N		BOHENASTH2C	-1.2600	908.4200	0.0100 M	0.0100 M	-999.250	RUTHERFORD	08/26/07	EASTERN STAR	NARRA
BOMERAEAST1.las	2.0 N		BOMERAEAST1	465.0000	1041.7750	0.0250 M	0.0250 M	-999.250	Weatherford	25-Aug-2009	SANTOS LTD	BOMEI
BrigalowPk2.las	2.0 N		BRIGALOWPK2	356.0000	910.2000	0.1000 M	0.1000 M	-999.250	Reeves Wireline	13-Oct-2004	EASTERN STAR GAS LIMITED	GUNNE
Calala1.las	1.2 N		CALALA1	539.0000	495.0100	-0.0100 M	-0.0100 M	-999.250	BPB Wireline Services	03-DEC-1998	AUSTRALIAN COAL BED METHANE	GUNNE
Canal.las	2.0 N		CANA1	735.0000	963.1750	0.0250 M	0.0250 M	-999.250	Weatherford	14-Mar-2011	SANTOS	GUNNE
COOGAL2.las	2.0 N		COOGAL2	527.0000	0.0000	-0.0100 M	-0.0100 M	-999.250	Weatherford	28-Oct-2009	EASTERN STAR GAS	COOG,
Coolahville1.LAS	2.0 N		COOLAHVILLE1	-0.1100	399.6200	0.0100 M	0.0100 M	-999.250	RUTHERFORD	08/16/07	EASTERN STAR	COOL,
Coonarah3.las	2.0 N		COONARAH 3	736.2000	343.2000	-0.1000 M	-0.1000 M	-999.250	Reeves Wireline	06-Dec-2001	EASTERN STAR GAS	COON,
CULGOORA2.las	2.0 N		CULGOORA2	466.0000	1013.7000	0.0250 M	0.0250 M	-999.250	Weatherford	16-Jan-2011	EASTERN STAR GAS	CULGC
Dewhurst2.LAS	2.0 N		DEWHURST2	977.0000	-1.9900	-0.0100 M	-0.0100 M	-999.250	Weatherford	28-JUN-2008	EASTERNSTAR GAS	NARRA
Dewhurst5.las	2.0 N		DEWHURST5	0.0000	823.5000	0.1000 M	0.1000 M	-999.250	Weatherford		EASTERN STAR GAS	DEWH
DEWHURST8.las	2.0 N		DEWHURST8	0.4000	1011.9000	0.1000 M	0.1000 M	-999.250	Weatherford	16-May-2009	EASTERNSTAR GAS	DEWH

Curves

Delete	CurrentName	Desc	NewName	Filter	FilterSize
<input type="checkbox"/>	ADEN	ALPHA PROCESSED DENSITY	ADEN	<input type="checkbox"/>	
<input type="checkbox"/>	AVOL	Annular Volume	AVOL	<input type="checkbox"/>	
<input type="checkbox"/>	BAZI	Borehole Azimuth (Mag.)	BAZI	<input type="checkbox"/>	
<input type="checkbox"/>	BHTD	DIFFERENTIAL TEMPERATURE	BHTD	<input type="checkbox"/>	
<input type="checkbox"/>	BHTF	BOREHOLE TEMPERATURE LOG	BHTF	<input type="checkbox"/>	
<input type="checkbox"/>	BISI	BIT SIZE	BISI	<input type="checkbox"/>	
<input type="checkbox"/>	RIT	Rit size	RIT	<input type="checkbox"/>	

Text Colour Guide

- Grey - Read only item that cannot be modified
- Black - Item that can be modified but has not been
- Green - Item that can be modified and has been since the last Save
- Red - Wells: Well name cannot be found in Las Filename
Sirt/Stop: Depth not a multiple of step size
Date: Invalid date

Logging Company

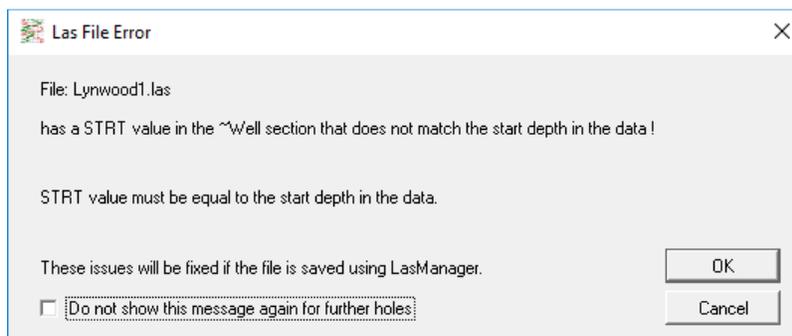
Files Table

The Files Table displays the:

- **File Path** of each file's folder. This column is only displayed though if the *All within a specified folder and its subfolders* option has been selected when the user was selecting the files to open or if *Display full path of Filenames instead of just subfolder names* is ticked in the **LasManager** options. The folder names in this column are shown in grey as the files' folders cannot be modified from **LasManager**.
- **File Name** of each selected file. These are shown in grey as they cannot be modified from **LasManager**.
- **Las Version Number** in the Vers column. The values in this column can only be 1.2 or 2.0. To convert a Las File from LAS Version 1.2 to 2.0 or vice versa just change the entry in this column and on saving the file will be saved as the required version.
- Whether the **Las file is Wrapped** is displayed in the Wrap column. Wrapped Las files have the depth value on its own line and then the values for each depth are shown on the subsequent lines which are all no longer than 80 characters (including the <carriage return><line feed> end of line marker). To change between files being wrapped or not, change the value in the Wrap column to either Y or N and then the change will be implemented upon saving the file.
- **Well or Hole Name** is displayed in the Well column. Any instances where the well name cannot be found in the filename are highlighted by showing the well name in **red**. In the example on the previous page, the wells BARNEYSSPG1A and WILGA PARK # 4 are shown in **red** as their names cannot be found in the filenames BARNEYSPRINGS1a.las and Bohena4.las. Clearly, BARNEYSSPG1A is an abbreviation of the fuller name BARNEYSPRINGS1a shown in the filename, however, the situation with WILGA PARK # 4 is not so clear and may require further investigation.
- **Start and Stop Depths** and the **Step Interval** are shown in the Strt, Stop and Step columns. According to the LAS Version 2.0 documentation released in February 2017, the Start and Stop Depths when divided by the Step Depth value must be a whole number. Where this not so, **LasManager** displays the Start and Stop Depths in **red**:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units
NTHMULLALEY1.las	2.0	N	NTHMULLALEY1	800.0000	264.0100	-0.0100	M
OAKDALE1.las	2.0	N	OAKDALE1	892.7350	3.2850	-0.0250	M
PO44.las	2.0	N	P044	472.3500	-1.6500	-0.0100	M
ROSEVALE1A.las	2.0	N	ROSEVALE1A	3.0000	912.0000	0.0100	M

Where the Start or Stop Depth or the Step Interval do not match the data in the ~Ascii Log Data section of the file. **LasManager** warns the user with a message:



And instead of displaying the values in the Las header for these items the values from the actual data are displayed in **green** to indicate that they have been modified:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units
BOHENA7.LAS	2.0	N	BOHENA7	935.7000	355.9000	-0.1000	M
Bohena12C.LAS	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M
Bohena13C.LAS	2.0	N	BOHENA13C	943.0000	-1.9900	-0.0100	M

These modified values will be saved if the file is saved from **LasManager**.

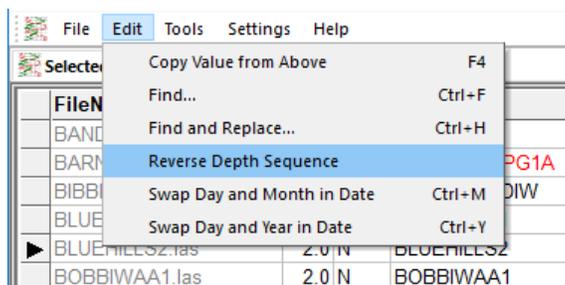
The user may also modify these values. If the modified Start or Stop depth reduces the depth range of the data then data outside the new range will be removed when the file is saved and if they increase the depth range then the values on the new depth records will be given the NULL value on saving. If a new Step Interval is entered, the data will be resampled at this new Step Interval on saving. The user can also reverse the depth sequence by simply swapping the Start and Stop Depths and reversing the sign on the Step Interval. For example, to reverse the depth sequence on:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units
BANDO1G.las	2.0	N	BANDO1G	970.000	850.010	-0.010	M

The Start and Stop Depth and the Step Interval need to be modified to:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units
BANDO1G.las	2.0	N	BANDO1G	850.010	970.000	0.010	M

This can either be done manually at the keyboard or by selecting *Reverse Depth Sequence* from the **Edit** dropdown menu:

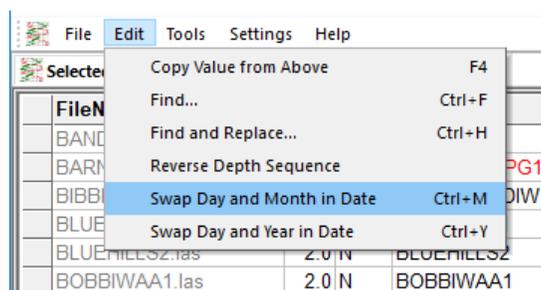


which will swap the Start and Stop Depths and reverse the sign on the Step Interval for the currently selected file.

- **Depth Units** as recorded in the Las header for the Depth curve is displayed. To convert all the depths in the data and the Start, Stop and Step in the header between metres and feet, change the units for the file. When converting depths, **LasManager** assumes that for both the names of the original and modified units, if they start with an “m” or “M” they are in metres and if they start with an “f” or “F” they are in feet.
- **Null** value for the file. If this is modified by the user then when the file is saved, the NULL value in the Las header will be modified and any NULL values in the data will be changed from the old NULL value to the new one.
- **Date** value. Any dates that are not valid dates are shown in **red**:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srvc	Date
BANDO1G.las	2.0	N	BANDO1G	970.0000	850.0100	-0.0100	M	-999.250	Reeves Wireline	N/A
BIBBLEWINDIW.LAS	2.0	N	BIBBLEWINDIW	889.0000	0.0000	-0.0100	M	-999.250	Reeves Wireline	13-DEC-2007
BLUEHILLS1.las	2.0	N	BLUEHILLS1	5.0000	895.2000	0.1000	M	-999.250	Weatherford	20-Feb-2009
BLUEHILLS2.las	2.0	N	BLUEHILLS2	992.5000	455.0000	-0.0250	M	-999.250	Weatherford	23-May-2010
BOBBIWAA1.las	2.0	N	BOBBIWAA1	-1.3000	602.6100	0.0100	M	-999.250	GSA	03/07/11
BOHENA7.LAS	2.0	N	BOHENA7	935.7000	355.9000	-0.1000	M	-999.250	BPB Wireline Services	24-DEC-1998
Bohena12C.las	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M	-999.250	RUTHERFORD	07/05/07
Bohena13C.LAS	2.0	N	BOHENA13C	943.0000	-1.9900	-0.0100	M	-999.250	Reeves Wireline	02-OCT-2007
BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07
Calala1.las	1.2	N	CALALA1	539.0000	495.0100	-0.0100	M	-999.250	BPB Wireline Services	03-DEC-1998
Cana1.las	2.0	N	CANA1	735.0000	963.1750	0.0250	M	-999.250	Weatherford	14-Mar-2011
COOGAL2.las	2.0	N	COOGAL2	527.0000	0.0000	-0.0100	M	-999.250	Weatherford	28-Oct-2009
Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07
Coonarah3.las	2.0	N	COONARAH 3	736.2000	343.2000	-0.1000	M	-999.250	Reeves Wireline	06-Dec-2001

The dates can either be corrected manually at the keyboard or by selecting one of *Swap Day and Month in Date* or *Swap Day and Year in Date* from the **Edit** dropdown menu or by pressing their hotkeys **Ctrl+M** and **Ctrl+Y**:



The function will then operate upon the Date in the currently selected file.

- **Logging Company** (Srcv), **Company Name** (Comp), **Field Name** (Fld), **Well Location** (Loc), **County** (Cnty), **State** (Stat), **Country** (Ctry) and **Universal Well Index** (Uwi), each have their own columns and can be edited from the keyboard.
- By scrolling to the right past the information regarding the ~Well section of the file, **LasManager** displays which curves are in the file. The format for this information is controlled by the user when they select the files to be opened. See the previous section entitled **Select the Curves to be Checked and Displayed** on how to select the format and examples of each format.

Curves Table

The Curves Table has a line for each Curve that occurs in at least one of the files displayed in the Files Table. It displays:

- A **Delete** flag which the user can tick to indicate that the particular curve will be deleted from all files containing the curve when the files are saved.
- The **Current Name** for the curve whose parameters are displayed on this line.
- The **Description** for the curve. The curve may have different descriptions in different files and the one shown is the description found in the first file containing a description for this curve. The user can modify the displayed description and then all files with this curve will have this new description saved for this curve.
- The **New Name** for the curve. If the new name is different to the Current Name then all files containing this curve will have the Current Name of the curve replaced by this New Name.
- A **Filter** flag which the user can tick to indicate that on saving a new curve will be added to the file with a filtered version of the particular curve. The filter is what is known as a box filter meaning that the filtered value is created by averaging all the readings within an interval as defined by the Filter Size. The default Filter Size is seven which means that the new filtered value for a particular depth will be the average of the three values before that depth, the value at that depth and the three

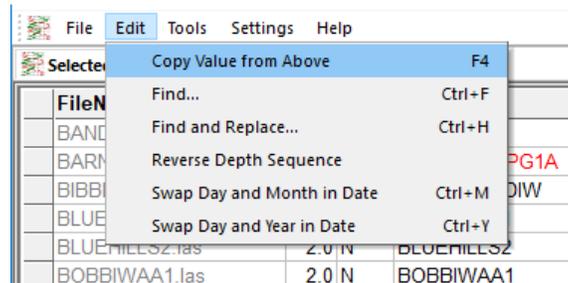
values after that depth. The new filtered curve is given the New Name for the curve along with a suffix of `_FILT n` where n is the filter size that was used.

- The **Filter Size** which defaults to seven but the user can change to any positive odd number.

Other Editing Functions

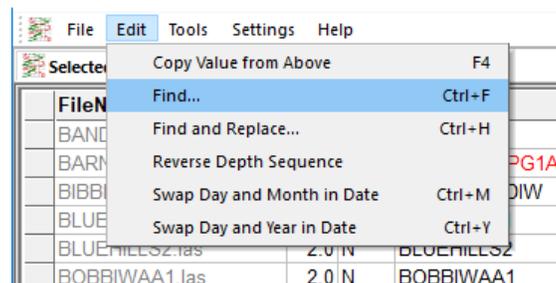
In addition to the column specific editing functions to swap around parts of the date and to reverse the depth sequence there are three other editing functions:

- **Copy Value from Above** by selecting this option in the Edit dropdown menu or pressing its hotkey **F4**:



This function copies down the last non-blank value in the column that you are currently editing.

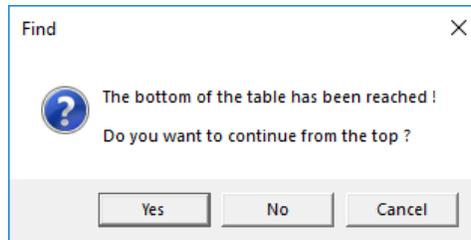
- **Find** by selecting this option in the Edit dropdown menu or pressing its hotkey **Ctrl+F**:



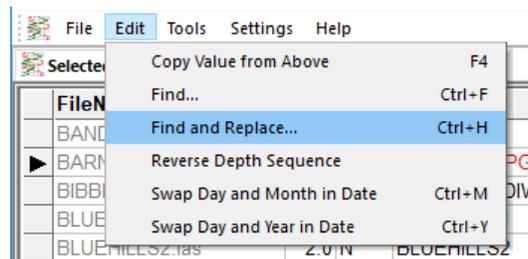
Upon selecting this option, the user is prompted for the field to be searched, the value to be searched for and whether the search needs to match the case of the search string:



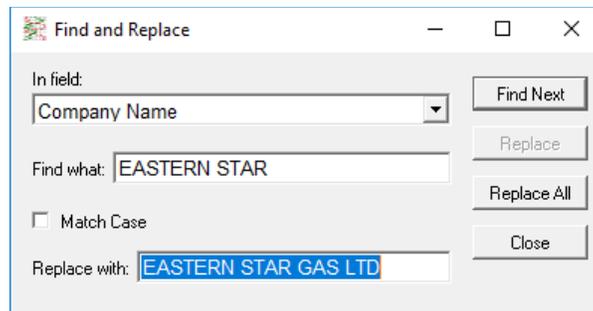
On clicking the **Find Next** button, the current line pointer will move to the next line that satisfies the search criteria. If no further instances are found that satisfy the search criteria the following prompt appears:



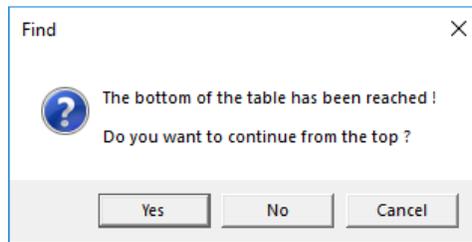
- **Find and Replace** by selecting this option in the Edit dropdown menu or pressing its hotkey **Ctrl+H**:



Upon selecting this option, the user is prompted for the field to be searched, the value to search for, whether the search needs to match the case of the search string and the replacement value:



On clicking the **Find Next** button, the current line pointer will move to the next line that satisfies the search criteria and if such a line is found the **Replace** button will become enabled so the user can replace the value. As with the Find function, if on pressing the **Find Next** button no further instances are found that satisfy the search criteria the following prompt appears:

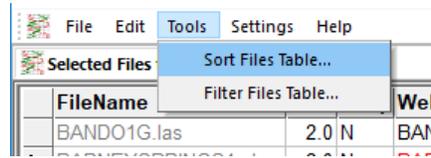


The user also has the option at any time that the Find and Replace window is open, to Replace All instances of the search value by selecting the Replace All button.

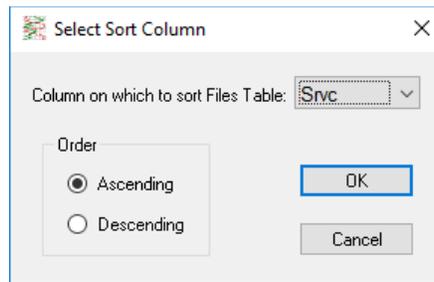
4. Sorting and Filtering the Files Table

Sorting the Files Table

The Files Table is initially sorted on the FileName column but the user can sort the table on any of the columns apart from those showing the Curves in the file. To sort the Files Table, select **Sort Files Table** from the **Tools** dropdown menu:



LasManager then displays the following window for the user to select the column on which to sort:

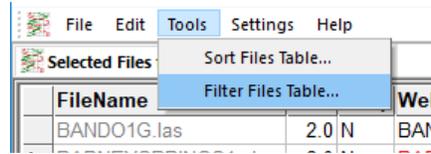


Sorting the example Files Table on the Srcv column produces the following display:

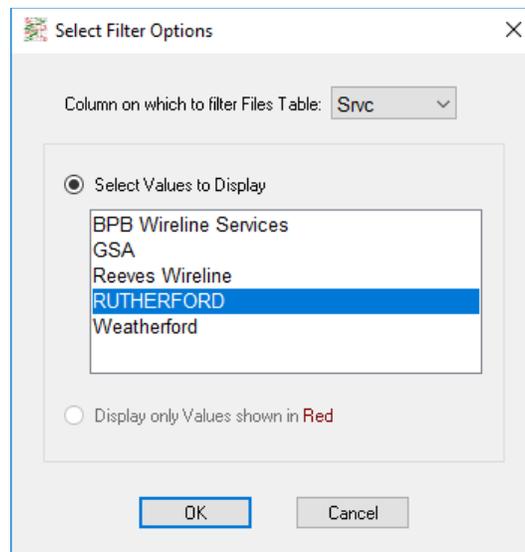
FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srcv	Date	Comp
▶ Calala1.las	1.2	N	CALALA1	539.0000	495.0100	-0.0100	M	-999.250	BPB Wireline Services	03-DEC-1998	AUSTRAL
WILGAPARK5.las	2.0	N	WILGAPARK5	814.9000	3.0000	-0.1000	M	-999.250	BPB Wireline Services	15-DEC-1998	FORCE E
Bohena4.LAS	2.0	N	WILGA PARK # 4	722.7000	1.0000	-0.1000	M	-999.250	BPB Wireline Services	04-JAN-1999	FORCE E
BOHENA7.LAS	2.0	N	BOHENA7	935.7000	355.9000	-0.1000	M	-999.250	BPB Wireline Services	24-DEC-1998	FORCENI
BOBBIWAA1.las	2.0	N	BOBBIWAA1	-1.3000	602.6100	0.0100	M	-999.250	GSA	03/07/11	DART EN
Bohena13C.LAS	2.0	N	BOHENA13C	943.0000	-1.9900	-0.0100	M	-999.250	Reeves Wireline	02-OCT-2007	EASTERI
Coonarah3.las	2.0	N	COONARAH 3	736.2000	343.2000	-0.1000	M	-999.250	Reeves Wireline	06-Dec-2001	EASTERI
BrigalowPk2.las	2.0	N	BRIGALOWPK2	356.0000	910.2000	0.1000	M	-999.250	Reeves Wireline	13-Oct-2004	EASTERI
BANDO1G.las	2.0	N	BANDO1G	970.0000	850.0100	-0.0100	M	-999.250	Reeves Wireline	N/A	AUSTRAL
NTHMULLALEY1.las	2.0	N	NTHMULLALEY1	800.0000	264.0100	-0.0100	M	-999.250	Reeves Wireline	3-FEB-2002	AUSTRAL
Lynwood1.las	2.0	N	LYNWOOD1	-1.6990	716.2010	0.1000	M	-999.250	Reeves Wireline	01-Oct-2004	EASTERI
BIBBLEWINDIW.LAS	2.0	N	BIBBLEWINDIW	889.0000	0.0000	-0.0100	M	-999.250	Reeves Wireline	13-DEC-2007	EASTERI
Bohena12C.las	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M	-999.250	RUTHERFORD	07/05/07	EASTERI
BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07	EASTERI
WC030C.las	2.0	N	WC030C	0.7800	104.4900	0.0100	M	0.000	RUTHERFORD	07/17/03	CREEK R
Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07	EASTERI
OAKDALE1.las	2.0	N	OAKDALE1	892.7350	3.2850	-0.0250	M	-999.250	Weatherford	07-Nov-2009	SANTOS
LAKEGORAN1.las	2.0	N	LAKEGORAN1	2.4800	946.1300	0.0250	M	-999.250	Weatherford	25-May-2009	
PO44.las	2.0	N	P044	472.3500	-1.6500	-0.0100	M	-999.250	Weatherford	17-Jun-2012	WHITEH
ROSEVALE1A.las	2.0	N	ROSEVALE1A	3.0000	912.0000	0.0100	M	-999.250	Weatherford		Eastern S
KERAWAH 1.las	2.0	N	KERAWAH1	3.0000	947.0000	0.0100	M	-999.250	Weatherford	07-Nov-2009	SANTOS

Filtering the Files Table

The user can filter which files are displayed in the Files Table. To filter the Files Table, select **Filter Files Table** from the **Tools** dropdown menu:



LasManager then displays the following window for the user to select the column on which to filter and the desired value for this column:

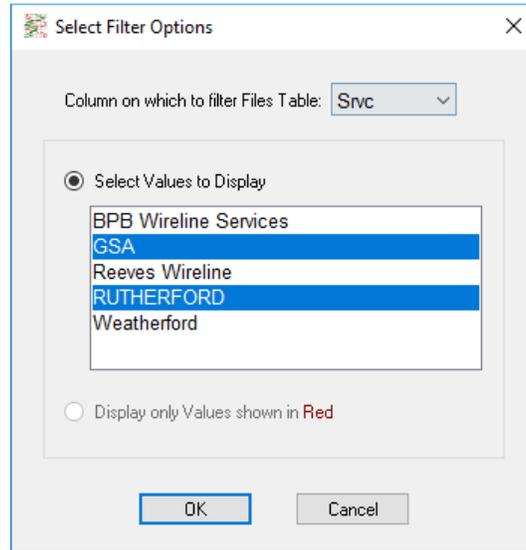


The columns Well, Strt, Stop and Date can have values shown in **red** and so if one of these columns is selected, both the *Select Values to Display* and *Display only Values shown in Red* are available but for all other columns only the first option is available. The value selection box is populated with all the options in the selected column for the files that have been opened. Filtering the example Files Table on the Svc column equalling RUTHERFORD produces the following display:

	FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Svc	Date	Comp
▶	Bohena12C.las	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M	-999.250	RUTHERFORD	07/05/07	EASTE
	BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07	EASTE
	Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07	EASTE
	WC030C.las	2.0	N	WC030C	0.7800	104.4900	0.0100	M	0.000	RUTHERFORD	07/17/03	CREEK

Note that even though the logging date for the first file in this list has a valid date, this date is probably in American date format like all the other dates supplied by this Service Company and is therefore probably the 5th July 2007 rather than the 7th May 2007.

By pressing the Ctrl and/or Shift keys while selecting the desired values, multiple values can be selected for the filter:



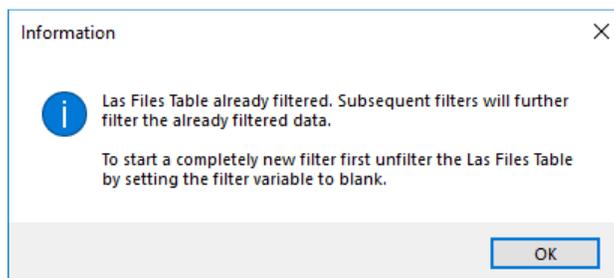
which provides the following result on the example data set:

	FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Svc	Date	Comp
▶	BOBBIWAA1.las	2.0	N	BOBBIWAA1	-1.3000	602.6100	0.0100	M	-999.250	GSA	03/07/11	DART t
	Bohena12C.las	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M	-999.250	RUTHERFORD	07/05/07	EASTE
	BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07	EASTE
	Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07	EASTE
	WC030C.las	2.0	N	WC030C	0.7800	104.4900	0.0100	M	0.000	RUTHERFORD	07/17/03	CREEP

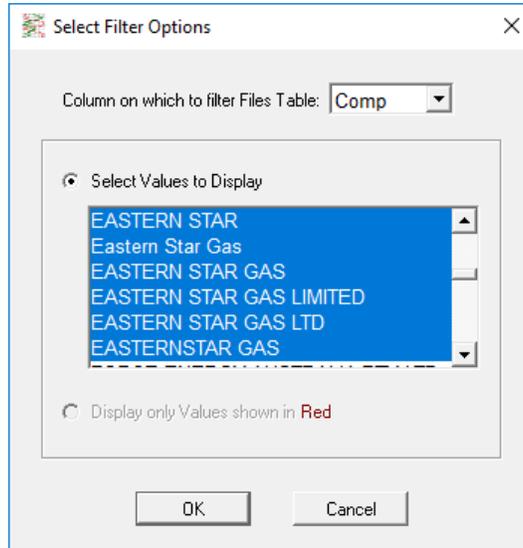
If Date is chosen for *Column on which to filter Files Table* and *Display only Values shown in Red* is selected the results for the example data are:

	FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Svc	Date	Comp
▶	BANDO1G.las	2.0	N	BANDO1G	970.0000	850.0100	-0.0100	M	-999.250	Reeves Wireline	N/A	AUSTR
	BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07	EASTE
	Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07	EASTE
	WC030C.las	2.0	N	WC030C	0.7800	104.4900	0.0100	M	0.000	RUTHERFORD	07/17/03	CREEP

Once the data is Filtered then if **Filter Files Table** is chosen again, **LasManager** further filters the current results but first warns the user:



For example, in the example data set, to display all the Eastern Gas files where Reeves Wireline was the Service Company, first filter on Comp being Eastern Star (including variations on the name):



This generates the following results:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srvc	Date	Comp
BIBBLEWINDIW.LAS	2.0	N	BIBBLEWINDIW	889.0000	0.0000	-0.0100	M	-999.250	Reeves Wireline	13-DEC-2007	EASTERN STAR GAS LT
BLUEHILLS1.las	2.0	N	BLUEHILLS1	5.0000	895.2000	0.1000	M	-999.250	Weatherford	20-Feb-2009	EASTERN STAR GAS
BLUEHILLS2.las	2.0	N	BLUEHILLS2	992.5000	455.0000	-0.0250	M	-999.250	Weatherford	23-May-2010	EASTERN STAR GAS
Bohena12C.las	2.0	N	Bohena12C	-1.2200	1009.3000	0.0100	M	-999.250	RUTHERFORD	07/05/07	EASTERN STAR
Bohena13C.LAS	2.0	N	BOHENA13C	943.0000	-1.9900	-0.0100	M	-999.250	Reeves Wireline	02-OCT-2007	EASTERN STAR GAS
BohenaSth2C.las	2.0	N	BOHENASTH2C	-1.2600	908.4200	0.0100	M	-999.250	RUTHERFORD	08/26/07	EASTERN STAR
BrigalowPk2.las	2.0	N	BRIGALOWPK2	356.0000	910.2000	0.1000	M	-999.250	Reeves Wireline	13-Oct-2004	EASTERN STAR GAS LIM
COOGAL2.las	2.0	N	COOGAL2	527.0000	0.0000	-0.0100	M	-999.250	Weatherford	28-Oct-2009	EASTERN STAR GAS
Coolahville1.LAS	2.0	N	COOLAHVILLE1	-0.1100	399.6200	0.0100	M	-999.250	RUTHERFORD	08/16/07	EASTERN STAR
Coonarah3.las	2.0	N	COONARAH 3	736.2000	343.2000	-0.1000	M	-999.250	Reeves Wireline	06-Dec-2001	EASTERN STAR GAS
CULGOORA2.las	2.0	N	CULGOORA2	466.0000	1013.7000	0.0250	M	-999.250	Weatherford	16-Jan-2011	EASTERN STAR GAS
Dewhurst2.LAS	2.0	N	DEWHURST2	977.0000	-1.9900	-0.0100	M	-999.250	Weatherford	28-JUN-2008	EASTERNSTAR GAS
Dewhurst5.las	2.0	N	DEWHURST5	0.0000	823.5000	0.1000	M	-999.250	Weatherford		EASTERN STAR GAS
DEWHURST8.las	2.0	N	DEWHURST8	0.4000	1011.9000	0.1000	M	-999.250	Weatherford	16-May-2009	EASTERNSTAR GAS
DEWHURST9.las	2.0	N	DEWHURST9	0.0000	1020.2000	0.1000	M	-999.250	Weatherford	23-Jul-2009	EASTERN STAR GAS
DEWHURST11.las	2.0	N	DEWHURST11	1039.1000	0.0000	-0.1000	M	-999.250	Weatherford	06-Nov-2009	EASTERN STAR GAS
EDGEROI1.las	2.0	N	EDGEROI1	5.0000	1007.7000	0.1000	M	-999.250	Weatherford		EASTERN STAR GAS
EDGEROI2.las	2.0	N	EDGEROI2	1050.0000	10.0000	-0.0100	M	-999.250	Weatherford	15-May-2010	Eastern Star Gas
ELLEDALE1.las	2.0	N	ELLEDALE 1	190.0000	428.6750	0.0250	M	-999.250	Weatherford	02-Sep-2010	EASTERN STAR GAS

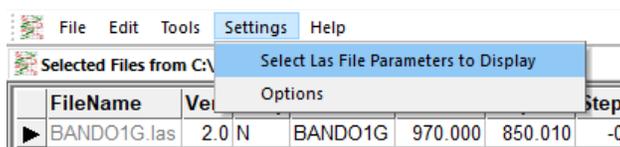
Then filter on Srvc equal to Reeves Wireline to produce the following results:

FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srvc	Date	Comp
BIBBLEWINDIW.LAS	2.0	N	BIBBLEWINDIW	889.0000	0.0000	-0.0100	M	-999.250	Reeves Wireline	13-DEC-2007	EASTERN STAR GAS LT
Bohena13C.LAS	2.0	N	BOHENA13C	943.0000	-1.9900	-0.0100	M	-999.250	Reeves Wireline	02-OCT-2007	EASTERN STAR GAS
BrigalowPk2.las	2.0	N	BRIGALOWPK2	356.0000	910.2000	0.1000	M	-999.250	Reeves Wireline	13-Oct-2004	EASTERN STAR GAS LIF
Coonarah3.las	2.0	N	COONARAH 3	736.2000	343.2000	-0.1000	M	-999.250	Reeves Wireline	06-Dec-2001	EASTERN STAR GAS
Lynwood1.las	2.0	N	LYNWOOD1	-1.6990	716.2010	0.1000	M	-999.250	Reeves Wireline	01-Oct-2004	EASTERN STAR

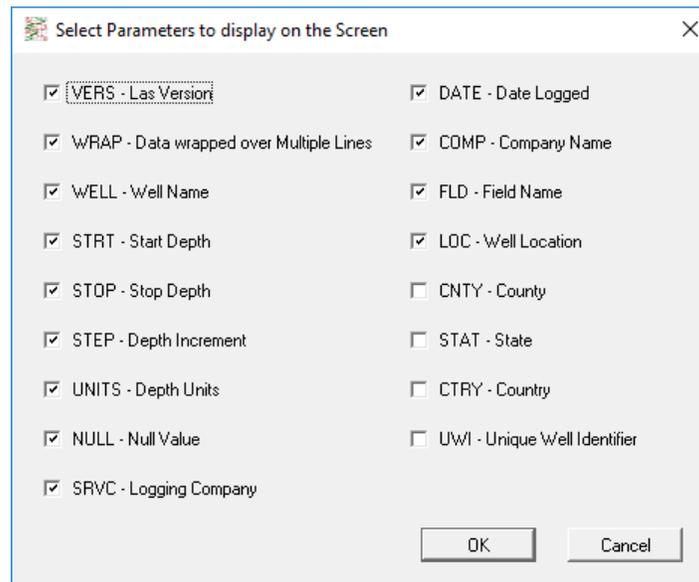
5. Settings

Select Las File Parameters to Display

Except for the FileName column and the Curve columns, the columns in the Files Table can be displayed or hidden. To change whether columns are displayed or not, select **Select Las File Parameters to Display** from the **Settings** drop down menu:



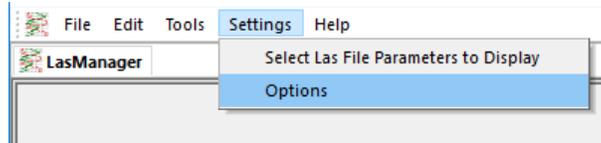
Next the parameters to display on the screen are requested:



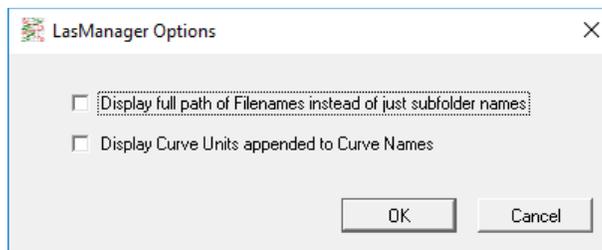
The selection is saved and used every time files are opened in **LasManager** even after the user closes **LasManager** and reopens it.

Options

The full path for Filenames and the curve units for each curve can be displayed. To select or deselect these options select **Options** from the drop-down **Settings** menu:



Then set the required options in the following window:



When opening files with *All within a specified folder and its subfolders* ticked, **LasManager** displays the subfolder names along with the filename. For example:

	FilePath	FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srvc
		YALLAMBEE1.las	2.0	N	YALLAMBEE1	895.0000	0.0000	-0.1000	M	-999.250	Weath
		YALLAMBEE2.las	2.0	N	YALLAMBEE2	400.0000	1082.8500	0.0250	M	-999.250	Weath
	BLUEHILLS	BLUEHILLS1.las	2.0	N	BLUEHILLS1	5.0000	895.2000	0.1000	M	-999.250	Weath
	BLUEHILLS	BLUEHILLS2.las	2.0	N	BLUEHILLS2	992.5000	455.0000	-0.0250	M	-999.250	Weath

If *Display full path of Filenames instead of just subfolder names* is ticked in the options then the full path name is shown, not only where subfolders need to be shown but for all files. For example:

	FilePath	FileName	Vers	Wrap	Well	Strt	Stop	Step	Units	Null	Srvc
	C:\LasData\Gunnedah\	YALLAMBEE1.las	2.0	N	YALLAMBEE1	895.0000	0.0000	-0.1000	M	-999.250	Weath
	C:\LasData\Gunnedah\	YALLAMBEE2.las	2.0	N	YALLAMBEE2	400.0000	1082.8500	0.0250	M	-999.250	Weath
	C:\LasData\Gunnedah\BLUEHILLS	BLUEHILLS1.las	2.0	N	BLUEHILLS1	5.0000	895.2000	0.1000	M	-999.250	Weath
	C:\LasData\Gunnedah\BLUEHILLS	BLUEHILLS2.las	2.0	N	BLUEHILLS2	992.5000	455.0000	-0.0250	M	-999.250	Weath

If *Display Curve Units appended to Curve Names* is ticked then the units are shown along with the curve names both in the Files Table and in the Curves Table. The user can then modify the unit names as well as the curve names by editing the entries in the Curves Table.

For example, when this option and *Column for each unique Curve Name* in the File opening window are ticked, the Files Table for the example data will display:

FileName	ADEN.G/C3	AVOL.F3	AVOL.M3	BAZI.DEG	BHTD.DC/S	BHTF.DEGC	BISI.MM	BIT.IN	BIT.MM
▶ BANDO1G.las	✓						✓		
BARNEYSPRINGS1a.las	✓								✓
BIBBLEWINDIW.LAS	✓								
BOBBIWAA1.las									
Bohena4.LAS					✓	✓		✓	
BOHENA7.LAS					✓	✓		✓	
Bohena12C.las									

From this display it is now easy to see which files have their Bit Size (BIT) recorded in inches and which in mms.

When *Display Curve Units appended to Curve Names* and *Column for each Curve Column* in the file opening window are ticked, the Files Table for the example data will display:

FileName	Curve1	Curve2	Curve3	Curve4	Curve5	Curve6
▶ BANDO1G.las	DEPT.M	GRDE.GAPI	CODE.G/C3	DECR.G/C3	LSDU.SDU	BRDU.SDU
BARNEYSPRINGS1a.las	DEPT.M	GRDE.GAPI	CODE.G/C3	DECR.G/C3	LSDU.SDU	BRDU.SDU
BIBBLEWINDIW.LAS	DEPT.M	GRDE.GAPI	CODE.G/C3	DECR.G/C3	LSDU.SDU	BRDU.SDU
BOBBIWAA1.las	DEPT.M	GAMMA.API-GR	CALIPERL.CM	DEN(LS).G/CC	DEN(SS).G/CC	RES(SG).OHM-M
Bohena4.LAS	DEPT.M	TSS1.LB	SPLL.MV	SLL.OHMM	DLL.OHMM	PEDF.B/E
BOHENA7.LAS	DEPT.M	TSS1.LB	PEDF.B/E	NPRL.PERC	NPRS.PERC	DEN.G/C3
Bohena12C.las	DEPT.M	GAMMA.API-GR	CALIPER.CM	DEN(LS).G/CC	DEN(SS).G/CC	POR(DEN).PERCENT

When *Display Curve Units appended to Curve Names* is ticked the Curves Table for the example data will display:

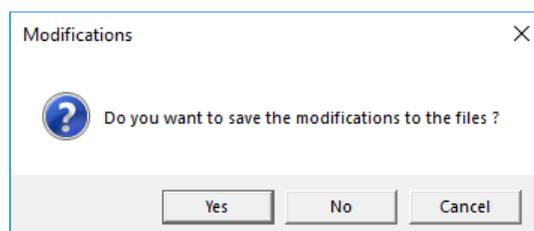
Curves						
Delete	CurrentName	Desc	NewName	Filter	FilterSize	
▶ <input type="checkbox"/>	ADEN.G/C3	ALPHA PROCESSED DENSITY	ADEN.G/C3	<input type="checkbox"/>		
<input type="checkbox"/>	AVOL.F3	Annular Volume	AVOL.F3	<input type="checkbox"/>		
<input type="checkbox"/>	AVOL.M3	ANNULAR VOLUME	AVOL.M3	<input type="checkbox"/>		
<input type="checkbox"/>	BAZI.DEG	Borehole Azimuth (Mag.)	BAZI.DEG	<input type="checkbox"/>		
<input type="checkbox"/>	BHTD.DC/S	DIFFERENTIAL TEMPERATURE	BHTD.DC/S	<input type="checkbox"/>		
<input type="checkbox"/>	BHTF.DEGC	BOREHOLE TEMPERATURE LOG	BHTF.DEGC	<input type="checkbox"/>		

6. Saving Files

There are four options for saving the results:

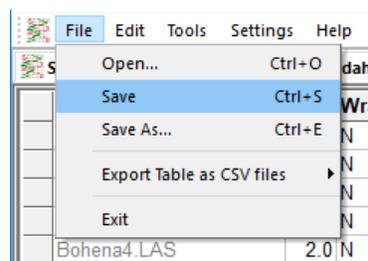
- 1) **Save** which will save all the files that need to be modified, these will include both those files that **LasManager** has indicated need to be modified due to not complying to the LAS standard and those that the user has made changes to.
- 2) **Save As** which will save all the open files whether they need to be modified or not. Save As includes options to save the files to a different folder, place a suffix on the filename and/or change the file type between Las and Csv.
- 3) **Export Files Table as a CSV files.**
- 4) **Export Curves Table as a CSV file.**

If any files need to be modified and they have not been saved, **LasManager** will warn with the following message that they have not been saved before a new set of files opened or **LasManager** is closed:



Save Files

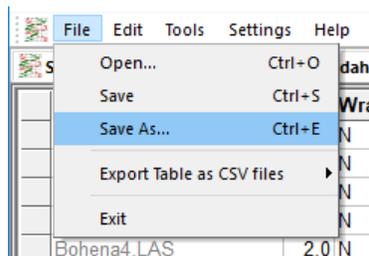
To save the files that need to be modified select **Save** from the **File** dropdown menu or press its hotkey **Ctrl+S**:



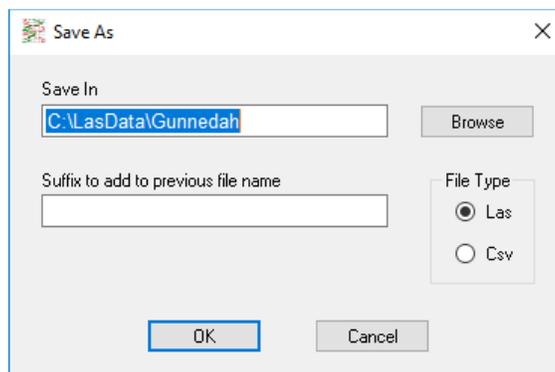
Before each file is saved the original copy is renamed with a “ - Backup” suffix added to its filename. If there is already a file with this name then it is renamed with a “ - Backup(2)” suffix added to it. If this name already exists then it uses “ - Backup(3)” and so on.

Save Files with Save As

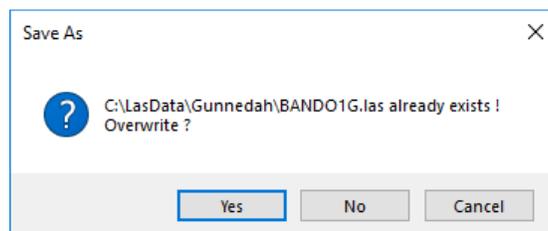
To save the files to a different folder, place a suffix on the filename and/or change the file type between Las and Csv select **Save As** from the **File** dropdown menu or press its hotkey **Ctrl+E**:



Next the following information is requested:

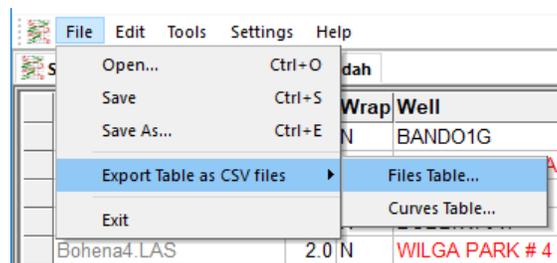


Whenever a file already exists with the same name as the desired filename of one of the files being saved, the user is warned and asked if they want to overwrite the previous file:

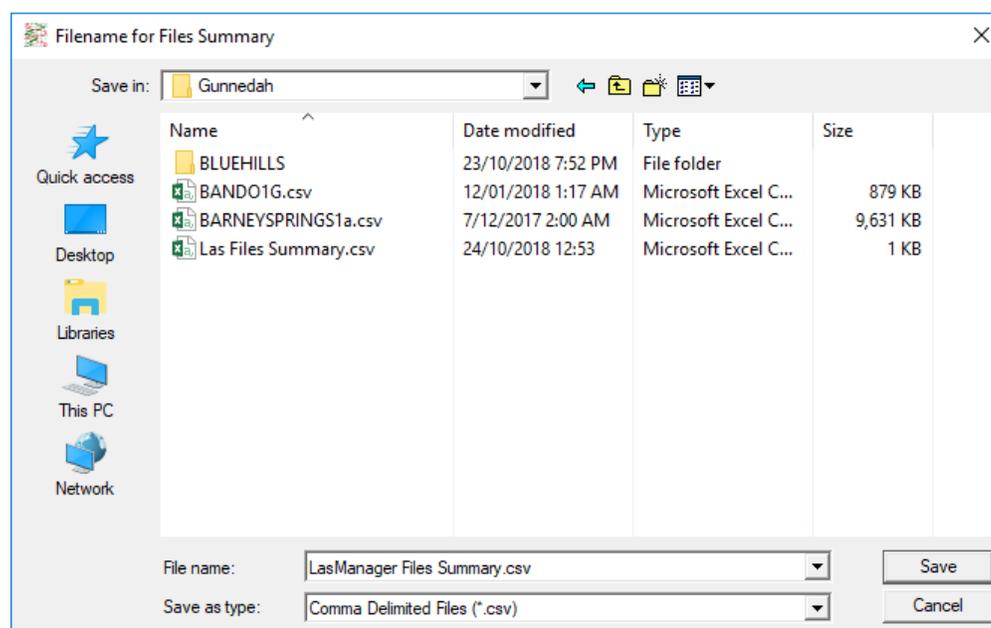


Export Tables as CSV files

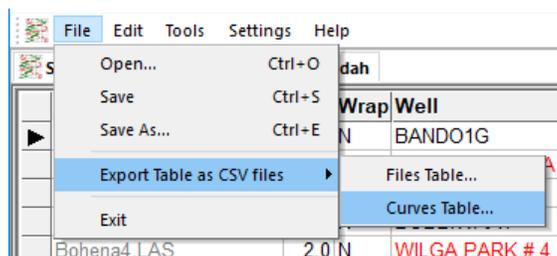
To export the information in the Files Table to a Csv file select **Export Table as CSV files** from the **File** drop down menu and then select the **Files Table** option:



The user is then prompted for the folder and filename for the Files Table Csv file:



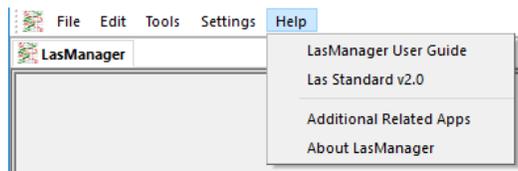
To export the information in the Curves Table to a Csv file select **Export Table as CSV files** from the **File** drop down menu and then select the Curves Table option:



The user is then prompted for the folder and filename for the Curves Table Csv file.

7. Additional Information

Additional information can be obtained by selecting one of the options from the **Help** dropdown menu:



There are four options:

1. **LasManager User Guide** which displays the LasManager User Guide that you are currently reading.
2. **Las Standard v2.0** which displays a copy of the latest LAS Standard which was updated by the Canadian Well Logging Society in February 2017.
3. **Additional Related Apps** which displays a list of other Apps and Services provided by the **LasManager** authors:



4. **About LasManager** which displays a synopsis of the program, the release number of **LasManager** and the contact for support:

