

DataVerse User Manual

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Introduction

DataVerse is a tool for viewing and editing pipeline, wind farm, geographic and structural inspection data in all its forms. The aim is to isolate the end user from the many underlying data formats used by oil & renewables companies for their deliverables (PRISM, IBIS, TPDS, Sitras, etc.) and allow the viewing tools to do the hard work.

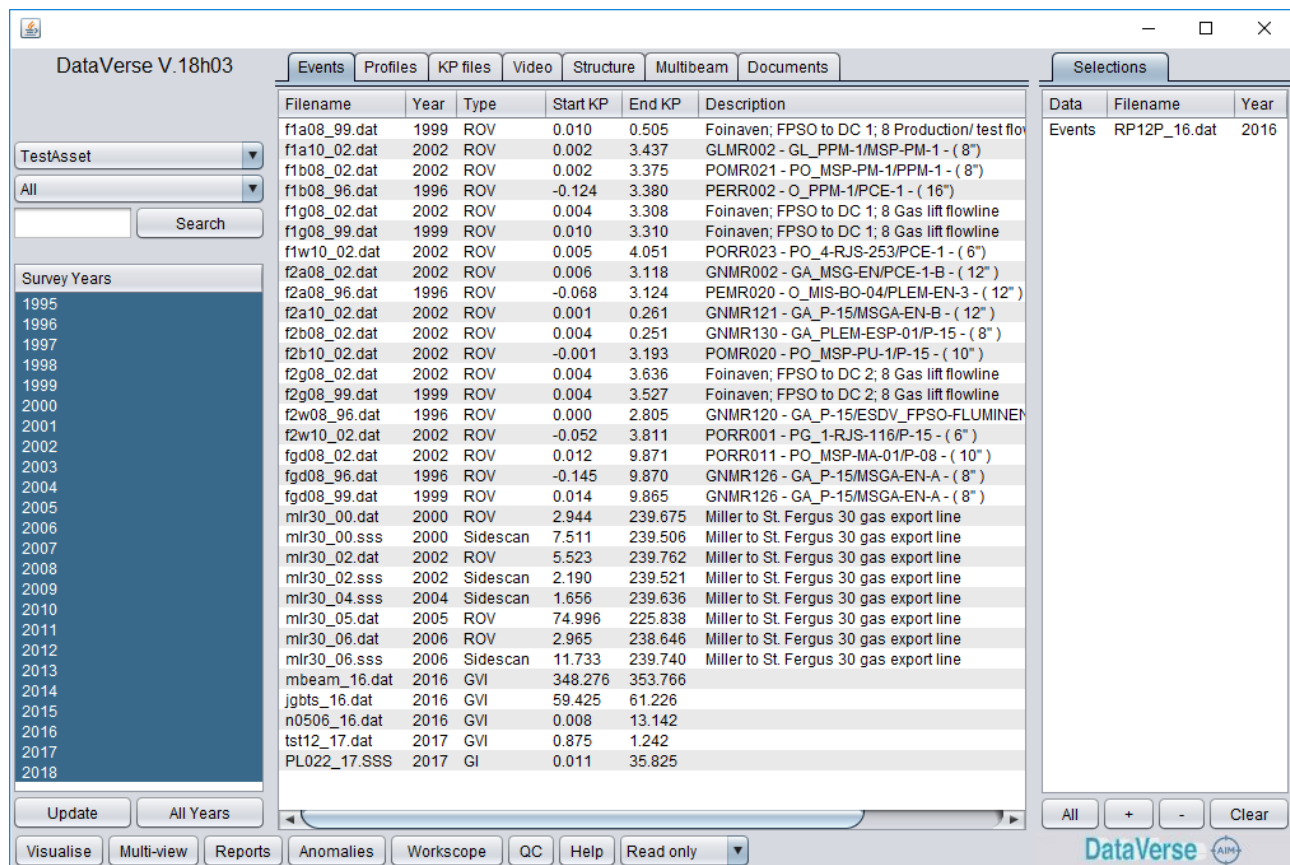
The program is graphically rich in its presentation of 2D and 3D data and can allow GIS style viewing without the trouble of learning to use a complex GIS. It allows a user to compare multiple years and types of data simply and efficiently. There is a strong emphasis on data QC with minimal user effort. An entire survey and all of its data types can be checked against acceptance criteria with one button click.

There is no requirement to load data into a back end database, files need only to be copied into place and even that can be automated. This reduces the need for IT support and database administration. It also makes the program a plug-in replacement for older software with zero changes to the existing data.

This is a user manual, it is not a technical reference for the software or its data formats and structures. Data formats are generally described in client documentation. Please refer to the separate DataVerse technical manual if needed.

The Main Menu

The purpose of the main menu is to allow the user to select the data he or she wishes to visualise, QC or report on.



The data types represented are Event files (with associated anomalies), cross profiles, KP line files, multibeam / GeoTIFF / DTM data, videos and structural inspection data. Header information for these, such as pipeline descriptions, is held in a separate summary table.

The program is based around the concept of working with one asset's worth of data at a time. The user can filter the available data by survey type (side scan GI, ROV GVI, landfall, etc.), year of survey and by a textual wild card.

To search by year select a single year or multiple years (using the mouse and Ctrl or Shift) then press Update.

To filter textually the type the search string (such as mlr30) into the field next to the Search button then press the button. To clear the search and display all files just empty the text field and press Search. The search is not case sensitive.

Double clicking on an item will move it into the selected menu. Double clicking on a selected item will deselect it.

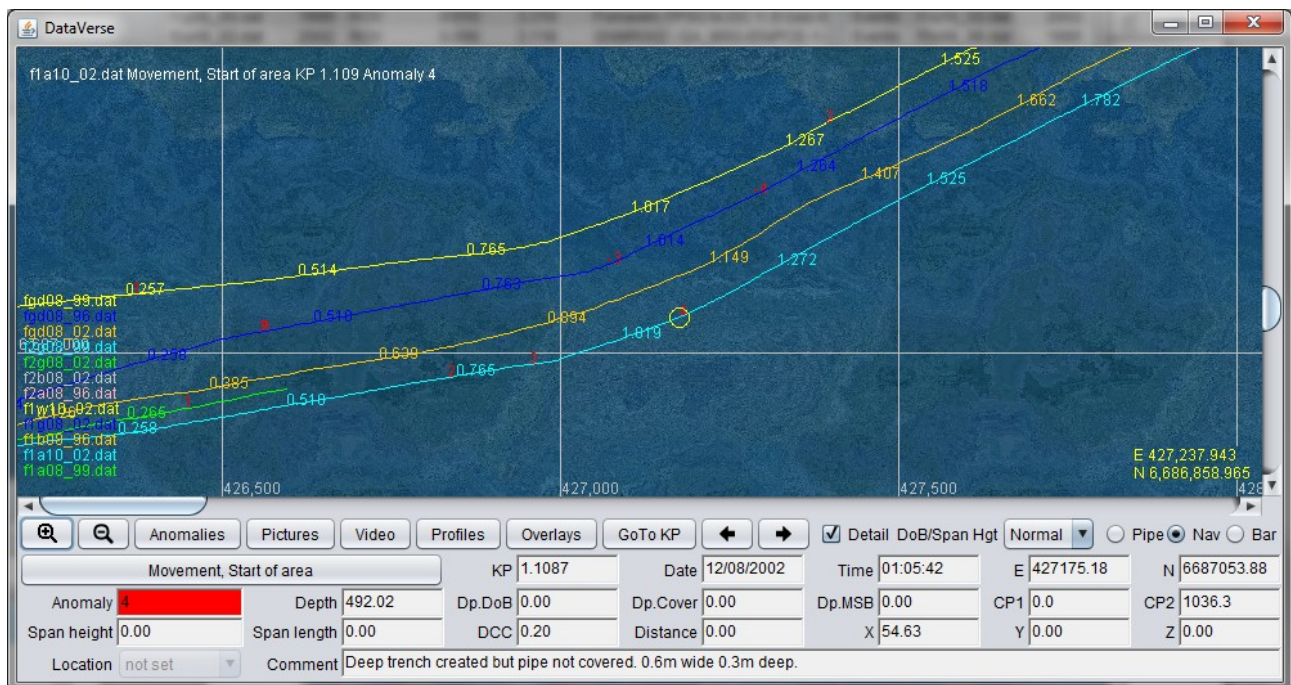
By default the access mode is read only. This may be changed on the pull down menu to anomaly edit or survey edit. In anomaly edit mode only items in the anomaly database may be changed, this should be used by integrity managers. In survey edit mode events may be edited but nothing in the anomaly database may be changed.

Data Visualisation

The purpose of the Visualiser is to graphically display events, shape files and KP line files. The dialog may be invoked with single or multiple files. Various map underlays are available.

Central to this screen is the concept of the snapped event, a user may click on any of the views to select the nearest event. Moving the mouse wheel or using the ← / → arrow buttons will snap to the next or previous event in KP order from the same event file. If the event is off screen the view will recentre automatically. The detail toggle button at the base of the screen turns the alphanumeric section on or off to display the snapped event's fields.

The screen may be zoomed in or out using the +/- buttons or by pressing down on the mouse wheel and rotating it. It may be moved by dragging with the mouse whilst holding the left button or by means of the scroll bars.

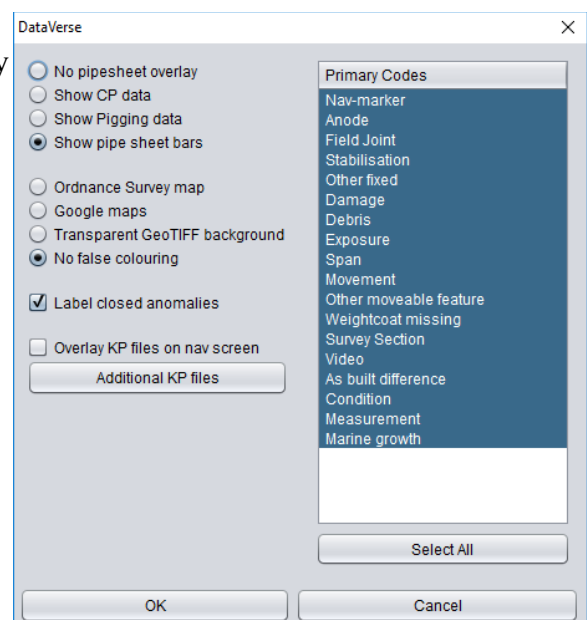


The navigation view offers a GIS style perspective on the data.

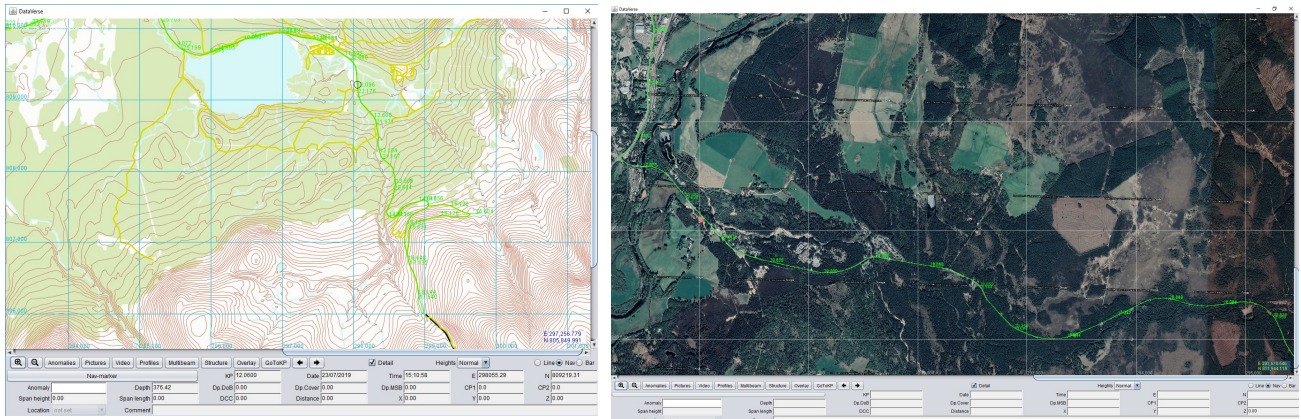
KP line files are overlaid in green if any are loaded. They may be selected from the main menu or added by means of the Overlays dialog. On the dialog they may be added manually by a file selector or automatically matched to the relevant event files.

The event codes to display may be selected and a choice of pipe sheet graphical overlay made from:

- CP graph (contact & continuous)
- Wall thickness data from pigging
- Span / Exposure & Stabilisation bars
- None



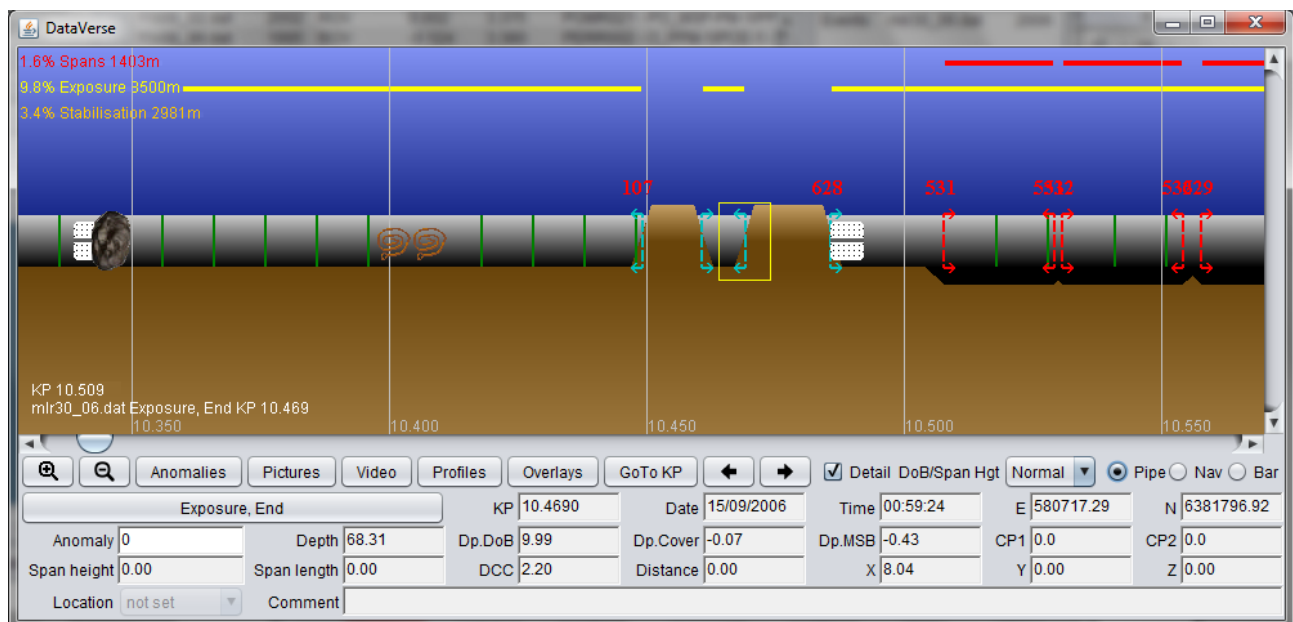
The Ordnance Survey map toggle button on the Overlay dialog enables the display of an OS map as an underlay to the data. For this to work your data must be in the OS co-ordinate system. It works very nicely with the GoPro video / GPS import described later in this manual. Similarly we can overlay Google maps, again this works in OS co-ordinates.



OS maps are stored in an 11Gb SQLite data file in the system directory, this is available free from Ordnance Survey. Google maps are loaded from the Internet but are cached in the system to speed up subsequent access.

Pipesheet View

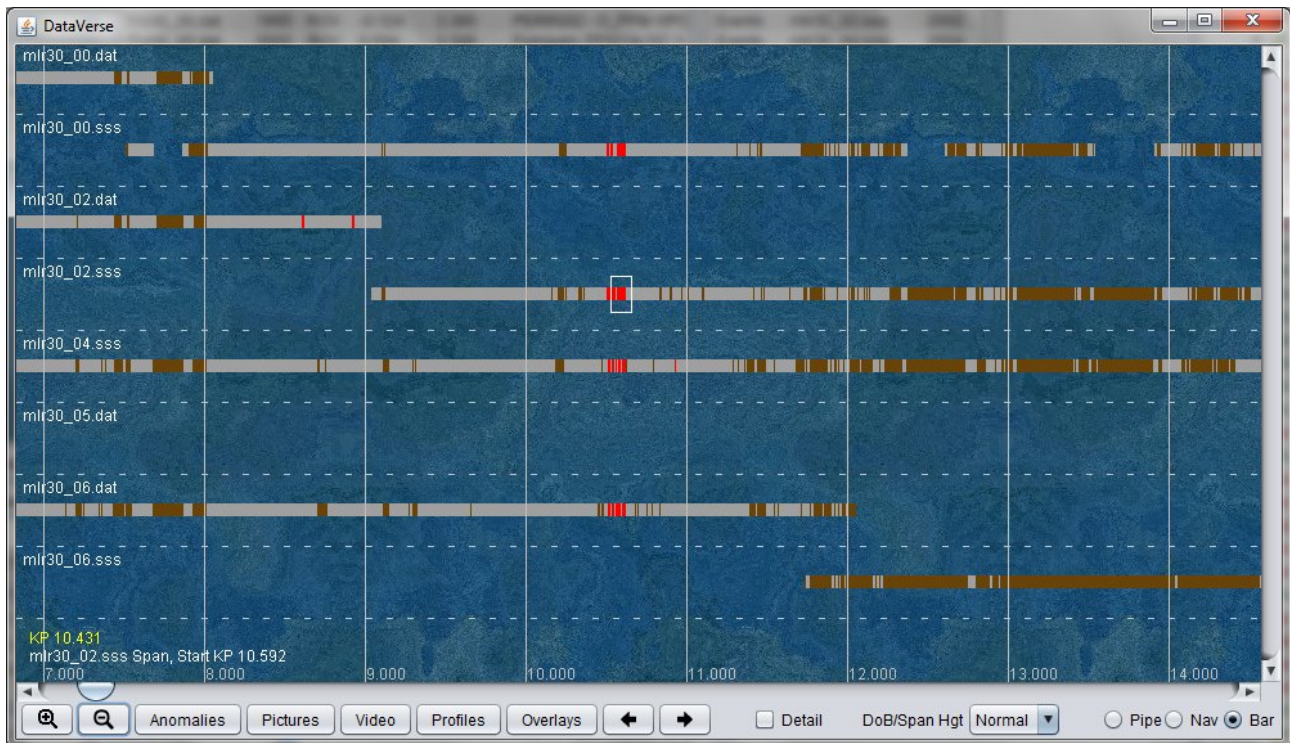
The pipe sheet view offers a graphical representation of event data for a single pipeline with respect to KP. If a user has the correct permissions this data may be edited. The pipe's burial status is shown as are spans. Events are represented by icons which are configured in the client's event codes spreadsheet. As on the navigation view anomaly numbers are displayed in red above the pipe.



The DoB/Span Hgt selector allows depth of bury and span height to be shown as a standard height for all items or to be displayed as a percentage of the pipe's diameter, this is an easy visual reference for the user to identify shallow and deep spans or large depths of bury.

The Anomalies, Pictures, Video and Profiles buttons open a new dialog with the relevant data type at the point by time or KP of the snapped event. GoTo KP asks the user to enter a KP, the display will move to that area and if an event is nearby it will be selected.

Bar Chart View



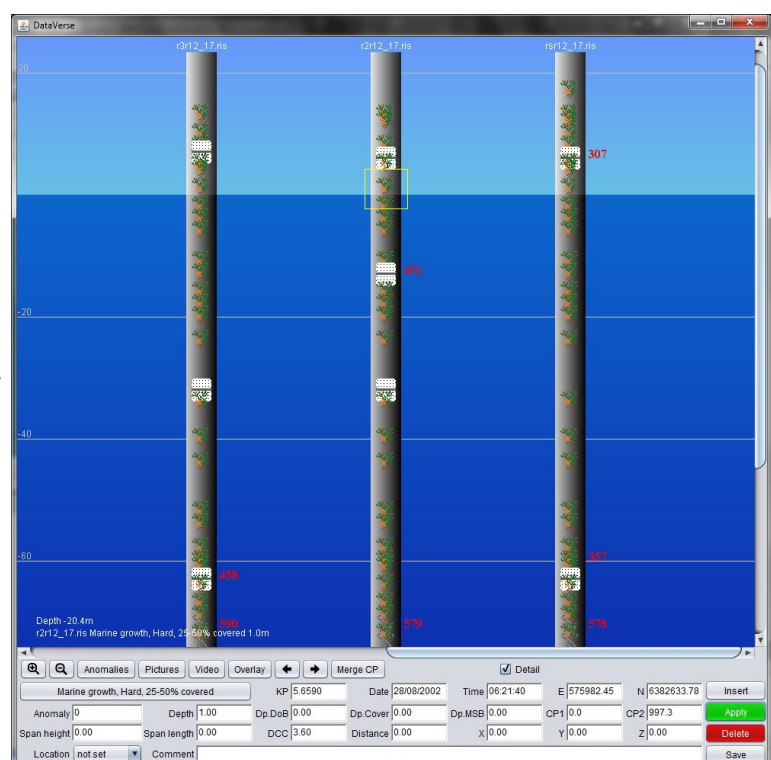
The bar chart view offers a graphical method of comparing multiple surveys of the same pipeline. This allows the user to see which areas have and have not been surveyed and whether span and exposure lengths are changing with time. Spans are shown in red, buried section in brown.

At higher levels of zoom individual events are displayed as coloured lines.

Riser Viewer

The riser viewer may be used to view events based on their depth. Positive depths are above the LAT sea level (from a drone), negative depths are below (from an ROV). The screen operation is identical to the main event viewer. Multiple risers may be viewed side by side.

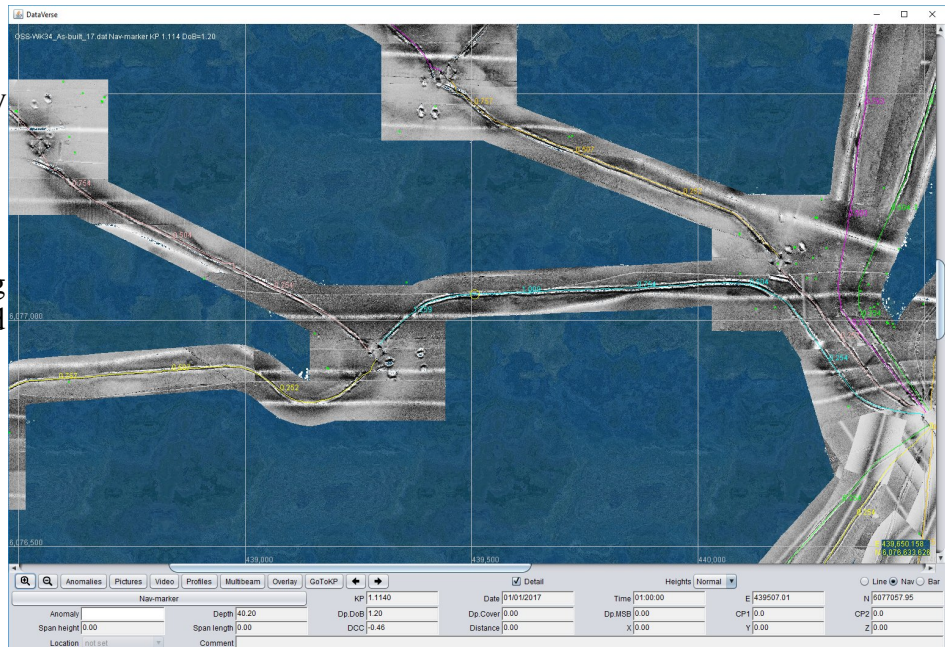
This screen is especially useful if CAD drawings for a structure are unavailable.



Viewing GeoTIFFs

GeoTIFFs may be viewed as an overlay in the navigation visualiser. They are copied into a directory such as \geotiff\asset\2018 and appear on the main menu alongside multi-beam data. When selecting event files to view just add a GeoTIFF.

In the example shown areas with no data coverage were white. A toggle button in the visualiser Overlay dialog allows you to omit white / blank areas and make them transparent to give more pleasing view.

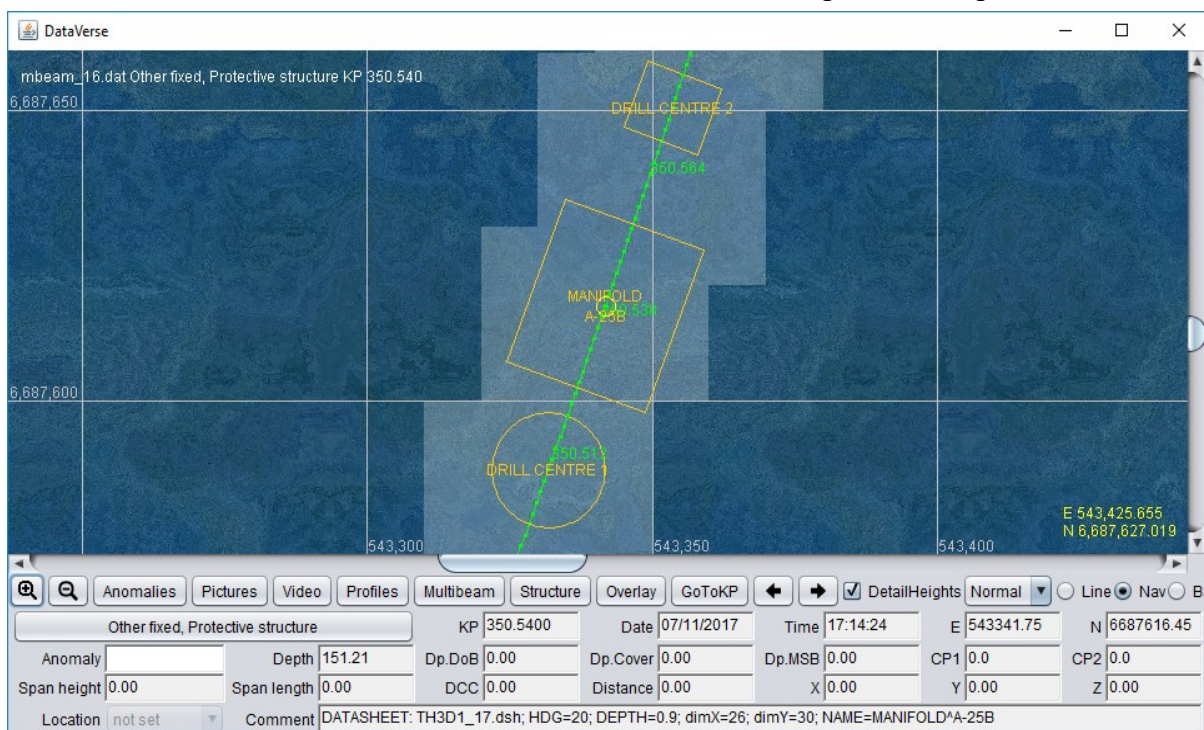


Linking Events & Structures

Setting the comment field of any event to LABEL: <any text> will display a label next to the event. The comment can be used to reference a structural data sheet (on the main menu Structures pane).

DATASHEET: TH3D1_17.dsh; HDG=20; DEPTH=0.9; dimX=26; dimY=30; NAME=MANIFOLD^A-25B

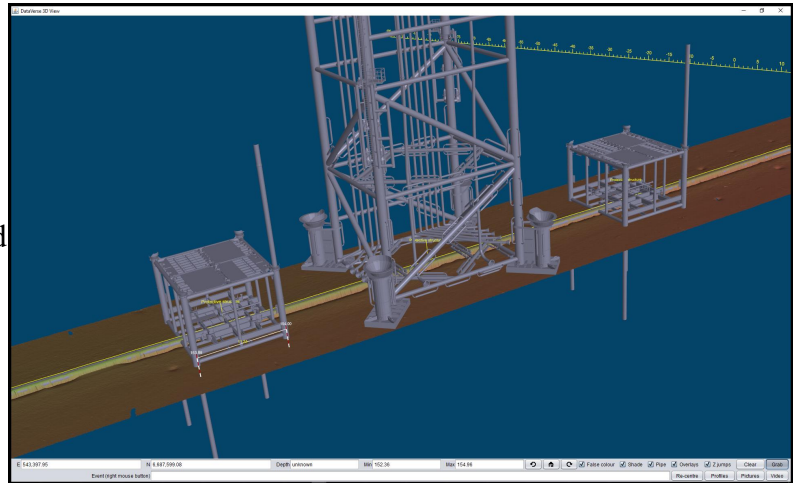
The first item is the data sheet name. HDG is the heading of the square relative to north. DEPTH is a fine adjustment in metres to display 3D structures and make them touch the seabed correctly. The dimX/Y fields set the width and height of the box in metres, for circles the RADIUS=7.5 command is used instead. NAME=Text^text2 is a screen label, ^ is used to separate multiple lines.



Pressing the Structure button opens a 2D or 3D structure viewer for the specified data sheet.

If you view Multibeam data and have events which reference one or more 3D data sheets then the 3D models connected to the data sheets will be displayed. This allows you to build 3D virtual worlds inside DataVerse and use the navigation Visualiser to move around them.

For simplicity's sake any structural events linked to the 3D model are not displayed here. To access those use the Structure button and view the data sheet in its dedicated screen.



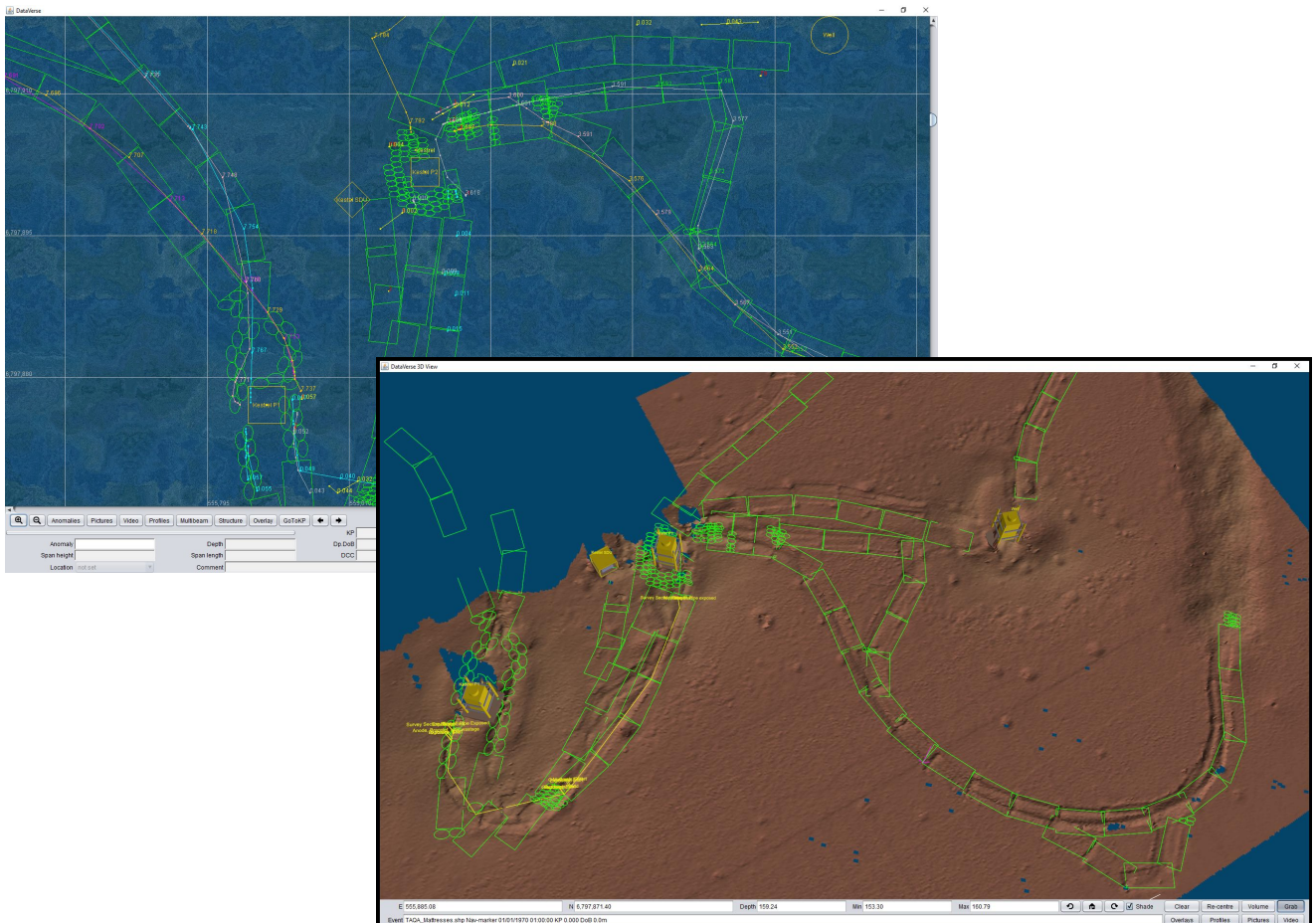
Another way to directly link DataVerse dvs 3D file (see technical manual for details) is to place the following in an event comment:

```
3D_STRUCTURE: MODEL=eider.dvs; HDG=45; DEPTH=160.0; dimX=80; dimY=70; NAME=Eider
```

This method doesn't need the user to create a datasheet dsh entry so is simpler. The dvs file live in the \structs\<asset> directory.

Shape Files

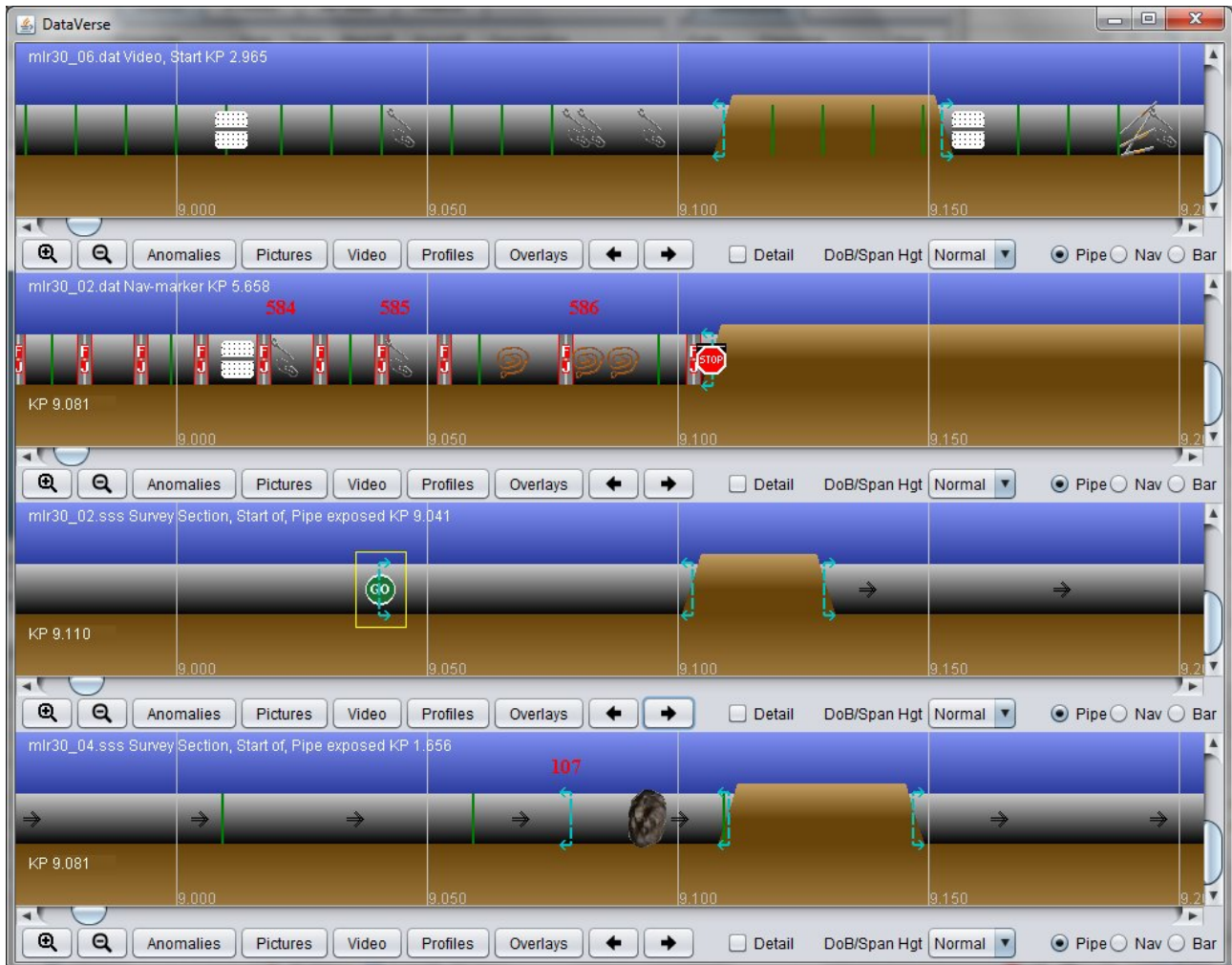
ESRI shape files may be viewed (and created using the Report Builder) in the 2D Visualiser and 3D screens. There is no need to import shape files, just copy all the parts of the shape file into the DataVerse events directory for your asset, the program will auto-detect them at next restart.



Multi-View

The multi-view screen allows several pipe sheets to be displayed side by side. They zoom and scroll in unison and are synchronised by KP.

Operation of each pane is the same as for the single pane visualiser.



This view is ideal for comparing several surveys of the same pipeline.

Video Playback

Video playback is available from most dialogs. Video selection is time based. The system holds a table of all known video files and uses this to look up the relevant video files.

The admin menu's Video Import button invokes the dialog below. The user may select to play videos in DataVerse's own player or remote control VisualReview by UDP. Where there is a choice of video files HD or SD may be selected.

Before videos can be played they must be imported into DataVerse. It may be that new videos have been placed on a server or that a USB disc of videos has become available.

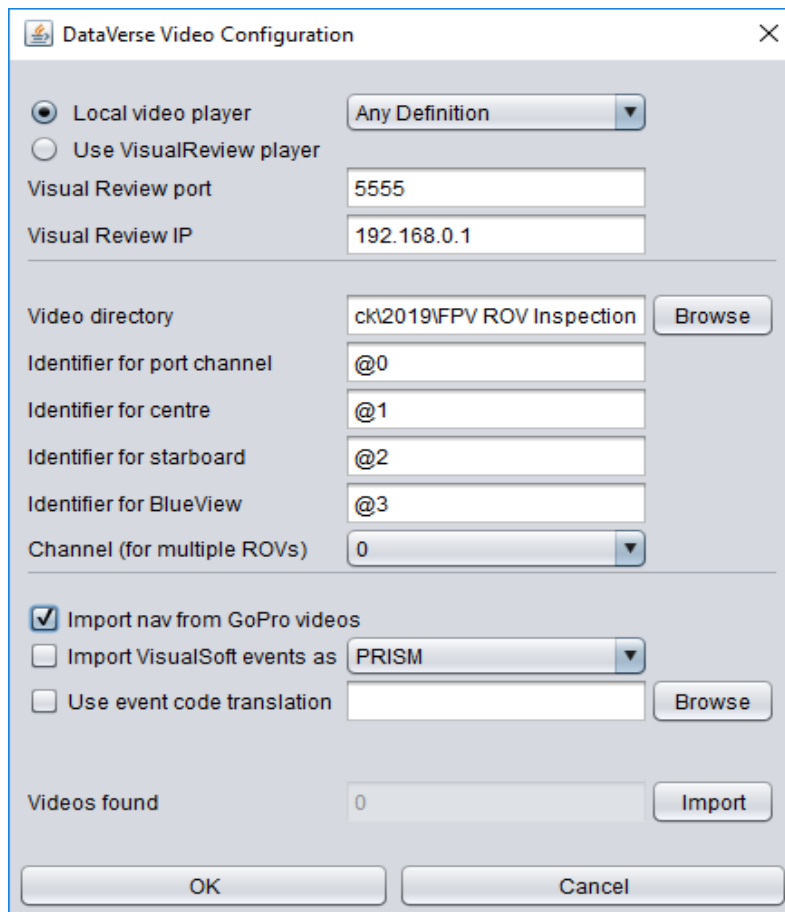
The user specifies the path and channel identifiers (such as PORT or CH0) to begin import. Importing videos is a fairly quick process taking a matter of seconds for thousands of items.

If multiple ROVs or an ROV and drone are recording at the same time there's a non-unique time index. This is solved by having multiple channels, selected on the pull down menu. Import data for each channel in separate import runs. During the eventing process events can be assigned to the relevant video channel. This means that even on a single structure several ROVs can operate at once and the results all live in the same event file.

Pressing Import starts the process. Number of videos found will update until task completion.

GoPro GPS nav data may be imported automatically from suitably recorded video. Where multiple videos join in time order their nav will be combined into one event file. At present GPS Lat/Long is auto converted to Ordnance Survey E/N, other projections can be added on request.

Settings are stored in the Windows registry for future automatic recall.



The image shows a Windows-style dialog box titled "DataVerse Video Configuration". It contains several sections for configuring video playback and import settings. The first section has two radio buttons: "Local video player" (selected) and "Use VisualReview player". Next to the first radio button is a dropdown menu set to "Any Definition". Below these are text fields for "Visual Review port" (5555) and "Visual Review IP" (192.168.0.1). The second section is for video source configuration, with a "Video directory" field (ck2019\FPV ROV Inspection) and a "Browse" button. Below this are four text fields for channel identifiers: "Identifier for port channel" (@0), "Identifier for centre" (@1), "Identifier for starboard" (@2), and "Identifier for BlueView" (@3). A dropdown menu for "Channel (for multiple ROVs)" is set to 0. The third section has a checked checkbox "Import nav from GoPro videos", followed by an unchecked checkbox "Import VisualSoft events as" with a dropdown set to "PRISM", and another unchecked checkbox "Use event code translation" with a "Browse" button. At the bottom, a "Videos found" field shows 0, with an "Import" button. The dialog concludes with "OK" and "Cancel" buttons.

DataVerse Video Configuration	
☒ Local video player	Any Definition
☐ Use VisualReview player	
Visual Review port	5555
Visual Review IP	192.168.0.1
Video directory	ck2019\FPV ROV Inspection Browse
Identifier for port channel	@0
Identifier for centre	@1
Identifier for starboard	@2
Identifier for BlueView	@3
Channel (for multiple ROVs)	0
☒ Import nav from GoPro videos	
☐ Import VisualSoft events as	PRISM
☐ Use event code translation	Browse
Videos found	0 Import
OK Cancel	



The DataVerse video player can show up to four videos synchronised by time.

The Grab button takes a screen grab of each video and places the files on the Windows desktop. Grabs are at full video resolution regardless of the current player size.

The Prev and Next buttons go to the previous or next set of videos in time order assuming there is no time gap between sets. This is useful if an event is near the time when one set of videos ends and another starts.

The audio channel selector will mute all channels except for the selected channel.

On the bottom right is a channel selector. This allows one channel to be made full screen for more detailed examination.



VisualSoft Event Import

Along with video files any accompanying event files may be imported. These are stored in 15 minute chunks within VisualSoft but during import are merged into one file per VisualSoft task. They are saved in DataVerse as either PRISM, Shell IBIS, Statoil Sitras or VisualSoft format.

Event codes may be translated from VisualSoft format (typically PRISM style) to IBIS or other specifications using a translation table, see technical manual for file format.

Video Descriptions & Task Filter

Video descriptions are generated on video import based on the video path names. If desired the video index file may be manually cleaned up to improve the relevance of the descriptions. The descriptions are in effect the task names used by programs such as VisualSoft.

At the top of the video pane is a task filter pull down menu. In cases where there are thousands of videos finding one based purely on time is not easy. The pull down menu contains a unique list of all descriptions (tasks) in the system. Selecting a task shows only those videos with a matching description.

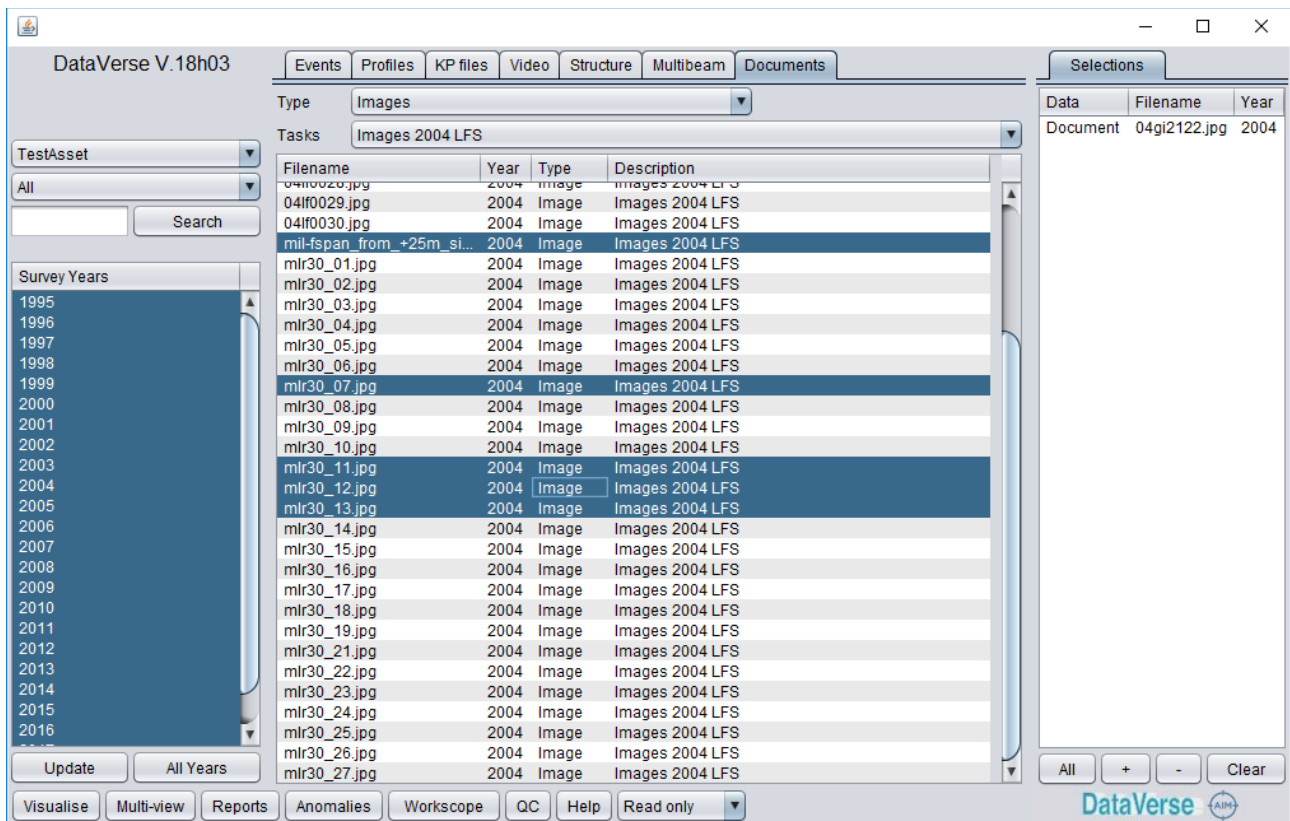
The task filter may be used in conjunction with the main screen year selector and search box. To see videos for the FPV for 2017 you'd select 2017 and press update. Then enter FPV into the search box and press Search. The task list will now show only the tasks for the FPV in 2017.

The screenshot displays the DataVerse V.18h03 software interface. The 'Video' tab is selected in the top navigation bar. On the left, there is a 'Task filter' dropdown menu set to 'All', a 'TestAsset' dropdown, and a 'Survey Years' list from 1995 to 2018. Below the years are 'Update' and 'All Years' buttons. A search box with a 'Search' button is also present. The main area shows a table of video files with columns: Filename, Year, Start Time, Camera, and Description. The table lists various video files, mostly from 2016 and 2017, with descriptions like 'starboard temp', 'port temp', and 'centre temp'. On the right, there is a 'Selections' pane with columns for Data, Filename, and Year. At the bottom, there are buttons for 'Visualise', 'Multi-view', 'Reports', 'Anomalies', 'Workspace', 'QC', 'Help', and 'Read only'. The DataVerse logo is in the bottom right corner.

Filename	Year	Start Time	Camera	Description
20050809050501000_SDPORT.mkv	2005	09/08/05 05:05:01	starboard	temp
20050809050501000_SDSTBD.mkv	2005	09/08/05 05:05:01	port	temp
20050809050501000_SDCENTRE.mkv	2005	09/08/05 05:05:01	centre	temp
20160710212813078@QUADDVR-1_Ch1.asf	2016	10/07/16 21:28:13	centre	UK-COL0026
20160710212813187@QUADDVR-1_Ch2.asf	2016	10/07/16 21:28:13	centre	UK-COL0026
20160710212813437@QUADDVR-1_Ch3.asf	2016	10/07/16 21:28:13	centre	UK-COL0026
20160710212812531@QUADDVR-1_Ch4.asf	2016	10/07/16 21:28:12	centre	UK-COL0026
20160710215813047@QUADDVR-1_Ch1.asf	2016	10/07/16 21:58:13	centre	UK-COL0026
20160710215813266@QUADDVR-1_Ch2.asf	2016	10/07/16 21:58:13	centre	UK-COL0026
20160710215813516@QUADDVR-1_Ch3.asf	2016	10/07/16 21:58:13	centre	UK-COL0026
20160710215814110@QUADDVR-1_Ch4.asf	2016	10/07/16 21:58:14	centre	UK-COL0026
20160719062530953@QUADDVR-1_Ch1.asf	2016	19/07/16 06:25:30	centre	UK-COL0026
20160719062531063@QUADDVR-1_Ch2.asf	2016	19/07/16 06:25:31	centre	UK-COL0026
20160719062531328@QUADDVR-1_Ch3.asf	2016	19/07/16 06:25:31	centre	UK-COL0026
20160719062530813@QUADDVR-1_Ch4.asf	2016	19/07/16 06:25:30	centre	UK-COL0026
20160719065531015@QUADDVR-1_Ch1.asf	2016	19/07/16 06:55:31	centre	UK-COL0026
20160719065531265@QUADDVR-1_Ch2.asf	2016	19/07/16 06:55:31	centre	UK-COL0026
20160719065531437@QUADDVR-1_Ch3.asf	2016	19/07/16 06:55:31	centre	UK-COL0026
20160719065531750@QUADDVR-1_Ch4.asf	2016	19/07/16 06:55:31	centre	UK-COL0026
20160719030414250@QUADDVR-1_Ch1.asf	2016	19/07/16 03:04:14	centre	UK-COL0026
20160719030414625@QUADDVR-1_Ch2.asf	2016	19/07/16 03:04:14	centre	UK-COL0026
20160719030414813@QUADDVR-1_Ch3.asf	2016	19/07/16 03:04:14	centre	UK-COL0026
20160719030414078@QUADDVR-1_Ch4.asf	2016	19/07/16 03:04:14	centre	UK-COL0026
20160719033414266@QUADDVR-1_Ch1.asf	2016	19/07/16 03:34:14	centre	UK-COL0026
20160719033414609@QUADDVR-1_Ch2.asf	2016	19/07/16 03:34:14	centre	UK-COL0026
20160719033414828@QUADDVR-1_Ch3.asf	2016	19/07/16 03:34:14	centre	UK-COL0026
20160719033414047@QUADDVR-1_Ch4.asf	2016	19/07/16 03:34:14	centre	UK-COL0026
20160719040414281@QUADDVR-1_Ch1.asf	2016	19/07/16 04:04:14	centre	UK-COL0026
20160719040414609@QUADDVR-1_Ch2.asf	2016	19/07/16 04:04:14	centre	UK-COL0026
20160719040414828@QUADDVR-1_Ch3.asf	2016	19/07/16 04:04:14	centre	UK-COL0026
20160719040414015@QUADDVR-1_Ch4.asf	2016	19/07/16 04:04:14	centre	UK-COL0026
20160719043414313@QUADDVR-1_Ch1.asf	2016	19/07/16 04:34:14	centre	UK-COL0026

The Documents Pane

The main screen has a dedicated pane for your documents. A document is defined as any of the following: image, document, spreadsheet, text, drawing, zip, data, html.

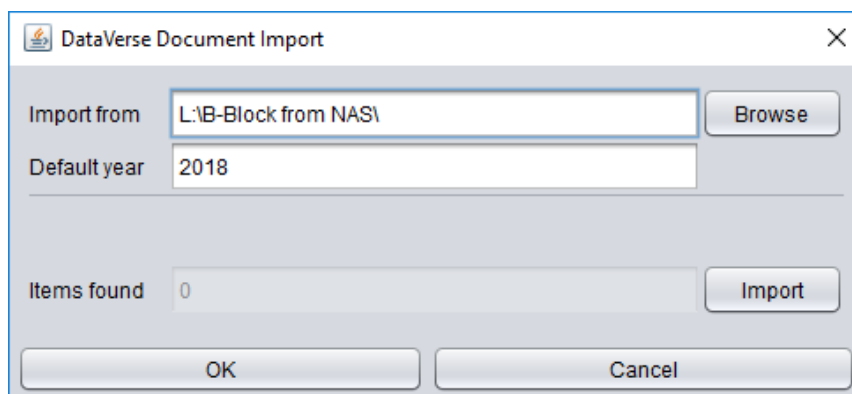


The pane first shows any items in the DataVerse images directory hierarchy. Then it adds the contents of the documents index file for each asset (see technical manual).

The screen is searched and filtered in much the same way as the Video pane. Filters may be set with the year selector, text search box, pull down menu for task and the pull down for file type.

Items may be selected and placed in the right hand Selections pane in the normal way. Pressing Visualise will ask Windows to open each file using the default program (Windows Paint, Word, etc.). Multiple files of different types may be selected at once.

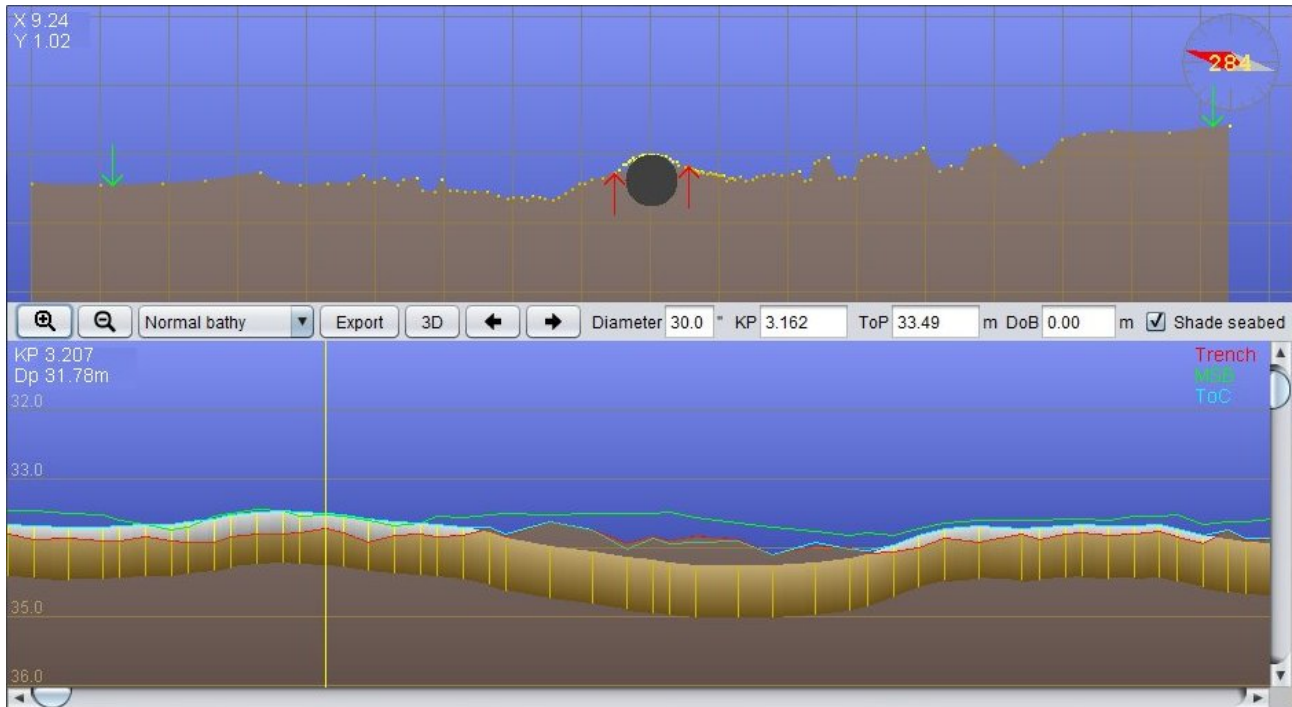
The index file is appended to by means of the documents import function on the Admin menu. The importer asks for the directory hierarchy to search and for a default year to use if a year can't be identified automatically from the path name. This import can be redone every few weeks or after a new survey is placed on your server.



Cross Profile Visualiser

The profile viewer is available from the main menu, Visualiser and 3D screens. It can display profiles held in new or old TPDS format, Sitras and a few others.

It may be dragged, scrolled and zoomed in the same way as the other screens. Profiles are selected by clicking on the long profile pane or moving back and forth with the mouse thumb wheel.



The Normal bathy / Top of Pipe toggle changes the long profile reference point from Top of Pipe depth (normal) to height minus ToP, the latter gives a clearer profile for spans.

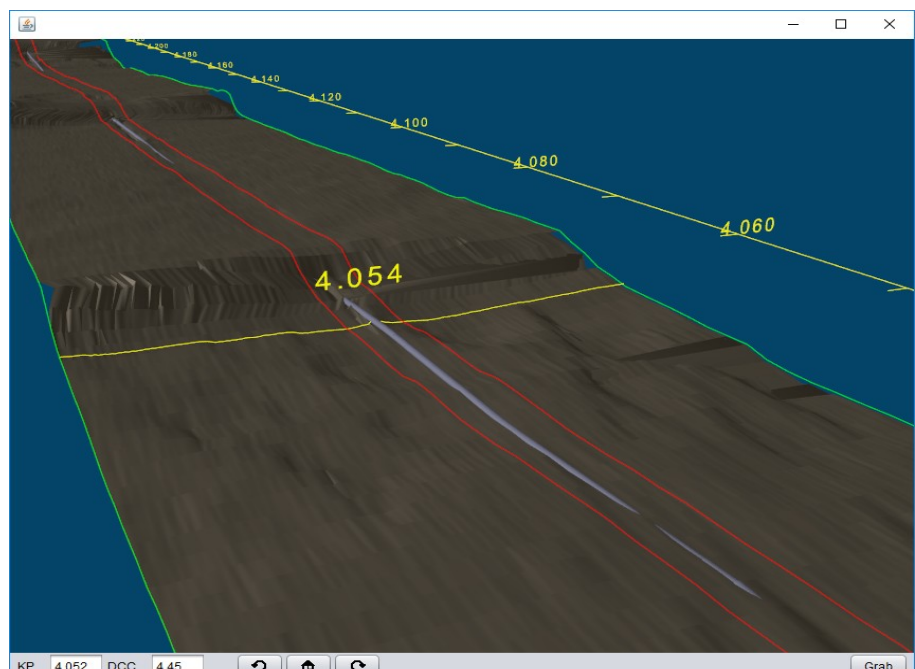
The user may type a new value for the pipe diameter in the case that a thick weight coat is present, this will adjust the displayed pipe accordingly. If a new KP is typed the display will recentre on it.

The Export function calls a Report Builder with the current file loaded.

3D visualisation is available. As the mouse is moved KP and DCC update at the bottom.

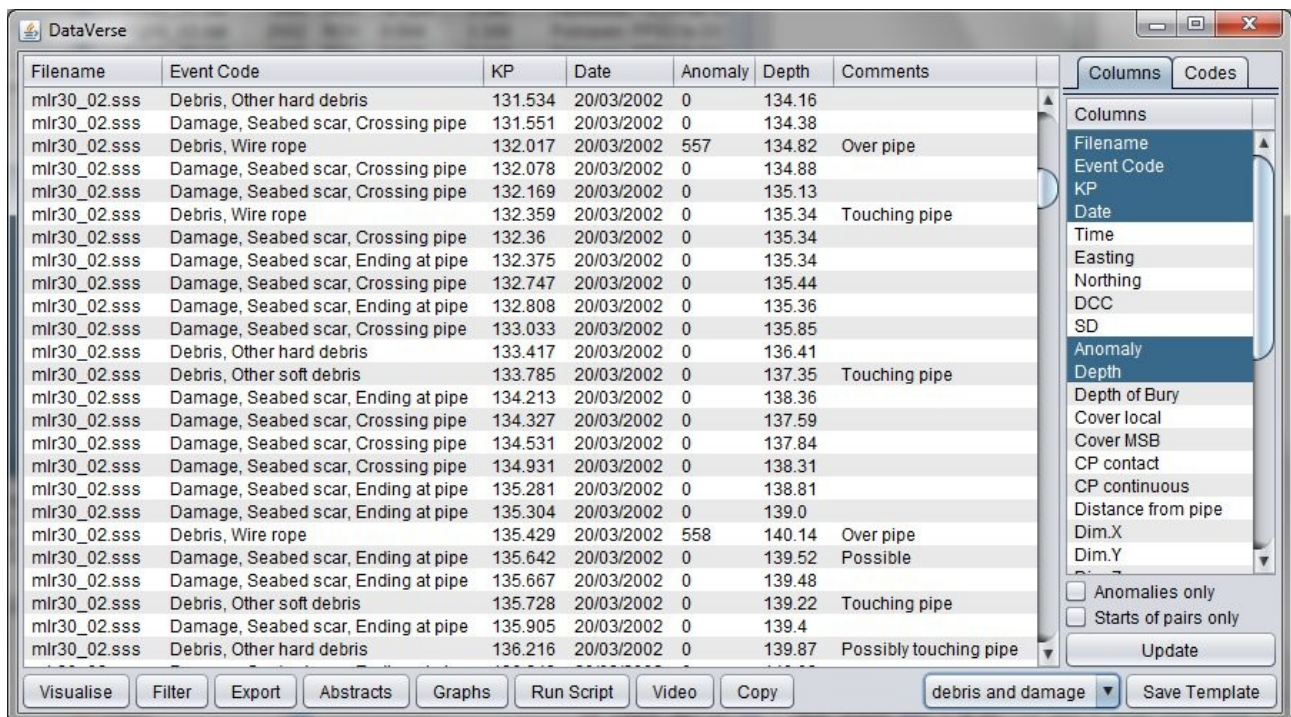
The view may be zoomed using the thumb wheel and rotated by dragging with the left button. Dragging with the right button moves it in 2D.

Clicking on the pipe in 3D mode re-centres the view on the clicked KP.



Report Builder

DataVerse has an extremely powerful yet easy to use report builder. It can be used for simple event or anomaly interrogation, graph production, Excel export or as a powerful document generator with video grabbing and cross profile pasting ability. Cross profile files may also be loaded.

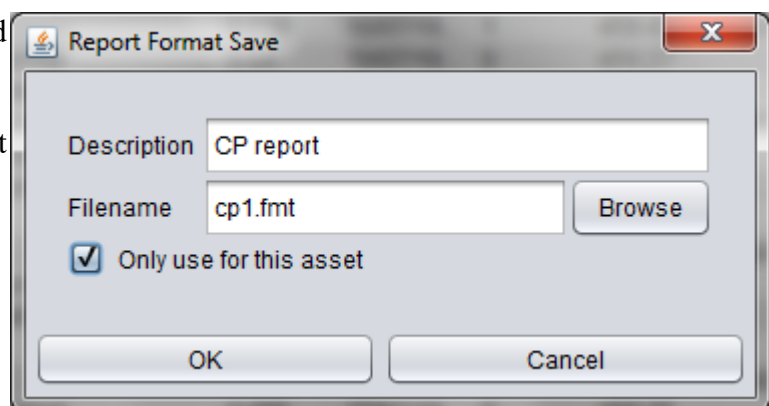


Filename	Event Code	KP	Date	Anomaly	Depth	Comments
mlr30_02.sss	Debris, Other hard debris	131.534	20/03/2002	0	134.16	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	131.551	20/03/2002	0	134.38	
mlr30_02.sss	Debris, Wire rope	132.017	20/03/2002	557	134.82	Over pipe
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	132.078	20/03/2002	0	134.88	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	132.169	20/03/2002	0	135.13	
mlr30_02.sss	Debris, Wire rope	132.359	20/03/2002	0	135.34	Touching pipe
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	132.36	20/03/2002	0	135.34	
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	132.375	20/03/2002	0	135.34	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	132.747	20/03/2002	0	135.44	
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	132.808	20/03/2002	0	135.36	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	133.033	20/03/2002	0	135.85	
mlr30_02.sss	Debris, Other hard debris	133.417	20/03/2002	0	136.41	
mlr30_02.sss	Debris, Other soft debris	133.785	20/03/2002	0	137.35	Touching pipe
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	134.213	20/03/2002	0	138.36	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	134.327	20/03/2002	0	137.59	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	134.531	20/03/2002	0	137.84	
mlr30_02.sss	Damage, Seabed scar, Crossing pipe	134.931	20/03/2002	0	138.31	
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	135.281	20/03/2002	0	138.81	
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	135.304	20/03/2002	0	139.0	
mlr30_02.sss	Debris, Wire rope	135.429	20/03/2002	558	140.14	Over pipe
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	135.642	20/03/2002	0	139.52	Possible
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	135.667	20/03/2002	0	139.48	
mlr30_02.sss	Debris, Other soft debris	135.728	20/03/2002	0	139.22	Touching pipe
mlr30_02.sss	Damage, Seabed scar, Ending at pipe	135.905	20/03/2002	0	139.4	
mlr30_02.sss	Debris, Other hard debris	136.216	20/03/2002	0	139.87	Possibly touching pipe

The report may be sorted in ascending or descending order by clicking the column header for each column. Columns headers may be dragged to change the column order or resized by dragging the column separators.

Event codes and columns to display may be selected on the Codes and Columns panes on the right. Once this is done the user must press Update to refresh the report.

Reports may be saved for future use and given English names for ease of recognition. Save Template calls the appropriate dialog. A list of saved report formats is available on the pull down menu in the bottom right, to change report it's as easy as selecting a new item on the pull down. This makes it extremely fast to run a variety of reports. Report formats are available to all assets unless the tick box for asset specific formats is ticked.



Report Format Save

Description: CP report

Filename: cp1.fmt [Browse]

☒ Only use for this asset

OK Cancel

A selection of rows may be highlighted on the main report grid using a combination of the left button, Shift and Ctrl. Pressing Copy saves these to the Windows clipboard so that they can be pasted into Word, Excel and other applications.

If a single row is highlighted the Visualise and Video buttons may be used to call viewing dialogs.

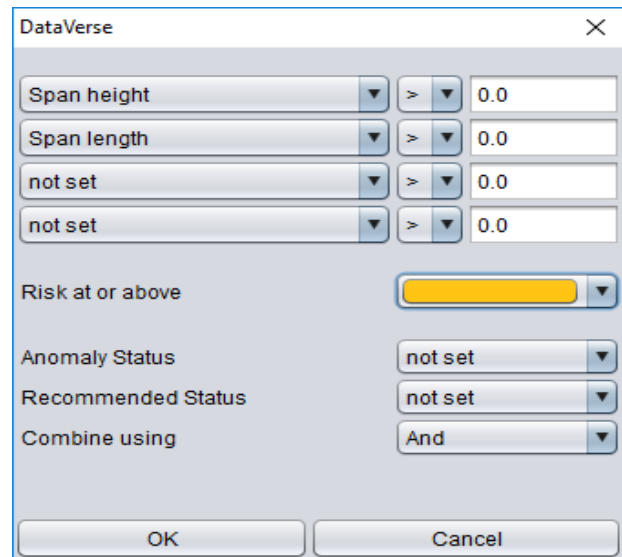
The Export button saves the current report's data in Excel, CSV, ESRI Shape or HTML format.

Abstracts save the report as a multi-pane Excel spreadsheet with sections for each major event type (spans, burial, debris, etc.). This is a deliverable for some oil companies such as Statoil.

The Filter dialog allows for the report to be filtered by KP, CP, depth of bury, span height, anomaly risk and many other column values.

These may be combined using <, > and And/Or logic as needed.

Choices are saved in the user's report formats.



The DataVerse Filter dialog box contains the following controls:

- Span height: dropdown menu, comparison operator (>), value (0.0)
- Span length: dropdown menu, comparison operator (>), value (0.0)
- not set: dropdown menu, comparison operator (>), value (0.0)
- not set: dropdown menu, comparison operator (>), value (0.0)
- Risk at or above: color selection button (yellow), dropdown menu
- Anomaly Status: dropdown menu (not set)
- Recommended Status: dropdown menu (not set)
- Combine using: dropdown menu (And)
- Buttons: OK, Cancel

Graphs

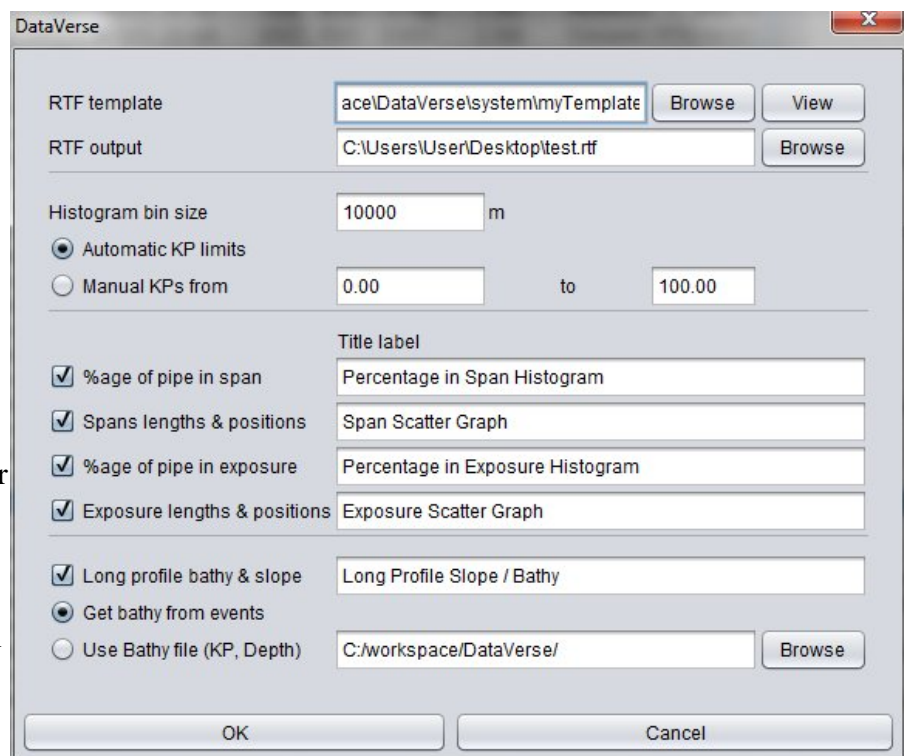
The Graph facility takes a user supplied RTF template and inserts graphs into the named output RTF file. This may be loaded into Word and incorporated into larger reports.

For the span and exposure histograms the user may select the bin size in metres for each graph column.

KP limits may be auto-generated as the input file's extents or manually selected.

For the bathy / slope graph depth data may be extracted from the events or from a user specified CSV file (format KP, Depth with an optional header line).

All value entered are saved in the Windows registry for future use.



The DataVerse Graph dialog box contains the following controls:

- RTF template: text field (ace\DataVerse\system\myTemplate), Browse, View buttons
- RTF output: text field (C:\Users\User\Desktop\test.rtf), Browse button
- Histogram bin size: text field (10000), unit (m)
- Automatic KP limits: radio button (selected)
- Manual KPs from: text field (0.00) to text field (100.00)
- Title label:
 - ☒ %age of pipe in span: text field (Percentage in Span Histogram)
 - ☒ Spans lengths & positions: text field (Span Scatter Graph)
 - ☒ %age of pipe in exposure: text field (Percentage in Exposure Histogram)
 - ☒ Exposure lengths & positions: text field (Exposure Scatter Graph)
 - ☒ Long profile bathy & slope: text field (Long Profile Slope / Bathy)
- Get bathy from events: radio button (selected)
- Use Bathy file (KP, Depth): text field (C:/workspace/DataVerse/), Browse button
- Buttons: OK, Cancel

Scripting

The Run Script function is a very powerful summary report generator and is covered in it's own manual. A user generated RTF template is processed to create an output file which may have auto generated summary information, video grabs, tables of events by type, cross profile grabs and many other features.

In the template the program will search for terms such as <KPRANGE> and substitute the KP range of the report, in this way a sentence of text may be written and values substituted at run time. There are currently over 40 such terms in the system's vocabulary such as percentage in span or exposure, number of open anomalies and number of damage events.

A line such as :

```
<TABLE COLS="kp,evtcode,spnleng,spnhgt", TYPE="SPANS", DOVIDEO, DOXP>
```

Would create a formatted table of spans events with the requested columns. Each entry would have a video grab and a bitmap of the relevant cross profile.

Anomaly Viewer

Structure	Event	Anomaly	KP	Date Time	Status	Rec.Sta...	Description	Pictur...	Risk	Comme...	Primary Codes
mlr30_00.dat	Exposure, Start	113	2.944	22/06/00 06:10:55	not set	Assess	Exposure-Start Max exposure ...	1	2 I B	Max expo...	Nav-marker
mlr30_00.dat	Exposure, End	113	2.987	22/06/00 06:05:41	not set	Assess	Exposure-Start Max exposure ...	1	2 I B		Anode
mlr30_00.dat	Exposure, Start	113	2.988	22/06/00 06:05:35	not set	Assess	Exposure-Start Max exposure ...	1	2 I B	Max expo...	Field Joint
mlr30_00.dat	Exposure, End	113	2.992	22/06/00 06:05:11	not set	Assess	Exposure-Start Max exposure ...	1	2 I B		Stabilisation
mlr30_00.dat	Exposure, Start	113	2.994	22/06/00 06:05:01	not set	Assess	Exposure-Start Max exposure ...	1	2 I B	predomi...	Other fixed
mlr30_00.dat	Exposure, End	113	3.108	22/06/00 05:39:35	not set	Assess	Exposure-Start Max exposure ...	1	2 I B		Damage
mlr30_00.dat	Debris, Netting	-506	24.287	19/06/00 09:26:33	Closed	Closed	Debris-Netting L=2.5 W=0.5 ...	0	2 I B		Debris
mlr30_00.dat	Span, Start	516	232.2...	19/08/00 13:05:59	Closed	Closed	Span-Start span separation L...	0	2 I B	span se...	Exposure
mlr30_00.dat	Span, Start	516	232.2...	19/08/00 13:05:59	Closed	Closed	Span-Start span separation L...	0	2 I B	span se...	Span
mlr30_00.dat	Span, End	516	232.3...	19/08/00 13:29:33	Closed	Closed	Span-Start span separation L...	0	2 I B	end cond...	Movement
mlr30_00.dat	Span, End	516	232.3...	19/08/00 13:29:33	Closed	Closed	Span-Start span separation L...	0	2 I B	end cond...	Other moveable fea...
mlr30_00.dat	Span, Start	517	232.8...	19/08/00 13:52:27	Closed	Closed	Span-Start L=126.3m H=0.15...	0	2 I B		Weightcoat missing
mlr30_00.dat	Span, Start	517	232.8...	19/08/00 13:52:27	Closed	Closed	Span-Start L=126.3m H=0.15...	0	2 I B		Survey Section
mlr30_00.dat	Span, End	517	233.0...	19/08/00 14:02:45	Closed	Closed	Span-Start L=126.3m H=0.15...	0	2 I B		Video
mlr30_00.dat	Span, End	517	233.0...	19/08/00 14:02:45	Closed	Closed	Span-Start L=126.3m H=0.15...	0	2 I B		As built difference
mlr30_02.dat	Debris, Wire rope	582	8.243	28/08/02 08:40:51	Closed	Closed	Debris-wire rope Lots of thick...	1	2 I B	Lots of th...	Condition
mlr30_02.dat	Debris, Wire rope	583	8.567	28/08/02 09:01:41	Closed	Closed	Debris-wire rope Half buried ...	1	2 I B	Half buri...	Measurement
mlr30_05.dat	Debris, Metalwork	614b	75.06	09/08/05 05:08:18	Assess	Assess	Metal cylinder L=1.20 H=0.30 ...	3	2 I B	Metal cyli...	Marine growth
mlr30_05.dat	Debris, Wire rope	615	75.669	09/08/05 05:09:54	Assess	Assess	Associated with wreck. Cross...	1	7 III D	Associat...	
mlr30_05.dat	Debris, Wire rope	616	75.671	09/08/05 05:07:58	Assess	Assess	Associated with wreck. Origin...	1	2 I B	Associat...	
mlr30_05.dat	Debris, Wire rope	617	75.69	09/08/05 05:08:29	Assess	Assess	Associated with wreck. Wire r...	1	2 I B	Associat...	

DataVerse provides an anomaly viewing grid with detail pane to simplify the management of anomaly data. The grid may be called from the main menu or from other viewing tools and can present anomalies from one pipe or multiple surveys.

Data may be sorted in ascending or descending order by clicking the column headers. Columns widths may be changed by dragging the separators on the header line.

The codes selector on the right may be used to select one or many codes to view using the usual left button, Shift, Ctrl key combinations. Once codes are selected the Update button refreshes the view.

Individual anomalies are highlighted by clicking on the relevant line in the table. The details pane (top left button) shows all the fields in the anomaly database (see next page of manual).

Visualise calls a graphical visualiser for the selected anomaly.

Pictures shows all still images for the selected anomaly using the system's default web browser. In addition, clicking on an image thumbnail in the detail view will open that single image in your default image viewer (such as Windows Photo Viewer).

Video calls a video viewer for the time of the selected anomaly.

Export saves the current view as an Excel, CSV or HTML file.

The Commit button saves any edits made by the user.

The Min. risk selector filters anomalies to show those at or above the selected risk level.

The Only show newest checkbox filters anomalies to only show the most recent record (by year) for each anomaly.

DataVerse

Anomalies Details

Anomaly: 357 Event: Exposure, Start Risk: 2 III B

Category: EXP Status: Assess Recd. Status: Assess

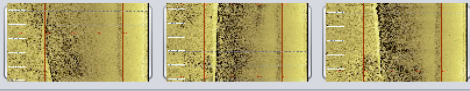
Approver: JGB Approval Date: Review Date: 06/04/2004

Assessor: RAR / EG Assessment Ref: Report Ref: BP04PLN-CTN-00006

Description: Exposure L = 287.8m
Up to 90% exposed.

Assessment: History - Known anomaly. Anomaly 357 reported as circa 155m by the 98 GI, GVI and LFS and the 99 LFS. 00 LFS reported 6 anomalous exposures between KP 1.923 and KP 2.334

Sub.Assess:

Images:  Add

View History Commit Undo

Filename	Event file	Anomaly	Year	Status	Rec.Status	Images
anoms_04.sss	mlr30_04.sss	357	2004	Assess	Assess	3

Visualise Pictures Video Export Close Out Set Risk Status filter: All Rec. Status: All Min. Risk: Only show newest

View History will start another anomaly dialog based on the line selected in the History panel.

Commit will apply user changes to the database but does not save the file.

Pressing the Risk button allows you to set the risk level using the dialog on the right.

Risk Determination

Pipelines Matrix

Rating	E	D	C	B	A
V: Very low	12	9	6	3	1
IV: Low	10	8	5	2	1
III: Medium	9	7	5	2	1
II: High	8	6	4	2	1
I: Very high	8	6	4	2	1

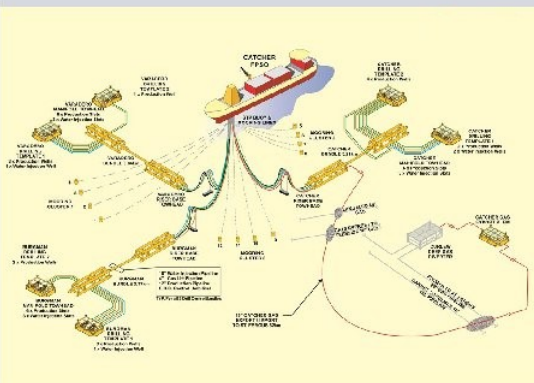
OK Cancel

Anomaly Dashboard

The Dashboard is called from the main screen (when configured) and acts as a front end to highlight anomalies of different status and risk. Sub-areas may be defined, such as a drill centre or export cable. When a cell in either table is selected View Anomalies call the anomaly viewer with the relevant data loaded. From there the video, history and other data can be explored as normal.

DataVerse Dashboard

Back



Location	To be defined	Action	Waiting	Monitor
All	32	2	6	0
Gas export	0	1	0	0
Burgman	6	0	1	0
Varadero	2	1	0	0

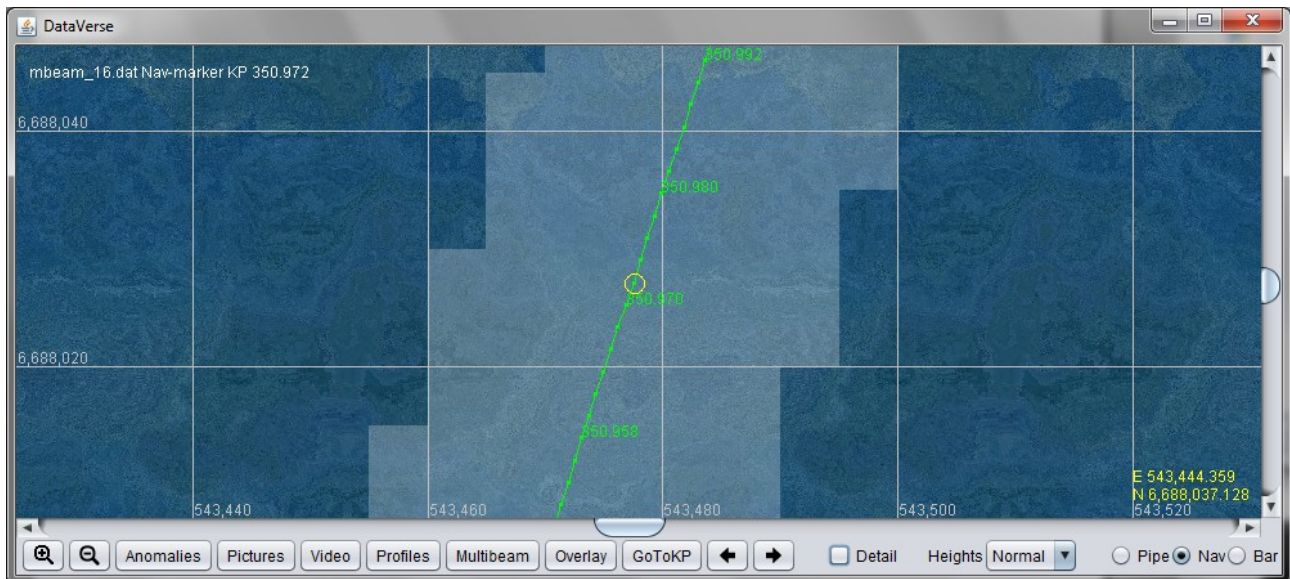
View Anomalies

Location	To be defi...	P5	P4	P3	P2	P1
All	43	0	0	1	1	1
Gas export	0	0	0	1	1	0
Burgman	6	0	0	1	0	0
Varadero	7	0	0	0	0	0

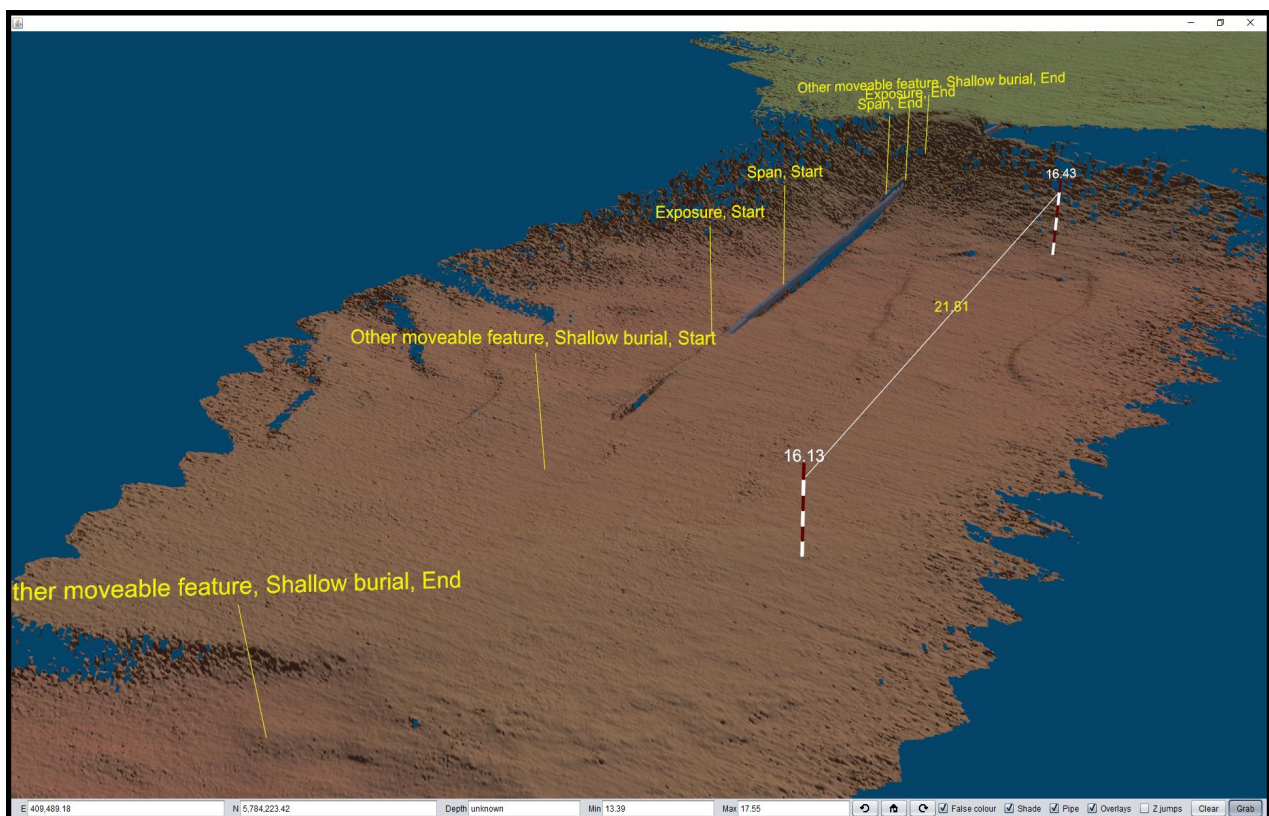
View Anomalies

Multi-Beam Sonar / Digital Terrain Model Viewer

A list of multi-beam / DTM tables is shown on the main screen's Multi-beam data tab. Multi-beam data coverage is shown in the visualiser as transparent light coloured squares.



A viewer for multi-beam sonar data / digital terrain models can be called from the main visualiser by pressing the Multi-beam button. DataVerse will ask for the size in metres of the box to be viewed, default is 100 x 100m. Larger sizes up to 60000 x 60000m are possible depending the density of the data and power of the user's computer. If more than 4,000,000 points are selected the system will reject the selection.



Events will be overlaid based on their E/N co-ordinates. Pipeline top of pipe positions are automatically read from a cross profile file matched to the event file.

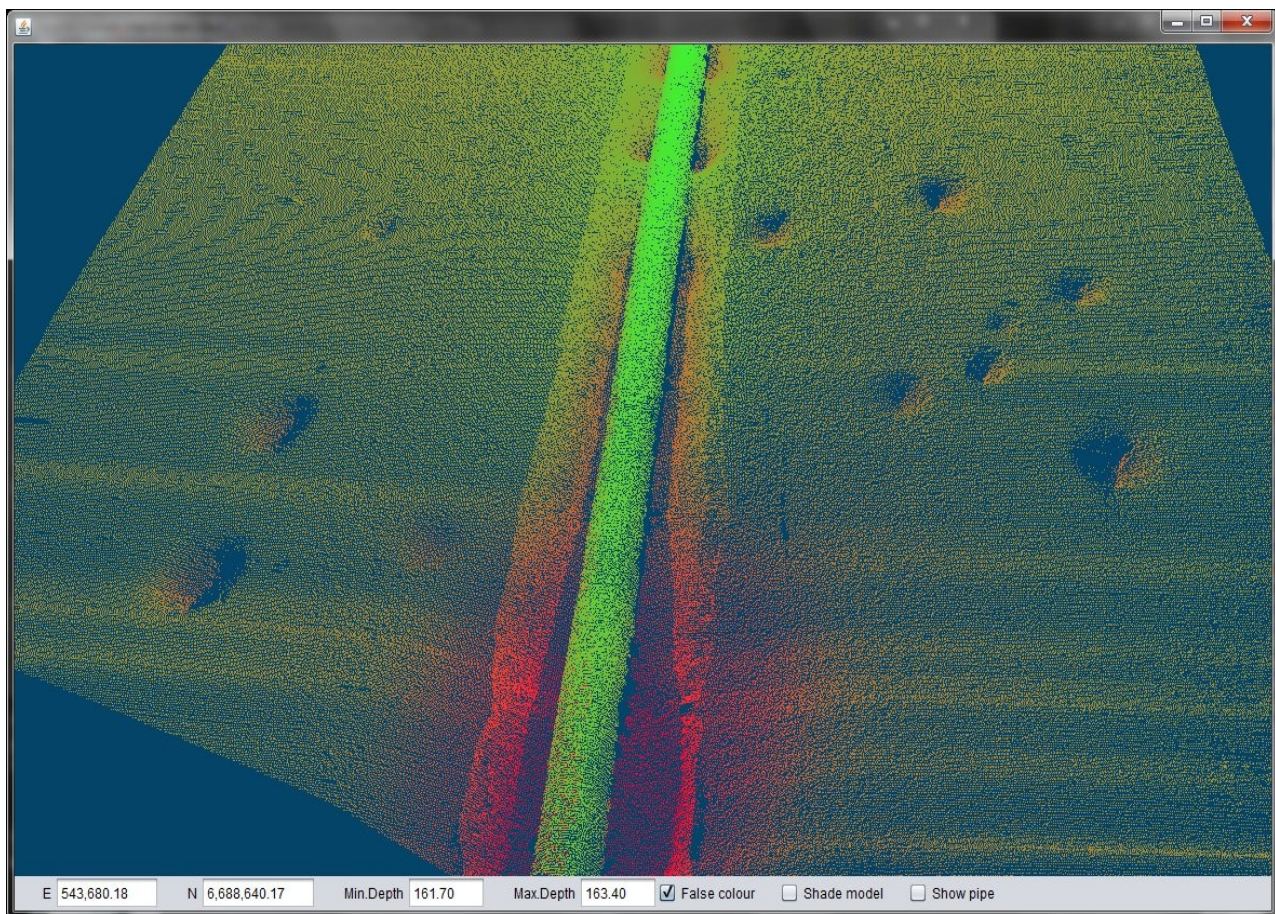
As the mouse is moved over the view E/N and depth information updates based on the model. If the mouse moves to an area with no data “unknown” is displayed for depth.

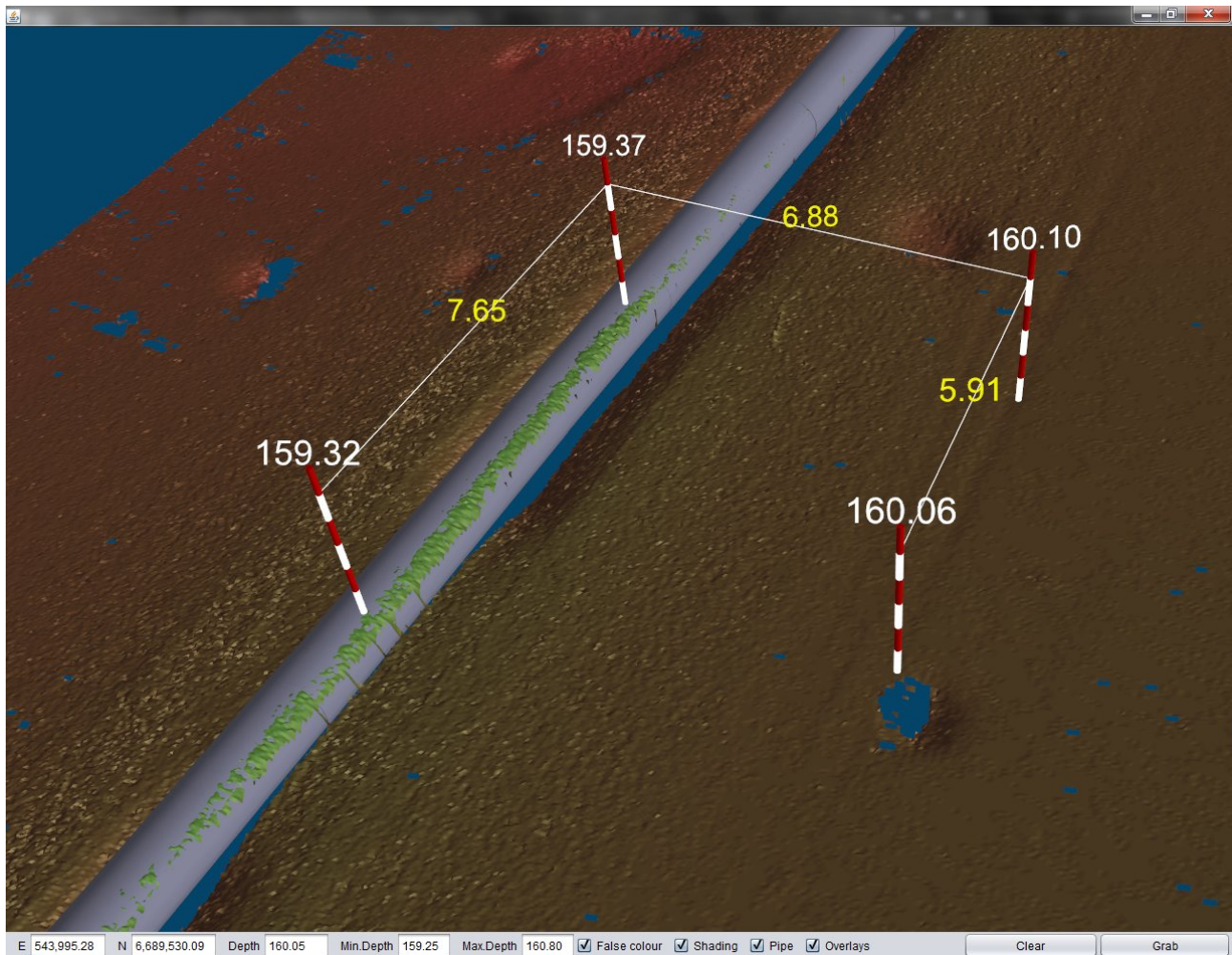
The view may be rotated by dragging the mouse with the left button held down. The thumb wheel controls the zoom of the view. A Grab button is provided to take a screen grab and automatically save it to the desktop.

False colour may be applied to the model with green for shallow values and red for deep. The current section's depth limits are displayed and if manually edited will reset the green/red limits to change the shading as the user desires.

The shaded view groups data points into suitably sized grid boxes and takes the average depth therein. As the raw data is often rounded to the nearest cm and due to the sheer volume of data (1 million points in these 40x40m examples) alternative techniques such as Delaunay triangulation would produce poor representations and be extremely time consuming even on fast computers.

The shaded view may be disabled to show raw data points as below:



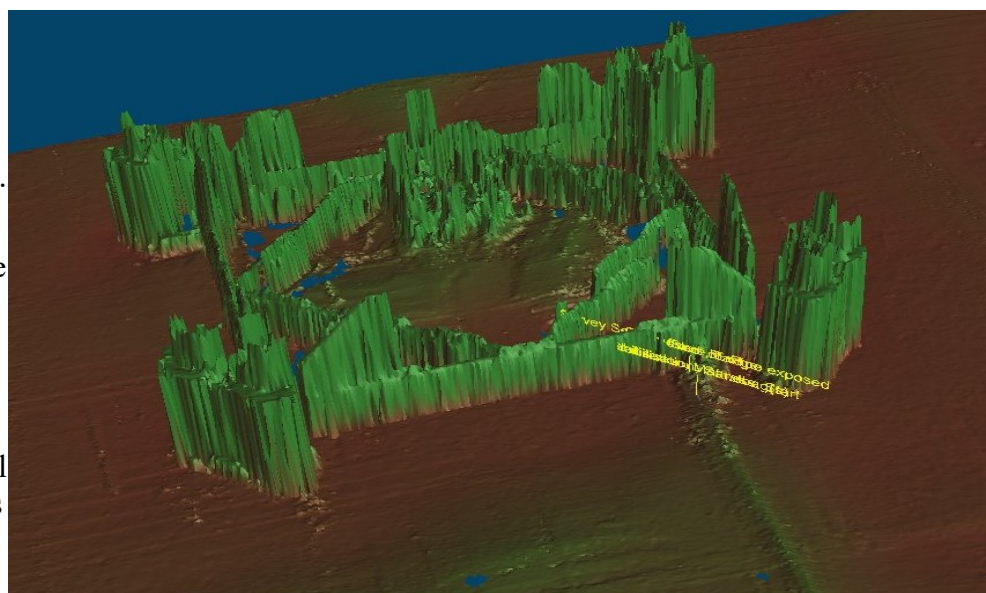


Clicking on the 3D view will add a marker pole if the depth of a point is known. If the depth box on the bottom line says “unknown” a pole won't be added. The pole's depth is shown in white above it. Clicking the Clear button removes all markers. Distance in metres between poles is shown in yellow. As many poles may be added as needed.

The Z-Jumps toggle button at the bottom of the screen allows shading to ignore any depth jumps in the data.

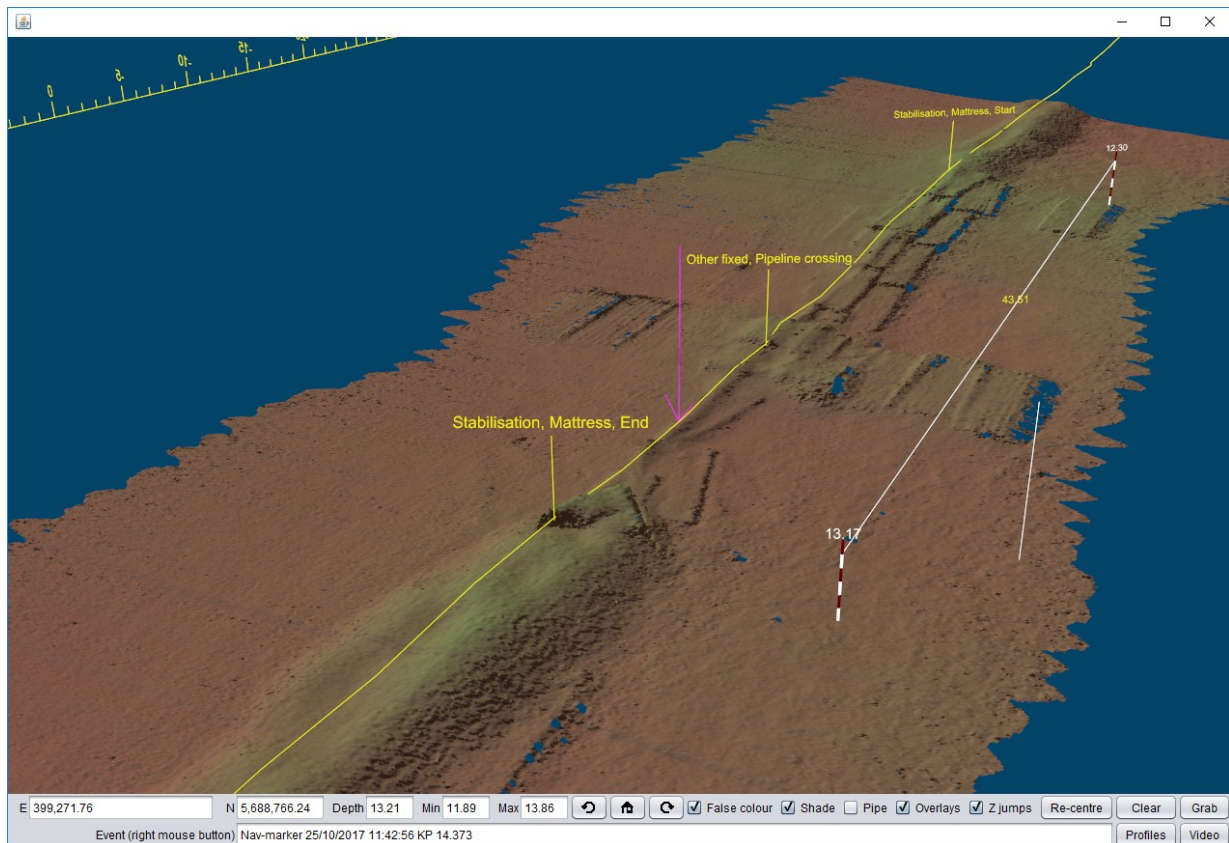
Normally any depth jump over 18cm will be treated as a gap and stop shading.

With Z Jumps enabled depth gaps are ignored. This can produce useful renderings of structures such as the one on the right.



Selecting Events in 3D

Events may be selected by right clicking the mouse near the track of the pipe or cable. The nearest event will be selected and highlighted with a magenta arrow as shown below.



The text box will show the event code, KP, time, anomaly number (if set) and comments.

Pressing Profiles will try to find a cross profile file associated with the event, then call the cross profile viewer. This can be useful to work out the exact start and end KP's of a span.

Pressing Video will launch a video player for the event's time.

Calculating Volumes in 3D

The volume of an object can be easily calculated in DataVerse. First you drop marker poles around the area of interest by clicking the left mouse button. The Clear button removes all markers.

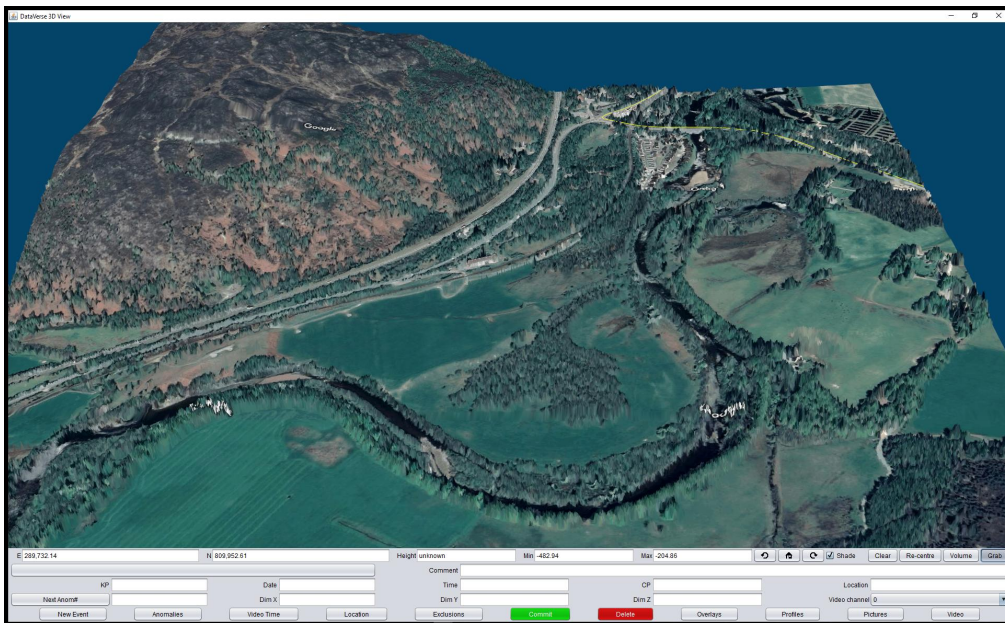
The markers should surround the area and leave a small margin. The software will automatically fill in the final line and close the area.



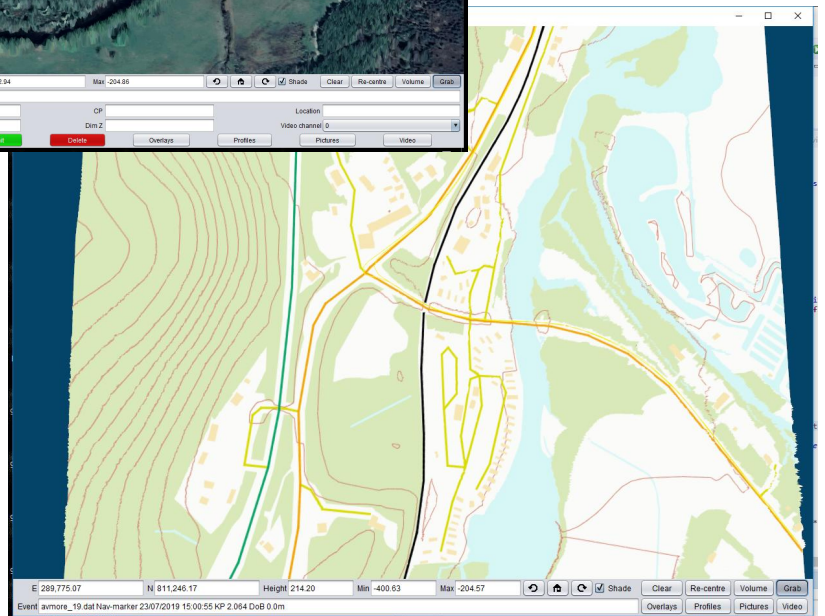
Pressing Volume gives the volume in cubic metres, this will be negative for a hole in the terrain.

Ordnance Survey & Google Maps in 3D

The Overlay dialog can toggle selection of OS and Google maps overlaid on your terrain heights.

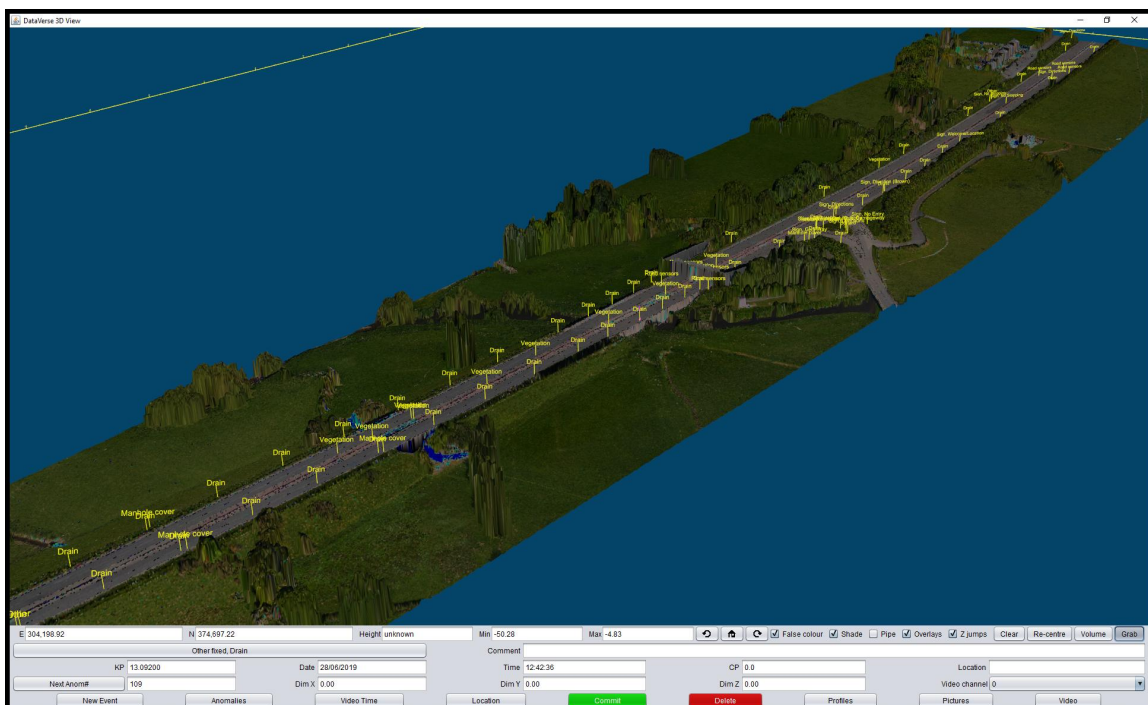


This Google map is overlaid on a LIDAR survey at 1m density provided free by the Scottish Government and imported as a point cloud. The OS map is from the same area and height source.



LAS & Colour DTMs

Some DTM formats contain colour data. DataVerse imports LAS and other formats to support this.

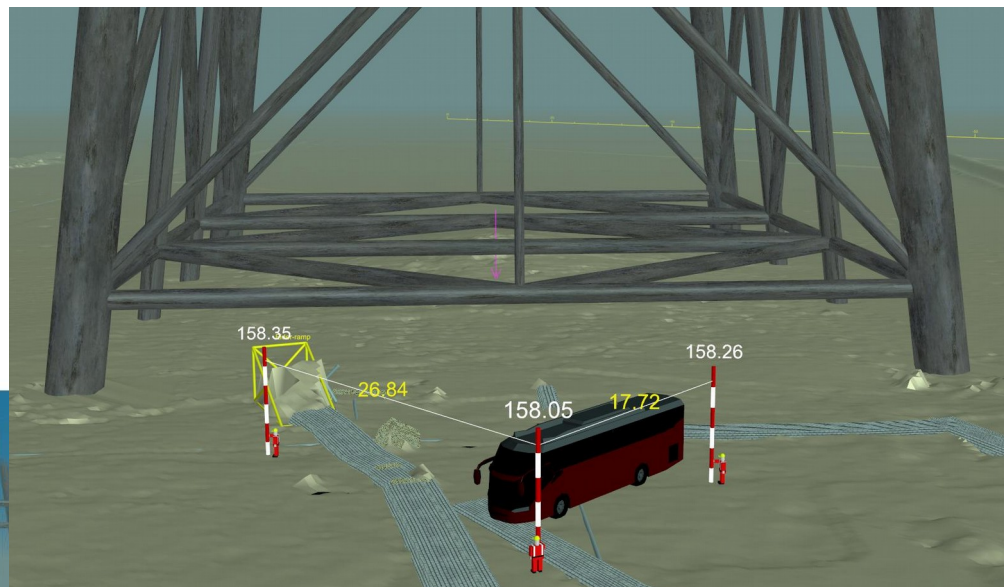
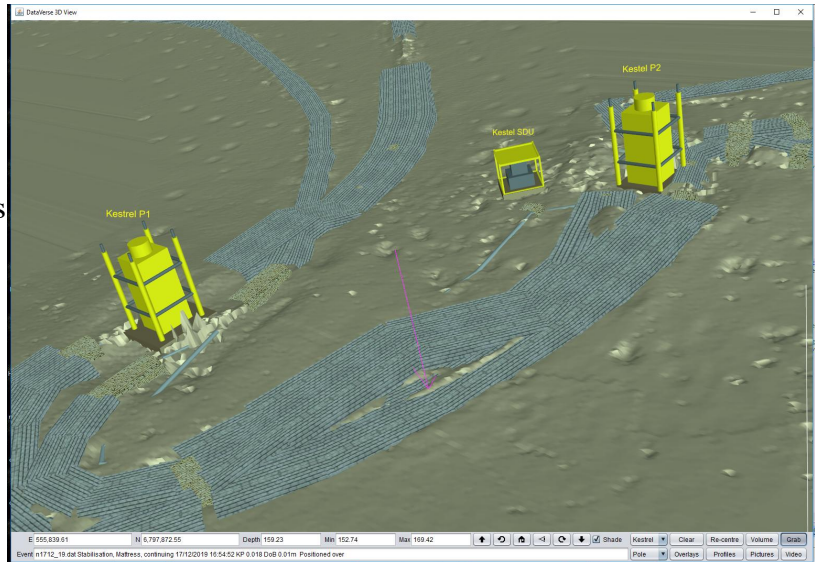


Texture Visualisation Mode

A more realistic view of 3D data is enabled by selecting Texture Mode on the Overlay dialog. This uses bitmap textures to represent mattresses, rock dumps, gravel dumps and other features. Fogging is used to represent the effect of sea water.

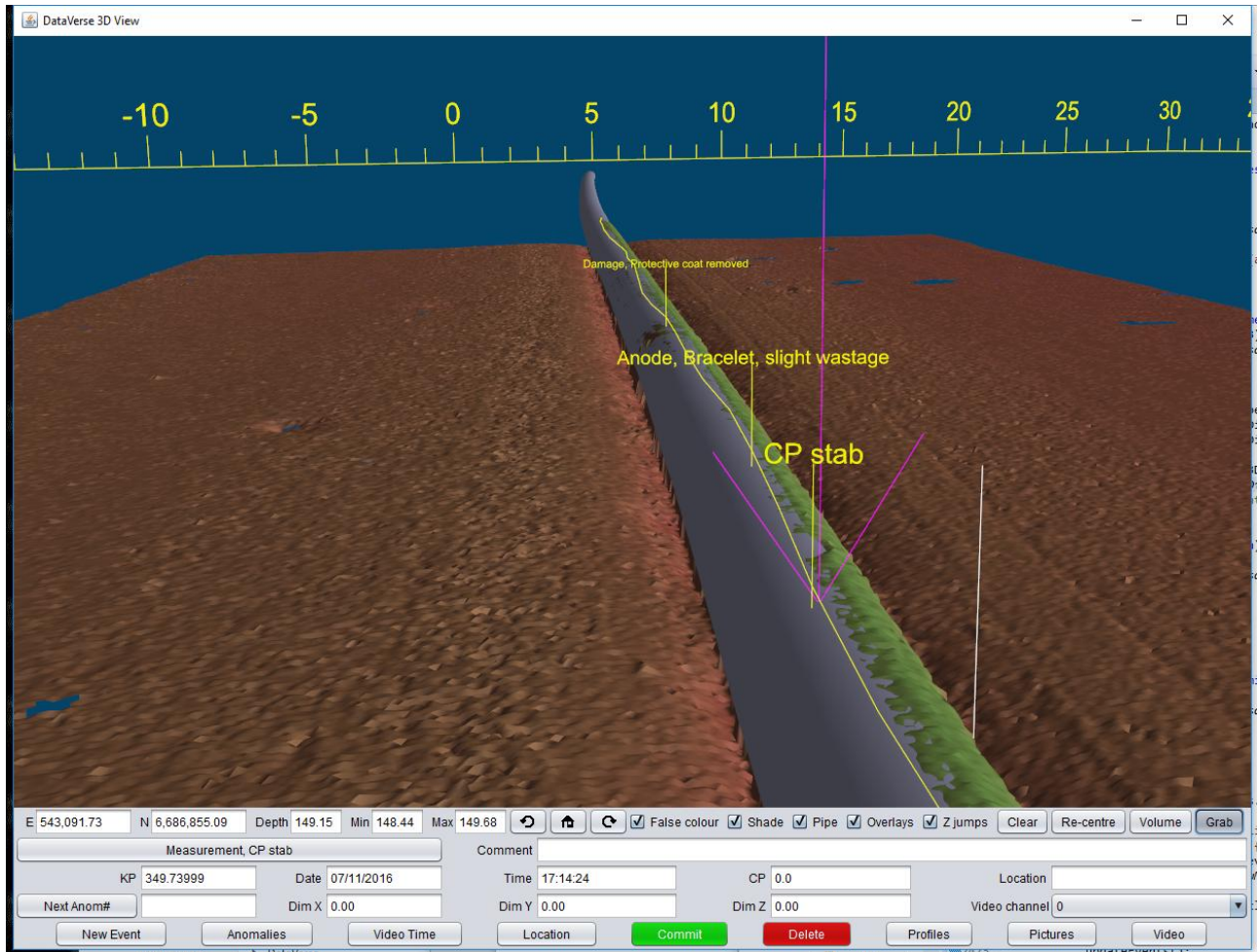
Combined with the addition of 3D structure models it makes an excellent presentation tool.

To add scale to a view Big Ben or a tour bus model may be added to the scene.



Editing Events in 3D

It is possible to edit and create new events in the 3D viewer. Select survey edit mode on the main screen and view the multibeam model as normal from the Visualiser. The screen will now have editing controls and data fields as shown below.



Events are selected by right clicking near them, they will be highlighted with a magenta 3D arrow. Once selected you can edit the event's text fields. To change it's 3D location click Location then click on the 3D model with the left button. Changes should be saved using the Commit button.

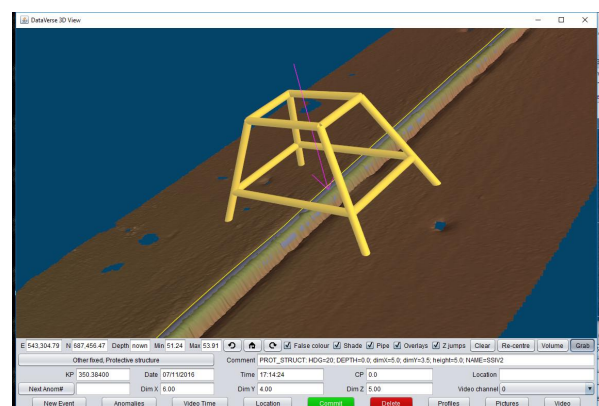
Other editing buttons have the same functions as described on the 2D and structural eventing screens.

Adding Stock Structures to 3D Worlds

A comment on an event of the form:

PROT_STRUCT: HDG=30; DEPTH=-0.9; dimX=5.0;
dimY=3.5; height=5.0; NAME=SSIV

Will add a protective structure at a heading of 30 degrees, 5x3.5m (top section, double at base), 5m tall called SSIV. This will also be shown as an outline on



the navigation Visualiser.

The DEPTH term is an offset in metres to make it align nicely with the seabed.

Importing Multi-Beam Data

Originally DataVerse used SQL to store multi-beam, for now this is maintained as legacy support. SQL has been superseded with a file storage method which is much faster and removes the need for an SQL server to be installed.

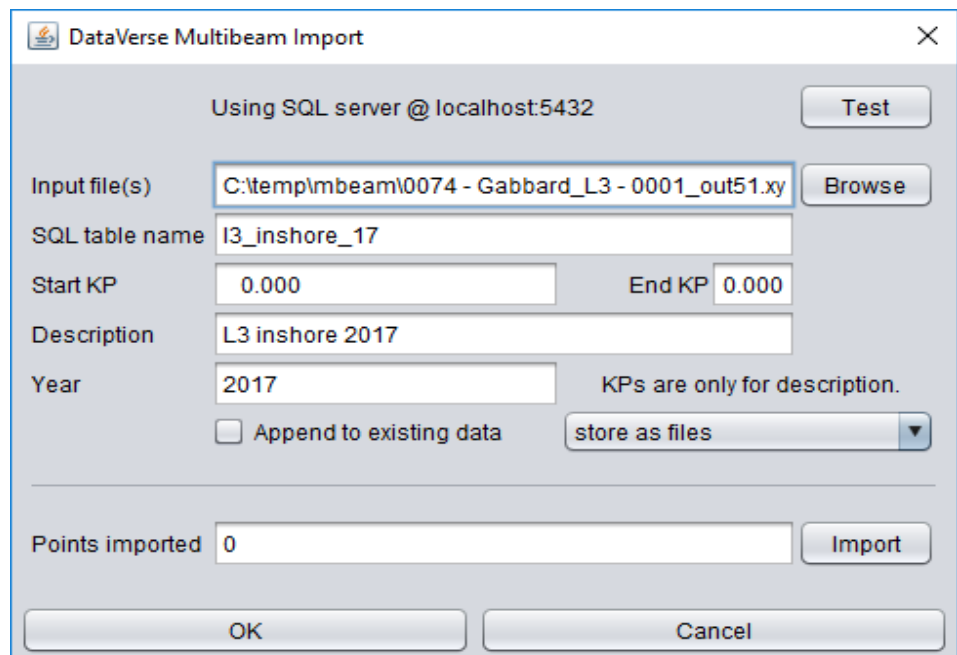
Loading multi-beam point cloud files is accomplished by means of the screen shown below. Point cloud files should be of the format; Easting, Northing, Depth using just a single space as the column separator. LAS files are also supported, with or without colour.

Multiple input files may be selected for input and combined into a single DTM.

The KP and description will appear on the main screen's data selector panel, they have no other affect.

Once Import is pressed the number of lines read will update continuously.

For SQL the data will be indexed after it's been read, this can be quite time consuming and may take as long as it took to parse the file so don't be alarmed if the program appears to stall after giving an "indexing" progress message.



The screenshot shows the 'DataVerse Multibeam Import' dialog box. At the top, it says 'Using SQL server @ localhost:5432' with a 'Test' button. Below this are several input fields: 'Input file(s)' with a text box containing 'C:\temp\lmbear\0074 - Gabbard_L3 - 0001_out51.xy' and a 'Browse' button; 'SQL table name' with a text box containing 'l3_inshore_17'; 'Start KP' and 'End KP' both with text boxes containing '0.000'; 'Description' with a text box containing 'L3 inshore 2017'; and 'Year' with a text box containing '2017'. There is also a checkbox for 'Append to existing data' which is unchecked, and a dropdown menu for 'store as files' which is currently selected. At the bottom, there is a 'Points imported' text box showing '0' and an 'Import' button. The dialog box has 'OK' and 'Cancel' buttons at the very bottom.

The "Append to existing table" function will add the new data to a current table.

The option "store as files" or "store as SQL" allows selection of the destination. The new "files" option is the preferred choice. SQL and file system data may exist side by side for users with older data.

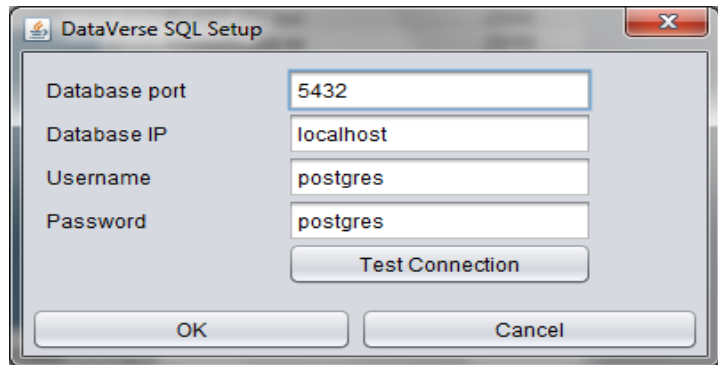
Multibeam File Storage

File storage creates a directory and stores data in chunks within it. For details see the technical manual. This method is far faster than SQL. SQL is only retained for legacy reasons and should not be used now. The chunk size goes from 10x10m for dense data up to several km for very sparse data.

SQL (Deprecated)

To configure the connection between Postgres SQL and DataVerse this screen is used. The fields required are the database port number and IP address along with its user name and password.

The Test Connection button will verify the credentials and give a meaningful error message if a fault is detected.

A screenshot of the 'DataVerse SQL Setup' dialog box. It contains four text input fields: 'Database port' with the value '5432', 'Database IP' with 'localhost', 'Username' with 'postgres', and 'Password' with 'postgres'. Below these fields is a 'Test Connection' button. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

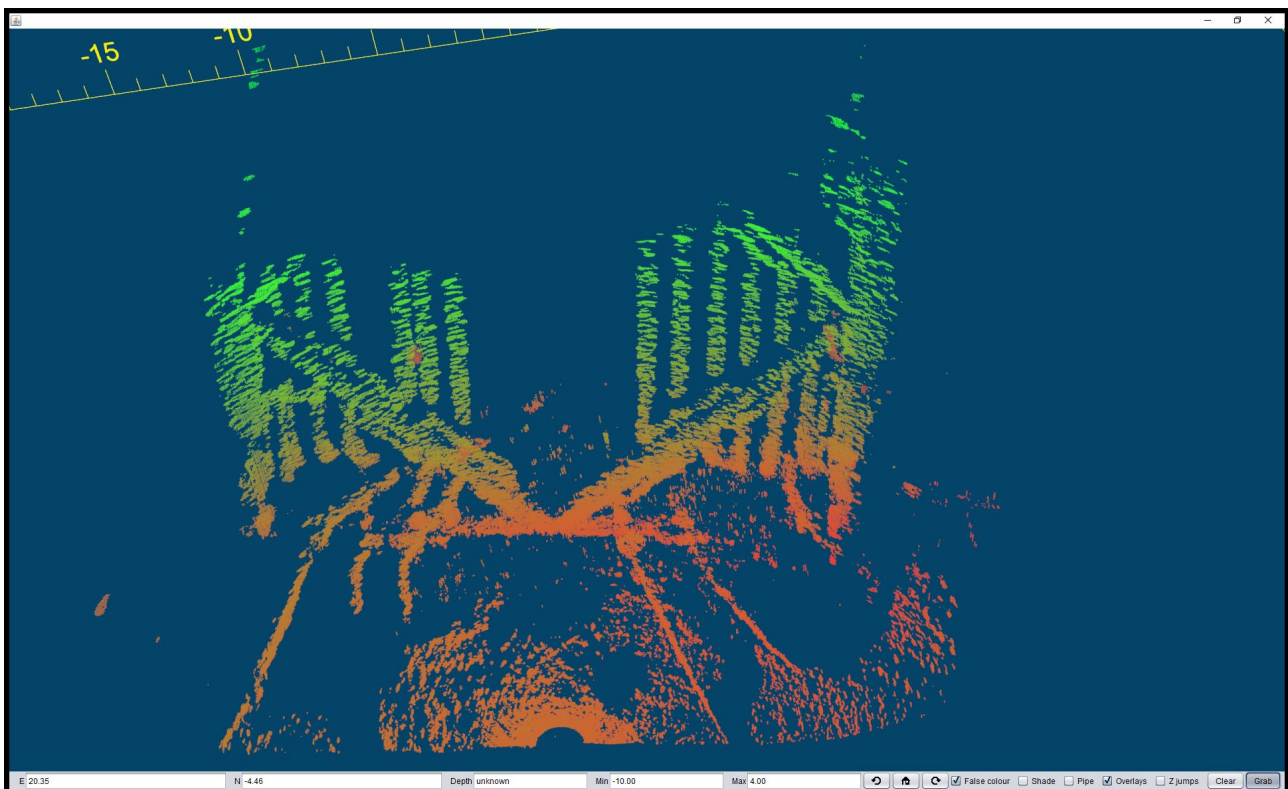
A dedicated SQL server may be provided by your IT department, but some users with more powerful PCs have just added a large (say 4Tb) disc and installed Postgres locally. The latter approach is faster as the office network isn't a bottleneck. An SSD will work much faster.

Viewing BlueView Data

BlueView is stored in the same directory structure as Multibeam, for details see the technical manual. Files do not need to be imported as DataVerse uses the standard four column BlueView ASCII format.

All that is needed to import them is to create the directory and copy the file in place (one per directory). When DataVerse is restarted it will automatically find them and show them in the multibeam tab.

To view a BlueView file select it from the multibeam tab and make it the only selected file in the right hand menu, then click Visualise. It will display in the multibeam viewer as below:



The shading option has little merit on BlueView data at present and should not be used.

Data QC Tool

DataVerse has a powerful and easy to use QC facility which is available from the main menu. Events, KP line files and cross profiles may all be checked at the same time. So a complete deliverable package can be checked with one button click.

The screenshot shows the 'DataVerse' application window with the 'Setup' tab selected. The window is divided into several sections for configuring quality control parameters:

- Event Parameters:**
 - Max. KP gap: 20.0 m
 - Max. nav velocity: 5.0 m/s
 - Max. bathy jump: 10.0 m
 - ☒ Do mandatory field checks
 - ☐ Check for missing anomaly pictures
 - Codes Setup
- KP File Parameters:**
 - KP vs E/N dist. tolerance: 5.0 %
- Cross Profile Parameters:**
 - Max. KP gap: 3.0 m
 - Max. depth of bury: 7.0 m
 - Max. ToP depth change: 0.1 m
 - Min. points per scan: 120
 - ☒ Check scan dat vs edited points (time consuming)
- Video File Parameters:**
 - ☒ Check video coverage of selected event files by time
 - ☒ Any camera
 - ☐ Port camera
 - ☐ Centre camera
 - ☐ Starboard camera
 - Video quality to check for: Any definition (dropdown menu) (videos should contain SD or HD in filename for this work)
 - ☐ Check video files exist on disc

At the bottom, there are buttons for 'Export', 'View', and 'Execute'.

A list of all the checks performed may be found in the technical manual. Only those which require user input appear on the Setup pane. All values are saved in the Windows registry for future use.

The Codes Setup button loads a spread sheet with the mandatory codes file. If checking is enabled this spread sheet is used as the template. Every possible event code must be listed on the left, columns are listed along the top. For a given event code a column may be mandatory (0, green), optional (1, yellow) or must be empty (2, red).

	D	E	F	G	H	I	J	K	L	M	N	O
	Name	DateTime	Position	KP	End KP	Side of pipe	Distance	DimX	DimY	DimZ	Span Len	Span Hc
4	Field Joint	0	0	0	1	2	2	2	2	2	2	2
5	Stabilisation	0	0	0	1	2	2	1	1	1	1	2
6	Other fixed	0	0	0	1	1	1	1	1	1	1	2
7	Damage	0	0	0	1	1	2	1	1	1	1	2
8	Debris	0	0	0	1	2	1	1	1	1	1	2
9	Exposure	0	0	0	1	2	2	1	1	1	1	2
10	Span	0	0	0	1	2	2	1	1	1	1	0
11	Movement	0	0	0	1	2	2	1	1	1	1	2
12	Other moveable feature	0	0	0	1	1	1	1	1	1	1	2
13	Weightcoat missing	0	0	0	1	1	2	1	1	1	1	2
14	Survey Section	0	0	0	1	2	2	1	2	2	2	2
15	Video	0	0	0	1	2	2	1	2	2	2	2
16	As built difference	0	0	0	1	1	1	1	1	1	1	2
17	Condition	0	0	0	1	1	1	1	1	1	1	2

Video QC ensures that video exists to cover the time range of all events which have been QC'd. The user may select the cameras and video quality required. The “check files exist” option make sure any files in the video index actually exist on disc.

In future a facility may be added to enforce numeric limits on certain field and code combinations.

Execute starts the QC process and a progress bar will appear, this is usually fairly fast and takes seconds.

Type	Filename	KP	Event code	Error
Events	mlr30_02.dat	5.5226	Survey Section, Start of	Depth is mandatory but blank
Events	mlr30_02.dat	5.5226	Video, Start	Bathy difference 44.000m
Events	mlr30_02.dat	5.5226	Exposure, Start	Depth is mandatory but blank
Events	mlr30_02.dat	5.5226	Exposure, Start	Bathy difference 44.000m
Events	mlr30_02.dat	5.5236	Field Joint, Normal	Bathy difference 44.020m
Events	mlr30_02.dat	8.423	Video, Start	Two start events in a row
Events	mlr30_02.dat	8.4233	Video, End	KP difference and dimX disagree in event pair
Events	mlr30_02.dat	8.5395	Exposure, Anomalous Start	Depth is mandatory but blank
Events	mlr30_02.dat	8.5395	Exposure, Anomalous Start	Bathy difference 54.990m
Events	mlr30_02.dat	8.5507	Field Joint, Normal	Bathy difference 54.700m
Events	mlr30_02.dat	8.6234	Exposure, Anomalous End	Depth is mandatory but blank
Events	mlr30_02.dat	8.6234	Exposure, Anomalous End	Bathy difference 55.370m
Events	mlr30_02.dat	8.6245	Field Joint, Normal	Bathy difference 55.140m
Events	mlr30_02.dat	9.1068	Video, End	Two end events in a row
Events	mlr30_02.dat	9.1068	Exposure, End	Depth is mandatory but blank
Events	mlr30_02.dat	9.1068	Exposure, End	Bathy difference 56.250m
Events	mlr30_02.dat	9.1068	Survey Section, End of	Depth is mandatory but blank
Events	mlr30_02.dat	239.4727	Survey Section, Start of	KP gap 230,365.906m
Events	mlr30_02.dat	239.4799	Anode, Bracelet, slight wast...	No time difference for 4 records

QC failures appear on the results pane along with a reason for the non-conformance and a location.

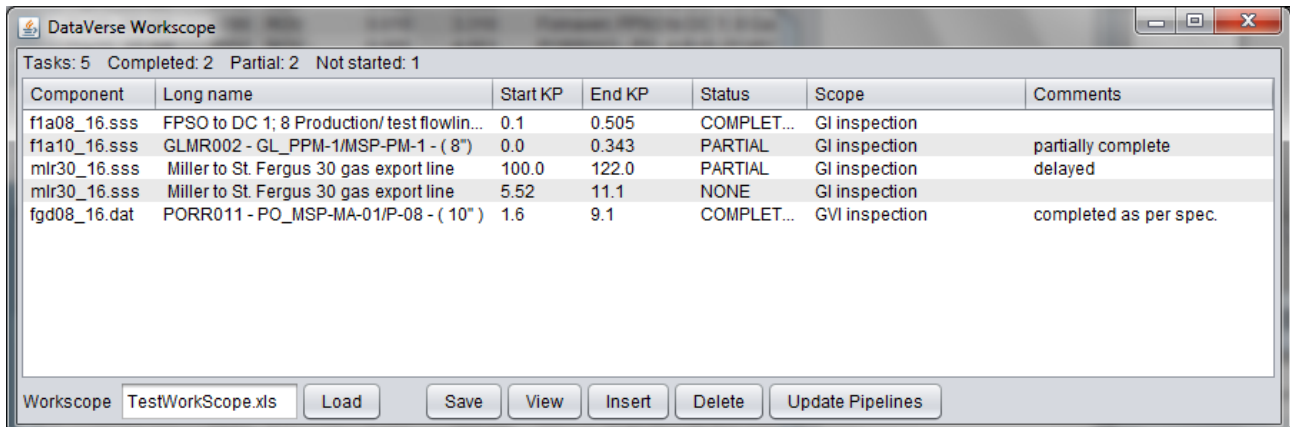
The View button will open a visualiser for the selected failure. This may be an event, KP line file or cross profile. For video QC see the appendix on future work.

The Export button saves all QC failures as an Excel, CSV or HTML file.

A client rep. could select the required files on the main menu and press QC to start the dialog. Then press Execute followed by Export to create a failures list for the survey contractor. A very fast, simple and audit-able process.

Work Scopes

Work scopes are used to indicate which sections of a pipeline or elements on a structure are to be inspected. The data is saved in an Excel format spreadsheet located in the \workscope\<asset name> directory so may be edited outside of DataVerse or by using the dialog below. To edit the data you need to select the Survey Edit access level.



The DataVerse Workscope dialog box displays a table of work tasks and their status. The table has columns for Component, Long name, Start KP, End KP, Status, Scope, and Comments. Below the table are buttons for Load, Save, View, Insert, Delete, and Update Pipelines. The current workscope file is TestWorkScope.xls.

Component	Long name	Start KP	End KP	Status	Scope	Comments
f1a08_16.sss	FPSO to DC 1; 8 Production/ test flowlin...	0.1	0.505	COMPLET...	GI inspection	
f1a10_16.sss	GLMR002 - GL_PPM-1/MSP-PM-1 - (8")	0.0	0.343	PARTIAL	GI inspection	partially complete
mlr30_16.sss	Miller to St. Fergus 30 gas export line	100.0	122.0	PARTIAL	GI inspection	delayed
mlr30_16.sss	Miller to St. Fergus 30 gas export line	5.52	11.1	NONE	GI inspection	
fgd08_16.dat	PORR011 - PO_MSP-MA-01/P-08 - (10")	1.6	9.1	COMPLET...	GVI inspection	completed as per spec.

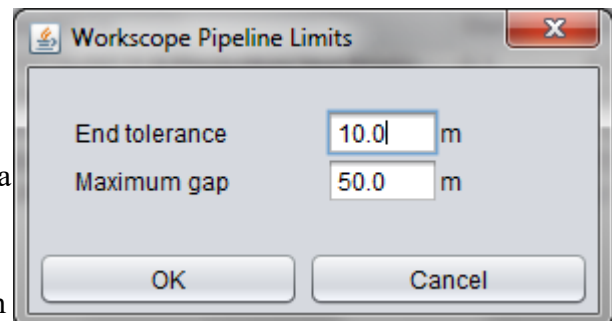
Firstly data must be loaded using the load button. Only one work scope may be loaded at a time and once selected it will also appear in structural eventing screens. The View button will call a pipeline or structural visualiser for the selected work task.

The Update Pipelines button will compare the work scope to the relevant event files. The user will be asked to input the end tolerance, this is the distance in metres within which events must exist at the start or end of a survey section. There may be no gaps in a survey section larger than that specified by the maximum gap field.

A section is deemed completed if it has data between the start and end KP, has no gaps larger than the user's criteria and has events within tolerance of the section ends. If it has data within the start / end KP range but fails the tolerance or gap checks it will be marked as partially complete.

Running "update pipelines" will overwrite any manual changes to the work scope status.

Structural data can be marked as complete using the work scope button on the structural data visualiser. In this case the dialog only shows data for the structure being edited.



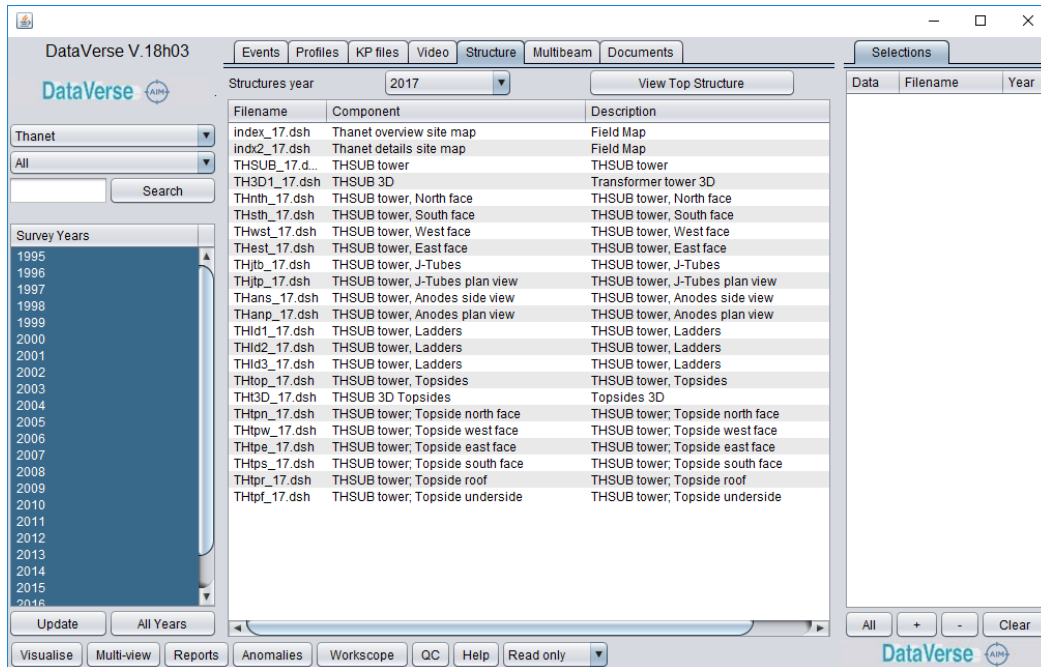
The Workscope Pipeline Limits dialog box allows the user to set the end tolerance and maximum gap for the work scope. The end tolerance is set to 10.0 m and the maximum gap is set to 50.0 m. The dialog has OK and Cancel buttons.

End tolerance	10.0	m
Maximum gap	50.0	m

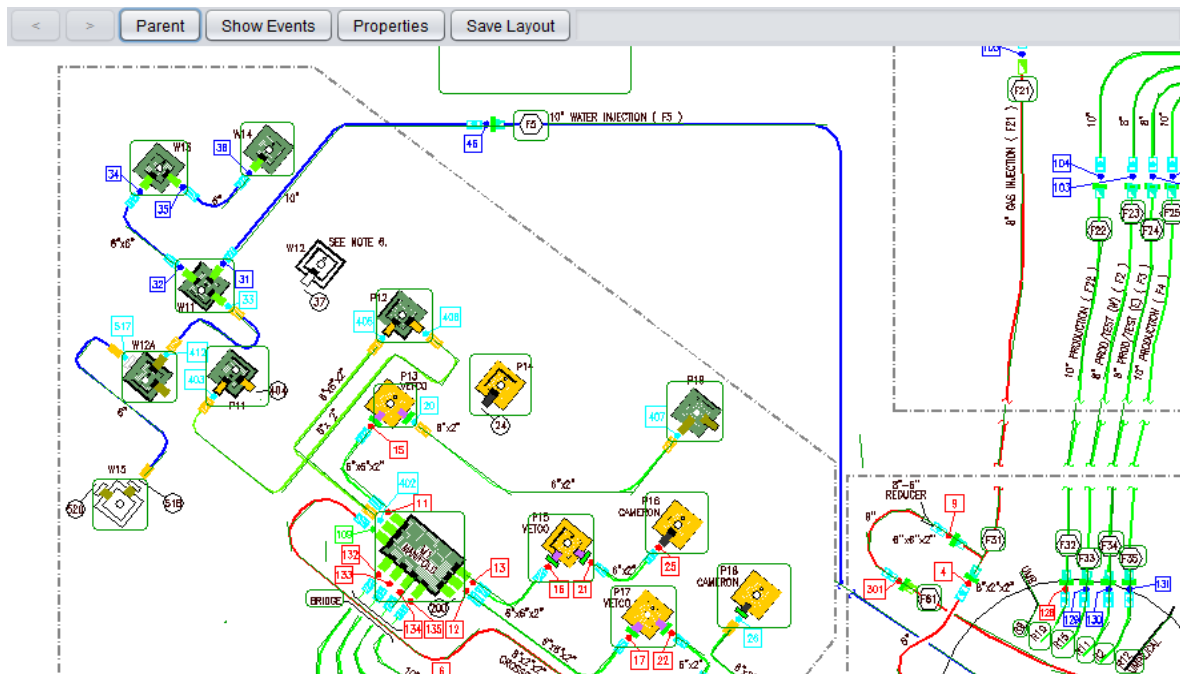
Structural Inspection

Structural inspection in DataVerse is based around the concept of a tree structure of drawings linked by hyperlinks in the same way as a website. The Structures pane on the main screen shows a list of drawings which may be filtered and selected in the same way as normal event / pipeline files. These may be viewed in the report generator, the anomaly screen or visualised in a structural viewer.

There should be one complete set of drawings and event files per year. This is to take account of changes to field layouts over time as new components are added or modified. Surveys in a given year become a baseline for following years ensuring continuity and making anomaly numbers easy to follow over time. A year end facility automates the generation of a new year's baseline.



The top level drawing is called the index, it may be viewed quickly (to save searching in a large data set) by selecting the master survey year and pressing View Top Structure. The index is normally a field map as shown below.



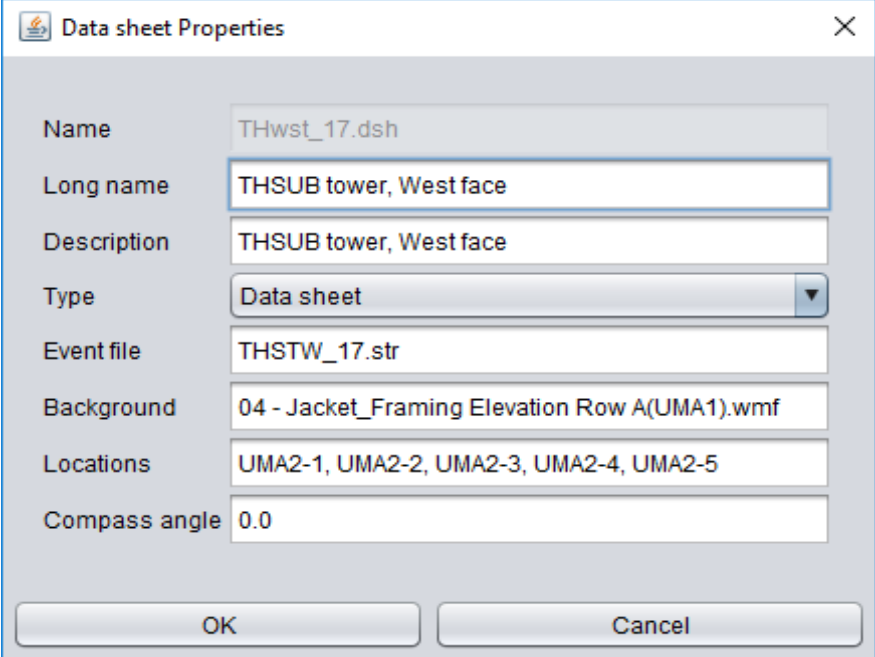
In a data sheet the background CAD drawing (which may be a photograph or scanned bitmap if a CAD file is unavailable) is overlaid by hyperlinks. These links may be rectangular, circular or straight lines if they go to a pipeline or cable. Icons may also be placed as hyperlinks with bitmaps of the users choice.

The drawing may be dragged by holding down the left mouse button or zoomed using the mouse thumb wheel.

The properties button on a data sheet shows the dialog on the right.

In edit mode this is used to set the background drawing, event file name and description.

Several data sheets may share the same event file. For example a well head may have drawings for each face plus a plan view and flanges but all refer to the same event file.



The 'Data sheet Properties' dialog box contains the following fields:

Field	Value
Name	THwst_17.dsh
Long name	THSUB tower, West face
Description	THSUB tower, West face
Type	Data sheet
Event file	THSTW_17.str
Background	04 - Jacket_Framing Elevation Row A(UMA1).wmf
Locations	UMA2-1, UMA2-2, UMA2-3, UMA2-4, UMA2-5
Compass angle	0.0

Buttons: OK, Cancel

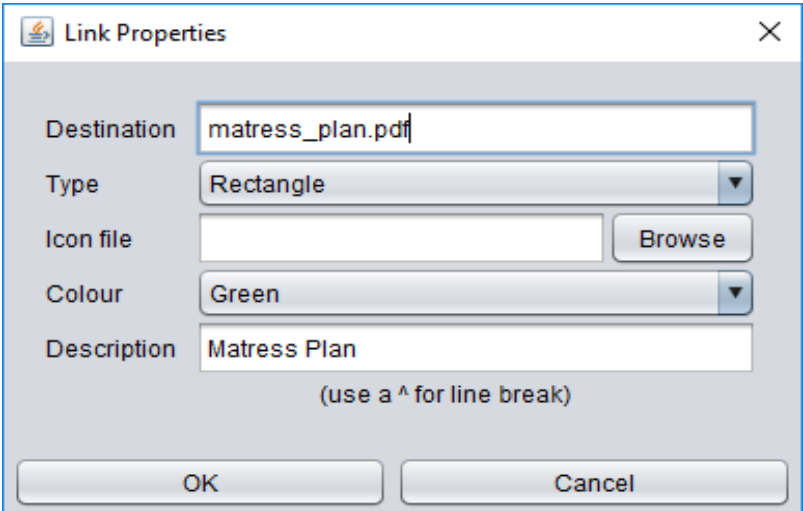
Hyperlinks

Hyperlinks between data sheets have the properties shown in this dialog.

The destination can be another data sheet or an event file. It could also be a spreadsheet, PDF or any other type of file.

If it's a file DataVerse asks the operating system to open the document with it's default handler (such as Excel). This is useful to link documentation to your data sheet.

Line breaks may be inserted in the description using the ^ character.



The 'Link Properties' dialog box contains the following fields:

Field	Value
Destination	matress_plan.pdf
Type	Rectangle
Icon file	[Empty field] Browse
Colour	Green
Description	Matress Plan (use a ^ for line break)

Buttons: OK, Cancel

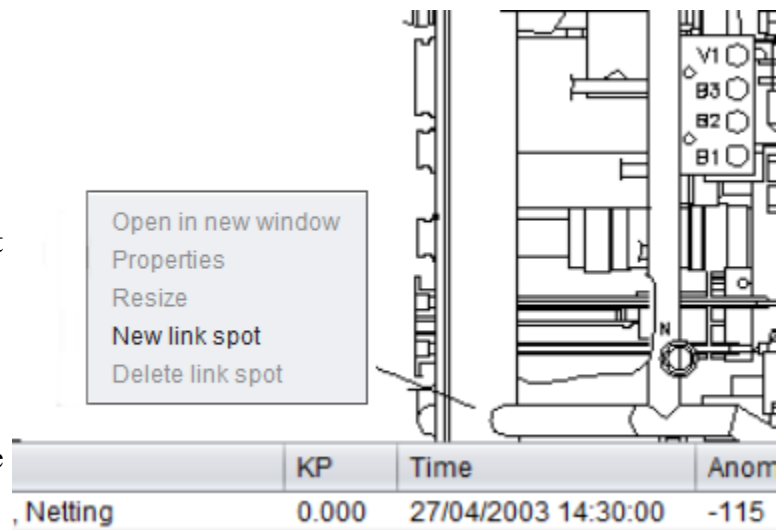
If a destination is of the format `directory:<directory>` it will open Windows Explorer at `<codebase>\images\<asset>\<year>\structs\<directory>`

This is useful for linking a page of image thumbnails for example.

Right clicking on a drawing reveals the popup menu shown on the right. If used to create a “New link spot” the properties dialog is shown. After OK is pressed on the dialog the user clicks the drawing to set the start of the line / rectangle / circle then clicks again to set the end point to the desired shape.

In a similar manner existing links may be resized.

If the right button is clicked over an existing hyperlink its properties may be viewed or it may be deleted.



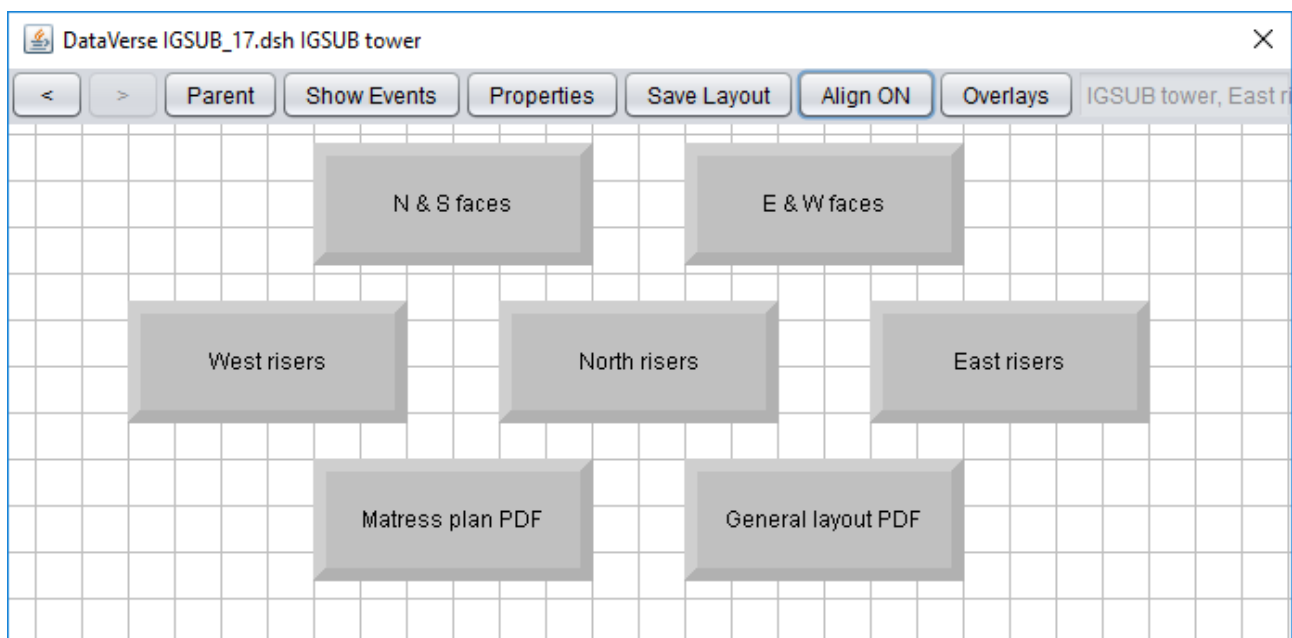
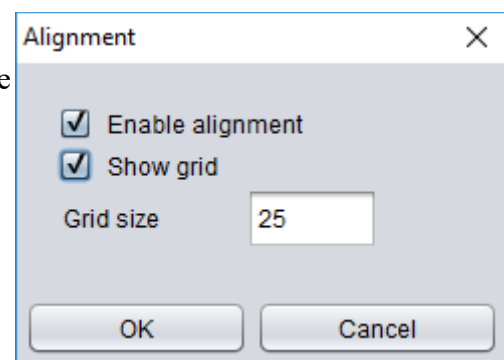
Links may be opened in a new window (just as in a web browser) by right clicking the link and selecting “Open in a new window”.

The Label style just draws a textual label on screen, there is no destination link. It will scale its font to fit the width indicated by the user when it was created.

The Save Layout buttons save data sheet properties and hyperlink settings. **It does not save events.**

Aligning Link Spots

In edit mode an Align button is shown in the top menu bar. Pressing it launches the Alignment dialog which controls the display of an alignment grid, the size of the grid cells and whether creating or moving link spots makes the end points snap to the grid. Alignment makes it much easier to create buttons groups.



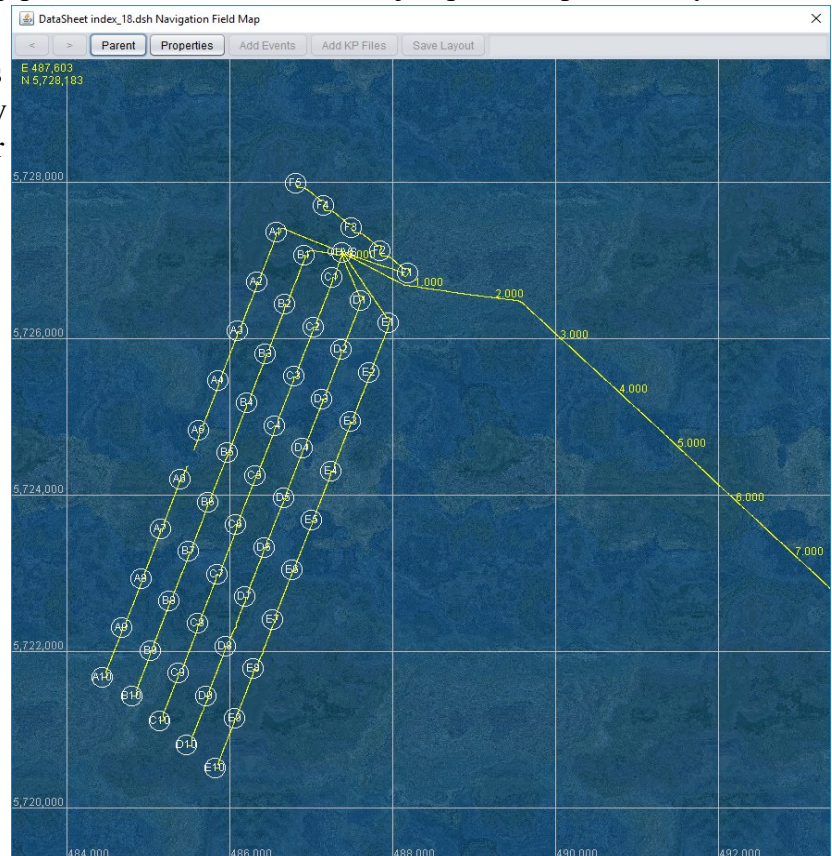
Navigational Data Sheets

When a data sheet is created the link on the properties dialog may be set to “Navigation screen”. In this case the background is made up of KP files (in green) and event files (in yellow). These have properties which can be set to link to pipeline files or data sheets for jumpers. Properties may be changed by right clicking on the file.

As is the case with normal data sheets rectangular or circular hyperlinks may be created to link to other drawings or documents and icons of the user's choice may be placed anywhere on the screen.

This screen is useful as an alternative to or a complement to a field map drawing.

If event file comments have references to 2D or 3D data sheets these will be automatically imported and displayed as links to the relevant data sheets. This is described in detail in the section “Linking Events & Structures”.



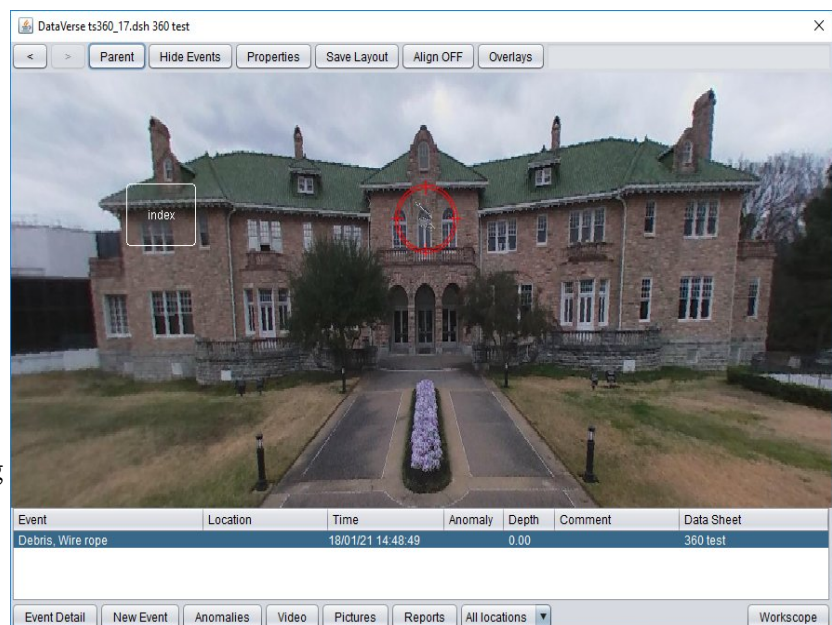
360 Degree Data Sheets

Images from 360 cameras may be included in DataVerse in much the same manner as a 2D DataSheet based on a bitmap or CAD file.

These data sheets have the same support for event location icons and hyperlinks to other data sheets or documents. Right clicking brings up the same menu as the 2D viewer.

Hyperlinks may be used to create a “walk through” of a survey by linking multiple 360 data sheets.

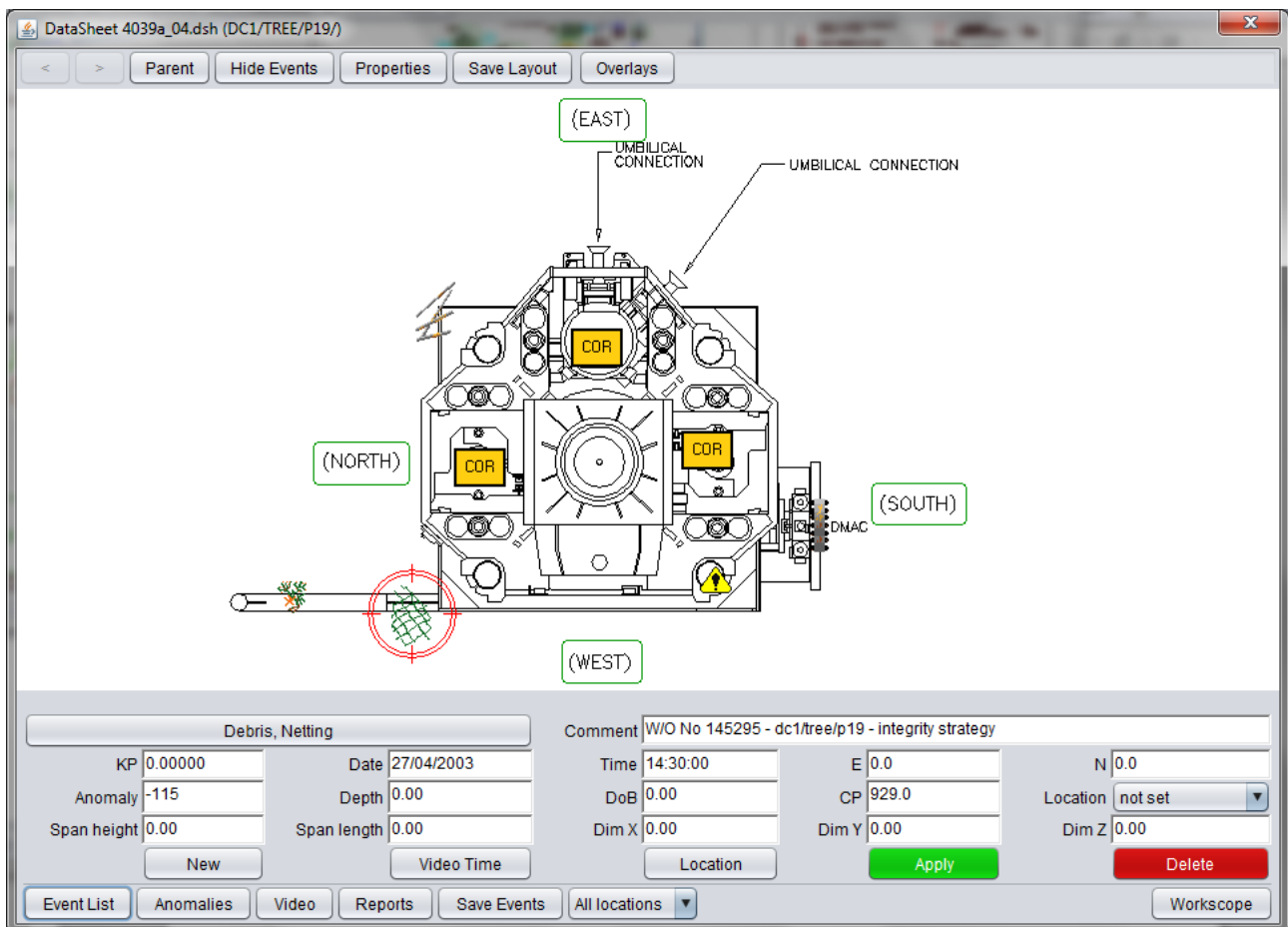
When you click on an icon in the event table the screen will rotate to centre the selected event's icon.



The 360 degree image is rotated in bearing and elevation by dragging with the left mouse button. The mouse thumbwheel controls the zoom factor.

Data Sheets and Events

Data sheets are associated with an event file. Several data sheets can share the same event file, for example if they are different views of the same structure.



The Event List / Event Details button flips the display between showing data for one event or all events in the data sheet's event file. Double clicking on an event in the list view will call it's detail view. The Hide / Show Events button can toggle this pane to give more space for the drawing. The event list may be sorted by clicking in the column headers.

Event	KP	Time	Anomaly	Depth	Comment
Debris, Netting	0.000	27/04/2003 14:30:00	-115	0.00	W/O No 145295 - dc1/tree/p19 - integrity strategy
Debris, Metalwork	0.000	29/02/2004 19:29:00	-252	0.00	W/O no 159524 DC-1/trees/P19/Dmac/P19-P13 GVI
Other fixed, Flange	0.000	01/03/2004 08:45:00	-251	0.00	W/O No 159525 DC1/Tree/P19/Dmac/P19-P13 CP survey
Condition, Corrosion	0.000	29/02/2004 19:29:00	2370	0.00	w/o 159524 - DC1/Tree/P19/Dmac/P19-P13 anomaly investigation
Damage, Leak	0.000	20/08/2003 07:05:40	2359	0.00	Leak on SCM observed - level 1
Condition, Corrosion	0.000	27/04/2003 14:49:00	2442	0.00	W/O No 145295 - dc1/tree/019 - new anomaly - staining to nuts on PCV
Condition, Corrosion	0.000	27/04/2003 14:45:00	2441	0.00	W/O No 145295 - dc1/tree/p19 - new anomaly - staining to SCM retlock
Condition, Corrosion	0.000	09/08/2005 05:09:00	2440	0.00	W/O No 145295 dc1/tree/p19 - new anomaly - staining to nuts on ACV
Marine growth, Hard, 75-1...	0.000	27/04/2003 14:52:00	-116	0.00	W/O 145058 - dc1/tree/p19/dmac - integrity strategy

The table is part of the 'Event List' view. Below the table are buttons for 'Event Detail', 'Anomalies', 'Video', 'Reports', 'Save Events', and 'Workspace'.

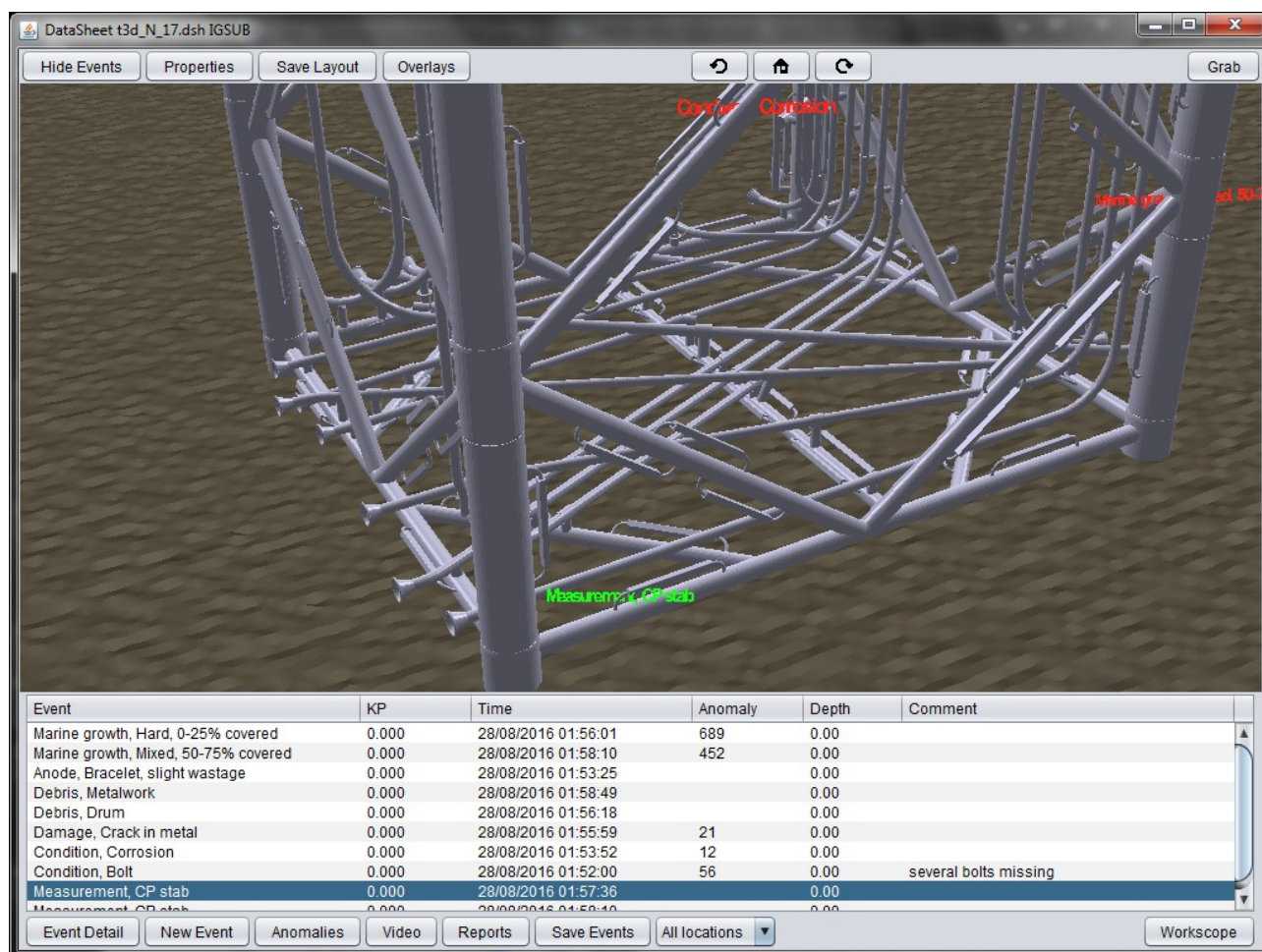
An event may have an icon located on the drawing, although this is not mandatory. This is done by pressing the Location button (only shown in edit mode) then clicking the drawing.

The New button creates a blank event which may be populated and then have it's location set. The Video Time button will get the time from the video player (our own or VisualSoft) and populate the date and time fields, these may also be set manually.

The Workscope button will show all tasks in the current work scope for this data sheet and their status may be updated if in survey edit mode.

3D Structural Data Sheets

3D data sheets function in the same basic manner as their 2D counterpart. The eventing pane at the bottom of the screen is identical. Events may be selected by clicking on the event list or by clicking near them on the 3D model. Events may have icon locations on both 2D and 3D drawings.



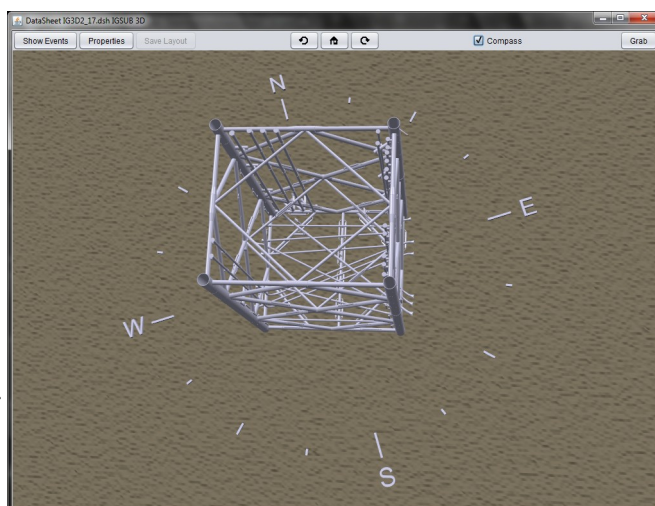
Moving the 3D scene is the same as the multi-beam and XP 3D screens. Holding down and moving with the left button rotates about the x/y/z axes. The thumb wheel controls zoom and the right button translates the view vertically or horizontally. In addition at the top of the screen there are clockwise and anti-clockwise buttons which rotate the scene 10 degrees around the Z (vertical) axis when pressed. The “home” button between them normalises the view to the default position.

Pressing Grab saves a screen shot to the desktop.

The overlays dialog may be used to filter which events codes are displayed.

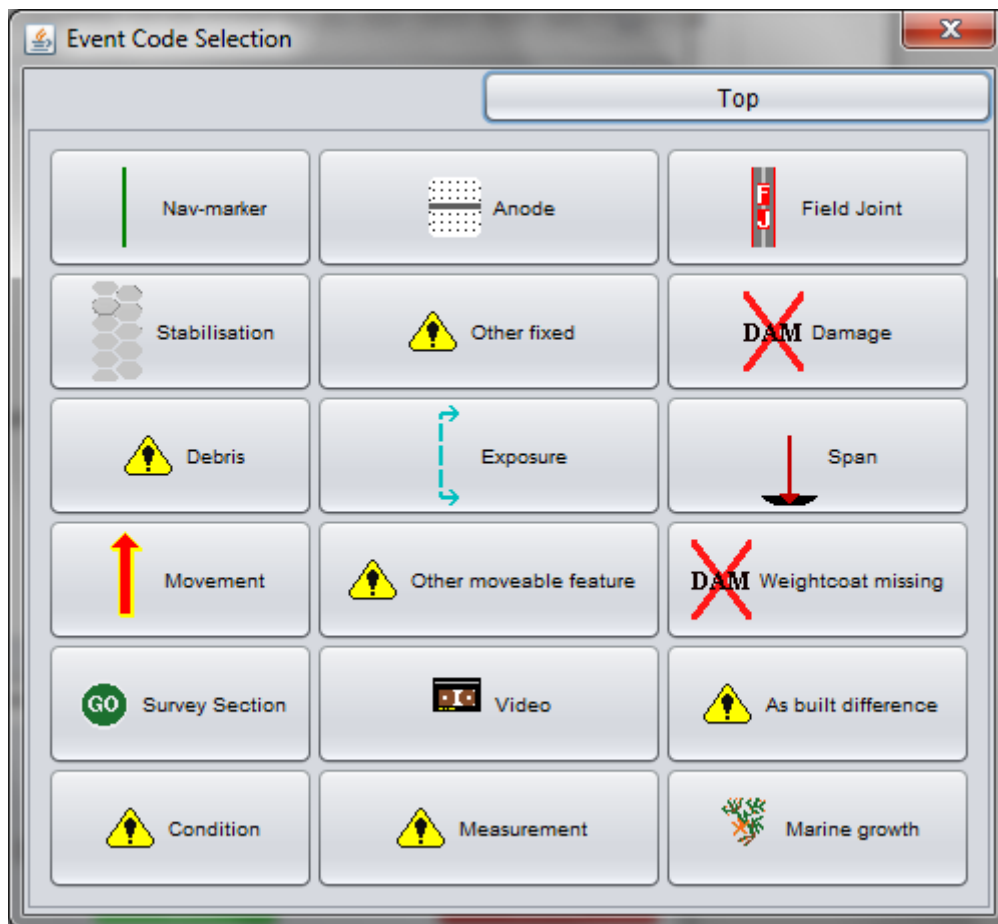
The Compass toggle button on the Overlays dialog will select display of a north facing compass rose. The angle of drawing north vs true north may be set for each drawing in the dsh file.

The locations pull down menu at the bottom of the screen filters events by location.



Selecting Event Codes

In both pipeline and structural visualisers event codes may be set using the code selection dialog.



The event code scheme is to have primary, secondary and tertiary codes. So the user could click on Anode (primary) and then choose the type of anode (secondary) then it's wastage (tertiary). Once a code has no sub-codes the dialog auto-selects the event code, such as span-end which has no tertiary code.

In the case of Shell codes which only have a primary level no subcodes are shown.

The Top button goes back to the primary code selection stage.

Event codes and their icons are set in the event code CSV file (see technical manual) and are not hard coded.

Data Import Wizard

The data import wizard lets you copy files into DataVerse without having to know the program's internal directory structure (which is detailed in the Technical Manual). It's called from the Admin menu.

You select the data type, survey type, year and the system will show the correct directory path in the Output directory field. Use Browse to select input files of the correct type and Import to begin the copy process. Once files have been imported using this tool they should be QC'd if applicable.

The screenshot shows the 'DataVerse Import Wizard' dialog box. It has several fields: 'Data type' set to 'Events (PRISM, VisualSoft, Sitras, IBIS)', 'Survey type' set to 'GVI (default)', 'Year' set to '2019', and 'Output directory' set to 'C:\workspace\DataVerse\TestAsset/'. Below these is a list of files for import, including 'f1b08_02.dat', 'f1b08_96.dat', 'f1g08_02.dat', 'f1g08_99.dat', 'f1w10_02.dat', 'f2a08_02.dat', 'f2a08_96.dat', 'f2a10_02.dat', 'f2b08_02.dat', 'f2b10_02.dat', 'f2g08_02.dat', 'f2g08_99.dat', and 'f2w08_96.dat'. There is a 'Browse' button to the right of the file list. At the bottom, there is a 'Files imported' field showing '0', an 'Import' button, and 'OK' and 'Cancel' buttons.

JPEG/EXIF Import for Mobile Phones with GPS

This import tool is available from the Admin menu. It allows a user to take multiple pictures with a mobile phone camera and import them to DataVerse. The import will parse the images EXIF header to obtain the GPS position and time.

An event file is created using the supplied name and each event is linked to one picture.

The screenshot shows the 'DataVerse EXIF Import' dialog box. It has an 'Input JPEGs' field with a 'Browse' button. Below this is an 'Event file name' field with the text 'testJ_21.str'. A table displays the imported data:

Filename	Date	Lat	Long	Easting	Northing
IMG_20210208_171307.jpg	11/02/2021 16:28:56	57.19611666666...	-3.82526388888...	289806.4514551...	813179.0775002...
IMG_20210208_171316.jpg	11/02/2021 16:28:56	57.19611666666...	-3.82526388888...	289806.4514551...	813179.0775002...
IMG_20210208_171328.jpg	11/02/2021 16:28:56	57.19611666666...	-3.82526388888...	289806.4514551...	813179.0775002...

Below the table, there is a 'JPEGs read' field showing '3', an 'Import' button, and 'OK' and 'Cancel' buttons.

Please ensure your phone settings enable EXIF position tagging. Social media websites generally remove EXIF headers to ensure confidentiality, so downloaded files may not have position information.

At present co-ordinates are converted from Lat/Long to Ordnance Survey E/N, other datums will be added. The event file can be viewed in conjunction with our OS map layer or Google Earth overlays.

Data Import from ASCII files or Excel

In survey edit mode an Import button appears on the main screen. When pressed it will ask the user to select a text or Excel file then show the dialog below.

The screenshot shows the 'ASCII Import' dialog box. At the top, there is a text area containing the following data lines:

```
Filename, Event Code, KP, Date, Anomaly, Depth, Comments
f2g08_99.dat, Survey Section; Start of, 0.004, 15/08/1999, 0, 478.97, Foi/Kin/99/138
f2g08_99.dat, Other fixed; Protective structure, 0.004, 15/09/1999, 0, 478.97, FTA F21
f2g08_99.dat, Field Joint; Normal, 0.01, 15/09/1999, 0, 478.69,
f2g08_99.dat, Stabilisation; Sandbag(s), 0.011, 15/08/1999, 1, 478.7, Not supporting (8 bags)
f2g08_99.dat, Stabilisation; Sandbag(s); Start, 0.013, 15/09/1999, 0, 478.7,
```

Below the text area, there are input fields for 'Columns' (set to 7), 'Separator' (set to comma), and 'Lines in header' (set to 1). There is a checkbox for 'Import all as single event code' and a 'Nav-marker' button.

Below these are seven dropdown menus for column mapping:

- Column 1: Ignore
- Column 2: Event code for lookup
- Column 3: KP
- Column 4: Date
- Column 5: Anomaly
- Column 6: Depth
- Column 7: Comment

At the bottom, there is a 'Save file as' text field containing 'pip30_16.dat' and 'OK' and 'Cancel' buttons.

The program will attempt to skip the header lines and automatically determine the type of file spacer (comma, tab, etc.). It will identify the number of columns and if a header row is present will try to guess the contents of each column and set the pull down menus accordingly.

If a column's name is not guessed correctly or is not determined the user may manually set it or choose "ignore" from the pull down menus.

Files will be saved as PRISM, Shell IBIS or Statoil Sitras.

On completion the user will be informed of any import errors and the file should then be QC'd.

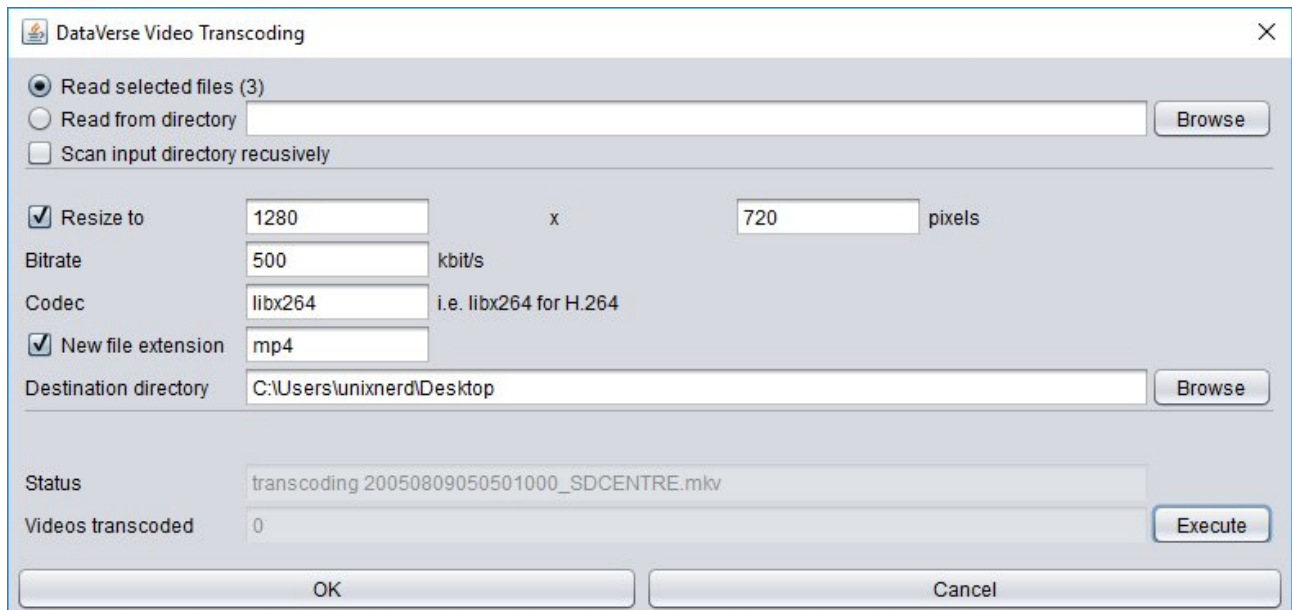
Event Code Import

Event codes may be set to the same code for all events using the import as single code toggle, the code is set by the code selector button.

Event codes may also be looked up from a code lookup table, a CSV file called clut.csv in the system directory. This can be used to map a client's event codes to your own code set or vice-versa. The relevant column is set to "event code for lookup" on the pull down menu.

Video Transcoding

Videos are typically very large when delivered, effectively raw camera footage. They can be reduced hugely in size with negligible quality loss by transcoding. Transcoding can also change the width and height of a video, its encoding standard (H.264, MPEG 2, etc.) and its bit rate.



The transcoding screen is called from the Admin menu.

The source of files can either be videos selected from the main menu's Video pane or all of the video files in a specified directory. If a directory is specified the option exists to scan all subdirectories in that hierarchy for videos (such as a VisualSoft directory tree) or just to look in top directory.

A video may be resized in height and width if this is selected.

The bit rate may be used to reduce the file size of a video. For acceptable quality on 1080p or 720p videos a value of 800 kbit/s is worth trying first. Transcoding requires a bit of trial and error to get the correct formula for a given set of input videos. The user should experiment with a test video before trying a larger batch.

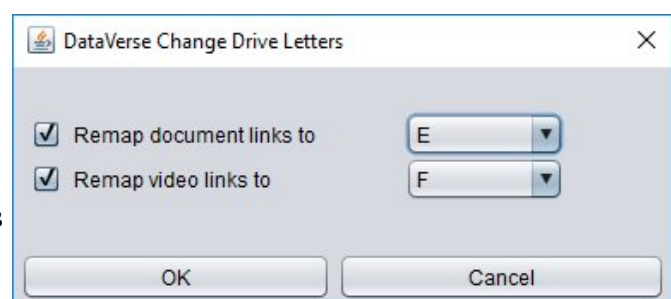
If changing video codec the user may wish to change the file extension.

If the file extension is not changed the output and input directories must be different. If videos are read from a tree structure all output is to a single non-nested directory. A batch file can be constructed to move videos back if needed.

Once all input parameters are set the Execute button starts the transcoding session. The status field will show each video as its conversion starts.

Drive Letter Remapping

The Admin menu has a function to remap drive letters, this is useful for USB drives. The function changes drive letters for the document index and structural links to external documents and also the video index.



Appendix A: Program Development

DataVerse has been written in Java SE 1.8 using the Eclipse development environment. This should give it exceptional shelf life as previous Java applications such as PRISM were started in 1996 under Java 1.0 and are still in use today.

Java and Eclipse are the foundations of all Android apps and offer excellent connectivity to SQL databases should the need occur. Windows C# / .Net libraries may be accessed via JNA, in fact this is done in our video player.

Internally the program uses the JavaDoc documentation standard. Not only can this generate a mini-website documenting the program and its classes but it allows for interactive documentation hints within Eclipse. This makes it easy for a programmer new to the system to maintain or modify it.

The code has been externally audited by NCC and can be held in ESCROW with them at your request.

Appendix B: Future Work

DataVerse has excellent scope for future development. The program is built on a class structure that could easily be expanded upon or tailored to suit a client's needs. In addition configuration for different client event codes and other features may be done without need to modify the source code.

Android App

We currently have an Android app for data gathering and remote eventing, this supports our GoPro GPS import. We intend to expand the scope of this app and add useful new functionality.

PODS Integration

Adding a PODS interface to the software for both loading and saving data would pose few technical problems. Existing data types have multiple load and save options for different clients, (Sitras, IBIS, etc.) so adding another is just a logical progression of the software.

Video QC

Extensive QC of video files is possible, all that is needed is a specification of how far a client wishes to take things. Basic QC such as checking event file time ranges against video time ranges is already provided. More advanced QC such as identifying black video, erroneous videos, videos where the ROV is in transit is all possible.

QC Criteria by KP

A facility will shortly be added (at the request of an existing user) to have different QC criteria dependant on the KP range of the pipe. This is to allow for different span height/length limits in different areas of a pipe.