CLIENT	
Wood	
PROJECT	
Management System	
DOCUMENT TYPE	
MANUAL	

TITLE	
NEXUS IC Offshore Operator Training Manual	NO. OF SHEETS 54
DOCUMENT NO.	**301-WG-MNL-002**

REV	DATE	REVISION	BY	CHK	APP	QA	CLIENT
05	27/06/2018						
04	12/11/2015	RE-ISSUED FOR USE					
03	05/09/2014	RE-ISSUED FOR USE	DG	RM	RM	KP	
02	18/10/2013	ISSUED FOR USE	RM	DG	RM	KP	
01	29/03/2012	ISSUED FOR USE	RM	DG	RM		

IMPORTANT NOTE : THIS DOCUMENT RELATES TO THE SERVICES OF *WOOD GROUP INTEGRITY MANAGEMENT – ABERDEEN, A TRADING DIVISION OF WOOD GROUP KENNY CALEDONIA LTD*, ACCREDITED INSPECTION BODY No. 4388.

Independent - Innovative - International

COMMENTS SHEET		
REVISION	**DATE**	**COMMENTS**
01	29/03/2012	Issued For Use Reviewed and updated Issued for use
02	18/10/2013	Issued For Use
03	05/09/2014	Re-Issued For Use
04	12/11/2015	Additional information and updates Re-Issued For Use <u>Signature Legend:</u> RM: Roddy McLean DG: Dearne Gaebler KP: Katherine Pithie FH: Frances Hutcheon
05	27/06/2018	Updated for 6.3

NEXUS IC Offshore Operator Training Manual

Table of Contents

1.0 INTRODUCTION 3

1.1 Purpose 3

1.2 Scope 3

1.3 Course agenda 3

1.4 Pre-training checklist 3

2.0 TERMS AND ABBREVIATIONS 4

3.0 ONLINE INSPECTION USING IC-INSPECTION 5

3.1 Start IC-Inspection and connect to database 5

3.2 Configure online desktop with common windows 6

3.3 Pre-inspection checks 7

3.4 Online inspection 13

3.5 Advanced Features – Assets 22

3.6 Advanced Features – Asset Information 22

3.7 Advanced Features – Tasks 23

3.8 Advanced Features – Drawings 24

3.9 Advanced Features – Events 26

3.10 Advanced Features – Event Listing 26

3.11 Advanced Features – Pipeline Views 27

3.12 Pipeline inspection simulation 28

3.13 Structural inspection simulation 28

4.0 OFFLINE REVIEW USING NEXUS INTEGRITY CENTRE 29

4.1 Start NEXUS IC and connect to database 29

4.2 Overview of Inspections | Review in NEXUS IC 30

4.3 Inspection overview 33

4.4 Review events with findings....34

4.5 Review bookmarked events....35

4.6 Reviewing events by date/time....36

4.7 Post-processing survey data....37

5.0 HOW TO:....40

5.1 Database backups....40

5.2 Update event start/end from the digital video....40

5.3 View all event fields in a grid....42

5.4 Running reports....43

5.5 Keyboard shortcuts....44

APPENDIX 1. DESKTOP CONFIGURATIONS....A

APPENDIX 2. DEFAULT KEYBOARD SHORTCUT LAYOUT....B

1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide training material for instruction in the use of IC-Inspection for online inspection and NEXUS Integrity Centre (NEXUS IC) for offline review.

1.2 Scope

This document covers functionality relating to online inspection and offline review using IC-Inspection and NEXUS IC products only. Training documentation for NEXUS IC is covered by the NEXUS Integrity Centre Training Manual and training for IC-Inspection is covered by the IC-Inspection Training Manual.

1.3 Course agenda

1. Introduction to IC-Inspection.
2. Perform a pipeline Inspection using IC-Inspection.
3. Perform a structural Inspection using IC-Inspection.
4. Post inspection review of recorded event data.

1.4 Pre-training checklist

Training PC's have following applications installed:	☐
• NEXUS IC	☐
• IC-Inspection	☐
• IC-Video	☐
• Digital Video Player (DVP)	☐
• VisualReview	☐
• MS Office	☐
• SQL Express (for local database connection)	☐
Training PC's have the following training material copied to local drive:	☐
• Inspection video	☐
• Smoothed pipeline survey file (for track repositioning)	☐
Training PC's have dual monitor	☐
Training database is restored to training PC's	☐

2.0 TERMS AND ABBREVIATIONS

AIG	Asset Information Group
Child Assets	In a hierarchical list, an Asset's children (Child Assets) are any assets which exist below it in the hierarchy.
CP	Cathodic Protection
CSV	Comma Separated Values
DV	Digital Video
DVP	Digital Video Player
DVR	Digital Video Recorder
GEP	Gas Export Pipeline
GVI	General Visual Inspection
IC	Integrity Centre
IC-Inspection	Integrity Centre - Inspection (Wood Proprietary Software)
IP	Internet Protocol
KP	Kilometre Point
NEXUS IC	NEXUS Integrity Centre (Wood Proprietary Software)
m	Metres
MS Office	Microsoft Office
PC	Personal Computer
ROV	Remote Operated Vehicle
Shift Check	IC-Inspection desktop to check at the start of each shift
SQL	Structured Query Language
SQL Server	Relational Database Engine (Microsoft SQL Server software)
VDM	Vertical Diagonal Member

3.0 ONLINE INSPECTION USING IC-INSPECTION

Online inspection is carried out using IC-Inspection.

3.1 Start IC-Inspection and connect to database

IC-Inspection is started by navigating to **Start > All Programs > NEXUS** and clicking on **IC-Inspection**. Once the software has started it is necessary to connect to a database using the Database Connection Wizard. However, the user may be presented with a login box automatically, or maybe logged in automatically. This is to allow the user to re-connect to the last database which was used without having to go through the Database Connection Wizard.

3.1.1 Option 1 - Connect to a database (Database Connection Wizard)

Use the following steps to connect to a database.

1. To connect to an existing database, click the **Database** > **Connect**… main menu item to launch the **Database Connection Wizard**.
2. On the **Database Server** page, enter the **Server Name** of the SQL Server.
3. This will be the machine name or IP address of the SQL Server machine followed by the SQL Server instance name. E.g. **myMachine\mySQLServer**.
4. On the **Specify Database** page, choose the database from the **Existing NEXUS IC Databases** drop-down box.
5. If necessary, enter the **Username** and **Password** on the credentials page of the wizard.
6. Finish the wizard.

3.1.2 Option 2 - Log into a previous database

If you are given the option to log into the last used database enter the password to log in. If you do not wish to log into the last used database click on **Cancel** or **Database > Close** and then use Option 1 above to connect to a database.

	Start IC-Inspection and connect to the training database.
Activity:	***Your tutor will tell you the correct SQL server name and database to connect to and the login credentials to use.***

3.2 Configure online desktop with common windows

IC-Inspection has a configurable desktop display. You can:

- If you are using dual screen monitors, extend the IC-Inspection screen across both monitors before configuring desktop windows.
- Decide which windows you want to display on the screen and how they are organized.
- Adjust position, height and width of each of the windows to suit the current Inspection task.
- Add/remove windows from the desktop using the **View** menu button on the main toolbar.
- Pin and un-pin windows so that they auto-hide when not in use.
- "Float" windows so that they appear as separate windows outside IC-Inspection's main application window.
- Set-up and save different desktops.

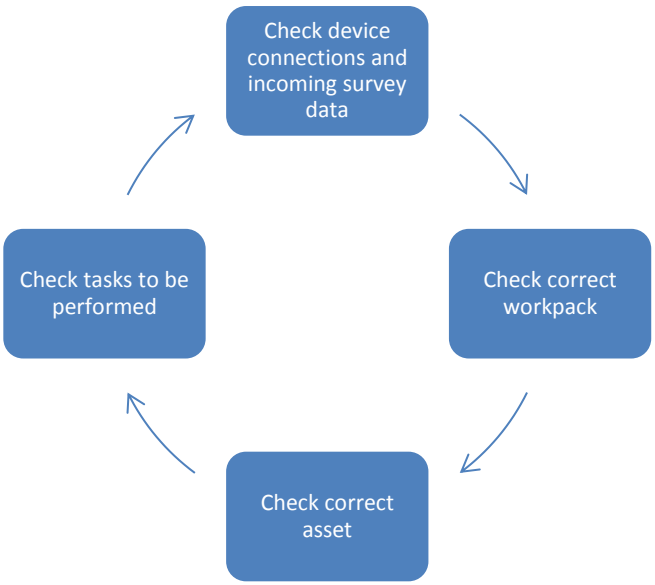
Activity:	***Setup desktop titled "Shift Check".*** ***See Appendix 1 – DESKTOP CONFIGURATIONS for an example of a "Shift Check" desktop.*** ***Tip: Remember to save your desktop when you are finished.***

Activity:	***Setup desktop titled "Structural Eventing".*** ***See Appendix 1 – DESKTOP CONFIGURATIONS for an example of a "Structural Eventing" desktop.*** ***Tip: See what happens to the Event Launcher window if you select an asset type that has no available events.*** ***Tip: Remember to save your desktop when you are finished.***

Activity:	***Setup desktop titled "Pipeline Eventing".*** ***See Appendix 1 – DESKTOP CONFIGURATIONS for an example of a "Pipeline Eventing" desktop.*** ***Tip: Remember to save your desktop when you are finished.***

3.3 Pre-inspection checks

Before you commence inspecting and logging inspection data, there are some checks that need to be performed to ensure that the system is configured correctly to log events to the correct asset and workpack, and to ensure that video and survey data interfaces are working.



3.3.1 Check device connections (Video Recorder / Survey String / Text Overlay)

IC-Inspection can be configured to interface with many different types of devices for inspection control and information transfer. These can include Survey/Positional inputs or outputs and Video Recorder systems.

Where compatible, IC-Inspection will control all starting and stopping of recording on the video recorder device. This interconnection must be tested. This can be done by performing an audio/video test recording. Clicking **Start** in IC-Inspection should start recording on the recorder and clicking **Stop** should stop recording.

Any Text Overlay configuration can be tested by making sure that any information being supplied by IC-Inspection is being correctly displayed on the text overlay on the video recorder screen.

Survey string data can be checked by examining the data displayed on the IC-Inspection Survey Values window. Any of the following can indicate a problem with survey data:

- Fields which alternate between two different values which differ substantially.
- Fields which alternate between a value and blank.
- Fields which contain erroneous data (i.e. positional data that is wildly out, heading and depth which are wildly out).
- Date and Time values that are erroneous (Out of sync by one hour, one day, one year etc.).

Alternatively, if values are dark red in the IC-Inspection Survey Values window, this will indicate that there is a problem with the incoming survey data:

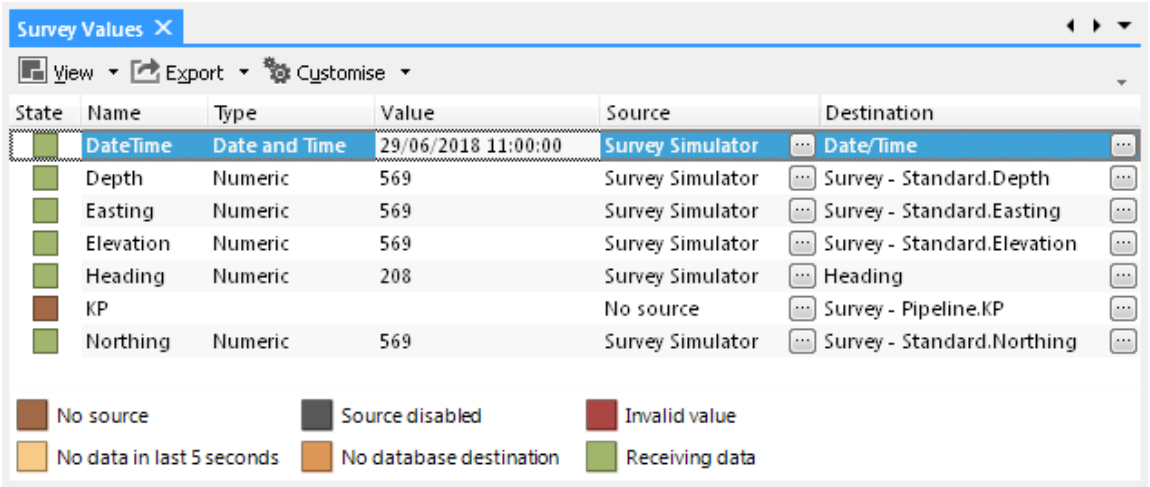


Figure 3.1 – Survey Values window

If any of these are present then please contact your NEXUS IC administrator or contact support@nexusic.com.

3.3.2 Check workpack

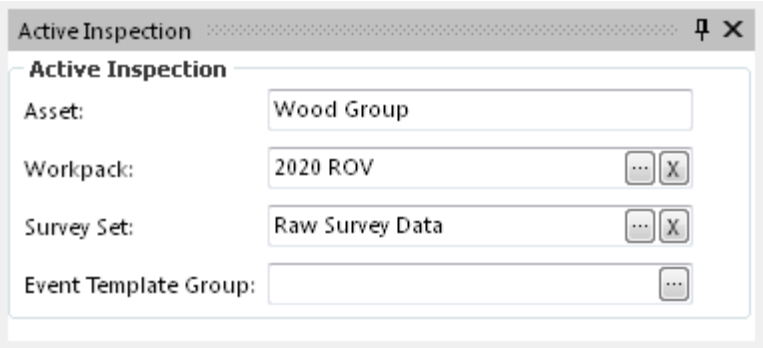


Figure 3.2 – Active Inspection window

The Active Inspection window shows the current database which you are connected to, the current workpack, current survey set and optionally the currently selected event template group.

The workpack should be the current inspection workpack. It will contain all of the tasks for the current inspection and any events created will be against this workpack, so it needs to be correct!

The survey set should be set to the correct one for the current ROV. This will identify the video recording for any events that you create. If you are never using more than one ROV simultaneously, a single survey set will be sufficient.

You should check that all of the settings on this window are correct before starting inspection.

Activity:	***Using the "Shift Check" desktop, check that you have the correct settings in the Active inspection window. Click on the Workpack, Survey Set and Event Template Group '…' ellipsis buttons to view alternate options for selection.***

3.3.3 Check correct asset

Before starting, we need to make sure that we are on the correct asset. This can be done using the Assets Window as shown in Figure 3.3 - Assets window.

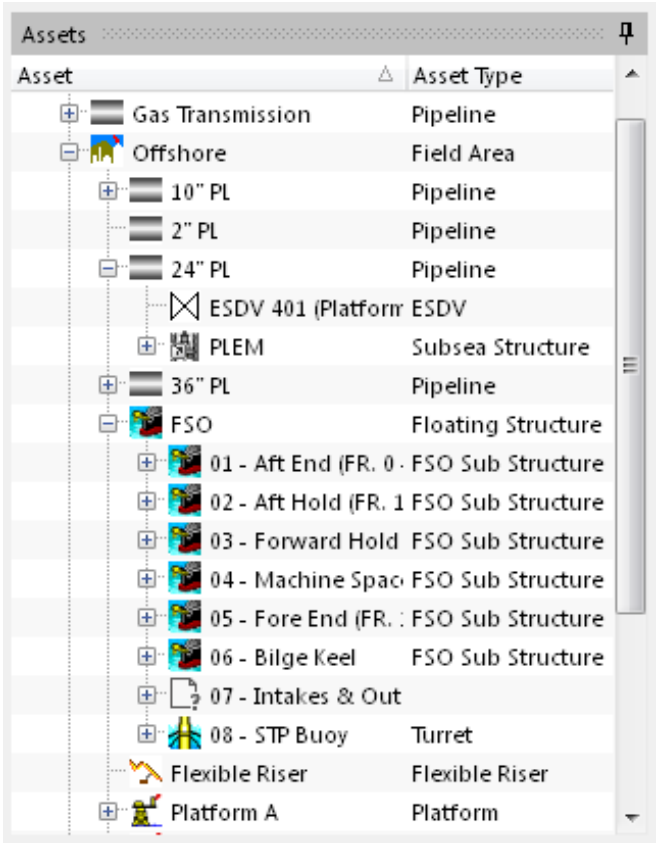


Figure 3.3 - Assets window

Each client's database will be configured differently. The hierarchy will contain different asset types and the groupings may differ from client to client.

The Assets window is a hierarchical list of all of the assets in the database. You can "drill down" into the hierarchy levels until you locate the asset you are going to inspect. The Assets window controls the source of information for many other windows in the system, so when you select an asset in the hierarchy all of the events in the Event Listing window will be against the selected asset, all of the tasks listed in the Tasks window will be for the selected asset, etc.

In addition, it is possible to navigate to assets in the hierarchy using drawings. If the item exists on a high level drawing then clicking on it will present the option to navigate to it in the hierarchy. See the drawings window below in which a field overview drawing is being used to navigate to the 24" Gas Export Pipeline.

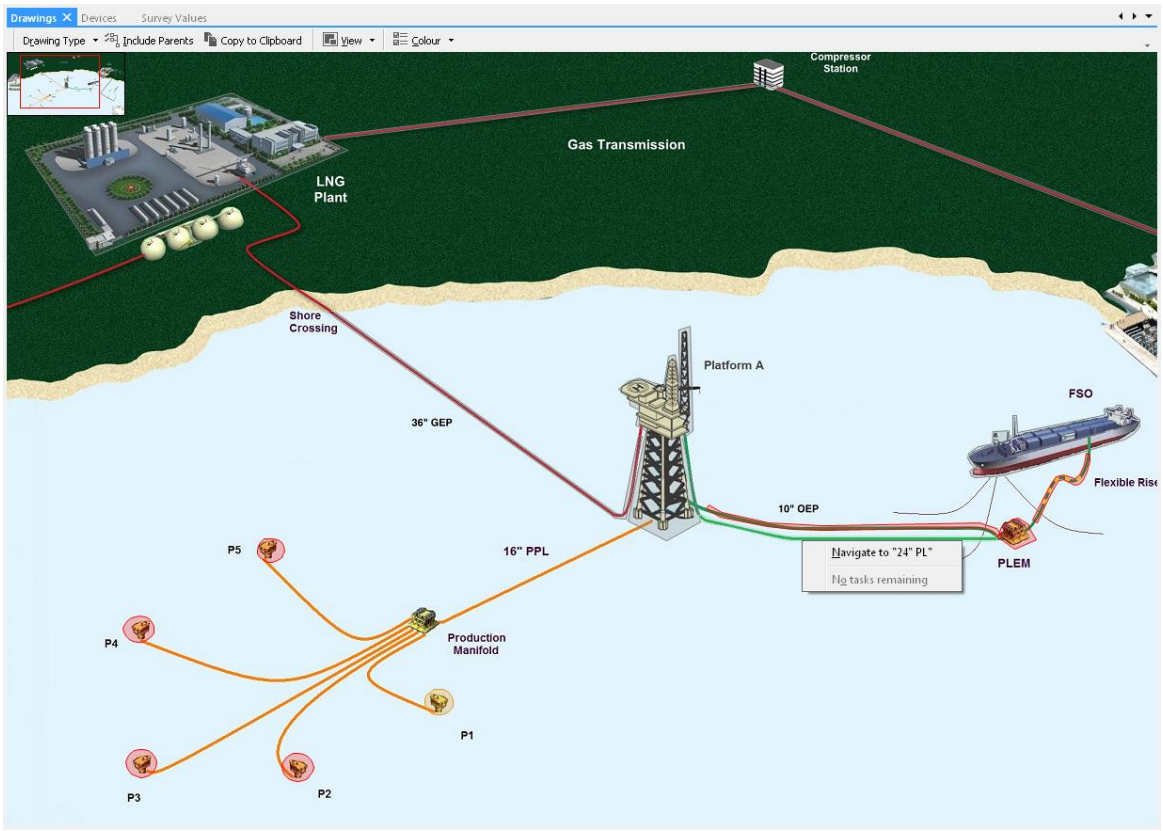


Figure 3.4 - Drawings window

Activity:	***Experiment with selecting assets from the hierarchy. Note how information changes in the tasks window when you select a different asset.***

3.3.4 Check tasks to be performed

Once you have selected the correct asset from the hierarchy in section 3.3.3 above you will need to check the tasks which need to be completed as part of the current workpack. This can be done using the Tasks window, shown in Figure 3.5 below.

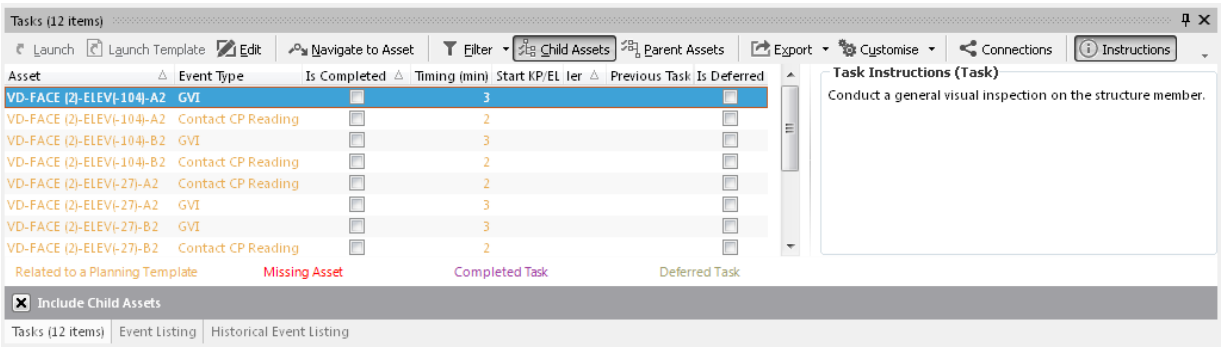


Figure 3.5 - Tasks window

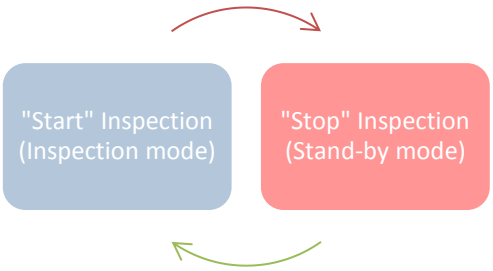
The Tasks window provides the following functionality:

- Task Information including instructions.
- Launch task as an event.
- Modify task information.

Activity:	***Select a few different assets to see what tasks are available. Try selecting the root (top level) node with the Child Assets button depressed – this will show all tasks that have been selected for the current workpack.***

3.4 Online inspection

Activity:	***At this point ensure you switch to the "Pipeline Eventing" desktop.***



3.4.1 Starting and stopping inspection

To enable on-line data capture, you must first "Start" the inspection. Several things occur in the background when the inspection is "Started":

- Any video recording devices which are interfaced with IC-Inspection start recording.
- Survey data will commence logging.

It is recommended that when you "Start" inspection, you wait until all video recorders are reported as recording before commencing video commentary and data acquisition. When IC-Inspection is in inspection mode, the Start button will disable and the Stop button will enable (as shown in Figure 3.6).

"Stand-by" mode "Inspection" mode

Figure 3.6 – IC-Inspection workspace background in both modes

Activity:	***Alternate between "Inspection" mode and "Stand-by" mode. Note the informational message at the bottom right of the main window.***

3.4.2 Creating Events from Tasks

Certain clients will pre-populate their database by defining what tasks are to be carried out on what components. As a general rule, pre-populated tasks are generally defined for subsea structures and equipment.

Tasks can be launched either from the **Tasks** window or from the **Drawings** window. When a task is launched, the associated event form will be created in the **Active Events**

window. You will be required to fill-in the fields in the form, then save the event. IC-Inspection will automatically mark the task as being completed.

Activity:	***Using the "Pipeline Eventing" desktop, choose any of the subsea pipeline assets and create events from the Tasks window and the Drawings window. See section 3.8 Advanced Features – Drawings for more information on creating events from drawings.***

3.4.3 Creating Ad Hoc Events

At any time, whilst IC-Inspection is in inspection mode, you can log events against the currently selected asset. This is what we refer to as "ad-hoc eventing".

Note: You are not restricted to only eventing from the pre-defined tasks!

Ad-hoc events are created from the **Event Launcher**. The events available appear in the Event Launcher and the list is dependent on the "type" of asset that is currently selected. For example, a **Span** event is not visible when you have a VDM asset selected. See example of the events toolbar in

Figure 3.7 below.

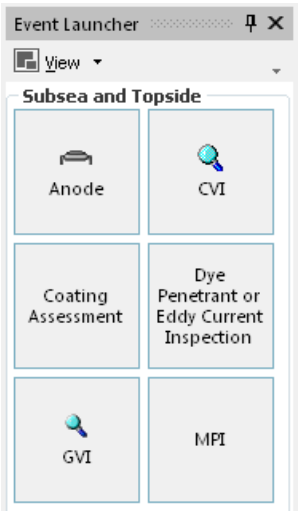


Figure 3.7 – Event launcher

Events appear in the launcher grouped by category and ordered alphabetically.

3.4.4 One-click eventing

One-click eventing is commonly used during pipeline inspections. The **Event Templates** window allows you to pre-configure events (with fully or partially populated information) and assign hot keys to those events. Event Templates can then be launched either by pressing the hot key you have chosen, or by clicking the template's button in the Event Launcher.

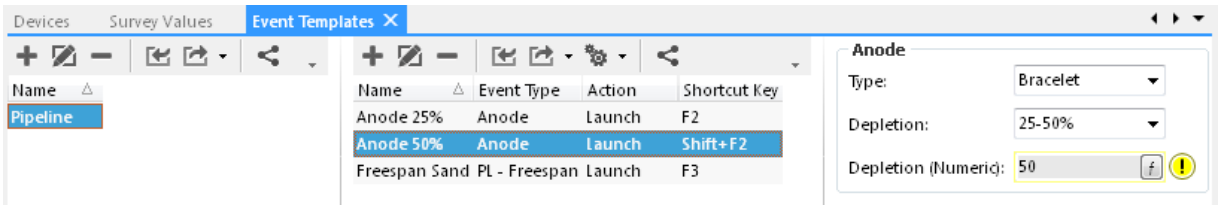


Figure 3.8 - Event Templates window

The configuration window is used to create/modify event templates. Generic data includes:

- Template Name — Can be anything you like. Try to place key information near the start of the name, so it's easily visible in the Event Launcher button.
- Shortcut Key — Can be a variety of different key strokes, enter by performing the keystroke on the keyboard. You can hold down Shift, Ctrl or Alt while choosing a key if you like.
- Shortcut Action — Events can be launched and left open for editing, launched and immediately saved (One-click Record) or launched and left open with a recorded image attached.
- Event Type — The event type to launch.
- Event Details — Once you have selected the Event Type the Event Details pane will become available. Here you can configure any default data.

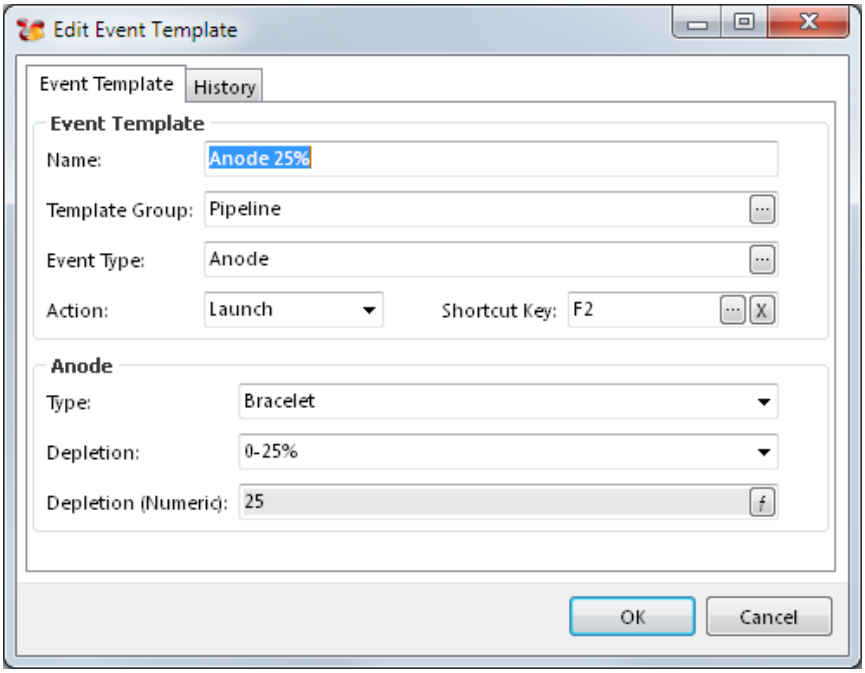


Figure 3.9 - Event Template configuration window

Note that to make events from your template group available for launching, you must select your event template group in the Active Inspection window.

Activity:

Set up some event templates of your own now.

Use the various 'Actions' available when setting up your event templates.

3.4.5 Active Events window - overview

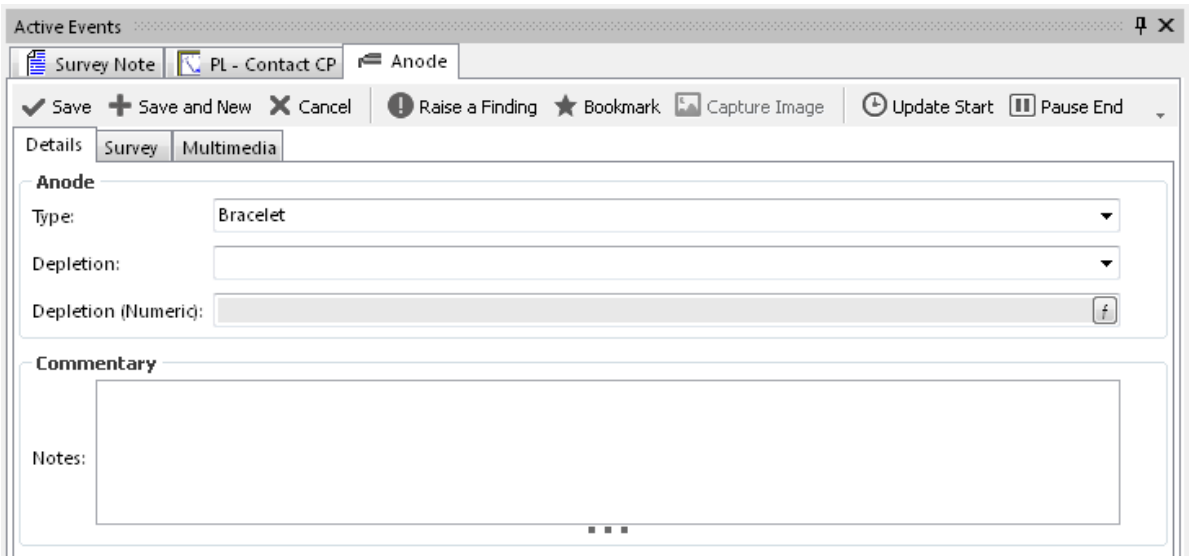


Figure 3.10 – Active Events window

The Active Events window displays any active events – events you've launched but not yet saved. If you have multiple events open at once, you will see a tab for each open event. Select an event's tab to see its data.

When an event is created (either ad-hoc or from a task) the event will appear in the Active Events window. At the point the event is created, IC-Inspection will store any available survey data as start information for the event. Once the event is finished (e.g. End of Span) the event should be saved using the **Save** button. This will update the event end information using any live survey data. The **Survey** tabbed page can be used to view any recorded survey data for the selected event. Events can also be cancelled using the Cancel button (✖).

More than one event can be active in the **Active Events** window at any given time, and events can be created/saved in any order.

Figure 3.11 - Event Details

The **Details** tabbed page displays the fields that need to be completed by the online inspection engineer. The information recorded will differ by event type.

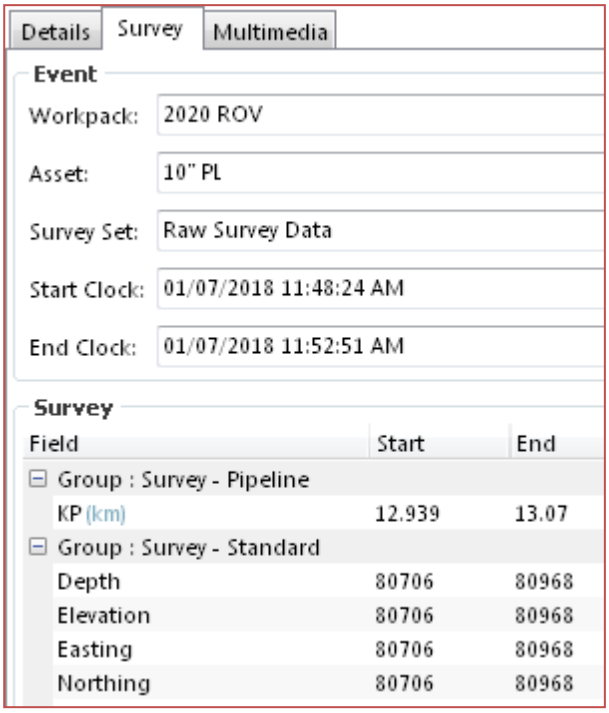


Figure 3.12 - Survey data

The **Survey** tabbed page displays survey positional data. This survey data is normally populated automatically by the incoming survey strings. When an event is triggered, the start information is populated and when the event is saved the end information is populated.

Figure 3.13 – Multimedia

The multimedia tab is used to show any multimedia (normally photos) against the current event. Multimedia types can include images or video files. If your digital video recorders support it, IC-Inspection can initiate an image grab from each video recorder and store those images directly in the database. See section 3.4.6 below for more details.

3.4.6 Event Image Capture

Some video recorder applications allow an image capture to be triggered and transferred back to IC-Inspection (for example IC-Recorder, EdgeDVR and NETmc DVRi do).

An image capture can be triggered by clicking on the **Capture Image** button on the **Active Events** window. See Figure 3.14 below.

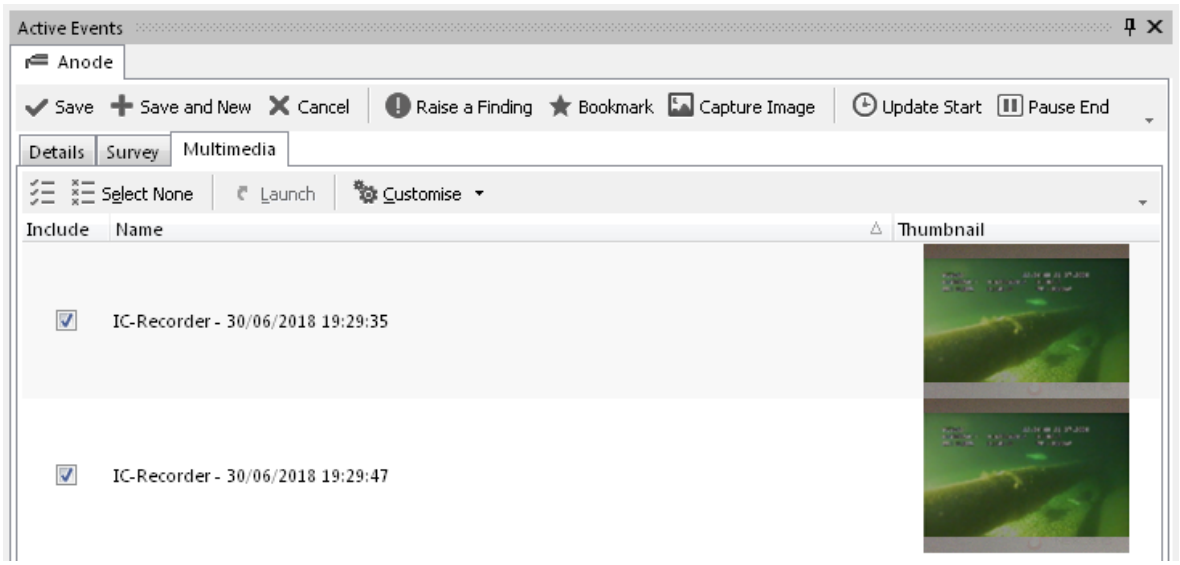


Figure 3.14 - Image Capture

Activity: ***Experiment with creating events and adding Event Details and Multimedia. Try a variety of Asset Types and Event Types.***

Create events from Tasks, Ad-Hoc eventing and Event Templates.

3.4.7 Automatic Findings from Anomaly Triggers and manually raising a Finding

In NEXUS IC, an event which records a situation that is out of specification or out of range is raised to a finding. Findings can then be reviewed and if necessary linked to an anomaly. In the case that an event is recorded and raised to a finding over different inspection years, these findings are all linked to the same anomaly. Figure 3.15 below shows how events are raised as findings and then, if necessary, linked to anomalies.

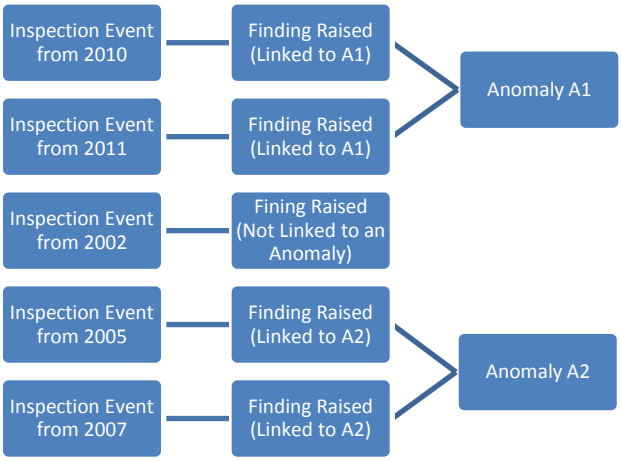


Figure 3.15 - Event, Finding and Anomaly structure

Anomaly triggers are used to set the point at which NEXUS IC will decide that an event should be raised as a finding. These anomaly triggers are configured using NEXUS IC and are configured specifically to client anomaly criteria. Examples include span maximum length and height, low and high CP, metallic debris.

If a field has an anomaly trigger defined, and the value for that field is out with the trigger boundaries, the field will be marked with a yellow exclamation mark ( ).

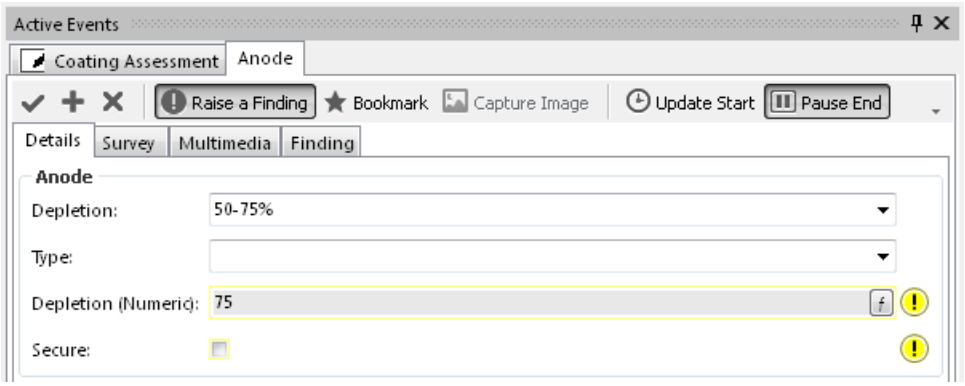


Figure 3.16 - Anomaly message

When you save the event, a finding will automatically be generated. If you want to add a finding to an event which does *not* have any yellow exclamation marks showing, toggle the **Raise a Finding** button.

In the Event Listing window, events with findings will have a yellow rectangle in the "F" column, indicating the presence of the finding. The event will also have an extra tab titled "Findings". This tab is a list of all the findings for that event. You can select a finding and click Edit (or just double-click the finding) to edit it. You can also Add or Delete findings.

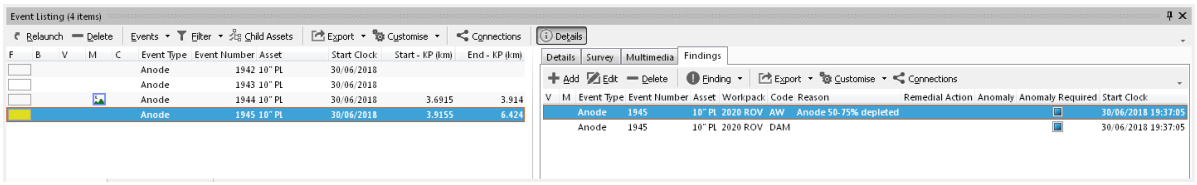


Figure 3.17 - Findings tab on the Event Listing window

If you relaunch the event, the Active Events window entry for the event will have an extra tab called Finding, which displays only the first finding for the event. (It's unusual for a single event to have more than one finding.) Again you can toggle this with the **Raise a Finding** button.

Activity:	***Experiment with creating events that have out of specification data. See where Findings are created automatically.***

Activity:	***Experiment with creating Findings on events manually using the 'Raise a Finding' button.***

Activity:	***Experiment with manually adding and deleting Findings.***

3.5 Advanced Features – Assets

Table 3.1 - Functionality in the Assets window

ITEM	DESCRIPTION
< Previous Asset > Next Asset	These buttons let you navigate to previously selected assets.
Assets > Show Asset Type	This menu button will enable/disable the Asset Type column in the asset hierarchy.
Asset Views	If your database has multiple different asset views, this menu button will let you choose which one to display.
Traffic Lighting	This menu button will let you select a traffic light. The Incomplete Tasks traffic light is often useful during inspection.

3.6 Advanced Features – Asset Information

The **Asset Information** window displays any Asset Information Group (AIG) forms that are associated with the currently selected asset. These AIG Forms hold any asset specific information about the current asset.

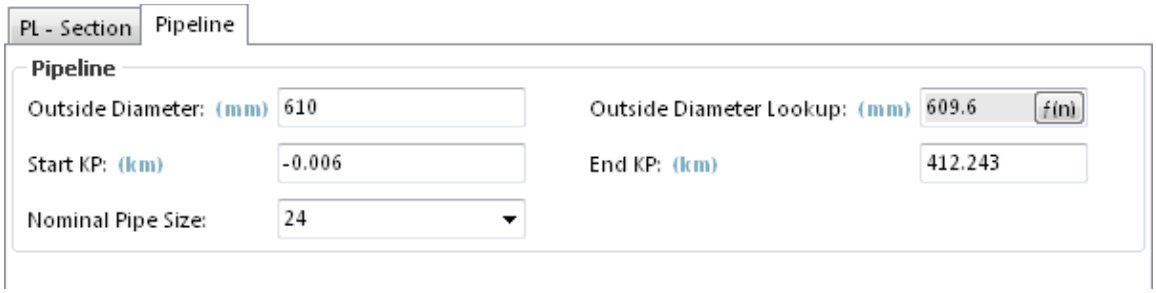


Figure 3.18- Asset Information window

3.7 Advanced Features – Tasks

Table 3.2 - Functionality in the Tasks window

ITEM	DESCRIPTION
Launch	During inspection, clicking this will launch the selected task as a new event. It is also possible to do the same thing by double clicking on the task in the table. This option will be disabled if there are no tasks in the window or you are not in *Inspection Mode*.
Launch Template	If there are event templates of the appropriate type to complete this task, you can choose one to launch from this drop-down. For example, if the task is “Anode”, and you have an Event Template called “Anode 25%”, you could pick that template from the drop-down. This may be faster than launching the task and filling in the form yourself.
Edit	Edit the task.
Navigate to Asset	If you have **Child Assets** or **Parent Assets** selected, you can click on a particular task and click Navigate to Asset to move the selection in the Assets window to the specific asset that this task is on.
Filter	**Filter** lets you show or hide completed tasks.
Child Assets	If depressed, the Tasks window will show tasks on the asset selected in the Assets window and on all that asset’s descendants. Clicking on the very top asset and depressing **Child Assets** will show all tasks in the selected workpack.
Parent Assets	If depressed, the Tasks window will show tasks on the selected asset plus any tasks on its ancestors.
Instructions	If depressed, you will see a pane at the right of the Tasks window showing any instructions that have been set up for this task.

3.8 Advanced Features – Drawings

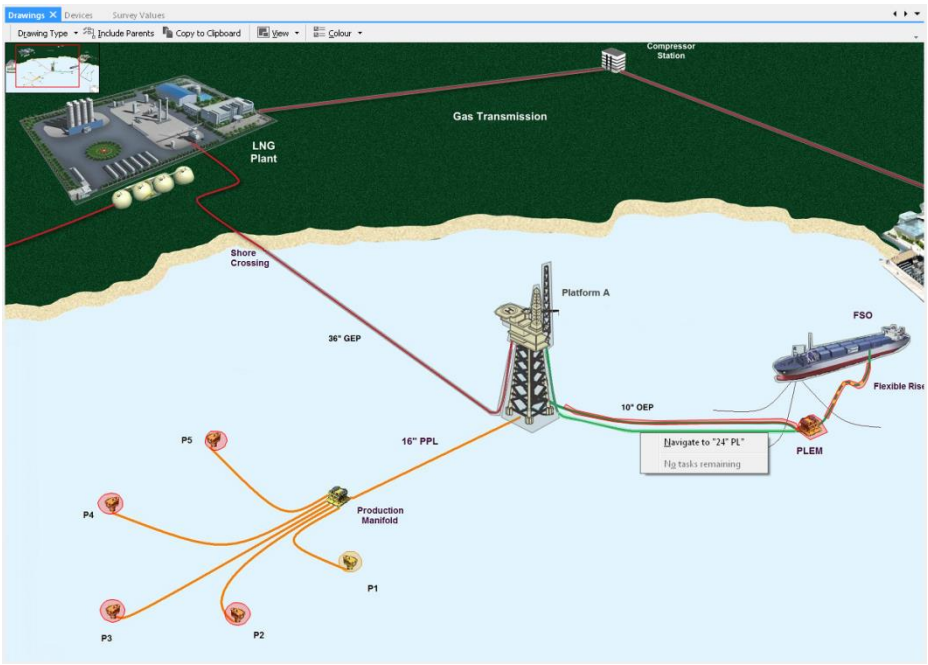


Figure 3.19 - Drawings window

The **Drawings Window** will display any drawings or photos that are available for the selected asset. Where more than one drawing or photo exists for the selected asset a thumbnail bar will appear with a preview icon of each of the available drawings or photos. These can be selected to view.

The Drawings window includes regions which overlay the drawing/photo allowing specific areas to be highlighted. The regions are always linked to an asset and provide the following functionality:

1. Colouring to illustrate the following:
   - Red — Asset has tasks in this workpack and none have been completed.
   - Orange — Asset has tasks in this workpack and some, but not all, have been completed.
   - Green — Asset has tasks in this workpack and all have been completed.
   - Grey — Asset has no tasks in this workpack.
2. Clicking on the region will show an options list that allows the user to:
   - Navigate to the asset.
   - Launch an associated task for the asset.
   - Navigate to any of the asset's children that have tasks in this workpack.
   - Launch any task associated with the asset's children.

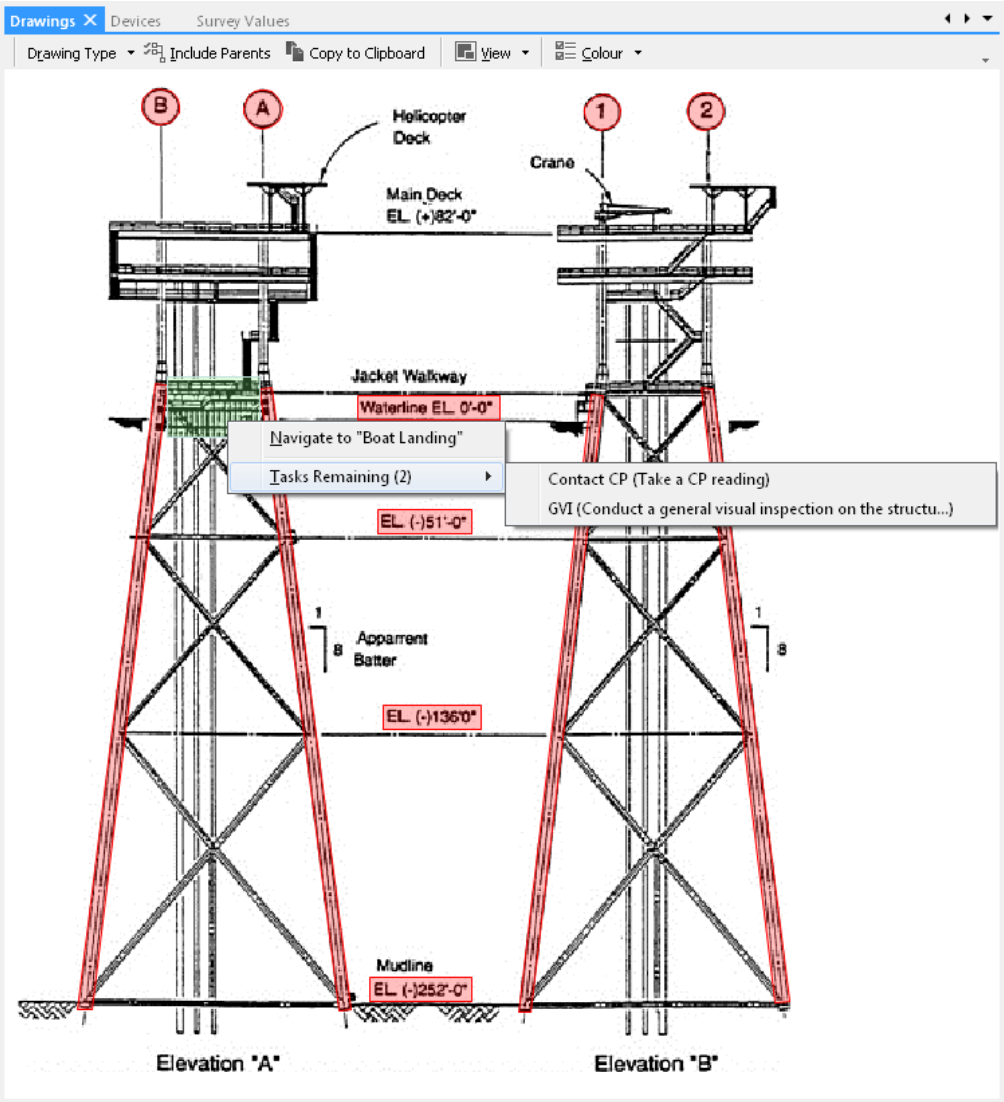
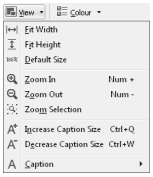
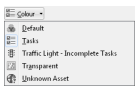


Figure 3.20 - Drawing showing region colouring and navigation menu

Table 3.3 - Functionality in the Drawings window

ITEM	DESCRIPTION
Include Parent	When depressed, you can pick from drawings on this asset and on its parent assets.
	The **View Menu** gives a selection of viewing and zooming options. The "Caption" option lets you display a caption on each layer showing text from an Asset Information field, or from an event field for events logged on the assets represented by each layer.
	The **Colour Menu** lets you choose how layers on the drawing are coloured. "Tasks" is often the most useful selection when inspecting.

The drawings window supports the following navigational controls:

Table 3.4 – Drawings mouse and keyboard shortcuts

Action	Applies to	Keyboard & Mouse Combination
Move	Drawing	Left mouse button click & drag.
Navigate	Button	Left mouse button click.
	Region	
Zoom In	Drawing	Mouse wheel up.
Zoom Out		Mouse wheel down.

3.9 Advanced Features – Events

Table 3.5 - Functionality in the Active Events window

Item	DESCRIPTION
Save	Saves to the database and closes the active event.
Save and New	Saves to the database and closes the active event, then creates a new event of the same type.
Cancel	Cancels the active event. If the event has not previously been saved, then no changes are made to the database. If the event has been previously saved, then any edits to the event are cancelled and the event will be saved back to the database.
Raise a Finding	Raises a Finding on the active event.
Capture Image	Where hardware configuration allows, a photo is attached to the active event.
Bookmark	Add a bookmark to the active event.
Update Start	When clicked, this will update the start date/time and survey position data for the active event.
Pause End	When clicked, this will cease updating the end survey position data for the active event.

3.10 Advanced Features – Event Listing

Table 3.6 - Functionality in the Event Listing window

ICON	DESCRIPTION
Relaunch	This button will launch the selected event for editing. This will move the event back into the active events list.
Delete	Deletes this event.
Events	This menu lets you navigate to the event's asset in the Assets window, update the event's start or end survey time from live survey time, or toggle a

	bookmark that will be visible to the off-line reviewer.
Filter	This lets you filter for a subset of events on this asset. If you filter by time you'll only be shown events logged in the last 1 hour, 2 hours, etc.
Child Assets	This button will include events in the list which have been logged against any child assets.
Details	The Details button will toggle the display of the event details portion of the window (Event, Survey, Comments, Multimedia, Findings tabs). This view is read-only.

3.10.1 Historical Event Listing workpack filter

The Historical Event Listing window has an extra item in its Filter menu which allows the events in the listing to be filtered by Workpack.

It should be noted that the Historical Event Listing window can be configured to show events from a different Workpack to that configured in the Active Inspection window (See section 3.3.2 above). This means that events from different workpacks can be compared side-by-side during inspection.

3.11 Advanced Features – Pipeline Views

Activity:	***Navigate to 2009 ROV workpack, select the 24" GEP Pipeline and finally 0 KP point. This should allow you to find events within this range.***

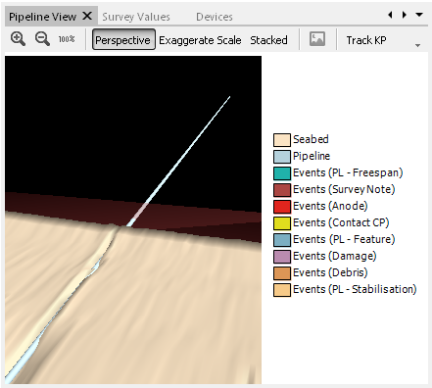


Figure 3.21 - Pipeline View

IC-Inspection includes a **Pipeline View** window which overlays events on top of a graphical pipeline representation. The view can be configured using a variety of filters to show events on the current pipeline. The pipeline view uses KP positional data from survey to determine the ROV's current position on the pipeline. Seabed cross-profile is not typically available in real time.

Table 3.7 – Functionality in the Pipeline View window

ITEM	DESCRIPTION
Zoom In	Zoom in. you can also click in the view and use the mouse wheel.
Zoom Out	Zoom out. you can also click in the view and use the mouse wheel.
Reset Zoom	This button can be used to reset the zoom level of the pipeline view.
Perspective	Toggle between looking at the pipeline sideways-on and looking at it in perspective.
Exaggerate Scale	Increases the apparent height of seabed bumps to make them more visible.
Stacked	Pops events out and shows them above the pipeline.
Track KP	Toggles between showing the current KP from live survey vs showing the KP from the event selected in the Event Listing window.

3.12 Pipeline inspection simulation

Activity:

Your instructor will now commence a video of a pipeline inspection using an ROV. You should treat this as footage of an inspection you are carrying out and event accordingly.

Navigate to the 24" GEP pipeline asset, remembering to create events from the pre-defined tasks, ad-hoc events and events from event templates.

3.13 Structural inspection simulation

Activity:

Your instructor will now commence a video of a structural inspection using an ROV. You should treat this as footage of an inspection you are carrying out and event accordingly.

Navigate to asset R3901, remembering to create events from the pre-defined tasks, ad-hoc events and events from event templates.

4.0 OFFLINE REVIEW USING NEXUS INTEGRITY CENTRE

Offline Review is carried out using NEXUS IC.

4.1 Start NEXUS IC and connect to database

NEXUS IC is started by navigating to **Start > All Programs > NEXUS** and clicking on **NEXUS Integrity Centre**. Once the software has started it is necessary to connect to a database using the Database Connection Wizard, however, the user may be presented with a login box automatically. This is to allow the user to re-connect to the last database which was used without having to go through the Database Connection Wizard.

4.1.1 Option 1 - Connect to a database (Database Connection Wizard)

Use the following steps to connect to a database.

1. To connect to an existing database, click the **Database** > **Connect**… main menu item to launch the Database Connection Wizard.
2. On the **Database Server** page, enter the **Server Name** of the SQL Server. This will be the machine name or IP address of the SQL Server machine followed by the SQL Server instance name. E.g. **myMachine\mySQLServer**.
3. On the **Specify Database** page, choose the database from the **Existing NEXUS IC Databases** drop-down box.
4. If necessary, enter the Username and Password on the Credentials page of the wizard.
5. Finish the wizard.

4.1.2 Option 2 - Log into a previous database

If you are given the option to log into the last used database enter the password to log in. If you do not wish to log into the last used database click on **Cancel** and then use Option 1 above to connect to a database.

	Start NEXUS IC and connect to the training database.
Activity:	***Your tutor will tell you the correct SQL Server Name and Database to connect to.***

4.2 Overview of Review in NEXUS IC

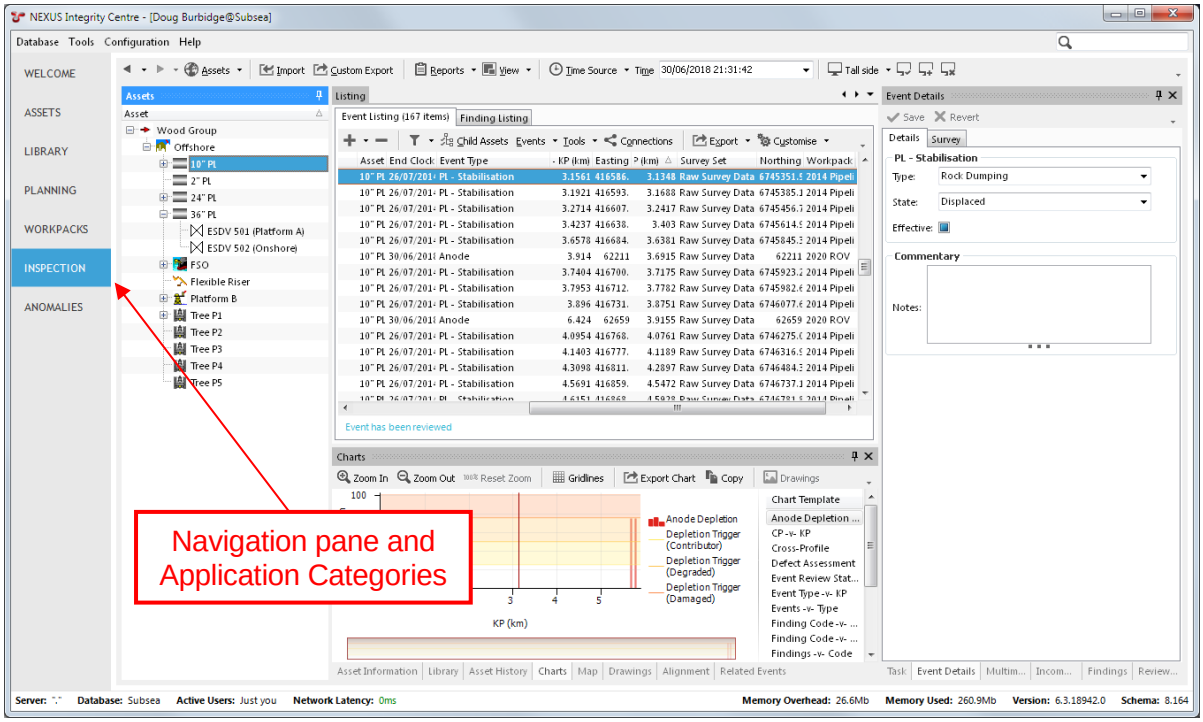


Figure 4.1 - NEXUS IC navigation pane and application categories

In NEXUS IC, Offline Review is performed from the **Inspection** area. To navigate to **Inspection**, select **Inspection** from the navigation pane (See Figure 4.1 above).

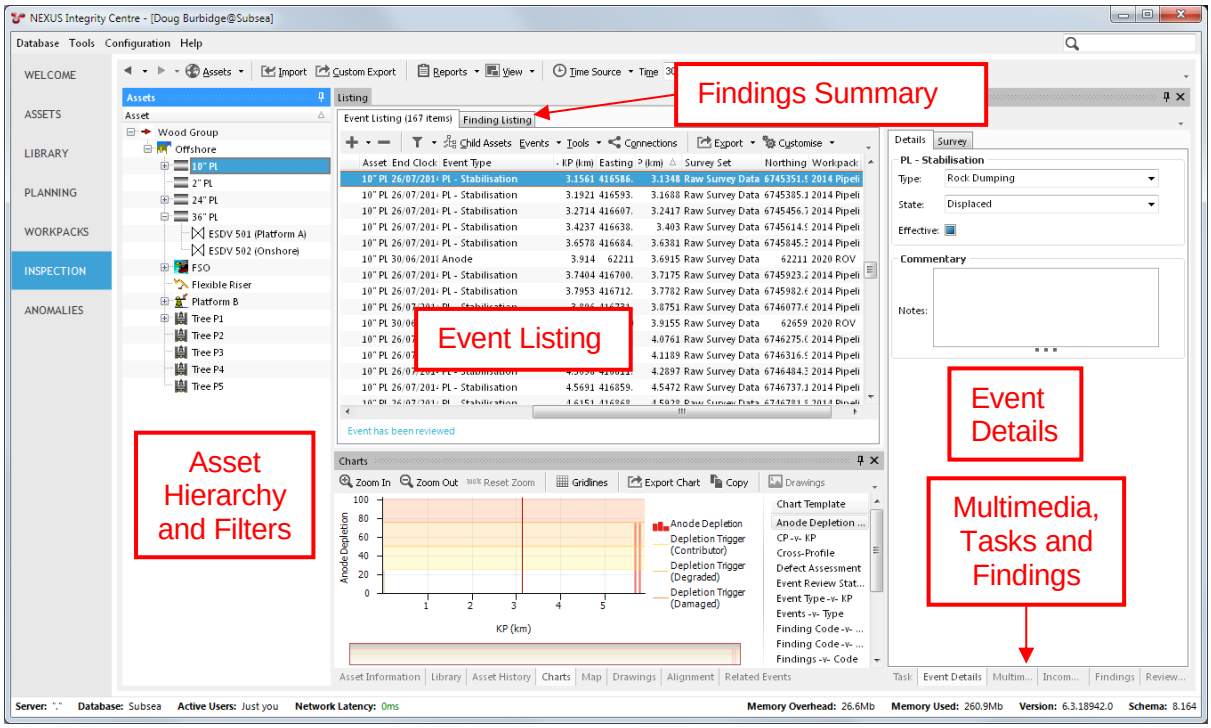


Figure 4.2 – NEXUS IC Inspection screen

The **Inspection** screen is broken up into several sub-windows. These windows can be rearranged, “torn off” to float outside the main application window, and toggled on/off via the **View** menu button.

4.2.1 Asset Hierarchy and Filters

The **Assets** window contains the asset hierarchy. This hierarchy can be used in the same way as the IC-Inspection hierarchy described in section 3.3.3 above.

The **Filters** menu button is used to filter the events listed in the **Event Listing** by Workpack or Event Type.

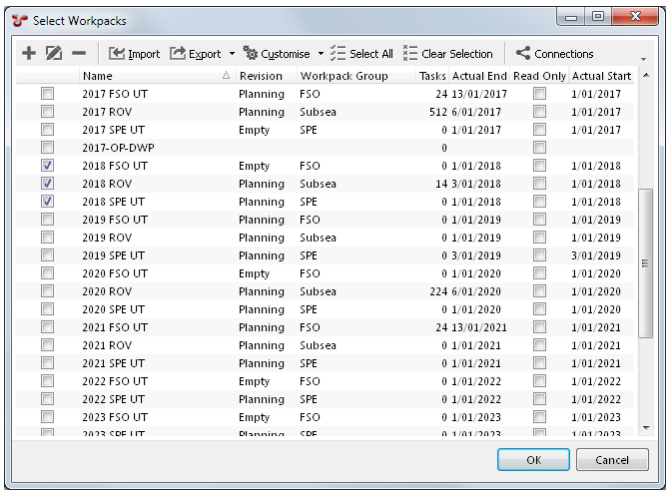


Figure 4.3 – Workpack Filters

The **Workpack** filter is set by putting check-marks next to the correct workpack(s). While performing review the correct workpack should always be selected. If additional workpacks are selected, or none are selected (All) then you will see events from previous years interlaced with the current events. This can lead to confusion.

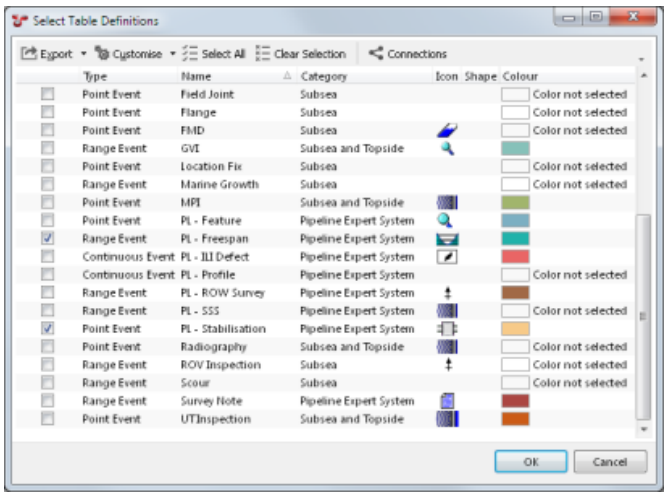


Figure 4.4 – Event Filters

The **Event Type** can be set by selecting it from the list. More than one can be selected at a time. Right clicking will provide options to Select All, Unselect All and Invert Selection.

The **Include Child Assets** button can be selected to include any events that exist on child assets.

Filters can also be set on grid columns. For example, you can filter the Start Clock column to cover a particular range of dates and times.

Selected filters will show at the bottom of the Event Listing grid. To clear a filter, click the 'X" at its left side.

4.2.2 Event Summary

The **Event Listing** is a grid listing of events that have been logged against the selected asset and which match the configured filtering criteria. Event data is shown in the grid columns.

4.2.3 Event Details

The **Event Details** area shows information specific to the event selected in the **Event Listing** grid. As with the **Active Events** window in IC-Inspection, the Survey and Comments Tabbed pages are available here.

4.2.4 Findings Summary

The **Finding Listing** is a grid listing of Findings that have been recorded against the selected asset and which match the configured event filtering criteria.

4.2.5 Multimedia, Task, Findings

The **Multimedia** window shows any multimedia that have been recorded against the selected event. Images can be added or removed.

If the selected event was launched from a task, the **Task** window shows that task.

The **Findings** area provides details of any findings on the selected event only.

	Use the asset hierarchy and filters tabs to find the events you created during your mock pipeline and structural inspections.
Activity:	***Use the Events and Findings Summaries to browse the event and finding data.***
	Use the Events Details to view the event data.

4.3 Inspection overview

The primary objectives of reviewing inspection data are to ensure that:

- Any inspection events have findings have sufficient supporting evidence attached (e.g. photos/video still and event information).
- Inspection events which have been specifically bookmarked by the online inspection engineer/s are reviewed.
- Review of all inspection events recorded.
- Multimedia attached to inspection events are of good quality.
- The date/timestamp of the inspection events recorded match the actual start date/timestamp and end date/timestamp indicated on the Digital Video.

Additionally, once the date/time stamps of the events have been reviewed and confirmed, then Track Repositioning can be performed and Anomaly Triggers re-run against updated survey fields.

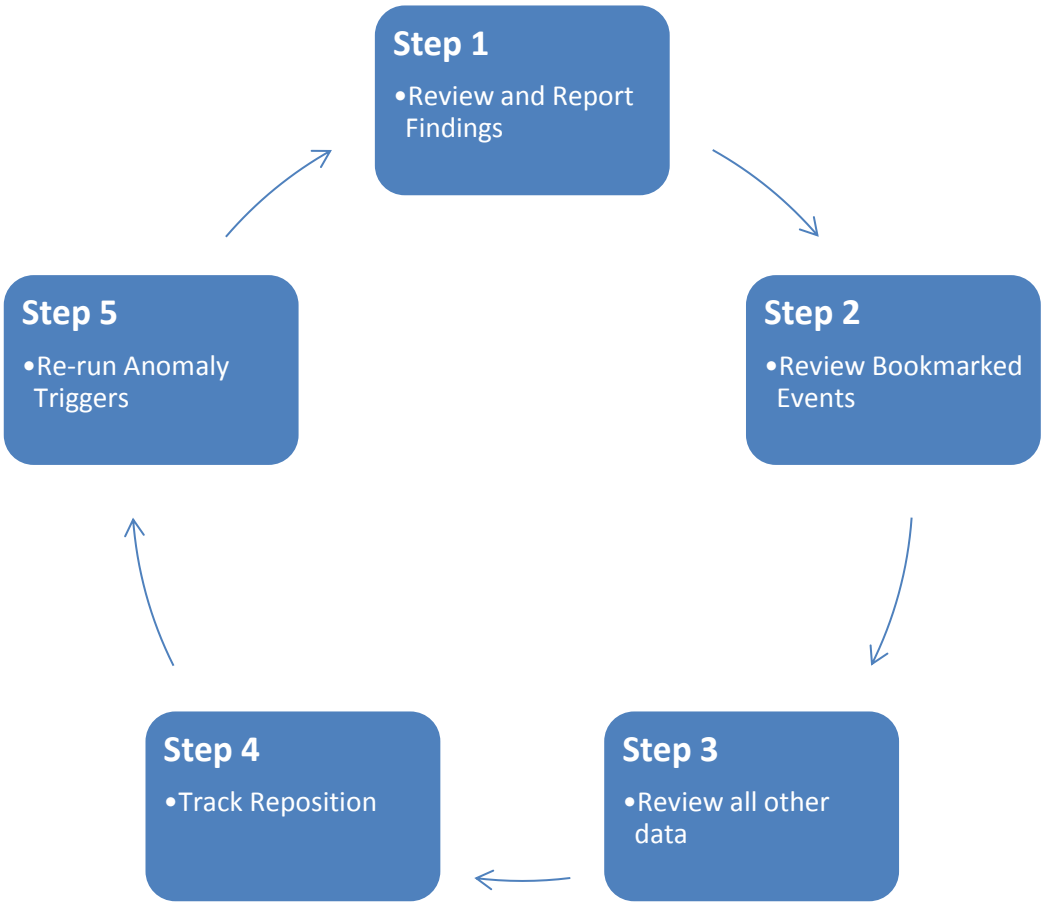


Figure 4.5 - Data review process

4.4 Review events with findings

All findings recorded by the online inspection engineers in IC-Inspection are identified in the Event Summary pane by a yellow rectangle in the column titled **F**. You can click on the Column heading **F** to sort the grid so that all findings are at the top, or filter that column so that only events with findings are displayed. Events marked with a red rectangle have one or more findings that have an open Anomaly connected to them. Events marked with a grey rectangle have one or more findings connected to a closed-out Anomaly.

- Check the video and ensure that the timestamps for the start event and end event are correct (keyboard shortcuts: **7/Home** & **9/PgUp** on the numeric keypad for Start and End respectively).
  (Please note: For information regarding updating Event Start and End times please see section 5.2 on page 40)
- Check that the event form is complete and that all data and comments are accurate and concise.
- Check that any multimedia attached to the event are of good quality; delete any bad quality or extraneous multimedia, or add more/clearer ones to the event if necessary
- Ensure that the Finding Description is accurate and concise.
- Ensure that the correct Findings code has been assigned.
- Mark the event as reviewed and continue to the next finding (keyboard shortcut: 0/Ins on the numeric keypad).

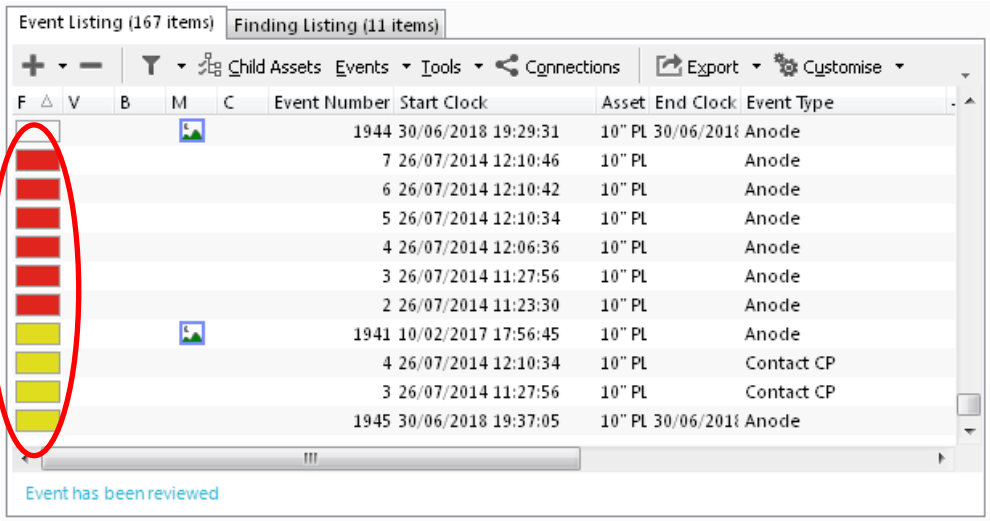


Figure 4.6 - Events with findings

Activity:	***Use the procedure above to review any events that you created during your mock pipeline inspection that contain findings.***

4.5 Review bookmarked events

Online inspection engineers may bookmark any event for specific review by the offline data review team. When online inspection engineers have utilised the Bookmarking functionality in IC-Inspection the offline data reviewer will be required to pay special attention to these events.

All bookmarked events recorded by the on-line inspection engineers in IC-Inspection are identified in the Event Summary pane by a star icon in the column titled **B** (See Figure 4.7 below). To sort the grid so that all bookmarked events are at the top, click on the Column heading **B**. You can set or clear a bookmark by right-clicking on the event and choosing the appropriate menu option.

- Check the video and ensure that the timestamps for the start event and end event are correct (keyboard shortcuts: **7/Home** & **9/PgUp** on the numeric keypad for Start and End respectively).
  (Please note: For information regarding Updating event start and end times please see section 5.2 on page 40).
- Check that the event form is complete and that all data and comments are accurate and concise.
- Check that any multimedia attached to the event are of good quality; delete any bad quality or extraneous multimedia, or add more/clearer ones to the event if necessary.
- If required this bookmarked event can be raised to a finding.
- Mark the event as reviewed and continue to the next bookmarked event.

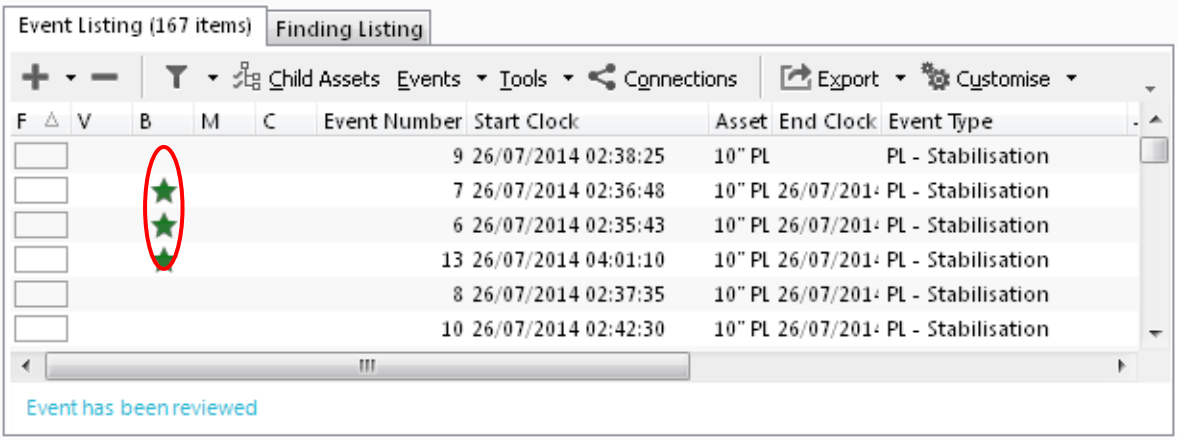


Figure 4.7 - Bookmarked events

Activity:	***Use the procedure above to review any events that you created during your mock pipeline inspection that contain bookmarks.*** ***Tip: Remember to toggle bookmarks off once reviewed!***

4.6 Reviewing events by date/time

Once Findings and Bookmarked events have been reviewed the process of data review can continue on all other recorded events. It is standard practice to review the events from oldest to newest.

To sort the Events by Date/Time, click on the **Start Clock** column heading.

- Check the video and ensure that the timestamps for the start event and end event are correct (keyboard shortcuts: **7/Home** & **9/PgUp** on the numeric keypad for Start and End respectively).
  (Please note: For information regarding Updating event start and end times please see section 5.2 on page 40).
- Check that the event form is complete and that all data and comments are accurate and concise.
- Check that any photos attached to the event are of good quality, delete any bad quality or extraneous photos or add more photos to the event if necessary.
- Mark the event as reviewed and continue to the next event (keyboard shortcut: **0/Ins** on the numeric keypad).

Reviewed events are highlighted in the Event Summary window in blue (see Figure 4.8 below).

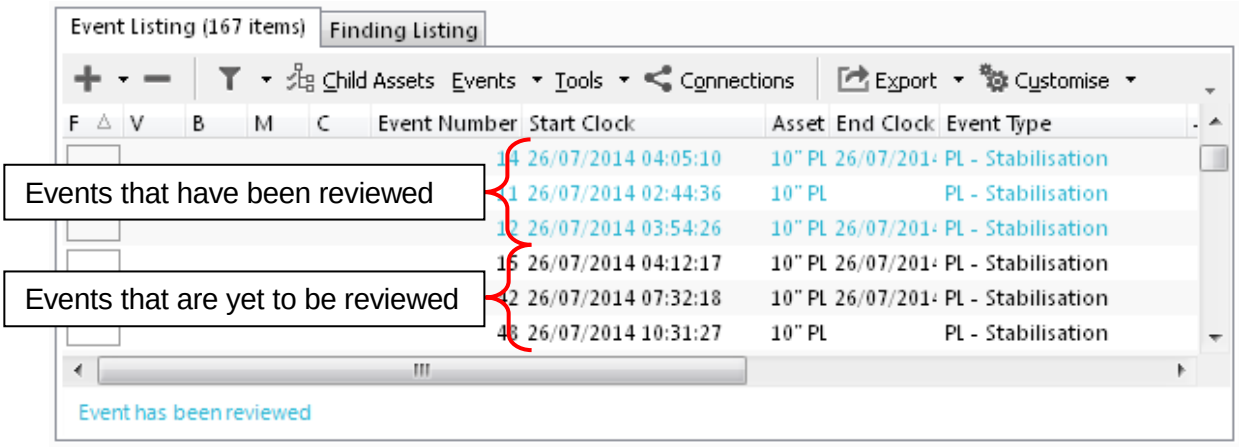


Figure 4.8 – Event Summary

Activity:	***Use the procedure above to review the remaining events in Date / Time order.*** ***Tip: Open the Pipeline View tab and play the inspection video from the***

beginning (starting from the first GVI event) all the way through to the end. Review the events and add any missed events if necessary.

4.7 Post-processing survey data

4.7.1 Track Repositioning

After the data has been reviewed and the **Date / Time** stamps of each of the events has been cross-checked and updated against the DV, the post processed survey data (normally supplied by the contracted survey company) will need to be used to update the NEXUS IC database by importing that processed survey data as a new Survey Set.

4.7.2 Processed Data (Smoothed) Files

Track Reposition requires a 'CSV' or MS Excel file of the processed survey data, most likely in the format originally provided in the survey string. For example:

#Fields:DateTime, KP, Easting, Northing, Depth, CPReading, FieldGradient
15/03/2005 10:19:37, 0.8372, 143436.27, 6441508.37, 266.28, 0, 0
15/03/2005 10:19:38, 0.8374, 143438.28, 6441506.36, 266.3, 0, 0
15/03/2005 10:19:39, 0.8376, 143440.29, 6441504.35, 266.32, 0, 0

A header line or lines is required to identify the elements of each subsequent line of data. There are no restrictions on the number, naming conventions or order of data fields within each line and in addition the date/time format is somewhat flexible.

The Survey contractor needs to be made aware that post processed data is required and that it should not be discarded. It may be helpful to provide the survey contractor with a listing of times during which events were recorded so that they can provide the correct data.

The 'smoothed' data provided by the surveyors MUST contain data points with intervals of no more than 5 seconds.

4.7.3 Interpolation and Threshold

Track reposition works by matching the event date and time to a line entry in the processed data file. It then takes the survey data entries on that line and saves them into the event survey data. When an exact date and time match cannot be found NEXUS IC can interpolate values for the survey data based on the preceding and following line entries. If no matching date time values exist within the threshold NEXUS IC will not return any survey values.

4.7.4 Procedure

We recommend that **Track Repositioning** be performed one pipeline (or asset) at a time.

- Select one of the events which is to be repositioned.
- Go to the Event Details window.
- Click the Survey tab.
- Click the "…" ellipsis button next to "Survey Set".
- In the resulting "Select Survey Set", click "+" to add a new survey set if necessary.
- Click the Import button to launch the **Import Survey Sets Wizard**.
- ~~On the Source File page of the wizard use the ellipses button […] to browse to the CSV/ Excel file, click **Next.**~~ (The Survey Set import code is not yet written.)
  (Please note: This will not make any changes to the database at this point).
- Once you have imported your new Survey Set, select all the events to be repositioned (click the first one, then shift-click the last one), click the "…" ellipsis button next to "Survey Set", and select the desired survey set.
- If you later wish to revert, simply select the events again and select the Raw Survey Set for them again (or whatever other survey set is desired).

Activity: ***Perform a track reposition on your pipeline inspection events.***

4.7.5 Re-run Anomaly Triggers

Once Track Repositioning has been performed, then the Anomaly Triggers utility can be re-run over the inspection data. This means that you can now correct the survey data that might trigger anomalies where previously they didn't. This can create new findings and remove previous findings.

For example: *Anomaly Triggers have been defined for a particular pipeline where spans over 15m are deemed to be anomalous. The raw survey data of a Span event had defined a start KP of 1.458 and end KP of 1.472 (with a calculated span length of 14m). However after post-processing the data the start KP is 1.457 and the end KP is 1.473 resulting in the new span length being 16m. Running the Anomaly Triggers utility will pick up the new span length and flag the event as a finding because it is now outside the anomaly limit*.

To run the Anomaly Triggers click on the **Tools** | **Anomaly Triggers** toolbar button in the Event Summary window.

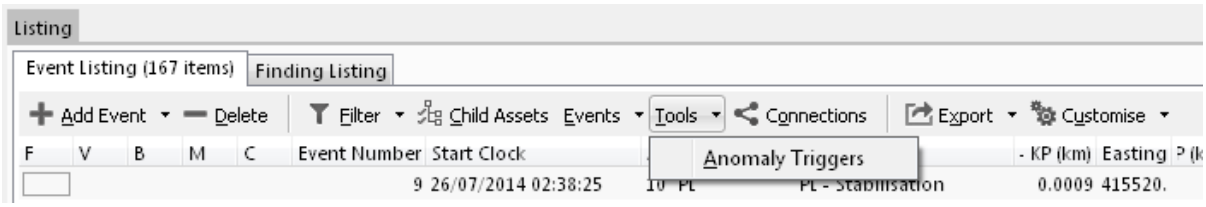


Figure 4.9 - Anomaly Triggers

Activity:	***Re-run the Anomaly Triggers on your pipeline inspection events.*** ***Tip: Try adding a debris event (if you don't already have an example) and select 'Metallic in Contact' then re-run the anomaly trigger.***

5.0 HOW TO:

5.1 Database backups

When the database server is the **Review PC** we recommend performing a database backup every six hours.

When the database server is the **IC-Inspection PC** then we recommend performing a database backup at the end of every shift **AND** at least once during the shift if there is sufficient downtime.

If the server is an **independent SQL server** we recommend performing a database backup at the end of every shift **AND** at least once during the shift if there is sufficient downtime.

5.2 Update event start/end from the digital video

Timestamps for the start and end of an event are viewable from the Survey tabbed page of the Event Details pane.

When reviewing data from digital video, the start and end time of the event can be automatically updated from the date and time of the digital video currently playing.

To update the start time of the currently selected event to the date/time of the Digital Video, ensure that the **Time** button on the Connect DVR toolbar is **DOWN** (see Figure 5.1 below).

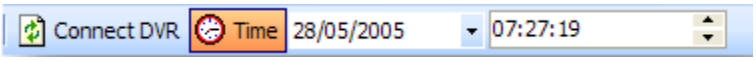


Figure 5.1 - DVR timings

When the **Time** button is up the local time is displayed. This is useful in scenarios where no digital video is present.

The start time of the currently selected event can be updated by clicking on the **Events | Update Start** toolbar button on the Event Summary toolbar (See Figure 5.2 below). The keyboard shortcut is the number **7/Home** on the numeric keypad (ensure that **Num Lock** is **off**).

The end time of the currently selected event can be updated by clicking on the **Events | Update End** toolbar button on the Event Summary toolbar. The keyboard shortcut is the number **9/PgUp** on the numeric keypad (ensure that **Num Lock** is **off**).

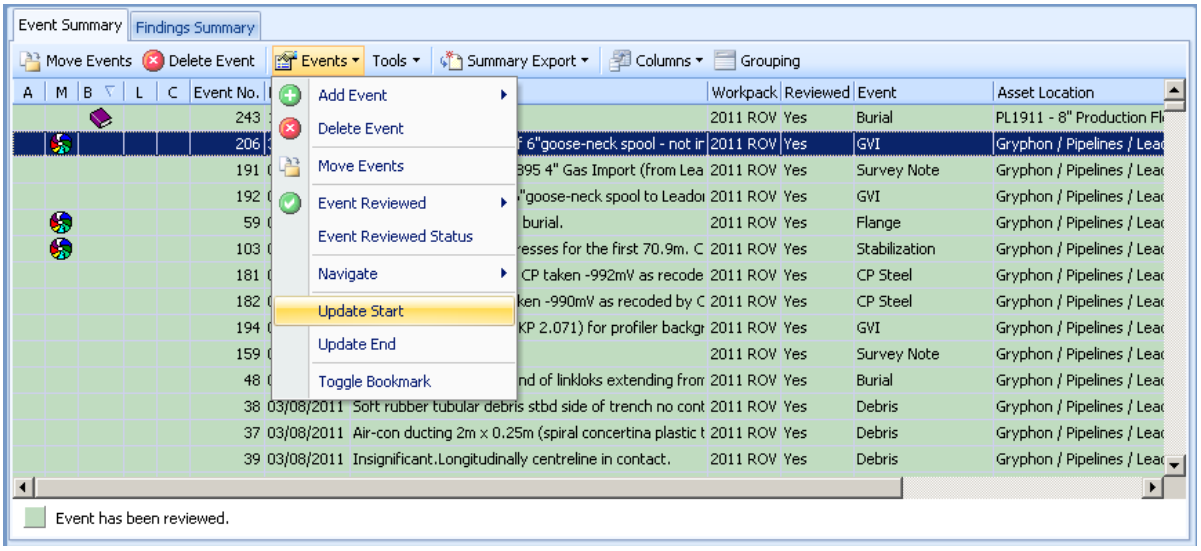


Figure 5.2 - Events Summary updating start/end

After the event is reviewed, click on the number **0/Ins** on the numeric keypad (ensure that **Num Lock** is **off**) – this will mark the currently selected event as reviewed and move to the next record.

You can also select the reviewed event and then click on the drop-down list **Events**, scroll down to **Event Reviewed** and select **Mark Event as Reviewed** which will also highlight the event as reviewed (See Figure 5.3 below).

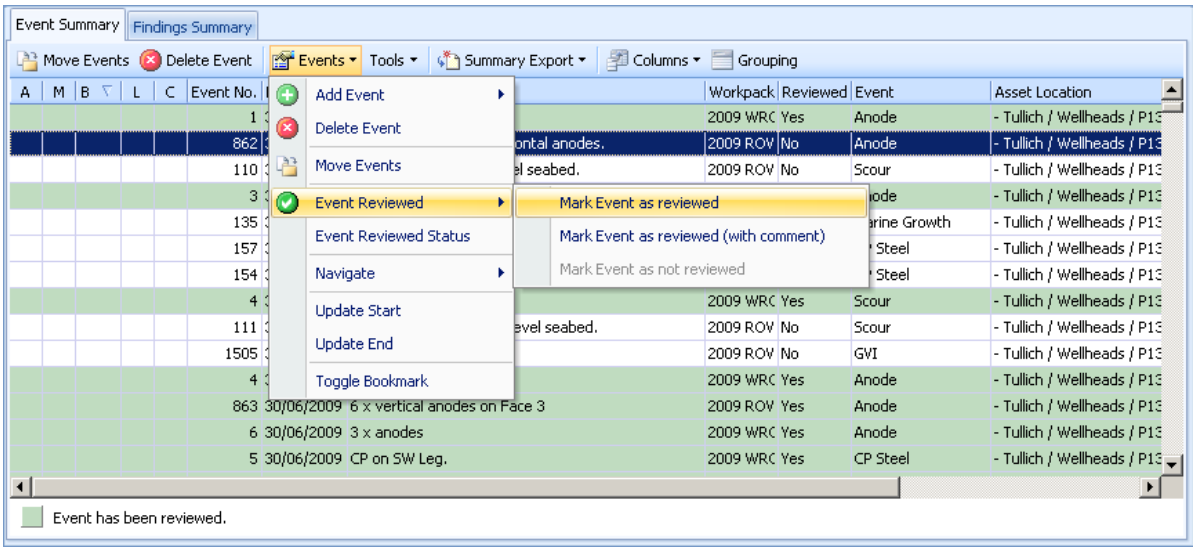


Figure 5.3 - Events Summary reviewed

5.3 View all event fields in a grid

By default the **Event Listing** grid displays all fields which are common to all event types (e.g. Event Name, Number, Start Date/Time, Asset, Comments etc.).

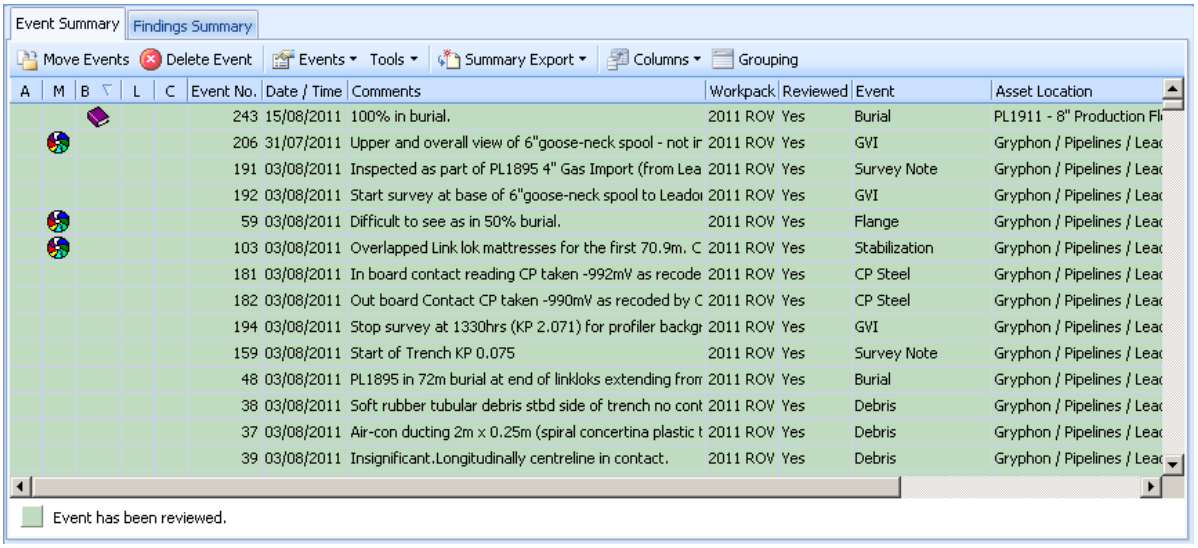


Figure 5.4 - Events Summary showing common fields

To display event specific data in the Event Summary grid, you must have **only one** Event Type in the grid. To do this, click on **Filter | By Event Type…** toolbar button and check only one of the event definitions in the grid.

Alternatively click on the Filters tabbed page in the Assets pane and check **only one** of the event definitions then click on **Apply**.

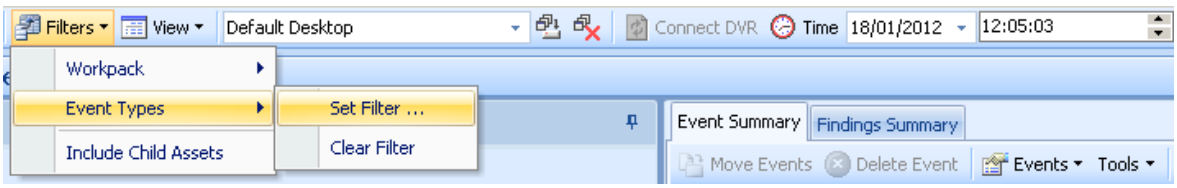


Figure 5.5 - Setting an event filter

Please note that using the in-grid filtering is not sufficient to display the event properties in the Event Summary grid.

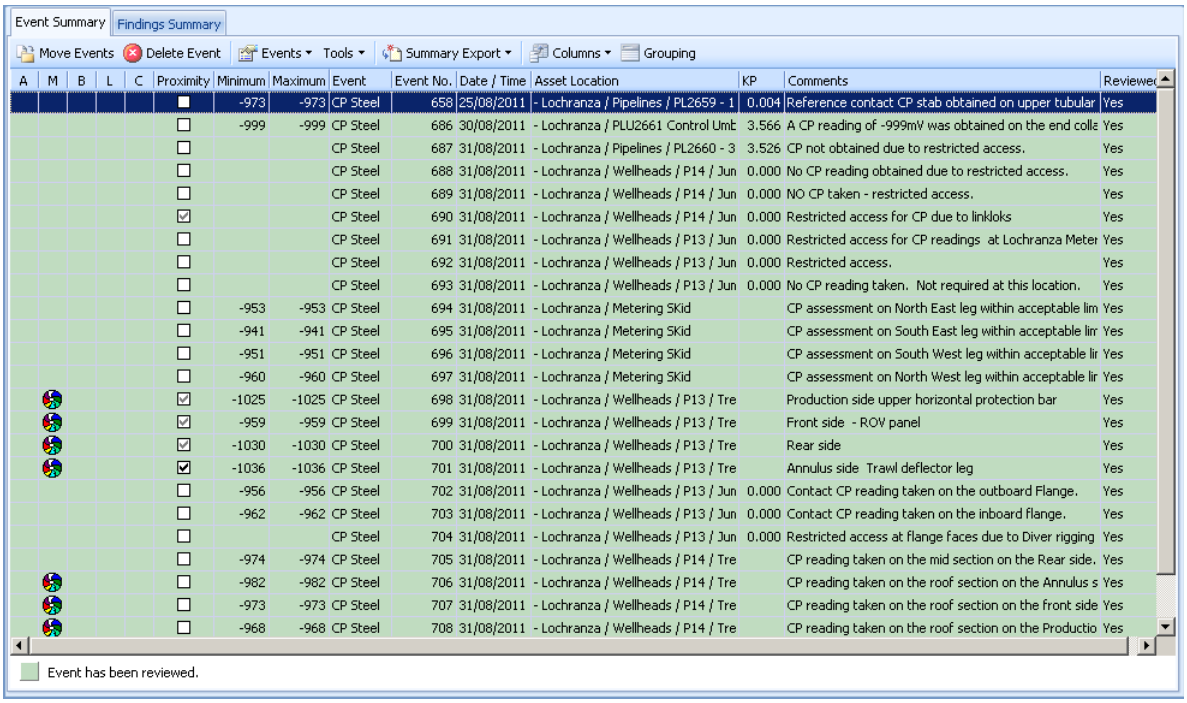


Figure 5.6 - Events Summary showing filtered events

5.4 Running reports

During an inspection campaign, some clients may request that a report is generated from NEXUS IC. An example of this is if a client wished to see a report on the findings for each day. Each client's database will be set up differently and therefore have different reports available in the **Reports** application category.

To run a Report in NEXUS IC, carry out the following steps:

1. Navigate to the **Reports** appplication category.
2. Navigate to the report you wish to run.
3. Right click on the report and select **Export (Microsoft Word)**.
4. Follow the export wizard to generate the report.

5.5 Keyboard shortcuts

The default keyboard shortcuts in the **Inspections** | **Review** screen use the numeric keypad on a standard keyboard with the defaults shown in the image below. These shortcuts have been refined after numerous offshore inspection campaigns however they can be altered if required.

To change the default keyboard shortcuts go to **Tools** | **Options** | **Review** | **Keyboard Shortcuts** (available from the Main Menu).

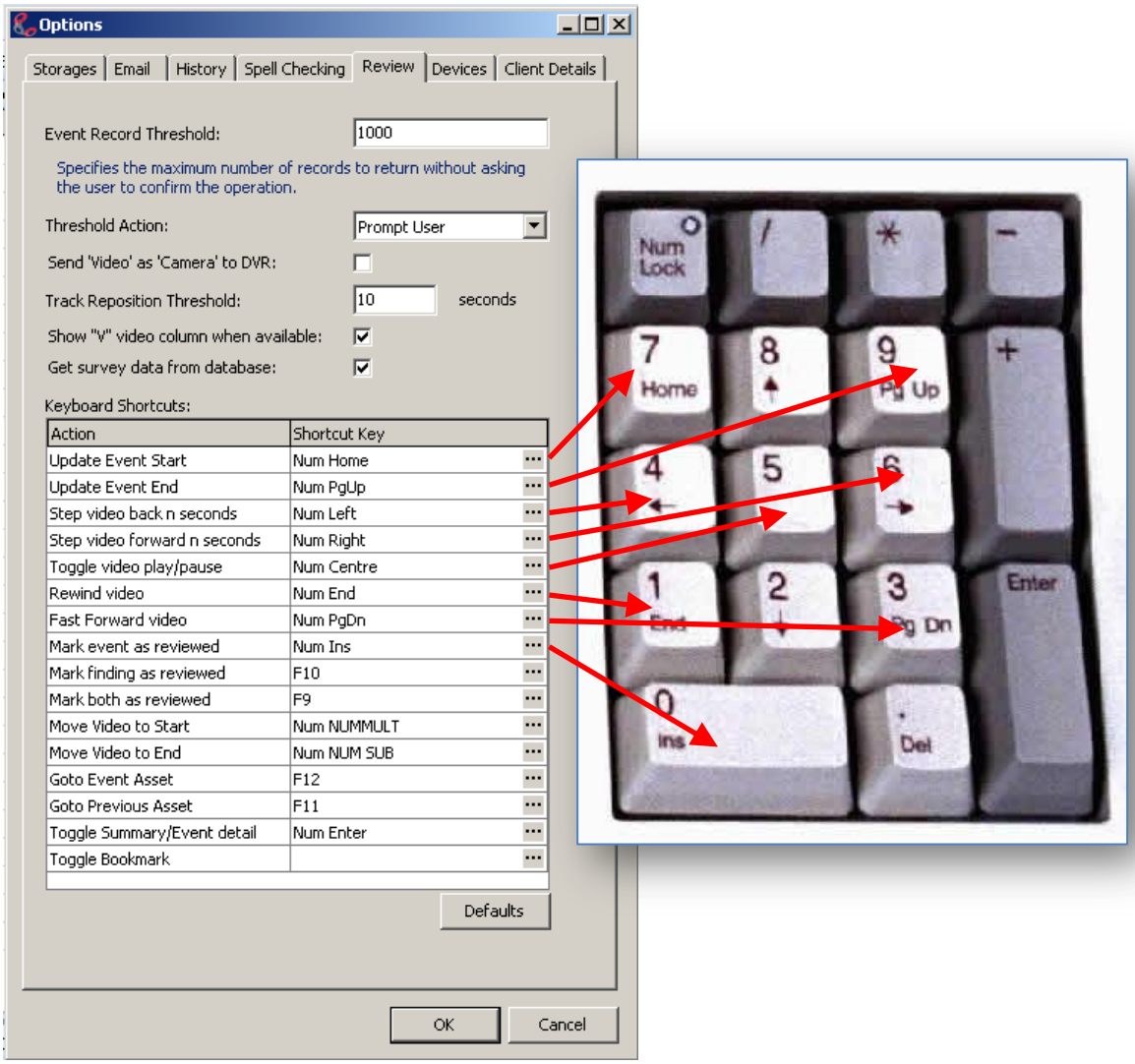


Figure 5.7 - Keyboard shortcut keys

See Appendix 2 for a keyboard shortcut layout that can be printed and used as reference during inspection review.

APPENDICES

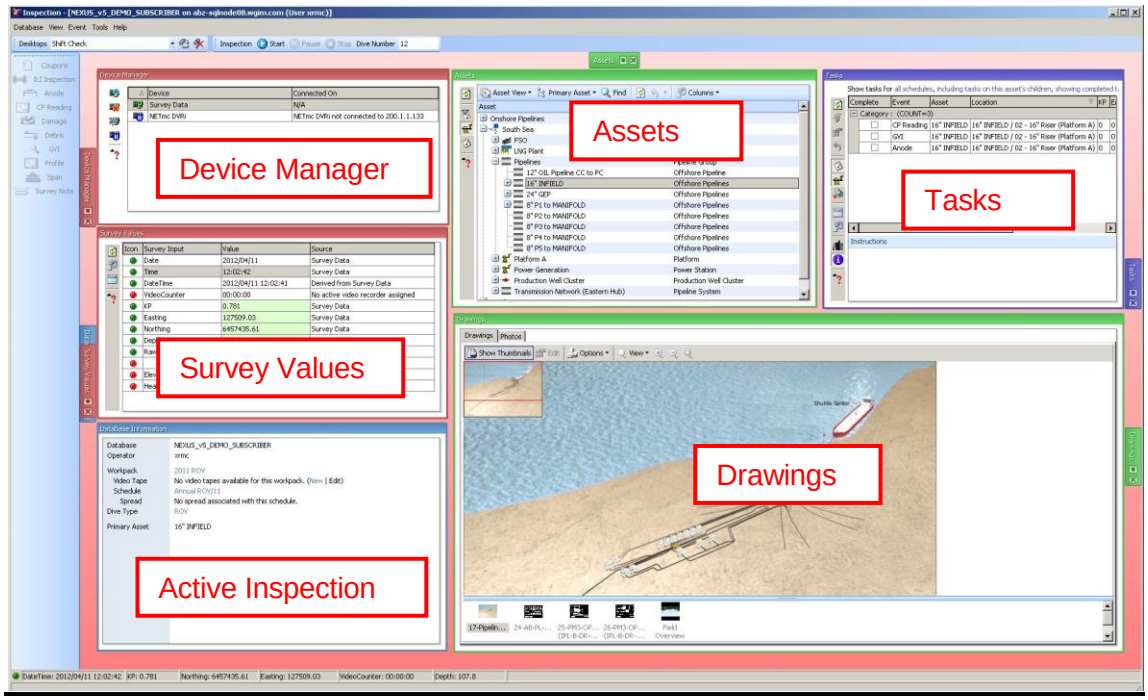
Appendix 1 - DESKTOP CONFIGURATIONS

Appendix 2 - DEFAULT KEYBOARD SHORTCUT LAYOUT

Appendix 1. DESKTOP CONFIGURATIONS

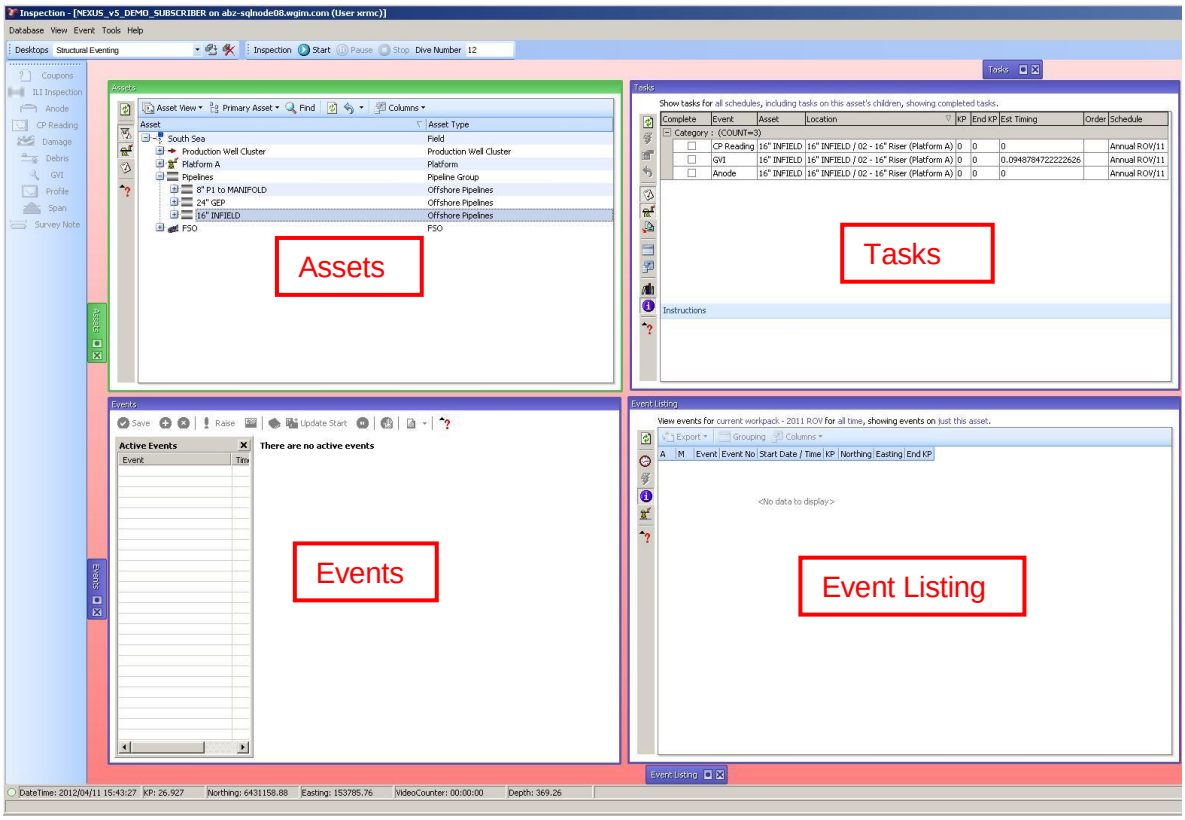
"SHIFT CHECK" DESKTOP

Primary Monitor

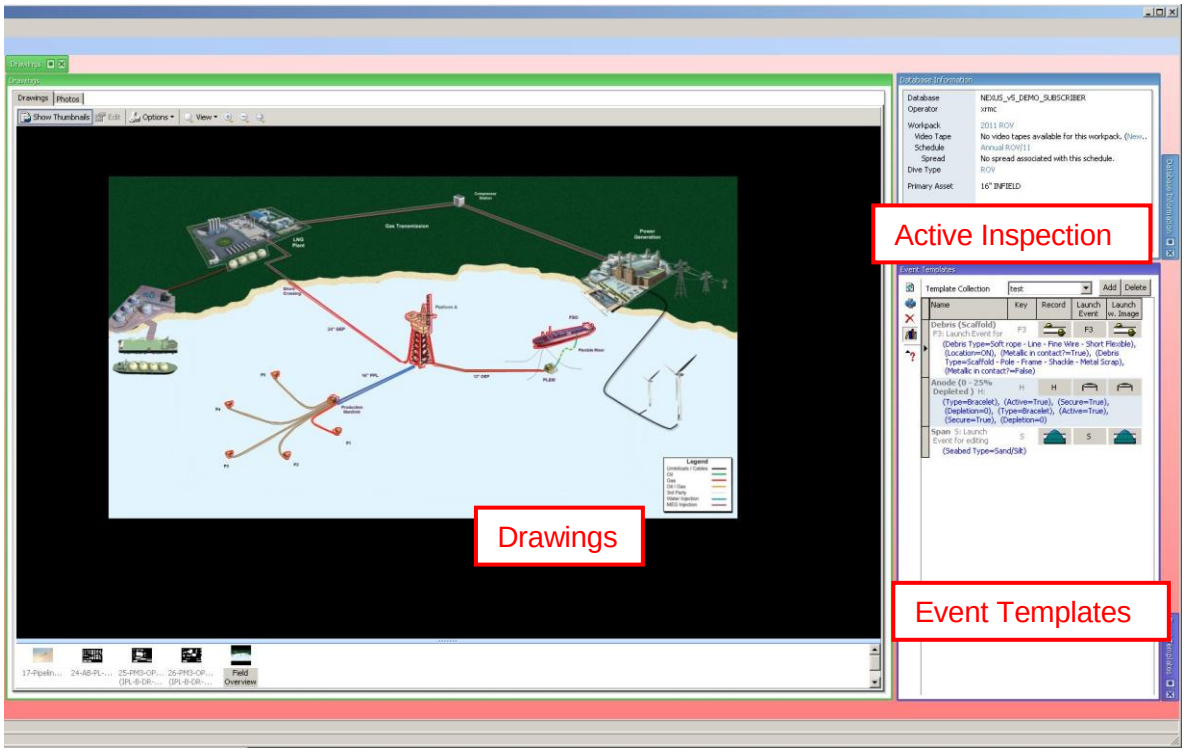


"STRUCTURAL EVENTING" DESKTOP

Primary Monitor

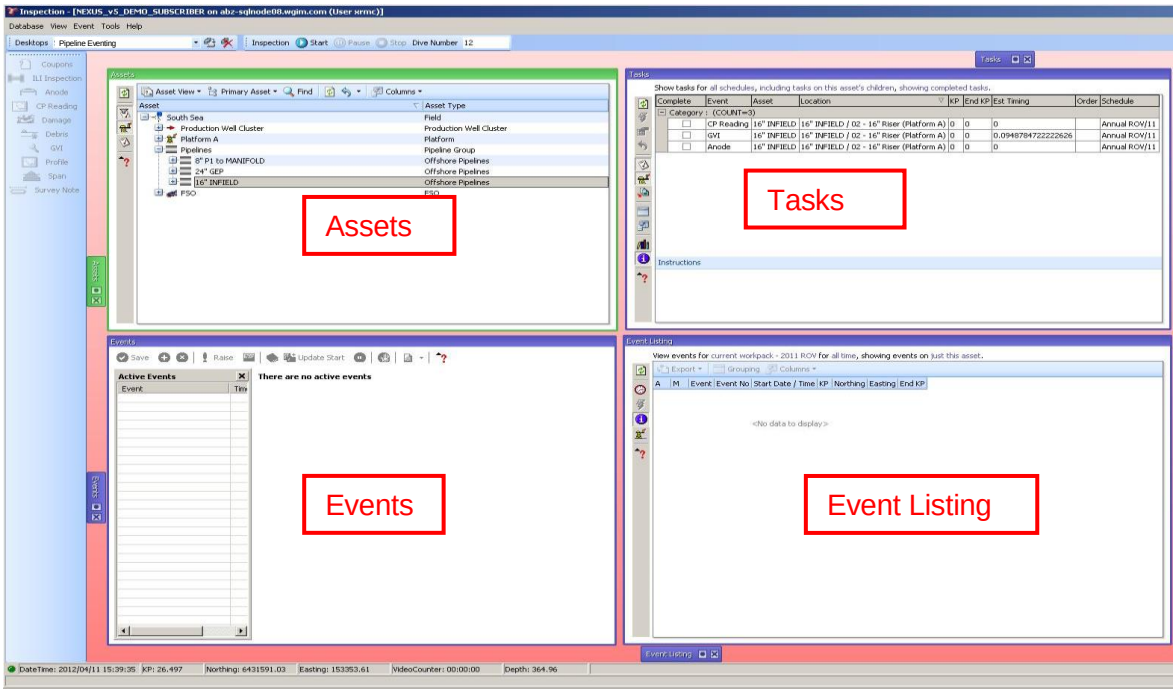


Secondary Monitor

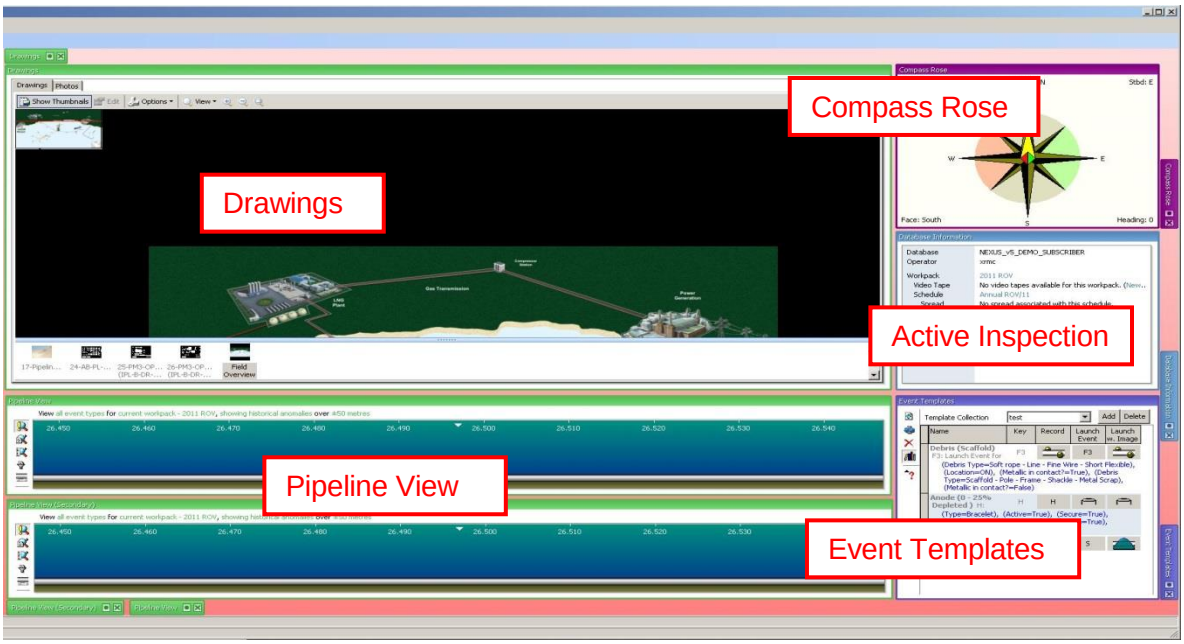


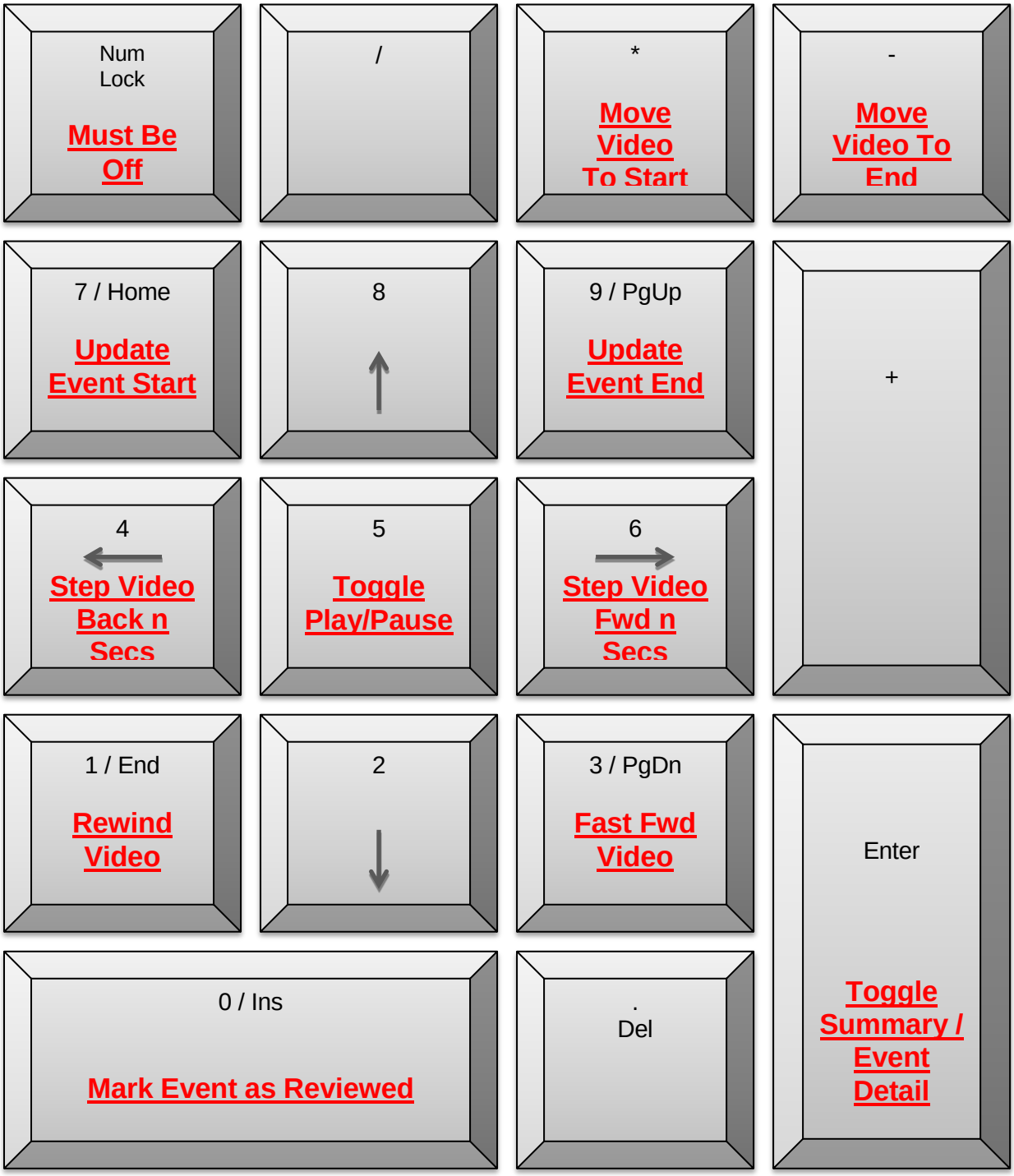
"PIPELINE EVENTING" DESKTOP

Primary Monitor



Secondary Monitor



Appendix 2. DEFAULT KEYBOARD SHORTCUT LAYOUT

NEXUS default keyboard shortcut layout