

Lane Cove Creative Photography 2024

Essential Skills

RAW Processing Essentials

Why Use RAW Capture?

You can take worthwhile photographs using the JPEG file format, particularly:

- If you set up and use your camera's built in enhancement functions
- For documentary style photographs such as:
 - Holiday snaps
 - Family portraits
 - Family special occasions

JPEG is convenient and simple as your photos can be taken straight from your camera

Why Use RAW Capture?

So why bother with RAW capture?

Because it gives you the tools and processes to create art – **making not taking**

RAW capture:

- Provides the highest level of fidelity in:
 - Colour
 - Tone
- Allows the use of additional processes such as:
 - Topaz
 - NIK Filters
 - AI enhancement

Why Use RAW Capture?

Let's now examine in detail why we should use RAW capture and how we should process it to make creative masterpieces

Why Use RAW Capture?



RAW File Unprocessed



JPG File Out of Camera



RAW File Processed

Why Use RAW Capture?

To maintain highest level of data quality to allow most flexibility in processing and output

Formats like JPEG are “lossy” and discard up to 90+% of the image information

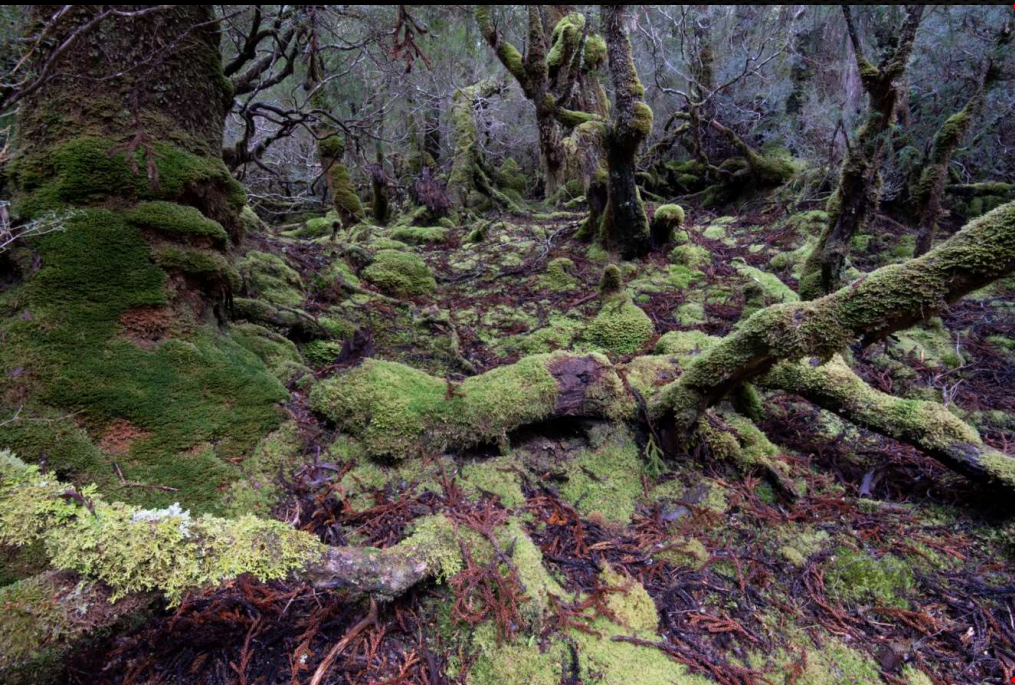


90+% of tonal values and colour information discarded when rendered as a JPEG and it can't be recovered.



Why Use RAW Capture?

Some factors, such as white balance, bit depth and colour space, are not set until the file is rendered and exported into one of several image formats



Why Use RAW Capture?

- JPEG images are rendered in camera
- All settings are applied using a “one size fits all” algorithm
- Critical settings are locked in, including restricting the file to 8 bits (256 maximum possible levels of tone)



JPEG 8 Bit



PSD 16 Bit

Why Use RAW Capture?

Processing RAW data in a program like Lightroom is:

- non-destructive
- can be modified and changed multiple times without degrading the image quality



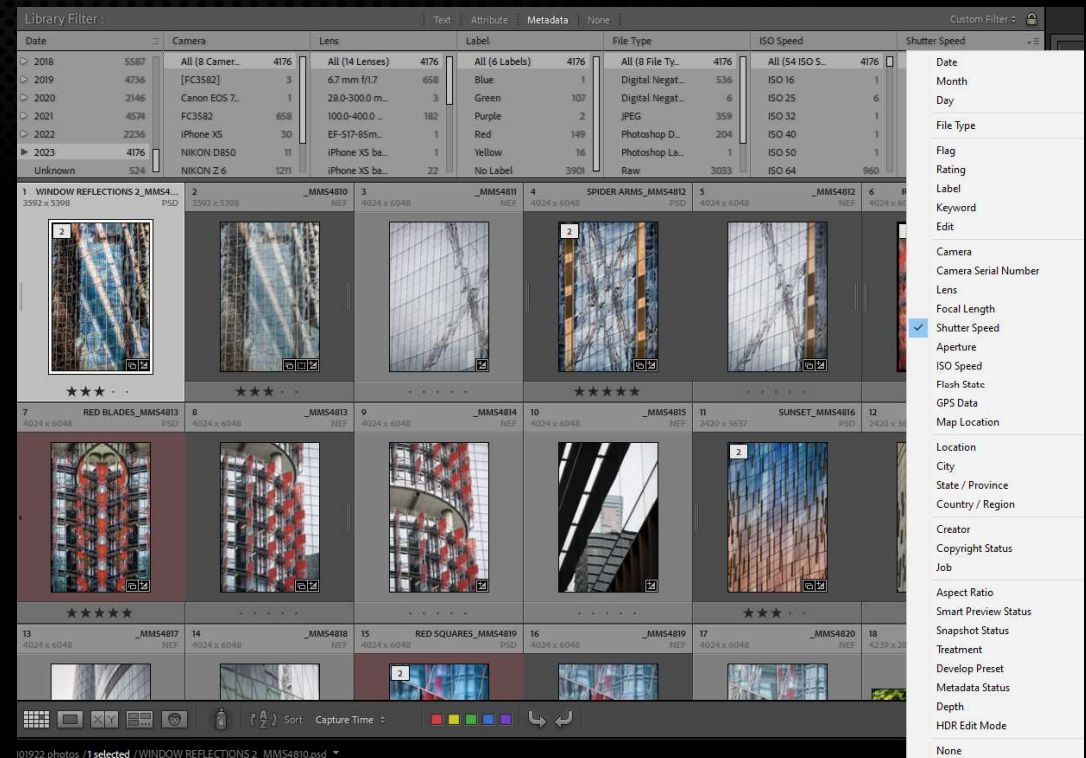
What is a RAW File?

A RAW file is purely data captured by your camera and is **NOT** a viewable file.

In addition to the image data, the file contains important metadata such as:

- camera settings
- lens focal length
- ISO
- time and date
- camera make
- model and serial number
- exposure compensation
- flash status
- exposure metering method
- GPS coordinates, in some cases

All of this data is searchable in a program like Lightroom.



What is a RAW File?

What is a Bit?

- Bit is short for binary digit
- It is the smallest unit of data that a computer can process and store
- A bit is always in one of two physical states, on or off
- The state is represented by a single binary value, 0 or 1
- Bits are usually grouped into bit multiples – eg 8 bit or 14 bit
- More bits in the multiple gives larger number representations
- Multiple bits are assigned a value depending on their place in the multiple

What is a RAW File?

What is a Bit?

Multiple of 8 bits

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

$$\begin{aligned} 2^0 &= 1 \\ 2^1 &= 2 \\ 2^2 &= 4 \\ 2^3 &= 8 \\ 2^4 &= 16 \\ 2^5 &= 32 \\ 2^6 &= 64 \\ 2^7 &= 128 \end{aligned}$$

Total = 255

or 256 if 0
is included

Multiple of 14 bits

0	1	2	11	12	13
---	---	---	-----	-----	----	----	----

$$\begin{aligned} 2^0 &= 1 \\ 2^1 &= 2 \\ 2^2 &= 4 \\ &\downarrow \\ 2^{11} &= 2048 \\ 2^{12} &= 4096 \\ 2^{13} &= 8192 \end{aligned}$$

Total = 16383

or 16384 if 0
is included

What is a RAW File?

A RAW file contains the most information possible from the subject – up to 14 bits (16,383 levels of tone) ensuring the maximum dynamic range (depending on ISO settings) for processing

1-bit

2-bits

3-bits

4-bits

5-bits

6-bits

7-bits

8-bits

9-bits

10-bits

11-bits

12-bits

13-bits

14-bits

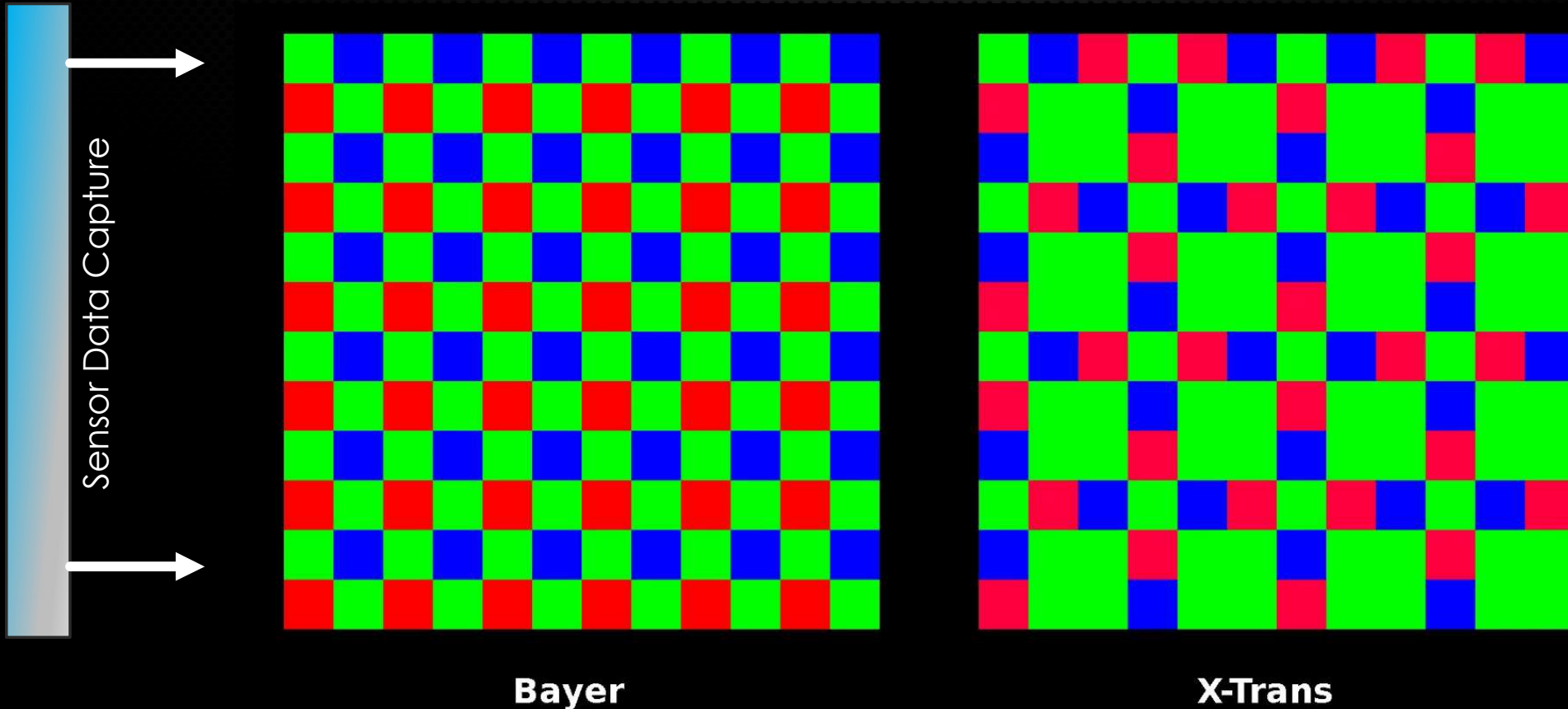
2 bit = a maximum of 2 levels of tone
Black and White

8 bit = a maximum of 256 levels of tone *
*Assuming every tone from black to white is captured

14 bit = a maximum of 16383 levels of tone

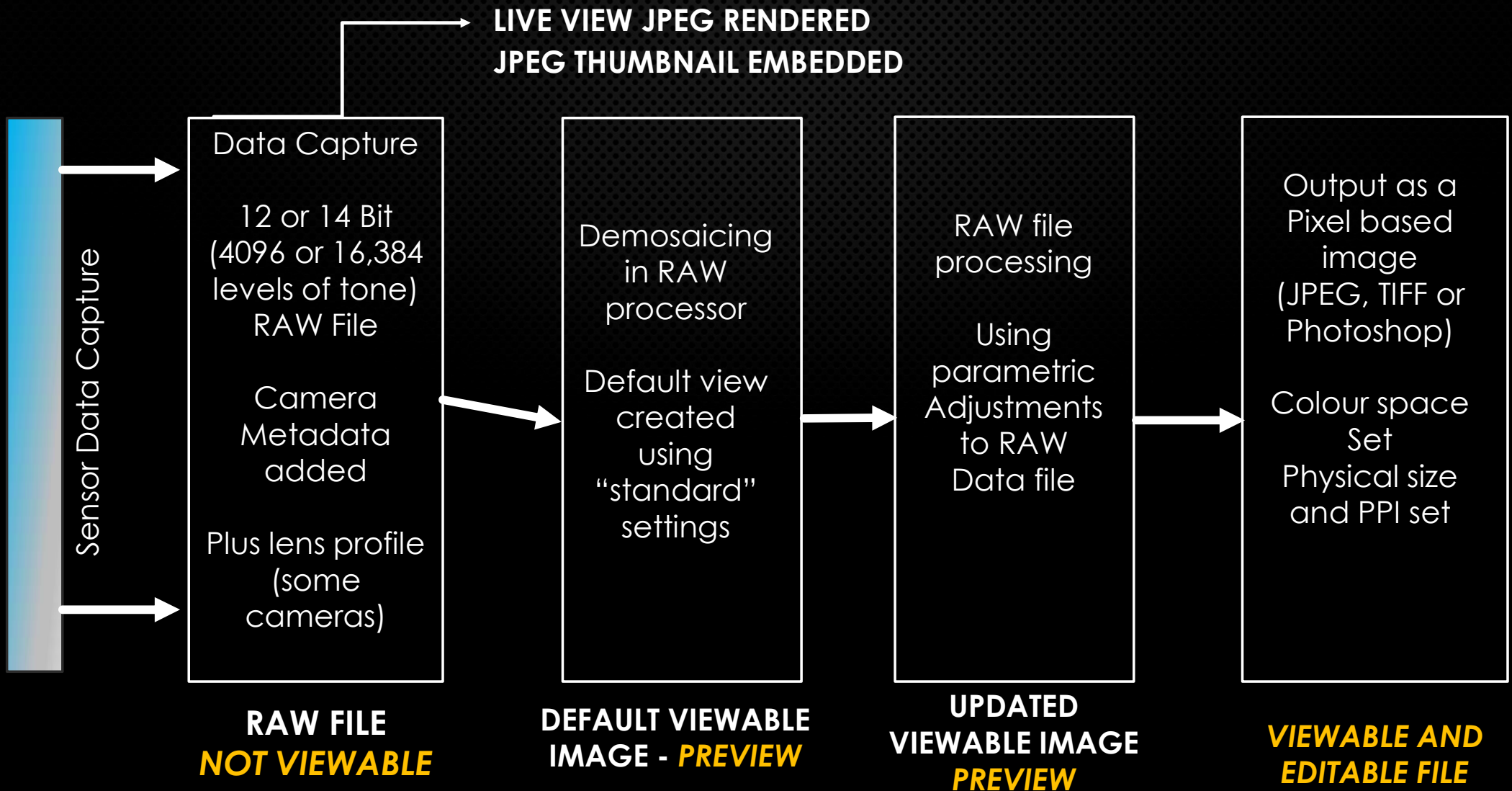
What is a RAW File?

The camera sensor only records one value of either Red, Green or Blue at each pixel.



To make a viewable image, the data recorded must be processed in software.

Understanding RAW Files



Understanding RAW Files

The RAW image data is unprocessed in the camera.

Just like there were different types of film, there are different ways to process image data - to achieve the result you want.



There is no right or wrong way to process the data.

Just a range of choices.

Understanding RAW Files

It is important to remember that the image you see on the camera back, or in the viewfinder of a mirrorless camera is **NOT** the RAW image being captured



- The viewfinder image is a JPEG preview created by the camera
- It serves as a guide for the photographer
- Highlights may appear to be clipped in the viewfinder (because the preview is compressed to 8 bit)
- But in reality, they may not be clipped in the RAW file

What is important to get “right” at capture?

A “good” RAW data capture will give you the maximum information to work with when processing your photograph.

These are the things that are important to master at capture:

- **Focus point and Depth Of Field**
- **Framing and viewpoint** (mostly – some allowance for cropping)
- **Exposure** – Expose To The Right (ETTR) for maximum data – without clipping highlights
- **Timing** - The decisive moment, or time of day
- **Movement** – camera and/or subject
- **Data quality** - Dynamic Range or Signal to Noise ratio (Depends on ISO settings mostly)
- **Lighting** – direction and quality

What is **NOT** so important to get “right” at capture?

Things that are not so necessary to consider at capture are set at the time of processing.

These are:

- **White Balance** – is set during processing, however using “Auto” White balance may give a good starting point as this is used in the initial view after demosaicing.
- **Tonality** – the range between the darkest (black) and the Lightest (White) tones. This is set during processing provided you have captured enough data – no black or white clipping.
- **Contrast and Saturation** – these are set during processing
- **Sharpening and Noise Reduction** – depending on ISO and initial capture sharpness.

The Basics of RAW Processing

RAW files cannot be read without a suitable software program that can carry out demosaicing and previewing the file.

Programs such as Lightroom, Adobe Camera RAW, ON1, Affinity Photo and others.

Note: the thumbnail you may see in Windows Explorer is NOT the image file – it is the JPEG thumbnail generated by the camera at capture.

The initial view once the file is opened in a suitable program is not intended to be the final image. It should look flat and dull. ***The initial view is the starting point, not the finishing point.***

In other words, RAW files ***NEED*** to be processed to produce an acceptable photograph.

RAW Processing Principles

Essentially, there are **five main things** we do to our image data, using the tools available in the processing software:

- Make the image **Warmer or Cooler** – White Balance/Colour Temperature.
- Make the image **Harder or Softer** – Increase or decrease contrast
- Make the image **Sharper or Duller** – increase or decrease sharpening and fine detail (Sharpening, Texture and Clarity)
- Make the image **Lighter or Darker** – adjusting overall tonality or “Exposure”
- Make the image more or less **Saturated** – Saturation and Vibrance

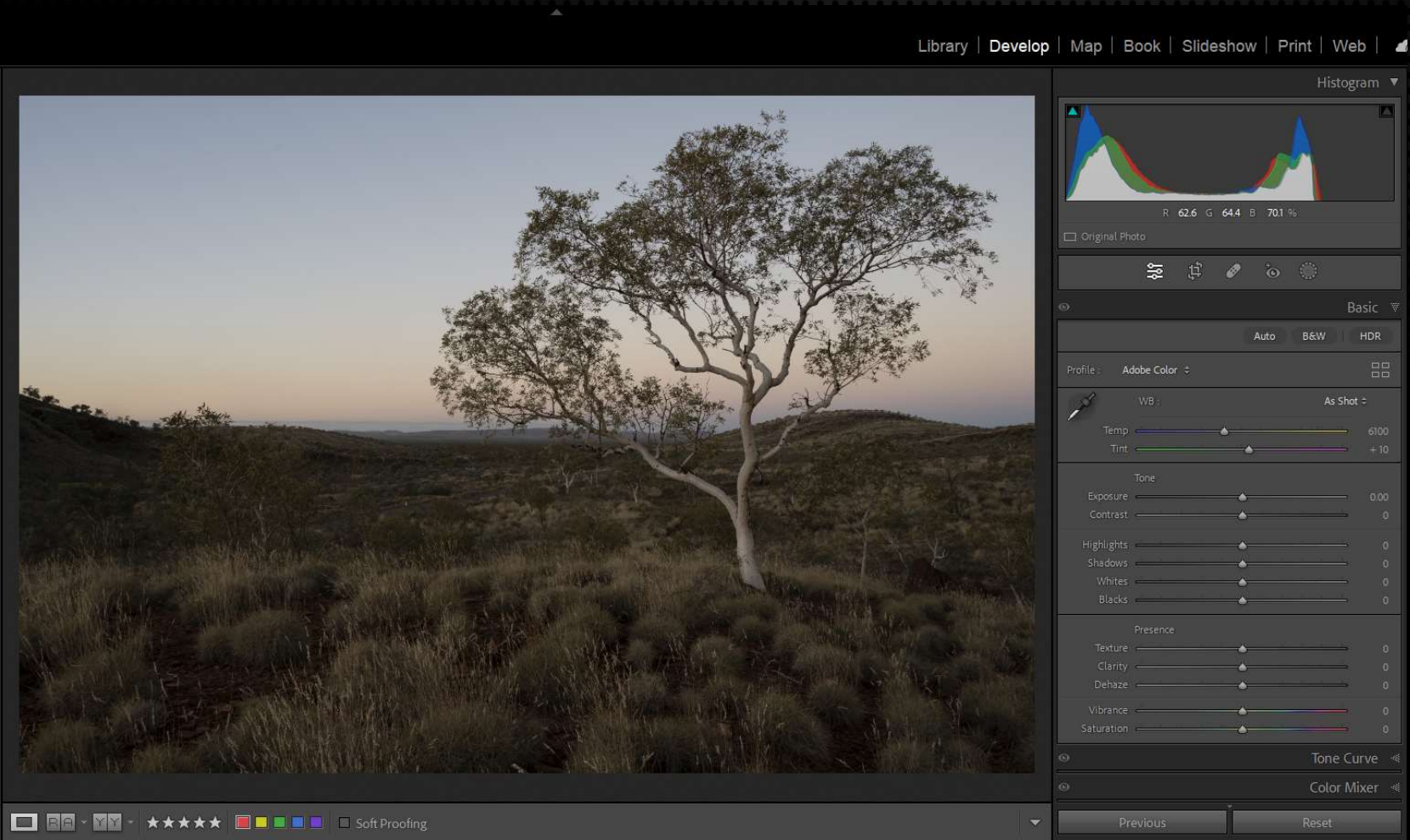
RAW Processing Principles

Other steps we may take during processing are:

- ***Cropping and levelling*** – using the Crop tools – which may change the aspect ratio
- ***Adding or removing a vignette*** – using the Effects tools
- ***Applying lens corrections*** – profile and/or removing chromatic aberrations
- ***Selective adjustments*** using the Masks panel

All of the above steps are done in the Develop module

RAW Processing Steps

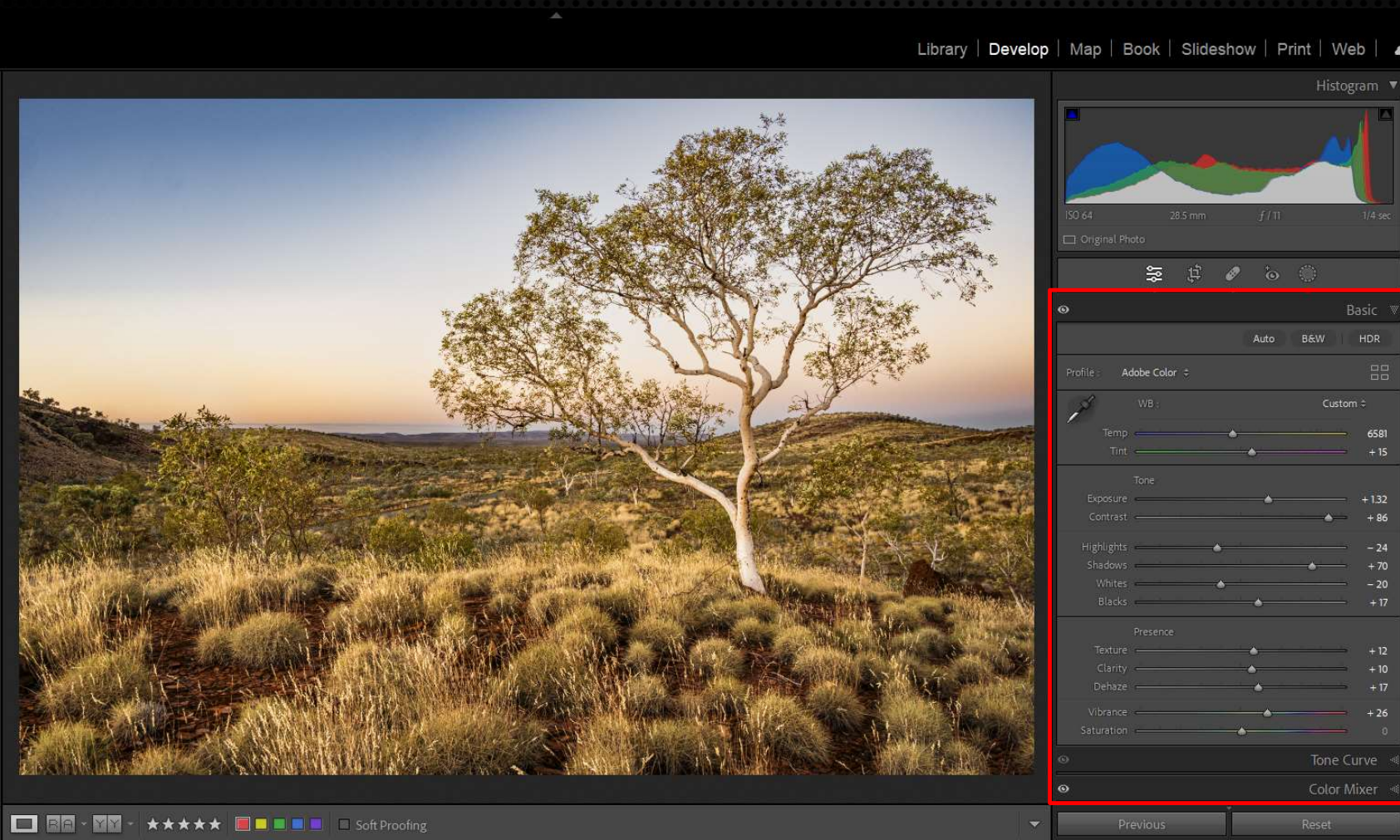


Develop Panel

Default view on opening an image file

Image lacks contrast and colour

RAW Processing Steps



Develop Panel

Preview after Processing

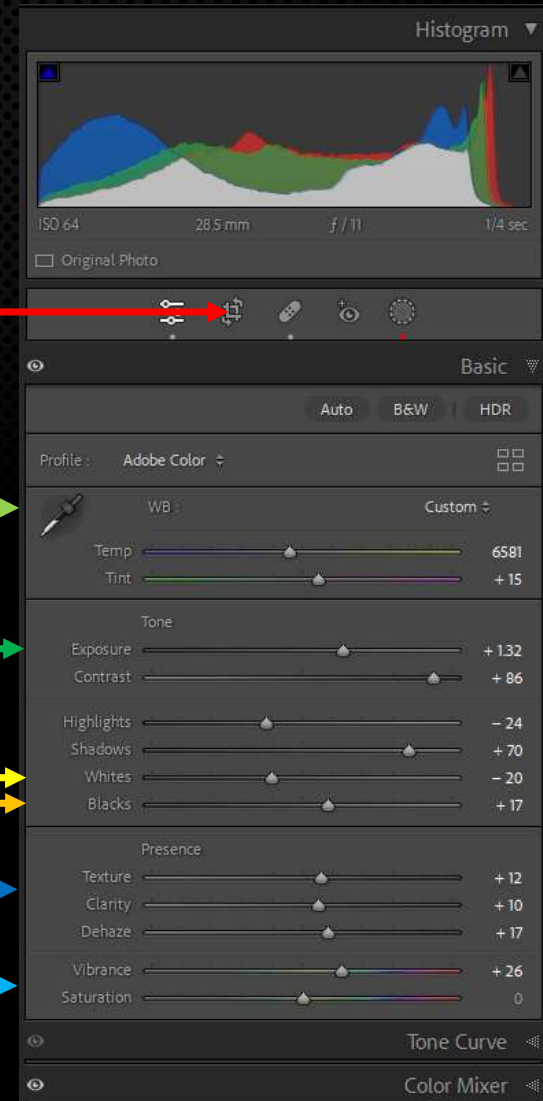
But what order should the steps take?

RAW Processing Steps

DEVELOP – Process the RAW file:

ESSENTIAL STEPS IN PREFERRED ORDER:

1. Crop/Straighten
2. Set Black Point)
) overall tonality
3. Set White Point)
4. Adjust Mid tones = Exposure
5. White Balance
6. Vibrance & Saturation
7. Texture and Clarity (local contrast)



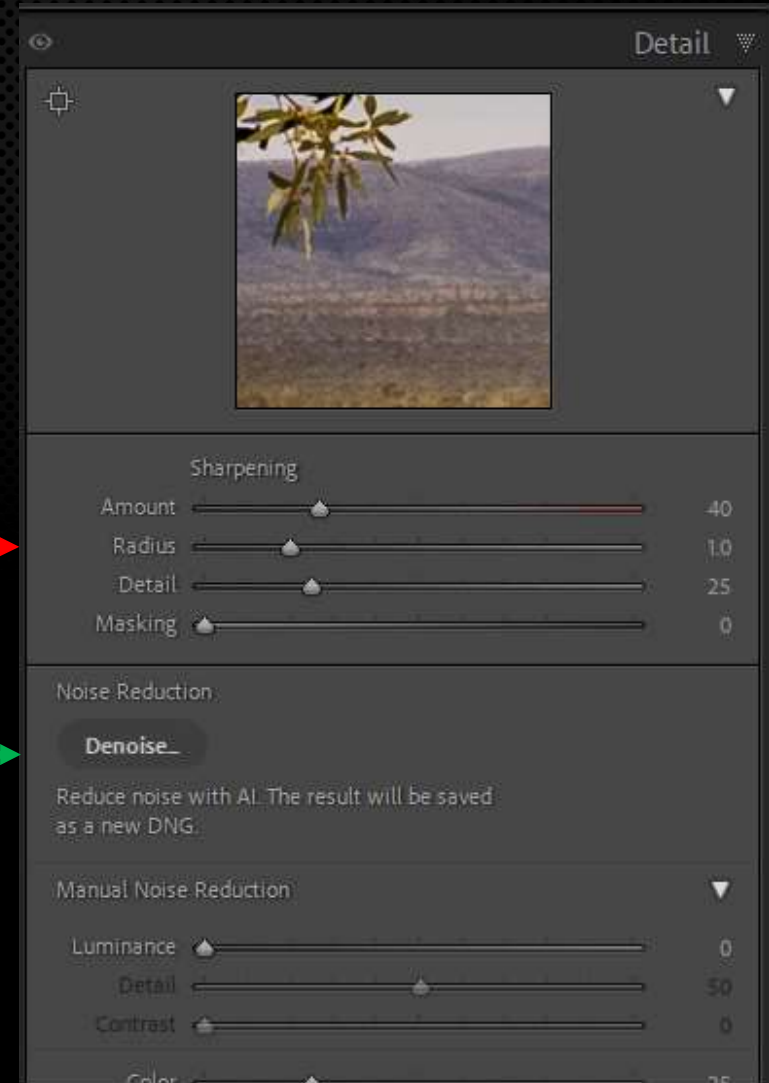
RAW Processing Steps

DETAIL PANEL

8. Sharpening, Detail with Masking



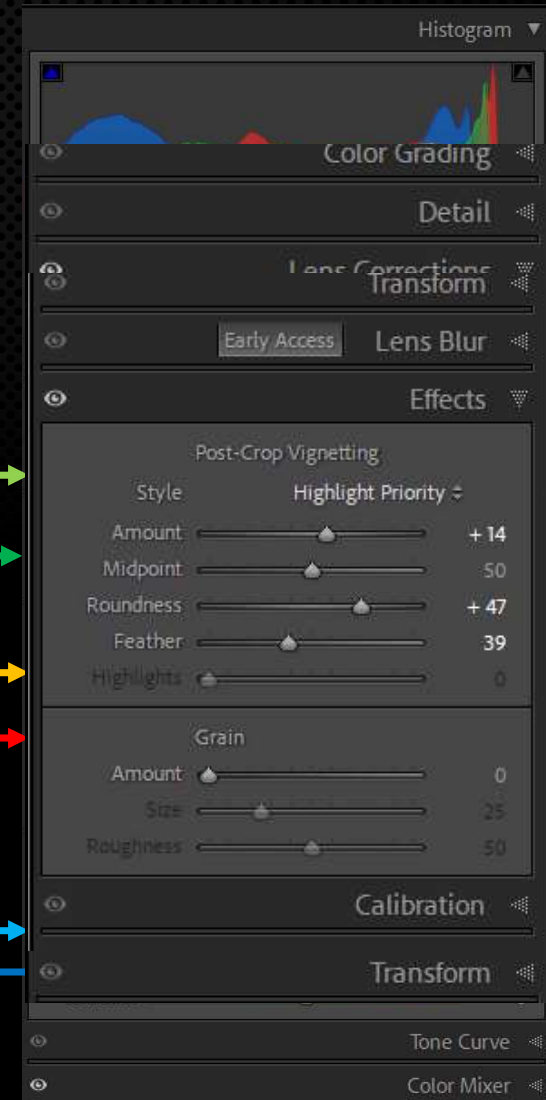
9. Noise reduction if/as required



RAW Processing Steps

Optional Steps:

10. Adjust Shadows and Highlights for tonal distribution
11. Adjust overall contrast using the contrast slider
12. Apply lens corrections – especially Chromatic aberration (for wide angle lenses)
13. Apply a vignette using the Effects panel
14. Apply some Dehaze – for hazy or very low contrast images
15. Remove sensor dust using the Spot removal tool



Advanced RAW Processing Steps



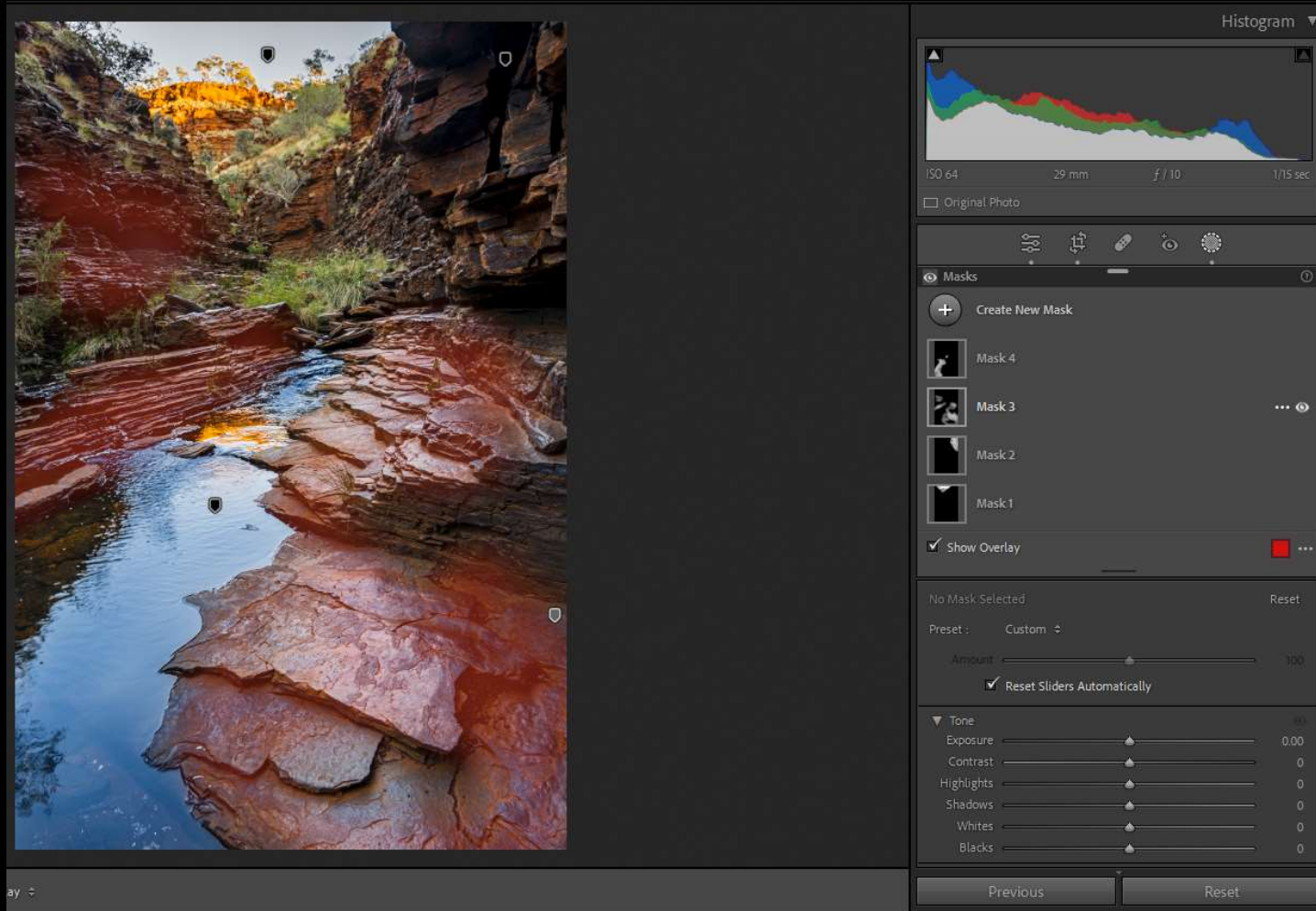
Selective adjustments using the Masks Panel

Now more options than in previous versions

The Sky selection option is probably the most often used

Advanced RAW Processing Steps

Library | **Develop** | Map | Book | Slideshow | Print | Web | 



The screenshot displays the Adobe Lightroom Develop module interface. On the left is a large preview window showing a photograph of a river flowing through a canyon with layered red rock walls. The right side of the interface contains several panels:

- Histogram:** Shows a multi-colored histogram with a peak in the blue (shadows) and red (highlights) areas. Metadata below includes ISO 64, 29 mm, f/10, and 1/15 sec.
- Masks Panel:** Features a '+ Create New Mask' button and a list of four masks: Mask 4, Mask 3, Mask 2, and Mask 1. A 'Show Overlay' checkbox is checked.
- Adjustment Panel:** Shows 'No Mask Selected' and a 'Preset' dropdown set to 'Custom'. It includes an 'Amount' slider at 100 and a checked 'Reset Sliders Automatically' option.
- Tone Panel:** Lists sliders for Exposure (0.00), Contrast (0), Highlights (0), Shadows (0), Whites (0), and Blacks (0).

At the bottom of the interface are 'Previous' and 'Reset' buttons.

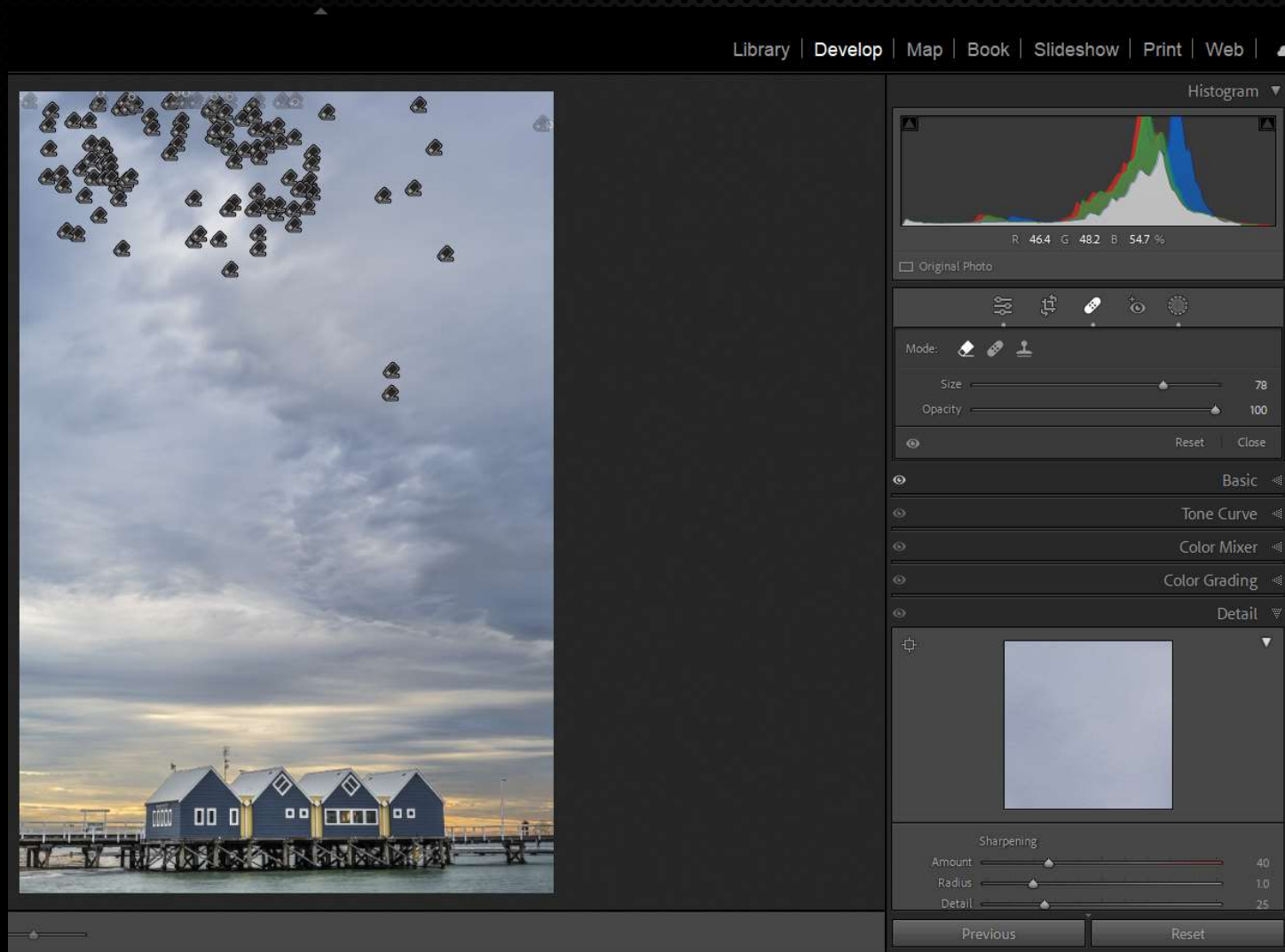
Advanced Masking and adjustments using the Masks panel

Multiple masks:

- Intersect
- Invert
- Luminance
- Select sky
- Select subject

and many other options

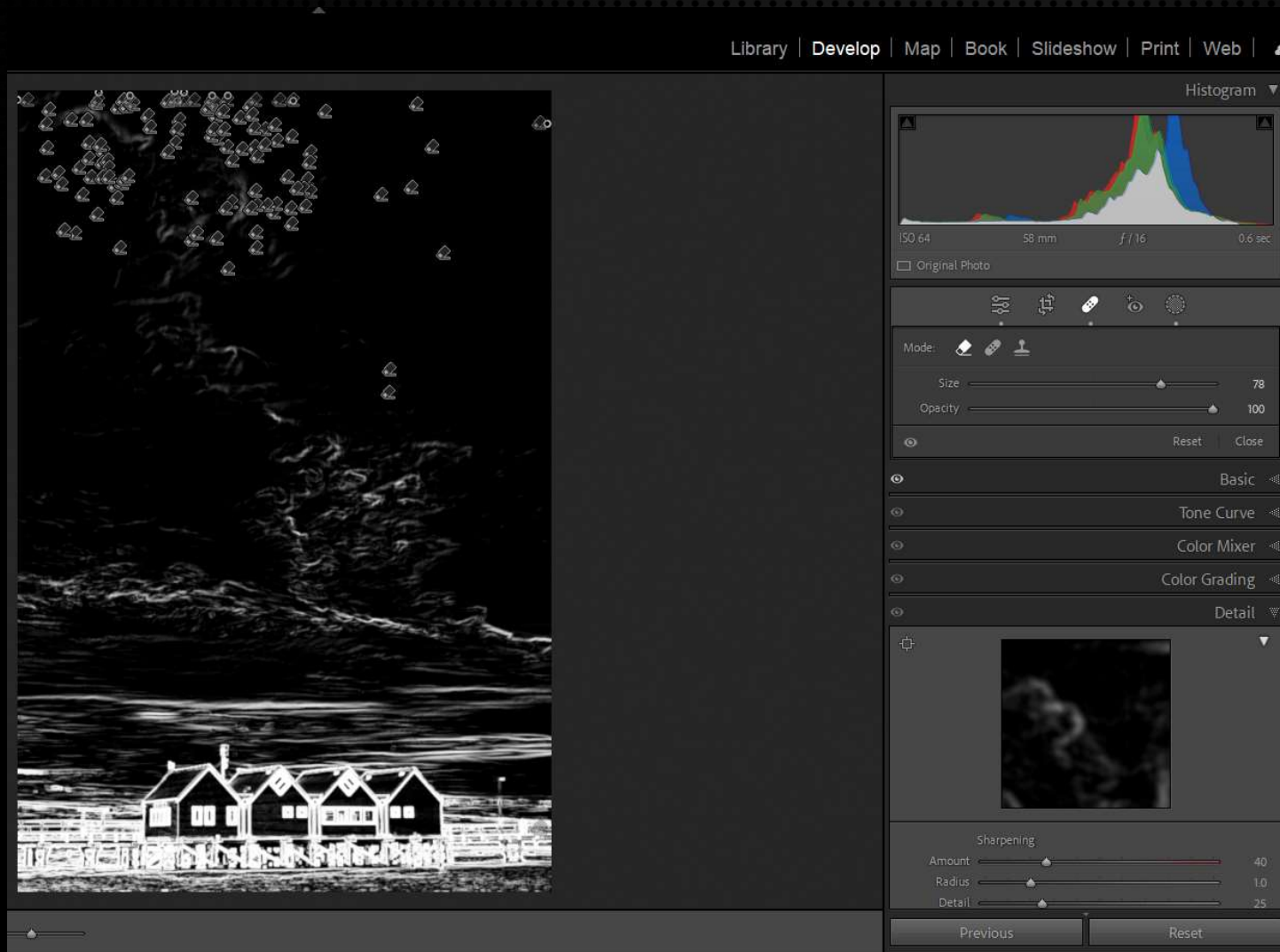
Advanced RAW Processing Steps



Dust Spot Removal

Using the patch tool
and "Visualise Spots"

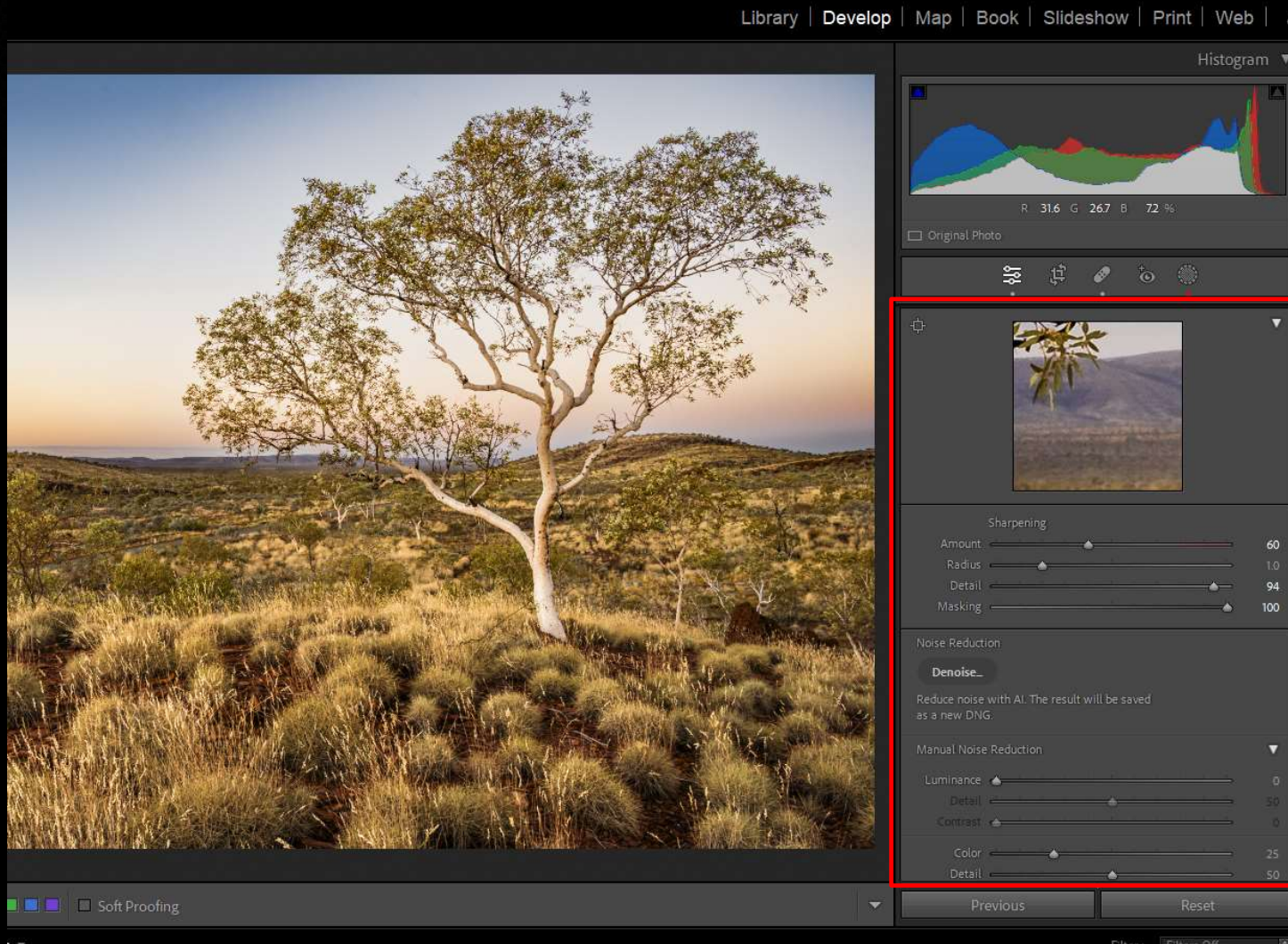
Advanced RAW Processing Steps



Dust Spot Removal

Using “Visualise Spots” with a slider for the amount will reveal how much dust is on your sensor

Advanced RAW Processing Steps



Sharpening and Noise Reduction

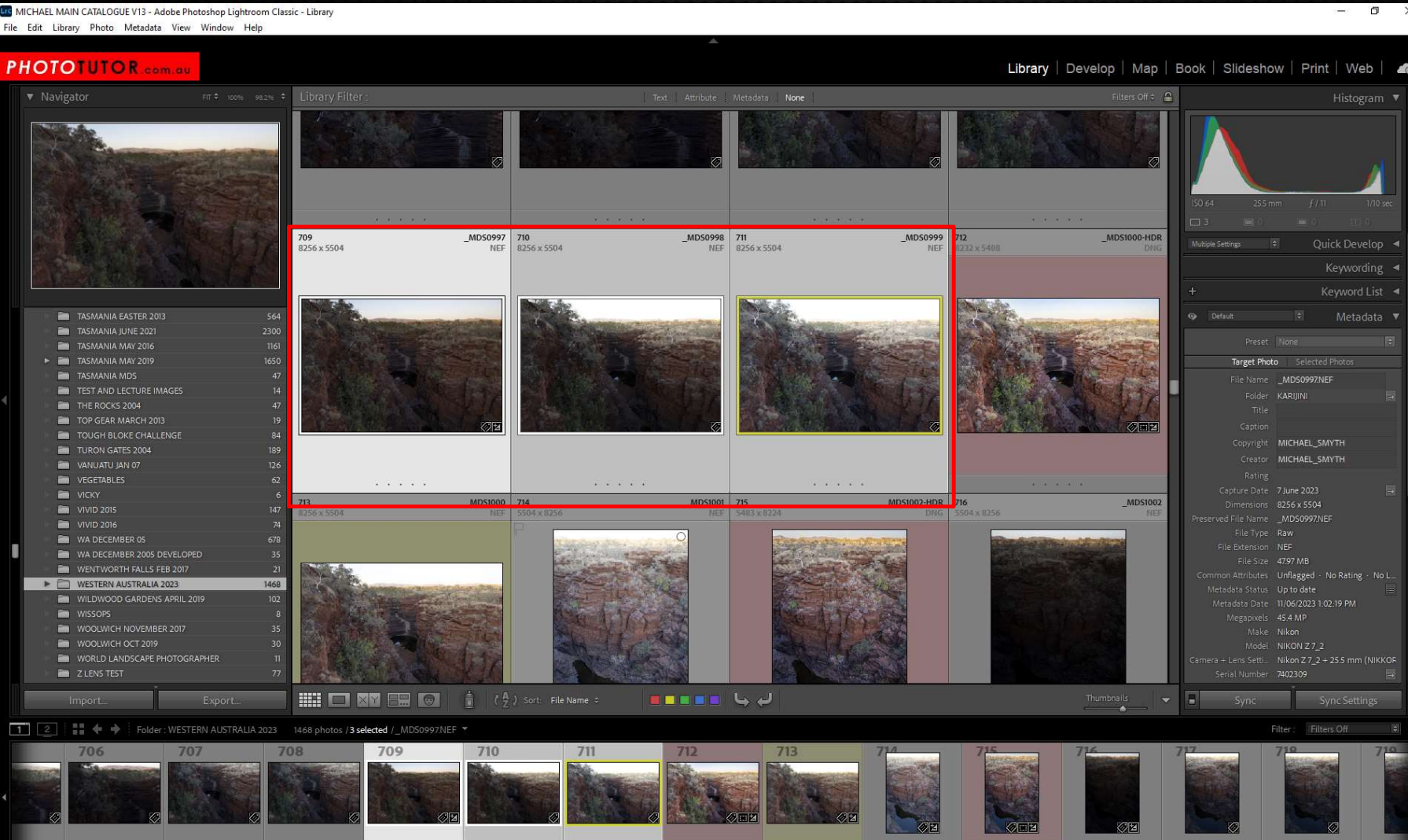
All images need some Sharpening
Most need some Noise Reduction.

Now Lightroom has improved NR with a new Plug in – but it converts the RAW file to a DNG at 3 x the file size.

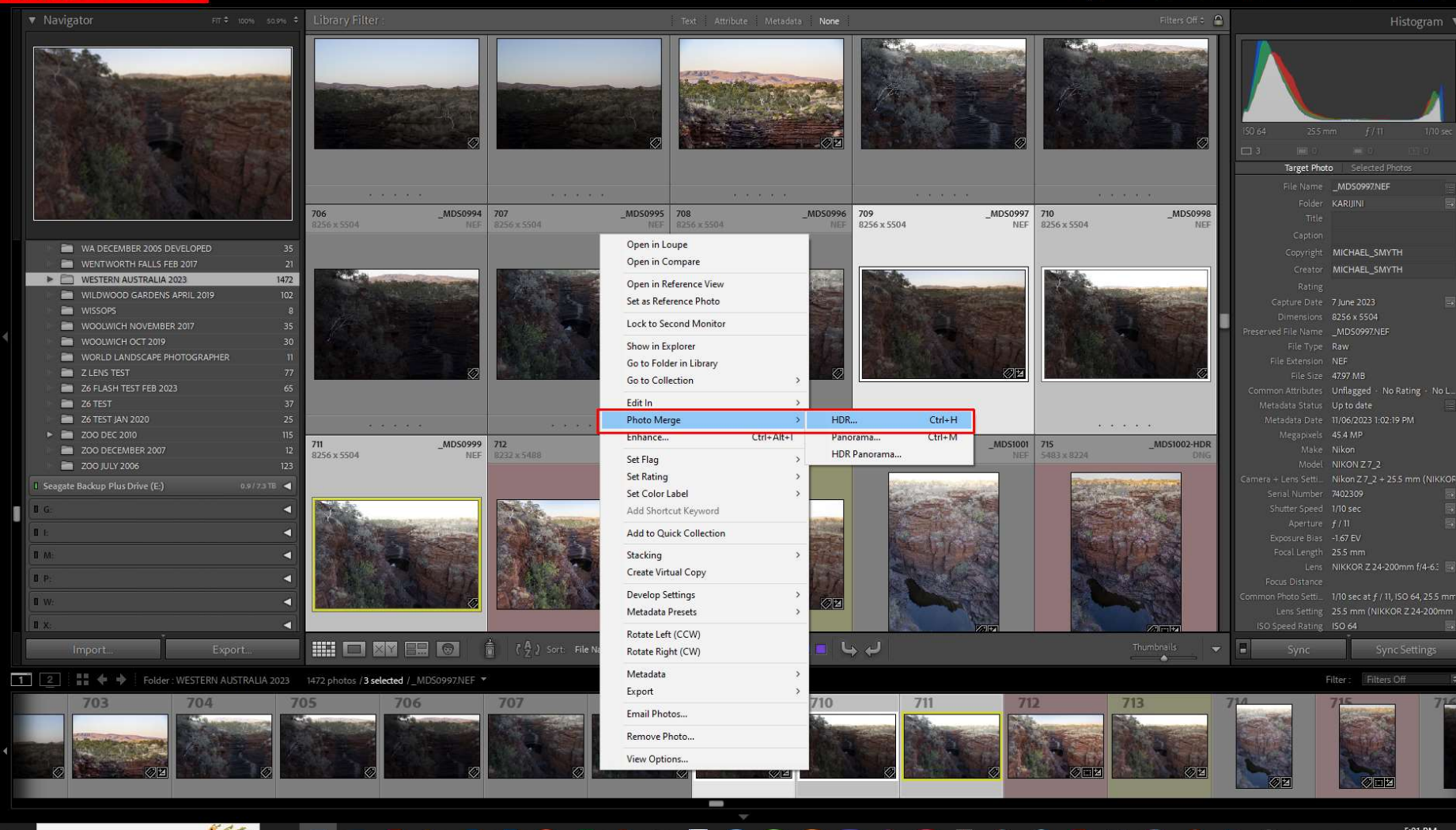
External Plug ins do a better job of Sharpening and Noise Reduction BUT you have to buy them separately

Advanced RAW Processing Steps

Merge two or more image captures to create a **High Dynamic Range** photograph

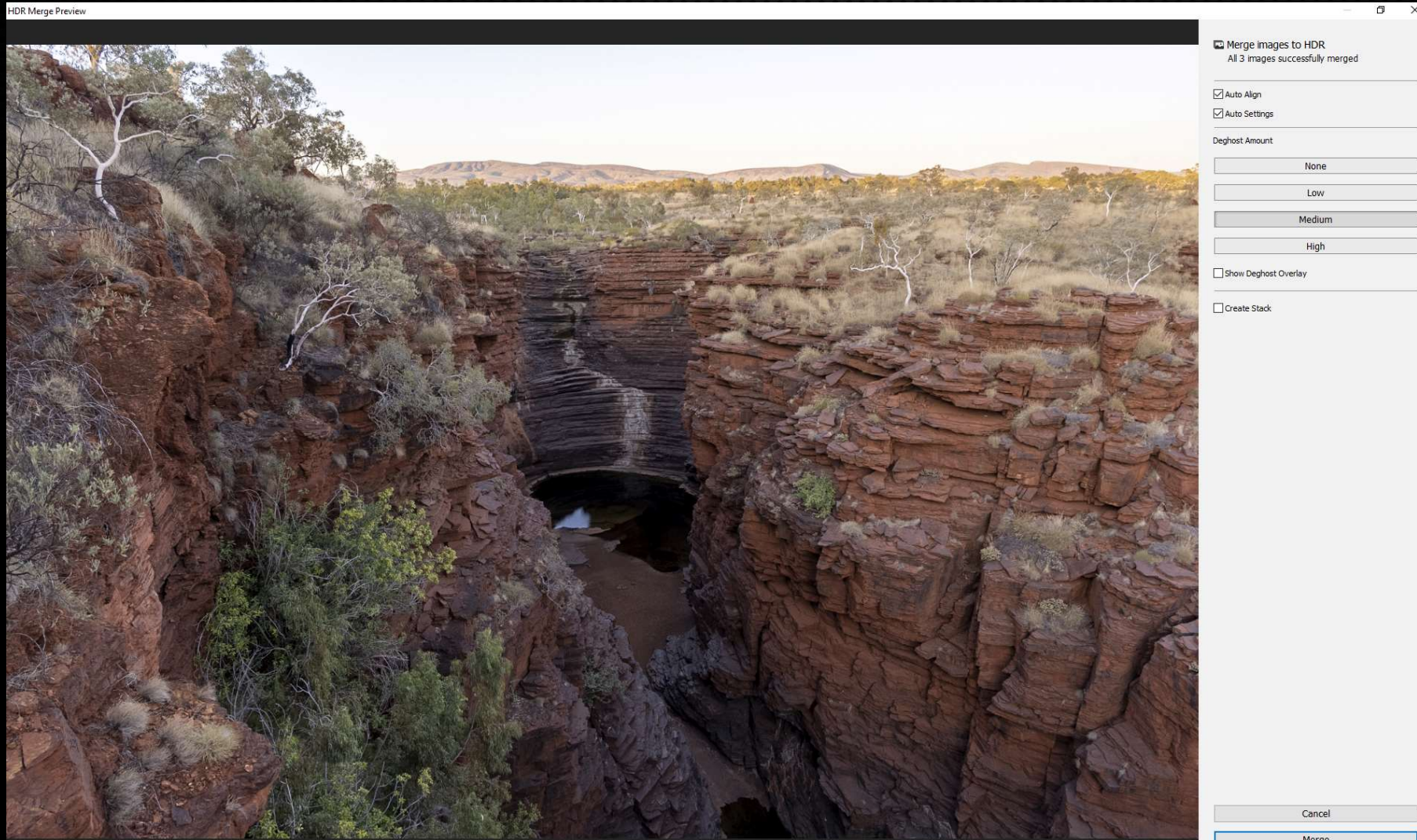


Advanced RAW Processing Steps



Select photos in the sequence, Right mouse click, then Choose: Photo Merge/ HDR

Advanced RAW Processing Steps

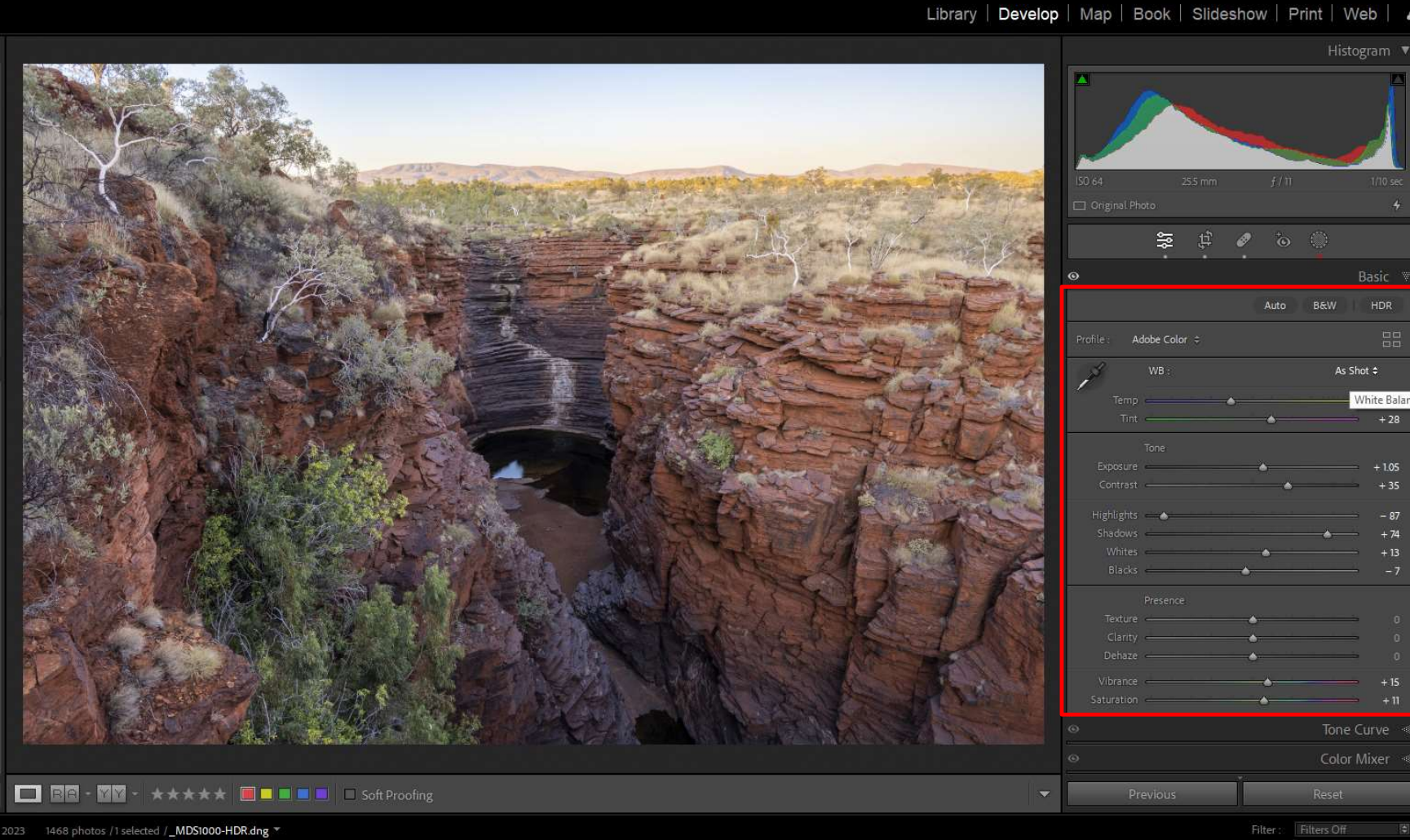


Selected captures
Previewed

Three captures at different exposures used to cover the dynamic range of the scene.

Looks flat but now has A full range of tones.

Advanced RAW Processing Steps



Merged HDR is a DNG file which retains full RAW editing options

Process the HDR as if it was a normal photo

Advanced RAW Processing Steps

Library | Develop | Map | Book | Slideshow | Print | Web |

Merge to Panorama

Select source files and process all to the same settings – Copy and Paste Development steps

The screenshot shows the Adobe Lightroom library grid with 28 thumbnails of RAW files. The files are arranged in a grid, and several are selected with white borders. The right-hand panel displays the metadata and technical details for the selected file, including camera settings and file information.

Library Filter: Text Attribute Metadata None Filters Off

Grid View: 28 thumbnails of RAW files, including files 848 through 875. Files 867 and 874 are highlighted in green, indicating they are selected for merging.

Right Panel (Metadata):

- ISO 64, 16 mm, f/13, 1.6 sec
- File Size: 52.64 MB
- Common Attributes: Unflagged · No Rating · No L...
- Metadata Status: Up to date
- Metadata Date: 11/06/2023 1:00:18 PM
- Megapixels: 45.4 MP
- Make: Nikon
- Model: NIKON Z7_2
- Camera + Lens Setti...: Nikon Z7_2 + 16 mm (VR 16-35n
- Serial Number: 7402309
- Shutter Speed: [icon]
- Aperture: f/13
- Exposure Bias: 0 EV
- Focal Length: 16 mm
- Lens: VR 16-35mm f/4G
- Focus Distance: [icon]
- Common Photo Setti...: 1.6 sec at f/13, ISO 64, 16 mm (V
- Lens Setting: 16 mm (VR 16-35mm f/4G)
- ISO Speed Rating: ISO 64
- Flash: Did not fire
- Exposure Program: Manual
- Metering Mode: Pattern
- Capture Date/Time: 8/06/2023 11:24:02 AM
- Original Raw File: [icon]
- Original Raw File Na...: [icon]
- Original Dimensions: Exposure and ISO: 1.6 sec at f/13, ISO 64; Date Time Original: 8/06/2023 11:24:02 AM

Bottom Panel: Sync Sync Settings

Advanced RAW Processing Steps

PHOTOTUTOR.com.au

Library | Develop | Map | Book | Slideshow | Print | Web

The screenshot displays the Adobe Lightroom library grid with 1472 photos. A context menu is open over a selected photo, with the 'Photo Merge' option highlighted in blue. A sub-menu is also open, showing 'HDR...' (Ctrl+H) and 'Panorama...' (Ctrl+M) options, with 'Panorama...' highlighted in blue. The interface includes a Navigator on the left, a Library Filter bar at the top, and a Histogram on the right. The bottom of the screen shows a filmstrip of the selected photos.

Select and
Choose
Photo Merge/
Panorama

The histogram shows a distribution of colors (red, green, blue) across the tonal range. Below it, the metadata panel displays the following information:

- Target Photo: Selected Photos
- File Name: _MDS1141.NEF
- Folder: KARUINI
- Title
- Caption
- Copyright: MICHAEL_SMYTH
- Creator: MICHAEL_SMYTH
- Rating
- Capture Date: 8 June 2023
- Dimensions: 5504 x 8256
- Preserved File Name: _MDS1141.NEF
- File Type: Raw
- File Extension: NEF
- File Size: 52.64 MB
- Common Attributes: Unflagged · No Rating · No L...
- Metadata Status: Up to date
- Metadata Date: 11/06/2023 1:00:18 PM
- Megapixels: 45.4 MP
- Make: Nikon
- Model: NIKON Z7_2
- Camera + Lens Setti...: Nikon Z7_2 + 16 mm (VR 16-35F
- Serial Number: 7402309
- Shutter Speed
- Aperture: f / 13
- Exposure Bias: 0 EV
- Focal Length: 16 mm
- Lens: VR 16-35mm f/4G
- Focus Distance
- Common Photo Setti...: 1.6 sec at f / 13, ISO 64, 16 mm (V
- Lens Setting: 16 mm (VR 16-35mm f/4G)
- ISO Speed Rating: ISO 64

Advanced RAW Processing Steps

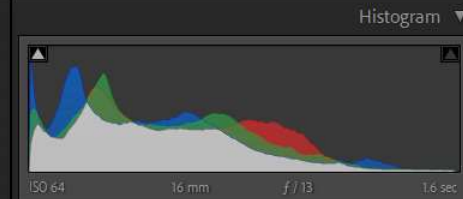


Selected
captures
Previewed

13 captures
combined
to create a
panorama

Advanced RAW Processing Steps

Library | Develop | Map | Book | Slideshow | Print | Web



Original Photo

Basic

Auto B&W HDR

Profile: Adobe Color

WB: As Shot

Temp: 7900
Tint: +4

Tone

Exposure: +1.13
Contrast: +35
Highlights: -75
Shadows: +56
Whites: -23
Blacks: -16

Presence

Texture: 0
Clarity: 0
Dehaze: 0
Vibrance: +15
Saturation: +1

Tone Curve

Color Mixer

Previous

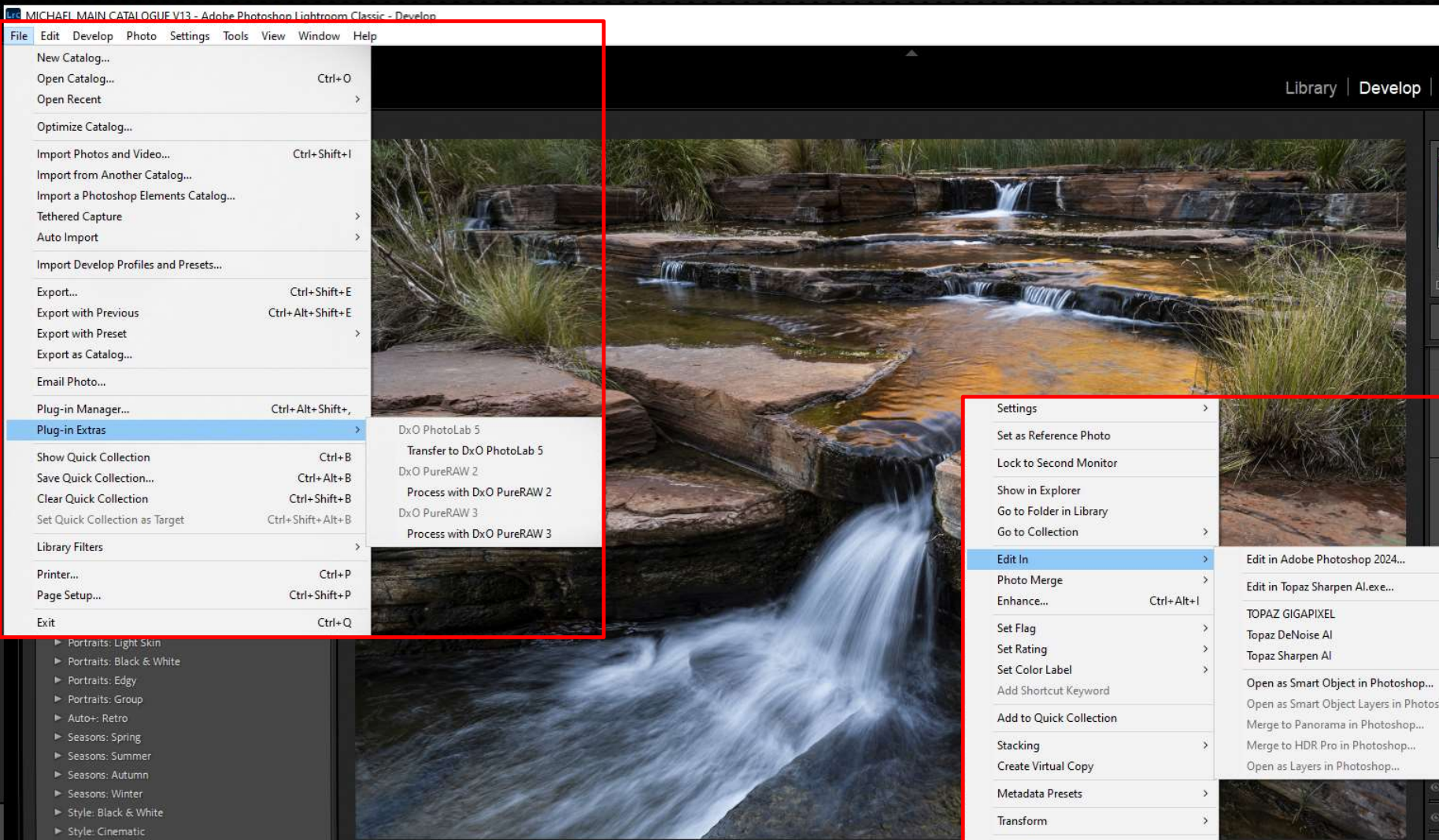
Reset

Merged
Panorama
Is a DNG
file which
retains full
RAW
editing
options

Edit as a
normal
photo

Soft Proofing

Advanced RAW Processing Steps



Plug-ins and other options for Noise Reduction, Sharpening and Upscaling

Must convert the RAW file to A TIFF to use these plug-ins

Advanced RAW Processing Steps

Selective colour changes using Point Colour

The screenshot displays the Adobe Lightroom library grid with a waterfall photograph selected. The right-hand panel is open to the 'Color Mixer' section, specifically the 'Point Color' tab. A red circle on the photo indicates the target area for adjustment. The 'Point Color' panel features a color wheel and a vertical slider, with a target icon positioned on the yellow-to-orange gradient. Below the color wheel are sliders for 'Hue Shift', 'Sat. Shift', 'Lum. Shift', and 'Range', all currently set to 0, except for 'Range' which is set to 50. A 'Visualize Range' checkbox is also present. The top of the right panel shows a histogram and technical data: ISO 64, 22 mm, f / 9.0, and 0.4 sec. The bottom of the interface includes a toolbar with icons for grid, compare, web, and print, along with a star rating system and a 'Soft Proofing' checkbox. The status bar at the bottom left shows '2023 1468 photos / 1 selected / _MDS1062.NEF' and the bottom right shows 'Filter: > ★★★★★ Filters Off'.

Advanced RAW Processing Steps

Point Colour

The screenshot displays the Adobe Lightroom interface. The main image is a waterfall with a yellow color grade applied to the water. The right-hand panel shows the 'Color Mixer' section, specifically the 'Point Color' tool. A red box highlights the 'Point Color' panel, which includes a color wheel and sliders for Hue Shift (100), Sat. Shift (100), Lum. Shift (40), and Range (50). The 'Visualize Range' checkbox is also visible. The top right panel shows a histogram and camera metadata: ISO 64, 22 mm, f / 9.0, 0.4 sec. The bottom left shows the library grid with 1468 photos, 1 selected, and the file name _MDS1062.NEF. The bottom right shows the filter bar with 5 stars and 'Filters Off'.

Advanced RAW Processing Steps

Library | Develop | Map | Book | Slideshow | Print | Web |

Or Colour adjustments using the Channel Mixer

The screenshot displays the Adobe Lightroom Develop module interface. On the left is a large preview window showing a waterfall cascading over layered rock formations. On the right is the adjustment panel, with the 'Color Mixer' section highlighted by a red border. The 'Color Mixer' panel is set to 'Mixer' mode and 'Saturation' adjustment. The sliders for Red, Orange, Yellow, Green, Aqua, Blue, Purple, and Magenta are visible, with Red at +23 and Orange at +70. Above the sliders, the 'Adjust' dropdown is set to 'HSL'. The 'Basic' panel above shows a histogram and technical data: ISO 64, 22 mm, f/9.0, 0.4 sec. The 'Original Photo' checkbox is checked. At the bottom of the interface, the 'Target Group' is set to 'Saturation'.

Color	Saturation
Red	+23
Orange	+70
Yellow	0
Green	0
Aqua	0
Blue	0
Purple	0
Magenta	0

Exporting as a Viewable File

So far, all the adjustments are viewed as a “**preview**” of how the file will look when rendered into a pixel based photo.

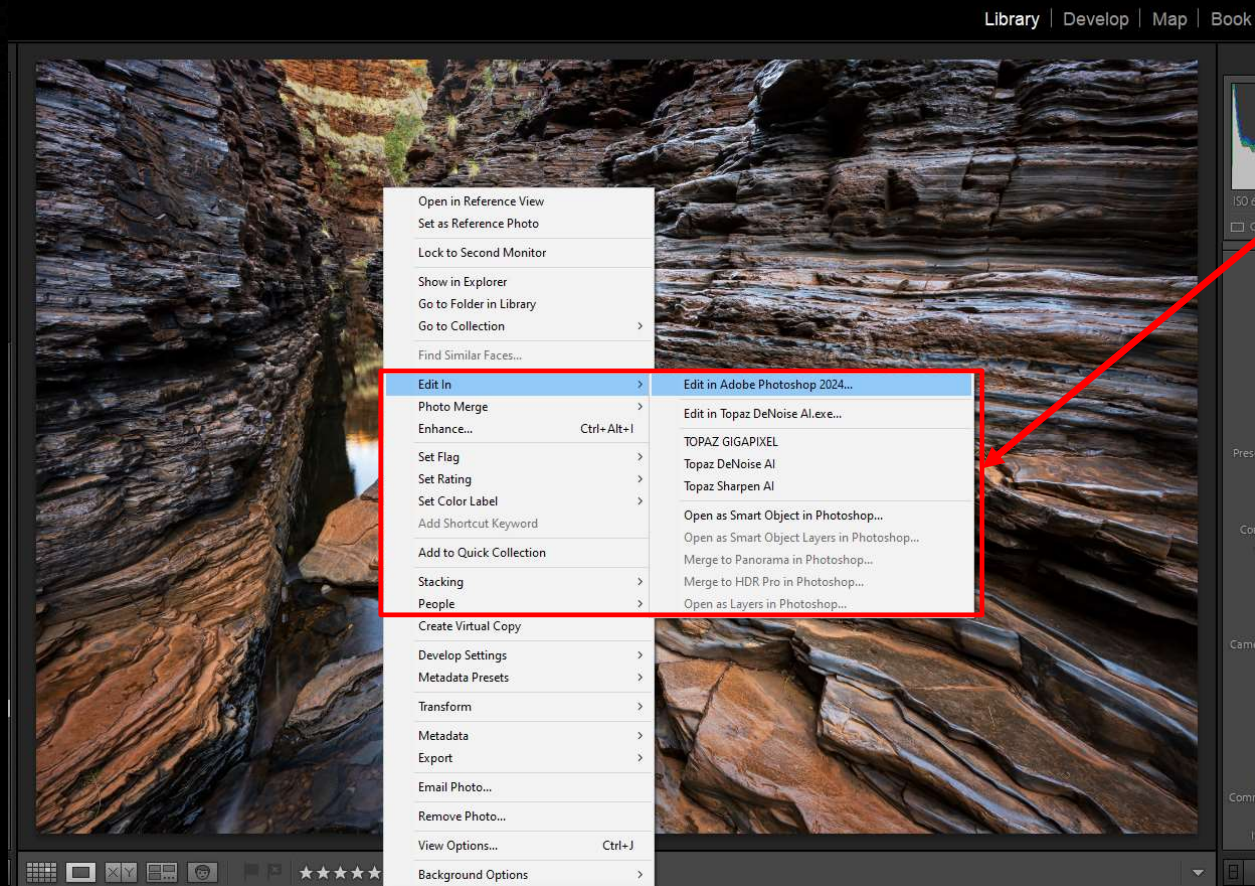
The final step in the RAW processing workflow is to **export** the file into a variety of possible image formats.

Possible formats that can be created from the processed RAW file are:

- JPEG
- JPEG XL
- AVIF
- TIFF
- PSD
- PNG
- DNG

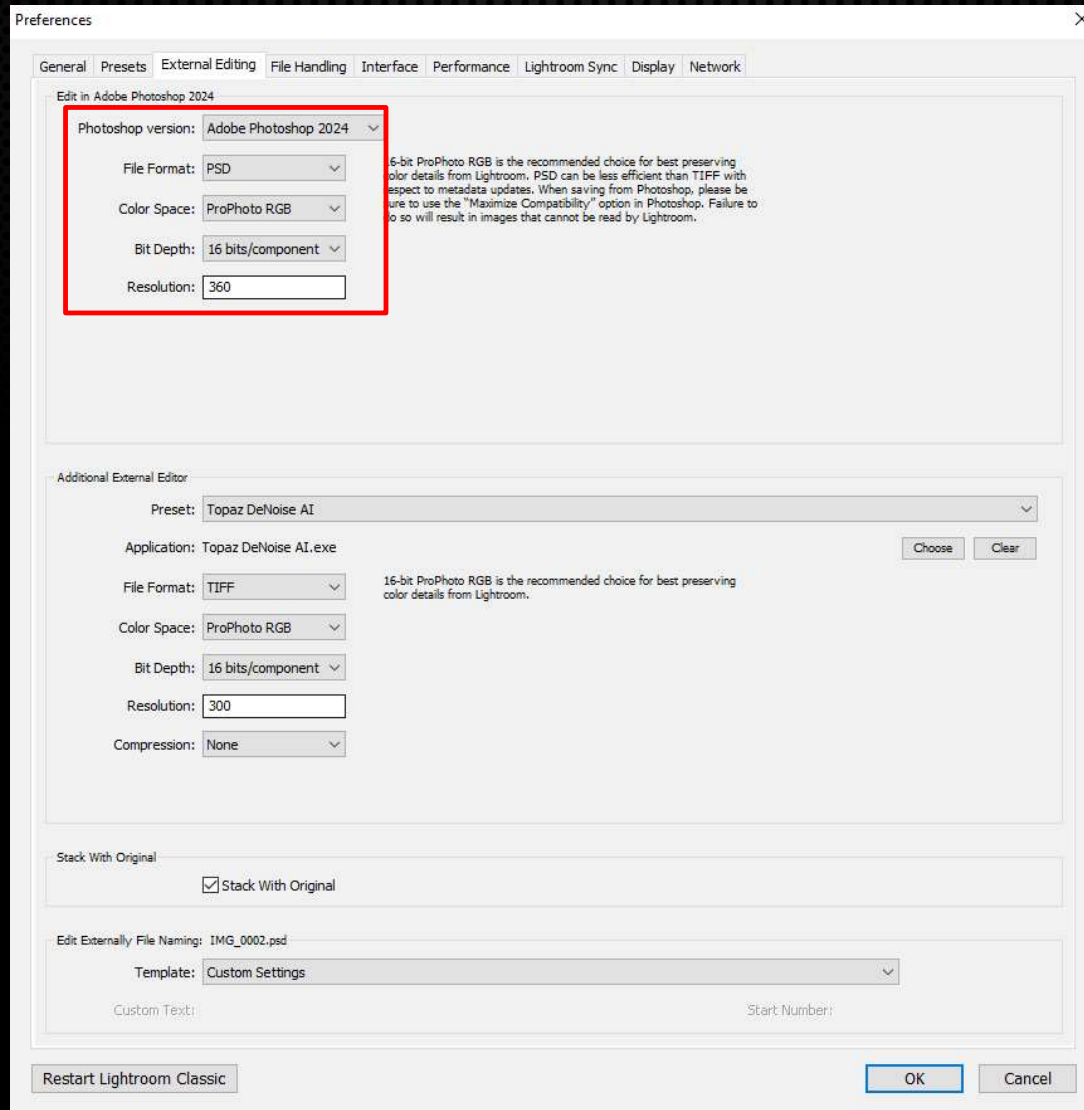
Exporting as a Viewable File

Option 1: Export the RAW file as a TIFF or PSD file for further editing in Photoshop, Photoshop Elements, Affinity Photo or one of the various plug-ins



Right mouse click on the preview and select "Edit In" and choose the appropriate program

Exporting as a Viewable File

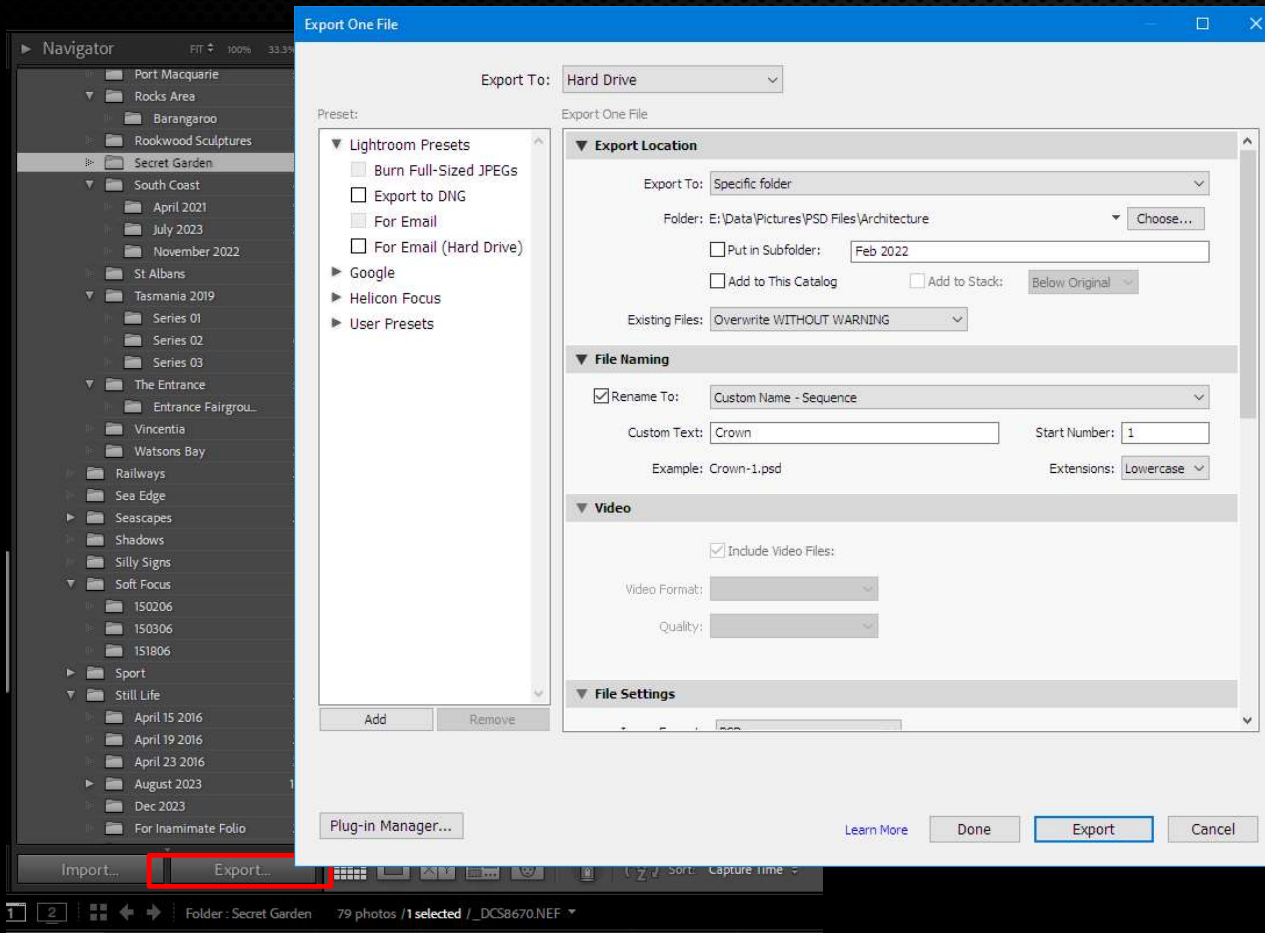


The settings for the exported file are set from Lightroom's preferences:

Edit>Preferences> External editing

Exporting as a Viewable File

Option 2: Export as a different file format with no further editing.

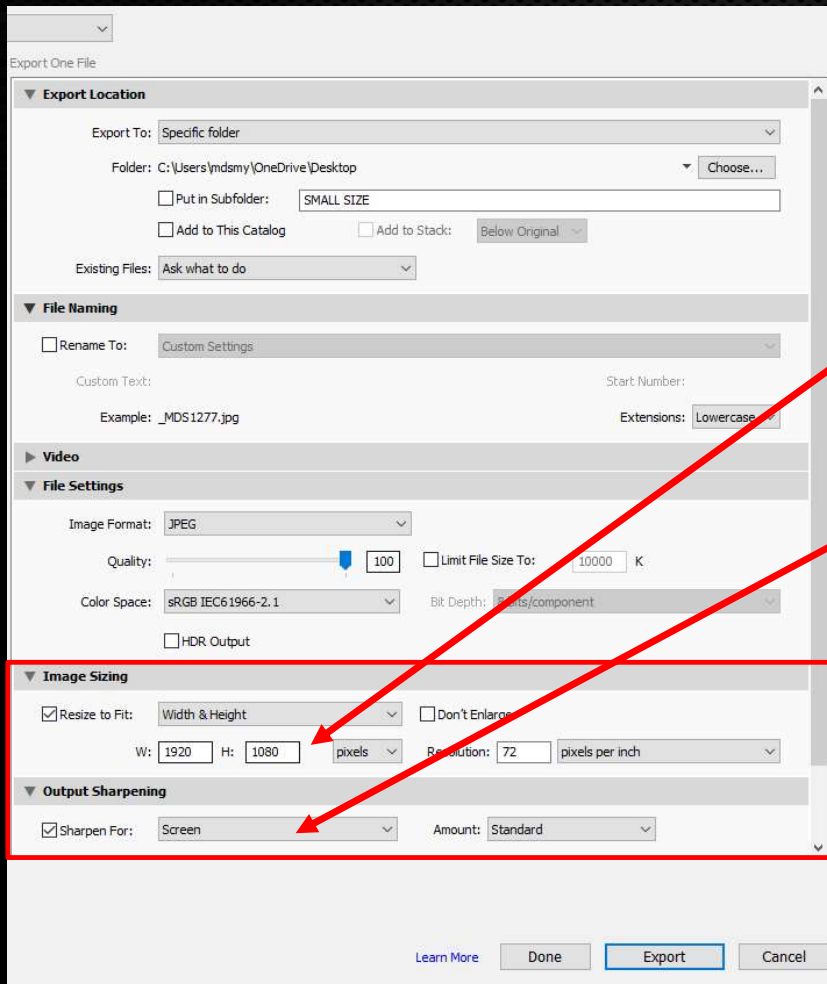


In the Library module:

1. Click on Export to open the Export menu
2. Select destination,
3. File renaming (if needed)
4. File settings – type, colour space and bit depth
5. Image sizing
6. Sharpening

Exporting as a Viewable File

To export a file for projection, use these settings:



Sizing for projection is controlled by the “Resize to Fit” option – 1920 x 1080 pixels

Regardless of the aspect ratio or original size, the output will fit to these dimensions for best quality (100%) at projection

Make sure to add “Sharpen for Screen”

When You May Need Photoshop

Despite the power and improvements in Lightroom and Camera RAW, there will still be times when you will want to carry out further editing in Photoshop or Affinity Photo:

- Making a composite using two or more source photos
- Critical editing where more detailed masking is required. Photoshop has more powerful tools for creating and refining masks.
- Photographs that require a fine level of selective adjustment using layers and masks to achieve a desired result
- Using Blend Modes, Opacity and masking for further refinements
- Using other plug ins such as NIK, Topaz, etc. Many of these can be accessed from Lightroom, but the resulting file is flattened with no option for blending or masking.

When You May Need Photoshop

- Using any of the “Neural Filters” included in Photoshop
- Using any of the advanced AI features such as Generative Expand or Generative Fill
- Using any of the “artistic” filters – Topaz Studio and similar, where you need to use Opacity Blend Modes and Masking for refining the application of the filter.
- Printing your finished photograph – You can print from Lightroom, BUT Photoshop has access to more controls for a better result.

RAW Processing Summary

Mastering the essentials of RAW processing is as important as making the initial capture.

Understanding and implementing the steps outlined here will allow you to realise your creative vision for the photograph you saw in your mind's eye when pressing the shutter.

Non photographers (anyone with a smartphone) wrongly assume there is only one way to process a photograph, because it is all done “under the bonnet” on their phone.

However: There are multiple ways to process the RAW data to allow you creative freedom and to maximise the quality of the photographs you create.

QUESTIONS?