Web Accessibility Guide

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Abstract

Web accessibility is governed by standards and best practice methods that aim to provide access to all potential users of a website. These standards are often not requirements for website design and are often ignored. This guide aims to provide a useful tool to allow web designers and owners to evaluate their websites for accessibility and explains many of the common pitfalls with respect to web accessibility. The guide makes use of both the Web Content Accessibility Guidelines and the Usability Guidelines to inform best practice and allow users to make informed choices regarding their own particular needs.

Keywords

Web Accessibility; Web Content Accessibility Guidelines; Standards; Usability; Web design

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Contribution of Authors

This is the first edition of the Occasional Paper: Web Accessibility Guide for the Home Modification Information Clearinghouse, UNSW Sydney.

Kim Andersen selected the criteria to include and wrote the guide.

Helmut Hoss selected the criteria and aided in writing the guide, including checking for technical accuracy.

Catherine Bridge supervised the project and edited the guide.

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1.Introduction

When discussing web accessibility with those who are not familiar with the area it may not be immediately clear what is meant. Similarly, as there is a wide range of disabilities which may inhibit a person's ability to fully access and understand a websites content, web accessibility can mean different things to different people. In general though, accessibility is about removing barriers to access for a place or thing to ensure all people have equal access and opportunity, no matter what impairments they may have. In terms of web accessibility, this involves making sure content is available in a manner that does not significantly advantage or disadvantage one group of users over another.

The content of this guide aims to give web designers and managers the tools to evaluate their websites for accessibility and usability and to understand some common pitfalls related to those guidelines. The content included is by no means exhaustive and web designers should exercise their own discretion when addressing errors found using the evaluation tools.

1.1. Guidelines

In practice, it may be difficult for web developers and designers to understand how different disabilities may impact web accessibility. To enable accessible design the Web Content Accessibility Guidelines (WCAG) are compiled by the World Wide Web Consortium (W3C), an international community whose mission is to lead the web to its full potential. They complete this along two design principles: web for all and web on everything. As such, the guidelines were created to facilitate those design principles, instructing web designers in correct technique and practice to enable all people to access the internet on whatever devices they may be using. Success criteria, as defined in the WCAG, are divided into three classifications; A, AA and AAA. The first level, A, *must* be met for accessibility, AA *should* be met, and AAA *may* be met. Level one is considered the minimum for accessibility, however achieving AA level is the goal of this document. The latest version of the guidelines

(version 2.1, June 2018 at time of writing) can be found at https://www.w3.org/TR by searching "WCAG". This version of the guideline is used throughout this guide.

Website usability is also covered by guidelines, in this case maintained by the United States Department of Health and Human Services (DHHS). These guidelines are based on research compiled by the DHHS to reflect best practice. These guidelines overlap significantly with the WCAG, with a focus on ease of use rather than accessibility. There are some areas where following the WCAG without consideration of the usability guidelines may cause unintended frustration for the user. Issues flagged by the usability guidelines are ranked by priority where priority 1 (P1) is the highest and priority 5 (P5) is the lowest.

1.2.   Legal Requirements

In legal terms[1], under the Disability Discrimination Act (1992)[2] content must be accessible to all users and not discriminate against any particular group, either directly or indirectly. Inaccessible content is considered to be discriminatory under section 5 of the Disability Discrimination Act (1992) by treating people with disabilities less favourably than those without. Refusal to make a reasonable adjustment to remedy the issues is considered discrimination. In practice, if a website is deemed to be inaccessible a complaint may be filed against the host organisation under the Act.

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[1] All cited legislation and standards in this report are current at the time of writing and may change and evolve with time.

[2] https://www.legislation.gov.au/Details/C2018C00125

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The Web Accessibility National Transition Strategy was released in June 2010[3]. This document set out the road map for all federal, state and territory websites to conform to WCAG 2.0[4] level AA over a four-year period. The Human Rights Commission advises that all Australian government websites should comply with timelines of the National Transition Strategy, whether mandated to do so or not. All new and existing non-government websites and web content are advised that they should comply with WCAG 2.0 level AA by December 31st 2013. While WCAG 2.0 is the standard used in the legal framework, WCAG 2.1 includes additional content or adjustments to account for changing technologies and is backwards compatible with 2.0. Therefore, if a website is compliant with WCAG 2.1 it is also compliant with WCAG 2.0.

1.3.   Why this guide

There are a number of accessibility guides available across the internet with differing levels of content and explanation provided. Many guides present users with a checklist of accessibility items with minimal, if any, explanation of the guidelines themselves. While this has its place in educating users in the basics of accessibility this guide aims to also explain the content while still providing checklist style content, where applicable. This means this guide is suitable to web designers and management alike. The technical content is provided for the web designer while the questions posed throughout the guide provide a checklist for management and stakeholders to assess content against.

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[3] https://humanrights.gov.au/our-work/disability-rights/world-wide-web-access-disability-discrimination-act-advisory-notes-ver#wcag

[4] WCAG 2.0 became an ISO standard in 2012 - ISO/IEC 40500:2012. This was reviewed in 2019 and remains current at the time of writing.

2. Accessibility Tools

Three main tools will be discussed here for assessing the accessibility of a website: a web accessibility tool, a usability checker and a colour contrast analyser.

2.1. Web Accessibility Evaluation (WAVE) Tool

The WAVE tool is used to check the accessibility of a single webpage. Enter the website address into the box on the main page to run the check. An example of output from the tool is shown in Figure 1. The left pane shows a summary of the results while the main part of the window on the right shows an annotated version of the webpage. Not all items highlighted on the page are errors or alerts; some indicate the location of structure elements such as headings, among other things. These items are noted as items to check and should be reviewed when checking the webpage. Hovering over an item in the main window will show a tooltip explaining what the symbol means. In the example shown the symbol indicates the presence of underlined text. There is code linked to the output at the bottom of the screen that has been cropped for the privacy of the website owner. By selecting the "View details" button the actual results can be shown.

In the details section (Figure 2), the results can be seen in the left pane. Some items will display a tooltip on hover but not all. Clicking on an error button will cause the corresponding tag to flash in the main window to indicate its position. The example shot shows the link between corresponding error button and tag. On selection the code at the bottom of the screen will also jump to the relevant line. At the end of each error or alert type there is an information button which when selected will open an explainer for that item, as shown in Figure 3. This will cover why the item was flagged, how to fix it and how the algorithm determined if it was compliant.
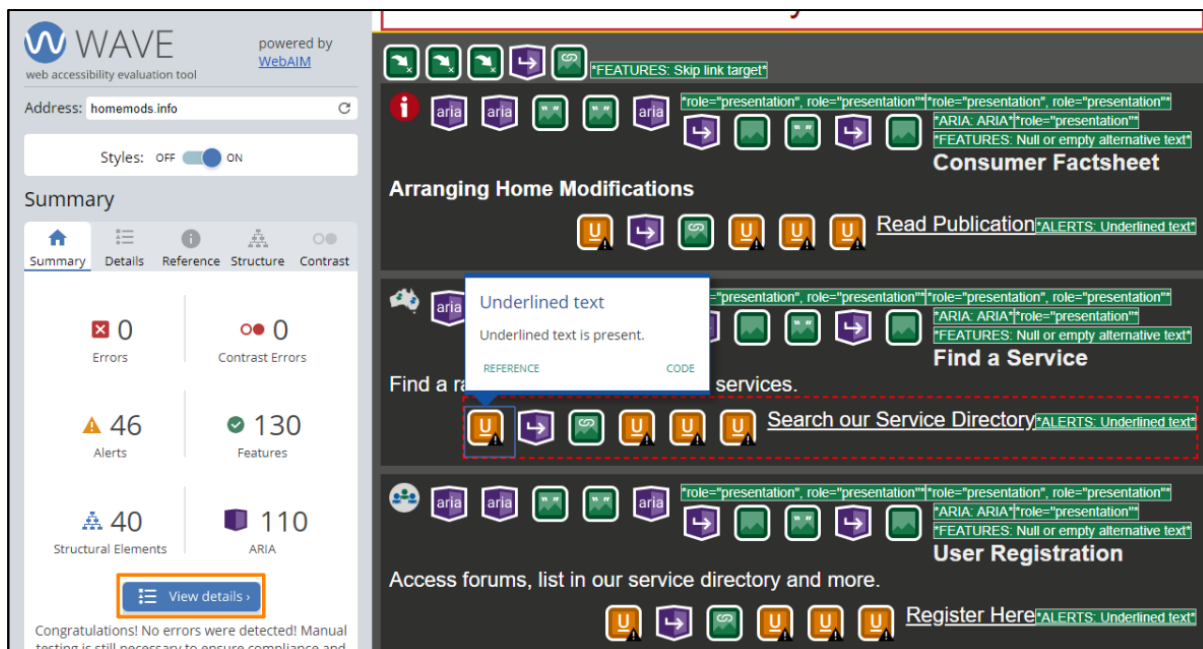
Figure 1: WAVE tool output.
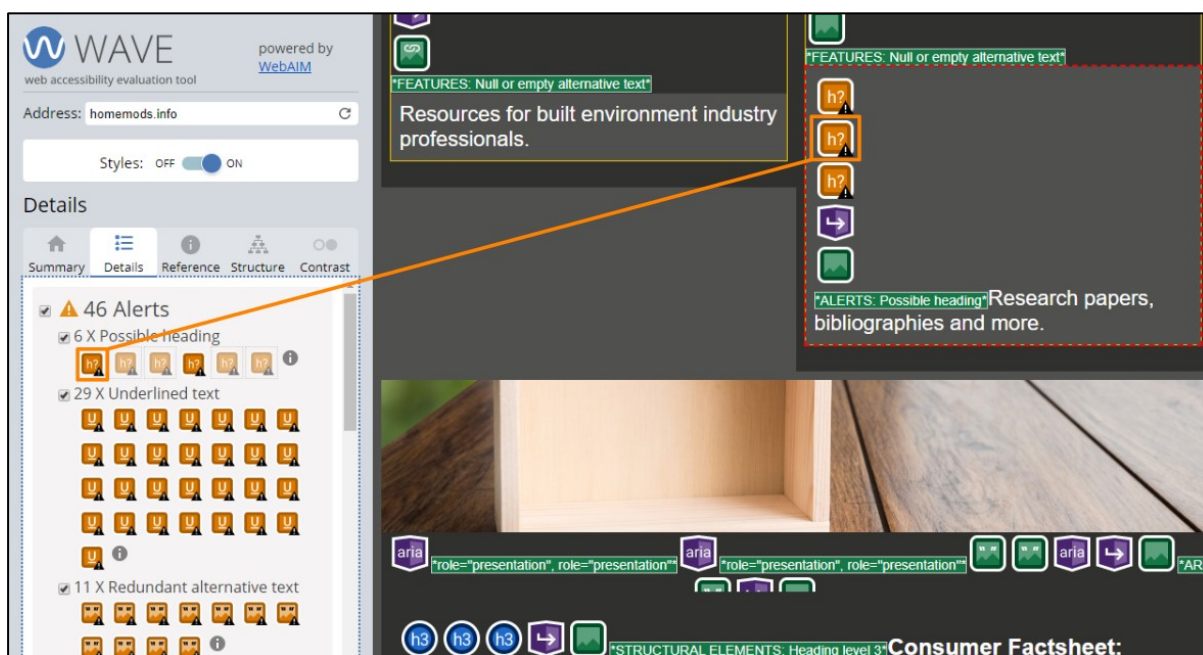
Figure 2: Details of a WAVE report.
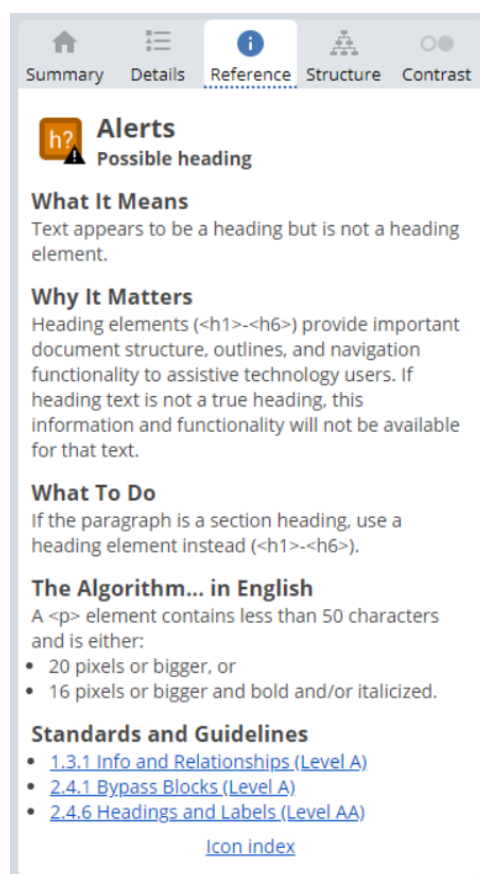
Figure 3: WAVE tool alert explanation.

2.2. PowerMapper

The next webpage evaluation tool is the PowerMapper tool; this tool can be used to check the webpage against the usability guidelines as well as the WCAG. This differs to the WAVE tool in how it presents the results with a focus on code whereas the WAVE tool will show the error on the page visually with the code at a different part of the window. Entering the homepage into the relevant box and pressing "Test site" will run the check. Web addresses should have an http or https as part of the address else the check will not run. The first output screen is shown in Figure 4. Clicking on "View Report" will open the actual results.

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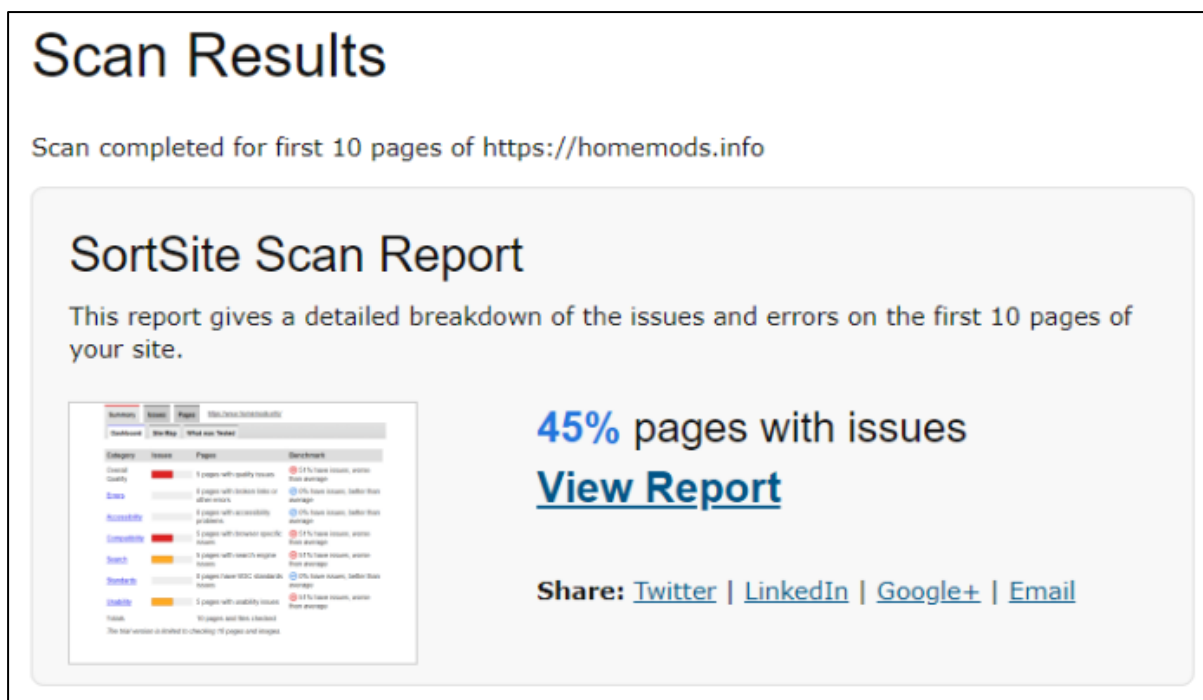
Figure 4: PowerMapper first results screen.

The report summary shows the results from the analysis including benchmarking against other websites (Figure 5). Each category is a link to that section of the results so they can be assessed individually. The trial version of the page only checks 10 pages and images on the website so results should only be taken as a general indication of success or failure in relation to the guidelines.
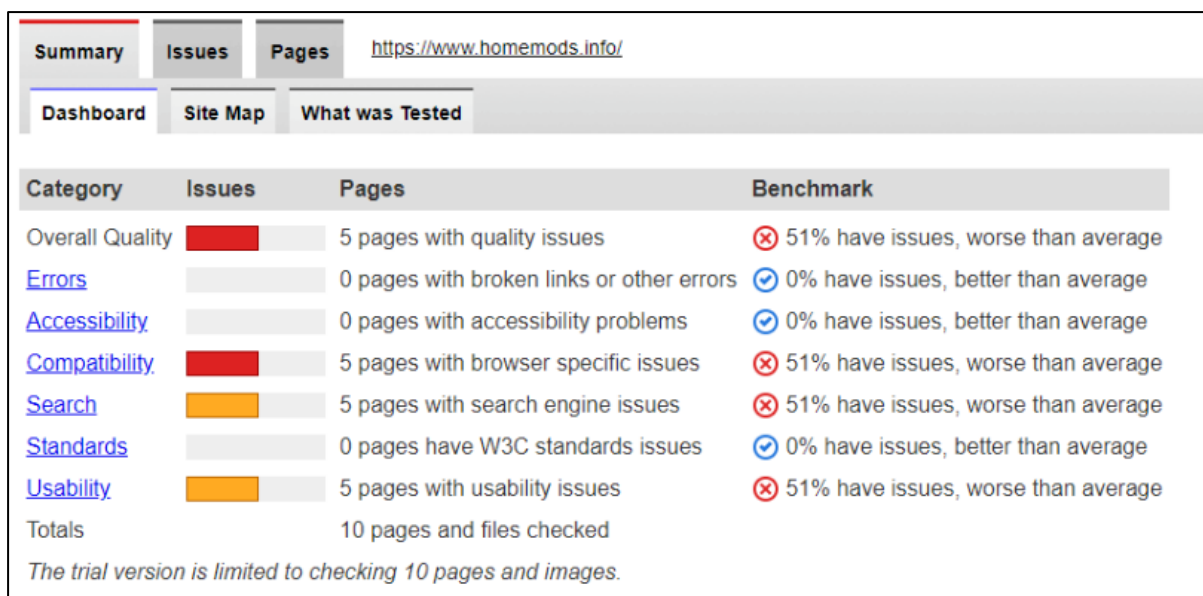
Figure 5: PowerMapper report outline.

The usability results (Figure 6), and many other categories in PowerMapper, list issues by priority level. Expanding the issue shows the URL of the webpage with the issue and the line(s) in the code that relates to it. Clicking on the line number will open a page showing the underlying code for the page, annotated with the errors, not just the one selected. As this shows the actual code for the website an example image will not be shown here. Selecting the Usability.gov link will take the user to the relevant section of the usability guidelines.

Figure 6: Usability report for example website.

2.3.   Colour Contrast Analyser (CCA)

The CCA is a tool developed by the Web Accessibility Tools Consortium in collaboration with Vision Australia and the Paciello Group. The purpose of the tool is to compare a foreground colour with a background colour to determine if they create suitable colour visibility. The tool will calculate the contrast ratio for the picked colours and can simulate how the selected colours would appear with certain visual impairments. The

contrast ratio can be used to determine compliance with the WCAG contrast guidelines, as discussed in Section 3.3.1. The tool can be downloaded from the Vision Australia website.

The use of the CCA is demonstrated below using an example homepage, as shown in Figure 7. The output for analysing zones 1 and 2 from Figure 7 is shown in Figure 8. Zone 1 is the information symbol in red, while zone 2 is the white text, both on the dark grey background. Controls for selecting the foreground and background colours are highlighted in orange; the colour can be entered manually or selected with a colour picker. An additional control is in the foreground colour section which switches the foreground and background colours. The resulting contrast ratio is also highlighted. In that section, compliance with the WCAG guidelines is shown. These guidelines are discussed in more detail in Section 3.3.1 of this guide.
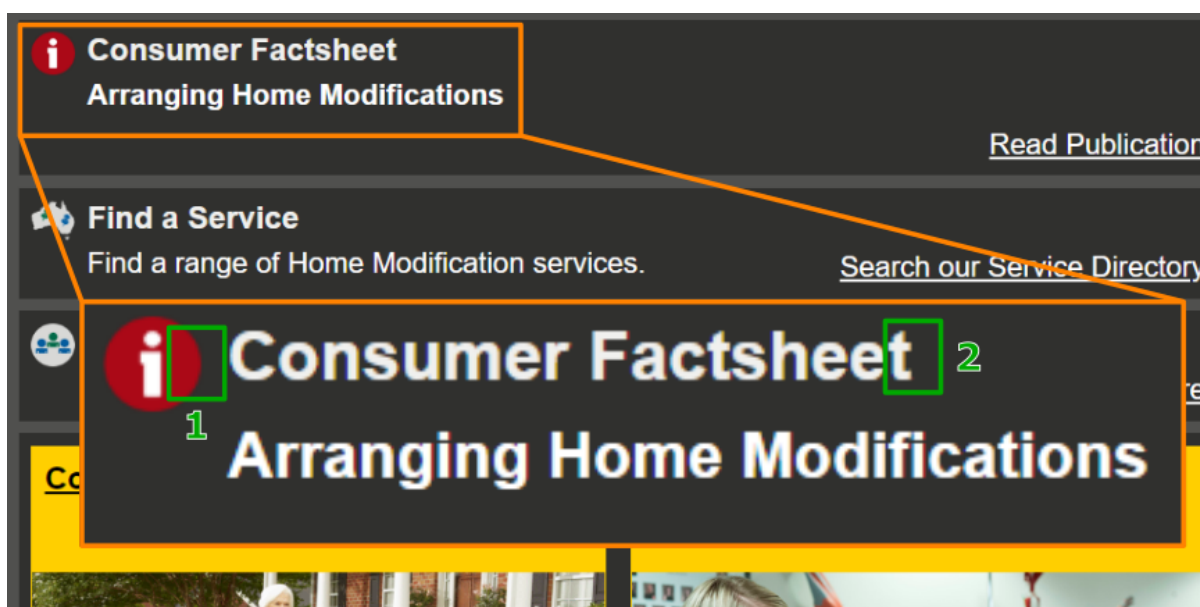
Figure 7: A screenshot of the example website with highlighted areas that were colour analysed.
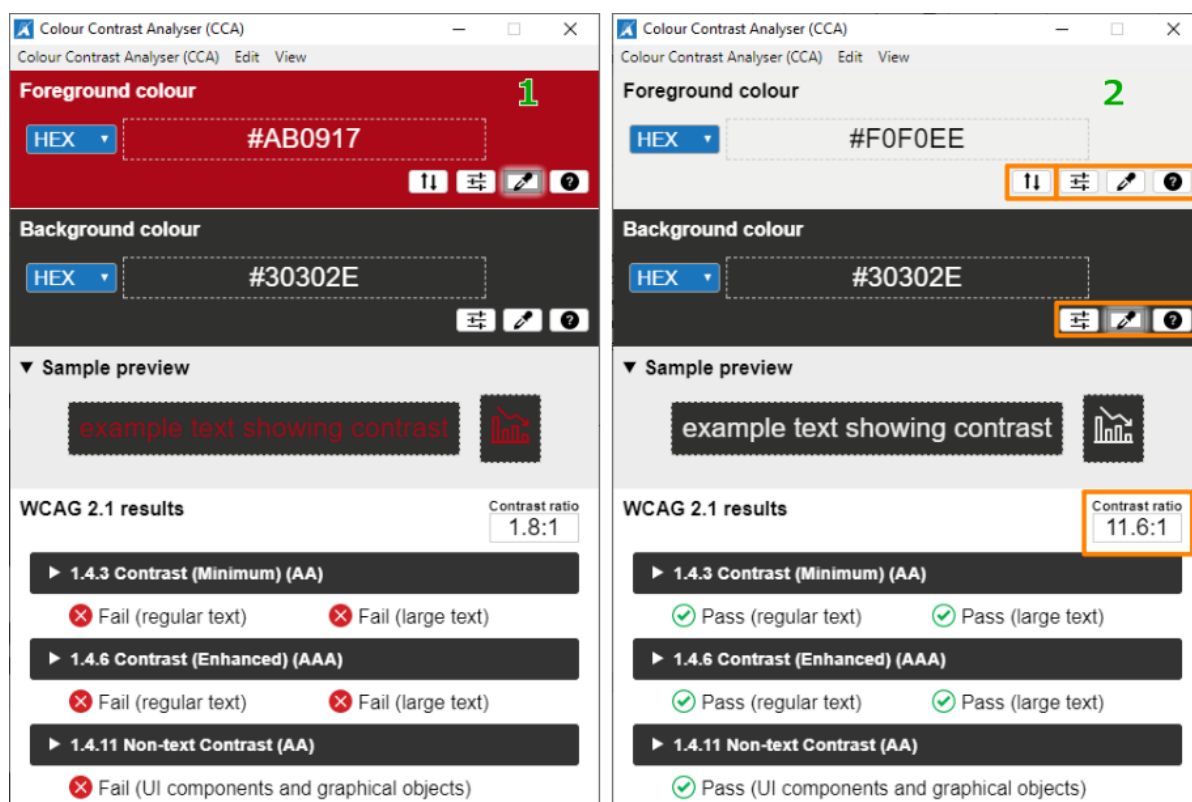
Figure 8: CCA main window showing contrast results from the example screenshot.

To simulate colour blindness, go to View at the top of the window and select Colour Blindness Simulation and a window like the one shown in Figure 9 opens. While both zones resulted in different contrast ratios for different types of colour blindness the most notable result was in zone 1 simulating Achromatopsia and Achromatomaly. In these simulations the text almost completely disappears and the contrast ratio drops from 1.8:1 to approximately 1:1. When determining theme colours a number of useful tools are available online. One such tool is the Color Brewer website. This website is designed for determining colour schemes for maps however the tool allows users to select different criteria such as colour blind safe (red-green only), print friendly and photocopy friendly (grayscale), as well as types of colour schemes and number of output colours. Be aware of the limitations of the tool used and if in doubt check the scheme colours with the CCA. The more colours required the more difficult finding appropriately contrasting choices.

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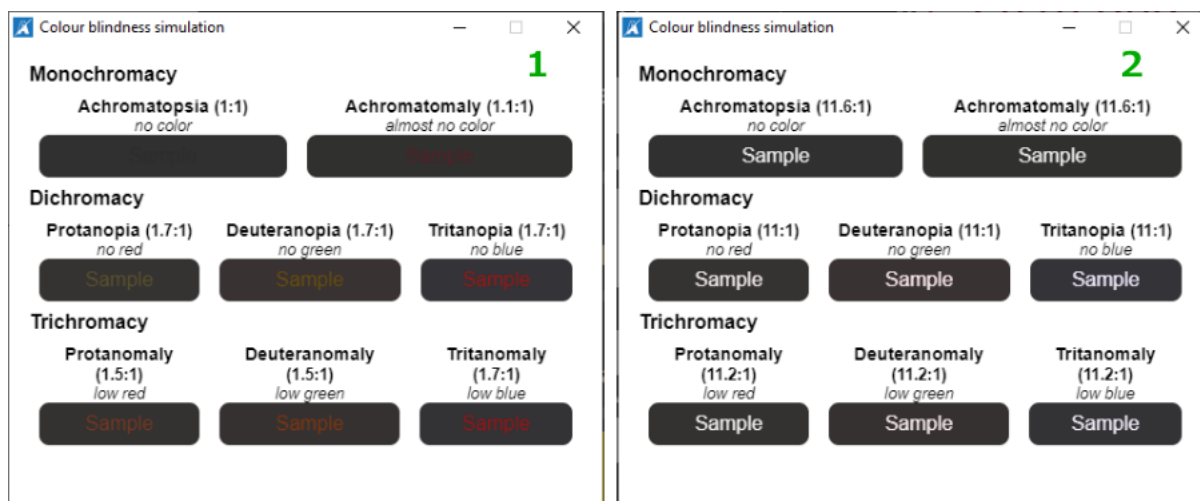
Figure 9: Colour blindness simulation in the CCA.

2.4.   Tool Selection

The WAVE tool and PowerMapper both investigate website accessibility but then what tool should be used? In practice, both are useful but have pros and cons that may influence the choice of tool. Both tools have paid versions that offer more functionality. Each assesses accessibility on a web page after inputting a URL, but each provides results in a different way or assesses other items in addition to accessibility. The WAVE tool assesses the page found at the URL destination only, providing a visual user interface to see errors and page elements, as well as the associated code. The interface allows the number of occurrences of each issue on the page to be seen. PowerMapper, in contrast, assesses the first 10 pages from the given URL. These are the first 10 pages reached via internal links on the page. The results from PowerMapper are recorded in terms of number of issues and the number of pages that have that issue. Results presented from PowerMapper are the number of pages with issues, while those from WAVE are the number on the assessed page alone.

The PowerMapper system uses different delineations than the WAVE tool. For example, PowerMapper uses the headings Errors, Accessibility and Standards, however there is significant overlap between these sections and with the WAVE tool. In addition to the WCAG guidelines,

PowerMapper also checks against the HTML5 and CSS[5] standards for compliance. Additionally, PowerMapper also assesses compliance with search engine guidelines (Google, Yahoo and Bing) and browser compatibility (both current and superseded versions). Similarly to the WAVE tool, PowerMapper also allows access to the associated code for an error, but does not have the visual user interface. A limitation of PowerMapper is that in the free-to-use version it will not show code snippets or specifics for each occurrence of an error after a limited number of results, meaning additional checks will need to be run to see all information as errors are addressed.

The WAVE tool has a more intuitive user interface which may be useful for those who are new to web accessibility, while the PowerMapper tool may be more useful in that it checks more content in one go. It is up to individual websites to determine the number of pages checked when auditing their sites. In some cases it may be sufficient to test a select group of pages due to common formatting, in others it may be necessary to test a larger amount or even all pages.

3. Building an Accessible Webpage

The ability to check webpage accessibility is useful when building a webpage and maintaining and improving an existing website. To save time when building a new website it would be preferable to build it with accessibility in mind from the start. The following sections describe elements of website design that have been identified as issues from a website audit. Additionally, guidelines that are deemed fundamental to website accessibility have also been included. These elements do not cover all aspects of accessibility or usability discussed in the guidelines

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[5] Cascading Style Sheet (CSS) is a language for describing the presentation of a document written in a markup language, such as HTML.

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but represent areas of critical importance or places where errors often occur.

As with many things, there is no one answer for all websites and all users and as such web designers may need to weigh up competing requirements when determining what is most important. **When considering usability versus accessibility it is important to consider the individual needs of the website users in relation to the website's content and purpose**. What is considered important for a website presenting documents will likely not be the same for a website presenting graphical information. In certain circumstances it may be appropriate to not fully apply AA and AAA accessibility criteria if doing so creates a more usable experience and does not disadvantage any subset of users. It would not be considered appropriate however to do the same with A level criterion which must be satisfied for a website to be accessible.

3.1. Basics

The items considered basic here are those that are fundamental to creating an accessible and functional webpage.

Table 1: Key questions to ask about website basics.

Question	Reference	Level
Is the language of the page and its parts specified?	3.1.1 Language of page 3.1.2 Language of parts	A AA
Is the code free from syntax errors?	4.1.1 Parsing	A
Has load time been considered in the construction of the page?	Usability.gov 2.6	P2

The language of the page and its parts should be specified such that it can be programmatically determined. In most systems for web design the language is set in the initial setup. Language may need to be

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specified separately if the web page is multilingual and hence one language for a single page is insufficient. In this case the language of the parts needs to be specified as covered under success criterion 3.1.2. The language tag is used by screen readers to determine word pronunciation and ensure content is read correctly to the user. For example, Spanish content may be read out as it should be pronounced rather than with an English pronunciation.

Success criterion 4.1.1 Parsing requires that the syntax of content implemented with markup languages (e.g. HTML or CSS) is syntactically correct. That is, the **code is free from certain errors related to syntax**. This means that start and end tags are complete, elements are nested according to their specification, elements do not contain duplicate attributes and any IDs are unique. Exceptions to this are allowed if the specification allows. Incomplete start and end tags may be missing a character which is a common coding error. If the code is not syntactically correct then the website may not work correctly and assistive technologies may try to render the code anyway resulting in different appearances or even a crash of the software. These errors may be invisible to web designers if the page still displays correctly to sighted users but may be unintentionally excluding other users.

The last guideline to be discussed here is related to usability rather than accessibility and discusses the load time of a webpage. **The time it takes to load a page can influence the number of people who will ultimately make it to the website**. If it takes too long to access a website then users may turn away to other sources and this could negatively affect user opinion of the website. The usability guideline 2.6 Minimise page download time, suggests that download time is best reduced by reducing the number of bytes per page. Additionally, guideline 14.3 Ensure that images do not slow downloads, provides more detail on measures related to page load time. While related to images, the guideline suggests that download times should be less than five seconds and page sizes should be limited to less than 30,000 bytes. These differences are not likely to be noticeable to users with high-

speed internet connections but could be noticeable for users with poorer connections and hotspot users.

An additional reason to minimise download time with respect to images is to stop page reflow. Page reflow is an issue where a page loads but the images load afterwards causing the content to shift to account for the image. This is an issue in that someone may be reading or browsing content on a page which then shifts the content. **Image dimensions should be specified with the image reference** to ensure that the image has allocated space. This means that even if an image fails to load or takes longer the website layout will look as expected.

To improve speeds it is suggested that several small images are used instead of a single large image, use repeated images where possible and save images with the interlaced or progressive options. Repeated images are where a large image with a repeating pattern is broken up into a smaller image and tiled to create the same visual effect in a manner akin to bathroom tiling. Finally, downloadable items should be marked with the file size where possible to warn users of potentially large downloads.

3.2.   Links and Navigation

A website user should be able to find the content they need on a website quickly and easily. This is achieved via links and appropriate navigation options. If a user cannot easily navigate a website they will go elsewhere for the content they are seeking. This can lead to unintentional gatekeeping and users being excluded from the conversation

Table 2: Key questions concerning links and page navigation.

Question	Reference	Level
Can the link purpose/destination be determined by all users?	2.4.4 Link purpose (in context) Usability.gov 10.1	A P1
Are there repeated sections of content and can they be skipped?	2.4.1: Bypass Blocks	A

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Question	Reference	Level
Are the headings tagged as headings correctly?	1.3.1: Info and Relationships	A
Are the heading labels structured in a logical order?	2.4.6: Headings and Labels	AA
Is the heading clear and descriptive?	2.4.6: Headings and Labels	AA
Is there a way to return to the homepage from any page within the website?	Usability.gov 5.1	P1
If the order of items is important/meaningful is this sequence determinable by all users	1.3.2 Meaningful sequence 2.4.3 Focus order	A A

Links on webpages include both links to other pages and links within the same page. It is important that these links are clearly identified and that the purpose of the link is clear to the users. According to WCAG section 2.4.4 Link Purpose (In Context), **the purpose of each link should be able to be determined from the link text alone, where possible. Where this is not achievable the context should be provided before the link**. This context can be programmatically determined in that text in the same paragraph, list or table cell as the link provides the context. The caveat to this is where the purpose of a link is unclear to all users, such that people with disabilities are not disadvantaged any more than other users. Examples of this include web-based games where links to open doors are meant to lead to unknown places or in a sentence where a word is a link and it could lead to a picture representing that word, a related chart, definition, or some other place.

In addition to the WCAG the usability guidelines have a section related to links. Of note are guidelines 10.1 and 10.6, use meaningful link labels and use text for links, respectively. **Link labels and concepts should be meaningful, understandable and easily differentiated by users rather than designers**. Link labels should also be clearly differentiable from

each other. Labels or link text such as "Click Here" should be avoided. The guidelines also make the point that **the more decisions a user needs to make regarding links, the more chances they have to make the wrong decision**. Text links are preferable as they download faster than image links, are more recognisable as clickable and tend to be preferred by users. It also allows users with deactivated graphics or text-only browsers to see navigation options without additional coding for the website. Finally, link length must be considered (usability guideline 10.11) and line wrapping should be avoided where possible. It is however not always possible to control how links will look to all users due to differing browser settings and screen resolutions.

Empty and redundant links will also result in accessibility errors under section 2.4.4 of the WCAG on the WAVE tool, though they are not directly mentioned in this criterion. **Empty links are those where there is no text in the link or may have no destination. Redundant links are duplicated links such as when a text link is next to an image link to the same destination**. Users of screen readers would potentially be confused by the repeated identical link and keyboard users would need to move past each link individually instead of just one.

Heading levels are used to convey the organisation of content on a web page or in a document and often double as in-page navigation links. As such, it is important that these headings are clear to the user, no matter the technology they are using. Screen readers will read out the heading level along with the heading itself when progressing through the web page. **Best practice is to nest headings by their level or rank**, that is heading level 1 (<h1>) is followed by subheadings at level 2 (<h2>), and so on. **Heading levels should not be skipped except when closing subsections**. For example, skipping from heading level 4 (<h4>) to heading level 2 is acceptable as it is the end of the subsection under heading 4. Heading 4 cannot follow heading 2, however as this skips heading level 3 and may cause confusion to the reader and will result in a skipped heading level alert with the WAVE tool.

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Headings and labels **should be clear and descriptive such that users can better understand the relationships between different parts of the content more easily**. They do not need to be lengthy, sometimes a word or even a single character may suffice provided it is appropriate cue to finding and navigating content. Correct implementation of this is covered by section 2.4.6 Headings and Labels (AA) of the WCAG.

In relation to success criterion 1.3.1 Info and Relationships, the structure and relationships indicated by visual and auditory cues need to be preserved when the format changes. Format on a web page may change when a screen reader is used or a user substitutes in their own style sheet. **Visual cues present in written text such as bullet points for lists, the use of underlines, bolds and italics for emphasis, etc. must be presented to other users**. For example, heading labels are read by a screen reader providing a clear indication of the relative importance of that heading even if the user cannot see the larger/bolder font used.

While emphasis has been made about clear content headings and labels to indicate structure to all users, there is also a need sometimes to skip sections of content to enable better navigation and avoid repetition. This is often the case with heading/navigation blocks and advertising frames. Sighted users will tend to ignore these items and focus on the content they are interested in, however non-sighted users will be read out the content, in order, from start to finish meaning there may be a significant amount of time before that user reaches the desired content. Understandably, this can lead to frustration among non-sighted users. Similarly, repeated header blocks on multiple pages don't need to be re-read each time the page is changed. **A mechanism should be available to skip this repeated content** as described by success criterion 2.4.1 Bypass Blocks.

When navigating a website it is reasonable that users may want to return to the homepage and a link should be provided to facilitate this action from any point in the website. Many sites use the logo on the top of a page as a link to the homepage but many users may not realise that it is

a link. Therefore, **a link labelled 'Home' should also be included** for those users, as stated in usability guideline 5.1.

Finally, where the order of items in a webpage is important to convey meaning to users, that order should be programmatically determinable. That is, the order that focus is applied to items (2.4.3 Focus order) and the order in which they appear as described visually (1.3.2 Meaningful sequence) should be set in a way that assistive technology will present the information to the user in the correct order. If the order is not important it does not need to be specified. In practice, this means that **items like tab, link and heading orders must be retained for users applying different style sheets or using assistive technology**. Similarly, tables that are meant to be read by columns or by row should have that order specified.

3.3. Visual

Often when web designers build a website one of the key requirements is that it is visually appealing. There are a lot of visual design elements that may look good but may be inaccessible or confusing to some users. As contrast plays such a significant role in this area it will be covered separately in section 3.3.1.

Table 3: Key questions concerning visual elements of webpage design.

Question	Reference	Level
Do the fore and background elements have sufficient contrast?	1.4.3: Contrast (Minimum)	AA
Is the font size appropriate for the audience?	Usability.gov 11.8	P3
Can text be resized up to 200% without assistive technology?	1.4.4 Resize text	AA
Is bold and italic text used sparingly?	Usability.gov 11.5	P3
	Usability.gov 11.10	P3

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Aside from contrast, the appearance of text on a page can both enhance and detract from the content of the page. With regards to general font appearance there are a series of usability guidelines that cover how text appears. In this guide, guidelines 11.5, 11.8 and 11.10 will be discussed specifically. These guidelines cover the use of bold text, appropriate font size and methods of emphasising importance, respectively.

With regards to font size, **fonts that are smaller than 12-point slow reading speeds and font sizes less than 9-point should never be used**. If the target audience for the website is over 65 years old, then the font size should be at least 14-point. The caveat to this is that fonts may appear differently with respect to size on Windows and Macintosh (Apple) systems and high pixel density displays may also have an impact.

While font size should be sufficient to be read clearly by users there will always be those who would prefer a larger font size. These may be people who have difficulty reading smaller text due to cognitive or visual impairments. As such, success criterion 1.4.4 Resize text of the WCAG requires websites to **have a mechanism to increase the text size up to 200% without the use of assistive technology or any corresponding loss of functionality or content**. An extension of this is included in success criterion 1.4.8 Visual presentation, a AAA level guideline. In this criterion there should be a mechanism for blocks of text to be resized as in 1.4.4 without a need to scroll horizontally when the window is full screen. Additionally, line spacing should be at least 1.5 times the font size, paragraph spacing at least 1.5 times the line spacing (2.25x font size), text should not be justified and no more than 80 characters or glyphs wide, and the user should be able to select fore and background colours. While this is a AAA criterion and therefore not required, these items represent good practice with regards to text presentation both on the web and in document creation and as such should be considered.

Bold text is typically looked at more often than non-bolded text and as such should be used sparingly to ensure focus is not pulled from content when that is not the desired response. Similarly, **font characteristics**

that are not the same as the surrounding text will pull focus from the more routine text. For example, italics, different font styles, larger font size, etc. will draw focus from main body text. In this guide, key statements are highlighted with the strong style (bold) to allow readers to pull information from the text quickly in a text-heavy document and is intended to draw focus. Underlined text should be avoided as it may be mistaken for a link.

3.3.1.　Contrast

The purpose of this criterion is to ensure there is enough contrast around text and graphical elements to ensure it can be read/seen against the background by people with moderately low vision, who do not utilise contrast-enhancing assistive technology. There are a number of success criteria in the WCAG that cover contrast. A selection of these are summarised in Table 4, however it should be noted that this list is not exhaustive. In the case of text, there are two levels of contrast with different levels with respect to the WCAG rankings. This represents a minimum success level and a higher standard to aim for (enhanced). It is up to the individual to determine what level of contrast is appropriate to aim for on their own website. For a detailed explanation regarding contrast and its calculation according to the standard please consult the WCAG guideline, linked in Table 4.

Table 4: Select contrast guidelines from the WCAG.

Item	Description	Ratio	WCAG Reference	Level
Text and images of text	All text or images of text unless otherwise stated below	4.5:1	1.4.3: Contrast (Minimum)	AA
		7:1	1.4.6: Contrast (Enhanced)	AAA
Large text	Text that is greater than 18pt or 14pt bold. The equivalent sizes in pixels are 24px and 18.5px, respectively.	3:1	1.4.3: Contrast (Minimum)	AA
		4.5:1	1.4.6: Contrast (Enhanced)	AAA

Item	Description	Ratio	WCAG Reference	Level
Incidental text	Text that is an inactive user component, pure decoration, not visible to the user or is part of an image with significant visual content	N/A	1.4.3: Contrast (Minimum)	AA
Logotypes	Text that is part of a logo or brand name	N/A	1.4.3: Contrast (Minimum)	AA
User interface (UI) components	Visual information required to identify UI components except those that are inactive (see incidental text). This includes buttons and input boxes.	3:1	1.4.11: Non-text Contrast	AA
Graphical objects	Parts of graphics that are required to understand the content.	3:1	1.4.11: Non-text Contrast	AA

In practice, **consideration should be taken when placing text over complex or changing backgrounds as what may be sufficiently contrasted at one part of the background may not be at another place**. The same general rule applies to button controls and other visual indicators and is covered by section 1.4.11 of the WCAG, which is also an AA ranked criterion. Previously, the example was provided of a banner with an icon in Figure 7. In that example the colour contrast was checked between the red circle and the black background, however in practice only the white icon against the red icon needs to be assessed as the icon is the important information being conveyed. The colour contrast is hence 7.5:1 which passes all criteria.

For example, consider the banner below that simulates a banner on an existing website (Figure 10). Using the CCA, the leftmost of each bar has a contrast ratio of 3.2:1 (red), 1.6:1 (black) and 13.1:1 (white). If contrast for buttons or text is determined at this point then red or white are appropriate choices. Considering the other end of the scale on the

right then the contrast ratios become 1.1:1 (red), 4.8:1 (black) and 4.3:1 (white). In this case then black and white are both appropriate but red is almost completely blended into the background. When selecting a colour pallet over a relatively simple background, such as the red gradated background shown below, it is important to consider the full spectrum of the background before finalising choices.

Figure 10: Colour bars against a changing background.

Another example, shown in Figure 11 (left side), is of text placed over a complex background. Both the black text over the darker parts of the image and the white text over the lighter result in an approximate contrast ratio of 1.3:1. The text appears to disappear into the image in places making it difficult to read. A solution to this is to include an outline around the text that provides the required contrast with the main text colour. If the outline blends into the background the text will still contrast sufficiently to meet the success criterion. This is shown in the right image in Figure 11.

Colour blindness is another factor that should be taken into account when considering contrast. Different types of colour blindness will impact the effective contrast ratio for users with those conditions. The CCA allows users to simulate the contrast for colour blindness and provides the contrast ratio for each (see Figure 9). **Colour blindness is much more susceptible to hue with regards to contrast than for people who don't have colour deficiencies**. In most cases, if using a neutral colour, such as black, white and greys, for either the foreground or background the contrast ratios will typically not change significantly. This is due to the minimal amount or lack of colour in these neutral colours, causing only one element of the colour pairing to change. This is demonstrated in

Figure 12 where the colour contrast ratio for the original sample was 4.5:1. With the exceptions of monochromacy, the colour ratios changed only slightly from the original sample and still pass for all text sizes. Monochromacy showed a more marked increase in colour ratio due to the absence of colour changing the selections to a more greyscale palette.
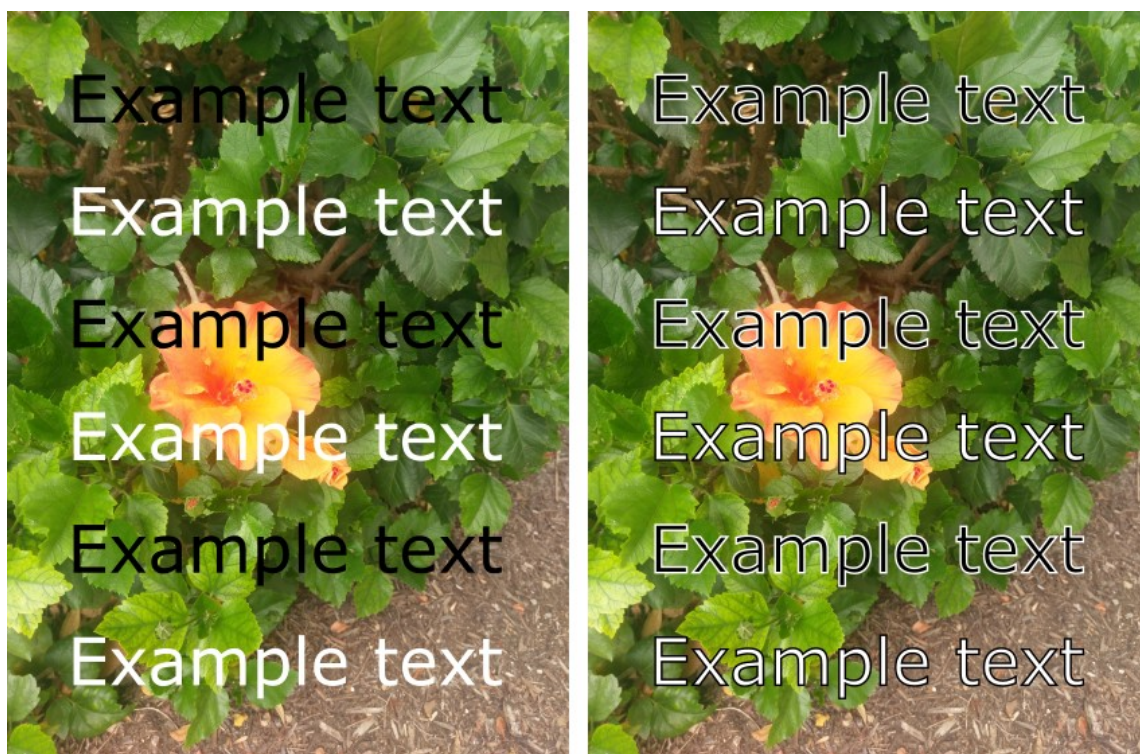

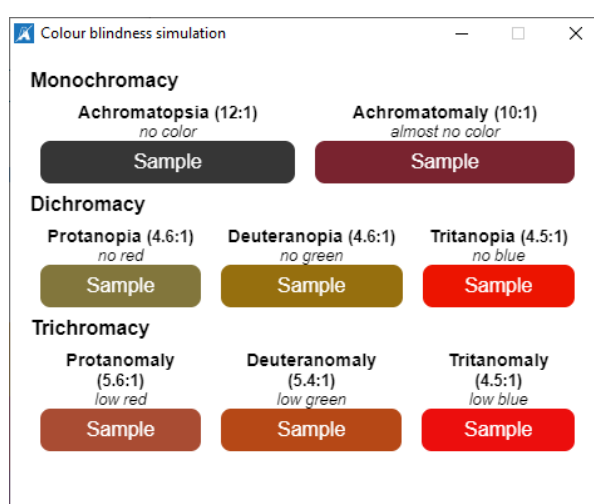**Figure 11: Complex background image demonstrating the use of text outlines.**

Figure 12: Colour blindness simulation with a neutral colour included.

As mentioned previously, there are cases where not meeting an accessibility criterion may be appropriate provided it is to improve usability without disadvantaging any subset of users. An example of this would be using a lower than specified contrast ratio on a graph or chart, violating the contrast requirement of section 1.4.11 of the WCAG, but using patterns, markers, line styles or labels to differentiate the content instead of colour.

3.4.   User Interface Components

When considering user interface components such as input fields or buttons it is important that the function of each item is clear to all users. From completing legal documents to online shopping, data entered into a webpage needs to be accurate to ensure the correct result is achieved.

Table 5: Key questions to consider when using user interface components.

Question	Reference	Level
Are form labels included on input areas?	3.3.2: Labels and Instructions	A
Is the meaning of field labels clear to all users?	Usability.gov 13.5	P2
Have HTML user interface controls been implemented correctly, according to their specification?	4.1.2 Name, role, value	A
Can the purpose of each input be determined?	1.3.5 Identify input purpose	AA
Have long data items been broken into smaller parts, where possible?	Usability.gov 13.12	P3

Form labels identify and describe the purpose of form controls on a web page. Form controls can include text fields, checkboxes, radio buttons and drop-down menus. Labels are used to ensure a user knows what data or input is expected at a given input field, as specified in section 3.3.2 Labels and Instructions. Examples of this are date input boxes that initially show the correct date format, required and optional inputs that

are clearly marked, and address inputs that separate the components such as street number and name to avoid confusion with input format. **Form labels can be hidden visually where the purpose is clear from context, but they still need to be provided for other presentation or interaction**, for example, screen readers and speech input devices.

The level AA success criterion, 1.3.5 Identify input purpose builds on this requirement to add that the **purpose of each input field can be programmatically determined** when the following conditions are met; the input field serves a purpose under guideline 7 of the WCAG[6] and the content is implemented using technologies with support for identifying the expected meaning for form and input data. The purpose is to increase the potential for users and assistive technologies to apply personal presentations which in turn enables more people to understand and use the content. Currently, the main benefit for this criteria is to add autocomplete functionality, allowing users to quickly fill in a form with known personal information.

In further support of this criterion is the usability guideline 13.5 Label data entry fields clearly. The guideline requires that **for each data entry field a descriptive label is provided to help users understand what entries are desired**. These labels should be distinct enough that readers do not confuse them with the entry itself, should use common terms, bold for labels and asterisks for required fields. If a specific format is required this should be specified either as part of the label of with on-screen help text. The guideline 13.12 Partition long data items also helps with ensuring that data entered is correct by breaking large data items into smaller, more manageable parts. For example, phone numbers with

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[6] This guideline "Input Purposes for User Interface Components" sets out a list of common user interface component input purposes. The list is not exhaustive.

separate entries for country and area codes to the number or bank card details being broken into 4-digit sections. In the latter example this aligns the entry requirements with the method the information is presented to the user on the card itself making it easier to check the entered information is correct. In general, **the longer an entry item is the more opportunities for errors to be made and the harder it is to check for those errors**.

Finally, the success criterion 4.1.2 Name, role, value specifies that **for all user interface components, the name and role can be programmatically determined and the items that can be set by the user can be programmatically set**. Additionally, changes to these items can be communicated to the user, including those using assistive technologies. Standard HTML implementation to its specification meets these requirements by default. This would mean that issues flagged for this criterion relate to improper HTML implementation or custom user interface components.

3.5.   Text Alternatives

In this last section the usage of text alternatives will be discussed. Unlike other sections there is a single guideline that covers the majority of text-based alternatives, apart from controls and inputs and time-based media, section 1.1.1 Non-text Content. The criterion states that **information conveyed by non-text formats should be available through a text alternative**. That is, graphics should be accompanied by alternative text, videos should have captions or transcripts and audio should be described in text form. There may be other solutions and scenarios unique to the website in question, but the principle remains the same as it is for cues under section 1.3.1 Info and Relationships; what is perceivable to one set of users should be perceivable to all users. A list of alternatives for non-text content and the associated guidelines are included in Table 6. For reference, synchronised media is audio or video that is synchronised with another method of presenting information or with time-based interactive components. An exception to the

requirements in Table 6 is where the content is itself an alternative for
text or media. In this case this should be clearly labelled.

Table 6: Alternatives to non-text content. All guidelines are level A.

Item	Alternative	Reference
Sensory content and tests	Text alternative that provides a descriptive identification of the content[7]	1.1.1: Non-text content
CAPTCHA	Text alternative that provides descriptive identification of the content plus alternative forms of CAPTCHA are provided	1.1.1: Non-text content
Decorative, formatting and invisible content	Content should be implemented such that it is ignored by assistive technology	1.1.1: Non-text content
Audio only (e.g. a radio interview)	An alternative for time-based media[8] that presents equivalent information (e.g. a transcript)	1.2.1: Audio-only & video-only (prerecorded)
Video only (e.g. an illustrative animation)	An alternative for time-based media or an audio track (e.g. audio description of a silent movie)	1.2.1: Audio-only & video-only (prerecorded)

[7] A description of the purpose of the non-text content and what it is without
describing the content itself.

[8] An alternative for time-based media is a document that is correctly
sequenced text descriptions of time-based audio and visual information.

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Item	Alternative	Reference
Audio content (e.g. a tutorial video)	Captions should be provided on all pre-recorded audio content in synchronised media, including video content	1.2.2: Captions (prerecorded)
Video content (e.g. a training video)	Alternatives to time-based media or audio description should be provided for pre-recorded video content (e.g. time synchronised text descriptions)	1.2.3: Audio description or media alternative (prerecorded)
Controls and inputs	Item must have a name that describes the purpose	4.1.2 Name, role, value
All other content	Text alternative	1.1.1: Non-text content

It should be noted that the information displayed in Table 6 does not include provisions for live content. Due to the complex nature of the time-based media content (audio and video items) it is strongly recommended that the guidelines are consulted when utilising these features for the first time.

An area where usability and accessibility do not always align is in the inclusion of alternative text for images. As discussed, all non-text content must be accompanied by a text alternative. In the case of an image this is termed alternative text and is a description of the image. Where this clashes with usability is the repetition of content from the text in the alternative text or redundant images being explained. The inclusion of alternative text in these cases may cause frustration for the user through the repetition and additional time it will take to get to read out the statement. For example, **purely aesthetic items on a page should not have accompanying alternative text and should instead be marked as decorative**. This will mean the screen reader will ignore these elements. In the case of content repetition this occurs when the image is described in the text already and the alternative text is just a reiteration of that content. This occurs often with charts or items that are

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topics of discussion. One method to alleviate this problem is to **provide a different alternative text that focuses on the image itself**. For example, a report may include a time-lapse of an event and this is described and discussed in the text. The alternative text for the time-lapse may state that it is a time-lapse of an event without discussing what in particular is happening between the frames.