Activity A

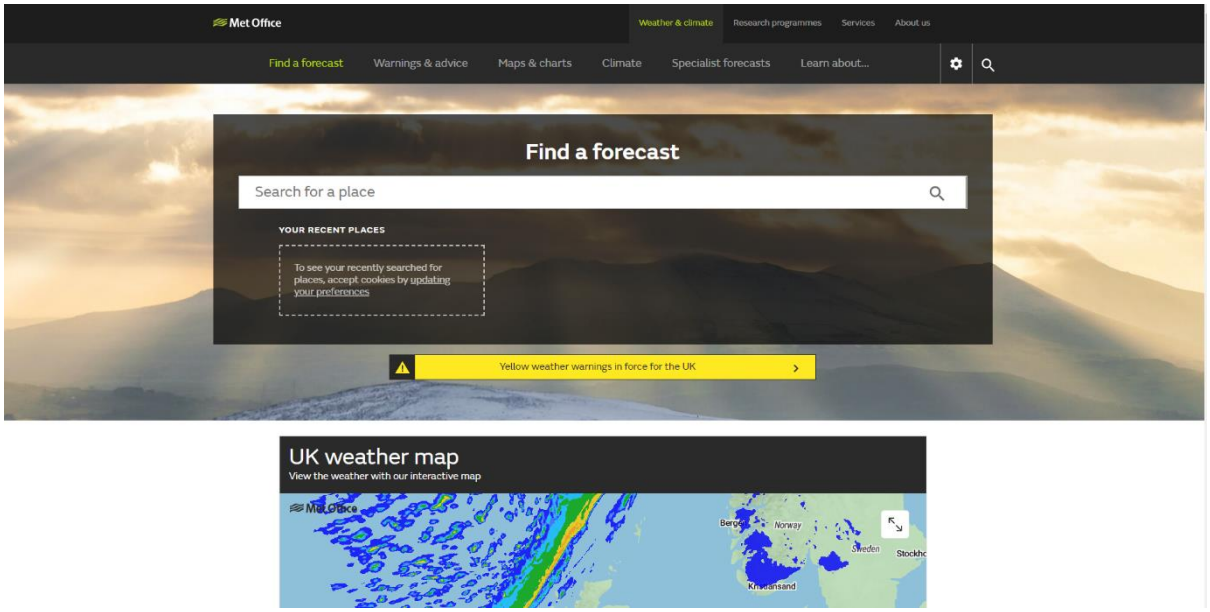
This document provides the proposal to meet the digital solution requirements of Health Advice Group, it also includes the research carried out to develop this solution proposal.

Activity A (i)

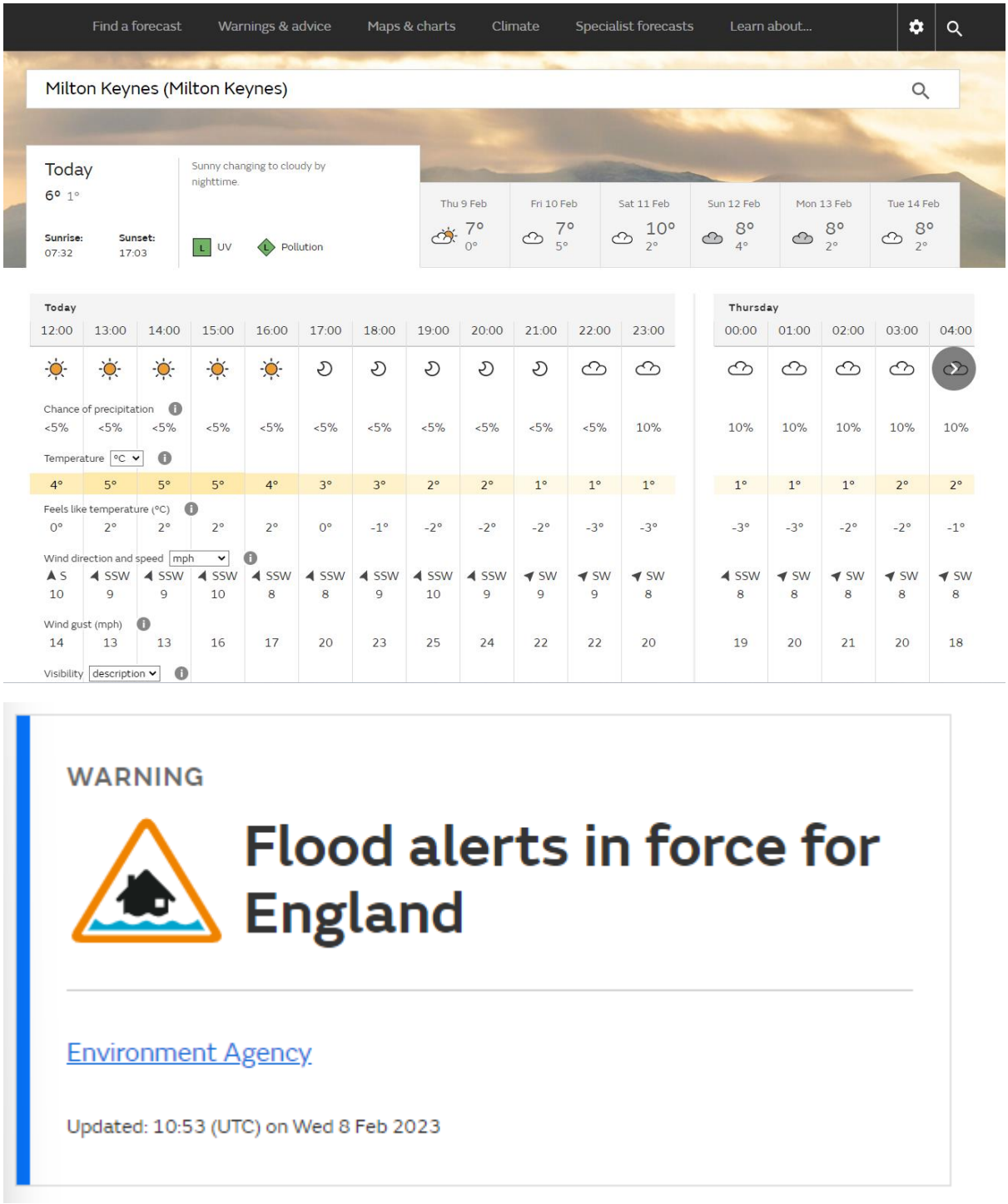
The research

MetOffice

Health Advice Group provides information and support for environmental health issues. During my research finding similar groups providing what Health Advice Group is planning to provide with their digital solution I found a few, government organisations as well as independent organisations. The first organisation is the Meteorological Office (Met Office), the United Kingdom's national weather service. Considering the fact that they are a national office it is clear that their information is official and reliable. They provide the user with an intuitive and straightforward website, asking the user the place for which they are looking for weather data.



As soon as this is inputted the user is provided with weather forecast data for the week including the humidity rate and any weather warning.

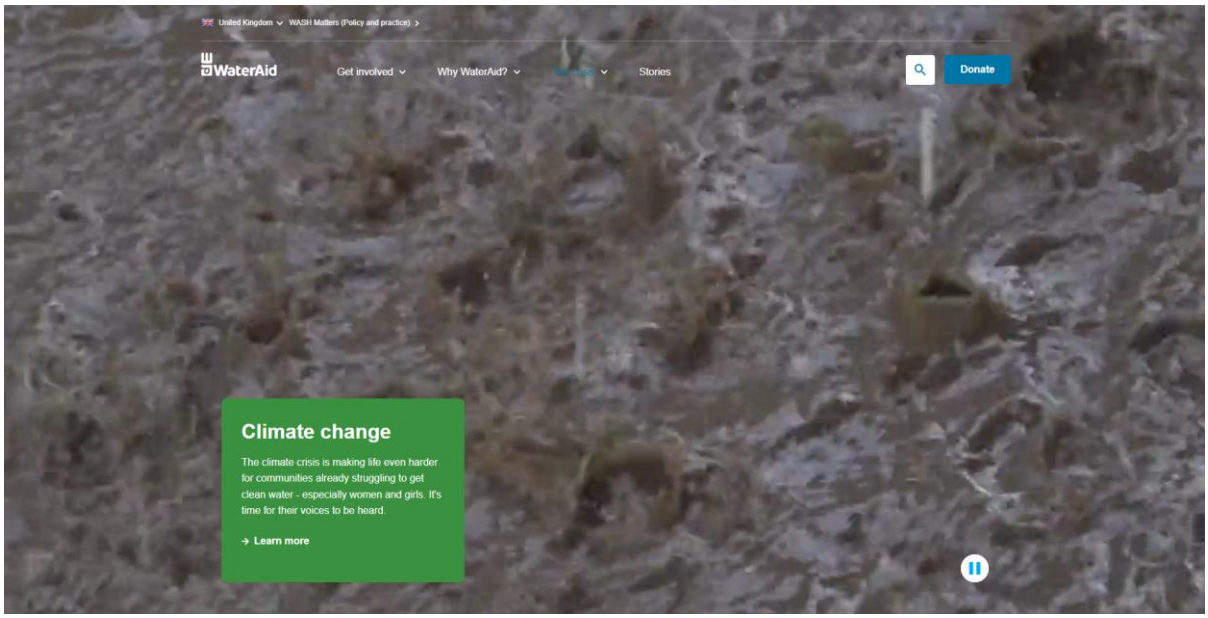


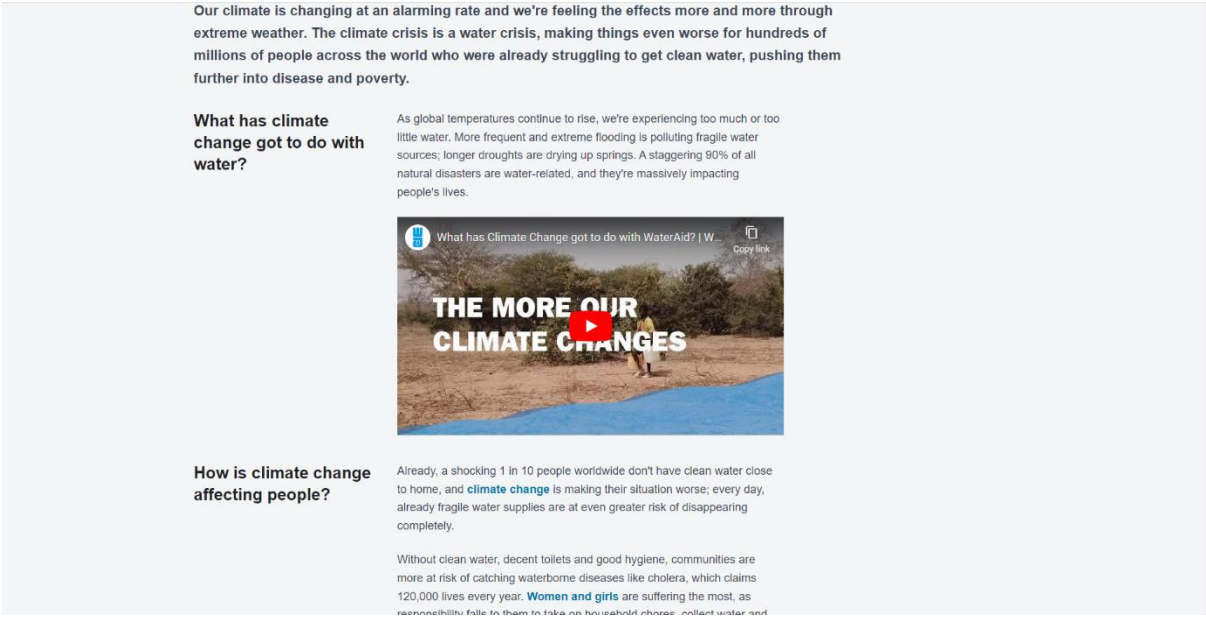
In addition to these the user is also provided with direct access to other weather-related pages such as the ‘Warning & Advice’ and ‘Climate’ pages directly in the navigation menu. This highlights the importance of environmental health. Another thing included in the menu bar is the search bar which prompts the user with access to other similar pages; such as: pollen allergies, hay fever and asthma – providing information in regards to the weather.

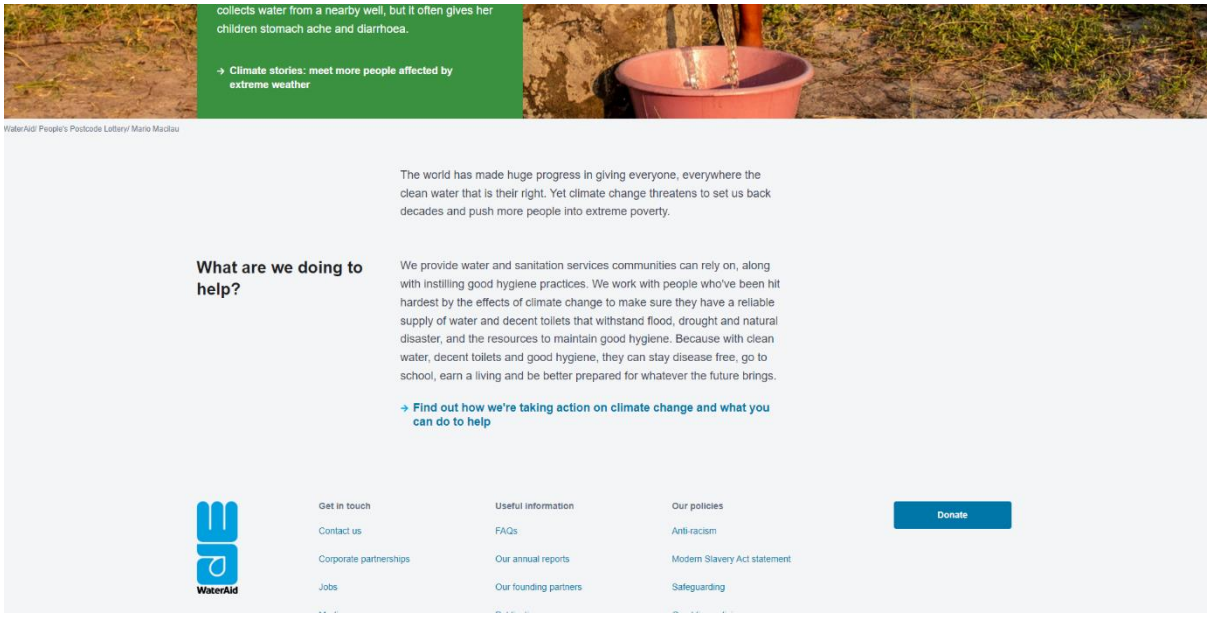
These pages provide information, and are presented in an intuitive way following a layout that is presentable and follows regulations and guidelines for websites, set by W3C.

WaterAid

Another website that partially does what Health Advice Group intends to do is WaterAid, a non-governmental charity organisation working towards providing clean water, decent toilets and hygiene knowledge to people who don't yet have access to them. They present the visitor an intuitive webpage enhanced with video content showing the work they do, why they do it and how they do it. This makes any visitor understand their purpose and invoke them to read more their website and make their contribution. For the purpose of my research I want to discuss about the 'Climate Change' page from their website. Like in all their other pages they have a video playing in the background, related to the context. This video can also be paused and they have included information regarding the context underneath. The information section of the page also includes some videos from external sources such as YouTube (in this case a video uploaded by themselves) providing further information and finally a donate button in the footer of the page (along with other similar page links).







Newly emerging technologies

The need for a change in order to save our planet is now understood by many, and many are changing their daily lifestyles they've been following for years. For example, more people started avoiding unnecessary use of resources already in possession such as plastic bags; since the UK government implemented the law to charge for plastic bags more and more people understood the reason for this and started re-using bags already in their possession. Below are a few newly emerging technologies which will have an impact on our planet:

- Zero emission vehicles – electric vehicles used for domestic use are no more an emerging technology in 2023 considering the numerous electric vehicles we keep seeing on a daily basis. However, what can be considered as newly emerging technology are large vehicles such as busses and lorries powered by electricity or hydrogen. More and more manufacturer and considering the impact large diesel vehicles have on the planet and the legislations worldwide nations are introducing, for this reason they are developing newer sustainable ways to substitute older technologies. However, the negative impact of these are the long charging times which make it an obstacle since these vehicles are on continuous and constant movement, meaning that companies will have to make higher investments. Local transport businesses are being supported by their councils and government to make this a reality. The UK govenement has already agreed on a £198.3 million worth of funding (data from gov.uk) to provide 943 zero emission busses, of which £50 million is going to Coventry making it the first UK's all electric bus city.
- Electric delivery robot – some cities in the UK such as Milton Keynes have autonomous delivery robots, these are small sized vehicles/robots which collect orders from a partner shop (where a human will unlock the device and load the order) and deliver it to the customer who made the order. These delivery robots are electric powered, making them an energy efficient solution reducing the overall fuel consumption consumed when it comes people need to make small purchases. Alastair Westgarth, the CEO of Starship (company operating delivery robots) stated in an interview to Forbes that these robots are powered by machine learning

algorithms, work autonomously but are always operable by humans when needed

Delivery Robots Parked Beside Glass Window; Kindel Media

- Building with integrated photovoltaics- photovoltaic systems have zero emission. New technology known as solar roof tiles or shingles are roof tiles with integrated photovoltaic technology, which makes this solution not only sustainable but also adaptive to the style of the house unlike photovoltaic panels which are easily noticeable. The main advantage of these are that the savings the user makes after the installation of these in their house, with an estimated figure of between 40% and 70%, other than that it provides clean and free energy which also increase the property's market value. However, there are some downsides with this technology. The main being that the initial cost is really high compared to solar panels and there are some specific angle that the roof must meet to accommodate the technology (data from greenmatch.co.uk).

Activity A(ii)

Solution Proposal:

Description of the proposed solution and user interface and user experience

Health Advice Group provides information and support for environmental health issues. Environmental health issues are severely increasing in the past decades, statistics shows air pollution as the major reason for pre-mature deaths across Europe. These are mainly caused by unsustainable solutions humans have been adapting in the past years such as flights (used frequently) which emit greenhouse gases directly into the higher levels of the atmosphere, affecting the environment at higher levels of the atmosphere. The impact of these is directly affecting us and other lives in the planet. The government is working towards reducing these issues by introducing restrictions such as the ULEZ (Ultra Low Emission Zone), restricting vehicles with high emissions accessing certain zones of London.

In order to provide information on the topic and support people facing issues related to the environmental health, Health Advice Group has approached for the development of a digital solution that provides:

- weather forecasting to inform health decisions
- access to a dashboard for monitoring air quality data
- advice on how to deal with health matters affected by weather and environmental conditions.

Moreover, the client also conducted some market research to come up with the ideal digital solution for their users. Based on this, they suggest us to include:

- personalised health advice based on the location
- accessibility features to support a wide range of user needs
- a personal health tracking tool.

Taking into consideration their requirements and the type of organisation they are, a website would be the best approach to fulfil their needs, since web-based solutions allow the development of quality products accessible simply by navigating to the relevant address, accessible to users with specific needs and open for further improvements in the future whether they are basic changes or advanced changes such as the integration of applications. In addition to that, a web solution can be utilised in all modern devices such as smart mobile devices (tablet and smartphones) and desktop devices meaning that the solution is more likely to reach a wider audience.

The solution would also provide what the client has been already providing in a digital format:

- advice on how to deal with extreme weather temperatures
- information on environmental health conditions and seasonal allergies
- risk assessment for home environments.

Based on what the client is currently providing, the solution could have a set of pages for each service/information they provide.

Considering the high number of people whose health is affected by weather and environmental conditions providing advice on how to deal with these conditions is very important, especially if the individual themself or their surrounding has health conditions and seasonal allergies. To provide advice on how to deal with extreme weather temperature the solution will have a page where information on extreme weather temperatures is given and links to pages for specific weather conditions such as heatwaves, torrential rains and floods. And considering that sudden extreme weather conditions are becoming a normality in recent years (such as heatwaves) people would want to know more information about these and how to keep themselves safe during these times. For this purpose, this specific section of the solution could be the section that would make more people aware of Health Advice Group and be used to bring more traffic to the site.

A similar approach will be followed for the pages regarding information on environmental health conditions and seasonal allergies since they are all informational pages. The section related to providing information on environmental health conditions and seasonal allergies is of high importance and needs to be treated with due care since it will be providing health related data, that people might base their important decisions based on it. Experts will have to write the information in this page and a warning that the information is not to be taken as medical advice should also be provided. A higher traffic could be expected on these pages during allergies' seasons.

Weather forecasting data could be provided using a reliable API service, provided by an organisation that specialises in the sector. This will make sure that the data is up to date,

save money on the charity as they won't have to invest in forecasting the weather themselves or manually update weather data collected from external sources and provide data that is accurate (depending on the source). In simple terms an API (Application Programming Interface) is an interface that lets a digital product communicate with another product without the knowledge on their implementation, for example many websites provide their location by incorporating Google Maps in their website, including the features of Google Maps, this is done using the Google Maps API. In order to incorporate an API, authorisation from the provider is required (more information on the API that will be used is given in the following sections). Another page of the solution will have a dashboard for monitoring air quality data, this will also be provided using the API. This will be one of the key pages of the website since environmental health decision will be mainly based on air quality data. Using the API weather forecast will be shown on the weather forecast page, here the user will be able to see relevant weather data by simply typing in their location; similarly for air quality data. The API will obtain the data requested and provide the user with this. Under both pages some information about health decisions will be provided, so that the user can take the decision relevant to the weather forecast for their location.

In order to meet the requirements of the client OpenWeather API service has been chosen. They provide with weather data for over 200 000 cities for affordable prices, the ideal plan will be discussed with the client in future meetings but to give an idea of how the solution will look like the free subscription plan will be used when making the prototype, so the One Call API 3.0 subscription plan.

Since the client already provides risk assessments for home environments a section of the solution could be dedicated for this purpose, where the user will be asked a few questions with a few pre-written responses to choose from based on which a response will be given regarding the conditions of their home.

Health Advice Group also conducted some market research to find out about potential features that could be included in their digital solution. This makes sure that the solution provides what people would be expecting from the organisation and so increases the trust in the charity, potentially leading to more funding. Based on the research they need:

- personalised health advice based on location- users will be using the solution from different regions, and in order to provide service for people from a variety of locations and make them frequent users of the service it is necessary to provide advice relevant to them. Most services limit themselves providing data only for bigger regions such as London; in those cases, users from areas out of London always tend to avoid the service since that information is not relevant to them.
- accessibility features to support a wide range of user needs- this will make sure that everyone is able to access and utilise the solution, treating everyone fairly and equally. For example, if a user with colour vision deficiency (colour blindness) uses the solution and it has colours such as red and orange highlighting key differences the user won't be able to distinguish them and most likely would make the wrong choice. For that purpose, the market research result expects to develop a solution that includes accessibility features.
- a personal health tracking tool- with constant environmental changes directly affecting people's health, users would be expecting some kind of tool that would evaluate their health and the likelihood of them getting/having any conditions.

All the above-mentioned requirements and needs are further detailed with information in regards of how these will be designed and implemented in the following parts of this rationale.

Although the best work will be deployed in the first release, there might still be some user feedback that users would want to share to make the service better. For that purpose, a contact page will be created with information in regards of how to contact the charity for different purposes; the different purposes include how to economically support the charity, any volunteering people might want to do and other similar purposes.

Another page will also be created to accept charity donations, these will fund Health Advice Group to do their charity works. This page will contain all the legal requirements required to collect donations from users (further details on legislation and regulations is given in the regulations section). This feature will be implemented based on the time availability since it wasn't requested by the client but is a recommendation from us, based on our previous experience and similar websites.

Finally, in order to provide personalised results using the personal health tracking tool a user account for each user can be set up. This will have user's personal data and any more data required to deliver the advice and track their health. In order to comply with the GDPR regulations the data will be only used to find out the conditions of the user and won't be stored; the only information that will be stored is the advice given to them the last time and the condition of their health. A user account won't be required to those users requiring personalised health advice based on location as this will be solely based on the individual location.

The user log in details will be stored as a table in a database, linked to further tables (specified in details in the design document).

In order to sign in the user will be asked for their email and password, which they would have set up during the registration; along with their name and an answer for a security question to choose from a set of pre-set security questions. In case the user forgets their password, they will be allowed to reset this by simply inputting their emails, security question answer and double confirming their new password. A link to the privacy policy of Health Advice Group will be also provided next to the sign-up button so the user reads it and confirms by registering the account. Due to security reasons the admin account's password will not be able to be reset by an admin, and the only way this could be done would be to contact us who would reset this manually using coding knowledge.

The personal health tracking tool will be a questionnaire similar to the risk assessment questionnaire with a set of answers to choose from for a set of questions, and based on these answers a result will be given to the user. Both of these questionnaires can be re-done if the user has input some wrong data or done it in correctly. This makes sure that they are using a reliable and trustable service.

Due to the complexity of the solution and the different types of pages they will be hosting the best approach to develop the solution is to follow the ASP.NET Model View Controller (MVC) pattern, which does not only link data models with the user interface but also allows to use controllers controlling access and manage the flow of the program which is very useful in this context since there is a lot of different types of pages involved as well as different types of user account (discussed in detail in the below sections). The main advantage of MVC is that this supports a variety of programming languages, in this context html, CSS, SQL and C#

will be used in the main context, however as the first prototypes will get developed any other additional programming language might be added depending on the need. Moreover, the pattern will help any third party developer to understand the flow of the solution and how each function is implemented quickly due to its straightforward and organised structure

As mentioned above the user accounts will be of two types, one is for the general user while the other is for the client's staff who would access the site to make modifications, so that the staff responsible for the website won't need any coding knowledge to make modifications to the solution.

Finally, the user has to be able to edit their account information, such as password, name and e-mail address. In order to make changes to this they will be allowed access to a page where they will be able to modify these details. The changes made here will directly affect the main database.

All pages will include images as shown in the wireframes in the upcoming sections.

The solution as a whole will follow a consistent style in order to make it more appealing, cohesive and formal. It will include a navigation menu giving access to a variety of main pages, and a footer containing information such as charity address, link to the donation page and link to a sitemap. The navigation menu will be shown on each page at the top of the page.

Functional Requirements:

- User is able to share their feedback
- User is able to make donations
- Client account so that modifications can be made without coding knowledge
- Health tracking tool
- Home environment risk assessment
- Personalised health advice based on location
- Password reset system when user forgets their password
- Updated weather forecasting
- Support for external accessibility software/hardware.

Non-functional requirements:

- Storage of personal details in a secure environment
- Supporting different types of devices
- Reliable solution, available at all times unless when specified to go offline
- Good response time to input and good performance
- Follow the local legislation
- Good usability
- Provide updated, true and reliable information.

Risk mitigation:

After the solution is released to the public the user might find face themselves in some unexpected issues, which can be counted as risks. These risks should be identified and a plan to reduce the impact of these should be specified; this is known as risk mitigation. The table that follows features some risks we may encounter as the final solution is presented to the public and the mitigation plan to overcome them.

No.	RISK	PRIORITY	MITIGATION
1	User forgets their log in details	HIGH	When the user first registers they will be asked to choose a security question and an answer for this, this will be asked when they will try to reset the password and if answered correctly they will be granted the permission to reset the password. However, they won't be able to gain back access to the account if they happen to forget their email they won't be able to gain back access to the account since it's not secure to do so as criminals may use the method in their advance (discussed in further details in the security section).
2	User finds errors in the system	HIGH	If a user finds an error within the software solution they can contact the charity directly via email and let them know of the error they found, Health Advice Group will have to contact us and we'll fix this immediately. This is set as high priority since errors are often what allows cyber criminals to initiate their attacks.
3	The server is under hackers attack	HIGH	The server will be protected using third party's protection such as Cloudflare's Website Security protection which protects the website from a variety of cyber attacks such as the Distributed Denial of Service (DDoS) attack.
4	Staff leak their log in data in phishing websites	HIGH	Staff will need to be trained in IT security and how to be away from scams and cyber attacks such as phishing attacks. Moreover, the database will have to be immediately wiped and reset.
5	Users find bugs in the solution	MEDIUM	Contact details will be provided in the solution where users can share their feedback and any bug they found; this will then have to be submitted to us and we'll fix it immediately free of charge since it's an error on our side.
6	Display of incorrect information	Depends on the information	Since most of the information is health related this has to be 100% accurate. Whenever new information is updated this has be checked with experts before being posted,moreover in pages with medical data a message inviting the user to check with a professional will be shown. Moreover, in some

			conditions the information might be incorrect as a result of time, for example if weather data for today was updated yesterday saying it would be a sunny day but it's actually raining then this data will be considered incorrect, for that purpose a message showing the last update time and data should be shown.
7	Data that is not updated	HIGH	As the API provides the data the time this data has been last updated will be shown, therefore the user will know if the data seems to be incorrect the time this was collected. Unfortunately, the data can not be modified as it is provided by an external source although, accuracy will be ensured thanks to the high-end tools used by the source.

Legislations and regulations needed to be followed:

From the needs of the client and the operations they do a website is the most appropriate solution that would fit the needs and requirement of Health Advice Group. Websites have specific guidelines, regulations and legislations, varying depending on the country. Based on the client requirements and similar websites I can understand that the main ones to consider are: GDPR, providing charity information and accessibility requirements, since the website users will be providing their data when contributing to the charity. Hence is a brief explanation of each below:

- UK GDPR- this is the UK implementation of the General Data Protection Regulation, setting out seven key principles: lawfulness, fairness and transparency, purpose limitation, data minimisation, accuracy, storage limitation, integrity and confidentiality and accountability. Failure to comply with the principles leads to fines up to 4% of the annual turnover or £17.5 million (whichever is the highest). The laws in the regulation need to be strictly followed; an example of law in the UK GDPR is that only the required data should be collected and, the purpose they will be used for must be mentioned before the data party approves to provide these (and they can only be stored for the required and specified time period).
- Charity information- when collecting money for charity the charity registration number corresponding for the nation should be provided, for example, if the charity is registered in England then the registration number should be provided, preferably close to the donate button.
- Accessibility- when developing a website the aim of the client and developer is that this can be visited and used by the most people it can reach. If we want to obtain that result we have to develop our website in a way that no user would find it hard to use the system. 1 in 5 people in UK have a long term illness, impairment or disability; if our website is unable to be used by them we would be losing the 20% of visitors already. Moreover, it would be unfair and unethical. When developing the solution each possible considerations should be considered; for example if a navigation menu is being coded this should be in a style that people with visual impairment can also understand.

In addition to the above, the following will also have to be considered.

- Equality act – this act ensures that everyone is treated fairly and equally, regardless of their race, disability, gender reassignment, marriage and civil partnerships, pregnancy or maternity, religion or belief, sexual orientation, sex and age.
- Health and safety – the health and safety regulations must be followed in all workplaces. In the context of the project the client must make sure that they follow the health and safety regulations regarding the Display Screen Equipment regulations, in addition to the other Health and Safety rules. Based on this the employer should follow the rules in case their employees frequently use display screen equipment. Some of the requirements the employer needs to meet based on this are:
    - The provision of eye tests
    - Provide regular breaks
    - Conduct a DSE workstation assessment.

Accessibility:

In terms of accessibility the solution will have to meet a set of requirements in order to allow every user access to the solution without facing any issues. The solution should follow the standards set by W3C regarding accessibility. Based on this the solution will be using colour schemes that can be seen by everyone and use of sensible colour choices, for example text in dark colour such as blue cannot be used where the background is also darks such as black. In terms of styling the font chosen will be a font that has not styling that makes it harder to read, but a basic at the same time good looking font such as Helvetica or Arial will be used. Any media content will also provide a text alternative so that people with visual impairments will understand what has been represented. The overall layout will be designed in a minimalistic and simple way so that keyboard can be used for input. Any text provided will be supportable by software reading out the text.

Performance and reliability:

As mentioned in the previous sections above the solution must be reliable and performing in order to make sure that the user is satisfied with the service offered and will return to use it more often. Overall, the solution should have a good quick response time. In order to achieve this heavy files such as videos will be avoided as these will take longer to load. In terms of reliability, the information must be provided by the client and the client should make sure that this is reliable and legit information preferably provided or consulted with experts; sticking to this requirement will also help avoid the damage of brand reputation and legal actions.

Key Performance Indicator (KPI)

Key Performance Indicators are some type of quantifiable measure chosen in a context that would show the performance, for example in a retail business the KPI would be the number of sales a specific product made, this will be then used by the business manager to make business decisions. In the context of Health Advice Group’s digital solution there are several KPIs we could consider using to measure different performances. These are:

- Number of donations received- this will show the number of people who are understanding the issues mentioned in the webpages and the number of people willing to support the cause.
- Number of visits to the website- this will show the number of people who visit the website showing how known is the website among the public
- Number of registered users- this shows how many users are willing to register to use the additional features needing personal data
- Number of emails sent to the technical team regarding errors- this will give an idea of how many issues have been found within the software, showing the performance of the developing and testing team which may be positive or negative
- Average time spent in each page- this shows whether the content produced is interesting or not which may suggest some changes to be made in the future.

Functional requirements:

No.	Features	Priority	Justification
1	Users are able to edit their account details	HIGH	Users might change their details in the future, this feature will allow them to keep using the service and avoid the need of creating new accounts with new details and make those old accounts be unutilised.
2	Users are able to reset their password	HIGH	Users may forget their password, and this should not mean that they lose access to the account. If this feature is not included they would lose interest in the solution and organisation.
3	The home environment risk assessment provides a fairly accurate response.	HIGH	This ensures that the organisation is providing reliable data and would make users recommend the tool to other users.
4	The health tracking tool is accurate and provides reliable accurate responses.	HIGH	Users may make important decisions based on this and since is regarding health this must be accurate.
5	Client account provides enough functionality to edit all the information displayed.	HIGH	The client should have control over the content displayed in the website, hence this will make sure that the information shown is up to date and is in control of the client.
6	The API takes user's input and provides the requested outcome.	HIGH	One of the main component of the solution is integrated with the API, and so this must do a good job.
7	The response regarding the health condition should be stored.	MEDIUM	The user will be able to see their last result, however a new response could still be obtained by re-taking the test.
8	Each link takes to the relevant page.	HIGH	Links are the only way to access the web pages (unless the routing link is understood) and so must work correctly.

Non-functional requirements:

No.	Features	Priority	Justification
1	The API provides the outcome within an acceptable time to ensure a good performance.	HIGH	The performance is essential to satisfy the user, therefore a fast response time should be ensured when obtaining data from the API client.
2	Fast overall response time, ensuring an overall good performance of the solution.	HIGH	The overall performance is what defines the experience of the user and so this has to be at high levels.
3	Supporting different types of devices	MEDIUM	Users would use the solution without any issues if this is implemented.
4	Legal, following all the legislations, including new legislations	HIGH	Failing to comply to legislations could cause fines, ruin the reputation of the organisation and lose users' trust.
5	The solution must be accessible	HIGH	This will make sure users with different needs can access the solution without any issues.
6	User data is securely stored	HIGH	This ensures that data is protected accordingly, and any unauthorised person would not access the data.

Decomposition of problems to fulfil the functional and non-functional requirements:

- Conduct research on further accessibility requirements in order to make sure that everyone can access the solution
- Hashing the user's password so that not even our staff can not see the password
- Further research on home environment risk assessment to provide with a relevant response
- Further research to develop the health tracking tool to ensure a reliable response
- Train Health Advice Group staff on how to manage and maintain the website
- Research on encryption methods that could be applied to encrypt personal data

User acceptance criteria:

User acceptance criteria is defined as criteria that must be met in order to be accepted by a wider set of users. For example, the user acceptance criteria for an instant messaging app could be that messages are delivered instantly. Here are some user acceptance criteria for the solution proposed to Health Advice Group:

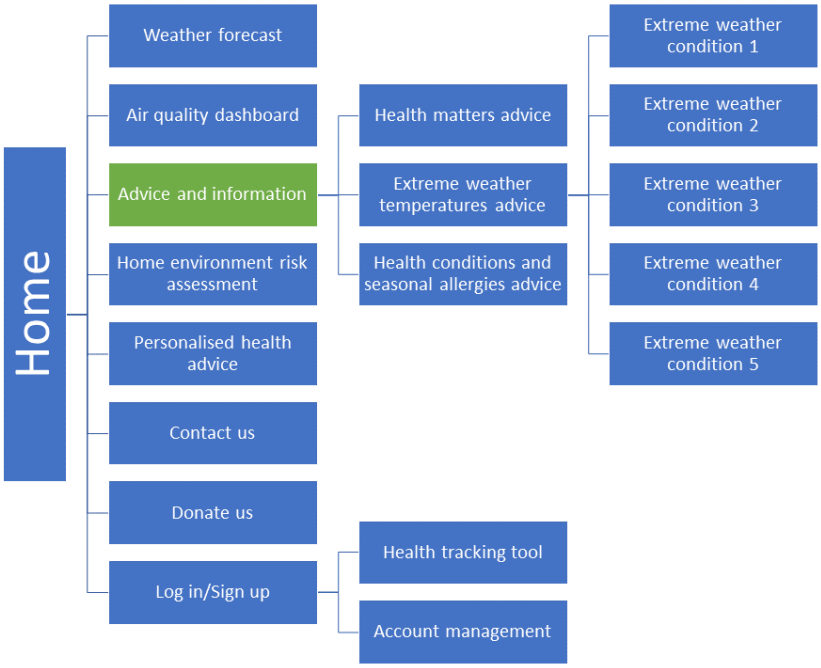
- Support of a variety of UK regions (a minimum of 10)
- Support of a number of different accessibility tools, software and hardware
- Support different types of devices
- User should be able to modify their details
- User should be able to reset the password if they forgot it
- The data must be reliable
- Data from external sources should be from reliable sources
- Overall good looking, following a consistent and minimalistic style

Differences between client and user accounts:

In order to allow the client to make modifications to the information displayed throughout the website a (or more) user account specifically made for them will be provided. This account will have administrator permissions, allowing the user to make modifications to the data shown in each page. The controller in the MVC pattern will make sure that the user who is logged in has administrator permissions and allow the display of administrator features that will be generally hidden to the general user. The table below shows the differences between the two types of accounts:

General user account	Client (admin) account
Log in using their credential	Log in using their credentials and answer a security question
Ability to see their past health tracking tool's result	Available only to test the function
Ability to only view the information that is shown	Ability to view and modify the information provided
Ability to create new account (general user)	Ability to create new account (general user)
Ability to change their personal details	Not available for security reasons
Ability to change their password	Not available for security reasons

Hierarchy:



As shown in the hierarchy above, the website will have 18 pages, each page will be different from the others. The main page will be the home page which will have links to the 8 types of pages. These links will be provided in a navigation menu, which won't be available only in the home page but in all the other pages as well. In order to use the health tracking tool the user will have to log in to their account or sign up to make a new account, once this is done they will be granted access to the tool. Similarly, the account management page can also only be accessed after logging in or signing up since an account is needed before it can be managed. Advice and information is displayed using a green box in the hierarchy, this is to highlight that this is not a page but a section of pages that are similar so will be accessible through that category in the navigation menu. The extreme weather temperature advice

page will contain links to further five pages (the number of pages could change in the future), each dedicated for a single weather condition.