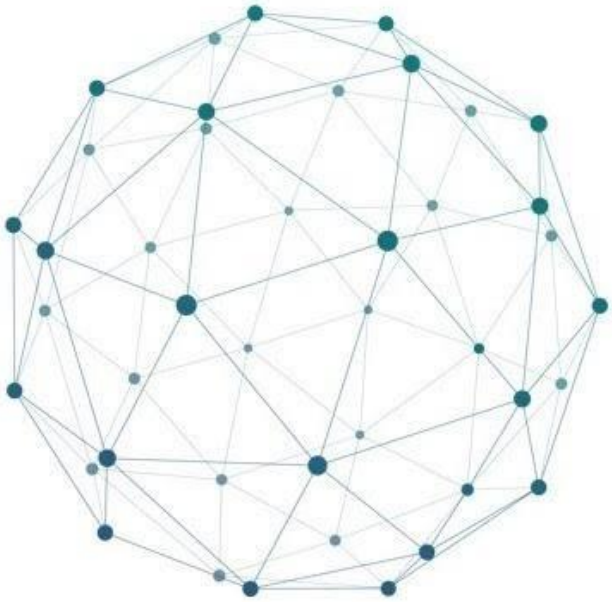

Frontline GIS Solutions

REQUIREMENTS ANALYSIS: **MAMELODI VACCINE SITES WEB MAP**

GMT 320

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1. Executive Summary

This requirements document is for our product which is, a web mapping application that incorporates a web map and a database to be used by the client and other end-users. It comprises of Frontline GIS Solutions' change log, requirement specifications, project scope statement and its work breakdown structure. This document is meant to describe how the requirements mentioned fulfil the business need for the project, which brings forth a weighted distribution system for COVID-19 vaccines in Mamelodi.

The change log will indicate the recorded changes made to the versions of this document. The requirements specified in this document describe the business, stakeholder, solution (functional and non-functional), quality and project requirements. These will be ranked according to their priority classification towards the product. The requirements also include their acceptance criteria, meaning when they can be approved and lastly, the stakeholders involved in each requirement's successful completion.

The project scope statement will include the product scope description, a list of deliverables, project acceptance criteria for deliverables, exclusions from the project, constraints, and assumptions. The Work Breakdown Structure (WBS) in this document hierarchically decomposes the work for each section of the project. The Work Breakdown Structure Dictionary which is also included in this document will provide detailed deliverable, activity, and scheduling information about each component in the WBS.

2. Change Log

The table below displays the changes made to the requirement document for Frontline GIS Solutions.

Project Title: Mamelodi Vaccine Sites **Date prepared: 12 October 2020**

TABLE 1: CHANGE LOG

Change Number	Original Version	New Version	Change Type	Change Description	Requestor	Date: Submitted	Date: Approved	Status	Comment
CR001	NULL	1.0.0	Planning	This change request is for creating our document.	N. De Kock	12 October 2020			Official document created.
CR002	1.0.0	1.0.1	Scope	This change request calls for adding an additional section to write input values to the database.	N. De Kock	12 October 2020	14 October 2020	Approved	This request is approved to ensure the application fulfils all the necessary parts to complete the updated product.
CR003	1.0.0	1.0.1	Design	This change request calls for a calculation of an input value to determine the amount of vaccines distributed to each healthsite.	N. De Kock	12 October 2020	14 October 2020	Approved	This request is approved to ensure that the design illustrates all the appropriate parts of the product in order for it to function correctly.

CR004	1.0.0	1.0.1	Design	This change request calls for a uniform format for the document.	D.Pule	14 October 2020	15 October 2020	Approved	The formatting of the document was fixed.

3. Requirements

3.1 Priority Classification

The following is a Priority Classification table used within the Requirement tables which follow.

TABLE 2: CLASSIFICATION TYPES

Priority	Priority Classification (PRTY)
Must have	1
Should have	2
Nice to have	3

3.2 Stakeholders

The following table displays all the stakeholders involved in fulfilling the requirements listed, for the successful completion of the project's product.

TABLE 3: STAKEHOLDERS

Stakeholder	Stakeholder Role	Stakeholder Classification (STHR)
Zweli Lawrence Mkhize	Client and public health administrator	HA
Angela Thoko Didiza	Data resource	DR
Lindiwe Sisulu	Water and sanitation organizer	WS
Victoria Rautenbach	Project Supervisor	PS
Fikile April Mbalula	Regulating and coordinating transportation	RT
Sipho Thabiso Maila	Line of communication between the Mamelodi community and the Council	LC
Healthsites and employees	Obtain the vaccines from suppliers and distribute vaccines to patients	HS
Sanofi S.A.	Supply vaccines to healthsites	SV
Data source collectors	Data collection	DC
Community (people against vaccines)	Criticize project objective	CA
Community (people for vaccines)	Benefit from project objective	CF

Tshepiso Solly Msimanga	Communicates with the relevant ministers and councillors to enable the processes of the project are implemented	CM
Media	Support and critique the project and its success	MS
University of Pretoria	Leadership of the university as a whole.	UP
Product Testers	Test the product	TP
WIX	Create a web presence for the project	WX
GMT Students	Develop, test and maintain the proposed system	US

3.3 Business requirements

TABLE 4: BUSINESS REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance criteria
3.3.1	HS CF	Covid-19 vaccine accessibility in Mamelodi	1	The vaccine for Covid-19 is available to the community through the healthsites in Mamelodi; increase effectiveness of vaccine distribution to people in informal settlements, by identifying optimal distribution points for the vaccine, including areas inside and outside the catchment areas within Mamelodi.
3.3.2	HS	Resources available	1	The resources required for vaccination at the healthsite is available and used by the employees of the healthsites.
3.3.3	SV	Increase health response by distribution of the vaccine	2	The implementation for adequate health response with vaccine distribution within Mamelodi and its informal settlement.
3.3.4	CF	Calculate distributions	1	The distribution of the vaccines will be calculated according to the amount of vaccines available at a certain point in time and distributed according to the rank of the healthsites.

3.4 Stakeholder requirements

TABLE 5: STAKEHOLDER REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance criteria
3.4.1	HA	Signs off project related decisions and spreading awareness to the community about the project.	1	In order for the project to move forward and be put into action, it must be signed off and awareness of the project will be made within the communities.
3.4.2	DR	Data resources	1	To allow for the use of spatially related sources or data only accessed by the department.
3.4.3	WS	Provide improved services, including water and sanitation, to healthcare sites	1	Adequate and improved services must be provided for the community of Mamelodi, as well as the sanitized healthsites used for vaccine distribution.
3.4.4	PS	A blog	1	A blog which depicts the teams steps they followed to create the project.
3.4.5	PS	Hard copy maps	1	These maps illustrate the data for the project as 2D maps and must be approved by the project supervisor.
3.4.6	PS	An interactive web map	1	An interactive web map which demonstrates the idea of the project with the use of our data, and it must be approved by the project supervisor.
3.4.7	PS	A version control system	1	A version control system (Github) must be used to record the files and code used for the project and must be accepted by the project supervisor
3.4.8	PS	A website	1	A website for the project with access to all the work done for the project as well as, the end product must be approved by the project supervisor.
3.4.9	RT	Regulating and coordinating transportation	1	Making sure transportation adheres to COVID-19 prevention measures so that the weighted number of vaccines is not hugely thrown off by many new COVID-19 cases.
3.4.10	LC	Line of communication between the Mamelodi	1	Allow for the smooth sailing of the project and allow for further data

		community and the Council		collection and awareness campaigns to take place in the community.
3.4.11	HS	Obtain vaccines from the suppliers	1	The healthsites require the vaccines in order to distribute to and inoculate patients of Covid-19.
3.4.12	SV	Supply the vaccines	1	Supply each healthsite with the necessary amount of vaccines needed according to our weighting system.
3.4.13	DC US	Collect the data	1	Data must be collected about healthsites, population census and transportation networks within Mamelodi in order to implement the results of the project.
3.4.14	CA CF	Community uses service	1	The community uses our service to go to the most convenient healthsite for their vaccination Alternatively they decide to not receive their vaccine and thus do not use our service.
3.4.15	CM	Mayor commences the project	1	The mayor must communicate with the relevant ministers and councillors to begin implementation of the project.
3.4.16	UP	Provide sufficient funding in accordance with the budget	1	The university will provide the necessary funding in order for the project to be fully implemented
3.4.17	US	Receive permission for project	1	The team must receive permission to undergo with the project creation
3.4.18	TP	Test the project	1	The service created must be tested by verified testers for such a project of vaccine distribution.
3.4.19	WX	Provide a website host	1	Wix provides a platform to design a website for the project.
3.4.20	CF	A database receives and stores input values	1	When the input value is submitted into the input box, the value is written to the database and can be calculated thereafter.

3.5 Solution Requirements – Functional

TABLE 6: FUNCTIONAL REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance criteria
3.5.1	US	All headers when clicked on must open the appropriate directory.	1	The correct directory should be opened and showcase the relevant wanted information.
3.5.2	US	Users must be able to send/submit messages sent on the application to the project team.	2	When messages are sent, a notification should be received by the team in their email address.
3.5.3	US	Must display a web map when requested.	1	A functional embedded web map would suffice.
3.5.4	US	Web map layers and base maps must display when toggled on.	1	The correct map layers and base maps must toggle on/off when selected or deselected.
3.5.5	HA US	Sign in when updating product.	1	All users must not be able to gain access to the product's profile. Only signed in users must have access.
3.5.6	HA US	Save updated changes made to the application.	1	When application refreshed, updated sections must be displayed.
3.5.7	US	Web map must be able to zoom in/out.	1	The function must work as specified in web map coding done.
3.5.8	HA US	Admin must be able to write and post new blogs in application.	3	After refreshing the application, the new blog posts must be displayed.
3.5.9	US	Web map should	1	Pop-ups should be displayed when the user

		display pop-ups.		clicks on appropriate places on the web map.
3.5.10	US	When the team logo clicked on, the user must be redirected to the application's homepage.	3	The user must be redirected to the application's homepage.
3.5.11	US	When database field clicked on, healthsite on web map must be highlighted.	3	Healthsite must be distinctively displayed.
3.5.12	US	Database should calculate and display available vaccines after being updated.	1	After refreshing the updated database, new and correct database values should appear.

3.6 Solution Requirements – Non-functional

TABLE 7: NON-FUNCTIONAL REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance Criteria
3.6.1	US	Must be accessible on multiple devices.	1	Application must be functional on any device (e.g. modern computers and mobile devices) and must have the same capabilities on every platform.
3.6.2	US	Should be cross-browser compatible.	2	The application must work on every internet browser.
3.6.3	US	Should be easy to use and navigate.	1	Must have explanatory headings and descriptions of data.
3.6.4	US	Data and information must be accurate.	1	Data and information must not be incorrect or false.

3.6.5	US	Web map must be made to accommodate colour blind people.	2	The colour choices to be used must not be predominantly colour combinations that affect colour blind people.
3.6.6	US	Application should host multiple users.	2	Application must be able to accommodate 100000+ users at a time.
3.6.7	HA CF US PS	Must have internet access.	1	The application's homepage must be displayed when opened to ensure internet connectivity.
3.6.8	US	Send notification to the team's email address when contacted by the application user.	1	The notification must be displayed on team's e-mail (frontlinegissolutions@gmail.com).
3.6.9	US	Must be functional or available anywhere, location wise.	1	As long as there is internet connectivity wherever in the world, the application must work.
3.6.10	HA US	Must be notified when updates are made to the database.	1	E-mail notifications must reach appropriate stakeholders.
3.6.11	US	Active user numbers must be displayed.	3	The count must always be increasing.
3.6.12	US	In case of a forgotten password, a new password is sent to the admin's email address in order for the user to sign in.	1	New password must be sent to email when requested on the first try.
3.6.13	US	Area of interest with additional information should	1	No extra layers with content outside of the Mamelodi area should be focused on.

		solely be in the Mamelodi bounds/extent.		
3.6.14	US	Operational at all times.	1	Application bug fixing periods are the only downtimes permitted.
3.6.15	US	Web map overlays must be accurately and precisely overlaid.	1	All map layers must be on top of each other with misplaced features as well.
3.6.16	US	Allow maximum of 2 concurrent admin sign ins to the product.	1	Must not crash or disallow further logins from admins.
3.6.17	US PS	Application must be approved by relevant stakeholders.	1	Approved by client and project supervisor.
3.6.18	US	Application error or malfunction notifications must be sent to the team immediately when they occur.	1	Must receive notification in less than 1 minute from error occurrence.
3.6.19	US	The chosen output or layout for the web map must be exportable or printable.	1	Formats allowed are JPEG and PNG.
3.6.20	US	Application must be able to upload media files (e.g. images, videos and audio files)	2	Uploaded media must be visible and audible after upload.
3.6.21	US	Messages sent to the team must be received	1	Must receive messages in less than 1 minute.

		immediately.		

3.7 Quality Requirements

TABLE 8: QUALITY REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance Criteria
3.7.1	US	Application must run smoothly at all times	1	No major product malfunctions or glitches must be present.
3.7.2	US	The weighted distribution of vaccines must be precise and displayed on product.	1	The catchment areas must be determined from good data sources.
3.7.3	US	Final product must be delivered on time.	1	No rushed finishing evident in the final product's components.
3.7.4	US	Application should not be missing wanted or promised functionalities.	1	Product must get the job done for what its purpose was.
3.7.5	HA US	Notification of any data updates made on the application must reach its users on time.	1	Notification must reach the product's user in less than 5 minutes after execution.
3.7.6	US	Application must load in less than 5 seconds.	1	Application must load quickly to enhance user experience and efficiency.
3.7.7	US	Final product must be delivered within estimated budget.	1	Must be less than R37 350.00 (estimated budget).
3.7.8	US	Labels in application must be correct and	1	No spelling mistakes and placement of labels

		positionally accurate.		must be clearly visible.
3.7.9	US	Application must be well protected from hacking and computer viruses.	1	Necessary firewalls and antiviruses must be put in place.
3.7.10	US	The product must include additional features in it.	1	These must be enhancing features to the end product's goal.

3.8 Project Requirements

TABLE 9: PROJECT REQUIREMENTS

ID	STHR	Requirement	PRTY	Acceptance criteria
3.5.1	SV HS	Feasible vaccine distribution structure	1	The vaccine distribution must be practical and functional; each healthsite must receive sufficient supplies for distribution.
3.5.2	US	Create census catchment areas around healthsites	1	Catchment areas surrounding the healthsites must cover the region of Mamelodi.
3.5.3	US	Service operates	1	The service provided by our project operates efficiently and effectively and functions work indefinitely.
3.5.4	US HS	Temporary vaccination drives	3	The temporary vaccine drives must cover the regions of Mamelodi which are not part of the healthsites catchment area.

4. Project Scope Statement

4.1 Project Scope Description

The goal of this project is to develop a system, which allows for a fair distribution of COVID-19 vaccines in the Mamelodi Area. In order to achieve this goal, a web mapping application needs to be developed, which will include a map of the Mamelodi area, showing the positions of all the clinics, as well as a table ranking the clinics in order of the number of people in that clinic's drive-time "catchment area". Finally, the webpage will have a calculator, where the user may input the number of vaccines available, and a report will be generated stating the number of vaccines that should be sent to each hospital. These values are weighted according to magnitude of the population in each clinic's catchment area and the results will be written to a database.

4.2 List of Deliverables and Acceptance Criteria

TABLE 10: DELIVERABLES & ACCEPTANCE CRITERIA

Deliverable	Deadline:	Acceptance Criteria:
Team Profile	7 August 2020	Full name, vision, mission as well as approval and CV for each member.
Project Proposal	28 August 2020	This document is a detailed explanation on the project and approved by the supervisor and client.
Stakeholder Analysis Matrix	14 September 2020	This document is compilation of all project stakeholders and their importance to the project.
Stakeholder Register	14 September 2020	A document with all project stakeholders with their contact details and description of their roles in the project.
Website Development	13 September 2020	Creating a company website with all relevant information about the project team, all project documents, company contact details and blog posts by the project team.
Deliverable 1	1 October 2020	A presentation of what has been done and what needs to be done. The progress must be approved by the client.
Requirements Analysis	16 October 2020	A detailed document of the requirements of the project and must be approved by the client.
Deliverable 2	27 October 2020	A presentation of what has been done, what needs to be done, at least two technical blogs from each member and a database before the final demonstration and must be approved by the client.
Deliverable 3	12	The final presentation of the project and

	November 2020	must be approved by the client.

4.3 Exclusions from the Project

1. Connecting of system to customer portals (demo on our website and DB, however not connected)
2. Other parts of the country not involved in Mamelodi area
3. Training on how to use the system.
4. Major security and encryption features – need to be worked on before final roll-out
5. Login system – assumed only will be available through existing portals.
6. Decision support tool – not yet involved in distribution of vaccines
7. No ordering system, stock control, etc
8. The implementation of the project will be up to the client
9. The supplier of the vaccines will not be included in the project
10. Creating a server and hosting the database
11. The maintenance and backup of the database
12. Inventory checking and allocation of the vaccines will not be included in the project

4.4 Project Constraints

1. Latest data is census 2011
2. Hosted on Geoserver – unreliable
3. Limited budget – cannot recruit specialized experts to assist with functions such as security and encryption
4. Population data is hard-coded, meaning that come the next census, some elements of the program may need to be reengineered
5. Lack of time meant that drawing up catchment areas and other important phases were rushed as multiple assumptions were made without being tested for
6. Only available for Mamelodi area. The system will need to be looked at again if to be implemented for another region
7. There are four people working on the project
8. 5 hours a week per member will be allocated to working on the project
9. The quality of the results are dependent on the data used
10. We have a time constraint as all the requirements need to be met by 12 November 2020

4.5 Project Assumptions

1. We have a complete list of all the sites where vaccine distribution is permitted
2. People will try to go to their NEAREST health site to get a vaccination
3. Each clinic uses up their available vaccines at the same rate, meaning that all clinics will deplete their stockpiles at the same time. Thus, an equal ratio will be sent out for each "distribution event"
4. The distribution of the population of the Mamelodi wards has not significantly changed since 2011
5. The client will be able to use the web map
6. The client will be able to read the information from the database
7. The client has reliable internet connection
8. The user is computer literate
9. The client has the necessary software to access the database
10. The web mapping application will only be accessed on a computer, and therefore it does not need to be configured for mobile phones

5. Work Breakdown Structure (WBS)

5.1 List view

MAMELODI VACCINE SITES

Phase 1: Conception and Initiation

- 1.1 Define Project
- 1.2 Appoint Project Team
- 1.3 Develop Team Profile
  - 1.3.1 Vote on team leader and team secretary
  - 1.3.2 Decide on team name
  - 1.3.3 Decide on vision statement
  - 1.3.4 Decide on mission statement
  - 1.3.5 Each compile CV and send to team secretary
  - 1.3.6 Final document compilation, formatting and sign-off
  - 1.3.7 Submit Team Profile
- 1.4 Develop Stakeholder Matrix
  - 1.4.1 Identify and list all stakeholders
  - 1.4.2 Classify stakeholders according to their power and interest in the project
  - 1.4.3 Final document compilation, formatting and sign-off
- 1.5 Develop Stakeholder Register
  - 1.5.1 Identify and list all stakeholders
  - 1.5.2 Investigate stakeholders' details, roles, and expectations
  - 1.5.3 Final document compilation, formatting and sign-off
- 1.6 Submit Stakeholder Matrix and Register

Phase 2: Definition and Planning

- 2.1 Develop Project Proposal
  - 2.1.1 Create company logo
  - 2.1.2 Develop executive summary
  - 2.1.3 Investigate business and client perspective
    - 2.1.3.1 Background research
    - 2.1.3.2 Overview of proposed solution
  - 2.1.4 Define project scope
  - 2.1.5 Identify project limitations
  - 2.1.6 Define high-level non-functional requirements
  - 2.1.7 Identify project phases and deadlines
  - 2.1.8 Set project budget
  - 2.1.9 Define project success factors
    - 2.1.9.1 Identify high priority drivers
    - 2.1.9.2 Identify nice-to-haves
  - 2.1.10 Final document compilation, formatting and sign-off
  - 2.1.11 Submit Project Proposal
- 2.2 Develop Requirements Analysis
  - 2.2.1 Repurpose executive summary from project proposal and make relevant changes

2.2.2 Create change log and ensure it is kept up to date
2.2.3 Identify, classify, and list all necessary requirements
2.2.4 Compile project scope statement
2.2.4.1 Product scope description
2.2.4.2 List of deliverables
2.2.4.3 Project acceptance criteria for deliverables
2.2.4.4 Exclusions from the project
2.2.4.5 Project constraints
2.2.4.6 Project assumptions
2.2.5 Create work breakdown structure
2.2.5.1 List format
2.2.5.2 Flow diagram format
2.2.6 Submit Requirements Analysis
2.3 Define Communication Plan

Phase 3: Launching and Execution

3.1. Website Development
3.1.1. Create company email address
3.1.2. Create Wix profile and initialize website
3.1.3. Design and implement home page
3.1.4. Design and implement "About us" page
3.1.5. Design and implement "Who are we?" page
3.1.6. Design and implement "Contact us" page
3.1.7. Design and implement "Resources" page
3.1.8. Initialize and test blog
3.2. Data collection
3.3. Testing

Phase 4: Performance and Control

4.1 Deliverable 1
4.1.1 Create various hardcopy maps
4.1.2 Create GitHub repository and ensure it is up to date
4.1.3 Create Trello board and ensure it is up to date
4.1.4 Clean and load data into Postgres and Geoserver
4.1.5 Create layer styles in Geoserver
4.1.6 Develop web map application (not yet linked to website)
4.1.6.1 Decide on base maps
4.1.6.2 Create custom base map in Mapbox and integrate with web map
4.1.6.3 Import WFS and WMS layers as necessary
4.1.6.4 Create and style popups where relevant
4.1.6.5 Implement layer control feature
4.1.6.6 Add scale bar
4.1.6.7 Video recording and member approval
4.1.7 Create title and improve general aesthetics of web page (CSS styling, etc)
4.2 Deliverable 2
4.2.1 Changes and recommendations from Deliverable 1

4.2.2 Create database
4.2.3 Define final catchment area for healthsite
4.2.4 Define vaccine ratio per healthsite
4.2.5 Develop healthsite ranking table
4.2.6 Setup PHP
4.2.7 Integrate web mapping application onto website
4.2.8 Two technical blog post per member
4.2.9 Video recording and member approval

4.3 Evaluate Deliverable Quality & Performance

Phase 5: Project Close

5.1. Project Documents Update
5.2. Lessons Learned Register
5.3. Final Deliverable 3: Final product
5.3.1. Two technical blog posts per member
5.3.2. Implement changes and recommendations from deliverable 2
5.3.3. Add "nice-to-have" features only if there is time available
5.3.4. Video recording and member approval
5.4. Upload all necessary documents on website

5.2 Flowchart View

FIGURE 1: HIGH-LEVEL WBS FLOWCHART OF ALL THE PROJECT PHASES

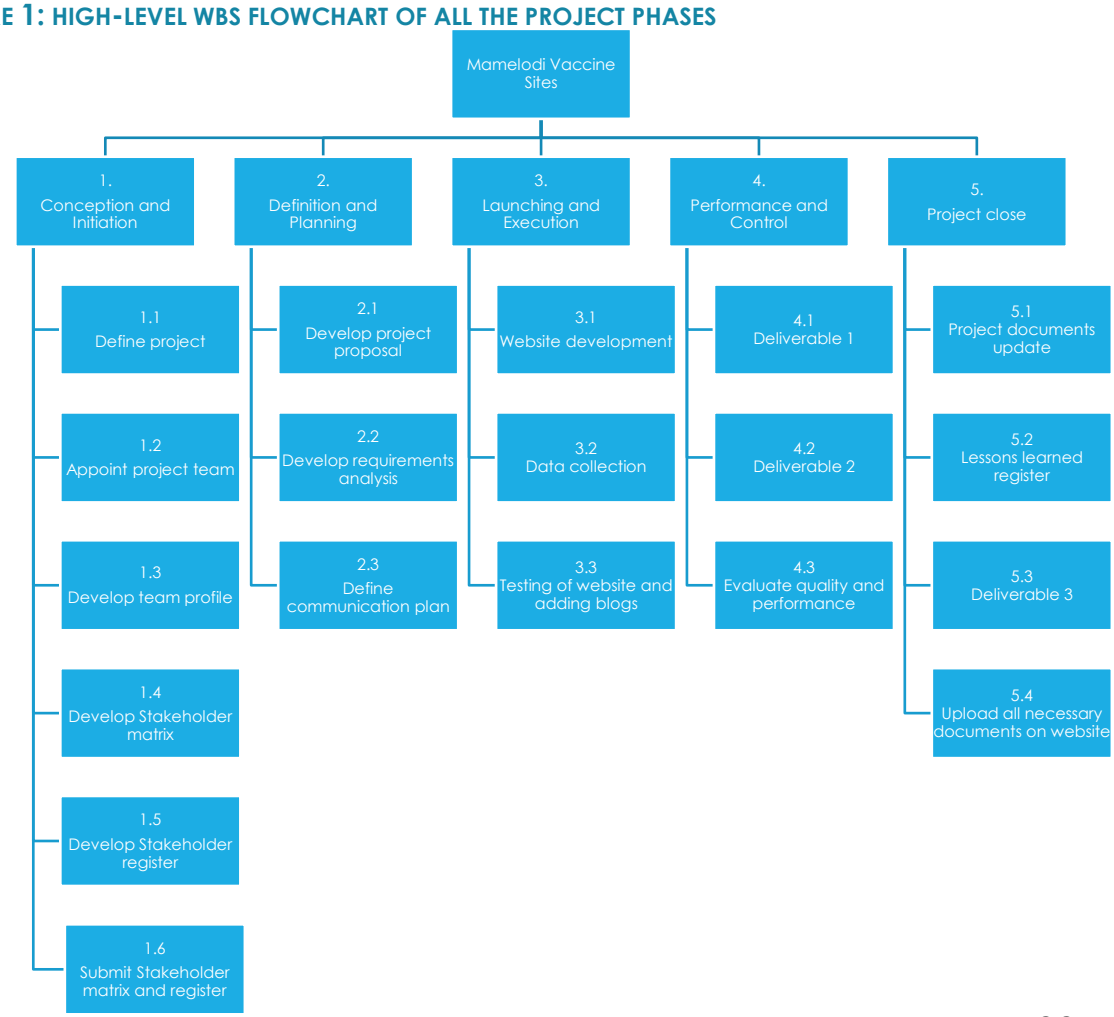


FIGURE 2: WBS BREAKDOWN FOR PHASE 1

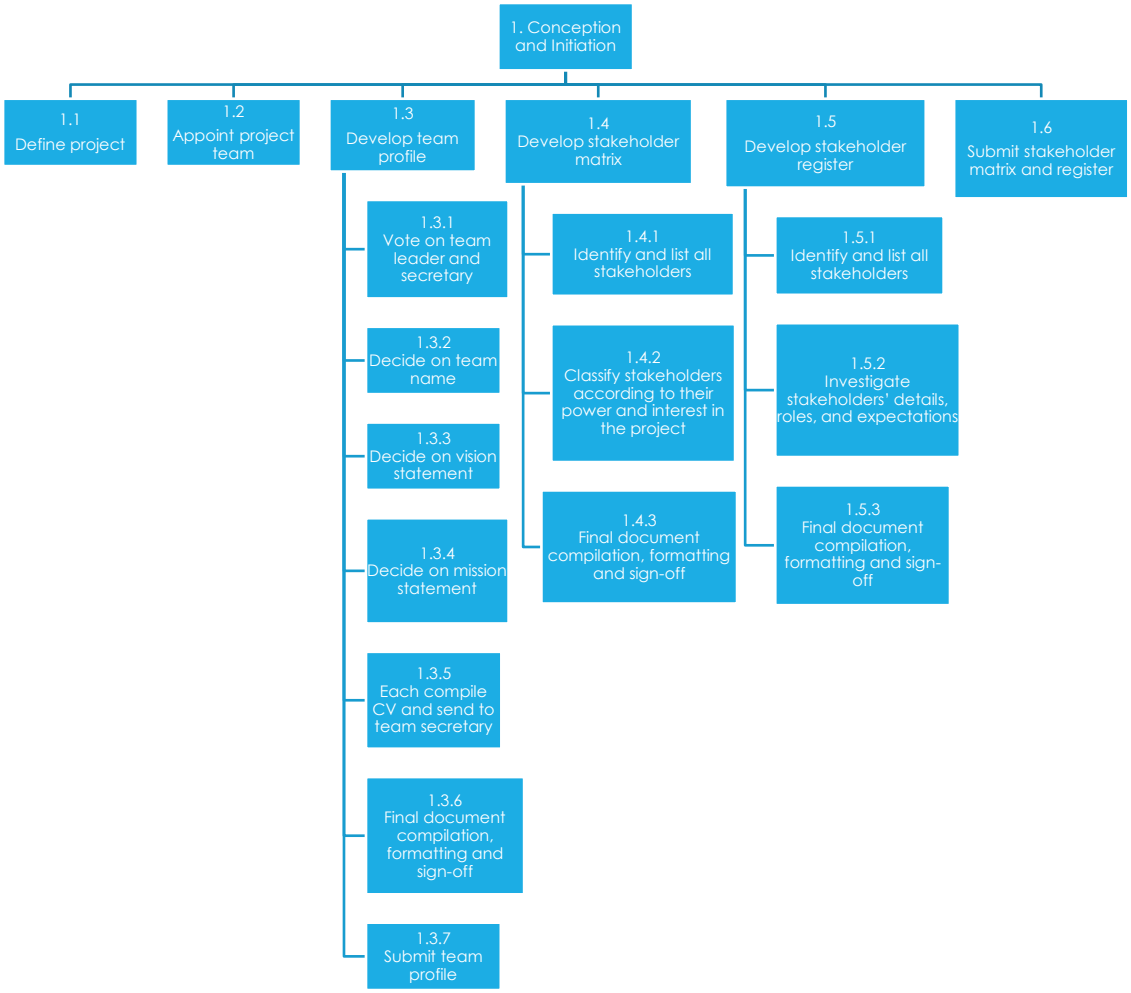


FIGURE 3: WBS BREAKDOWN FOR PHASE 2

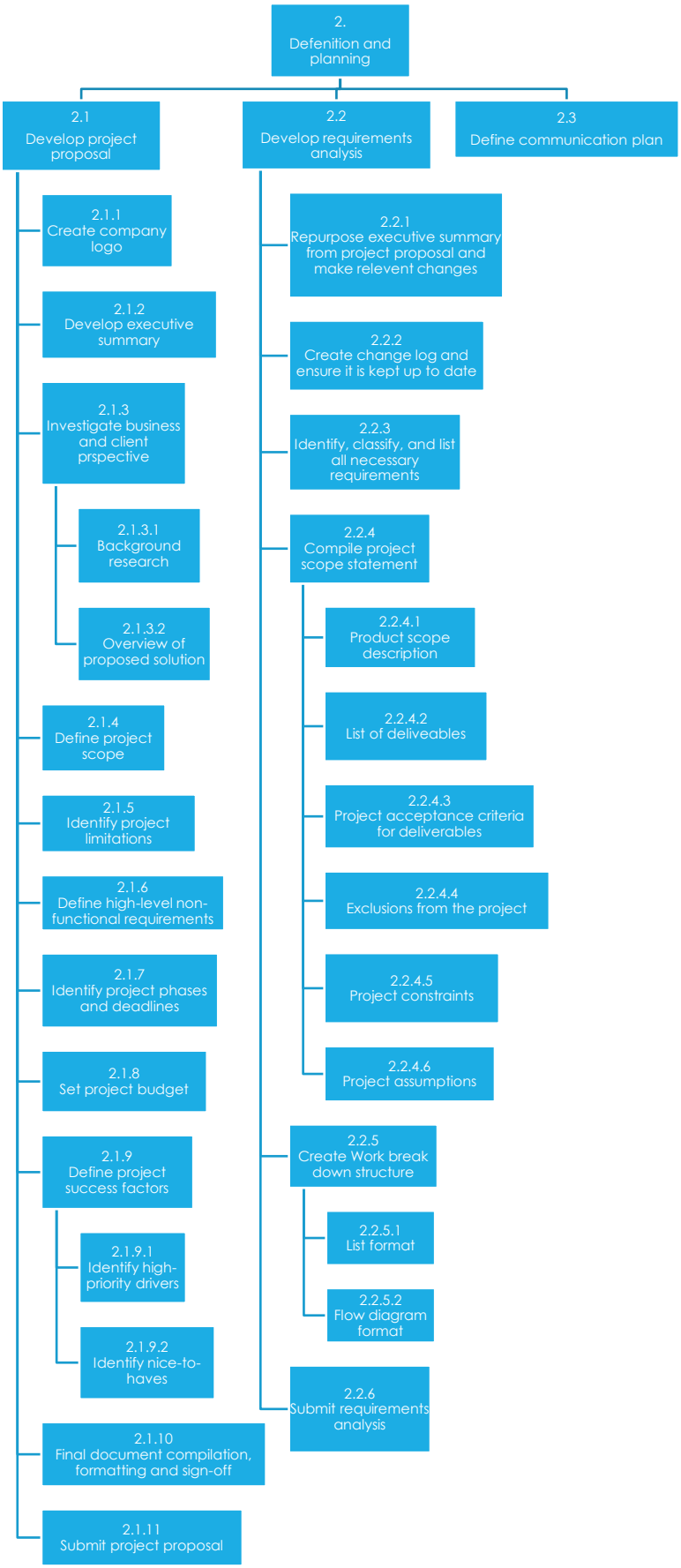


FIGURE 4: WBS BREAKDOWN FOR PHASE 3

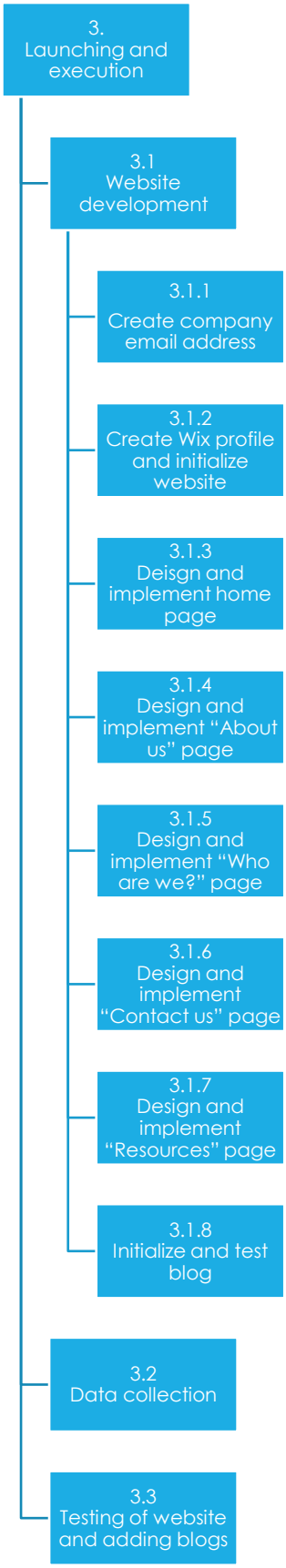


FIGURE 5: WBS BREAKDOWN FOR PHASE 4

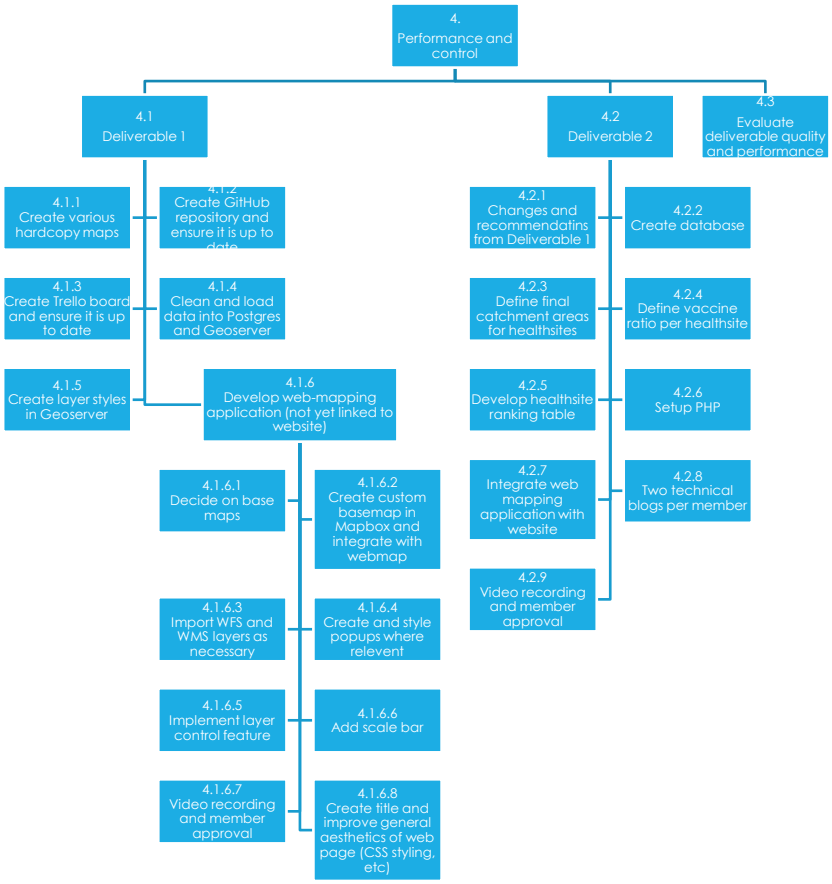
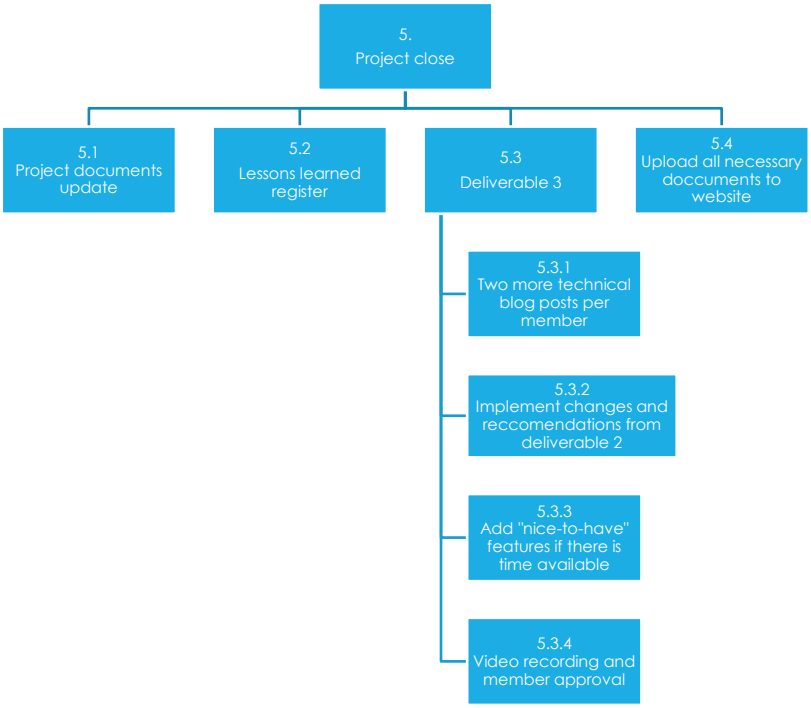


FIGURE 6: WBS BREAKDOWN FOR PHASE 5



6. WBS Dictionary

Phase Level	WBS	Task Name	Definition	Start	Finish
1 Conception and Initiation phase					
1	1.1	Define Project			
1	1.2	Appoint Project Team	The project team is appointed by the supervisor	4 August 2020	4 August 2020
1	1.3	Develop Team Profile	The team profile is developed	4 August 2020	7 August 2020
1	1.3.1	Vote on team leader and team secretary	The team appoints a team leader and secretary	4 August 2020	7 August 2020
1	1.3.2	Decide on team name	The team brainstorms and decide on a team name	4 August 2020	7 August 2020
1	1.3.3	Decide on vision statement	The team brainstorms and decide on a suitable vision statement	4 August 2020	7 August 2020
1	1.3.4	Decide on mission statement	The team brainstorms and decide on a suitable mission statement	4 August 2020	7 August 2020
1	1.3.5	Compilation of member CV	Each team member compiles their CV	4 August 2020	7 August 2020
1	1.3.6	Final document compilation, formatting and sign-off	The team profile components are put together and signed off by each team member	4 August 2020	7 August 2020
1	1.3.7	Submit Team Profile	The team profile is submitted and will be reviewed by the supervisor and client	7 August 2020	7 August 2020
1	1.4	Develop Stakeholder Matrix	The stakeholder matrix is developed	10 September 2020	14 September 2020
1	1.4.1	Identify and list all stakeholders	The project stakeholders are identified by the team	10 September 2020	14 September 2020
1	1.4.2	Classify stakeholders	The stakeholders are classified and placed accordingly on	10	14

		according to their power and interest in the project	the matrix	September 2020	September 2020
1	1.4.3	Final document compilation, formatting and sign-off	The stakeholder matrix is put together and reviewed by each member	10 September 2020	14 September 2020
1	1.5	Develop Stakeholder Register	The stakeholder register is developed by the team	10 September 2020	14 September 2020
1	1.5.1	Identify and list all stakeholders	The stakeholders are identified	10 September 2020	14 September 2020
1	1.5.2	Classify stakeholders according to their power and interest in the project	The stakeholders are classified and placed accordingly on the list	10 September 2020	14 September 2020
1	1.5.3	Final document compilation, formatting and sign-off	The stakeholder register is finalised and reviewed by each member	10 September 2020	14 September 2020
1	1.6	Submit Stakeholder Matrix and Register	Both stakeholder matrix and register are submitted and will be reviewed by the supervisor and client	14 September 2020	14 September 2020
2 Definition and Planning phase					
2	2.1	Develop Project Proposal	The project proposal is developed	17 August 2020	28 August 2020
2	2.1.1	Create company logo	A logo for the company is created and approved by each member	17 August 2020	28 August 2020
2	2.1.2	Develop executive summary	The executive summary for the project is developed	17 August 2020	28 August 2020
2	2.1.3	Investigate business and client perspective	The business and client perspective are outlined and discussed	17 August 2020	28 August 2020
2	2.1.3.1	Background research	The project topic is researched	17 August 2020	28 August 2020
2	2.1.3.2	Overview of proposed solution	The proposed solution is discussed by the team	17 August	28 August

				2020	2020
2	2.1.2	Define project scope	The project scope is defined	17 August 2020	28 August 2020
2	2.1.3	Identify project limitations	Project limitations are outlined	17 August 2020	28 August 2020
2	2.1.4	Define high-level non-functional requirements	High-level non-functional requirements are defined	17 August 2020	28 August 2020
2	2.1.5	Identify project phases and deadlines	Project phases and deadlines are established	17 August 2020	28 August 2020
2	2.1.6	Set project budget	The project budget is established	17 August 2020	28 August 2020
2	2.1.7	Define project success factors	Project success factors are discussed and defined	17 August 2020	28 August 2020
2	2.1.7.1	Identify high priority drivers	High priority project drivers are identified	17 August 2020	28 August 2020
2	2.1.7.2	Identify nice-to-have features	Nice-to-have features are discussed and identified	17 August 2020	28 August 2020
2	2.1.8	Final document compilation, formatting and sign-off	The project proposal is put together and reviewed by each member	17 August 2020	28 August 2020
2	2.1.9.	Submit project proposal	The project proposal is submitted and will be reviewed by the client	28 August 2020	28 August 2020
2	2.2	Review project proposal	The reviewed project proposal with comments from the client is viewed by the team	6 October 2020	6 October 2020
2	2.3	Develop requirements analysis	The requirements specifications are developed	6 October 2020	16 October 2020
2	2.3.1	Repurpose executive summary from project proposal and make relevant changes	The executive summary is updated	6 October 2020	16 October 2020
2	2.3.2	Create change log and ensure it is kept up to date	All changes are written to the change log	6 October 2020	16 October 2020
2	2.3.3	Identify, classify and list all	Requirements are identified, discussed and classified	6 October	16 October

		necessary requirements	accordingly by the team	2020	2020
2	2.3.4	Compile project scope statement	Project scope statement is discussed	6 October 2020	16 October 2020
2	2.3.4.1	Product scope description	Product scope description is developed	6 October 2020	16 October 2020
2	2.3.4.2	List of deliverables	A list of deliverables is created	6 October 2020	16 October 2020
2	2.3.4.3	Project acceptance criteria for deliverables	The acceptance criteria for deliverables is defined	6 October 2020	16 October 2020
2	2.3.4.4	Exclusions from the project	The exclusions from the project are defined	6 October 2020	16 October 2020
2	2.3.4.5	Project constraints	Project constraints are developed	6 October 2020	16 October 2020
2	2.3.4.6	Project assumptions	Project assumptions are developed	6 October 2020	16 October 2020
2	2.3.5	Create work breakdown structure	The work breakdown structure is developed	6 October 2020	16 October 2020
2	2.3.5.1	List format	The work breakdown structure is formatted as a list	6 October 2020	16 October 2020
2	2.3.5.2	Flow diagram format	The work breakdown structure is formatted as a flow diagram	6 October 2020	16 October 2020
2	2.4	Submit requirements analysis	The requirements specification is compiled and submitted by the team to the client	16 October 2020	16 October 2020
2	2.5	Review requirements analysis	The requirements specifications are review by the team with comments from the client	26 October 2020	16 October 2020
3 Launching and Execution phase					
3	3.1	Website development	The company website is developed	13 September 2020	12 November 2020
3	3.1.1	Create company email	The company email address is created	13	12 November

		address		September 2020	2020
3	3.1.2	Create Wix profile and initialize website	A profile on Wix is created to start the development of the website	13 September 2020	12 November 2020
3	3.1.3	Design and implement home page	Website homepage is designed	13 September 2020	12 November 2020
3	3.1.4	Design and implement "About us" page	Website "About us" page is designed	13 September 2020	12 November 2020
3	3.1.5	Design and implement "Who we are" page	Website "Who we are "page is designed	13 September 2020	12 November 2020
3	3.1.6	Design and implement "Contact us" page	Website "Contact us" page is designed	13 September 2020	12 November 2020
3	3.1.7	Design and implement "Resources" page	Website "Resources" page is designed	13 September 2020	12 November 2020
3	3.1.8	Initialize and test blog	Develop and publish blogs on the website	13 September 2020	12 November 2020
3	3.2	Data collection	Necessary data for the project is collected	28 August 2020	8 September 2020
3	3.3	Testing	The website and other project components are tested	30 October 2020	30 October 2020
4 Performance and Control phase					
4	4.1	Deliverable 1	The first project demonstration	4 August 2020	1 October 2020
4	4.1.1	Create various hardcopy	Project solution is visualised using hardcopy maps	4 August	1 October

		maps		2020	2020
4	4.1.2	Create GitHub repository and ensure it is up to date	GitHub repository is set up and all project developments are published	4 August 2020	1 October 2020
4	4.1.3	Create Trello board and ensure it is up to date	Trello is setup to keep track of the project	4 August 2020	1 October 2020
4	4.1.4	Clean and load data into Postgres and Geoserver	Clean the collected data and load it to Postgres and Geoserver	4 August 2020	1 October 2020
4	4.1.5	Create layer styles in Geoserver	Create layer styles in Geoserver for the web map	4 August 2020	1 October 2020
4	4.1.6	Develop web map application	The web map application is developed using the data in Geoserver	4 August 2020	1 October 2020
4	4.1.6.1	Decide on base maps	A base map is included on the web map	4 August 2020	1 October 2020
4	4.1.6.2	Create custom base map in Mapbox and integrate with web map	A custom base map is Mapbox is created	4 August 2020	1 October 2020
4	4.1.6.3	Import WFS and WMS layers as necessary	WFS and WMS layers are imported	4 August 2020	1 October 2020
4	4.1.6.4	Create and style popups where relevant	Web map popups are created and styled	4 August 2020	1 October 2020
4	4.1.6.5	Implement layer control feature	Layer control feature is developed for the web map	4 August 2020	1 October 2020
4	4.1.6.6	Video recording for presentation and member approval	Video presentation for demonstration 1 is created	4 August 2020	1 October 2020
4	4.1.7	Create title and improve general aesthetics of web page (CSS styling)	Overall web map is developed	4 August 2020	1 October 2020
4	4.2	Deliverable 2	The second project demonstration	1 October 2020	27 October 2020
4	4.2.1	Implement changes and recommendations from	Recommended changes from deliverable 1 are implemented	1 October 2020	27 October 2020

		Deliverable 1			
4	4.2.2	Create database	A database is created as part of the deliverable 2	1 October 2020	27 October 2020
4	4.2.3	Define final catchment area for healthsite	Use the necessary software to map catchment areas for each healthsite	1 October 2020	27 October 2020
4	4.2.4	Define vaccine ratio per healthsite	The vaccine ratio per each healthsite is calculated	1 October 2020	27 October 2020
4	4.2.5	Develop healthsite ranking table	A table ranking each healthsite is created	1 October 2020	27 October 2020
4	4.2.6	Setup PHP	PHP is setup	1 October 2020	27 October 2020
4	4.2.7	Integrate web mapping application into website	The web map application is integrated into the website	1 October 2020	27 October 2020
4	4.2.8	Two technical blog posts per member	Each member to post blogs on the website	1 October 2020	27 October 2020
4	4.2.9	Video recording for presentation	Video presentation for demonstration 2 is created	1 October 2020	27 October 2020
4	4.3	Evaluate deliverable quality/performance	Review all the components of deliverable 2	28 October 2020	28 October 2020
5 Project closing phase					
5	5.1	Project documents update	All project documents are reviewed by the team and updated	28 October 2020	10 November 2020
5	5.2	Lessons learned register	The team to create a lessons learned register for the project	10 November 2020	12 November 2020
5	5.3	Final Deliverable 3: Final product	The final project demonstration	27 October 2020	12 November 2020
5	5.3.1	Two technical blog posts per member	Each member to post blogs on the website	27 October	12 November 2020

				2020	
5	5.3.2	Implement changes and recommendations from deliverable 2	Recommended changes from deliverable 2 are implemented	27 October 2020	12 November 2020
5	5.3.3	Nice-to-have features	The nice-to-have features will only be implemented if there is time left after the important components are finalised	27 October 2020	12 November 2020
5	5.3.4	Video recording for presentation and member approval	Video presentation for the final demonstration is created	27 October 2020	12 November 2020
5	5.4	Upload all necessary documents on website	All project document are uploaded onto the website	14 September 2020	12 November 2020

Bibliography

Project Management Institute, 2017, *A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK guide)*, 6th edn, Project Management Institute, Inc., Newton Square

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Annexure A

The below table is an extract of the document we used to review our datasets. This fits in with our requirement of ensuring the highest accuracy and quality of our results. Furthermore, it aligns with our WBS section, as this was the direct result of our data assessment which was carried out in the launching and execution phase.

Dataset:	Nicholas De Kock	Dineo Pule	Sandile Welile Thwala	Matthew Clarke
Administrative boundaries	Good shapes, my only concern is the wards do not have names, just numbers. Also some of the polygons overlap?	It doesn't have different boundaries within the City of Tshwane and Mamelodi boundary cannot be found when zooming into the area of Tshwane.	The administrative boundaries might be too big for the area we want to focus on. The attribute table does not give enough useful information.	Has the same shapes as the Census 2011 population dataset around Mamelodi. The ward names are only numbered. They all have area fields, which may be useful.
Census 2011 population	Good dataset, however the aggregation areas may be too large. Lourens said he would be able to assist us with more accurate census data...	The dataset has boundaries per ward and shows data in each, only concern is the time frame in which the data was collected.	The attribute table has some useful data. The problem might still be the boundary size that it still does not give us the specific data we need for Mamelodi.	Has the same ward shapes as the Administrative boundaries dataset. This seems like a good dataset with the population numbers for each ward, however it is 2011 census data.
Roads_1	None of the roads pass through the Mamelodi area so I don't think we can use this	The roads dataset doesn't show any road that intersect within Mamelodi.	The roads are not in the area we are interested in. This might mean these roads are only main roads as well.	Closest road to Mamelodi shown in this dataset is the R513, which is quite north of Mamelodi. Might be useful for final map, to show some features/roads around our area of focus.

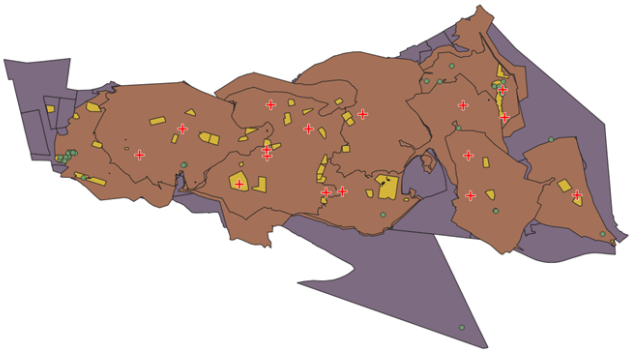
Roads_OSM	Good dataset, we may just need to ensure topology rules are met.	Good road dataset, shows roads within Mamelodi.	This dataset can work but roads have no names and road surface type that might help in gauging the road's quality.	Good dataset, has all the OSM roads for Mamelodi.
SA educational facilities	I think this is a good layer to use as orientation data if needed.	Has only five schools within Mamelodi and only to the east side of Mamelodi, it's not spread out.	The dataset has 5 educational facilities on the right side of Mamelodi. This is a good dataset but not sure if all the facilities in Mamelodi were recorded.	This dataset has the Mamelodi UP campus and other schools in the area for any necessary orientation data.
SA points of interest	I think this is a good layer to use as orientation data if needed.	Definitely a good dataset for orientation, the polygons are spread out through Mamelodi which includes schools, petrol stations, a hospital and bus station. (Polygon dataset)	Another good data set since some points and polygons are in Mamelodi.	This dataset has some of the malls and other points of interest in the area of Mamelodi.
South Africa	Nothing in Mamelodi, I don't think we can use this.	Not a good dataset.	Has two points in Mamelodi showing hospitals in Mamelodi which might be helpful if we do not manage to get a better dataset for that.	Only 2 data points in Mamelodi which are both found in the Mamelodi Healthsites dataset.

Mamelodi Healthsites	Good dataset, I've used what Azile gave us and digitised new data.	Good dataset, it shows 17 healthcare facilities within Mamelodi.	A good dataset with a more realistic number of health-sites in Mamelodi.	Good dataset, has a good number of healthsites in the area.
Newly added Population dataset (Census 2011)		Good dataset, specific to Mamelodi, gives population for each sub place which will probably be very useful.	The attribute table has the population numbers of sub-places in Mamelodi that will be useful. The issue might be the date of acquisition (2011).	Seems like a good dataset, having the population numbers in each sub-place as well as the households in these places too.

Annexure B

The below figure is a mock-up of the final product to briefly depict how the system will work on the web map. In the figure in the bottom right, is a table of the healthsites in Mamelodi that have been ranked according to the population that the healthsite serves and shows the percentage of the total that are being served too. Above the table is the section where the user of the system inputs the amount of vaccines available. This input value is used with the population numbers served for each healthsite and calculates the amount that will be distributed to each healthsite according to the rank of each healthsite and displays the amount per healthsite. After the calculation has been done, the resulting values are written to the database as mentioned in the figure. The left side of the figure is the web map that will be displayed.

The figure fits in with our solution requirement as it depicts a mock-up of our solution; and aligns with the WBS performance and control. This is what we plan on achieving as our final product for our web map application.



Vaccine Distribution Calculator:

Number of Vaccines available:

Calculation Information

Calculate

Writes to DB, calculates distribution and shows number per health site

***
Results
***

Rank:	Name:	Population Served:	Percentage of total:
1	AME Pharmacy	80 000	80%
2	Maruke Pharmacy	60 000	60%
.	.	.	
.	.	.	
.	.	.	
15	Mamelodi East Clinic	10 000	10%
16	Lusaka Clinic	5 000	5%