1. **Analysis of your Research Project - Report**

**Instructions:** In your documentation make sure you create statements of functional and non-functional requirements, constraints, and scope. Please use the following table to guide you to complete the analysis stage of your SAT.

|  |  |
| --- | --- |
| Solution requirements | List all the Solution Requirements according to |
| Determine the functional requirements of the solution. These describe what the software solution should do. This involves specific details such as input required, output developed and functions of the solution including data manipulation and validation. |
| Determine the non-functional requirements. These describe the quality attributes of the solution. These include usability, reliability, portability, robustness and maintainability of project solution. |
| Use tools to assist in determining solution requirements, including context diagrams, data flow diagrams and use case diagrams. |
| Solution constraints | Solution constraints can be described as the conditions or limitations that  must be taken into account when researching and designing your solution. |
| Determine the constraints of the solution. These include economic, such as cost and time; technical, such as speed of processing, capacity, availability of equipment, compatibility and security; social, such as level of expertise of users; legal, such as ownership and privacy of data requirements; and usability, such as usefulness and ease of use of solutions. |
| Solution scope | Solution scope describes the boundaries or parameters of the solution. |
| Identify what will be and/or what will not be addressed by the solution. |
| Skills underpinning the Analysis Stage | Identify and clarify the data and information that needs to be collected and from what sources it will be collected. |
| Critically analyse the sources of data and information to determine the reliability of it. |
| Draft and evaluate questions to critically analyse requirements, needs or opportunities. (Draft your survey/interview etc. data collection questions) |
| Develop strategies for asking follow-up questions to further clarify the data and information collected. |

From PSM Applied Computing Study Design 2025-2028

Analysis of Research Report

# Solution Requirements

**Functional requirements** describe the **tasks** that your solution should be able to perform. In the simplest terms, these are the things you want your solution to be able to do – the main reason you are creating it.

The final solution must:

* Display changes in heavy metal concentration over time or across locations.
* Present fish biodiversity measures (e.g. species richness or presence/absence)
* Clearly highlight patterns or correlations in the data
* Include visual aids (graphs, captions, labels) to support understanding.
* Be suitable for use in a public infographic or awareness campaign.

**Non-functional requirements** describe the **attributes** or **qualities** that your solution should have.

The final solution must:

* Be easy for a general audience to read and interpret (Usability)
* Be visually clean, with logical flow and consistent design (Clarity)
* Have all content directly support the research question (Relevance)
* Have all fonts, colours, and layout styles must match throughout (Consistency)
* Be viewable digitally and printable in A3 or A4 format. (Accessibility)

**Data requirements** describe the specifications required to support your research statement.

(I.e. The data you must locate for your outcome.)

The final solution must:

* Quantitative data showing concentration levels of heavy metals (e.g. Cd, Pb, Cu, Zn) in freshwater systems.
* Fish biodiversity records including species richness, population trends, and presence/absence across locations.
* Location-based data for areas such as Roxburgh Park, Greenvale, or comparable freshwater sites.
* Data from reliable government and scientific sources, such as EPA Victoria, CSIRO, and the Victorian Biodiversity Atlas.
* Measurable environmental variables (e.g. pH, turbidity) to account for other influencing factors.
* Survey data capturing local awareness or observations about pollution and fish population changes.
* Metadata describing how each data set was collected.
* Time-based data to show changes in pollution and biodiversity over several years (e.g. 2009–2018).

## A screenshot of a computer Description automatically generatedContext Diagram

(Thank you eraser.io!)

# Solution Constraints

Constraints are **limiting** factors or conditions that need to be considered when you are designing a solution.

**Time Constraints**

* Limited amount of time available to complete the research, collect data, and design the infographic.
* Must follow timetable allocation in Gantt chart, all parts of project must be submitted in their allocated time to the teacher.
* Delays in receiving responses to surveys or collecting primary-secondary data may impact the timeline.

**Technical Constraints**

* Software tools are limited to those available at school (e.g. Excel, Google Sheets, Word, Canva).
* Data may be in formats (e.g. PDF, online databases) that require reformatting for analysis or may be entirely unavailable on school MacBook’s.
* Limited access to lab equipment means no accurate (lab precise) direct testing of heavy metal levels can be conducted.
* Data may spontaneously corrupt.

**Economic Constraints**

* No funding or budget for professional water testing or field research.
* Printing colour infographics or using paid data visualisation tools may be restricted.

**Legal Constraints**

* Participants in surveys or interviews must be informed and provide informed consent.
* Data must be collected, stored, and reported/manipulated to be anonymous.
* APA referencing must be used when citing secondary sources to avoid plagiarism.

**Usability Constraints**

* The final infographic must be understandable to a general, non-scientific audience.
* It should avoid overloading the viewer with dense data or complex terminology.
* Community interest or engagement in pollution-related topics may be limited.

# Solution Scope

Identify what your solution will be and what you expect it to achieve. This is its scope.

Make sure that your research question clearly states what it includes, so that the information you produce does not go beyond the scope.

A reasonable research question needs to be very specific.

## In scope

The study WILL cover:

* Freshwater ecosystems only
* Comparison of heavy metal levels with native fish biodiversity data
* Data from Roxburgh Park, Greenvale, and relevant Victorian regions

## Out of Scope

The study WILL NOT cover:

* Marine and saltwater systems
* Broader ecological impacts beyond fish species
* Direct testing of water samples for laboratory-grade metal concentration
* Predictive modelling (e.g. future projections or simulations)
* Other pollutants such as plastics, pharmaceuticals, or nutrient run-off
* In-depth analysis of fishing practices, government policy, or water treatment

## Scope Statement

The solution will be a digital infographic that visually presents the relationship between heavy metal pollution in freshwater and fish biodiversity decline.

It will include data visualisations, graphs, captions, and brief explanatory text to communicate trends and patterns clearly.

The infographic will draw on both secondary sources from trusted government agencies and primary data sources from relevant local areas (Roxburgh Park, Greenvale) and is intended to inform a local, general audience about how environmental pollution may be affecting aquatic ecosystems in Victoria.

It is expected to raise awareness, support understanding of ecological impacts, and demonstrate a data-driven correlation between water quality and biodiversity loss.

# Skills underpinning the Analysis Stage

the "Skills underpinning the Analysis Stage" section is your opportunity to show the assessor what practical thinking, decision-making, and data skills you used during the Analysis stage of your SAT.

This section isn't about the content of your findings — it’s about how you analysed, filtered, understood, and organised the data and requirements to prepare for designing your solution.

**Critical thonksing & Decision making.**

I had to decide which data sets were most relevant to my research question by comparing sources based on their credibility, timeliness, and geographic relevance. I chose to prioritise heavy metal data from EPA Victoria and fish biodiversity records from the Victorian Biodiversity Atlas because they were government-verified and covered the specific areas (Greenvale, Roxburgh Park) I was investigating. I also identified that not all environmental data (like temperature or salinity) was necessary (as I was limiting project to freshwater bodies only), so I excluded unrelated variables to keep the analysis focused. This helped me define a clear scope quickly and ensure the solution directly addressed the research problem.

**Data Literacy & Organisation**.

I organised my data using spreadsheets (will do in the future but for now I literally don’t know what to put here.), where I applied sorting, filtering, and averaging functions, etc. to identify patterns between heavy metal concentrations and fish biodiversity. I structured the data into clear tables to compare changes over time and across locations (again, will do in the future, but I don’t know what to put here.) To ensure safe and consistent access to my files, I also used GitHub Desktop to back up and version-control my data sets and documents. This helped me manage my data securely while keeping track of edits and avoiding loss of progress.

**Documentation & Analysis Techniques.**

I used documentation tools such as a data flow diagram and a context diagram to map how data would move through my system and how users would interact with the final solution. I clearly documented functional and non-functional requirements to guide the structure of my infographic. I also outlined constraints and scope to define what my solution would include and exclude.

**Draft and Evaluate Questions (Survey/Interview)**

**Follow-up Question Strategies**

Will be followed up once I have actually completed the survey(s)/interviews.