INTRODUCTION

In order for this new location to be suitable, I am using following parameters:

The New Zealand Government have decided that due to the drastic growth of Hamilton's population, it is now time to build a new Police Station to cater for the increase in people. Hamilton is a city located in the North Island of New Zealand. It is the most populated city of the Waikato Region, and encompasses a land area of 102 km^2.

The main stakeholders in this analysis are the Hamilton City Council, as well as the people that will be affected by the new station.

1. Be at least 2km away from the next nearest station.
2. Cater for an area of Hamilton where most of the area is not already catered for by existing stations (e.g. an area that is not already within a 5 minute drive of an existing station).
3. Be within 2km from a 'crime hotspot' (an area where an increase of crime is clustered in Hamilton).
4. Be able to reach at least 15,000 people within a 5 minute drive.

The information / data needed to be able to make the decisions is a 5 Minute Drive Time from each existing police station, data showing the crime rate and number of victimizations in Hamilton, where the 'crime hotspots' are located based off the crime data, a 2km distance buffer around each crime hotspot and around each existing station, as well as the population within the 5 minute drive times from each potential location for the new station.

Parameter 1:

The location of the new Police Station must be at least 2km away from the next nearest station.

In order to make sure that the new location will be at least 2km from the next nearest police station in Hamilton, I had to have the correct information about where the existing police stations in Hamilton are located. To do this, I researched and found out more information about the current police stations in Hamilton (via http://www.police.govt.nz).

This gave me the exact addresses for each of the three existing stations in Hamilton, in which I then located on my new map by adding them to a new layer, and to show that they are police stations I used an appropriate symbol of a police badge on each location.

This map shows the locations of the three existing police stations in Hamilton, and this layer will help me when solving each of the parameters.

Map of Hamilton showing the Three Existing Police Stations Located in Hamilton

P = Police Station

Parameter 1:

The location of the new Police Station must be at least 2km away from the next nearest station.

With the locations of each existing police station in Hamilton on my map, I then used that layer to run an analysis to show a 2km buffer around each of the existing stations.

On the map you can now see three large green circles around each of the existing stations. Each of these represent 2km of distance around each of the stations. This buffer is useful as it clearly shows me where the new police station cannot be located, as the first parameter requires it to be at least 2km away from the nearest stations, meaning the station cannot be within these buffers. As I am now able to see the areas within 2 km from each existing police station, this manipulation has made it easier and clearer to figure out the minimum distance my new police station can be from the existing stations. The green colour is different to other colours on this map, making the manipulation easy to read and understand.

Map of Hamilton Showing 2km Distance Buffers Around Each Existing Police Station Located in Hamilton
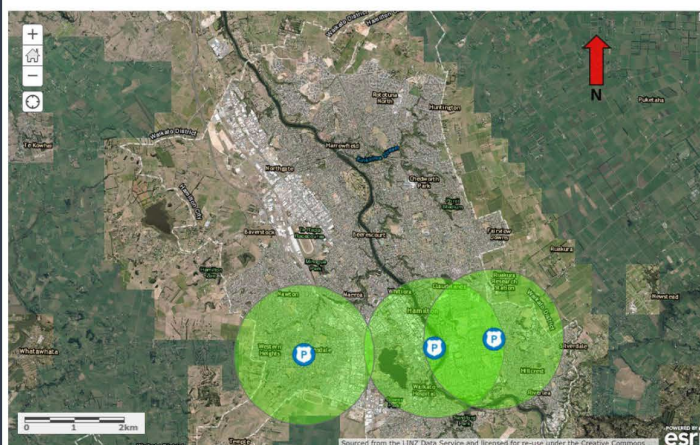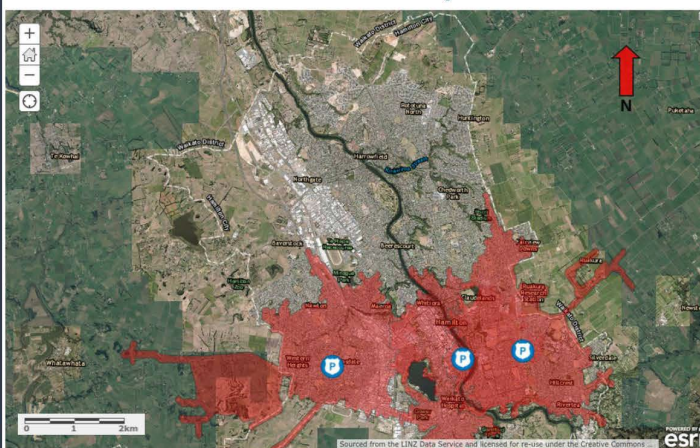

Parameter 2:

Cater for an area of Hamilton where the majority of the area is not already catered for by existing stations.

To make sure that the new station will cater for an area of Hamilton that is not already catered for by the existing stations, I used the proximity tool to create a drive time area on the 'Existing Police Stations in Hamilton' layer. The red area on this map represents the areas in Hamilton that can be reached from the current police stations within five minutes of driving. The use of the red colour makes the manipulation easy to see. I can see the red from the other items on the map. This analysis has made it clear where in Hamilton the three existing police stations can reach within five minutes of driving. It more precisely shows the areas of Hamilton that are catered for by the stations, and makes it easy to tell which areas are not catered for, and therefore are in need of a new police station. This analysis will further help me figure out the areas with potential for my new police station, as I will be able to tell if it is suitable if the drive times of the potential locations do not overlap with this drive time from the existing stations.

Map of Hamilton Showing Five Minute Drive Time Areas From Each Existing Police Station Located in Hamilton
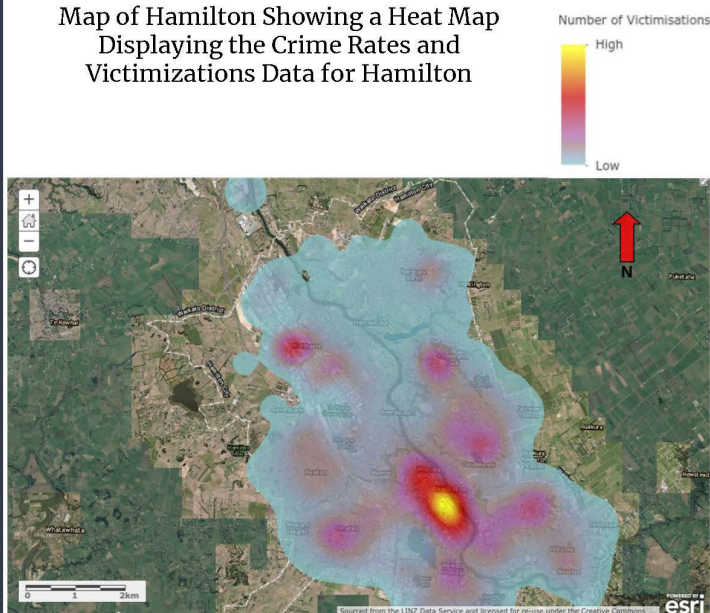
Parameter 3:

Be within 2km from a 'crime hotspot' (an area where an increase of crime is clustered in Hamilton).

The first step I took to solve this parameter was to create a new layer showing Hamilton's crime / victimizations data. To do this, I downloaded a summary of data called 'Victimisations Time and Place' off the New Zealand Police website (www.police.govt.nz) and converted the data into a new layer on my map in the form of a heat map.

On the map, the blue parts represent the areas with less crime and victimizations, and the red, orange and yellow parts represent areas with higher rates of crime. From this, I can see that a higher amount of crime occurs closer to the South of Hamilton, near the existing stations. However, I can also see multiple obvious hotspots towards the North of Hamilton as well, where there is a lack of police stations. The more obvious hotspots towards the North are located near the Base and Chartwell Shopping Centre. This gave me a clear idea of what parts of Hamilton are affected most by crime and further helped to inform my decisions of where the new station is needed / where it could potentially be built. This manipulation uses colours to show the number of victimizaitons. The gradient of the colour makes the specifics hard to read, but the general areas of yellow which is the high areas are clear.

Map of Hamilton Showing a Heat Map Displaying the Crime Rates and Victimizations Data for Hamilton
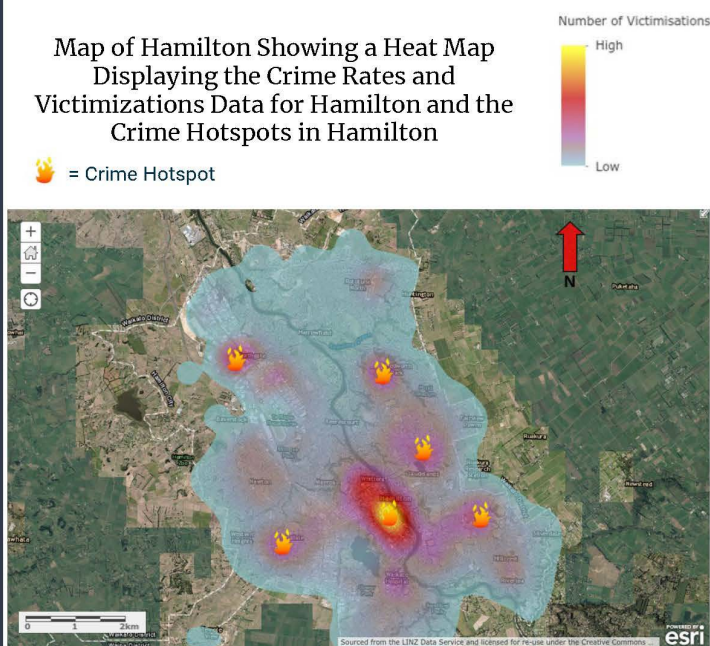

Parameter 3:

Be within 2km from a 'crime hotspot' (an area where an increase of crime is clustered in Hamilton).

After adding the heat map to my map, I then used the key to figure out what areas have the most crime happening. I created a new layer, and added pinpoints on the darker areas of colour, to represent the crime hotspots. This is to make the manipulation clearer than the last map. I then changed the points to more appropriate symbols that were easier to read. The fire symbols on the map represent these areas of high rates of crime.

By doing this, the manipulations made it a lot easier to locate the main areas where the most crime / victimisations happen, without having the entire heat map covering the other layers. I can now remove the layer of the crime data (heat map), (these manipulations were hard to read) which will leave me with only the crime hotspots, as these are all I need for this parameter. The new layer with only the hotspots will work as a base layer when creating a 2 km buffer around these hotspots, which will help me to solve the third parameter.

Map of Hamilton Showing a Heat Map Displaying the Crime Rates and Victimizations Data for Hamilton and the Crime Hotspots in Hamilton
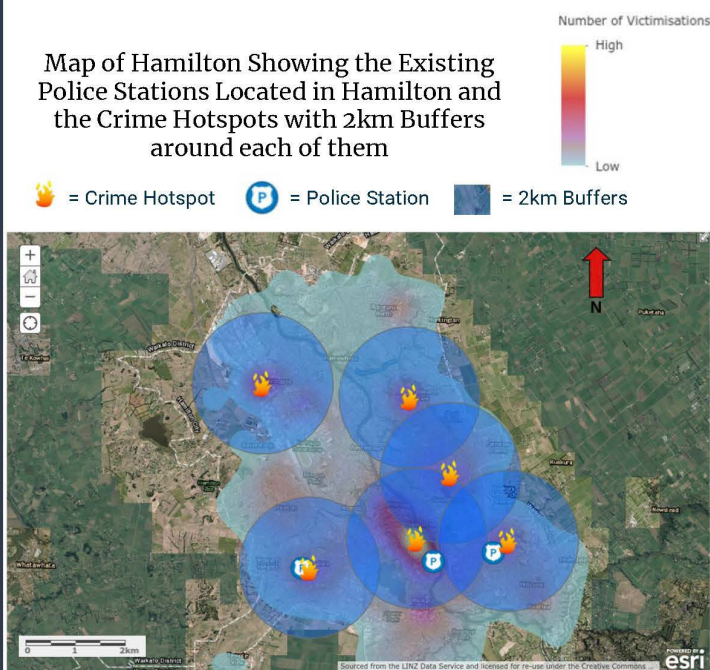
🔥 = Crime Hotspot

Parameter 3:

Be within 2km from a 'crime hotspot' (an area where an increase of crime is clustered in Hamilton).

The next step I took to solve the third parameter was to use the proximity tool to run an analysis to show a 2km buffer around each of the crime hotspots in Hamilton. I created a new layer by running the analysis on the 'crime hotspots' layer, which formed large circles around each hotspot, showing the 2km distance buffer around each of the crime hotspots.

The blue circles surrounding each hotspot represent the areas that are within 2km of each of these hotspots. This shows me where in Hamilton I can place my new station, as the parameter requires it to be within 2km from a crime hotspot, meaning it has to be located within one of these buffers. This narrows down my options for where to put the potential new station, therefore helping to make the decision easier. The different colours used make this layer of manipulations effective.

Map of Hamilton Showing the Existing Police Stations Located in Hamilton and the Crime Hotspots with 2km Buffers around each of them
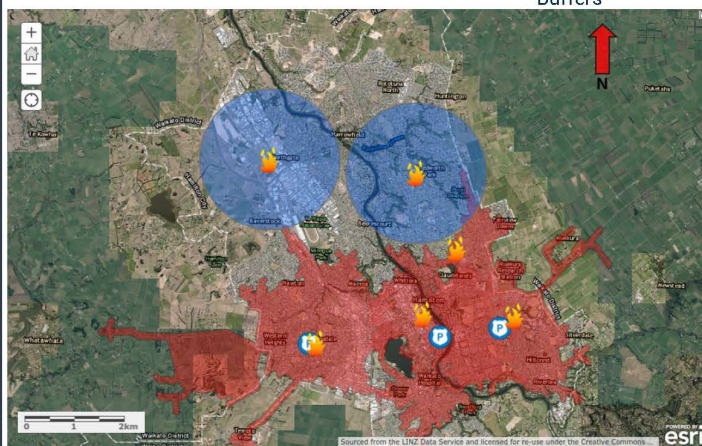

Parameter 3:

Be within 2km from a 'crime hotspot' (an area where an increase of crime is clustered in Hamilton).

I then added the layers of the existing police stations and the 5 minute drive time layer back on the map, and could clearly see that the 5 minute drive times from the existing police stations in Hamilton already catered for four of the crime hotspots on my map. This showed me that these crime hotspots were not as in need of a new station nearby as the two hotspots North of Hamilton, and therefore decided that I will put the two potential locations within these two buffers. I removed the 2km buffers around the four hotspots, as these manipulations were not needed, and left the buffers around the two North of Hamilton, so it is now clear to see what crime hotspots I am using to solve this parameter.

Map of Hamilton Showing Existing Police Stations and the Crime Hotspots with 2km Buffers
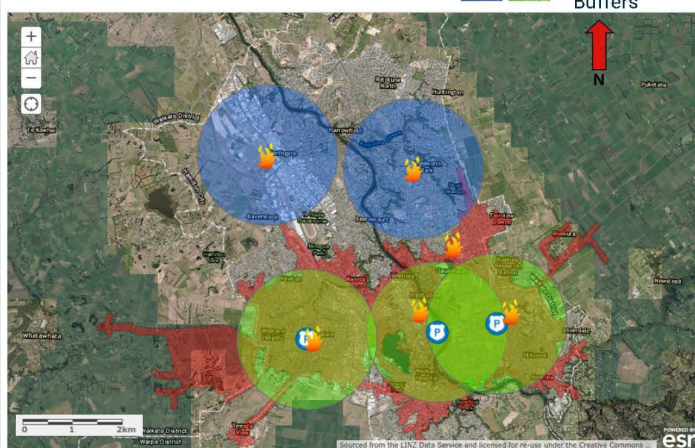
Parameter 4:

Be able to reach at least 15,000 people within a 5 minute drive.

The first step I needed to do before solving this parameter was to find two potential locations for where the new Police Station could be built. I used the limitations of the first three parameters as guidelines when choosing these two locations.

After solving the first three parameters, I could see that because the red area represents the areas that the current stations are able to cater for, the new potential locations for the police stations in Hamilton had to be located outside of the red area on this map, as it is required to cater for an area that is not already catered for by the existing stations. I could also see that they would have to be located outside of the green circles (the 2km buffer around the existing stations), because the first parameter requires it to be at least 2km from the nearest existing station. The third parameter then narrowed down my decision even more, as it requires the new station to be within 2km from a 'crime hotspot', meaning that I will have to locate the new potential station locations within the blue circles (2km buffers from the main crime hotspots that aren't already catered for by the existing police stations). Although there is a lot of information on this map, this step was effective in helping me solve the problem of where to put the police station.

Map of Hamilton Showing the Existing Police Stations, the Main Crime Hotspots, 2km Buffers Around the Existing Stations and Crime Hotspots, and a 5 Minute Drive Time from the Existing Stations
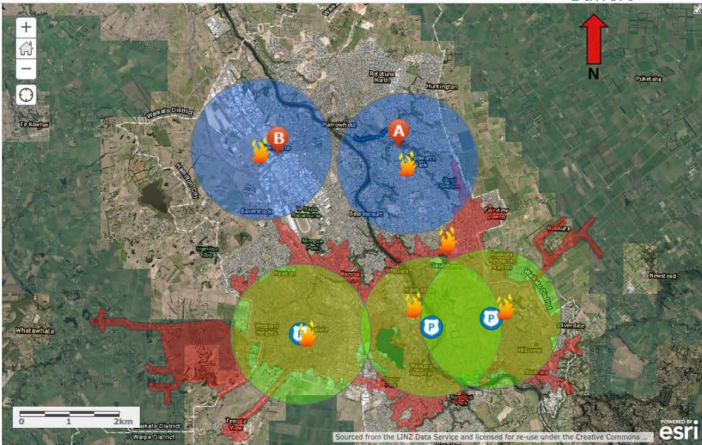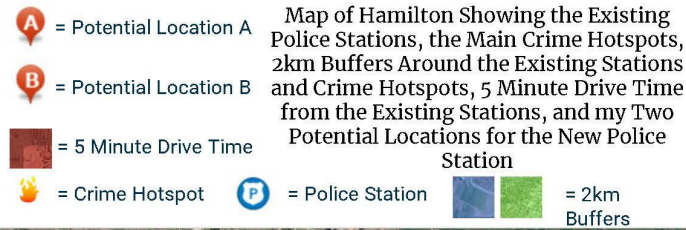
Parameter 4:

Be able to reach at least 15,000 people within a 5 minute drive.

Based off the requirements from the parameters, I was able to locate two potential spots on my map to potentially become the location of the new station.

Potential Location A is located in the area of Chartwell, not far from the Chartwell Shopping Centre. This location is within 2km of the nearest crime hotspot (the one located around the Chartwell Shopping Centre), and is more than 2km away from the nearest existing police station in Hamilton.

Potential Location B is located in the area of Te Rapa, near the Base Shopping Centre. This location is also within 2km of the nearest crime hotspot (the one located around The Base Shopping Centre), and is also more than 2km away from all existing police stations in Hamilton. These manipulations look good and were helpful in deciding where to put the police station.

Ⓐ = Potential Location A

Ⓑ = Potential Location B

■ = 5 Minute Drive Time

🔥 = Crime Hotspot   Ⓟ = Police Station   ■ ■ = 2km Buffers

Map of Hamilton Showing the Existing Police Stations, the Main Crime Hotspots, 2km Buffers Around the Existing Stations and Crime Hotspots, 5 Minute Drive Time from the Existing Stations, and my Two Potential Locations for the New Police Station
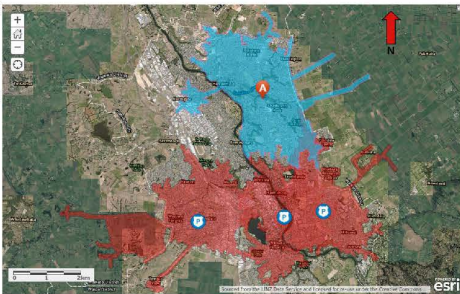
Parameter 4:

Be able to reach at least 15,000 people within a 5 minute drive.

After deciding on two potential locations based around the first three parameters, I then used the proximity tool on the layer containing the new potential locations to run a 5 minute drive time analysis on the two potential locations.

The top map shows the 5 minute drive time from the Potential Location A. The light blue area on the map represents the extent in which you can reach within five minutes of driving from location A. This shows me how much of Hamilton the new police station could potentially cater for, if it were to be built at location A. The bottom map shows the 5 minute drive time from the Potential Location B. The purple area on this map represents the extent in which you can reach within five minutes of driving from location B. This shows me the amount of Hamilton the new police station could potentially cater for, if it were to be built at location B.

From looking at these maps, I can see that the five minute drive time from the existing police stations in Hamilton caters for almost half of Hamilton, while the potential locations cater for approximately a quarter each. These layers will be the base layers for working out how many people each can reach.

Map of Hamilton Showing the Existing Police Stations in Hamilton and Five Minute Drive Time around the Existing Police Stations and Potential Location A

■ = 5 Minute Drive Times

Ⓐ = Potential Location A

Map of Hamilton Showing the Existing Police Stations in Hamilton and Five Minute Drive Time around the Existing Police Stations and Potential Location B

■ = 5 Minute Drive Times

Ⓑ = Potential Location B
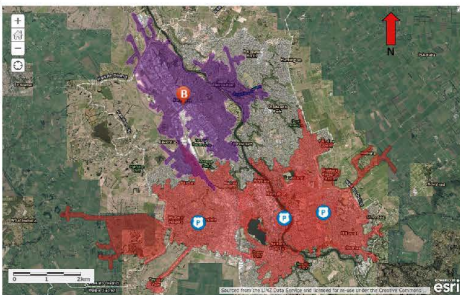
Parameter 4:
Be able to reach at least 15,000 people within a 5 minute drive.

After deciding on two potential locations and running a five minute drive time analysis on each of them, I then worked out how many people each location could potentially reach within a five minute drive, in order to solve the fourth parameter. Firstly, I added a new layer into my map by searching for the layer 'New Zealand Demographics for Emergency Management'. This set me up with the appropriate data in order for the next tool to figure out how many people these locations' drive times could cater for. By sharing my map, using the Web Appbuilder, and adding a new widget (Situation Awareness), I was able to use the widget to outline each five minute drive time of the potential locations separately. By doing this, it gave me the data based off what was within the area. To the right, in the first screencapture, you can see that for Potential Location A, the population within the 5 minute drive time area is **42,810** people (circled). This means that if the new Police Station were to be built at this location, it would be able to cater for 42,810 people within a five minute drive. Below this, in the second screencapture, you can see that for Potential Location B, the population within the 5 minute drive time area is **29,208** people (circled). This means that if the new Police Station were to be built at location B, it would be able to cater for 29,208 people within a five minute drive. Both Location A and B now meet the requirements of the fourth parameter, as they both reach more than 15,000 people within a 5 minute drive.

Maps of Hamilton Showing the Web App-builder Tool Showing Data Within the 5 Minute Drive Time Areas from Each Potential Location

Potential Location A:
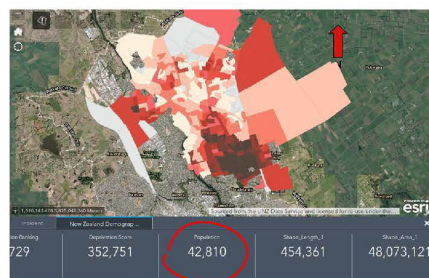
Potential Location B:

Strengths
Of Location A
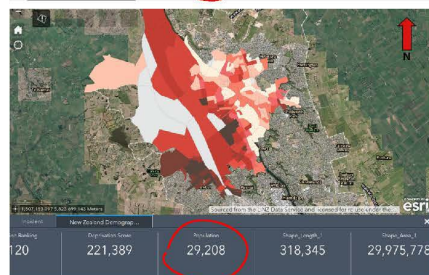
Weaknesses
Of Location A

★ It meets the requirements of all parameters (see previous slides):
  ○ It is more than 2 km away from the nearest existing Police Station in Hamilton
  ○ It caters for an area in which the majority of the area is not already catered for by existing stations (not already within the 5 minute drive times from current stations)
  ○ It is within 2km of a crime hotspot in Hamilton (the one located around Chartwell Shopping Centre)
  ○ It reaches more than 15,000 people within five minutes of driving from the location
★ It isn't far from the Pukete Bridge - so the West side of Hamilton (opposite side of the river) won't be too difficult to access
★ It will cater for 42,810 people within a five minute drive, which is almost a third of the Hamilton population

★ The Waikato River could potentially become a barrier (It may take longer to get to places on the Western side of Hamilton because of the bridge - you have to detour to get to some places because you have to cross a bridge) and therefore means it does not cater for much of the Western side of Hamilton
★ It is located on a road prone to being busy, and therefore may be an obstacle during rush hours

Strengths
Of Location B

★ It meets the requirements of all parameters (see previous slides):
  ○ It is more than 2 km away from the nearest existing Police Station in Hamilton
  ○ It caters for an area in which the majority of the area is not already catered for by existing stations (not already within the 5 minute drive times from current stations)
  ○ It is within 2km of a crime hotspot in Hamilton (the one located around Te Awa the Base Shopping Centre)
  ○ It reaches more than 15,000 people within five minutes of driving from the location
★ It will cater for 29,208 people within a five minute drive (more than 15,000)
★ It is close to the Pukete Bridge, which will make it easy to access some of the Eastern side of the Waikato River

Weaknesses
Of Location B

★ The Waikato River could potentially become a barrier (It may take longer to get to places on the East side of Hamilton because of the bridge - you have to detour to get to some places because you have to cross a bridge)
★ It is located near an intersection that is very prone to being busy, and therefore would be an obstacle during rush hours, and also from being located close to the shopping centre, it may also experience delays from traffic moving in and out of the centre

My Final Decision

I had to choose one of the two potential locations as my final decision on where I believe is the best place to build a new Police Station in Hamilton. I decided that, based on the parameters (specifically parameter 4), the Potential Location A is the best location for this new station to be built.

This decision was influenced mostly by the fact that from location A you can reach 42,810 people within a five minute drive, while location B can only reach 29,208 people within five minutes of driving. This influenced my decision to choose location A because although they both cater for the requirements of all four parameters, this station would be able to reach 13,602 more people than location B, therefore catering for a lot more of Hamilton within a five minute drive.

Map of Hamilton Showing the Existing Police Stations Located in Hamilton and Potential Location

A = Potential Location A   P △ Police Station
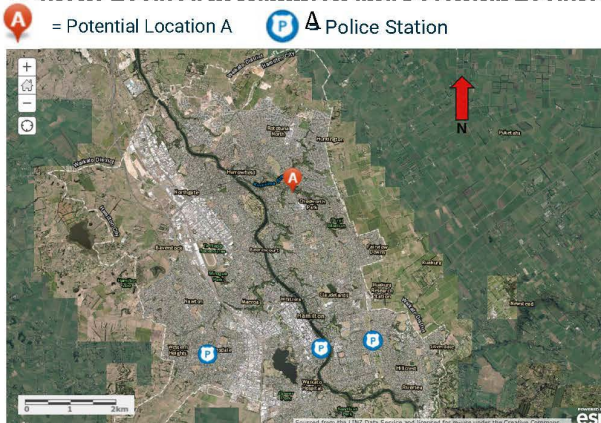
Why I Believe this is the Best Site

Location A is the best option for where to build this new police station because it meets all requirements of the parameters asked of me. I believe it is the best site because it caters for an area of Hamilton that is not already catered for by the three existing Police Stations in Hamilton. From using the Web App-Builder tool, I was able to see that this location can reach 42,810 people within five minutes of driving, which is almost a third of Hamilton, while the other potential location (Location B) could only reach 29,208 people within five minutes of driving. I believe this is because the Potential Location A is located closer to Hamilton North, where areas such as Rototuna and Flagstaff are located. These areas are more densely populated than the areas around the Potential Location B, and because Location A is further away from the nearest bridge over the Waikato River (Pukete Bridge), it is closer to the suburban areas on the East side of the River, meaning that people are more accessible.

The alternative option was Location B, however I didn't choose this location mostly because it was not able to reach an area as big as Location A within five minutes of driving, meaning it could not reach as many people as Location A could. This option was also in close proximity to the Base Shopping Centre, which is prone to getting very busy, and because it is also located right next to the main intersection, it could pose as a potential harm to the police vehicles when pulling in and out of the potential station, thus why I believe this location was not as suitable as Location A.