University of Southern Queensland

Faculty of Health, Engineering and Sciences

Developing an Asset Prioritization System for Hinchinbrook Shire Council's Water and Sewerage Assets

A dissertation submitted by

Haydn Grazioli

in fulfilment of the requirements of

ENG4111 and 4112 Research Project

towards the degree of

Bachelor of Engineering (Honours) (Civil)

Submitted October, 2020

Abstract

Hinchinbrook Shire Council is looking at improving its policies and procedures and part of this includes its asset management plans. One way being investigated to improve asset management plans and how HSC carries out its asset maintenance is through a criticality analysis. A criticality analysis will allow HSC to identify its most critical infrastructure to ensure adequate maintenance is carried out on an asset or refurbishment/replacement is carried out. This aim of this dissertation is to perform a criticality analysis on HSC's water and sewerage assets.

Asset data for HSC's water and sewerage assets was collected and criticality factors and severity scoring were developed. Based on the asset data, the criticality factors and severity scoring the assets received a criticality rating. A model was constructed in Microsoft Excel to process the data and automatically carry out calculations for each asset. Once the calculations were completed each asset would have received a criticality ranking which could be used to determine HSC's most critical water and sewerage assets and help in making asset management decisions.

Over 2500 assets were then analysed using the calculator with 98.4% of assets being identified as non-critical, 1.5% as semi critical, 0.1% as critical and no assets as highly critical. These results are relatively accurate of the assets however some improvements could be made to get a better representation of the assets and show a better spread amongst the different criticality rankings.

The results show that the criticality framework constructed as part of this investigation can be used by HSC to help make asset maintenance and replacement decisions and with further work and refinement could be expanded to incorporate more of Council's assets.

University of Southern Queensland

Faculty of Health, Engineering and Sciences

ENG4111 & ENG4112 Research Project

Limitations of Use

The Council of the University of Southern Queensland, its Faculty of Health, Engineering and Sciences, and the staff of the University of Southern Queensland, do not accept any responsibility for the truth, accuracy or completeness of material contained within or associated with this dissertation.

Persons using all or any part of this material do so at their own risk, and not at the risk of the Council of the University of Southern Queensland, its Faculty of Health, Engineering and Sciences or the staff of the University of Southern Queensland.

This dissertation reports an educational exercise and has no purpose or validity beyond this exercise. The sole purpose of the course pair entitles “Research Project” is to contribute to the overall education within the student’s chosen degree program. This document, the associated hardware, software, drawings, and any other material set out in the associated appendices should not be used for any other purpose: if they are so used, it is entirely at the risk of the user.

Certification

I certify that the ideas, designs and experimental work, results, analyses and conclusions set out in this dissertation are entirely my own effort, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Haydn Grazioli

Student Number: [redacted]

Table of Contents

List of Tables

List of Figures

Nomenclature

GIS	Geographic Information System
HSC	Hinchinbrook Shire Council
PdM	Predictive Maintenance
PM	Preventive Maintenance
RTF	Run-to-failure
SCADA	Supervisory Control and Data Acquisition
SPS	Sewerage Pumping Station
STP	Sewerage Treatment Plant
WR	Water Reservoir
WTP	Water Treatment Plant

Chapter 1 : INTRODUCTION

1.1: Introduction

Asset management is vital for organisations that are required to maintain and replace a large number of assets each year. This this even more important for local government organisations who has assets that are required to provide a service to the community. Asset management

One method that helps organisations carry out effective asset management is criticality analysis. Criticality analysis allows an organisation to identify its critical assets that have a high chance of failure or if they were to fail would cause major consequences. Identifying these critical assets allow for maintenance to be appropriately planned so that there isn't an unexpected failure of a critical asset.

Hinchinbrook Shire Council is currently looking at improving all of its policies and procedures. As part of this HSC is reviewing its asset management plans. It has been identified that criticality analysis could be used to help improve these plans. Initially a criticality analysis will be conducted on HSC's water and sewerage assets.

Failure of water and sewerage assets can have a wide range of consequences based on a number of factors. Water and sewerage asset failure can lead to major environmental, financial or customer service impacts among other things. Water and sewerage assets also have the extra problem where maintenance isn't always possible or damage cannot easily be seen as assets can be partially or completely buried. Therefore, knowing critical water and sewerage assets allow for assets to be monitored more closely based on their criticality.

This investigation aims to perform a criticality analysis for HSC's water and sewerage assets. From the results of this investigation will be provided to HSC for further use in the future or modify to be used on other asset types outside of water and sewerage if they wish.

1.2 Hinchinbrook Shire

The Hinchinbrook region is located in North Queensland approximately 110km north of Townsville and is nestled within the Herbert River Valley. The shire encompasses an approximate area of 2,810km^2 with a population of approximately 11,541 people.

The shire was originally the Hinchinbrook Division and was created in 1879 as part of the Divisional Boards Act 1879. The shire went through a number of changes through the next few decades before the Local Authorities Act 1902 was passed meaning that in 1903 the Hinchinbrook Division became the Shire of Hinchinbrook and has held this title and its borders since then.

Hinchinbrook is known for its vast multicultural heritage and for its strong roots in agriculture and farm. The shire's main industry is sugar cane farming but there is also a rich history of cattle farming and other agricultural crops including fruits and vegetables.

1.2.1 Hinchinbrook Shire Council

The Hinchinbrook Shire Council is the local governing body for the Hinchinbrook Shire. Currently HSC employees over 100 workers throughout its numerous sites throughout the district. Currently HSC is made up of four different functions. They are as follows:

- Mayor and CEO Office Function
- Community and Development Services Function
- Corporate and Financial Services Function
- Infrastructure and Utility Services Function

HSC's water and sewerage areas currently reside under the Infrastructure and Utility Services function within the Utility Services Department.

1.2.2 Hinchinbrook Shire Council Utility Services Department

HSCs' water and sewerage assets are maintained by HSC's Utility Services Department. The Utility Services Department currently resides within the Infrastructure and Utility Services Directorate. Utilities Services also maintain HSC's waste assets as well. The water and sewerage assets that Utility Services maintain include water mains (both potable and raw), sewerage mains (both gravity and pressure mains), sewerage pump stations (SPS) and treatment plants.

1.2.3 Hinchinbrook Shire Council Water Network

Utility Services currently maintains all of the water infrastructure in the Hinchinbrook Shire. Currently the Shire services 3 different water schemes with all of these schemes being able to sufficiently support themselves, however these schemes are all interconnected so in the event of a major failure water can still be distributed to residents until the failure is repaired. Currently these schemes are the Ingham Scheme, the Lower Herbert Scheme and the Forrest Beach Scheme. All the schemes currently source their raw water from bores with the Ingham Scheme also drawing water from the Herbert River when possible. All of these sources allow HSC to supply water to over 5,000 properties via the following infrastructure:

- 4 Water Treatment Plants
- 8 Water Reservoirs (e.g. water towers, water tanks and in ground reservoirs)
- Approximately 263 kilometres of treated water pipelines
- Approximately 6 kilometres of raw water pipelines

1.2.4 Hinchinbrook Shire Council Sewerage Network

Utility Services also maintain all of the sewerage infrastructure in the Hinchinbrook Shire. Currently the shire services 2 different sewerage schemes with both of these schemes being able to sufficiently support themselves with their own collection infrastructure, treatment facilities and effluent discharge points. Currently these schemes are the Ingham Sewerage Scheme and the Lucinda Sewerage Scheme. Currently these two schemes mean HSC collects and treats waste water from over 1,000 properties via the following infrastructure:

- 2 Sewerage Treatment Plant
- 80 SPS
- 929 manholes
- Approximately 55km gravity sewer mains
- Approximately 11km sewer rising mains

1.3 Research Problem

Currently when HSC's Utility Services staff are reviewing Council's water and sewerage assets for maintenance planning or replacement decisions are generally made by experienced staff members who have a vast knowledge of Council's water and sewerage systems. While this system is currently effective, it greatly relies on the experience of those few staff members. These staff members are starting to near the end of their careers, so when they soon retire or leave Council for other reasons it means that these decisions would fall on less experienced staff which could lead to considerable problems.

This project would mean creating an asset criticality framework for HSC's water and sewerage assets. This framework will allow Council officers to view its most critical water and sewerage assets. By knowing the most critical assets it will allow officers to know what assets to look at when carrying out planning based on a number of criticality factors. This will assist Council staff when making decisions about asset maintenance or replacement.

Chapter 2 : LITERATURE REVIEW

2.1 Introduction

This chapter will show the results of the literature review carried out. The aim of the literature review is to review existing literature to understand what research has already been carried out in the subject area. This literature review will look into existing research in the field of asset criticality analysis. This chapter will also look into asset management and any literature regarding this topic.

2.2 Asset Management

Asset management enables an organisation to examine the need for, and performance of, assets and asset systems at different levels. Additionally, it enables the application of analytical approaches towards managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities) (Standards Australia, 2014).

The Asset Management Council defines asset management as "The life cycle management of physical assets to achieve the stated outputs of the enterprise" (Asset Management Council, 2020). While, the APWA defines asset management as "a methodology to efficiently and equitably allocate resources amongst valid and competing goals and objectives".

Asset management varies from organisation to organisation depending on a number of factors. From the sources above it can be seen that asset management general focuses on managing the asset throughout its entire lifetime. Most organisations do this by creating asset management plans. Under the Local Government Act 2009, all local governments must have a long-term asset management plan (Hinchinbrook Shire Council, 2020)

2.2.1: Asset Management Plan

ISO 55000 defines an asset management plan as: "documented information that specifies the activities, resources and timescales required for an individual asset or grouping of assets, to achieve the organisation's asset management objectives" (Standards Australia, 2014).

Nicholas Anthony John Hasting describes an asset management plan as follows:

An Asset Management Plan is a plan that involves specifying:

- Activities
- Resources
- Timescales
- Responsibilities

That are required for the asset or group of assets to achieve specified objectives. Plans are based on the maintenance, repair, overhaul and replacement activities and logistic support needed to sustain the assets and to enable them to deliver the expected level of service over a specified timescale. (Hastings, 2015)

2.2.2: Asset Maintenance

Asset maintenance is conducted in order to stop the deterioration of an asset and to held the inherit value of the asset for the financial benefit of the enterprise.

There are a number of different maintenance terms and definitions but the four most common types of asset maintenance are as follows:

- Run-to-failure/Breakdown Maintenance (RTF)
- Preventive Maintenance (PM)
- Predictive Maintenance (PdM)

Each of these different types of maintenance can be used based on a number of factors surrounding the asset.

2.2.2.1 Run-to-failure Maintenance

Run-to-failure maintenance is possibly the simplest of the maintenance methods. Run-to-failure maintenance is basically exactly how it sounds. An asset is used until it fails and it is then replaced, for example a lightbulb being used until it fails and then replaced with a new bulb. RTF is however believed to possibly be the most expensive form of maintenance. Analysis of maintenance costs indicates that a repair performed in the reactive or RTF mode will average about three times higher than the same repair made within a scheduled or preventive mode (Mobley, 2002).

Fiix (2020) states that the advantages of RTF include:

- Minimal planning – Since maintenance does not need to be scheduled in advance, the planning requirements are very low. Maintenance only needs to happen after breakdown has occurred.
- Easy to understand – Because of the plan's simplicity, this system is easy to understand and implement.

However, Fiix (2020) also state that the disadvantages of RTF include:

- Unpredictable – Because most asset failures are unpredictable, it is difficult to anticipate when manpower and parts will be needed for repairs.
- Inconsistent – The intermittent nature of failures means efficient planning of staff and resources can be difficult.
- Costly – All costs associated with this strategy need to be considered when it is implemented. These costs include production costs and breakdown costs, in addition to direct parts and labour costs associated with performing the maintenance.
- Inventory costs – The maintenance team needs to hold spare parts in inventory, to accommodate for intermittent failures.

Based on this the most appropriate uses for RTF maintenance are when repair costs are less than the cost to carry out other forms of maintenance or for non-critical or redundant assets where a failure has minor to no consequences.

2.2.2.2 Preventive Maintenance

There are many definitions of preventive maintenance, but all preventive maintenance management programs are time-driven. This means that maintenance tasks are based on elapsed time or hours of operation (Mobley, 2020). An example of this may be lubricating a pump after 1000 hours of operation.

Fiix (2020) suggest that applications that PM is suitable for include those that have a critical operational function, have failure modes that can be prevented (and not increased) with regular maintenance and have a likelihood of failure that increases with time or use. Fiix (2020) also recommends that applications where PM is not suitable for include those that have random failures that are unrelated to maintenance (such as circuit boards) and those that do not serve a critical function.

2.2.2.3 Predictive Maintenance

Predictive maintenance is a technique that uses condition monitoring tools and techniques to track the performance of equipment during normal operation to detect possible defects and fix them before they result in failure (Fiix, 2020). A PdM program goes far beyond normal frequency based preventive maintenance with techniques such as vibration monitoring, oil analysis and thermography detect early warnings of serious equipment problems (Palmer, 2006). PdM allows the maintenance frequency to be as low as possible to prevent unplanned reactive maintenance, without incurring costs associated with doing too much preventive maintenance (Fiix, 2020).

As just stated, the major benefit of PdM is that when it is working effectively that maintenance is only carried out when it is required, which is generally just before failure is going to occur. This brings several cost savings:

- Minimizing the time the equipment is being maintained
- Minimizing the production hours lost to maintenance
- Minimizing the cost of spare parts and supplies

These cost savings came at a price, however. Some condition monitoring techniques are expensive and require specialist and experienced personnel for data analysis to be effective. Due to this, applications that PdM is suitable for include those that have a critical operational function and have failure modes that can be cost effectively predicted with regular monitoring (Fiix, 2020).

2.3 Asset Criticality Analysis

Asset criticality analysis is a systematic procedure for the analysis of a system of assets. The aim is to identify the consequence and likelihood of failure of an asset to perform its function. The results of the asset criticality analysis can be used to develop an appropriate and cost-effective maintenance strategy to manage organisational risk (Covaris, 2020).

Criticality analysis can help an organisation in a number of ways. In general, it's often considered a crucial part of managing a facility's assets and processes for the following reasons (UpKeep, 2019):

- Focuses maintenance efforts
- Improve maintenance scheduling

- Reduce Risk
- Streamline costs

There are a number of different methodologies for carrying out a criticality analysis but most of them follow the same basic structure. Most of these variations occur based on the organisation carrying out the analysis and the reason the analysis is being carried out. An example criticality analysis methodology can be seen in figure 2.1.

Figure 2.2.1: Example Criticality Methodology (Cohesive Solutions,2019)

There are also a number of additional criticality analysis methods found during this review that build on this basic approach. These include risk-based criticality analysis, qualitative criticality analysis, and quantitative criticality analysis. These further define criticality analysis and give more exact expectations from the criticality analysis when it is carried out.

2.3.1 Criticality Factors

Criticality factors, also referred to as consequence factors and consequence categories,

An example of criticality factors and units of measure for an electrical network can be seen below in Table 2.1.

Table 2.1: Example of Criticality Factors and Units of Measure (Pschierer-Barnfather, 2011)

Category	Units of Measurement
Network Performance	• Loss of system capacity (in MWh) • Number of SAIDI minutes
Safety	• Number of fatalities • Number of major injuries • Number of minor injuries
Financial	• Cost of repairs including collateral damage and site clean up • Cost of replacement
Environmental	• Volume of oil spilled • Volume of SF6 lost • Number of fires with significant smoke/pollution • Volume of waste created • Scale of disturbance (traffic/noise)

Another example of criticality factors for water and wastewater infrastructure can be seen below in Table 2.2.

Table 2.2: Example of Failure Consequence Categories and Consequence Factors (Olsen, 2015)

Failure Consequence Categories	Consequence Factors
Repair Costs	Asset Cost
	Difficulty of Repair
Third Party Losses	Location
	Volume Discharged
Media	Media Exposure
Public Health & Safety	Potential for Injury
Environmental Damage	Volume Discharged
	Proximity to Sensitive Area
Service Delivery	Equivalent Population Affected
	Customer Type
	Failure Tolerance
Compliance	Statutory Requirements

2.3.2 Risk-based Criticality Analysis

Risk-based asset management has shown to be effective for asset-intensive systems, not necessarily by reducing risk, but by using risk to balance the operational performance of the assets against the asset life-cycle cost (Deloitte, 2020).

Risk based analysis generally rely on a on a risk matrix to provide the criticality score. The most common approach is to use a 6x6 grid, which plots the probability of a failure against the severity of the failure, resulting in a risk priority number (Reliable Plant, 2020). An example risk matrix can be seen in figure 2.2 below with the severity of failure plotted on the x-axis and the probability for failure plotted on the y-axis:

Figure 2.2: Risk Matrix for Criticality Analysis (Reliable Plant, 2020)

Risk-based analysis can be either quantitative or qualitative based on how they are carried out. The risk matrix can be built like the one in figure 2.2 and qualitatively used by managers and operators to score the asset. A more complex matrix where data is used to determine where on the x-axis and y-axis the asset would rank which will then get the asset its risk priority number. This would be an example of a more quantitative risk-based analysis.

2.3.3 Quantitative Criticality Analysis

Quantitative analysis means conducting an analysis that is supported with data. Data is available for assigning failure rates and failure mode probabilities.

Borgovini, Pemberton and Rossi (1993) say that to perform a quantitative criticality analysis, it is necessary to have a completed FMEA as well as information on the system such as system mission, definition of failures, severity categories and part failure rate information (Borgovini & Pemberton & Rossi, 1993).

A quantitative analysis has a number of advantages when it is used. These advantages include the following (Rot, 2008):

- They allow for definition of consequences of incidents occurrence in quantitative way, what facilities realisation of costs and benefits analysis during selections of protections.
- They give more accurate image of risk.

Quantitative analysis does however have its disadvantages when it is used. These include (Rot, 2008):

- Quantitative measures depend on the scope and accuracy of defined measurement scale.
- Results of analysis may be not precise and even confusing.
- Normal methods must be enriched in qualitative description (in the form of comment, interpretation).
- Analysis conducted with application of those methods is generally more expensive, demanding greater experience and advanced tools.

2.3.4 Qualitative Criticality Analysis

Qualitative analysis means conducting an analysis without data. This means that team members subjectively rank probabilities of occurrence in place of failure rates. These team members generally include managers, supervisor, operators and technicians who have experience with the assets. The qualitative approach is used when specific part or item failure rates are not available (Borgovini & Pemberton & Rossi, 1993).

A qualitative analysis has a number of advantages when used. These advantages include (Rot, 2008):

- It allows for putting in order risks according to priority.
- It allows for determination of areas of greater risk in a short time and without bigger expenditures.
- Analysis is relatively easy and cheap.

However, it also has its disadvantages, such as (Rot, 2008):

- It does not allow for determination of probabilities and results using numerical measures.
- Cost-benefits analysis is more difficult during selection of protections.
- Achieved results have general character, approximate, etc.

Chapter 3 : METHODOLOGY

3.1 Introduction

The most crucial part to carrying out a criticality analysis is determining the methodology to for how the assets will be assessed. Initially the asset data needs to be collected and categorised so that assets of a similar nature can be compared to each other. Once the data collection phase was completed the criticality analysis framework had to be established. This involved developing a severity scoring system and criticality factors and weightings to determine the overall final criticality score.

The following is a brief overview of the methodology to carry out this criticality analysis:

- Determine asset groups and sub groups for HSC's water and sewerage assets.
- Review and correct current water and sewerage asset data
- Collect all required asset data
- Determine severity scoring to rank assets
- Develop criticality factors and weightings
- Construct Criticality Calculators

3.2 Asset Categories

The initial stage of this investigation involved categorising assets into asset groups. This involved grouping the assets based on their function and attributes. The following sections will show how the assets were grouped for this investigation based on how HSC categorises its assets.

3.2.1 Asset Classes

HSC's water and sewerage assets are currently split into 6 different classes, water assets, sewerage assets, water and sewerage plant and equipment assets, computer assets, water and sewerage building assets and other water and sewerage assets. However, for this investigation they were filtered down into 3 asset classes. These asset classes were water assets, sewerage assets and other assets. This was done due to the fact that a large majority of these assets are in either the water and sewerage asset class and the remaining four classes are very small and could be incorporated into either the water or sewerage asset class. Therefore, the final class configuration was water, sewerage and other assets and can be seen in Figure 3.1 below.

3.2.2 Asset Sub Groups

Once the assets are split into the 3 asset classes the assets were then further split within the 3 asset classes into asset sub groups. This process involved comparing the assets in the above asset classes and grouping them even more by their functions and uses. As an example, this included looking at all the water assets and moving all the water pumps into the water pumps sub group. A full break down of the sub groups can be seen in figure 3.2 below.

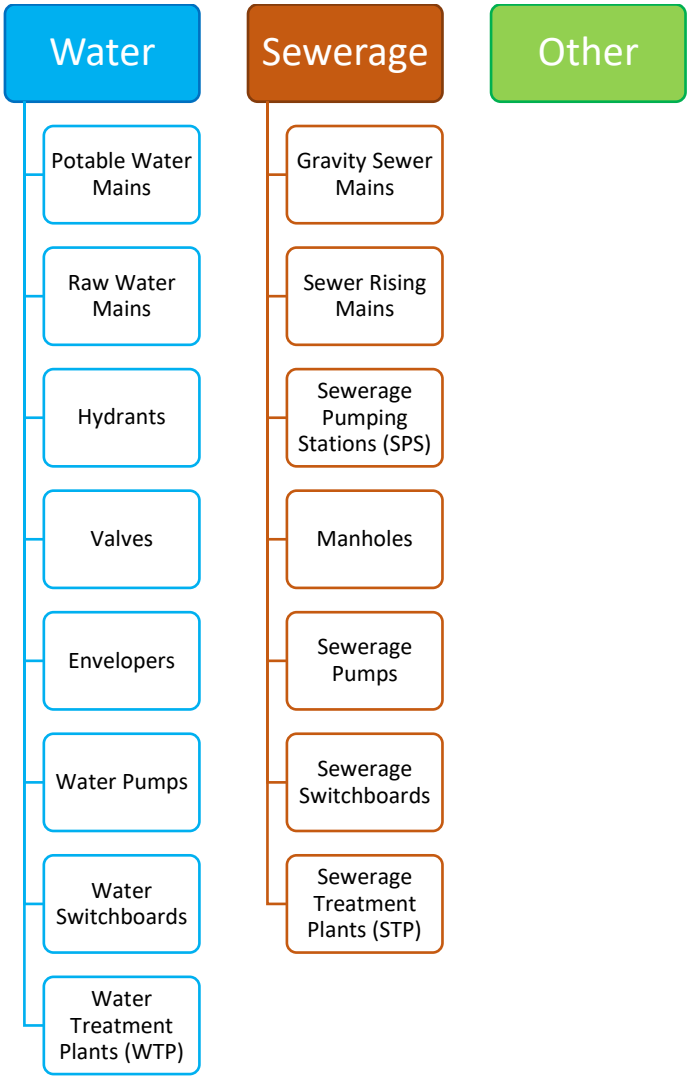


Figure 3.1: HSC Asset Group and Sub Groups

3.2.3 Assets Not Included

There were a number of assets that were not included in this investigation. The main assets not involved in this investigation were water connections and meters. It was decided not to include these assets in the investigation due to the constant changing of them. Water meters and connections are statistically the most often replaced asset for HSC's water and sewerage due to be broken by residents or contractors. This means that these assets never reach the end of their asset life and they are also assets that are not highly critical to the rest of the water and sewerage assets.

3.3 Asset Data Collection

Possibly one of the most important aspects of this investigation is data collection. The data that is available plays a major role in defining the rest of the criticality analysis. HSC has a number of sources for its asset data and the following were used to extract data for this investigation:

- TechnologyOne Enterprise Software
- ELPRO SCADA System
- ArcGIS GIS Mapping Software

- WaterCAD Software
- HSC Managers, supervisors and operators

Each of these sources provides valuable insight into HSC's water and sewerage assets and combined they will be used to verify that the data obtained is correct.

3.3.1: TechnologyOne

The TechnologyOne Enterprise Software is used by HSC for all of its purchasing, financial management, project management and asset management. The asset management section of the TechnologyOne software contains a large amount of information. The information collected in this system includes data like size, length, age, material and other asset attributes. TechnologyOne was the main source of asset data for this investigation and provided a majority if not all information required for each of the assets to be reviewed.

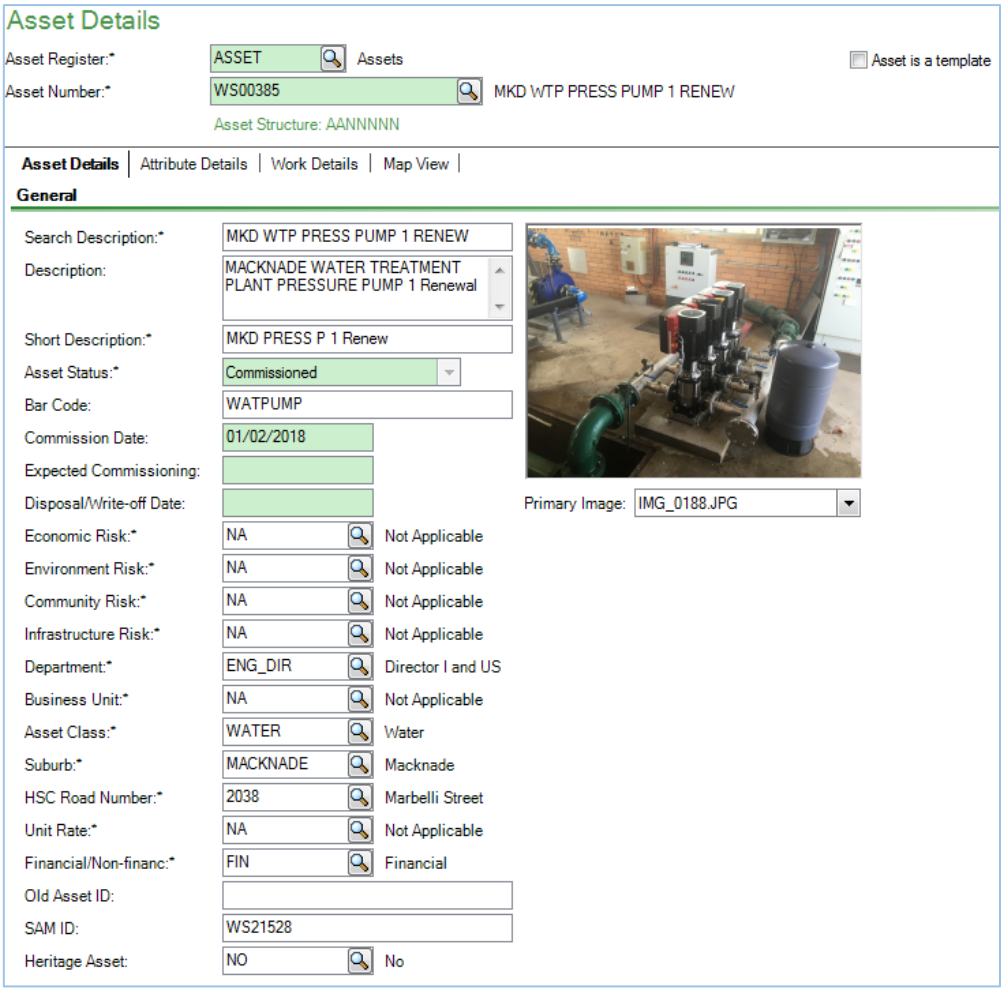


Figure 3.2: TechnologyOne Asset Register Display Example

3.3.2 ELPRO SCADA System

The ELPRO SCADA system is used by HSC to control and monitor a number of water and sewerage equipment. The system currently allows HSC officers and operators to remotely control pumps and other equipment without having to be on site. It also allows monitoring of a number of parameters

such as flow and volume. All of this data is transmitted via radios to HSC's telemetry servers and is then displayed via an interactive screen for operators. For this investigation SCADA systems was used to source data such as flows, volumes and running hours.

3.3.3 ArcGIS

Geographic information systems or GIS are powerful mapping tools used by Councils. HSC currently uses ArcGIS for its GIS mapping. ArcGIS is used by HSC to record and show large amounts of information as well as to create maps and locate assets. The main benefit of GIS, in regards to assets, is that you can see where within a treatment plant or network an asset is located. For this investigation ArcGIS was used to confirm data retrieved from TechnologyOne along with confirming where the asset is located.

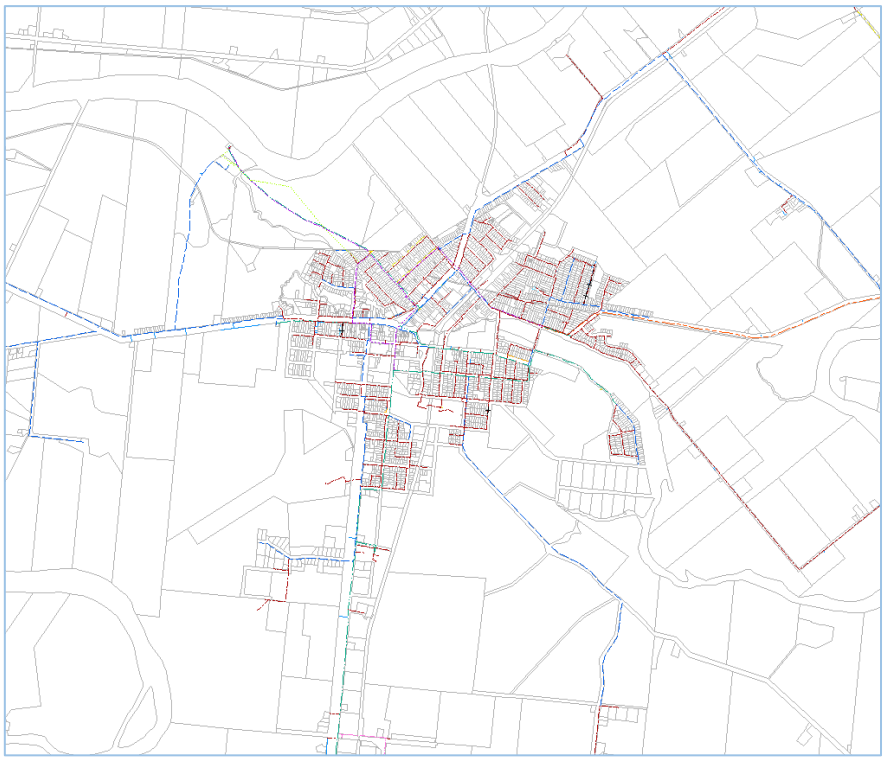


Figure 3.3: HSC ArcGIS Mapping Example

3.3.4 WaterCAD

WaterCAD is a modelling software that HSC uses for both its water and sewerage networks. The models allow HSC to check flows and pressures in pipelines and also allow HSC to model new pipelines to ensure that correct size main is being installed and that it will meet all statutory requirements like minimum pressure values and firefighting flows. For this investigation WaterCAD will be used to check how the failure of an asset would affect the remainder of the system as a whole. This would include if pumps were to fail and no standby pump is available or if a main is to failure how much of the entire water or sewerage system would this effect.

3.3.5 HSC Managers and Operators

The knowledge of HSC managers and operators is vital for the criticality analysis. Not only do these staff have a vast knowledge of HSC's water and sewerage assets due to their numerous years of installing, maintaining and replacing them, but their expertise will also be required when determining criticality factors and scoring in some instances.

3.4 Asset Data Review and Correction

Once the data that is going to be collected was determined and where the data was going to be collected from the data then needed to be reviewed to ensure this data was as correct as possible. While there is a high level of confidence in HSC's asset database, to ensure that the criticality analysis is as accurate as possible it is vital that the asset data is correct as possible. This means that all the assets that were part of the analysis were reviewed to see if any changes, corrections or additional information was required.

3.4.1 Asset Data Review

During the asset data review stage all the asset data was reviewed to ensure the data was correct and up to date. This involved reviewing all the data for each asset and comparing the information gathered from all the asset sources available. As these errors were identified they were noted for correction. Also, as a part of this step the asset data was also reviewed for areas where there was asset data missing. Again, these areas where asset data was lacking were noted for correction.

3.4.2 Asset Data Correction

As part of the review there was some data that needed to be corrected and this data was updated so that the correct information was used for this analysis. This incorrect data could include anything from asset sizes (i.e. length, diameter, etc), location and installation dates. These corrections were also filtered through all of HSC's asset sources to ensure that this data is correct going into the future.

3.4.3 Additional Data Collection

Throughout the data review there was also some asset data that was not available. This included assets that were installed but were not captured with HSC's asset system or where there were doubts about the information about the asset within the system. This required this data to be collected. A majority of this information could be found or confirmed by discussions with HSC managers and operators when the missing information was identified. There were some instances though where field work was required to confirm asset data. This field work generally required going on site to confirm information or getting HSC water and sewerage team members to confirm details in areas that were not easily accessible or where specific training was required to enter the area or carry out the works.

3.4.3 Merge Data

Once the initial asset data that was corrected and the additional data required were all collected the two data sets were merged to form one final data set that was used to carry out the criticality analysis.

This included adding the additional unknown data to the existing asset, correct data on the existing asset or creating an entirely new asset all together.

3.5 Criticality Analysis

The criticality analysis being carried out as part of this investigation is partly a quantitative criticality analysis and partly quantitative analysis. This means that this analysis will have some parts that are data driven to get the final criticality score and some parts that are based purely on the knowledge and experience of HSC's managers and operators. This means that both of these approaches will be used when determining a severity score for different criticality factors.

Criticality factors and severity scoring are vital to carrying out a successful criticality analysis. The criticality factors are what each asset will be reviewed against while the severity scoring for each criticality factor is the rating the asset will get based on the effects of that asset failing.

3.5.1 Severity Scoring

For this investigation a severity scoring structure needed to be constructed. This scoring system will be used to score assets based on the consequences of that asset failing. In constructing the severity scoring for this investigation a five point ranking system was selected based on HSC's risk management procedure. The severity scoring based on HSC's risk management procedure can be seen below in table 3.1.

Table 3.1: Severity Scoring Based on HSC Risk Management Procedure

Severity Score	Severity Score Description
1	Insignificant
2	Minor
3	Moderate
4	Major
5	Catastrophic

This scoring alone didn't allow for the criticality analysis to be carried out. Criticality factors were needed to finalise the analysis.

3.5.2 Criticality Factors

The other aspect required to carry out the criticality analysis are criticality factors. Criticality factors, are used as the basis for how assets will be reviewed. For example, the remaining life criticality factor will be used to review the remaining asset life of the selected. While the total age criticality factor will be used to review the total age of the asset from installation to the current date. Both of these criticality factors look at the age of the asset however they each review them in a different way. The criticality factors and a brief description of each of them can be seen in Table 3.2

Table 3.2:Analysis Criticality Factors with description

Criticality Factors	Description
Asset Age	
Remaining Life	Remaining effective asset life of the asset.
Total Age	Total age of asset from date of initial installation to now.
System Criticality	
Failure Effect on System	Effect on the entire system if the asset were to fail.
Redundancy	Redundancy of the asset (i.e is a duty/standby setup available, are spares available, etc).
Service Delivery	
Locality	Locality on the shire based on HSC classification of the area.
Customer	Customers being directly serviced by the asset.
Financial	
Replacement Cost	Cost to replace the asset based on either an estimated direct replacement cost or an estimated replacement cost per meter for pipelines.
Repair Time	Estimated time to repair the asset.

These factors above were selected based on criteria that was both important to HSC and are measurable. Information for each of the above criticality factors can be obtained either from HSC data sources or by conducting discussions with Council staff. These factors were also chosen as they are high priorities for Council. Asset age is vital to HSC as it is currently one of the key pieces of data used when making maintenance and replacement decisions. System Criticality was included in this investigation as water and sewerage are vital services to the community and the failure of these assets can cause major issues for the community. Service Delivery was included it is currently an aim of Council to ensure it provides as high a level of service to the community as possible. Finally, financial was selected like most organisations the financial costs of replacing and repair its assets are vital to Council. There are also a large number of other factors that could have been included in this investigation but they were either viewed as not important to Council or were not easily measurable with the data and information available to Council.

Once the criticality factors are determined they then need to be merged with severity scoring to determine a way to score the asset based on the review of the criticality factors. To follow on from the previous example for remaining life, if an asset is found to have a remaining life of greater than 80% of the total asset life then it will get a severity score of 1 where if that same asset were to have less than 20% of the total asset life remaining then it would score a rating of 5. This is based on the belief that an older asset is more likely to fail than a newer asset, therefore the older asset gets a more sever score. The severity scoring guidelines for each of the criticality factors can be seen in Tables 3.3, 3.4, 3.5 and 3.6.

Table 3.3: Asset Age Factors and Severity Scoring Guidelines

Asset Age			
Remaining Life		**Total Age**	
Score	**Criteria**	**Score**	**Criteria**
5	<20% Total Asset Life	5	>80% Total Asset Life
4	20% - 40% Total Asset Life	4	60% - 80% Total Asset Life
3	40% - 60% Total Asset Life	3	40% - 60% Total Asset Life
2	60% - 80% Total Asset Life	2	20% - 40% Total Asset Life
1	>80% Total Asset Life	1	<20% Total Asset Life

Table 3.4: System Criticality Factors and Severity Scoring Guidelines

System Criticality			
Failure Effect on System		**Redundancy**	
Score	**Criteria**	**Score**	**Criteria**
5	Failure of entire system	5	No Redundancy available
4	Failure causes major outages in the System	4	No Redundancy available but functions not effected
3	Failure cause minor outages in the system	3	Spares Available for immediate replacement
2	Failure effects other assets but no major effect to the System	2	Alternate Source/Asset Available
1	No Effect to the System/Failure Only Effects Asset	1	Standby Asset Available

Table 3.5: Service Delivery Factors and Severity Scoring Guidelines

Service Delivery			
Locality		**Customer**	
Score	**Criteria**	**Score**	**Criteria**
5	CBD	5	Critical Customer
4	Urban	4	Commercial
3	Residential	3	Industrial
2	Rural Residential	2	Residential
1	Rural	1	Community

Table 3.6: Financial Factors and Severity Scoring Guidelines

Financial			
Replacement Cost		**Repair Time**	
Score	**Criteria**	**Score**	**Criteria**
5	>$250,000	5	> 14 Days
4	$100,000 - $250,000	4	7 Days – 14 Days
3	$25,000 - $100,000	3	3 Days – 7 Days
2	$5,000 - $25,000	2	1 Day – 3 Days
1	<$5,000	1	< 1 Day

These factors have been decided on based on discussions with HSC's Utilities Manager. These factors and severity scoring guidelines have been reviewed by Council's Utilities staff prior to this investigation being conducting. After reviewing the above information Council staff were happy to proceed with the selected scoring and factors.

These scores will be awarded to each asset via one of two different methods. The first and preferred method is via data collected for each asset from the number of data sources outline in section 3.3. Examples of this would include using the Remaining Life of the asset that is located within Council's TechnologyOne asset database or the Locality of the asset which can be sourced from Council's ArcGIS software. The second method of awarding a severity score is via the experience and knowledge of Council's Utilities Services employees. A number of these employees have vast knowledge and experience with Council's water and sewerage assets and are the perfect candidates for supply information like the Repair Time for these assets or the Failure Effect on the System of these assets.

Criticality Factor	Severity Score	Severity Guideline	Guidelines for Scoring
Asset Age			
Remaining Life	1 2 3 4 5	<20% Total Asset Life 20% - 40% Total Asset Life 40% - 60% Total Asset Life 60% - 80% Total Asset Life >80% Total Asset Life	Where possible use remaining life data within TechnologyOne asset database.
Total Age	1 2 3 4 5	>80% Total Asset Life 60% - 80% Total Asset Life 40% - 60% Total Asset Life 20% - 40% Total Asset Life <20% Total Asset Life	Where possible use total age data within TechnologyOne asset database and compare against HSC asset lives.
System Criticality			
Failure Effect on System	1 2 3 4 5	Failure of entire system Failure causes major outages in the System Failure cause minor outages in the system Failure effects other assets but no major effect to the System No Effect to the System/Failure Only Effects Asset	Where possible use hydraulic models to simulate asset failure. Where this is not possible use SCADA to review process to determine failure effect.
Redundancy	1 2 3 4 5	No Redundancy available No Redundancy available but functions not effected Spares Available for immediate replacement Alternate Source/Asset Available Standby Asset Available	Where possible use hydraulic models to simulate asset failure.

Criticality Factor	Severity Score	Severity Guideline	Guidelines for Scoring
Service Delivery			
Locality	1 2 3 4 5	CBD Urban Residential Rural Residential Rural	Where possible use GIS to confirm locations based on location. For assets that are located over multiple localities use locality the contains a greater proportion of the asset.
Customer	1 2 3 4 5	Critical Customer Commercial Industrial Residential Community	Where possible use GIS to determine the highest classification of customer that is directly serviced by the asset. In the instance of WTP, WPS and STP determine the highest classification of customer that they will provide a service to.
Financial			
Replacement Cost	1 2 3 4 5	>$250,000 $100,000 - $250,000 $25,000 - $100,000 $5,000 - $25,000 <$5,000	Where possible use replacement cost data within TechnologyOne asset database.
Repair Time	1 2 3 4 5	> 14 Days 7 Days – 14 Days 3 Days – 7 Days 1 Day – 3 Days < 1 Day	Use location, asset type/size and HSC knowledge to estimate the possible repair time.

3.6 Criticality Factor Weightings

While the criticality factors and the severity scoring will provide a good base, some criticality factors have more importance that other factors. This is where the criticality factor weighting will become involved. Under each criticality category the factors will be weighted on how important they are HSC. This will put more importance on some factors within a category over others. A spilt for this investigation can be seen below in figure 3.4.

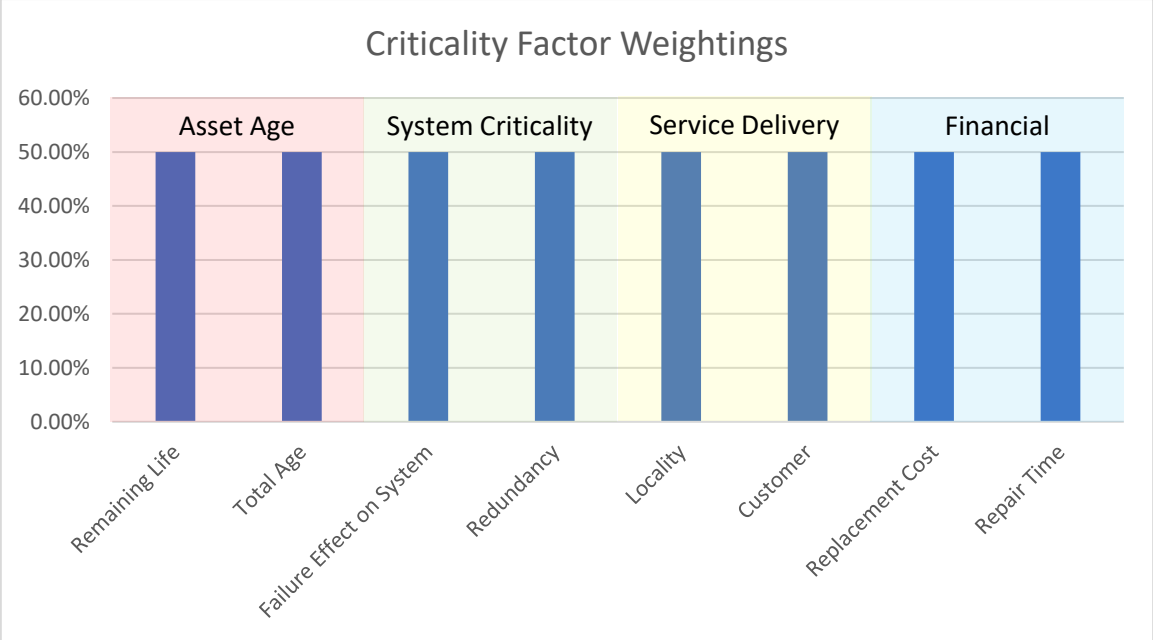


Figure 3.4: Criticality Factor Weightings

These weightings allow for a final severity score for each of the categories to be calculated based on the severity score for each of the criticality factors. This is done by multiplying the severity score for each of the criticality factors with the weighting for that particular criticality factor. The criticality factors that made up each of the consequence categories were then added together to determine the overall severity each of the specific consequence categories. This final severity score for each category is determined by equation 3.1 below:

$$SS_{CC} = \sum_{x=1}^{n} SS_{CF} \times Weighting \tag{3.1}$$

Where: $SS = Severity\ Score$

$CC = Consequence\ Category$

$CF = Criticality\ Factor$

and $1 \ldots n\ is\ the\ criticality\ factor\ number$

3.7 Final Criticality Rating

The final criticality rating is determined based on the severity scores for each of the above criticality factors above. There are a number of different ways to determine the final criticality rating for an asset. One of the most common approaches for calculating the final criticality rating is by multiplying the severity scores together to get the final criticality rating. UpKeep provides an example where they discuss that to show an asset's level of criticality, the ratings given for both seriousness and frequency of a given failure mode would be multiplied together (UpKeep, 2019). After reviewing all the available information, it was decided that the multiplication method would be used for this investigation. This was chosen as it was believed that it would better show the results with there being larger spacings between each of the final criticality scores rather than the relatively small differences that would be seen if the latter of the two options discussed above.

After the method to determine the final criticality score was selected, the final equation to determine the score was put together. The final score was determined based on equation 3.2 below:

$$CR = \prod_{x=1}^{n} SS_{CC} \quad (3.2)$$

Where: $CR = Final\ Criticality\ Rating\ of\ the\ Asset$
$SS = Severity\ Score$
$CC = Consequence\ Category$
and $1 \ldots n\ is\ the\ consequence\ catagory\ number$

This would provide a minimum criticality score of 1 and a maximum criticality score of 625. Based on this score a recommended asset criticality and preferred maintenance option for the asset was suggested. This asset criticality and maintenance suggestions can be seen in table 3.7.

Table 3.7: Summary of Criticality Rating and Recommended Asset Criticality and Maintenance Options

Final Criticality Rating	Asset Criticality	Comments
1 - 160	Non-Critical Asset	Run to failure
315 - 160	Semi Critical Asset	Preventative Maintenance
470 - 315	Critical Asset	Predictive Maintenance
625 - 470	Highly Critical Asset	Predictive Maintenance, Hold Critical Spares

3.8 Criticality Calculators

Criticality calculators will be built for the water, sewerage and other assets. The main purpose of these calculators is to automatically carry out as many calculations as possible when generating the final criticality score. This is due to the large number of assets in this investigation. To manually carry out each individual calculation for each asset would take a substantial amount of time. The calculators will also allow HSC to routinely update the criticality scoring based on future replacements, refurbishments or upgrades and receive an updated asset criticality rating.

To construct the calculators Microsoft Excel will be used. This was due to Excel's flexibility as software and due to how common the software is throughout not just Local Government but the world as a whole. Excel documents can also be easily integrated back into TechnologyOne in the future if required. This would be beneficial as TechnologyOne is the main asset database for HSC.

3.8.1 Water Calculators

The water criticality calculator was constructed to determine the final criticality rating for HSC's water assets. To do this, two separate excel spreadsheets were used. One of these spreadsheets was to do a majority of the work in regards to calculating the severity score for HSC's water pipeline assets. While, the second spreadsheet was used to calculate the severity score for the remainder of HSC's water assets and the final criticality ranking for all the water assets.

3.8.1.1 Water Pipeline Calculator

The water pipeline calculator was constructed to determine the severity scores for all of HSC's water pipeline. These severity scores were determined by using data from the TechnologyOne asset database, GIS data, WaterGEMs and HSC staff members. This data was used by the calculator in line with the severity scoring guidelines mentioned above in 3.5.2 to determine the final severity scoring for each criticality factor.

3.8.1.2 Water Criticality Calculator

The water criticality calculator was constructed to obtain the final criticality rating for all water assets. This final criticality rating was determined based on severity scores which were either obtained from the water pipeline calculator for the pipeline assets, automatically calculated based on the asset data or input directly by the user. Once the criticality ratings were determined for all the water assets, they were combined into one final sheet that would show the rankings of all water assets.

3.8.2 Sewerage Calculator

The sewerage criticality calculator was constructed in a very similar was to the water criticality calculator. Much like the water criticality calculator the sewerage calculator was split into two separate spreadsheets. One of these was again to determine the severity scores for each of the sewerage pipeline assets and another for determining the final criticality ranking for all sewerage assets.

3.8.2.1 Sewerage Pipeline Calculator

As mention above the sewerage pipeline calculator is very similar to the water pipeline calculator. This calculator was used to determine the severity scores for all of HSC's sewerage pipeline assets. These scores were again determined using data from the TechnologyOne asset database, GIS data, SewerCAD and HSC staff. This data was then used in line with the severity scoring guidelines to determine the final severity scores for each criticality factor.

3.8.2.2 Sewerage Criticality Calculator

Much like the water criticality calculator, the sewerage criticality calculator was constructed to obtain the final criticality rating for all sewerage assets. This final criticality rating was determined based on severity scores which were either obtained from the sewerage pipeline calculator for the pipeline assets, automatically calculated based on asset data or input directly by the user. Once the criticality ratings were determined for all the sewerage assets, they were combined into one final sheet that would show the rankings of all sewerage assets.

Chapter 4 Overview of Water and Sewerage Assets

4.1 Introduction

The main aim for this project is to create an asset prioritisation framework for HSC's water and sewerage assets. Due to time restraints a review of HSC's entire water and sewerage asset database was not possible, therefore, a number of assets had to be removed from the investigation. It was then decided that the analysis would be carried out on what HSC deemed its most important water and sewerage assets. For water this meant that assets such as hydrants, valves and connections were removed from the investigation, while for sewerage it meant that assets like valves and manholes were removed from the investigation. The assets that were included in this investigation for both water and sewerage will be discussed in paragraphs 4.2 and 4.3 below respectively.

4.2 Water Assets

HSC currently has over 9,000 water assets within its asset database. These assets range from reservoirs and mains to hydrant and valves. As mentioned above there were a number of assets that were removed from this investigation due to time and resource restraints. Due to this the assets used for this project were Council's WTPs, WPSs, water towers and water mains. A breakdown of these assets can be seen in Table 4.1 below:

Table 4.1: HSC Water Asset Groups and Sites

Asset Group	Asset Sites
WTP	Ingham Depot WTP
	Macknade WTP
	Forrest Beach WTP
WPS	Ingham Pumping Station
	Halifax Depot WPS
	Lucinda Booster Pump Station
	Washaway Booster Pump Station
	Trebonne Booster Pump Station
Water Towers	Ingham Water Tower
	Tokalon Water Tower
	Halifax Water Tower
	Forrest Beach Water Tower
Water Mains	Ingham Water Main Scheme
	Lower Herbert Water Main Scheme
	Forrest Beach Water Main Scheme

4.2.1 Ingham Depot Water Treatment Plant

The Ingham Depot WTP is the main source of potable water for a majority of the shire. The plant has the ability to supply water to or supplement the supply of water to the entire shire. This plant is a simple treatment plant that treats and stores water for public consumption. The treatment process is very simple and consists of aeration to increase pH, filtering through sand filters to remove any suspended solids and chlorination to remove any remaining microorganisms from the water. Following treatment, the water is then stored in a 3.8ML reservoir before being pumped into the reticulation system.

The Ingham Depot WTP currently consists of 20 different assets and these assets can be seen in Table 4.2 below:

Table 4.2: Ingham Depot WTP Assets

Asset Number	Asset Description
WS00151	DN 200 COMOM ROAD BORE PUMPS FLOW METER _ DEPOT WTP - 200mm
WS51255	INGHAM DEPOT WTP SWITCHBOARD
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2
WS51506	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 1
WS51507	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 2
WS51508	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT RECIRCULATING PUMP
WS52005	INGHAM DEPOT WATER TREATMENT PLANT TELEMETERY
WS52109	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR STRUCTURE
WS52110	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR BOTTOM LINER
WS52111	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR ROOF LINER
WS52112	DEPOT WATER TREATMENT PLANT CONCRETE MAZE RESERVOIR
WS52155	INGHAM DEPOT WATER TREATMENT PLANT AERATOR BUND
WS52160	INGHAM DEPOT WATER TREATMENT PLANT SAND FILTER BEDS
WS52175	INGHAM DEPOT WATER TREATMENT PLANT AERATOR;;Renewal
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WATER TREATMENT PLANT
WS52185	INGHAM DEPOT WATER TREATMENT PLANT CCTV SECURITY CAMERAS
WS53112	Sodium Hypo Chemical Controller - Depot WTP
WS53125	Sodium Hypochlorite Chemical Tank and Safety Shower - Ingham Depot Water Treatment Plant
WS75061	WATER DISTRBUTION PIPES - SAND FILTER INGHAM DEPOT WATER TREATMENT PLANT

Figure 4.1: Ingham Depot WTP

Figure 4.2: Ingham Depot WTP Aerator

Figure 4.3: Ingham Depot WTP Reservoir

4.2.2 Macknade Water Treatment Plant

The Macknade WTP is the main source of water for the Lower Herbert water scheme. This treatment plant treats water from a number of bores located near the plant for supply to the general public. The Macknade WTP has a very similar treatment process to the Ingham Depot WTP. Water is initially run through an aerator to increase the pH before going through a sand filter to remove any suspended solids and finally being treated with sodium hypochlorite to remove microorganisms. This water is

then stored in a number of takes before it is distributed into the reticulation system. The Macknade WTP currently consists of 39 assets that can be seen below in table 4.3.

Table 4.3: Macknade WTP Assets

Asset Number	Asset Description
WS00107	MACK WTP BORE INSTRUMENTS LEVEL & CONTRO
WS00183	GENERATOR _ MACKNADE WTP
WS00190	MACKNADE WTP HIGH LIFT PUMP 1 Renew
WS00191	MACKNADE WTP HIGH LIFT PUMP 2 Renew
WS00192	MACKNADE WTP HIGH LIFT PUMP 3 Renew
WS00204	CONCRET SIDE WALL FILTER BED MACK WTP
WS00385	MKD WTP PRESS PUMP 1 RENEW
WS00386	MKD WTP PRESS PUMP 2 RENEW
WS00387	MKD WTP PRESS PUMP 3 RENEW
WS00388	MKD WTP PRESS PUMP 4 RENEW
WS00389	MKD WTP PRESS PUMP SWITCHBOARD RENEW
WS00437	MACKNADE BORE 2 TELEMETERY RENEW
WS51276	MACKNADE WTP MAIN SWITCHBOARD
WS51278	MACKNADE WTP WELL 1 ELECTRICAL SERVICE
WS51279	MACKNADE BORE 2 SWITCHBOARD
WS51280	MACKNADE WTP WELL 3 ELECTRICAL SERVICE
WS51281	MACKNADE WTP WELL 4 ELECTRICAL SERVICE
WS51282	MACKNADE WTP WELL 5 ELECTRICAL SERVICE
WS51294	MACKNADE WTP BORE 2A ELECTRICAL SERVICE
WS51297	MACKNADE WTP BORE 3A S/BOARD & SUB BOARD
WS51532	MACKNADE WTP BORE PUMP 5
WS51538	MACKNADE WTP BORE 2A PUMP Renewal
WS51540	MACKNADE WTP BORE 2A & 3A PUMP Spare
WS52016	MACKNADE WTP TELEMETERY
WS52117	MACKNADE LOW LEVEL RESERVOIR 1
WS52118	MACKNADE LOW LEVEL RESERVOIR 2

WS52119	MACKNADE LOW LEVEL RESERVOIR 3
WS52120	MACKNADE HIGH LEVEL RESERVOIR 1
WS52121	MACKNADE HIGH LEVEL RESERVOIR 2
WS52140	MACKNADE WTP WELL 1 STRUCTURE
WS52143	MACKNADE WTP BORE 4 STRUCTURE
WS52144	MACKNADE WTP BORE 5 STRUCTURE
WS52162	MACKNADE WTP SAND FILTER BEDS
WS52165	MACKNADE WTP BORE 2A STRUCTURE Renewal
WS52166	MACKNADE WTP BORE 3A STRUCTURE Renewal
WS52169	MACKNADE WTP AERATOR renewal
WS53116	Chemical Controller - Macknade WTP
WS53126	Hypo Chem Tank & Safe Shower - MACK WTP
WS75060	DISTRIBUTION PIPES - FILTER MACKNADE WTP

Figure 4.4: Macknade WTP

4.2.3 Forrest Beach WTP

The Forrest Beach WTP is the main supplier of water to the Forrest Beach water scheme. This plant is again very similar to the other WTPs in that it receives a majority of its water from a number of bores in and surrounding the plant and also has a very similar treatment process. Like the other plants the water is initially put through an aerator to increase the pH but unlike the other plants the water then goes through a clarifier to remove some suspended solids before going through sand filters to remove any remaining solids before getting chlorinated to remove microorganisms. This water is then stored

in a 3ML reservoir before being distributed to the public. The Forrest Beach WTP currently consists of xx assets that can be seen below in table 4.4.

Table 4.4: Forrest Beach WTP Assets

Asset Number	Asset Description
WS00138	FORBCH WTP S/S AERATOR Renew
WS00139	F/BCH HIGH LIFT RES LADDER/HANDRAIL
WS00154	FBCH BORE FLOW METER _ BORE 4
WS00155	FBCH BORE FLOW METER _ BORE 6A
WS00156	FBCH BORE FLOW METER _ BORE 8
WS00157	FBCH BORE FLOW METER _ BORE 7
WS00200	FOR BCH WTP CLARIFIER SHADE COVER
WS00213	FOR BCH WPS HIGH LIFT PUMP 1 Renew
WS00214	FOR BCH WPS HIGH LIFT PUMP 2 Renew
WS00223	FORREST BEACH WTP BORE 6A STRUCTURE
WS00224	FORREST BEACH WTP BORE 8 STRUCTURE
WS00225	FORREST BCH BORE 4 ELECT SERVICE Renew
WS00226	FORREST BCH BORE 6A ELECT SERVICE Renew
WS00227	FORREST BCH BORE 7 ELECT SERVICE Renew
WS00228	FORREST BCH BORE 8 ELECT SERVICE
WS00230	FORREST BEACH WTP BORE PUMP 6A
WS00231	FORREST BEACH WTP BORE PUMP 8
WS00232	FORREST BEACH WTP BORE PUMP 6A & 8
WS00255	FORBCH WTP AERATOR BUND Renew
WS00337	FBCH WTP TRANSFER PUMP 1 RENEWAL
WS00340	FBCH WTP TRANSFER PUMP 2 RENEWAL
WS00409	FBCH WTP SINGLE ACCESS LID * 4
WS51262	FORREST BEACH HIGH LIFT STN SWITCHBOARD
WS51263	FORREST BEACH HIGH LIFT SOFT STARTER 1
WS51264	FORREST BEACH HIGH LIFT SOFT STARTER 2
WS51265	FORREST BEACH WTP SWITCHBOARD

WS51266	FORREST BCH WELL 4 ELECTRICAL SERVICE
WS51267	FORREST BCH WELL 1,2&3 POWER CABLES
WS51268	FORREST BCH WELL No.6 ELECTRICAL SERVICE
WS51269	FORREST BCH WELL No.7 ELECTRICAL SERVICE
WS51283	ELECTRICAL CABLE TRAYS - FORREST BEACH T
WS51306	FORREST BEACH WTP CHEMICAL SHED SUB SWIT
WS51511	FORREST BEACH WTP BORE PUMP 4
WS51512	FORREST BEACH WTP BORE PUMP 6
WS51513	FORREST BEACH WTP BORE PUMP 7
WS51514	FORREST BEACH WTP BORE PUMP 7 SPARE
WS51515	FORREST BEACH WPS HIGH LIFT PUMP 1
WS51516	FORREST BEACH WPS HIGH LIFT PUMP 2
WS52010	FORREST BEACH HIGH LIFT TELEMETERY
WS52124	FORREST BEACH WTP LOW LEVEL RESERVOIR
WS52125	FORREST BCH WPS 3.0Ml CONCRETE RESERVOIR
WS52126	FORREST BCH WPS 3.0Ml RESERVOIR EXT SEAL
WS52145	FORREST BEACH WTP WELL 1 STRUCTURE
WS52146	FORREST BEACH WTP WELL 2 STRUCTURE
WS52147	FORREST BEACH WTP WELL 3 STRUCTURE
WS52148	FORREST BEACH WTP BORE 4 STRUCTURE
WS52149	FORREST BEACH WTP BORE 6 STRUCTURE
WS52150	FORREST BEACH WTP BORE 7 STRUCTURE
WS52158	FORREST BEACH WTP SAND FILTER BEDS
WS52159	FORREST BEACH WTP CLARIFIER SUBSTRUCTURE
WS52173	FOR BCH HIGHLIFT RES ROOF FLASHING S/S
WS52177	FORREST BEACH WTP CLARIFIER BAFFLE WALLS
WS52178	FOR BCH WTP CLARIFIER INLET LAUNDER NTH
WS52179	FOR BCH WTP CLARIFIER INLET LAUNDER STH
WS52180	FOR BCH WTP CLARIFIER OUTLET LAUNDER NTH
WS52181	FOR BCH WTP CLARIFIER OUTLET LAUNDER STH

WS52182	FOR BCH WTP CLARIFIER HANDRAIL
WS52183	FOR BCH WTP CLARIFIER PENSTOCK 1
WS52184	FOR BCH WTP CLARIFIER PENSTOCK 2
WS53109	Pressure Monitors - Forrest Bch
WS53115	Chemical Controller - Forrest Bch WTP
WS53128	Hypo Chem Tank & Safe Shower- FORBCH WTP
WS53130	OUTLET FLOWMETER FOR BCH WPS
WS75058	DISTRIBUTION PIPES - FILTER FORR BCH WTP
WS75063	FOR BEACH WTP TELEMETERY - RENEWAL
WS75073	FORREST BEACH WPS RECIRCULATING PUMP
WS75074	FORREST BEACH WPS RECIR PUMP SHED
WS75075	FORREST BEACH WPS RECIR PUMP PLINTH
WS75076	CHEMICAL CONTROLLER1 - FORREST BEACH WPS
WS75077	CHEMICAL CONTROLLER2 - FORREST BEACH WPS
WS75078	TRANSFER PUMP FLOW METER _ FOR BCH WTP
WS75079	INLET FLOWMETER - FORBCH WPS FROM INGHAM
WS75080	GENERATOR _ FORREST BEACH WTP
WS75081	GENERATOR _ FORREST BEACH WPS
WS75082	ALTITUDE VALVE - FOR BCH WPS RES FILL
WS75083	ALTITUDE VALVE - FOR BCH WPS RES BYPASS
WS75085	FORREST BCH WPS PLC CONTROL SWITCHBOARD

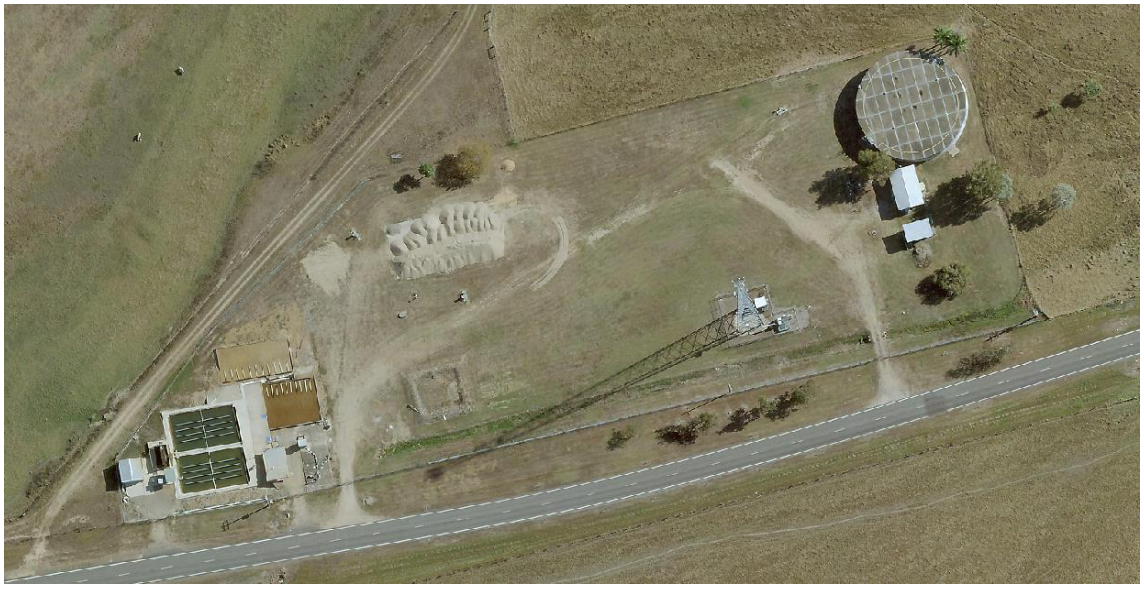


Figure 4.5: Forrest Beach WTP

4.2.4 Ingham Pumping Station

The Ingham Pumping Station was Shire's original source of water. The Ingham Pumping Station pulls water directly from the Herbert River through the river bed and has a very simple treatment process. The water is initially pulled through the river bed which is made of sand via a gallery to remove any solids in the water. The only other treatment process is chlorination to remove any microorganisms left in the water. The water is then stored in a 17.6ML reservoir before being pumped into the reticulation system. Use of this treatment plant varies through the year based on the turbidity of the water within the Herbert River. During periods of high rainfall, either within the Shire or further up in the catchment, the turbidity level of the water in the river can increase to a point where it is no longer suitable for consumption. During these times the Ingham Pumping Station no longer draws water from the river and is used as just a storage and distribution site with the large reservoir being filled at night when water consumption is low. The Ingham Pumping Station currently consists of 38 assets which can be seen in Table 4.5 below.

Table 4.5: Ingham Pumping Station Assets

Asset Number	Asset Description
WS00152	RIVER BORE FLOW METER _ BORE 1
WS00153	RIVER BORE FLOW METER _ BORE 2
WS00198	RIVER BORE 1 STRUCTURE
WS00199	RIVER BORE 2 STRUCTURE
WS00243	RIVER BORE PUMP 1
WS00244	RIVER BORE PUMP 1 Spare
WS00245	RIVER BORE PUMP 2
WS00246	RIVER BORE PUMP 2 Spare

WS00247	RIVER BORE 1 ELECTRICAL SERVICE
WS00248	RIVER BORE 2 ELECTRICAL SERVICE
WS00253	River Outlet Flowmeter Pit
WS00342	INGHAM WPS PIPE BRIDGE
WS51250	INGHAM RIVER HIGH LIFT STN SWITCHBOARD
WS51251	INGHAM RIVER HIGH LIFT SOFT STARTERS 1
WS51252	INGHAM RIVER HIGH LIFT SOFT STARTERS 2
WS51253	INGHAM RIVER HIGH LIFT SOFT STARTERS 3
WS51254	INGHAM RIVER LOW LIFT STN SWITCHBOARD
WS51299	INGHAM L/LIFTSTN BORE HOLE 1 STRUC RENEW
WS51300	INGHAM L/LIFTSTN BORE HOLE 2 STRUC RENEW
WS51301	INGHAM L/LIFTSTN TEST BORE 3 STRUC RENEW
WS51302	INGHAM L/LIFTSTN OBSERVATION BORE4 STRUC
WS51303	INGHAM L/LIFTSTN OBSERVATION HOLE5 STRUC
WS51500	INGHAM HIGH LIFT WPS PUMP 1
WS51501	INGHAM HIGH LIFT WPS PUMP 2
WS51502	INGHAM HIGH LIFT WPS PUMP 3
WS51503	INGHAM HIGH LIFT WPS RECIRCULATING
WS51504	INGHAM LOW LIFT WPS PUMP 1
WS51505	INGHAM LOW LIFT WPS PUMP 2
WS52006	INGHAM HIGH LIFT WPS TELEMETERY
WS52107	INGHAM HIGH LIFT 17.6Ml RESERVOIR
WS52108	INGHAM HIGH LIFT 17.6Ml RESERVOIR ROOF
WS52163	INGHAM LOW LIFT STATION GALLERY
WS52164	INGHAM LOW LIFT STATION FOOT VALVE WELL
WS52186	INGHAM RIVER PUMP STATION CCTV
WS53111	Chemical Controller - Ingham WPS
WS53129	OUTLET FLOWMETER INGHAM RIVER WPS
WS53132	Hypo Chem Tank & Safe Shower - ING RIVER
WS53135	INLET FLOWMETER INGHAM RIVER WPS

Figure 4.6: Ingham Pumping Station

Figure 4.7: Ingham Pumping Station Reservoir

4.2.5 Halifax Depot Water Pumping Station

The Halifax Depot Water Pumping Station is a large reservoir that helps supply water to the Lower Herbert Water Scheme. Due to the Halifax Depot Water Pumping Station being able to store a substantial amount of water the station also has a small chlorination and recirculation system to minimise chlorine degradation. Currently the Halifax Depot Water Pumping Station consists of 9 assets that can be seen in Table 4.6 below.

Table 4.6: Halifax Depot Water Pumping Station Assets

Asset Number	Asset Description
WS51261	HALIFAX DEPOT SWITCHBOARDS
WS51521	HALIFAX DEPOT WPS HIGH LIFT PUMP 1
WS51522	HALIFAX DEPOT WPS HIGH LIFT PUMP 2
WS51523	HALIFAX DEPOT WPS RECIRCULATING PUMP
WS52012	HALIFAX DEPOT WPS TELEMETERY
WS52113	HALIFAX DEPOT WPS RESERVOIR STRUCTURE
WS52114	HALIFAX DEPOT WPS RESERVOIR BOTTOM LINER
WS53114	Chemical Controller - Halifax Depot
WS53124	Hypo Chem Tank & Safe Shower - HAL DEPOT

4.2.6 Booster Pump Stations

HSC also has three booster pump stations located throughout the shire. These are the Lucinda Booster Pump Station, Washaway Booster Pump Station and Trebonne Booster Pump Station. These stations are used to pump water do areas of the shire that water would not be able to get to under the normal pressure within the reticulation system. These stations generally consist of some form of storage for water and a pressure pump which is used to deliver water into the system. Between the three booster pump locations there are 30 assets. These assets can be seen in Table 4.7, 4.8 and 4.9 below.

Table 4.7: Lucinda Booster Pump Station Assets

Asset Number	Asset Description
WS00256	LUCINDA BPS 3ML RESERVOIR ROOF
WS00257	LUCINDA BPS 3ML RESERVOIR DIVER PLATFORM
WS00266	LUCINDA BPS RECIRCULATING PUMP
WS00267	Dungeness Rd 150mm Recirc Main
WS00369	LUCINDA BPS FLOW METER
WS00609	LUCINDA BPS PRESSURE PUMP S/BOARD Renew
WS00610	LUCINDA BPS PRESSURE PUMP 1 Renew
WS00611	LUCINDA BPS PRESSURE PUMP 2 Renew
WS00612	LUCINDA BPS PRESSURE PUMP 3 Renew
WS00613	LUCINDA BPS PRESSURE PUMP 4 Renew
WS52116	LUCINDA BPS 3ML RESERVOIR SUB STRUCTURE
WS75065	LUCINDA WPS TELEMETERY - RENEWAL

Table 4.8: Washaway Booster Pump Station Assets

Asset Number	Asset Description
WS00368	WASHAWAY BPS FLOW METER
WS00372	WASHAWAY PRESS PUMP 1 RENEW
WS00373	WASHAWAY PRESS PUMP 2 RENEW
WS00374	WASHAWAY PRESS PUMP 3 RENEW
WS00375	WASHAWAY PRESS PUMP 4 RENEW
WS00376	WASHAWAY BPS PRESS PMP S/BOARD RENEW
WS52122	WASHAWAY BPS LOW LEVEL RESERVOIR 1

WS52123	WASHAWAY BPS LOW LEVEL RESERVOIR 2
WS75064	WASHAWAY WPS TELEMETERY - RENEWAL

Table 4.9: Trebonne Booster Pump Station Assets

Asset Number	Asset Description
WS00370	TREBONNE BPS FLOW METER
WS00371	TREBONNE BPS Flowmeter Pit
WS51258	TREBONNE BPS SWITCHBOARD
WS51534	TREBONNE PRESSURE PUMP 1
WS51535	TREBONNE PRESSURE PUMP 2
WS51536	TREBONNE PRESSURE PUMP 3
WS51537	TREBONNE PRESSURE PUMP 4
WS52007	TREBONNE WPS TELEMETERY
WS52128	TREBONNE WPS LOW LEVEL STORAGE RESERVOIR

4.2.7 Water Towers

HSC has 4 water towers located throughout the shire. These water towers are the Ingham Water Tower, Tokalon Water Tower, Halifax Water Tower and Forrest Beach Water Tower. All of these towers have two benefits to the system. The first of these benefits is being a water storage structure located throughout the shire but they also have the secondary benefit of introducing extra pressure into the reticulation system as the water is delivered via gravity. Currently the four towers consist of 20 assets which can be seen in table 4.10 below.

Table 4.10: Water Tower Assets

Asset Number	Asset Description
WS51284	ELECTRICAL CABLE TRAYS - HALIFAX TOWER
WS51285	FORREST BEACH WATER TOWER SWITCHBOARD
WS51286	FORREST BCH WATER TOWER ELECTRICAL CABLE
WS51287	HALIFAX WATER TOWER SWITCHBOARD
WS51288	HALIFAX WATER TOWER ELECTRICAL CABLE
WS51289	TOOBANNA WATER TOWER SWITCHBOARD
WS51290	INGHAM WATER TOWER SWITCHBOARD

WS52101	INGHAM WATER TOWER STRUCTURE
WS52102	INGHAM WATER TOWER LINING
WS52103	FORREST BEACH WATER TOWER STRUCTURE
WS52104	HALIFAX WATER TOWER STRUCTURE
WS52105	TOKALON WATER TOWER STRUCTURE
WS52106	TOKALON WATER TOWER EXTERNAL REFURBISH
WS52170	HALIFAX WATER TOWER LINING
WS52171	FORBCH WATER TOWER LINING
WS75066	INGHAM TOWER TELEMETERY - RENEWAL
WS75067	HALIFAX TOWER TELEMETERY - RENEWAL
WS75068	FORREST BEACH TOWER TELEMETERY - RENEWAL
WS75069	TOKALON TOWER TELEMETERY - RENEWAL
WS75084	ALTITUDE VALVE - FOR BCH WATER TOWER

Figure 4.8: Tokalon Water Tower

4.2.8 Ingham Water Scheme

The Ingham Water Scheme is the water main scheme in the Shire. This scheme includes the suburbs of Ingham, Trebonne, Toobanna, Blackrock, Victoria Plantation…… The scheme includes approximately 752 water mains that deliver the potable water to the above-mentioned suburbs. Some pipes within this scheme are dated back to as old as 1939. In Figure 4.9 below the extent of the scheme can be seen along with the mains within the scheme.

Figure 4.9: Ingham Water Scheme

4.2.9 Lower Herbert Water Scheme

The Lower Herbert Water Scheme is the second largest water scheme in the shire. This scheme includes the suburbs of Halifax, Macknade, Bemerside, Cordelia, Taylors Beach and Lucinda. This scheme consists of approximately 183 water mains that deliver potable water to the above suburbs. This scheme contains pipes that were installed as early as 1975. Figure 4.10 below shows the extent of the scheme along with that mains that make up the scheme.

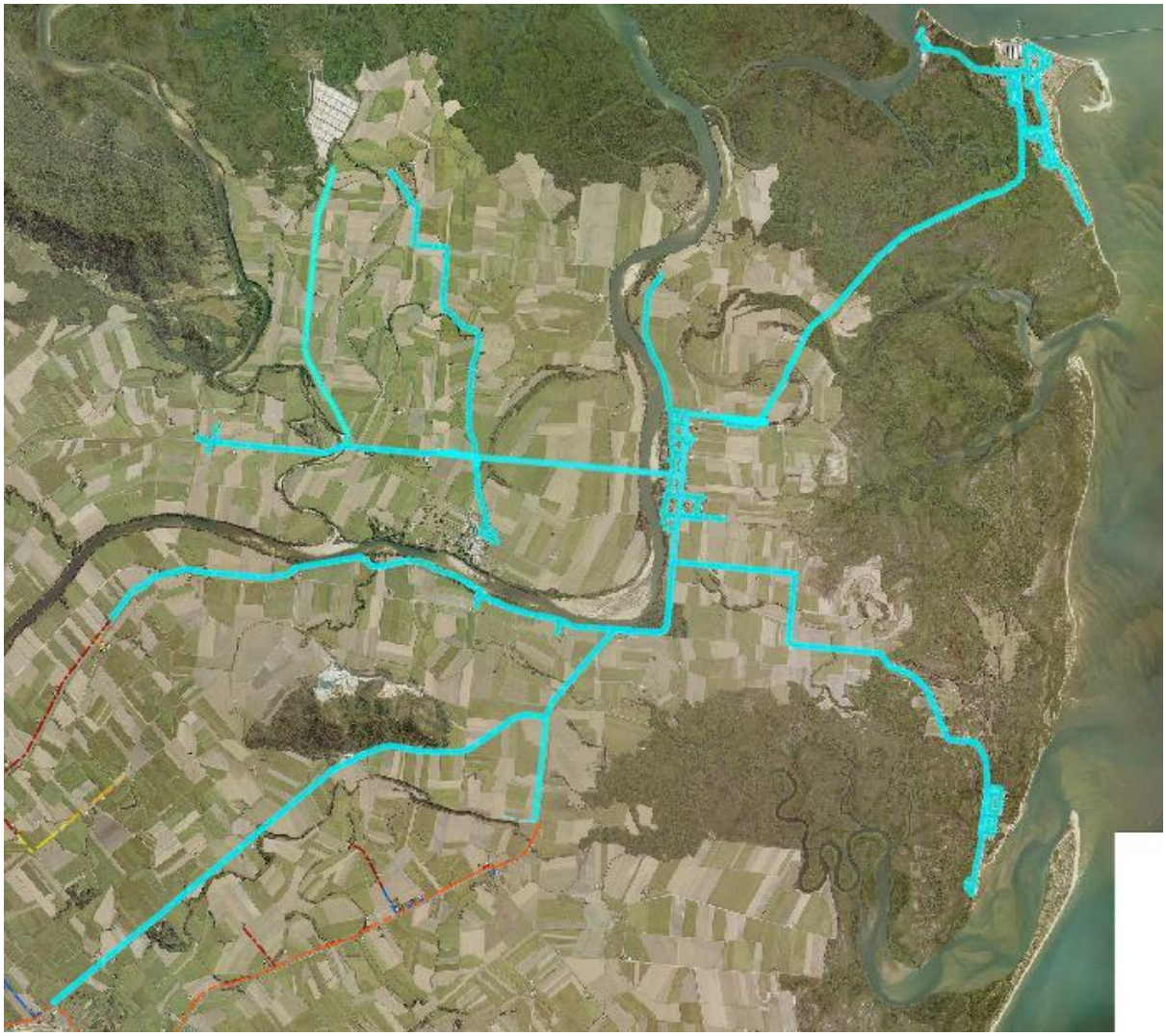


Figure 4.10: Lower Herbert Water Scheme

4.2.10 Forrest Beach Water Scheme

The Forrest Beach Water Scheme is the smallest of the water schemes in the shire. This scheme supplies water to Forrest Beach. This scheme consists of approximately 207 water mains that deliver potable water to the residents of Forrest Beach. Like with the Lower Herbert Water Scheme, this scheme contains pipes that were installed as early as 1975. Figues 4.11 below shows the extend of the scheme along with the mains that make up the scheme.

Figure 4.11: Forrest Beach Water Scheme

4.3 Sewerage Assets

HSC also currently has over 2,500 sewerage assets within its asset database. These assets currently range from STPs and their components to SPSs and sewerage mains. As already mentioned, a number of assets were removed from this investigation due to a number of restraints. Therefore, this investigation will be looking at the STPs and its sewerage main networks. A breakdown of the sewerage assets looked at in this investigation can be seen in Table 4.11 below:

Table 4.11: HSC Sewerage Asset Groups and Sites

Asset Group	Asset Sites
STP	Ingham STP
	Lucinda STP
Sewerage Mains	Ingham Sewerage Scheme Gravity Mains
	Ingham Sewerage Scheme Rising Mains
	Lucinda Sewerage Scheme Gravity Mains
	Lucinda Sewerage Scheme Rising Mains

4.3.1 Ingham Sewerage Treatment Plant

The Ingham Sewerage Treatment Plant was the Shire's first STP. It treats wastewater from Ingham and the surrounding areas ensuring it is acceptable to be released back into the environment. The plant

treats sewerage via the following process. Initially it is passed through a mechanical screen to remove some solids, after this it is run through 2 clarifiers which allow further solids are removed as sludge. The sewerage is then run through a trickling filter which spreads the sewerage over a media which is covered in a biological film to try and remove organic matter from it. There are instances where this film is wash off the media, so the water is them run through a humus tank to remove the particles of this film, also known as humus sludge, from the treated water. Finally, the treated water is then dosed with sodium hypochlorite and run through a contact tank to further disinfect it before it is pumped to the Hinchinbrook Community Wetlands. released back into t The Ingham STP currently consists of 54 assets which can be seen in Table 4.12 below.

Table 4.12: Ingham STP Assets

Asset Number	Asset Description
WS00171	ISTP Claridigestor 2 Handrails Renewal
WS00172	ISTP Claridigestor 2 Sidedoor Renewal
WS00173	ISTP Claridigestor 2 Electrical Renewal
WS00201	ISTP CCTV
WS00202	ISTP AUTOMATIC VEHICLE GATE
WS00203	ISTP CARD ACCESS AND ALARM SYSTEM
WS00307	ISTP GRIT CHAMBER Handrails
WS00308	ISTP Handrails and Stairs
WS00412	ISTP - Washdown Pump
WS00417	ISTP Contact Tank Handrails RENEW
WS00418	ISTP HUMUS TANK INLET BOX HANDRAILS
WS00438	ISTP TELEMETERY
WS00439	ISTP - Main Switchboard RENEW
WS00443	ISTP Filter Distribution Arms RENEW
WS00444	ISTP Filter Distribution Well
WS00445	ISTP Trickling Filter Access Stairs
WS40054	ISTP - Conatct Tank Switchboard
WS40769	ISTP - Recirculaing Pump
WS40770	ISTP - Sludge Pump
WS40771	ISTP - Wetlands Pump No.1
WS40772	ISTP - Wetlands Pump No.2
WS41831	ISTP Grit Chamber

WS41832	ISTP Mechanical Screen
WS41833	ISTP Inlet Structure
WS41834	ISTP Claridigestor 1 Structure
WS41835	ISTP Claridigestor 1 Walkway
WS41836	ISTP Claridigestor 1 Gearbox and Stirrer
WS41840	ISTP Claridigestor 2 Structure
WS41841	ISTP Claridigestor 2 Walkway
WS41842	ISTP Claridigestor 2 Gearbox and Stirrer
WS41846	ISTP Trickling Filter Structure
WS41847	ISTP Trickling Filter Bearing
WS41848	ISTP Trickling Filter Distribution Arms
WS41849	ISTP Trickling Filter Struct Rehab
WS41850	ISTP Sludge Pump Well
WS41851	ISTP Humus Tank Structure
WS41853	ISTP Humus Tank Gearbox and Stirrer
WS41856	ISTP Contact Tank Structure
WS41858	ISTP Contact Tank Coating System
WS41859	ISTP Sludge Beds Structure
WS41860	ISTP Sludge Beds Race
WS41861	ISTP STORMWATER PIPE
WS41862	ISTP Outfall
WS41876	ISTP HUMUS TANK ELECTRICAL RENEWAL
WS41877	ISTP HUMUS TANK WALKWAY RENEWAL
WS41878	ISTP HUMUS TANK HANDRAILS RENEWAL
WS41879	ISTP Claridigestor 1 Handrails Renewal
WS41880	ISTP Claridigestor 1 Sidedoor Renewal
WS41881	ISTP Claridigestor 1 Electrical Renewal
WS41882	ISTP Claridigestor 1 & 2 Access Stairs
WS51004	ISTP Generator 40KVA
WS51010	ISTP INLET FLOWMETER

WS52020	TELEMETRY pH & DO Anaylser ISTP
WS53133	Hypo Chem Tank & Safe Shower - ING STP

Figure 4.12: Ingham Sewerage Treatment Plant

4.3.2 Lucinda Sewerage Treatment Plant

The Lucinda STP is a small treatment plant that treats wastewater from a small area of Lucinda. It is a very small treatment plant and has a very simple treatment process. The wastewater is initially run through an aerator tank where blowers are used to aerate the water and help separate the solids from the liquid. The effluent is then run into a settling tank to allow the solids settle away from the liquid. The sludge is then moved to the drying beds and allowed to dry before being removed and the treated liquid effluent is used to irrigate the area surrounding the plant. The Lucinda STP currently has 22 assets that can be seen below in Table 4.13.

Table 4.13: Lucinda STP Assets

Asset Number	Asset Description
WS00146	LSTP FLOW METER _ IRRIGATION LINE
WS00147	LSTP FLOW METER _ OCEAN LINE
WS35121	LSTP Rising Main
WS40007	LSTP - Switchboard
WS40008	LSTP TELEMETRY UNIT
WS40009	LSTP PLC SWITCHBOARD
WS40773	LSTP - Blower No.1
WS40774	LSTP - Blower No.2
WS40775	LSTP - Blower No.3
WS41863	LSTP Inlet Structure
WS41864	LSTP Aeration Tank 1
WS41865	LSTP Aeration Tank 2
WS41866	LSTP Blower Air Lines
WS41867	LSTP Walkways
WS41868	LSTP Settling Tank
WS41869	LSTP Handrails
WS41871	LSTP Sprinkler Tank
WS41872	LSTP - Sump Pump Tank
WS41873	LSTP CONTACT TANK POLYTHENE
WS41883	LSTP Sludge Drying Beds
WS41884	LSTP pH Sensors
WS53134	Hypo Chem Tank & Safe Shower - LUC STP
WS00146	LSTP FLOW METER _ IRRIGATION LINE
WS00147	LSTP FLOW METER _ OCEAN LINE
WS35121	LSTP Rising Main

Figure 4.13: Lucinda Sewerage Treatment Plant

4.3.3 Ingham Sewerage Scheme

The Ingham sewerage scheme is the larger of the two sewerage schemes in the shire. The Ingham sewerage scheme consists of a combination of pressure/rising mains and gravity mains. The scheme has over twenty sewerage rising mains and over 1,000 gravity sewerage mains that collect and transport sewerage from the residents of Ingham, Blackrock and Trebonne. Some of these mains were installed as early as the 1960s. Figure 4.14 below shows the extents of the schemes and the pipelines that make up the scheme.

Figure 4.14: Ingham Sewerage Scheme

4.3.4 Lucinda Sewerage Scheme

The Lucinda sewerage scheme is the smaller of the two sewerage schemes in the shire. The Lucinda sewerage scheme again consists of a combination of pressure/rising mains and gravity mains. This scheme has seven sewerage rising mains and 43 gravity sewerage mains the collect and transport sewerage from a small section of Lucinda. Some of these mains can be dated back as early as the 1970s. Figure 4.15 below shows the extents of the schemes and the pipelines that make up the scheme.

Figure 4.15: Lucinda Sewerage Scheme

4.4 Summary

This chapter has provided a summary of the assets that were used as a part of the criticality analysis in this investigation. As can be seen there is a very wide and diverse range of assets that have been used for this investigation. These assets will be used to test out the criticality calculator to ensure that they work as expected.

Chapter 5 Carrying out the Criticality Analysis

5.1 Introduction

The main aspect of this investigation is the criticality analysis. The analysis will allow a criticality rating to be given to the assets discussed in chapter 4 above. The rating will be determined by using the parameters set in chapter 3 with the above-mentioned assets. The process to determine the criticality rating for each asset can be seen below in Figure 5.1:

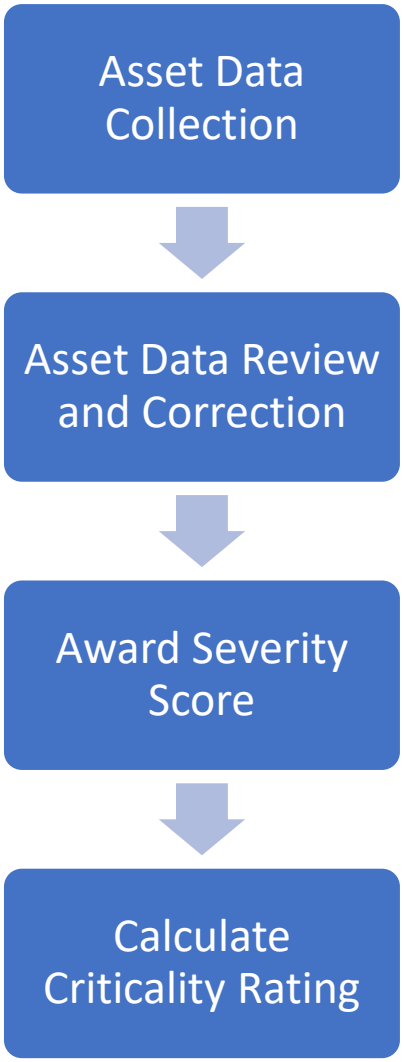


Figure 5.1: Flow Chart for the Criticality Analysis Process

Each of the above steps will be discussed in further detail in this chapter

5.2 Process to Carry out the Criticality Analysis

The following is a detailed description on each of the above steps required to carry out the criticality analysis.

5.2.1 Asset Data Collection

The initial stage in this investigation required the collection the asset data that was to be used. This data was collected from a number of sources such as TechnologyOne, ArcGIS, WaterCAD, SCADA and WaterCAD/SewerCAD. The data that was collected based on the criticality factors determined above in section 3.5. Where the data was sourced is as follows:

- The financial data and asset age information required was collected from the TechnologyOne asset database.
- Repair time was sourced from HSC Staff
- Locational data was collected from ArcGIS system.
- customer data required was also collected from ArcGIS along with HSC staff members.
- Failure effect information was collected from SCADA, WaterCAD and HSC staff member.
- Redundancy information was collected from SCADA and HSC staff members.

5.2.2 Asset Data Review and Correction

Once the data was collected it was reviewed to ensure it was correct. This meant initially conducting a desktop review to ensure the data was correct. This review included comparing data with alternate sources where possible (i.e. comparing redundancy information from SCADA and HSC staff members) to confirm that both have the same information. Where there were concerns in the data or data was missing then this data needed to be found. This missing or incorrect data needed to be sourced from a variety of different places. Some data required a site visit to see how the asset was actually constructed or built. This at times meant that excavation was required to access pipelines. In the case of pipelines which were buried and could not easily be accessed the data was sourced from as constructed plans. Finally, if the data could not be sourced by other means HSC staff members were consulted with to determine how the asset functioned, where it was located, who it serviced and other data.

Asset No	Asset Search Description	Asset Clas	Asset Class	Asset Category
Ingham Depot Water Treatment Plant				
WS00151	COMO RD BORES FLOW METER _ DEPOT WTP	WATER	Water Supply	Water Plant &
WS51255	INGHAM DEPOT WTP SWITCHBOARD	WATER	Electrical	Electrical
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1	WATER	Electrical	Electrical
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2	WATER	Electrical	Electrical
WS51506	INGHAM DEPOT WTP HIGH LIFT PUMP 1	WATER	Water Supply	Water Pump
WS51507	INGHAM DEPOT WTP HIGH LIFT PUMP 2	WATER	Water Supply	Water Pump
WS51508	INGHAM DEPOT HIGH LIFT RECIRCULAT PUMP	WATER	Water Supply	Water Pump
WS52005	INGHAM DEPOT WTP TELEMETERY	WATER	Electrical	Electrical
WS52109	DEPOT WTP 3.8MI RESERVOIR STRUCTURE	WATER	Water Supply	Water Reservoirs
WS52110	DEPOT WTP 3.8MI RESERVOIR BOTTOM LINER	WATER	Water Supply	Water Reservoirs
WS52111	DEPOT WTP 3.8MI RESERVOIR ROOF LINER	WATER	Water Supply	Water Reservoirs
WS52112	DEPOT WTP CONCRETE MAZE RESERVOIR	WATER	Water Supply	Water Reservoirs
WS52155	INGHAM DEPOT WTP AERATOR BUND	WATER	Water Supply	Water Treatment
WS52160	INGHAM DEPOT WTP SAND FILTER BEDS	WATER	Water Supply	Water Treatment
WS52175	INGHAM DEPOT WTP AERATOR	WATER	Water Supply	Water Treatment
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WTP	WATER	Water Supply	Water Treatment
WS52185	INGHAM DEPOT WTP CCTV	WATER	Water Supply	Water Treatment
WS53112	Chemical Controller - Depot WTP	WATER	Water Supply	Water Plant &
WS53125	Hypo Chem Tank & Safe Shower - ING DEPOT	WATER	Water Supply	Water Plant &
WS75061	DISTRIBUTION PIPES - FILTER DEPOT WTP	WATER	Water Supply	Water Treatment

Figure 5.2: Asset Data Example - Water Criticality Calculator

5.2.3 Award Severity Score

Once the asset data is finalised and as correct as possible it is time to award a severity scores to the asset. The severity scores awarded to the asset are based on the factors discussed within section 3.5. The scores for each asset were determined either via data that was collected from the asset database (i.e. Remaining Life, Total Age and Replacement Cost) or from the experience and knowledge of Council staff members (i.e. Failure Effect on System, Redundancy and Repair Time). These scores were either automatically awarded where possible based on asset data or manually inputted into the calculators discussed in section 3.8.

Asset No.	Remaining Life	Total Age	Failure Effect on System	Redundancy	Locality	Customer	Replacement Cost	Repair Time
Ingham Depot Water Treatment Plant								
WS00151	5	1	0	0	4	5	2	3
WS51255	5	2	4	5	4	5	3	5
WS51256	5	1	4	1	4	5	2	5
WS51257	5	1	4	1	4	5	2	5
WS51506	5	2	1	1	4	5	2	4
WS51507	5	2	1	1	4	5	2	4
WS51508	5	2	4	5	4	5	1	4
WS52005	5	2	1	5	4	5	2	5
WS52109	1	2	4	2	4	5	4	5
WS52110	5	2	4	2	4	5	3	5
WS52111	5	1	4	2	4	5	1	5
WS52112	1	2	4	4	4	5	4	3
WS52155	5	2	4	5	4	5	3	3
WS52160	3	2	4	5	4	5	4	3
WS52175	4	1	4	5	4	5	3	3
WS52176	4	1	1	1	4	5	3	5
WS52185	5	1	1	1	4	5	2	3
WS53112	5	1	4	5	4	5	2	5
WS53125	5	1	4	5	4	5	1	5
WS75061	5	1	1	4	4	5	3	1

Figure 5.3: Severity Scoring Example - Water Criticality Calculator

5.2.4 Calculate Criticality Rating

Once the severity scores for each of the assets was assigned the final criticality rating could be calculated. This rating is automatically calculated based on the severity scores mentioned above and using the calculators discussed in section 3.8. The severity scores that were awarded in the last step were either uploaded or input into the water criticality calculator or the sewerage criticality calculator which automatically calculated the final criticality rating for each asset based on formulas 3.1 and 3.2 above in section 3.7. The final criticality rating can be seen below in figure 5.4.

Asset No.	Asset Decription	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
Ingham Depot Water Treatment Plant						
WS00151	DN 200 COMOM ROAD BORE PUMPS FLOW METER _ DEPOT WTP - 200mm	3	1	4.5	2.5	33.75
WS51255	INGHAM DEPOT WTP SWITCHBOARD	3.5	4.5	4.5	4	283.5
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1	3	2.5	4.5	3.5	118.125
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2	3	2.5	4.5	3.5	118.125
WS51506	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 1	3.5	1	4.5	3	47.25
WS51507	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 2	3.5	1	4.5	3	47.25
WS51508	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT RECIRCULATING PUMP	3.5	4.5	4.5	2.5	177.1875
WS52005	INGHAM DEPOT WATER TREATMENT PLANT TELEMETERY	3.5	3	4.5	3.5	165.375
WS52109	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR STRUCTURE	1.5	3	4.5	4.5	91.125
WS52110	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR BOTTOM LINER	3.5	3	4.5	4	189
WS52111	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR ROOF LINER	3	3	4.5	3	121.5
WS52112	DEPOT WATER TREATMENT PLANT CONCRETE MAZE RESERVOIR	1.5	4	4.5	3.5	94.5
WS52155	INGHAM DEPOT WATER TREATMENT PLANT AERATOR BUND	3.5	4.5	4.5	3	212.625
WS52160	INGHAM DEPOT WATER TREATMENT PLANT SAND FILTER BEDS	2.5	4.5	4.5	3.5	177.1875
WS52175	INGHAM DEPOT WATER TREATMENT PLANT AERATOR;;Renewal	2.5	4.5	4.5	3	151.875
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WATER TREATMENT PLANT	2.5	1	4.5	4	45
WS52185	INGHAM DEPOT WATER TREATMENT PLANT CCTV SECURITY CAMERAS	3	1	4.5	2.5	33.75
WS53112	Sodium Hypo Chemical Controller - Depot WTP	3	4.5	4.5	3.5	212.625
WS53125	Sodium Hypochlorite Chemical Tank and Safety Shower - Ingham Depot Water Treatment Plant	3	4.5	4.5	3	182.25
WS75061	WATER DISTRBUTION PIPES - SAND FILTER INGHAM DEPOT WATER TREATMENT PLANT	3	2.5	4.5	2	67.5
Average		**2.95**	**3.0**	**4.5**	**3.3**	**128.475**

Figure 5.4: Final Criticality Rating Example - Water Criticality Calculator

5.3 Summary

This chapter has provided a detailed overview of how the criticality analysis was completed for this investigation. The introduction of the criticality calculators has allowed for the calculations to be instantaneously carried out whenever a severity score changes. This saves on doing a large amount of hand calculations as assets are refurbished or replaced.

Chapter 6 Results

6.1 Introduction

Following the processes discussed in the previous chapter a final criticality rating for each asset was calculated. This chapter will analysis the results of the criticality calculators to determine is the results are appropriate and methodology is able to be used throughout HSC for the remainder of its water and sewerage assets and further all HSC assets.

6.2 Water Criticality Analysis Results

The following sections will review the water assets that were included in this investigation. A total of 1,394 assets were analysed with the results being discussed for each site in the below sections. A full table of results can be seen in Appendix X.

6.2.1 Ingham Depot Water Treatment Plant Results

The results for the criticality analysis carried out on the assets at the Ingham Water Treatment Plant can be seen below in Table 6.1

Table 6.1: Ingham Depot Water Treatment Plant Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS51255	3.5	4.5	4.5	4	283.5
WS52155	3.5	4.5	4.5	3	212.625
WS53112	3	4.5	4.5	3.5	212.625
WS52110	3.5	3	4.5	4	189
WS53125	3	4.5	4.5	3	182.25
WS51508	3.5	4.5	4.5	2.5	177.1875
WS52160	2.5	4.5	4.5	3.5	177.1875
WS52005	3.5	3	4.5	3.5	165.375
WS52175	2.5	4.5	4.5	3	151.875
WS52111	3	3	4.5	3	121.5
WS51256	3	2.5	4.5	3.5	118.125
WS51257	3	2.5	4.5	3.5	118.125
WS52112	1.5	4	4.5	3.5	94.5
WS52109	1.5	3	4.5	4.5	91.125
WS75061	3	2.5	4.5	2	67.5
WS51506	3.5	1	4.5	3	47.25
WS51507	3.5	1	4.5	3	47.25
WS52176	2.5	1	4.5	4	45
WS52185	3	1	4.5	2.5	33.75
WS00151	3	0	4.5	2.5	0

From the results it can be seen that the 2 most critical assets at the Ingham Depot WTP are the switchboard and the aerator bund. This is mainly due to system criticality of both of the assets for the remainder of the plant. If the switchboard were to fail then it would mean that there would be

electricity supplied to the entire WTP basically shutting the plant down. As for the aerator bund, this is the first step in the treatment process. If this were to fail there would be very little to no water running through the remainder of the plant. Again, it would mean the plant would need to be shut down until the problem is rectified and fixed. At the other end of the scale the least critical asset at the Ingham Depot WTP is the CCTV. This is as expected as this asset plays no part in the treatment process and its failure would cause no outages or effects to the treatment plant or the water distribution system.

6.2.2 Macknade Water Treatment Plant Results

The results for the criticality analysis carried out on the assets at the Macknade Water Treatment Plant can be seen below in Table 6.2.

Table 6.2: Macknade Water Treatment Plant Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS52162	4	4	3.5	4	224
WS53116	3	4	3.5	3.5	147
WS51276	2.5	4	3.5	4	140
WS53126	3	4	3.5	3	126
WS00204	2	4	3.5	4	112
WS51279	4	2	3.5	4	112
WS00183	2.5	3	3.5	4	105
WS00389	2.5	4	3.5	3	105
WS52169	2	4	3.5	3.5	98
WS52120	4	1.5	3.5	4.5	94.5
WS52121	4	1.5	3.5	4.5	94.5
WS52117	4	1.5	3.5	4	84
WS52140	4	1.5	3.5	3.5	73.5
WS52143	3	2	3.5	3.5	73.5
WS51280	4	2	3.5	2.5	70
WS52165	2.5	2	3.5	4	70
WS52166	2.5	2	3.5	4	70
WS52016	3.5	2.5	3.5	2	61.25
WS52144	2.5	2	3.5	3.5	61.25
WS51278	4	2	3.5	2	56
WS00107	3	2.5	3.5	2	52.5
WS51532	3	2	3.5	2.5	52.5
WS51538	3	2	3.5	2.5	52.5
WS51540	3	2	3.5	2.5	52.5
WS52118	2.5	1.5	3.5	4	52.5
WS51281	3.5	2	3.5	2	49
WS51297	2	2	3.5	3.5	49
WS75060	3	3	3.5	1.5	47.25
WS51282	2.5	2	3.5	2.5	43.75
WS52119	2	1.5	3.5	4	42
WS00437	3	2.5	3.5	1.5	39.375
WS51294	2	2	3.5	2.5	35
WS00385	2.5	1	3.5	3	26.25

WS00386	2.5	1	3.5	3	26.25
WS00387	2.5	1	3.5	3	26.25
WS00388	2.5	1	3.5	3	26.25
WS00190	1	1	3.5	3	10.5
WS00191	1	1	3.5	3	10.5
WS00192	1	1	3.5	3	10.5

From the results it can be seen that the most critical asset at the Macknade WTP is the sand filter beds. This is due to the criticality of the asset to the system as well as the repair time for the asset. If the sand filter beds were to fail then the remainder of the plant would need to be shut down as this is a main treatment phase at this plant and cannot be bypassed. Also, if this asset were to fail the time to repair the asset would be relatively long which would again require the entire plant to be shut down. While the least critical assets are the 3 hi lift pumps at the WTP. This is because if one of these pumps were to fail there would still be another 2 available to continue operating. This could potentially lead to some decrease in the effectiveness of service but overall, the system could still function. Also a pump of this nature

6.2.3 Forrest Beach Water Treatment Plant Results

The results for the criticality analysis carried out on the assets at the Forrest Beach Water Treatment Plant can be seen below in Table 6.3.

Table 6.3: Forrest Beach Water Treatment Plant Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS51262	4	4	2.5	4	160
WS52158	4	4	2.5	4	160
WS52124	3.5	4	2.5	4	140
WS52177	3	4	2.5	4	120
WS51306	3	4	2.5	3.5	105
WS53115	3	4	2.5	3.5	105
WS75076	3	4	2.5	3.5	105
WS75077	3	4	2.5	3.5	105
WS00138	2.5	4	2.5	4	100
WS51265	2.5	4	2.5	4	100
WS52159	2	4	2.5	4.5	90
WS53128	3	4	2.5	3	90
WS75082	3	4	2.5	3	90
WS75083	3	4	2.5	3	90
WS52178	2.5	4	2.5	3.5	87.5
WS52179	2.5	4	2.5	3.5	87.5
WS52180	2.5	4	2.5	3.5	87.5
WS52181	2.5	4	2.5	3.5	87.5
WS52173	2.5	3.5	2.5	3.5	76.5625
WS52125	1.5	4	2.5	5	75
WS75073	2.5	4	2.5	3	75
WS75080	2.5	3	2.5	4	75
WS75081	2.5	3	2.5	4	75
WS00223	2.5	2.5	2.5	4	62.5

WS00224	2.5	2.5	2.5	4	62.5
WS51268	4	2.5	2.5	2.5	62.5
WS51263	3.5	2	2.5	3.5	61.25
WS51264	3.5	2	2.5	3.5	61.25
WS52148	4	1.5	2.5	4	60
WS00230	3	2.5	2.5	3	56.25
WS00231	3	2.5	2.5	3	56.25
WS51512	3.5	2.5	2.5	2.5	54.6875
WS51515	3.5	2	2.5	3	52.5
WS51516	3.5	2	2.5	3	52.5
WS52145	4	1.5	2.5	3.5	52.5
WS52146	4	1.5	2.5	3.5	52.5
WS52147	4	1.5	2.5	3.5	52.5
WS51266	4	2.5	2.5	2	50
WS00228	2.5	2.5	2.5	3	46.875
WS51511	3	2.5	2.5	2.5	46.875
WS51513	3	2.5	2.5	2.5	46.875
WS75074	2.5	3	2.5	2.5	46.875
WS00213	3	2	2.5	3	45
WS00214	3	2	2.5	3	45
WS00232	3	2	2.5	3	45
WS52126	3	2	2.5	3	45
WS00255	1	4	2.5	4	40
WS75063	3	1.5	2.5	3.5	39.375
WS00225	2.5	2.5	2.5	2.5	39.0625
WS00226	2.5	2.5	2.5	2.5	39.0625
WS00227	2.5	2.5	2.5	2.5	39.0625
WS51269	2.5	2.5	2.5	2.5	39.0625
WS00337	2.5	2	2.5	3	37.5
WS00340	2.5	2	2.5	3	37.5
WS51514	3	2	2.5	2.5	37.5
WS75058	3	3	2.5	1.5	33.75
WS52010	3.5	1.5	2.5	2.5	32.8125
WS52149	2.5	1.5	2.5	3.5	32.8125
WS52150	2.5	1.5	2.5	3.5	32.8125
WS52183	1.5	3.5	2.5	2.5	32.8125
WS52184	1.5	3.5	2.5	2.5	32.8125
WS51267	2.5	2.5	2.5	2	31.25
WS75085	3	1	2.5	3.5	26.25
WS52182	3	1	2.5	3	22.5
WS53109	3	1	2.5	3	22.5
WS53130	3	1	2.5	3	22.5
WS75075	1.5	3	2.5	2	22.5
WS75078	3	1	2.5	3	22.5
WS75079	3	1	2.5	3	22.5
WS00139	2.5	1	2.5	3.5	21.875
WS00200	3	1	2.5	1.5	11.25
WS00154	3	1	2.5	1	7.5
WS00155	3	1	2.5	1	7.5
WS00156	3	1	2.5	1	7.5

WS00157	3	1	2.5	1	7.5
WS00409	1.5	1	2.5	2	7.5

From the results it can be seen that the assets with the highest criticality ranking are the Hi Lift Switchboard and the Sand Filter Bed. These two assets can be seen to score highly in both the asset age and financial aspects of the criticality analysis. This is because both assets are nearing the end of their useful lives and are relatively old assets, while they both also have a long repair time and a moderately high replacement cost. It is also reasonable that these two assets scored the highest for the Forrest Beach Water Treatment Plant. This is because both of these assets play vital roles in the operation of the plant. The switchboard controls all the pumps and other pieces of plant that are required to distribute the treated water to the consumer. If this were to fail then the operations of the plant would be severely hampered as there is no way to supply the treated water to the consumer. The sand filter beds also play a vital part in the treatment process as the bores that supply the plant are high in iron and the filter beds are used to remove some iron from the water so that it is suitable for consumption. Again if this asset were to fail it would mean the plant is required to be shut down until it was repaired. The assets with the lowest criticality rating are however the flowmeters for bores 4, 6A, 8 and 7 along with the four single access lids at the treatment plant. These five assets scored relatively low across all aspects of the criticality analysis with the flowmeters scoring lower in the financial category than most other assets while the access lids scored lower than most other assets in the asset age category. These assets being identified as the least critical is realistic as the failure of these assets has no major effect on the operation of the plant and its ability to service the community and the time and cost to replace them is not overly large.

6.2.4 Ingham Pumping Station Results

The results for the criticality analysis carried out on the assets at the Ingham Pumping Station can be seen below in table 6.4.

Table 6.4: Ingham Pumping Station Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS52107	4	3	3	5	180
WS52163	3	4	3	4.5	162
WS52164	4	3	3	4.5	162
WS51250	2.5	4.5	3	4.5	151.875
WS53111	3	4.5	3	3.5	141.75
WS51503	4	4.5	3	2.5	135
WS53132	3	4.5	3	3	121.5
WS51254	2.5	4	3	4	120
WS52108	2.5	3	3	5	112.5
WS51504	4	2.5	3	3.5	105
WS51505	4	2.5	3	3.5	105
WS51500	4	2.5	3	3	90
WS51501	4	2.5	3	3	90
WS51502	4	2.5	3	3	90
WS00342	1.5	4.5	3	4	81
WS51251	3	2.5	3	3.5	78.75
WS51252	3	2.5	3	3.5	78.75
WS51253	3	2.5	3	3.5	78.75

WS00243	3	2.5	3	3	67.5
WS00245	3	2.5	3	3	67.5
WS00198	2.5	2.5	3	3.5	65.625
WS00199	2.5	2.5	3	3.5	65.625
WS51299	2	2.5	3	4	60
WS51300	2	2.5	3	4	60
WS51301	2	2.5	3	4	60
WS00247	3	2.5	3	2.5	56.25
WS00244	3	2	3	3	54
WS00246	3	2	3	3	54
WS52006	3.5	1.5	3	3	47.25
WS00248	2.5	2.5	3	2.5	46.875
WS51302	2	1.5	3	4	36
WS51303	2	1.5	3	4	36
WS53129	3	1	3	3	27
WS00253	1	2.5	3	3.5	26.25
WS52186	3	1	3	2.5	22.5
WS53135	3	1	3	2.5	22.5
WS00152	3	1	3	2	18
WS00153	3	1	3	2	18

From the results it can be seen that the most critical asset is 17.6ML reservoir at the Ingham Pumping Station. This is mainly due to the cost to replace the asset along with the current age of the asset. The cost and time to replace the asset is large, meaning that the reservoir scored highly in this area of the criticality analysis. The reservoir is also relatively old and would be nearing the end of its remaining life soon meaning it also scored highly in that area as well. It can also be seen that the least critical assets are the flowmeters that are on the 2 bore lines at the pumping station. This is because they are not that critical to the operation of the pumping station because if they were to fail there would be little to no effect to the supply. The replacement costs of these flowmeters are relatively low and repair time is generally fairly quick.

6.2.5 Halifax Depot Pumping Station Results

The results of the criticality analysis carried out on the assets at the Halifax Depot Pumping Station can be seen below in Table 6.5.

Table 6.5: Halifax Depot Pumping Station Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS51261	3	4	3.5	4	168
WS53114	3	4	3.5	3.5	147
WS51523	3	4	3.5	3	126
WS53124	3	4	3.5	3	126
WS52114	2.5	2.5	3.5	4.5	98.4375
WS52012	3.5	2.5	3.5	3	91.875
WS52115	2.5	2.5	3.5	4	87.5
WS52113	1	2.5	3.5	4.5	39.375
WS51521	3	1	3.5	3	31.5
WS51522	3	1	3.5	3	31.5

From the results it can be seen that the most critical asset is the Halifax depot switchboard. This is mainly due to how critical of an asset it is to the system. If the switchboard were to fail it would mean that the Halifax Depot Pumping Station would not be able to function until it is either repaired or an alternate power source is supplied through for example a generator. The switchboard also scored highly in the financial category as it has a rather long repair time and high repair cost. The least critical assets based on the results above can be seen to be the 2 Hi Lift pumps at the Halifax Depot. If one of these pumps were to fail the pumping station could still operate on the other until it was to be repaired or replace. Meaning the failure of one of these assets would cause little effect to the system.

6.2.6 Booster Pump Stations Results

The results of the criticality analysis carried out for the assets at each of the booster pump stations can be seen below in Tables 6.6, 6.7 and 6.8.

Table 6.6: Lucinda Booster Pump Station Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS52116	4	4	3	5	240
WS00256	2.5	4	3	5	150
WS00266	2.5	4	3	3	90
WS00609	2.5	4	3	3	90
WS75065	3	2.5	3	3	67.5
WS00369	3	2.5	3	2	45
WS00610	2.5	1.5	3	3	33.75
WS00611	2.5	1.5	3	3	33.75
WS00612	2.5	1.5	3	3	33.75
WS00613	2.5	1.5	3	3	33.75
WS00257	2.5	1	3	3.5	26.25
WS00267	1.5	1.5	3	1.5	10.125

Table 6.7: Washaway Booster Pump Station Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS00376	3	4	3	3	108
WS52122	4	1.5	3	4	72
WS52123	4	1.5	3	4	72
WS75064	3	2.5	3	3	67.5
WS00368	3	2.5	3	2.5	56.25
WS00372	3	1.5	3	3	40.5
WS00373	3	1.5	3	3	40.5
WS00374	3	1.5	3	3	40.5
WS00375	3	1.5	3	3	40.5

Table 6.8: Trebonne Booster Pump Station Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS52128	4	3.5	3	4	168
WS51258	4	4	3	3	144
WS52007	3.5	2.5	3	3	78.75
WS00371	3	3	3	2.5	67.5
WS00370	3	2.5	3	2.5	56.25
WS51534	3	1.5	3	3	40.5
WS51535	3	1.5	3	3	40.5
WS51536	3	1.5	3	3	40.5
WS51537	3	1.5	3	3	40.5

From the results in Table 6.6 above it can be seen that the most critical asset for the Lucinda Booster Pump Station is the Lucinda Booster Pump Station 3ML Reservoir Sub Structure. This is due to the major role that the reservoir plays in within the Lower Herbert Water scheme. The reservoir scored highly for Asset Age, System Criticality and Financial. For asset age it would score highly as again the asset is nearing the end of its life and is a relatively old asset. For system criticality if the reservoir were to fail then the entire Lucinda Booster Pump Station would not function and water would not be able to be supplied to the residents of Lucinda as there is no redundancy in the system and there would be outages within the system. Finally, the reservoir would be expensive to replace and repair time would be high so it scored highly on the financial front as well. The least critical asset from this site can also be seen to be the 100mm recirculating main. This main would be relatively quick and inexpensive to repair if it were to fail and operation of the booster pump station could continue with only little effect to the residents.

From Table 6.7 it can be seen that the Washaway Booster Pump Station's most critical asset is the switchboard for the booster pump set located at the Washaway Booster Pump Station. This is mainly due to the system criticality score for this asset. The switchboard scored highly in this area as if it were to fail it would cause minor outages to the system, because there would be no water supplied to Taylors Beach, and there is also no redundancy for the asset so if it were to fail there are no spare switchboards or standby switchboards to replace it with. While the its least critical assets are the four pressure pumps that make up the booster pump set. Again, this is mainly due to the system criticality score for the asset. With the pressure pumps, unlike with the switchboard, have each other available if any were to fail. This allows operations to continue as per normal without any disturbances.

Finally, from Table 6.8 it can be seen that the asset with the highest criticality rating for the Trebonne Booster Pump Station is the Low Level Storage Reservoir. The Low Level Storage Reservoir scored highly for Asset Age, System Criticality and Financial. The reservoir is again a relatively old asset meaning it scored highly for the asset age component of the criticality analysis. The asset also scored highly for the system criticality analysis as there is no redundancy for the asset on site and failure could cause minor outages to the system. Finally, for financial component of the analysis, as mentioned above, the reservoir scored highly. This is again due to the high replacement cost for the reservoir and the long repair time required for the reservoir. It can also be seen that the least critical assets are the four pressure pumps at the site. Much like with the Washaway Booster Pump Station the four pressure pumps provide redundancy for each other and allows their score for system criticality to be lower than the other assets at the site.

6.2.7 Water Tower Results

The results of the criticality analysis carried out for the assets at each of the Water Towers can be seen below in Table 6.9.

Table 6.9: Water Tower Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS52101	4.5	4.5	3.5	5	354.375
WS52102	3.5	4.5	3.5	5	275.625
WS51290	3.5	4.5	3.5	3.5	192.9375
WS52104	2.5	4	3.5	5	175
WS52103	2.5	4	3	5	150
WS52105	3.5	4	2	5	140
WS52170	2.5	4	3.5	4	140
WS51289	4	4	2	3.5	112
WS52171	2.5	4	3	3.5	105
WS52106	2.5	4	2	4.5	90
WS51285	2	4	3	3.5	84
WS51287	2	4	3	3.5	84
WS75066	3	2.5	3.5	3	78.75
WS75067	3	2.5	3.5	3	78.75
WS75084	3	2.5	3	3.5	78.75
WS75068	3	2.5	3	3	67.5
WS75069	3	2.5	2	3	45
WS51286	4	1	3	2	24
WS51288	4	1	3	2	24
WS51284	3	1	3	2	18

From the results it can be seen that the most critical asset for the Water Towers can be seen to be the Ingham Water Tower Structure. The Ingham Water Tower Structure scored highly in both the asset age and financial components of the criticality analysis. The water tower structure is a relatively old asset that is also nearly the end of its remaining life which is why it scored highly. The financial cost to replace the water tower is very high and the repair time for the tower is also high which is why it scored highly for the financial aspect of the analysis. While the least critical asset for all the Water Towers can be seen to be the Electrical Cable Tray at the Halifax Water Tower. This is mainly due to the system criticality component of the criticality analysis. If the cable trays were to fail there would be no effect to the system at all which is why this scored so low.

6.2.8 Ingham Water Scheme Results

The results of the criticality analysis carried out on the water mains that made up the Ingham Water Scheme can be seen below in Appendix D. The five assets with the highest criticality scores can be seen below in table 6.10 while the five assets with the lowest criticality scores can be seen in table 6.11 below.

Table 6.10: Ingham Water Scheme Top 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS20497	4	4	4.5	2	144
WS20526	4	4.5	2.5	2.5	112.5
WS20482	4	4	4.5	1.5	108
WS20529	4	4.5	2.5	2	90
WS20531	3	3	4	2.5	90

Table 6.11: Ingham Water Scheme Bottom 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS21073	1	1.5	1	1	1.5
WS21081	1	2.5	1	1	2.5
WS21083	1	2.5	1	1	2.5
WS21085	1	2.5	1	1	2.5
WS21086	1	2.5	1	1	2.5

6.2.9 Lower Herbert Scheme Results

The results of the criticality analysis carried out on the water mains that make up the Lower Herbert Water Scheme can be seen below in Appendix D. The five assets with the highest criticality scores can be seen below in table 6.12 while the five assets with the lowest criticality scores can be seen in table 6.13 below.

Table 6.12: Lower Herbert Water Scheme Top 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS20889	2	3.5	4	2	56
WS20915	3	4	1.5	3	54
WS20965	3	4	1.5	3	54
WS20894	3	4	2.5	1.5	45
WS20910	3	2	2.5	1	15

Table 6.13: Lower Herbert Water Scheme Bottom 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS20842	3	2	1	1	6
WS20839	3	1.5	1	1	4.5
WS20937	3	1.5	1	1	4.5
WS20841	2	2	1	1	4
WS20840	2	1.5	1	1	3

6.2.10 Forrest Beach Scheme Results

The results of the criticality analysis carried out on the water mains that make up the Forrest Beach Water Scheme can be seen below in Appendix D. The five assets with the highest criticality scores can be seen below in table 6.14 while the five assets with the lowest criticality scores can be seen in table 6.15 below.

Table 6.14: Forrest Beach Water Scheme Top 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS20842	3	2	1	1	6
WS20839	3	1.5	1	1	4.5
WS20937	3	1.5	1	1	4.5
WS20841	2	2	1	1	4
WS20840	2	1.5	1	1	3

Table 6.15: Forrest Beach Water Scheme Bottom 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS20842	3	2	1	1	6
WS20839	3	1.5	1	1	4.5
WS20937	3	1.5	1	1	4.5
WS20841	2	2	1	1	4
WS20840	2	1.5	1	1	3

6.3 Sewerage Criticality Analysis Results

The following sections will review the sewerage assets that were included in this investigation. A total of 1,294 assets were analysed with the results being discussed for each site in the below sections. A full table of results can be seen in Appendix X.

6.3.1 Ingham Sewerage Treatment Plant Results

The results for the criticality analysis carried out on the assets at the Ingham Sewerage Treatment Plant can be seen below in Table 6.16.

Table 6.16: Ingham Sewerage Treatment Plant Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS41846	4.5	5	3	5	337.5
WS41856	4.5	5	3	5	337.5
WS41833	4.5	5	3	4	270
WS41848	4.5	5	3	4	270
WS41851	4	4.5	3	5	270
WS41847	4	5	3	4	240
WS41853	4	4.5	3	4	216
WS41859	4.5	3.5	3	4.5	212.625

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS41850	4.5	3.5	3	4	189
WS41860	4.5	3.5	3	4	189
WS41862	4.5	4	3	3.5	189
WS40054	3.5	5	3	3.5	183.75
WS41832	3.5	5	3	3.5	183.75
WS41831	3	5	3	4	180
WS00439	2.5	5	3	4.5	168.75
WS41849	3	5	3	3.5	157.5
WS00443	3	4	3	4	144
WS40769	3	5	3	3	135
WS53133	3	5	3	3	135
WS00444	3	4	3	3.5	126
WS41834	4	2	3	5	120
WS41840	4	2	3	5	120
WS40770	2.5	5	3	3	112.5
WS41836	4	2	3	4.5	108
WS41842	4	2	3	4.5	108
WS00173	2.5	4	3	3.5	105
WS41858	2.5	3.5	3	4	105
WS51004	3	2.5	3	4	90
WS41881	2.5	4	3	2.5	75
WS41881	2.5	4	3	2.5	75
WS41877	2.5	3	3	3	67.5
WS00445	2.5	3	3	2.5	56.25
WS41878	2.5	3	3	2.5	56.25
WS41876	2.5	4.5	3	1.5	50.625
WS41835	4	1	3	4	48
WS41841	4	1	3	4	48
WS40771	3.5	1	3	3	31.5
WS40772	3.5	1	3	3	31.5
WS52020	3	1	3	3.5	31.5
WS00412	2.5	1.5	3	2.5	28.125
WS00203	3	1	3	3	27
WS41861	4.5	1	3	2	27
WS00172	2.5	1	3	3.5	26.25
WS41880	2.5	1	3	3	22.5
WS51010	2.5	1	3	3	22.5
WS00171	2.5	1	3	2.5	18.75
WS00202	2.5	1	3	2.5	18.75
WS00307	2.5	1	3	2.5	18.75
WS00308	2.5	1	3	2.5	18.75
WS00417	2.5	1	3	2.5	18.75
WS41879	2.5	1	3	2.5	18.75
WS00201	3	1	3	2	18
WS00418	2.5	1	3	2	15
WS41882	2.5	1	3	2	15
WS00438	3	1	3	1	9

From the results above it can be seen that the most critical assets at the Ingham Sewerage Treatment Plant are the Trickling Filter Structure and the Contact Tank Structure. This is because they scored highly for all the components of the criticality analysis. The component that made these the most critical assets though was the financial component of the analysis, with both assets having a critical score of five for financial. The replacement value for these two assets is relatively large and therefore is why they scored as they did. Both of these assets play a vital role in the treatment process of the Ingham Sewerage Treatment Plant, therefore these assets are certainly vital for the continued operation of not only the plant but the entire Ingham Sewerage Scheme. It can also be seen that the least critical asset is the Ingham Sewerage Treatment Plant Telemetry. This asset scored relatively low in system criticality and financial categories of the criticality analysis.

6.3.2 Lucinda Sewerage Treatment Plant Results

The results for the criticality analysis carried out on the assets at the Lucinda Sewerage Treatment Plant can be seen below in Table 6.17.

Table 6.17: Lucinda Sewerage Treatment Plant Results

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS41868	3.5	5	3	4	210
WS41872	4.5	5	3	3	202.5
WS41863	3.5	5	3	3.5	183.75
WS41871	3.5	5	3	3.5	183.75
WS40007	3	5	3	4	180
WS41873	3	5	3	4	180
WS41866	3.5	5	3	3	157.5
WS53134	3	5	3	3	135
WS35121	4	4.5	3	2	108
WS41864	3.5	2	3	4	84
WS41865	3	2	3	4.5	81
WS41884	3	3	3	2.5	67.5
WS41883	2.5	3	3	2.5	56.25
WS40773	3.5	1.5	3	3.5	55.125
WS40774	3	1.5	3	3.5	47.25
WS40775	3	1.5	3	3.5	47.25
WS40008	3	1	3	3.5	31.5
WS40009	3	1	3	3.5	31.5
WS41867	3.5	1	3	2.5	26.25
WS41869	3.5	1	3	2.5	26.25
WS00146	3	1	3	2.5	22.5
WS00147	3	1	3	2.5	22.5

From the results it can be seen that the asset with the highest criticality rating is the settling tank. The settling tank scored high in system criticality and financial. This is because it is a main piece of in the treatment plant that currently does not have any redundancy and if it were to fail the entire plant would not be able to function appropriately. It would also be at a great expense to replace the tank and it would take a long time to carry out any required repairs to get the tank back into working condition. While the assets with the lowest criticality score are the two flowmeters which are connected to the discharge lines. These two assets score relatively low for the system criticality part of the analysis and

this is due to the fact that if these two flowmeters were to fail the plant would still be able to operate at a sufficient standard.

6.3.3 Ingham Sewerage Scheme Results

The results of the criticality analysis carried out on the sewerage mains that make up the Ingham Sewerage Scheme can be seen below in Appendix E. The five assets with the highest criticality scores can be seen below in table 6.18 while the five assets with the lowest criticality scores can be seen in table 6.19 below.

Table 6.18: Ingham Sewerage Scheme Top 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS35005	4	5	2	3.5	140
WS36993	4	3.5	4.5	2	126
WS37235	4	3.5	4.5	2	126
WS36743	4.5	3.5	4.5	1.5	106.3125
WS36921	4.5	3.5	4.5	1.5	106.3125

Table 6.19: Ingham Sewerage Scheme Bottom 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS35060	2	3	1.5	1	9
WS35067	2	3	1.5	1	9
WS35058	2	3	1.5	1	9
WS35077	2	3	1	1.5	9
WS35071	2	3.5	1	1	7

6.3.4 Lucinda Sewerage Scheme Results

The results of the criticality analysis carried out on the sewerage mains that make up the Lucinda Sewerage Scheme can be seen below in Appendix E. The five assets with the highest criticality scores can be seen below in table 6.20 while the five assets with the lowest criticality scores can be seen in table 6.21 below.

Table 6.20: Forrest Beach Sewerage Scheme Top 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS37355	4	3.5	3.5	1.5	73.5
WS37357	4	3.5	3.5	1.5	73.5
WS37358	4	3.5	3.5	1.5	73.5
WS37359	4	3.5	3.5	1.5	73.5
WS37361	4	3.5	3.5	1.5	73.5

Table 6.21: Forrest Beach Sewerage Scheme Bottom 5 Scoring Assets

Asset No.	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS37375	4	3.5	2	1	28
WS37404	3	3.5	2.5	1	26.25
WS37405	3	3	2.5	1	22.5
WS37415	3	3	2.5	1	22.5
WS37414	3	3.5	2	1	21

6.4 Maintenance Recommendations

In table 3.7 above provided a number of different maintenance recommendations based on the final criticality rating for each asset. In total over 2,500 assets were analysed as part of this investigation and the distribution of these assets based on the aforementioned table can be seen below in table 6.22

Table 6.22: Distribution of Criticality Rankings for Water and Sewerage Assets

Final Criticality Rating	Asset Criticality	Number of Water Assets	Number of Sewerage Assets	Total Assets
1 - 160	Non-Critical Asset	1388	1233	2621
315 - 160	Semi Critical Asset	20	19	39
470 - 315	Critical Asset	1	2	3
625 - 470	Highly Critical Asset	0	0	0

6.5.1 Non-Critical Assets

As can be seen in table 6.12 above 98.4% of assets tested within this investigation were determined to be Non=Critical Assets. These assets received a final criticality rating between 1 and 160. It could also be seen that 98.5% of water assets and 98.3% of sewerage assets fall within this range. Assets that returned a criticality ranking within this range are deemed to not be critical and have minor consequences if they were to failure. As determine in section 3.7 above, the maintenance recommendation for assets within this range is run to failure.

6.5.2 Semi Critical Asset

From table 6.12 above it can be seen that 1.5% of assets tested within this investigation were determined to be Semi Critical Assets. These assets received a final criticality rating between 160 and 315. It could also be seen that 1.4% of water assets and 1.5% of sewerage assets fell within this range. Assets that returned a criticality ranking within this range were deemed to have moderate failure consequences and were considered to be semi critical. As determined in section 3.7 above, the maintenance recommendation for assets within this range was preventative maintenance.

6.5.3 Critical Assets

As can be seen in table 6.12 above, 0.1% of assets tested within this investigation were determined to be Critical Assets. These assets received a final criticality ranking between 315 and 470. It could also be seen that 0.07% of water assets and 0.2% of sewerage assets are within this range. Assets with this criticality ranking were deemed to have major failure consequences and were considered critical assets. For assets that return a criticality ranking within this range it was determined that the recommended maintenance proceed is predictive maintenance and the holding of critical spares for immediate replace if failure were to occur.

6.5.4 Highly Critical Assets

As can be seen in table 6.12 above, no assets tested within this investigation were determined to be Highly Critical Assets. These assets would have received a final criticality ranking between 470 and 625. Assets that would have had this criticality ranking were deemed to have catastrophic failure consequences and were considered highly critical assets. For assets that would have fallen within this range the proposed maintenance procedure is…. However, with no assets being deemed at Highly Critical HSC would only need to carry out these maintenance procedures on assets they believe require them.

6.6 Observations

From the results a number of observations could be made. The first of these was that a large majority of the assets that were used in this investigation received a final criticality rating of between 1 and 160 making them Non-Critical Assets. It can also be seen that a large majority of these Non-Critical Assets consisted of the water and sewerage pipeline assets, with every pipe asset having a final criticality ranking under 160. This could be due to a large number of reasons as to why this occurred. One of these reasons would be how HSC segments its pipe assets within its asset database. HSC generally splits a pipe asset whenever there is a tee junction, change of material, change of size or even at times when there is a bend. This can cause a large number of rather small assets within HSC's asset database. This means that some streets will have multiple short mains rather than one larger main, which decreases the replacement cost of each of these assets. With the decreased replacement cost comes a decreased financial severity score. The asset replacement cost was collected from the HSC asset database which is based on the installation cost of the asset. Therefore, by changing how the replacement cost is determined by working out a unit rate per metre for replacement might give a more accurate representation for these assets and potentially provide some with higher criticality rankings.

HSC also has a very well planned out and water and sewerage network meaning that for a majority of Council's pipelines, if they were to fail there would not be that great of an effect on the overall system. This led to many the pipeline assets returning low scores for both the system criticality criteria factors, failure effect on system and redundancy. This is due to how both the systems are designed and are run. The water system for example has connected the Ingham water scheme to the Lower Herbert and Forrest Beach Water Schemes so if the water sources for the latter two schemes were to fail then the Ingham Scheme could still supplement the supply until repairs are made. Each scheme also has multiple sources of supply such as multiple treatment plants and bores which also reduces the criticality scoring of the failure effect on system and redundancy for all the water assets. In regards to the sewerage schemes the networks do not provide as much redundancy but are still designed to ensure that there is minimal disruption if a failure were to occur.

It was also noted when reviewing the results for each of the severity criteria it could be seen that the financial category had a rather large proportion of its scores in the lower end of the severity scoring. Potentially reviewing the criteria for both components of the financial criticality factor, these being replacement cost and repair time, to see if they can be improved to better represent the assets. For the replacement cost this could also be avoided if the above-mentioned changes were made initially. For the repair time it may be beneficial to actually properly review repair times for different types of assets and then use this actual data to get an actual quantifiable answer rather than basing the scoring on human knowledge and assumptions.

It could also be seen that there were pipelines that crossed multiple different localities within the shire. For the instance of this investigation it was decided that for the locality that had the largest amount of the pipeline would be the locality that was assigned to the asset. This could cause issues as if the asset were to fail then technically it would affect both localities not just the one assigned to the asset. This could be improved by potentially changing how the asset is scored and giving it the highest locality that the asset was located in. However, this basically would lead to the reverse problem in that the remainder of the asset that is not in the higher locality would be ranked higher than it should be. Another option would be to potentially split the asset at the point where it changes locality so that no sections receive a lower or higher rank than they potentially should.

Chapter 7 Conclusions

7.1 Introduction

The aim of this dissertation was to create a criticality framework and carry out a criticality analysis on HSC's water and sewerage assets. This chapter will discuss the outcomes and conclusions that were come to during this investigation. This chapter will also discuss any further works to can be carried out to further expand and grow on the work done as part of this dissertation.

7.2 Conclusions

The main objectives of this investigation were to create a criticality framework for HSC and then carry out a criticality analysis on HSC's water and sewerage assets. The first of these objectives was to create the criticality framework. It can be seen that a framework was created as part of this investigation. Initially a severity scoring structure was determined to rank assets based on the effect of the failure of the asset. This structure was based on HSC's risk management procedure. Criticality factors were also determined to compare the assets if they were to fail. The severity scoring structure and the criticality factors were then merged to give a severity scoring guideline for each criticality factor. Equations were also developed to calculate the overall criticality ranking of each asset. This framework that was developed was then applied to a sample dataset of water and sewerage assets to determine HSC's most critical assets. Overall the development of the criticality framework was a success and this aim has been achieved.

The second objective was to carry out a criticality analysis using the constructed framework to test its effectiveness. This was done by initially creating criticality calculators to carry out a large portion of the calculations. The calculators were used to, where possible, automatically award a severity score for each of the criticality factors automatically based on the data that was collected on the asset. The calculators also required some severity scores to be manually input when data was not available. The calculators then would automatically calculate the final criticality rating based on the severity scoring. A calculator was created for both water and sewerage assets and they were created in Microsoft Excel. Once the calculators were built then the criticality analysis could be carried out. The analysis was conducted on a number of different water and sewerage assets to determine a criticality score for each of the assets. Once this was carried out the results of the analysis were reviewed to ensure the results were feasible. After reviewing the results, it can be seen that the analysis was fairly accurate in its ranking of assets based on their criticality and most assets being awarded the correct criticality ranking. While the results for the analysis are reasonable, some modifications could be made to the severity scoring guidelines for some criticality factors, mainly the Financial Factors, that would provide an improved and more accurate criticality ranking for each asset.

7.3 Limitations

There were a number of limitations that affected the outcome of this investigation. One of the main limitations of this investigation was the quality of the data that was used. It was assumed that a majority of the data that was collected as part of this investigation was correct. Even though a review stage was carried out it is hard to truly identify how correct a large majority of the data is. If any of the data collected was incorrect it could greatly affect the overall outcome of the analysis. Incorrect date would lead to inaccurate severity scores and in turn incorrect criticality rankings. This could lead to incorrect asset management decisions in the future if this data was not corrected.

Another limitation was the amount of data available. While HSC maintains a majority of the main asset data there is some information that is currently not collected. This has led to severity scores being award based on the knowledge of HSC staff members. While these decisions are based on their best judgements there is always the opportunity for individual bias or opinion to affect the results. This could lead to an asset being awarded a higher or lower criticality ranking. To mitigate this, it is advised that as more data become available and is collected in the future that as many of these qualitative critical factors be replaced with quantitative critical factors.

HSC also lacks information that could be used to help determine the criticality factors. This led to factors needing to be determined by staff based on their experience and knowledge. This could lead to problems if HSC were to adopt this framework for all of its assets with there potentially be other factors or severity scoring guidelines that are more suitable to other asset types. This means prior to adoption of this framework HSC would have to determine their Council wide factors and guidelines or provide this framework as a template that could be modified and be used with different asset types.

There was also not a lot of examples of previous research carried out similar to this investigation. There is a lot of literature available that discusses criticality analysis but there is a lack of literature that discusses a methodology for carrying out the analysis and its sub sections like determining severity criteria and criticality factors. Even the small amount of literature that does contain a methodology has major variances in how the analysis is constructed and carried out.

7.4 Further Work

There are several areas where future work can be carried out for this investigation. Firstly, there can be refinement of the severity scoring and criticality factors to optimise the results. Once these criteria are refined the analysis can be rerun and reviewed against this initial analysis to see if the refinement has improved the framework constructed. Once the criteria, scoring and calculators are refined to a point the HSC is happy with them then more Council water and sewerage assets can be incorporated thus increasing the dataset reviewed. Again, the severity scoring and factors can be reviewed to further optimise them if required. Council could then extend the use of the criticality framework to incorporate assets from other areas outside of just water and sewerage.

Research could also be carried out to determine the likelihood of failure of each of the assets studied in the investigation. This would provide even more information to HSC staff when making asset management decisions and could be used in tandem with this investigation to give HSC a more comprehensive understanding of its assets.

Finally, this framework could be developed into a template that could be used by Council staff for different assets types if it is deemed that is the prefer option compared to using this current framework. This would allow staff to carry out a criticality analysis on any number of assets or asset types with a wide variety of severity scoring guidelines or criticality factors.

Reference List

Moubray, J 2002, *Reliability-centered Maintenance*, Second Edition, Industrial Press Inc., New York, New York

Standards Australia, 2014, *Australian Standard AS ISO 55000: Asset Management – Overview, Principles and Terminology*, SAI Global Limited, Sydney, New South Wales

Fiix 2020, Run-to-failure Maintenance, Fiix, Ontario, Toronto, viewed 14 May 2020, <https://www.fiixsoftware.com/run-to-failure-maintenance/>

Fiix 2020, Predictive Maintenance, Fiix, Ontario, Toronto, viewed 15 May 2020, <https://www.fiixsoftware.com/maintenance-strategies/predictive-maintenance/>

Fiix 2020, Preventive Maintenance, Fiix, Ontario, Toronto, viewed 15 May 2020, <https://www.fiixsoftware.com/maintenance-strategies/preventative-maintenance/#guide>

Deloitte 2020, Asset Management: A Risk Based Approach, Deloitte, Instanbul, Turkey, viewed 20 May 2020, < https://www2.deloitte.com/tr/en/pages/energy-and-resources/articles/risk-based-approach-benchmark-survey.html>

Hinchinbrook Shire Council 2020, Asset Management Plans, Hinchinbrook Shire Council, Ingham, Queensland, viewed 19 April 2020, < https://www.hinchinbrook.qld.gov.au/our-council/corporate-publications-and-reports/asset-management-plans/>

Covaris 2020, Asset Criticality Assessment, Covaris, Bankstown, New South Wales, viewed 19 April 2020, < https://www.covaris.com.au/services/maintenance-and-reliability/asset-criticality-assessment/>

Palmer, RD 2006, *Maintenance Planning and Scheduling Handbook*, Second Edition, McGraw-Hill, New York

Mobley, RK 2002, *An Introduction to Predictive Maintenance*, Second Edition, Butterworth-Heinemann, Woburn, Massachusetts

Hastings, NAJ 2015, *Physical Asset Management*, Second Edition, Springer, Switzerland

UpKeep 2019, Understanding and Performing Criticality Analysis in Maintenance, Chan, R, Los Angeles, USA, viewed 19 May 2020, <https://www.onupkeep.com/answers/preventive-maintenance/criticality-analysis/>

Asset Management Council 2020, What is asset management?, Asset Management Council, Oakleigh, Victoria, viewed 18 April 2020, <https://www.onupkeep.com/answers/preventive-maintenance/criticality-analysis/>

g3p Consulting Engineers 2020, Asset Criticality Analysis, g3p Consulting Engineers, Lisbon, Portugal, viewed 15 May 2020, <https://www.g3pconsulting.com/en/reliability-maintenance-management/asset-criticality-analysis>

Pschierer-Barnfather, P, Hughes, D & Holmes, S 2011, 'Determination of Asset Criticality: A Practical Method for Use in Risk-Based Investment Planning', *International Conference of Electricity Distribution*, 6-9 June 2001 21st, Frankfurt, pp.1-4

Rot, A 2008, 'IT Risk Assessment: Quantitative and Qualitative Approach', *World Congress on Engineering and Computer Science,* 22-22 October 2008, San Francisco, pp.1-6

https://www.icheme.org/media/10269/xiv-paper-16.pdf

ICMA 2005, Criticality: A Key Idea in Asset Management, Trilogics Technologies Inc, Washington DC, viewed 19 May 2020, < https://icma.org/articles/article/criticality-key-idea-asset-management>

Accelix 2019, 7 Benefits to help make the case for an asset criticality assessment, Accelix, Everett, Washington, viewed 19 May 2020, < https://www.accelix.com/community/reliability/7-benefits-to-help-make-the-case-for-an-asset-criticality-assessment/>

Reliable Plant 2020, Criticality Analysis: What It Is and Why It's Important, Trout, J, Tulsa, Oklahoma, viewed 19 May 2020, < https://www.reliableplant.com/criticality-analysis-31830>

Assetivity 2020, Equipment Criticality Analysis – A Streamlined Approach, Dunn, S, South Perth, Western Australia, viewed 19 May 2020, <https://www.assetivity.com.au/article/reliability-improvement/equipment-criticality-analysis-a-streamlined-approach.html>

Cohesive Solutions 2019, Criticality Analysis: What is a criticality analysis? How and why you should conduct one, Morris, L, Kennesaw, Georgia, viewed 19 May 2020, <https://blog.cohesivesolutions.com/criticality-analysis-what-it-is-and-how-to-conduct-it>

Borgovini, R, Pemberton, S & Rossi, M 1993, *Failure Mode, Effects and Criticality Analysis (FMECA)*, Reliability Analysis Center, Rome, New York, viewed 20 May 2020 <https://apps.dtic.mil/dtic/tr/fulltext/u2/a278508.pdf>

Appendix A – Project Specification

ENG4111/4112 Research Project

Project Specification

For: Haydn Grazioli

Title: Developing an Asset Prioritization System for Hinchinbrook Shire Council's Water and Sewerage Assets

Major: Civil Engineering

Supervisors: David Thorpe

Enrolment: ENG4111 – EXT S1, 2020

ENG4112 – EXT S2, 2020

Project Aim: To develop an asset prioritization system for Hinchinbrook Shire Council's water and sewerage assets

Programme: Version 1, 11th March 2020

1. Project Approval – Obtain approval to commence project from USQ and HSC
2. Acquisition of Resources – Review resources to confirm what is required and procure any resources required
3. Assets to Include – Determine assets to be included in this project
4. Determine Asset Groups – Determine whether asset belongs in the water or sewerage asset group
5. Determine Asset Sub Groups – Once assets are split into water and sewerage determine asset sub groups and determine which assets belong in each sub group
6. Confirm Required Data – Determine asset data required for project
7. Review Current Asset Data – Review existing asset data that has been collected to ensure data is correct
8. Asset Data Correction – Correct any data that is known to be incorrect
9. Additional Data Identification – Identified any asset data required that is not currently in the HSC asset data base
10. Data Collection – Review Council's asset database and GIS mapping and collect required data
11. Additional Data Collection – If any of the required data is not available in the current asset system then desktop or infield studies may be required to collect data
12. Merge Data Sets – Merge the 2 asset data sets to ensure that each asset has the correct data required
13. Criticality Factors – Determine criticality factors
14. Construct Model – Excel model will be constructed to allow calculations to be automatically carried out.
15. Input Data – Data required by the model will be input to allow a criticality score to be determined.
16. Calculate Criticality Score – Run the Model to determine the overall criticality score

17. Verify Results and Retest – The results obtained will be reviewed to ensure that the results received seem reasonable. if results are not reasonable then the model will be reviewed and rerun.

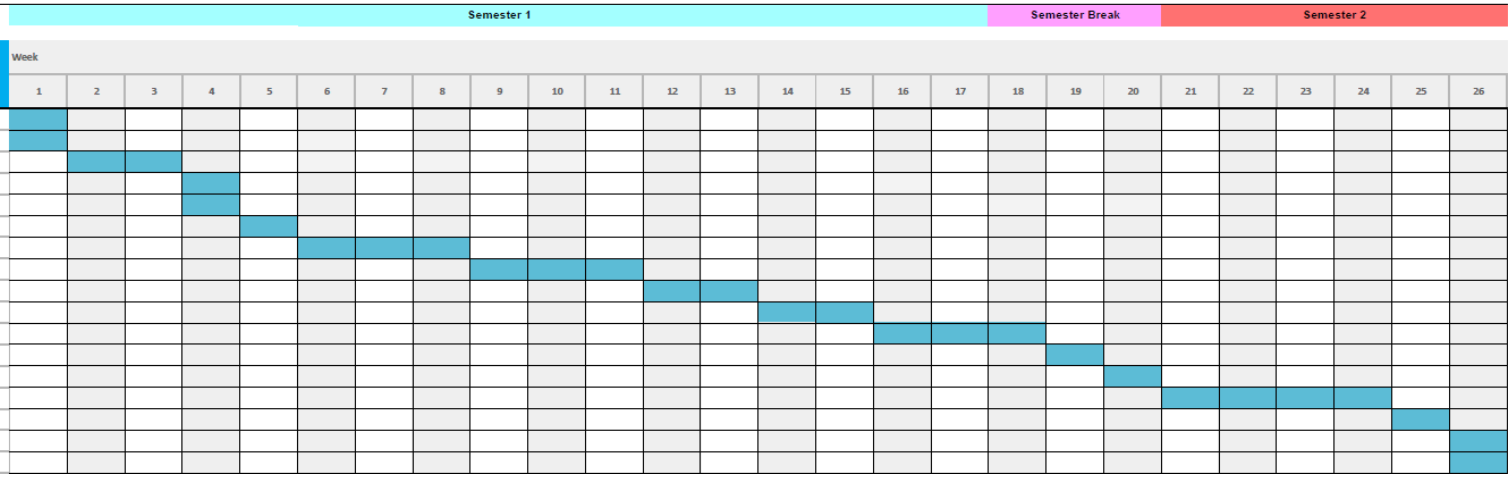
Project Resources

Item	Quantity	Source	Cost	Comment
PC with Microsoft Office	2	Student/HSC	In Kind/Nil	Access during and after work hours to student's work computer and personal computer.
Microsoft Word	1 per computer	Student/HSC	In Kind/Nil	For any work processing required such as typing dissertation. Access on both student's work computer and personal computer.
Microsoft Excel	1 per computer	Student/HSC	In Kind/Nil	For any data analysis required. Access on both student's work computer and personal computer
HSC Asset Database	1	HSC	In Kind/Nil	To access data for HSC Water and Sewerage asset details.
HSC GIS Mapping	1	HSC	In Kind/Nil	Access to HSC GIS software for mapping and asset identification.
HSC Staff and Machinery	As required	HSC	In Kind/Nil	Staff and machinery may be required if data needs to be collected in the field.
Stationary	As required	Student/HSC	$50	Purchase of pens, pencils, erasers and other assorted stationary items as required.
Printing	As required	Student/HSC	$50	Paper and ink costs for printing documents as required.

Appendix B – Project Timeline

2020 Research Project Program

TASK NAME	START DATE	END DATE	DURATION (WORK DAYS)
Acquisition of Resources	24-Feb	28-Feb	5
Acquisition of Resources	27-Feb	27-Feb	1
Assets to Include	02-Mar	13-Mar	10
Determine Asset Groups	16-Mar	17-Mar	2
Determine Asset Sub Groups	18-Mar	20-Mar	3
Confirm Required Data	23-Mar	27-Mar	5
Review Current Asset Data	30-Mar	18-Apr	15
Asset Data Correction	20-Apr	08-May	15
Additional Data Identification	11-May	15-May	5
Data Collection	18-May	22-May	5
Additional Data Collection	25-May	05-Jun	10
Merge Data Sets	08-Jun	12-Jun	5
Criticality Factors	15-Jun	19-Jun	5
Construct Model	22-Jun	17-Jul	20
Input Data	20-Jul	24-Jul	5
Calculate Criticality Score	27-Jul	28-Jul	2
Verify Results and Retest	29-Jul	01-Aug	3



Appendix C – Criticality Calculator Examples

Appendix C1 – Navigation Tab Example

Navigation	
Summary	
Overview	Provides an overview of the results and other data
Criticality Analysis	
Pipe Criticality	Criticality analysis for pipe assets
Water Asset Criticality	Criticality analysis for water assets (excluding water mains, hydrants, valves and connections)
Combined Asset Criticality	Combined asset criticality analysis for all water assets
Criteria Development	
Factor Weightings	Criticality Factor Weightings
Severity Guidelines	Severity Guidelines for each of the criticality factors

Figure C.0.1: Example of Navigation Tab in the Water Criticality Calculator

Appendix C2 – Overview Tab Example

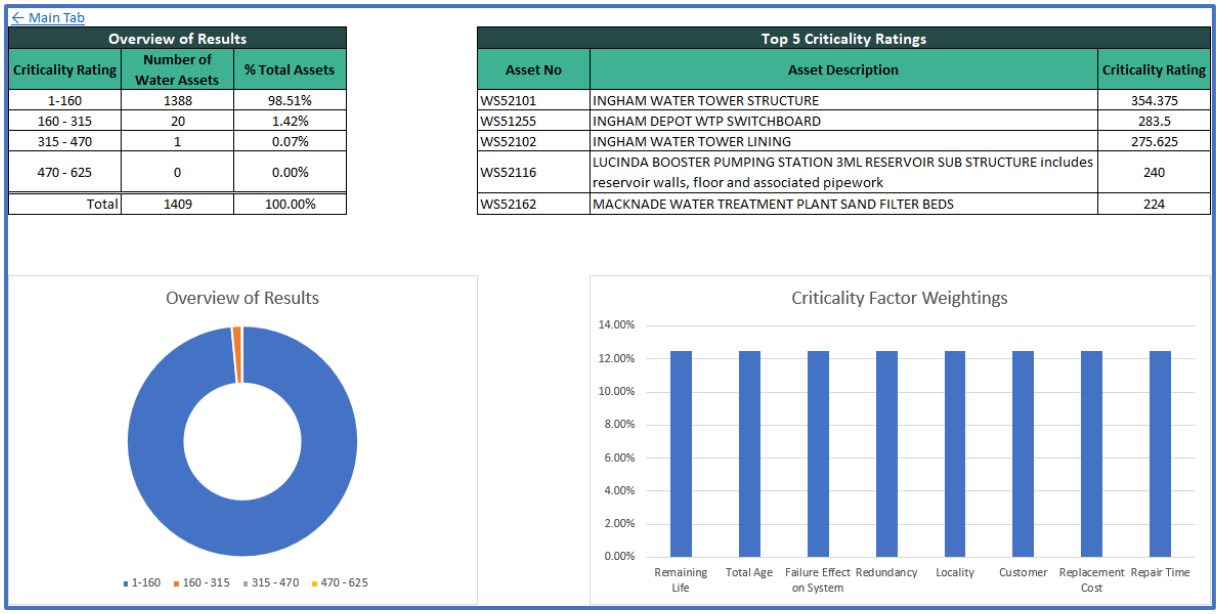


Figure C.0.2: Example of Overview Tab in the Water Criticality Calculator

Appendix C3 – Pipe Criticality Analysis Calculator Examples

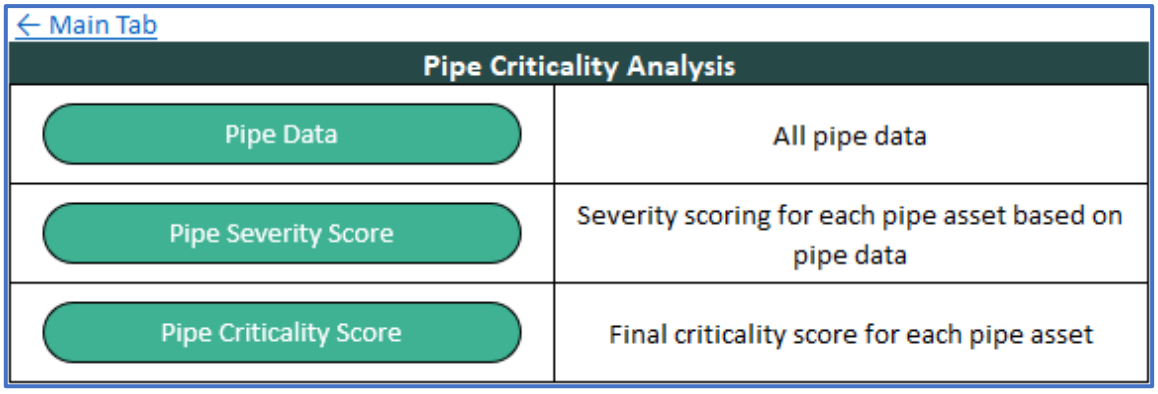


Figure C.0.3: Example of Pipe Criticality Analysis Navigation Tab in the Water Criticality Calculator

← Pipe Criticality

Asset No.	Asset Search Description	SAM ID	Acquisition Date	Asset Class	Asset Class	Asset Category	Water Main	Water Main	Replacement Cost
WS20000	Morehead St 50mm Water Main	ING-M050-0001	01/01/1958	WATER	Water Supply	Water Mains	74.396305	50	1771.77
WS20001	Palm Ave 50mm Water Main	ING-M050-0002	01/01/1982	WATER	Water Supply	Water Mains	207.86382	50	4950.86
WS20002	Palm Terrace 50mm Water Main	ING-M050-0003	01/01/1982	WATER	Water Supply	Water Mains	10.703574	50	254.87
WS20003	Palm Terrace 50mm Water Main	ING-M050-0004	01/01/1982	WATER	Water Supply	Water Mains	4.584082	50	109.58
WS20004	Renouf St 63mm Water Main	ING-M060-0001	01/01/2010	WATER	Water Supply	Water Mains	96.538053	63	2297.95
WS20005	Renouf St 63mm Water Main	ING-M060-0002	01/01/2010	WATER	Water Supply	Water Mains	19.059568	63	454.83
WS20006	Davidson St 100mm Water Main	ING-M063-0003	01/01/2007	WATER	Water Supply	Water Mains	74.450697	63	3421.22
WS20007	Lannercost St 80mm Water Main	ING-M080-0001	01/01/1939	WATER	Water Supply	Water Mains	4.104584	80	127.4
WS20008	Herbert St 80mm Water Main	ING-M080-0002	01/01/1939	WATER	Water Supply	Water Mains	4.94	80	152.41
WS20009	Lannercost St 80mm Water Main	ING-M080-0003	01/01/1956	WATER	Water Supply	Water Mains	3.200762	80	99.42
WS20010	Lannercost St 80mm Water Main	ING-M080-0004	01/01/1956	WATER	Water Supply	Water Mains	3.688258	80	114.98
WS20011	Herbert St 80mm Water Main	ING-M080-0005	01/01/1939	WATER	Water Supply	Water Mains	3.051662	80	96.42
WS20012	Herbert St 80mm Water Main	ING-M080-0006	01/01/1939	WATER	Water Supply	Water Mains	2.408061	80	74.65
WS20013	Cooper St 80mm Water Main	ING-M080-0007	01/01/1969	WATER	Water Supply	Water Mains	17.122824	80	531.44
WS20014	Marina Pde 80mm Water Main	ING-M080-0008	01/01/1969	WATER	Water Supply	Water Mains	26.808	80	833.49
WS20015	Herbert St 80mm Water Main	ING-M080-0010	01/01/1939	WATER	Water Supply	Water Mains	3.026622	80	93.31
WS20016	Herbert St 80mm Water Main	ING-M080-0011	01/01/1939	WATER	Water Supply	Water Mains	23.08038	80	718.5
WS20017	Herbert St 80mm Water Main	ING-M080-0012	01/01/1939	WATER	Water Supply	Water Mains	2.9	80	90.2
WS20018	Herbert St 80mm Water Main	ING-M080-0013	01/01/1939	WATER	Water Supply	Water Mains	3.59	80	111.97
WS20019	Herbert St 80mm Water Main	ING-M080-0014	01/01/1939	WATER	Water Supply	Water Mains	2.973172	80	93.31
WS20020	Warren St 80mm Water Main	ING-M080-0015	01/01/2008	WATER	Water Supply	Water Mains	199.26686	80	6198.79
WS20021	Warren St 80mm Water Main	ING-M080-0017	01/01/2008	WATER	Water Supply	Water Mains	244.79529	80	7613.97
WS20022	Neame St 80mm Water Main	ING-M080-0018	01/01/2009	WATER	Water Supply	Water Mains	233.87214	80	7275.41
WS20023	Neame St 80mm Water Main	ING-M080-0019	01/01/2009	WATER	Water Supply	Water Mains	152.63929	80	4746.6
WS20024	Hecht St 100mm Water Main	ING-M100-0001	01/01/1975	WATER	Water Supply	Water Mains	169.04309	100	7739.59
WS20025	Simpson St 100mm Water Main	ING-M100-0002	01/01/1975	WATER	Water Supply	Water Mains	37.470521	100	1723.45
WS20026	Townsend St 100mm Water Main	ING-M100-0003	01/01/1975	WATER	Water Supply	Water Mains	127.41131	100	5816.15
WS20027	Simpson St 100mm Water Main	ING-M100-0004	01/01/1975	WATER	Water Supply	Water Mains	95.548197	100	4389.04
WS20028	Maria Ct 100mm Water Main	ING-M100-0005	01/01/1989	WATER	Water Supply	Water Mains	153.47222	100	7052.65
WS20029	Simpson St 100mm Water Main	ING-M100-0006	01/01/1975	WATER	Water Supply	Water Mains	36.448224	100	1672.9
WS20030	Marco Ct 100mm Water Main	ING-M100-0007	01/01/1994	WATER	Water Supply	Water Mains	79.898788	100	3663.72
WS20031	Von Alpin St 100mm Water Main	ING-M100-0008	01/01/1968	WATER	Water Supply	Water Mains	98.863116	100	4533.84
WS20032	Yeldham St 100mm Water Main	ING-M100-0009	01/01/1966	WATER	Water Supply	Water Mains	325.11389	100	14883.84
WS20033	Hawkins St 100mm Water Main	ING-M100-0010	01/01/1939	WATER	Water Supply	Water Mains	275.36302	100	11298.61
WS20034	Lannercost St 100mm Water Main	ING-M100-0011	01/01/1939	WATER	Water Supply	Water Mains	315.53308	100	14441.66
WS20035	Perkins St 100mm Water Main	ING-M100-0012	01/01/1939	WATER	Water Supply	Water Mains	22.114933	100	1012.83
WS20036	Perkins St 100mm Water Main	ING-M100-0013	01/01/1974	WATER	Water Supply	Water Mains	8.956808	100	412.47
WS20037	Berwick St 100mm Water Main	ING-M100-0014	01/01/1974	WATER	Water Supply	Water Mains	137.82388	100	6327.77
WS20038	Perkins St 100mm Water Main	ING-M100-0015	01/01/1939	WATER	Water Supply	Water Mains	46.03096	100	2108.17
WS20039	Lannercost St 100mm Water Main	ING-M100-0016	01/01/1939	WATER	Water Supply	Water Mains	227.98514	100	10450.18
WS20040	Lannercost St 100mm Water Main	ING-M100-0017	01/01/1939	WATER	Water Supply	Water Mains	61.89935	100	2828.82
WS20041	Lannercost St 100mm Water Main	ING-M100-0018	01/01/1939	WATER	Water Supply	Water Mains	23.413364	100	1071.1
WS20042	Tully St 100mm Water Main	ING-M100-0019	01/01/1939	WATER	Water Supply	Water Mains	126.85982	100	0
WS20043	McIlwraith St 100mm Water Main	ING-M100-0020	01/01/1969	WATER	Water Supply	Water Mains	234.88853	100	10782.36
WS20044	Perkins St 100mm Water Main	ING-M100-0021	01/01/1969	WATER	Water Supply	Water Mains	117.73731	100	5417.07
WS20045	Lannercost St 100mm Water Main	ING-M100-0022	01/01/1939	WATER	Water Supply	Water Mains	25.426695	100	1153.5
WS20046	Herbert St 100mm Water Main	ING-M100-0023	01/01/1939	WATER	Water Supply	Water Mains	8.841387	100	403.74
WS20047	Perkins St 100mm Water Main	ING-M100-0024	01/01/1969	WATER	Water Supply	Water Mains	25.913	100	1168.66
WS20048	McIlwraith St 100mm Water Main	ING-M100-0025	01/01/1969	WATER	Water Supply	Water Mains	183.29481	100	8389.83
WS20049	Perkins St 100mm Water Main	ING-M100-0026	01/01/1969	WATER	Water Supply	Water Mains	79.910318	100	3657.2
WS20050	Churchill St 100mm Water Main	ING-M100-0027	01/01/1939	WATER	Water Supply	Water Mains	235.795	100	10807.96

Figure C.0.4: Example of Pipeline Asset Details Tab in the Water Criticality Calculator

← Pipe Criticality

Asset No.	Remaining Life	Total Age	Failure Effect on System	Redundancy	Locality	Customer	Replacement Cost	Repair Time
WS00233	1	1	3	2	1	5	1	1
WS00234	1	1	3	2	1	5	2	1
WS00235	1	1	1	2	1	5	1	1
WS00236	1	1	3	2	1	5	2	1
WS00237	1	1	3	2	1	5	1	1
WS00249	1	1	3	2	1	5	1	1
WS00250	1	1	3	2	1	5	1	1
WS00268	1	1	1	2	3	2	3	1
WS00330	1	1	1	5	3	5	1	1
WS00331	1	1	1	2	3	2	1	1
WS00393	2	1	1	2	3	1	2	1
WS00606	1	1	1	2	4	4	3	1
WS00607	1	1	1	2	4	2	1	1
WS00608	1	5	2	2	4	2	1	1
WS00614	1	1	1	2	3	2	2	1
WS00615	1	1	1	2	3	2	2	1
WS00616	1	1	2	5	4	2	2	1
WS00624	1	1	1	2	4	2	2	1
WS00625	1	1	1	2	4	4	1	1
WS00626	1	1	1	2	4	4	2	1
WS00627	1	1	1	2	4	2	1	1
WS00628	1	1	1	2	4	1	1	1
WS00629	1	1	1	2	3	2	3	1
WS00630	1	1	1	2	3	2	1	1
WS00631	1	1	1	2	3	2	2	1
WS20000	4	4	1	5	3	2	1	1
WS20001	3	3	1	2	4	2	1	1
WS20002	3	3	1	2	4	1	1	1
WS20003	3	3	1	2	4	1	1	1
WS20004	1	1	1	5	3	2	1	1
WS20005	1	1	1	5	3	2	1	1
WS20006	1	1	2	5	4	2	1	1
WS20007	5	5	1	5	5	4	1	1
WS20008	5	5	1	5	5	4	1	1
WS20009	4	4	1	5	5	4	1	1
WS20010	4	4	1	5	5	4	1	1
WS20011	5	5	1	5	5	4	1	1
WS20012	5	5	1	5	5	4	1	1
WS20013	3	4	1	5	3	1	1	1
WS20014	3	4	1	5	4	1	1	1
WS20015	5	5	1	5	5	4	1	1
WS20016	5	5	1	5	5	4	1	1
WS20017	5	5	1	5	5	4	1	1

Figure C.0.5: Example of Pipeline Severity Scoring Tab in the Water Criticality Calculator

← Pipe Criticality

Asset No.	Asset Data	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
WS00233	Forrest Beach Water treatment Plant Raw Water Line Bore 4 100mm Water Main RENEWAL	1	2.5	3	1	7.5
WS00234	Forrest Beach Water treatment Plant Raw Water Line Bore 8 100mm Water Main	1	2.5	3	1.5	11.25
WS00235	Forrest Beach Water treatment Plant Raw Water Line Bore 6 100mm Water Main	1	1.5	3	1	4.5
WS00236	Forrest Beach Water treatment Plant Raw Water Line Bore 6 & 8 Combined 150mm Water Main	1	2.5	3	1.5	11.25
WS00237	Forrest Beach Water treatment Plant Raw Water Line Bore 8 150mm Water Main	1	2.5	3	1	7.5
WS00249	NGHAM RIVER WATER PUMPING STATION River Bore 1 63mm Raw Water Main	1	2.5	3	1	7.5
WS00250	NGHAM RIVER WATER PUMPING STATION River Bore 2 63mm Raw Water Main	1	2.5	3	1	7.5
WS00268	Hunter Street 100mm Water Main Renew	1	1.5	2.5	2	7.5
WS00330	Hunter Street 100mm Water Main Renew	1	3	4	1	12
WS00331	Morrissey Street 100mm Water Main Renew	1	1.5	2.5	1	3.75
WS00393	Morehead Street 100mm Fire Water Main to Showgrounds Covered	1.5	1.5	2	1.5	6.75
WS00606	Cartwright Street 100mm Water Main RENEWAL	1	1.5	4	2	12
WS00607	Victoria Mill Road 100mm Water Main RENEWAL	1	1.5	3	1	4.5
WS00608	Victoria Mill Road 100mm Water Main RENEWAL	3	2	3	1	18
WS00614	Cassady Street 150mm Water Main	1	1.5	2.5	1.5	5.625
WS00615	Covell Street 150mm Water Main	1	1.5	2.5	1.5	5.625
WS00616	Victoria Mill Rd 150mm Water Main	1	3.5	3	1.5	15.75
WS00624	Hawkins Street 100mm Water Main;;Section Renewal 1;;RSL to Rural	1	1.5	3	1.5	6.75
WS00625	Hawkins Street 100mm Water Main;;Section Renewal 2;;In Front of Rural Supplies Entrance and Shop Dood	1	1.5	4	1	6
WS00626	Hawkins Street 100mm Water Main;;Section Renewal 3;;Left hand side of Rural Supplies	1	1.5	4	1.5	9
WS00627	Hawkins Street 100mm Water Main;;Section Renewal 4;;Left hand driveway of Rural Supplies	1	1.5	3	1	4.5
WS00628	Hawkins Street 100mm Water Main;;Section Renewal 5;;Left hand side of Rural Supplies	1	1.5	2.5	1	3.75
WS00629	Lyons Street 100mm Water Main	1	1.5	2.5	2	7.5
WS00630	Lyons Street 100mm Water Main;;Under Mahoney Street	1	1.5	2.5	1	3.75
WS00631	Lyons Street 90mm Water Main;;	1	1.5	2.5	1.5	5.625
WS20000	Morehead Street 50mm Water Main	4	3	2.5	1	30
WS20001	Palm Avenue 50mm Water Main	3	1.5	3	1	13.5
WS20002	Palm Terrace 50mm Water Main	3	1.5	2.5	1	11.25
WS20003	Palm Terrace 50mm Water Main	3	1.5	2.5	1	11.25
WS20004	Renouf Street 63mm Water Main	1	3	2.5	1	7.5
WS20005	Renouf Street 63mm Water Main	1	3	2.5	1	7.5
WS20006	Davidson Street 100mm Water Main	1	3.5	3	1	10.5
WS20007	Lannercost Street 80mm Water Main	5	3	4.5	1	67.5

Figure C.0.6 Example of Pipeline Criticality Analysis Tab in the Water Criticality Calculator

Appendix C4 –Asset Analysis Calculator Examples

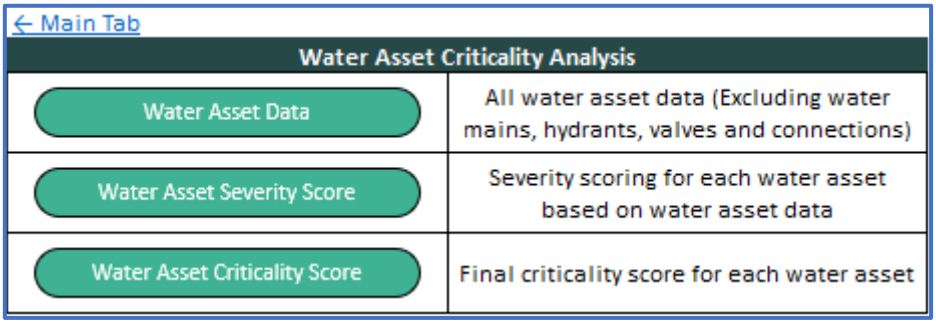


Figure C.0.7: Example of Water Asset Criticality Analysis Navigation Tab in the Water Criticality Calculator

← Water Asset Criticality

Asset No.	Asset Search Description	Asset Class	Asset Class	Asset Category	Replacement Cost	Remaining Life	Total Age
Ingham Depot Water Treatment Plant							
WS00151	COMO RD BORES FLOW METER _ DEPOT WTP	WATER	Water Supply	Water Plant & Equipment	17358.25	15	4
WS51255	INGHAM DEPOT WTP SWITCHBOARD	WATER	Electrical Infrastructure	Electrical	69388.26	8.46	23
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1	WATER	Electrical Infrastructure	Electrical	8860.02	11.26	10
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2	WATER	Electrical Infrastructure	Electrical	8860.02	11.26	10
WS51506	INGHAM DEPOT WTP HIGH LIFT PUMP 1	WATER	Water Supply	Water Pump	11535.05	7.51	23
WS51507	INGHAM DEPOT WTP HIGH LIFT PUMP 2	WATER	Water Supply	Water Pump	11535.05	7.51	23
WS51508	INGHAM DEPOT HIGH LIFT RECIRCULAT PUMP	WATER	Water Supply	Water Pump	4820.55	2.5	28
WS52005	INGHAM DEPOT WTP TELEMETERY	WATER	Electrical Infrastructure	Electrical	10038.15	2.99	18
WS52109	DEPOT WTP 3.8MI RESERVOIR STRUCTURE	WATER	Water Supply	Water Reservoirs	128019.26	83.5	23
WS52110	DEPOT WTP 3.8MI RESERVOIR BOTTOM LINER	WATER	Water Supply	Water Reservoirs	89915.15	13.45	23
WS52111	DEPOT WTP 3.8MI RESERVOIR ROOF LINER	WATER	Water Supply	Water Reservoirs	0	10.43	11
WS52112	DEPOT WTP CONCRETE MAZE RESERVOIR	WATER	Water Supply	Water Reservoirs	246445.75	83.51	23
WS52155	INGHAM DEPOT WTP AERATOR BUND	WATER	Water Supply	Water Treatment Systems	95883.89	13.45	23
WS52160	INGHAM DEPOT WTP SAND FILTER BEDS	WATER	Water Supply	Water Treatment Systems	182761.84	33.47	23
WS52175	INGHAM DEPOT WTP AERATOR	WATER	Water Supply	Water Treatment Systems	35264.84	25	4
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WTP	WATER	Water Supply	Water Treatment Facility	71147.46	25	4
WS52185	INGHAM DEPOT WTP CCTV	WATER	Water Supply	Water Treatment Systems	20610.83	10	4
WS53112	Chemical Controller - Depot WTP	WATER	Water Supply	Water Plant & Equipment	7023.2	13.75	7
WS53125	Hypo Chem Tank & Safe Shower - ING DEPOT	WATER	Water Supply	Water Plant & Equipment	0	5	6
WS75061	DISTRIBUTION PIPES - FILTER DEPOT WTP	WATER	Water Supply	Water Treatment Systems	30288.87	10	3
Ingham Pumping Station							
WS00152	RIVER BORE FLOW METER _ BORE 1	WATER	Water Supply	Water Plant & Equipment	2432.43	10	4
WS00153	RIVER BORE FLOW METER _ BORE 2	WATER	Water Supply	Water Plant & Equipment	2432.43	10	4
WS00198	RIVER BORE 1 STRUCTURE	WATER	Water Supply	Water Treatment Systems	13481.97	25	3
WS00199	RIVER BORE 2 STRUCTURE	WATER	Water Supply	Water Treatment Systems	11000.23	25	3
WS00243	RIVER BORE PUMP 1	WATER	Water Supply	Water Pump	5835.14	10	4
WS00244	RIVER BORE PUMP 1 Spare	WATER	Water Supply	Water Pump	5835.14	10	4
WS00245	RIVER BORE PUMP 2	WATER	Water Supply	Water Pump	5835.14	10	4
WS00246	RIVER BORE PUMP 2 Spare	WATER	Water Supply	Water Pump	5835.15	10	4
WS00247	RIVER BORE 1 ELECTRICAL SERVICE	WATER	Electrical Infrastructure	Electrical	10149.85	10	4
WS00248	RIVER BORE 2 ELECTRICAL SERVICE	WATER	Electrical Infrastructure	Electrical	10149.84	25	4
WS00253	River Outlet Flowmeter Pit	WATER	Water Supply	Water Treatment Facility	14328.8	80	4
WS00342	INGHAM WPS PIPE BRIDGE	WATER	Water Supply	Water Pump Stations	34401.02	50	3
WS51250	INGHAM RIVER HIGH LIFT STN SWITCHBOARD	WATER	Electrical Infrastructure	Electrical	151540.51	20.94	10
WS51251	INGHAM RIVER HIGH LIFT SOFT STARTERS 1	WATER	Electrical Infrastructure	Electrical	9523.56	10.93	10
WS51252	INGHAM RIVER HIGH LIFT SOFT STARTERS 2	WATER	Electrical Infrastructure	Electrical	9523.56	11.93	9
WS51253	INGHAM RIVER HIGH LIFT SOFT STARTERS 3	WATER	Electrical Infrastructure	Electrical	9523.56	12.93	8
WS51254	INGHAM RIVER LOW LIFT STN SWITCHBOARD	WATER	Electrical Infrastructure	Electrical	85926.46	16.85	14
WS51299	INGHAM L/LIFTSTN BORE HOLE 1 STRUC RENEW	WATER	Water Supply	Water Pump Stations	51321.43	40	7
WS51300	INGHAM L/LIFTSTN BORE HOLE 2 STRUC RENEW	WATER	Water Supply	Water Pump Stations	51321.45	40	7
WS51301	INGHAM L/LIFTSTN TEST BORE 3 STRUC RENEW	WATER	Water Supply	Water Pump Stations	51321.43	40	7
WS51302	INGHAM L/LIFTSTN OBSERVATION BORE4 STRUC	WATER	Water Supply	Water Pump Stations	39641.58	40	7

Figure C.0.8: Example of Water Asset Details Tab in the Water Criticality Calculator

← Water Asset Criticality

Asset No.	Remaining Life	Total Age	Failure Effect on System	Redundancy	Locality	Customer	Replacement Cost	Repair Time
Ingham Depot Water Treatment Plant								
WS00151	5	1	1	1	4	5	2	3
WS51255	5	2	4	5	4	5	3	5
WS51256	5	1	4	1	4	5	2	5
WS51257	5	1	4	1	4	5	2	5
WS51506	5	2	1	1	4	5	2	4
WS51507	5	2	1	1	4	5	2	4
WS51508	5	2	4	5	4	5	1	4
WS52005	5	2	1	5	4	5	2	5
WS52109	1	2	4	2	4	5	4	5
WS52110	5	2	4	2	4	5	3	5
WS52111	5	1	4	2	4	5	1	5
WS52112	1	2	4	4	4	5	4	3
WS52155	5	2	4	5	4	5	3	3
WS52160	3	2	4	5	4	5	4	3
WS52175	4	1	4	5	4	5	3	3
WS52176	4	1	1	1	4	5	3	5
WS52185	5	1	1	1	4	5	2	3
WS53112	5	1	4	5	4	5	2	5
WS53125	5	1	4	5	4	5	1	5
WS75061	5	1	1	4	4	5	3	1
Ingham Pumping Station								
WS00152	5	1	1	1	1	5	1	3
WS00153	5	1	1	1	1	5	1	3
WS00198	4	1	3	2	1	5	2	5
WS00199	4	1	3	2	1	5	2	5
WS00243	5	1	3	2	1	5	2	4
WS00244	5	1	2	2	1	5	2	4
WS00245	5	1	3	2	1	5	2	4
WS00246	5	1	2	2	1	5	2	4
WS00247	5	1	3	2	1	5	2	3
WS00248	4	1	3	2	1	5	2	3
WS00253	1	1	1	4	1	5	2	5
WS00342	2	1	4	5	1	5	3	5
WS51250	4	1	4	5	1	5	4	5
WS51251	5	1	4	1	1	5	2	5
WS51252	5	1	4	1	1	5	2	5
WS51253	5	1	4	1	1	5	2	5
WS51254	4	1	3	5	1	5	3	5
WS51299	3	1	3	2	1	5	3	5
WS51300	3	1	3	2	1	5	3	5
WS51301	3	1	3	2	1	5	3	5

Figure C.0.9: Example of Water Asset Severity Scoring Tab in the Water Criticality Calculator

← Water Asset Criticality

Asset No.	Asset Decription	Asset Age	System Criticality	Service Delivery	Financial	Criticality Score
Ingham Depot Water Treatment Plant						
WS00151	DN 200 COMOM ROAD BORE PUMPS FLOW METER _ DEPOT WTP - 200mm	3	1	4.5	2.5	33.75
WS51255	INGHAM DEPOT WTP SWITCHBOARD	3.5	4.5	4.5	4	283.5
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1	3	2.5	4.5	3.5	118.125
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2	3	2.5	4.5	3.5	118.125
WS51506	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 1	3.5	1	4.5	3	47.25
WS51507	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 2	3.5	1	4.5	3	47.25
WS51508	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT RECIRCULATING	3.5	4.5	4.5	2.5	177.1875
WS52005	INGHAM DEPOT WATER TREATMENT PLANT TELEMETERY	3.5	3	4.5	3.5	165.375
WS52109	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR STRUCTURE	1.5	3	4.5	4.5	91.125
WS52110	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR BOTTOM LINER	3.5	3	4.5	4	189
WS52111	DEPOT WATER TREATMENT PLANT 3.8MI RESERVOIR ROOF LINER	3	3	4.5	3	121.5
WS52112	DEPOT WATER TREATMENT PLANT CONCRETE MAZE RESERVOIR	1.5	4	4.5	3.5	94.5
WS52155	INGHAM DEPOT WATER TREATMENT PLANT AERATOR BUND	3.5	4.5	4.5	3	212.625
WS52160	INGHAM DEPOT WATER TREATMENT PLANT SAND FILTER BEDS	2.5	4.5	4.5	3.5	177.1875
WS52175	INGHAM DEPOT WATER TREATMENT PLANT AERATOR;;Renewal	2.5	4.5	4.5	3	151.875
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WATER TREATMENT PLANT	2.5	1	4.5	4	45
WS52185	INGHAM DEPOT WATER TREATMENT PLANT CCTV SECURITY CAMERAS	3	1	4.5	2.5	33.75
WS53112	Sodium Hypo Chemical Controller - Depot WTP	3	4.5	4.5	3.5	212.625
WS53125	Sodium Hypochlorite Chemical Tank and Safety Shower - Ingham Depot Water Treatment Plant	3	4.5	4.5	3	182.25
WS75061	WATER DISTRBUTION PIPES - SAND FILTER INGHAM DEPOT WATER TREATMENT PLANT	3	2.5	4.5	2	67.5
Average		**2.95**	**3.0**	**4.5**	**3.3**	**128.475**
Ingham Pumping Station						
WS00152	DN 50 INGHAM RIVER BORE 1 FLOW METER _ FOR RIVER BORE1 LINE -	3	1	3	2	18
WS00153	DN 50 INGHAM RIVER BORE 2 FLOW METER _ FOR RIVER BORE2 LINE -	3	1	3	2	18
WS00198	INGHAM LOW LIFT PUMPING STATION RIVER BORE 1 STRUCTURE	2.5	2.5	3	3.5	65.625
WS00199	INGHAM LOW LIFT PUMPING STATION RIVER BORE 2 STRUCTURE	2.5	2.5	3	3.5	65.625
WS00243	INGHAM LOW LIFT STATION RIVER BORE PUMP 1	3	2.5	3	3	67.5
WS00244	INGHAM LOW LIFT STATION RIVER BORE PUMP 1 SPARE	3	2	3	3	54
WS00245	INGHAM LOW LIFT STATION RIVER BORE PUMP 2	3	2.5	3	3	67.5
WS00246	INGHAM LOW LIFT STATION RIVER BORE PUMP 2 SPARE	3	2	3	3	54
WS00247	INGHAM WATER PUMPING STATION RIVER BORE 1 ELECTRICAL SERVICE	3	2.5	3	2.5	56.25
WS00248	INGHAM WATER PUMPING STATION RIVER BORE 2 ELECTRICAL SERVICE	2.5	2.5	3	2.5	46.875
WS00253	River Outlet Flow Meter Pit	1	2.5	3	3.5	26.25
WS00342	INGHAM Water Pumping Station PIPE BRIDGE	1.5	4.5	3	4	81
WS51250	INGHAM RIVER HIGH LIFT STN SWITCHBOARD	2.5	4.5	3	4.5	151.875
WS51251	INGHAM RIVER HIGH LIFT SOFT STARTERS 1	3	2.5	3	3.5	78.75
WS51252	INGHAM RIVER HIGH LIFT SOFT STARTERS 2	3	2.5	3	3.5	78.75
WS51253	INGHAM RIVER HIGH LIFT SOFT STARTERS 3	3	2.5	3	3.5	78.75
WS51254	INGHAM RIVER LOW LIFT STN SWITCHBOARD	2.5	4	3	4	120

Figure C.0.10: Example of Water Asset Criticality Analysis Tab in the Water Criticality Calculator

Appendix C5 – Combined Criticality Ranking Examples

← Main Tab

Asset No	Asset Description	Asset Ag	System Criticalit	Service Deliver	Financia	Criticality Score
WS00154	DN 100 FORREST BEACH WTP BORE 4 FLOW METER _ FORREST BCH BORE4 LINE - 100mm	3	1	2.5	1	7.5
WS00155	DN 100 FORREST BEACH WTP BORE 6A FLOW METER _ FORREST BCH BORE6A LINE - 100mm	3	1	2.5	1	7.5
WS00156	DN 100 FORREST BEACH WTP BORE 8 FLOW METER _ FORREST BCH BORE8 LINE - 100mm	3	1	2.5	1	7.5
WS00157	DN 150 FORREST BEACH WTP BORE 7 FLOW METER _ FORREST BCH BORE7 LINE - 150mm	3	1	2.5	1	7.5
WS00200	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER SHADE COVER	3	1	2.5	1.5	11.25
WS00233	Forrest Beach Water treatment Plant Raw Water Line Bore 4 100mm Water Main RENEWAL	1	2.5	3	1	7.5
WS00234	Forrest Beach Water treatment Plant Raw Water Line Bore 8 100mm Water Main	1	2.5	3	1.5	11.25
WS00235	Forrest Beach Water treatment Plant Raw Water Line Bore 6 100mm Water Main	1	1.5	3	1	4.5
WS00236	Forrest Beach Water treatment Plant Raw Water Line Bore 6 & 8 Combined 150mm Water Main	1	2.5	3	1.5	11.25
WS00237	Forrest Beach Water treatment Plant Raw Water Line Bore 8 150mm Water Main	1	2.5	3	1	7.5
WS00249	NGHAM RIVER WATER PUMPING STATION River Bore 1 63mm Raw Water Main	1	2.5	3	1	7.5
WS00250	NGHAM RIVER WATER PUMPING STATION River Bore 2 63mm Raw Water Main	1	2.5	3	1	7.5
WS00267	Dungeness Road 150mm Recirculation Water Main - Lucinda Low Level Reservoir. Lucinda BPS	1.5	1.5	3	1.5	10.125
WS00330	Hunter Street 100mm Water Main Renew	1	3	4	1	12
WS00331	Morrissey Street 100mm Water Main Renew	1	1.5	2.5	1	3.75
WS00393	Morehead Street 100mm Fire Water Main to Showgrounds Covered	1.5	1.5	2	1.5	6.75
WS00437	MACKNADE BORE 2 TELEMETERY Renewal	3	2.5	3.5	1.5	39.375
WS00607	Victoria Mill Road 100mm Water Main RENEWAL	1	1.5	3	1	4.5
WS00608	Victoria Mill Road 100mm Water Main RENEWAL	3	2	3	1	18
WS00614	Cassady Street 150mm Water Main	1	1.5	2.5	1.5	5.625
WS00615	Covell Street 150mm Water Main	1	1.5	2.5	1.5	5.625
WS00616	Victoria Mill Rd 150mm Water Main	1	3.5	3	1.5	15.75
WS00624	Hawkins Street 100mm Water Main;;Section Renewal 1;;RSL to Rural	1	1.5	3	1.5	6.75
WS00625	Hawkins Street 100mm Water Main;;Section Renewal 2;;In Front of Rural Supplies Entrance and Shop Dood	1	1.5	4	1	6
WS00626	Hawkins Street 100mm Water Main;;Section Renewal 3;;Left hand side of Rural Supplies	1	1.5	4	1.5	9
WS00627	Hawkins Street 100mm Water Main;;Section Renewal 4;;Left hand driveway of Rural Supplies	1	1.5	3	1	4.5
WS00628	Hawkins Street 100mm Water Main;;Section Renewal 5;;Left hand side of Rural Supplies	1	1.5	2.5	1	3.75

Figure C.0.11: Example of Combined Criticality Ranking Tab in the Water Criticality Calculator

Appendix D – Water Criticality Analysis Results

Appendix D1 –Combined Water Criticality Ranking Results

Table D.1: Combined Water Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS00107	MACKNADE WATER TREATMENT PLANT BORE INSTRUMENTS LEVEL & CONTROL INSTRUMENTS	52.5
WS00138	FORREST BEACH WATER TREATMENT PLANT STAINLESS STEEL AERATOR and TRAYS RENEWAL	100
WS00139	Forrest Beach High lift Station Reservoir safety ladder and hand rails	21.875
WS00151	DN 200 COMOM ROAD BORE PUMPS FLOW METER _ DEPOT WTP - 200mm	33.75
WS00152	DN 50 INGHAM RIVER BORE 1 FLOW METER _ FOR RIVER BORE1 LINE - 50mm	18
WS00153	DN 50 INGHAM RIVER BORE 2 FLOW METER _ FOR RIVER BORE2 LINE - 50mm	18
WS00154	DN 100 FORREST BEACH WTP BORE 4 FLOW METER _ FORREST BCH BORE4 LINE - 100mm	7.5
WS00155	DN 100 FORREST BEACH WTP BORE 6A FLOW METER _ FORREST BCH BORE6A LINE - 100mm	7.5
WS00156	DN 100 FORREST BEACH WTP BORE 8 FLOW METER _ FORREST BCH BORE8 LINE - 100mm	7.5
WS00157	DN 150 FORREST BEACH WTP BORE 7 FLOW METER _ FORREST BCH BORE7 LINE - 150mm	7.5
WS00183	EMERGENCY GENERATOR _ MACKNADE WATER TREATMENT PLANT	105
WS00190	MACKNADE WTP HIGH LIFT PUMP 1;;RENEWAL	10.5
WS00191	MACKNADE WTP HIGH LIFT PUMP 2;;RENEWAL	10.5
WS00192	MACKNADE WTP HIGH LIFT PUMP 3;;RENEWAL	10.5
WS00198	INGHAM LOW LIFT PUMPING STATION RIVER BORE 1 STRUCTURE	65.625
WS00199	INGHAM LOW LIFT PUMPING STATION RIVER BORE 2 STRUCTURE	65.625
WS00200	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER SHADE COVER SOUTH	11.25
WS00204	CONCRETE SIDE WALL FILTER BED MACKNADE Water Treatment Plant	112
WS00213	FORREST BEACH WATER PUMPING STATION HIGH LIFT PUMP 1 RENEWAL	45
WS00214	FORREST BEACH WATER PUMPING STATION HIGH LIFT PUMP 2 RENEWAL	45
WS00223	FORREST BEACH WATER TREATMENT PLANT BORE 6A STRUCTURE	62.5
WS00224	FORREST BEACH WATER TREATMENT PLANT BORE 8 STRUCTURE	62.5
WS00225	FORREST BCH BORE 4 ELECTRICAL SERVICE RENEWAL	39.0625
WS00226	FORREST BCH BORE 6A ELECTRICAL SERVICE RENEWAL	39.0625
WS00227	FORREST BCH BORE 7 ELECTRICAL SERVICE RENEWAL	39.0625
WS00228	FORREST BCH BORE 8 ELECTRICAL SERVICE	46.875
WS00230	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 6A	56.25
WS00231	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 8	56.25

Asset No.	Asset Description	Criticality Score
WS00232	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 6A & 8 Spare	45
WS00233	Forrest Beach Water treatment Plant Raw Water Line Bore 4 100mm Water Main RENEWAL	7.5
WS00234	Forrest Beach Water treatment Plant Raw Water Line Bore 8 100mm Water Main	11.25
WS00235	Forrest Beach Water treatment Plant Raw Water Line Bore 6 100mm Water Main	4.5
WS00236	Forrest Beach Water treatment Plant Raw Water Line Bore 6 & 8 Combined 150mm Water Main	11.25
WS00237	Forrest Beach Water treatment Plant Raw Water Line Bore 8 150mm Water Main	7.5
WS00243	INGHAM LOW LIFT STATION RIVER BORE PUMP 1	67.5
WS00244	INGHAM LOW LIFT STATION RIVER BORE PUMP 1 SPARE	54
WS00245	INGHAM LOW LIFT STATION RIVER BORE PUMP 2	67.5
WS00246	INGHAM LOW LIFT STATION RIVER BORE PUMP 2 SPARE	54
WS00247	INGHAM WATER PUMPING STATION RIVER BORE 1 ELECTRICAL SERVICE	56.25
WS00248	INGHAM WATER PUMPING STATION RIVER BORE 2 ELECTRICAL SERVICE	46.875
WS00249	NGHAM RIVER WATER PUMPING STATION River Bore 1 63mm Raw Water Main	7.5
WS00250	NGHAM RIVER WATER PUMPING STATION River Bore 2 63mm Raw Water Main	7.5
WS00253	River Outlet Flow Meter Pit	26.25
WS00255	FORREST BEACH WATER TREATMENT PLANT AERATOR BUND Renewal	40
WS00256	LUCINDA BOOSTER PUMPING STATION 3ML RESERVOIR ROOF (ALUMINIUM)	150
WS00257	LUCINDA BOOSTER PUMPING STATION 3ML RESERVOIR DIVERS PLATFORM	26.25
WS00266	LUCINDA WATER BOOSTER PUMPING STATION RECIRCULATING PUMP	90
WS00267	Dungeness Road 150mm Recirculation Water Main - Lucinda Low Level Reservoir. Lucinda BPS	10.125
WS00268	Hunter Street 100mm Water Main Renew	7.5
WS00330	Hunter Street 100mm Water Main Renew	12
WS00331	Morrissey Street 100mm Water Main Renew	3.75
WS00337	FORREST BEACH WTP TRANSFER PUMP 1 Renew	37.5
WS00340	FORREST BEACH WTP TRANSFER PUMP 2 Renew	37.5
WS00342	INGHAM Water Pumping Station PIPE BRIDGE	81
WS00368	DN 150 WASHAWAY WATER BOOSTER PUMPING STATION FLOW METER _ 150mm	56.25
WS00369	DN 150 LUCINDA WATER BOOSTER PUMPING STATION FLOW METER _ 150mm;;Property No 102023	45
WS00370	DN 150 TREBONNE WATER BOOSTER PUMPING STATION FLOW METER _ 150mm;;Property No 102023	56.25
WS00371	TREBONNE BPS Flow Meter Pit	67.5
WS00372	WASHAWAY PRESSURE PUMP 1 Renewal	40.5

Asset No.	Asset Description	Criticality Score
WS00373	WASHAWAY PRESSURE PUMP 2 Renewal	40.5
WS00374	WASHAWAY PRESSURE PUMP 3 Renewal	40.5
WS00375	WASHAWAY PRESSURE PUMP 4 Renewal	40.5
WS00376	WASHAWAY BPS PRESSURE PUMP SWITCHBOARD Renewal	108
WS00385	MACKNADE WATER TREATMENT PLANT PRESSURE PUMP 1 Renewal	26.25
WS00386	MACKNADE WATER TREATMENT PLANT PRESSURE PUMP 2 Renewal	26.25
WS00387	MACKNADE WATER TREATMENT PLANT PRESSURE PUMP 3 Renewal	26.25
WS00388	MACKNADE WATER TREATMENT PLANT PRESSURE PUMP 4 Renewal	26.25
WS00389	MACKNADE WTP PRESSURE PUMP SWITCHBOARD Renewal	105
WS00393	Morehead Street 100mm Fire Water Main to Showgrounds Covered Arena	6.75
WS00409	Forrest Beach Water Treatment Plant SINGLE ACCESS LID * 4	7.5
WS00437	MACKNADE BORE 2 TELEMETERY Renewal	39.375
WS00606	Cartwright Street 100mm Water Main RENEWAL	12
WS00607	Victoria Mill Road 100mm Water Main RENEWAL	4.5
WS00608	Victoria Mill Road 100mm Water Main RENEWAL	18
WS00609	LUCINDA BPS PRESSURE PUMP SWITCHBOARD REPLACEMENT RENEWAL 2	90
WS00610	LUCINDA BPS PRESSURE PUMP 1 Renewal	33.75
WS00611	LUCINDA BPS PRESSURE PUMP 2 Renewal	33.75
WS00612	LUCINDA BPS PRESSURE PUMP 3 Renewal	33.75
WS00613	LUCINDA BPS PRESSURE PUMP4 Renewal	33.75
WS00614	Cassady Street 150mm Water Main	5.625
WS00615	Covell Street 150mm Water Main	5.625
WS00616	Victoria Mill Rd 150mm Water Main	15.75
WS00624	Hawkins Street 100mm Water Main;;Section Renewal 1;;RSL to Rural Supplies	6.75
WS00625	Hawkins Street 100mm Water Main;;Section Renewal 2;;In Front of Rural Supplies Entrance and Shop Dood	6
WS00626	Hawkins Street 100mm Water Main;;Section Renewal 3;;Left hand side of Rural Supplies	9
WS00627	Hawkins Street 100mm Water Main;;Section Renewal 4;;Left hand driveway of Rural Supplies	4.5
WS00628	Hawkins Street 100mm Water Main;;Section Renewal 5;;Left hand side of Rural Supplies	3.75
WS00629	Lyons Street 100mm Water Main	7.5
WS00630	Lyons Street 100mm Water Main;;Under Mahoney Street	3.75
WS00631	Lyons Street 90mm Water Main;;	5.625
WS20000	Morehead Street 50mm Water Main	30
WS20001	Palm Avenue 50mm Water Main	13.5
WS20002	Palm Terrace 50mm Water Main	11.25
WS20003	Palm Terrace 50mm Water Main	11.25
WS20004	Renouf Street 63mm Water Main	7.5
WS20005	Renouf Street 63mm Water Main	7.5
WS20006	Davidson Street 100mm Water Main	10.5

Asset No.	Asset Description	Criticality Score
WS20007	Lannercost Street 80mm Water Main	67.5
WS20008	Herbert Street 80mm Water Main	67.5
WS20009	Lannercost Street 80mm Water Main	54
WS20010	Lannercost Street 80mm Water Main	54
WS20011	Herbert Street 80mm Water Main	67.5
WS20012	Herbert Street 80mm Water Main	67.5
WS20013	Cooper Street 80mm Water Main	21
WS20014	Marina Parade 80mm Water Main	26.25
WS20015	Herbert Street 80mm Water Main	67.5
WS20016	Herbert Street 80mm Water Main	67.5
WS20017	Herbert Street 80mm Water Main	67.5
WS20018	Herbert Street 80mm Water Main	67.5
WS20019	Herbert Street 80mm Water Main	67.5
WS20020	Warren Street 80mm Water Main	7.875
WS20021	Warren Street 80mm Water Main	5.625
WS20022	Neame Street 80mm Water Main	5.625
WS20023	Neame Street 80mm Water Main	3.75
WS20024	Hecht Street 100mm Water Main	33.75
WS20025	Simpson Street 100mm Water Main	11.25
WS20026	Townsend Street 100mm Water Main	33.75
WS20027	Simpson Street 100mm Water Main	11.25
WS20028	Maria Court 100mm Water Main	22.5
WS20029	Simpson Street 100mm Water Main	11.25
WS20030	Marco Court 100mm Water Main	15
WS20031	Von Alpin Street 100mm Water Main	26.25
WS20032	Yeldham Street 100mm Water Main	22.5
WS20033	Hawkins Street 100mm Water Main	45
WS20034	Lannercost Street 100mm Water Main	50.625
WS20035	Perkins Street 100mm Water Main	43.75
WS20036	Perkins Street 100mm Water Main	11.25
WS20037	Berwick Street 100mm Water Main	33.75
WS20038	Perkins Street 100mm Water Main	18.75
WS20039	Lannercost Street 100mm Water Main	50.625
WS20040	Lannercost Street 100mm Water Main	33.75
WS20041	Lannercost Street 100mm Water Main	33.75
WS20042	Tully Street 100mm Water Main	6
WS20043	McIlwraith Street 100mm Water Main	13.125
WS20044	Perkins Street 100mm Water Main	19.6875
WS20045	Lannercost Street 100mm Water Main	26.25
WS20046	Herbert Street 100mm Water Main	67.5
WS20047	Perkins Street 100mm Water Main	30.625
WS20048	McIlwraith Street 100mm Water Main	55.125

Asset No.	Asset Description	Criticality Score
WS20049	Perkins Street 100mm Water Main	26.25
WS20050	Churchill Street 100mm Water Main	65.625
WS20051	Chamberlain Street 100mm Water Main	12
WS20052	George Street 100mm Water Main	28.125
WS20053	George Street 100mm Water Main	37.5
WS20054	Herbert Street 100mm Water Main	33.75
WS20055	Gort Street 100mm Water Main	15
WS20056	Fanning Street 100mm Water Main	22.5
WS20057	Gort Street 100mm Water Main	22.5
WS20058	Gort Street 100mm Water Main	22.5
WS20059	George Street 100mm Water Main	39.375
WS20060	Herbert Street 100mm Water Main	33.75
WS20061	Herbert Street 100mm Water Main	50.625
WS20062	Herbert Street 100mm Water Main	33.75
WS20063	Herbert Street 100mm Water Main	33.75
WS20064	Lannercost Street 100mm Water Main	54
WS20065	Lynn Street 100mm Water Main	28.125
WS20066	Lynn Street 100mm Water Main	15
WS20067	Lynn Street 100mm Water Main	18.75
WS20068	Gedge Street 100mm Water Main	10.5
WS20069	Herbert Street 100mm Water Main	50.625
WS20070	Herbert Street 100mm Water Main	50.625
WS20071	Gardiner Street 100mm Water Main	18.75
WS20072	Gardiner Street 100mm Water Main	26.25
WS20073	Gardiner Street 100mm Water Main	18.75
WS20074	Gardiner Street 100mm Water Main	18.75
WS20075	Authurs Street 100mm Water Main	27
WS20076	Herbert Street 100mm Water Main	50.625
WS20077	White Street 100mm Water Main	56.25
WS20078	Lynch Street 100mm Water Main	28.125
WS20079	Cartwright Street 100mm Water Main	18.75
WS20080	Lynch Street 100mm Water Main	15
WS20081	Lynch Street 100mm Water Main	22.5
WS20082	Heard Street 100mm Water Main	39.375
WS20083	Herbert Street 100mm Water Main	33.75
WS20084	Allingham Street 100mm Water Main	28.125
WS20085	Allingham Street 100mm Water Main	22.5
WS20086	Herbert Street 100mm Water Main	50.625
WS20087	Venables Street 100mm Water Main	18.75
WS20088	Blamey Street 100mm Water Main	28.125
WS20089	Venables Street 100mm Water Main	13.125
WS20090	Garbutt Street 100mm Water Main	45

Asset No.	Asset Description	Criticality Score
WS20091	Garbutt Street 100mm Water Main	19.6875
WS20092	Garbutt Street 100mm Water Main	19.6875
WS20093	Garbutt Street 100mm Water Main	19.6875
WS20094	Leckie Street 100mm Water Main	26.25
WS20095	Cartwright Street 100mm Water Main	18.75
WS20096	Omalley Street 100mm Water Main	39.375
WS20097	Ann Street 100mm Water Main	65.625
WS20098	Francis Street 100mm Water Main	28.125
WS20099	Francis Street 100mm Water Main	26.25
WS20100	Cartwright Street 100mm Water Main	67.5
WS20101	Cartwright Street 100mm Water Main	45
WS20102	Victoria Mill Road 100mm Water Main	9
WS20103	Menzies Street 100mm Water Main	22.5
WS20104	Cartwright Street 100mm Water Main	22.5
WS20105	Cassady Street 100mm Water Main	18.75
WS20106	Cartwright Street 100mm Water Main	33.75
WS20107	Cartwright Street 100mm Water Main	45
WS20108	Mahoney Street 100mm Water Main	13.125
WS20109	Mahoney Street 100mm Water Main	13.125
WS20110	Tilley Street 100mm Water Main	26.25
WS20111	Lyons Street 100mm Water Main	3.75
WS20112	Mahoney Street 100mm Water Main	26.25
WS20113	Cassady Street 100mm Water Main	28.125
WS20114	Cassady Street 100mm Water Main	15
WS20115	Cassady Street 100mm Water Main	19.6875
WS20116	Morrissey Street 100mm Water Main	13.125
WS20117	Stone Street 100mm Water Main	28.125
WS20118	Hardy Street 100mm Water Main	15
WS20119	Jesson Street 100mm Water Main	22.5
WS20120	Jesson Street 100mm Water Main	16.875
WS20121	Morrissey Street 100mm Water Main	19.6875
WS20122	Morrissey Street 100mm Water Main	11.25
WS20123	Hunter Street 100mm Water Main	3.75
WS20124	Burke Street 100mm Water Main	39.375
WS20125	Burke Street 100mm Water Main	45
WS20126	Burke Street 100mm Water Main	26.25
WS20127	Blackburn Street 100mm Water Main	22.5
WS20128	Burke Street 100mm Water Main	22.5
WS20129	Hardy Street 100mm Water Main	22.5
WS20130	Hardy Street 100mm Water Main	37.5
WS20131	Hardy Street 100mm Water Main	28.125
WS20132	Hardy Street 100mm Water Main	18.75

Asset No.	Asset Description	Criticality Score
WS20133	Stone Street 100mm Water Main	31.25
WS20134	Hardy Street 100mm Water Main	36
WS20135	Stallan Street 100mm Water Main	15
WS20136	Stallan Street 100mm Water Main	22.5
WS20137	Harvey Street 100mm Water Main	54
WS20138	Covell Street 100mm Water Main	16.875
WS20139	Victoria Mill Road 100mm Water Main	9
WS20140	Victoria Mill Road 100mm Water Main	11.25
WS20141	Victoria Mill Road 100mm Water Main	40.5
WS20142	Badila Street 100mm Water Main	11.25
WS20143	Trojan Street 100mm Water Main	16.875
WS20144	Sir Arthur Fadden Parade 100mm Water Main	16.875
WS20145	Badila Street 100mm Water Main	15
WS20146	Pindar Street 100mm Water Main	16.875
WS20147	Marina Parade 100mm Water Main	28.125
WS20148	Menzies Street 100mm Water Main	22.5
WS20149	Alston Street 100mm Water Main	18.75
WS20150	Borello Street 100mm Water Main	30
WS20151	Roati Street 100mm Water Main	19.6875
WS20152	Alston Street 100mm Water Main	18.75
WS20153	Boyd Street 100mm Water Main	28.125
WS20154	Miles Street 100mm Water Main	13.125
WS20155	Macdonald Street 100mm Water Main	28.125
WS20156	Boyd Street 100mm Water Main	19.6875
WS20157	Alston Street 100mm Water Main	18.75
WS20158	Alston Street 100mm Water Main	18.75
WS20159	Macdonald Street 100mm Water Main	18.75
WS20160	Macdonald Street 100mm Water Main	19.6875
WS20161	Cooper Street 100mm Water Main	13.125
WS20162	Alston Street 100mm Water Main	28.125
WS20163	Dutton Street 100mm Water Main	19.6875
WS20164	Dutton Street 100mm Water Main	13.125
WS20165	Dutton Street 100mm Water Main	13.125
WS20166	Cooper Street 100mm Water Main	19.6875
WS20167	Dutton Street 100mm Water Main	19.6875
WS20168	Dutton Street 100mm Water Main	19.6875
WS20169	Dutton Street 100mm Water Main	26.25
WS20170	McIlwraith Street 100mm Water Main	67.5
WS20171	Miles Street 100mm Water Main	22.5
WS20172	Cooper Street 100mm Water Main	15
WS20173	Miles Street 100mm Water Main	19.6875
WS20174	Conroy Street 100mm Water Main	19.6875

Asset No.	Asset Description	Criticality Score
WS20175	Morehead Street 100mm Water Main	19.6875
WS20176	Morehead Street 100mm Water Main	39.375
WS20177	Miles Street 100mm Water Main	13.125
WS20178	Robertson Street 100mm Water Main	39.375
WS20179	Miles Street 100mm Water Main	28.125
WS20180	Fraser Street 100mm Water Main	39.375
WS20181	Fraser Street 100mm Water Main	28.125
WS20182	Miles Street 100mm Water Main	18.75
WS20183	Duffy Street 100mm Water Main	15
WS20184	Griffith Street 100mm Water Main	22.5
WS20185	Miles Street 100mm Water Main	22.5
WS20186	Griffith Street 100mm Water Main	18.75
WS20187	Fisher Street 100mm Water Main	22.5
WS20188	Griffith Street 100mm Water Main	28.125
WS20189	Gard Street 100mm Water Main	39.375
WS20190	Fraser Street 100mm Water Main	18.75
WS20191	Cooper Street 100mm Water Main	18.75
WS20192	Cooper Street 100mm Water Main	15
WS20193	Abbott Street 100mm Water Main	18.75
WS20194	Cooper Street 100mm Water Main	28.125
WS20195	Jane Street 100mm Water Main	22.5
WS20196	McIlwraith Street 100mm Water Main	33.75
WS20197	McIlwraith Street 100mm Water Main	60
WS20198	McIlwraith Street 100mm Water Main	22.5
WS20199	Macrossan Avenue 100mm Water Main	31.5
WS20200	Macrossan Avenue 100mm Water Main	47.25
WS20201	Halifax Road 100mm Water Main	67.5
WS20202	Markey Street 100mm Water Main	16.875
WS20203	Rutledge Street 100mm Water Main	18.75
WS20204	Rutledge Street 100mm Water Main	28.125
WS20205	Philp Street 100mm Water Main	28.125
WS20206	Davidson Street 100mm Water Main	27
WS20207	Dickson Street 100mm Water Main	31.5
WS20208	Dickson Street 100mm Water Main	22.5
WS20209	Dickson Street 100mm Water Main	15
WS20210	Philp Street 100mm Water Main	18.75
WS20211	Philp Street 100mm Water Main	19.6875
WS20212	Davidson Street 100mm Water Main	18
WS20213	Davidson Street 100mm Water Main	15.75
WS20214	Skinner Street 100mm Water Main	19.6875
WS20215	Skinner Street 100mm Water Main	13.125
WS20216	Cockrell Street 100mm Water Main	19.6875

Asset No.	Asset Description	Criticality Score
WS20217	Skinner Street 100mm Water Main	13.125
WS20218	Rutledge Street 100mm Water Main	18.75
WS20219	Davidson Street 100mm Water Main	18
WS20220	Kehl Street 100mm Water Main	22.5
WS20221	Row Street 100mm Water Main	22.5
WS20222	Druery Street 100mm Water Main	15
WS20223	Druery Street 100mm Water Main	22.5
WS20224	Clement Street 100mm Water Main	22.5
WS20225	Lehane Street 100mm Water Main	22.5
WS20226	McIlwraith Street 100mm Water Main	6
WS20227	McIlwraith Street 100mm Water Main	45
WS20228	Cooper Street 100mm Water Main	27.5625
WS20229	Townsville Road 100mm Water Main	6.75
WS20230	Palmer Street 100mm Water Main	7.875
WS20231	Townsville Road 100mm Water Main	3.75
WS20232	Davidson Street 100mm Water Main	27
WS20233	King Street 100mm Water Main	39.375
WS20234	Rutledge Street 100mm Water Main	28.125
WS20235	Cooper Street 100mm Water Main	10.5
WS20236	Cooper Street 100mm Water Main	21
WS20237	Cooper Street 100mm Water Main	15.75
WS20238	Cooper Street 100mm Water Main	31.5
WS20239	Cooper Street 100mm Water Main	10.5
WS20240	Cooper Street 100mm Water Main	10.5
WS20241	Cooper Street 100mm Water Main	15
WS20242	Cooper Street 100mm Water Main	10.5
WS20243	Palmer Street 100mm Water Main	43.75
WS20244	Palmer Street 100mm Water Main	8.75
WS20245	Cooper Street 100mm Water Main	15.75
WS20246	Cooper Street 100mm Water Main	47.25
WS20247	Townsville Road 100mm Water Main	63
WS20248	Dalrymple Street 100mm Water Main	45
WS20249	Moretti Street 100mm Water Main	45.9375
WS20250	Martin Street 100mm Water Main	59.0625
WS20251	Martin Street 100mm Water Main	39.375
WS20252	Martin Street 100mm Water Main	50.625
WS20253	Martin Street 100mm Water Main	33.75
WS20254	Plywood Street 100mm Water Main	36.75
WS20255	Industrial Avenue 100mm Water Main	47.25
WS20256	Industrial Avenue 100mm Water Main	55.125
WS20257	Sir Arthur Fadden Parade 100mm Water Main	16.875
WS20258	Eleanor Street 100mm Water Main	50.625

Asset No.	Asset Description	Criticality Score
WS20259	Eleanor Street 100mm Water Main	56.25
WS20260	Eleanor Street 100mm Water Main	8.4375
WS20261	Cartwright Street 100mm Water Main	33.75
WS20262	Cartwright Street 100mm Water Main	22.5
WS20263	Hardy Street 100mm Water Main	18.75
WS20264	Hardy Street 100mm Water Main	28.125
WS20265	Pump Station Road 100mm Water Main	7.5
WS20266	Burke Street Offset Road 100mm Water Main	30
WS20267	Burke Street Offset Road 100mm Water Main	30
WS20268	Burke Street 100mm Water Main	30
WS20269	Bird Street 100mm Water Main	28.125
WS20270	Menzies Street 100mm Water Main	22.5
WS20271	Marina Parade 100mm Water Main	54
WS20272	Cooper Street 100mm Water Main	6
WS20273	Covell Street 100mm Water Main	22.5
WS20274	Covell Street 100mm Water Main	39.375
WS20275	Scott Street - Ingham 100mm Water Main	30
WS20276	Covell Street 100mm Water Main	52.5
WS20277	Cassady Street 100mm Water Main	24
WS20278	Herbert Street 100mm Water Main	22.5
WS20279	McKenzie Street 100mm Water Main	39.375
WS20280	Dickson Street 100mm Water Main	16.875
WS20281	McIlwraith Street 100mm Water Main	24
WS20282	Neilsen Street 100mm Water Main	30
WS20283	Johnstone Street 100mm Water Main	42
WS20284	Johnstone Street 100mm Water Main	22.5
WS20285	Johnstone Street 100mm Water Main	22.5
WS20286	Lannercost Street 100mm Water Main	13.5
WS20287	Cooper Street 100mm Water Main	18.375
WS20288	Ann Street 100mm Water Main	22.5
WS20289	Menzies Street 100mm Water Main	30
WS20290	McIlwraith Street 100mm Water Main	22.5
WS20291	McIlwraith Street 100mm Water Main	13.5
WS20292	Warren Street 100mm Water Main	18.75
WS20293	Enterprise Street 100mm Water Main	47.25
WS20294	Neame Street 100mm Water Main	18.75
WS20295	Herbert Street 100mm Water Main	67.5
WS20296	Christie Street 100mm Water Main	72
WS20297	Herbert Street 100mm Water Main	27
WS20298	Larsens Road 100mm Water Main	39.375
WS20299	Neilsen Street 100mm Water Main	15
WS20300	Enterprise Street 100mm Water Main	10.5

Asset No.	Asset Description	Criticality Score
WS20301	Lannercost Street 100mm Water Main	36
WS20302	Bruce Highway South 100mm Water Main	22.5
WS20303	Morehead Street 100mm Water Main	12.25
WS20304	Morehead Street 100mm Water Main	15
WS20305	Morehead Street 100mm Water Main	22.5
WS20306	Morehead Street 100mm Water Main	39.375
WS20307	Francis Street 100mm Water Main	5.25
WS20308	Cooper Street 100mm Water Main	15
WS20309	Abbott Street 100mm Water Main	45
WS20310	Fisher Street 100mm Water Main	15
WS20311	Fisher Street 100mm Water Main	30
WS20312	Fisher Street 100mm Water Main	30
WS20313	Renouf Street 100mm Water Main	8.75
WS20314	Renouf Street 100mm Water Main	13.125
WS20315	Warren Street 100mm Water Main	28.125
WS20316	Warren Street 100mm Water Main	18.75
WS20317	Warren Street 100mm Water Main	11.25
WS20318	Warren Street 100mm Water Main	18.75
WS20319	Giugni Street 100mm Water Main	33.75
WS20320	Chamberlain Street 100mm Water Main	60
WS20321	Lynn Street 100mm Water Main	15.75
WS20322	Neame Street 100mm Water Main	28.125
WS20323	Neame Street 100mm Water Main	26.25
WS20324	Neame Street 100mm Water Main	28.125
WS20325	Gardiner Street 100mm Water Main	28.125
WS20326	Perkins Street 100mm Water Main	65.625
WS20327	Berwick Street 100mm Water Main	7.5
WS20328	Moretti Street 100mm Water Main	7.5
WS20329	Halifax Road 100mm Water Main	15
WS20330	Halifax Road 100mm Water Main	3.75
WS20331	Trebonne Road 100mm Water Main	13.5
WS20332	Palmer Street 100mm Water Main	7.5
WS20333	Palmer Street 100mm Water Main	5.625
WS20334	Davidson Street 100mm Water Main	4.5
WS20335	Palm Avenue 100mm Water Main	22.5
WS20336	Griffith Street 100mm Water Main	15
WS20337	Duffy Street 100mm Water Main	19.6875
WS20338	Dutton Street 100mm Water Main	28.125
WS20339	Griffith Street 100mm Water Main	13.125
WS20340	Dutton Street 100mm Water Main	13.125
WS20341	Dutton Street 100mm Water Main	19.6875
WS20342	Victoria Mill Road 100mm Water Main	20.25

Asset No.	Asset Description	Criticality Score
WS20343	Victoria Mill Road 100mm Water Main	13.5
WS20344	Badila Street 100mm Water Main	11.25
WS20345	Triton Street 100mm Water Main	22.5
WS20346	Badila Street 100mm Water Main	11.25
WS20347	Pindar Street 100mm Water Main	11.25
WS20348	Pindar Street 100mm Water Main	24
WS20349	Eros Street 100mm Water Main	7.5
WS20350	Sir Arthur Fadden Parade 100mm Water Main	26.25
WS20351	Cemetery Road 100mm Water Main	28.125
WS20352	Shanahan Road 100mm Water Main	33.75
WS20353	Martin Street 100mm Water Main	33.75
WS20354	Lannercost Street 100mm Water Main	27
WS20355	Ardrossan Street 150mm Water Main	22.5
WS20356	Churchill Street 150mm Water Main	22.5
WS20357	Ardrossan Street 150mm Water Main	22.5
WS20358	Ardrossan Street 150mm Water Main	52.5
WS20359	Hawkins Street 150mm Water Main	15
WS20360	Gardiner Street 150mm Water Main	15
WS20361	Mylrea Street 150mm Water Main	15
WS20362	Mylrea Street 150mm Water Main	22.5
WS20363	Herbert Street 150mm Water Main	18
WS20364	Allingham Street 150mm Water Main	15
WS20365	Herbert Street 150mm Water Main	50.625
WS20366	Cartwright Street 150mm Water Main	45
WS20367	Cartwright Street 150mm Water Main	30
WS20368	Cartwright Street 150mm Water Main	30
WS20369	Cartwright Street 150mm Water Main	45
WS20370	Cartwright Street 150mm Water Main	30
WS20371	Cartwright Street 150mm Water Main	30
WS20372	Cassady Street 100mm Water Main	15
WS20373	Cassady Street 150mm Water Main	22.5
WS20374	Cassady Street 150mm Water Main	15
WS20375	Cassady Street 150mm Water Main	15
WS20376	Clay Street 150mm Water Main	25.3125
WS20377	Clay Street 150mm Water Main	25.3125
WS20378	Forgan Street 150mm Water Main	26.25
WS20379	Clay Street 150mm Water Main	25.3125
WS20380	Clay Street 150mm Water Main	25.3125
WS20381	Menzies Street 150mm Water Main	27
WS20382	Menzies Street 150mm Water Main	18
WS20383	Menzies Street 150mm Water Main	22.5
WS20384	McIlwraith Street 150mm Water Main	28.125

Asset No.	Asset Description	Criticality Score
WS20385	McIlwraith Street 150mm Water Main	22.5
WS20386	Palm Terrace 150mm Water Main	45
WS20387	Palm Terrace 150mm Water Main	20.25
WS20388	Palm Terrace 150mm Water Main	45
WS20389	Herbert Street 150mm Water Main	50.625
WS20390	Herbert Street 150mm Water Main	33.75
WS20391	Herbert Street 150mm Water Main	6.75
WS20392	Herbert Street 150mm Water Main	50.625
WS20393	Herbert Street 150mm Water Main	33.75
WS20394	Herbert Street 150mm Water Main	33.75
WS20395	Lannercost Street 150mm Water Main	20.25
WS20396	Lannercost Street 150mm Water Main	13.5
WS20397	Lannercost Street 150mm Water Main	30.375
WS20398	Morehead Street 150mm Water Main	16.875
WS20399	Marina Parade 150mm Water Main	22.5
WS20400	Marina Parade 150mm Water Main	22.5
WS20401	Marina Parade 150mm Water Main	45
WS20402	Townsville Road 150mm Water Main	5.625
WS20403	McIlwraith Street 150mm Water Main	3.75
WS20404	Townsville Road 150mm Water Main	22.5
WS20405	Macrossan Avenue 150mm Water Main	18
WS20406	Townsville Road 150mm Water Main	6.75
WS20407	Rutledge Street 150mm Water Main	5.625
WS20408	Townsville Road 150mm Water Main	27
WS20409	Palmer Street 150mm Water Main	15
WS20410	Gough Street 150mm Water Main	27
WS20411	Gough Street 150mm Water Main	27
WS20412	Gough Street 150mm Water Main	15
WS20413	Bruce Highway South 150mm Water Main	26.25
WS20414	Martin Street 150mm Water Main	19.6875
WS20415	Martin Street 150mm Water Main	16.875
WS20416	Martin Street 150mm Water Main	9.375
WS20417	Herbert Street 150mm Water Main	45
WS20418	Origlasso Street 150mm Water Main	37.5
WS20419	Origlasso Street 150mm Water Main	45
WS20420	Origlasso Street 150mm Water Main	37.5
WS20421	Challands Street 150mm Water Main	73.5
WS20422	Challands Street 150mm Water Main	47.25
WS20423	Cartwright Street 150mm Water Main	45
WS20424	Menzies Street 150mm Water Main	15
WS20425	Herbert Street 150mm Water Main	50.625
WS20426	Herbert Street 150mm Water Main	33.75

Asset No.	Asset Description	Criticality Score
WS20427	Herbert Street 150mm Water Main	20.25
WS20428	Lannercost Street 150mm Water Main	20.25
WS20429	Miles Street 150mm Water Main	15
WS20430	Warrens Hill Road 150mm Water Main	7.5
WS20431	Miles Street 150mm Water Main	5.625
WS20432	Fairford Road 150mm Water Main	12
WS20433	Fairford Road 150mm Water Main	7.5
WS20434	Townsville Road 150mm Water Main	8.75
WS20435	Hamleigh Road 150mm Water Main	42
WS20436	Hamleigh Road 150mm Water Main	36
WS20437	Coates Road 150mm Water Main	36
WS20438	Cassady Street 150mm Water Main	15
WS20439	Origlasso Street 150mm Water Main	50
WS20440	Halifax Road 150mm Water Main	40
WS20441	Halifax Road 150mm Water Main	18.75
WS20442	Sachs Lane 150mm Water Main	14.0625
WS20443	Trebonne Road 150mm Water Main	27
WS20444	Trebonne Road 150mm Water Main	36
WS20445	Fairford Road 150mm Water Main	9
WS20446	Fairford Road 150mm Water Main	9
WS20447	Fairford Road 150mm Water Main	3
WS20448	Grove Street 150mm Water Main	5
WS20449	Grove Street 150mm Water Main	5
WS20450	Fairford Road 150mm Water Main	30
WS20451	Pump Station Road 150mm Water Main	5.25
WS20452	Pump Station Road 150mm Water Main	3
WS20453	Pump Station Road 150mm Water Main	10.5
WS20454	Pump Station Road 150mm Water Main	4.5
WS20455	Pump Station Road 150mm Water Main	4.5
WS20456	Fairford Road 150mm Water Main	60
WS20457	Townsville Road 150mm Water Main	27
WS20458	Palm Avenue 150mm Water Main	18
WS20459	Marina Parade 150mm Water Main	18
WS20460	Alm Street 150mm Water Main	28.125
WS20461	Alm Street 150mm Water Main	33.75
WS20462	Alm Street 150mm Water Main	9.375
WS20463	Ann Street 150mm Water Main	7.875
WS20464	Macrossan Avenue 150mm Water Main	11.25
WS20465	Victoria Mill Road 100mm Water Main	4.5
WS20466	Tokalon Road 200mm Water Main	3.75
WS20467	Tokalon Road 200mm Water Main	3.75
WS20468	Lannercost Street 225mm Water Main	27

Asset No.	Asset Description	Criticality Score
WS20469	River Easement 225mm Water Main	31.25
WS20470	Atkinson Street 225mm Water Main	28.125
WS20471	Atkinson Street 225mm Water Main	28.125
WS20472	Atkinson Street 225mm Water Main	28.125
WS20473	Atkinson Street 225mm Water Main	28.125
WS20474	Haig Street 225mm Water Main	60
WS20475	Haig Street 225mm Water Main	40
WS20476	Herbert Street 225mm Water Main	13.5
WS20477	Lannercost Street 225mm Water Main	40.5
WS20478	Palm Terrace 225mm Water Main	16.875
WS20479	Cartwright Street 225mm Water Main	27
WS20480	Cartwright Street 225mm Water Main	13.5
WS20481	McIlwraith Street 225mm Water Main	16.875
WS20482	Marina Parade 225mm Water Main	108
WS20483	Menzies Street 225mm Water Main	13.5
WS20484	Palm Avenue 225mm Water Main	20.25
WS20485	Palm Avenue 225mm Water Main	20.25
WS20486	Dutton Street 225mm Water Main	11.25
WS20487	McIlwraith Street 225mm Water Main	20.25
WS20488	Alston Street 225mm Water Main	30
WS20489	McIlwraith Street 225mm Water Main	20.25
WS20490	McIlwraith Street 225mm Water Main	13.5
WS20491	McIlwraith Street 225mm Water Main	22.5
WS20492	Cowley Street 225mm Water Main	30
WS20493	Cowley Street 225mm Water Main	18
WS20494	McIlwraith Street 225mm Water Main	20.25
WS20495	McIlwraith Street 225mm Water Main	18.75
WS20496	Marina Parade 225mm Water Main	60
WS20497	Marina Parade 225mm Water Main	144
WS20498	Marina Parade 225mm Water Main	60
WS20499	Davidson Street 225mm Water Main	22.5
WS20500	Davidson Street 225mm Water Main	22.5
WS20501	Davidson Street 225mm Water Main	11.25
WS20502	Davidson Street 225mm Water Main	75
WS20503	Davidson Street 225mm Water Main	13.5
WS20504	Martin Street 225mm Water Main	18.75
WS20505	Martin Street 225mm Water Main	12.5
WS20506	Martin Street 225mm Water Main	30
WS20507	Martin Street 225mm Water Main	30
WS20508	Bruce Highway South 225mm Water Main	40
WS20509	Bruce Highway South 225mm Water Main	18.75
WS20510	Menzies Street 225mm Water Main	40.5

Asset No.	Asset Description	Criticality Score
WS20511	McIlwraith Street 225mm Water Main	16.875
WS20512	McIlwraith Street 225mm Water Main	11.25
WS20513	Fairford Road 225mm Water Main	18
WS20514	Fairford Road 225mm Water Main	18
WS20515	Fairford Road 225mm Water Main	18
WS20516	Fairford Road 225mm Water Main	13.5
WS20517	Jane Street 225mm Water Main	16.875
WS20518	Palm Avenue 225mm Water Main	20.25
WS20519	Palm Avenue 225mm Water Main	22.5
WS20520	Griffith Street 225mm Water Main	22.5
WS20521	Bruce Highway South 225mm Water Main	50
WS20522	Victoria Mill Road 250mm Water Main	47.25
WS20523	Hawkins Street 300mm Water Main	50
WS20524	Hawkins Street 300mm Water Main	60
WS20525	Chamberlain Street 300mm Water Main	30
WS20526	Atkinson Street 300mm Water Main	112.5
WS20527	Chamberlain Street 300mm Water Main	28.125
WS20528	River Easement 300mm Water Main	35
WS20529	Atkinson Street 300mm Water Main	90
WS20530	Atkinson Street 300mm Water Main	67.5
WS20531	Haig Street 300mm Water Main	90
WS20532	Lannercost Street 300mm Water Main	40.5
WS20533	Lannercost Street 300mm Water Main	54
WS20534	Lannercost Street 300mm Water Main	54
WS20535	Lannercost Street 300mm Water Main	40.5
WS20536	Lynch Street 300mm Water Main	18
WS20537	Cartwright Street 300mm Water Main	30
WS20538	Cartwright Street 300mm Water Main	60
WS20539	Cassady Street 300mm Water Main	30
WS20540	Cassady Street 300mm Water Main	22.5
WS20541	Davidson Street 300mm Water Main	45
WS20542	Davidson Street 300mm Water Main	36
WS20543	Cartwright Street 300mm Water Main	67.5
WS20544	McIlwraith Street 300mm Water Main	30
WS20545	McIlwraith Street 300mm Water Main	60
WS20546	McIlwraith Street 300mm Water Main	22.5
WS20547	Davidson Street 300mm Water Main	36
WS20548	Davidson Street 300mm Water Main	30
WS20549	Townsville Road 300mm Water Main	22.5
WS20550	Warren Street 300mm Water Main	50
WS20551	Warren Street 300mm Water Main	31.5
WS20552	Gardiner Street 300mm Water Main	70

Asset No.	Asset Description	Criticality Score
WS20553	Gardiner Street 375mm Water Main	31.25
WS20554	Churchill Street 375mm Water Main	30
WS20555	River Easement 375mm Water Main	26.25
WS20556	Pump Station Road 375mm Water Main	15
WS20557	Pump Station Road 450mm Water Main	37.5
WS20558	Chamberlain Street 450mm Water Main	75
WS20559	Casanovas Road 100mm Water Main	18
WS20560	Crisps Road 100mm Water Main	27
WS20561	Blackrock Road 100mm Water Main	9
WS20562	Blackrock Road 100mm Water Main	13.5
WS20563	McDonaghs Road 100mm Water Main	27
WS20564	Tokalon Road 150mm Water Main	16.875
WS20565	Blackrock Road 150mm Water Main	18
WS20566	Orient Road 150mm Water Main	13.5
WS20567	Tokalon Road 200mm Water Main	13.5
WS20568	Tokalon Road 200mm Water Main	13.5
WS20569	Four Mile Road 100mm Water Main	6.75
WS20570	Mudies Road 100mm Water Main	22.5
WS20571	Cooks Lane 150mm Water Main	18
WS20572	Sachs Lane 150mm Water Main	11.25
WS20573	Victoria Mill Road 150mm Water Main	40.5
WS20574	Forrest Beach Road 250mm Water Main	7.5
WS20575	Four Mile Road 250mm Water Main	11.25
WS20576	Four Mile Road 250mm Water Main	11.25
WS20577	Victoria Mill Road 250mm Water Main	15.75
WS20578	Cooks Lane 250mm Water Main	3
WS20579	Forrest Beach Road 250mm Water Main	3.75
WS20580	Victoria Mill Road 250mm Water Main	16.875
WS20581	Five Mile Road 63mm Water Main	10.125
WS20582	Four Mile Road 100mm Water Main	7.875
WS20583	Four Mile Road 100mm Water Main	13.5
WS20584	Four Mile Road 100mm Water Main	13.5
WS20585	Two Mile Road 100mm Water Main	13.5
WS20586	Four Mile Road 100mm Water Main	10.5
WS20587	Four Mile Road 100mm Water Main	9
WS20588	Four Mile Road 100mm Water Main	9
WS20589	Four Mile Road 100mm Water Main	10.5
WS20590	Four Mile Road 100mm Water Main	9
WS20591	Four Mile Road 100mm Water Main	6.75
WS20592	Three Mile Road 100mm Water Main	18
WS20593	Four Mile Road 100mm Water Main	6.75
WS20594	Four Mile Road 100mm Water Main	9

Asset No.	Asset Description	Criticality Score
WS20595	Four Mile Road 100mm Water Main	9
WS20596	Four Mile Road 150mm Water Main	6.75
WS20597	Three Mile Road 150mm Water Main	21
WS20598	Four Mile Road 150mm Water Main	18
WS20599	Four Mile Road 150mm Water Main	10.125
WS20600	Four Mile Road 250mm Water Main	6.75
WS20601	Four Mile Road 250mm Water Main	8.4375
WS20602	Four Mile Road 250mm Water Main	9
WS20603	Four Mile Road 250mm Water Main	9
WS20604	Four Mile Road 250mm Water Main	5.625
WS20605	Four Mile Road 250mm Water Main	3.375
WS20606	Four Mile Road 250mm Water Main	8.4375
WS20607	Four Mile Road 250mm Water Main	8.4375
WS20608	Stephensens Road 100mm Water Main	27
WS20609	Cordelia School Road 100mm Water Main	27
WS20610	Eddleston Drive 100mm Water Main	24
WS20611	Cooks Lane 150mm Water Main	6
WS20612	Cooks Lane 150mm Water Main	9
WS20613	Stephensens Road 150mm Water Main	21
WS20614	Eddleston Drive 150mm Water Main	24
WS20615	Eddleston Drive 150mm Water Main	15.75
WS20616	Eddleston Drive 150mm Water Main	24
WS20617	Foresthome Road 50mm Water Main	16.875
WS20618	Gairloch Road 50mm Water Main	16.875
WS20619	Fracchias Road 50mm Water Main	15
WS20620	Foresthome Road 80mm Water Main	26.25
WS20621	Halifax Road 100mm Water Main	18.75
WS20622	Halifax Road 100mm Water Main	14.0625
WS20623	Foresthome Road 100mm Water Main	26.25
WS20624	Halifax Road 100mm Water Main	23.4375
WS20625	Halifax Road 100mm Water Main	14.0625
WS20626	Halifax Road 150mm Water Main	22.5
WS20627	Jasmine Close 63mm Water Main	7.5
WS20628	Cedar Street 63mm Water Main	7.5
WS20629	Baileyana Street 63mm Water Main	7.5
WS20630	Chestnut Street 63mm Water Main	7.5
WS20631	Mistletoe Street 63mm Water Main	7.5
WS20632	Melaleuca Close 63mm Water Main	7.5
WS20633	Rosella Street 63mm Water Main	7.5
WS20634	Lillypilly Court 63mm Water Main	7.5
WS20635	Mahogany Drive 63mm Water Main	3.75
WS20636	Mahogany Drive 63mm Water Main	7.5

Asset No.	Asset Description	Criticality Score
WS20637	Magnolia Court 63mm Water Main	7.5
WS20638	Marginata Court 63mm Water Main	7.5
WS20639	Red Gum Court 63mm Water Main	7.5
WS20640	Grey Gum Court 63mm Water Main	7.5
WS20641	Coral Tree Court 63mm Water Main	7.5
WS20642	Mahogany Drive 63mm Water Main	3.75
WS20643	Sheoak Street 100mm Water Main	18
WS20644	Fern Street 100mm Water Main	33.75
WS20645	Cassia Street 100mm Water Main	11.25
WS20646	Cassia Street 100mm Water Main	16.875
WS20647	Cashew Close 100mm Water Main	22.5
WS20648	Quandong Street 100mm Water Main	22.5
WS20649	Bottlebrush Street 100mm Water Main	45
WS20650	Candlenut Street 100mm Water Main	33.75
WS20651	Blackbean Street 100mm Water Main	11.25
WS20652	Whiteapple Street 100mm Water Main	33.75
WS20653	Blackbean Street 100mm Water Main	39.375
WS20654	Blackbean Street 100mm Water Main	8.75
WS20655	Blackbean Street 100mm Water Main	7.5
WS20656	Jasmine Close 100mm Water Main	8.75
WS20657	Tamarind Court 100mm Water Main	22.5
WS20658	Poinciana Street 100mm Water Main	11.25
WS20659	Acacia Street 100mm Water Main	31.5
WS20660	Cedar Street 100mm Water Main	39.375
WS20661	Cedar Street 100mm Water Main	8.75
WS20662	Cedar Street 100mm Water Main	16.875
WS20663	Maple Street 100mm Water Main	11.25
WS20664	Maple Street 100mm Water Main	16.875
WS20665	Bauhinia Street 100mm Water Main	16.875
WS20666	Orchid Street 100mm Water Main	22.5
WS20667	Bill Johnson Drive 100mm Water Main	11.25
WS20668	Baileyana Street 100mm Water Main	8.75
WS20669	Bill Johnson Drive 100mm Water Main	11.25
WS20670	Forrest Drive 100mm Water Main	11.25
WS20671	Forrest Lane 100mm Water Main	15
WS20672	Forrest Drive 100mm Water Main	15
WS20673	Macadamia Street 100mm Water Main	33.75
WS20674	Jacaranda Street 100mm Water Main	26.25
WS20675	Jacaranda Street Offset Road 100mm Water Main	22.5
WS20676	Jacaranda Street Offset Road 100mm Water Main	22.5
WS20677	Chestnut Street 100mm Water Main	13.125
WS20678	Mistletoe Street 100mm Water Main	13.125

Asset No.	Asset Description	Criticality Score
WS20679	Coconut Street 100mm Water Main	17.5
WS20680	Coconut Street Offset Road 100mm Water Main	15
WS20681	Coconut Street Offset Road 100mm Water Main	15
WS20682	Rosella Street 100mm Water Main	13.125
WS20683	Rosella Street 100mm Water Main	13.125
WS20684	Melaleuca Close 100mm Water Main	13.125
WS20685	Mango Tree Court 100mm Water Main	11.25
WS20686	Holly Street 100mm Water Main	3.75
WS20687	Lantana Street 100mm Water Main	3.75
WS20688	Bluegum Street 100mm Water Main	5.625
WS20689	Lantana Street 100mm Water Main	3.75
WS20690	Mahogany Drive 100mm Water Main	3.75
WS20691	Mahogany Drive 100mm Water Main	13.125
WS20692	Coconut Lane Offset Road 100mm Water Main	22.5
WS20693	Coconut Lane Offset Road 100mm Water Main	15
WS20694	Cassady Beach Road 100mm Water Main	35
WS20695	Poppis Road 100mm Water Main	22.5
WS20696	Magnolia Court 100mm Water Main	8.75
WS20697	Marginata Court 100mm Water Main	13.125
WS20698	Moreton Bay Street 100mm Water Main	7.5
WS20699	Moreton Bay Street 100mm Water Main	5
WS20700	Moreton Bay Street 100mm Water Main	7.5
WS20701	Hibiscus Street 100mm Water Main	8.75
WS20702	Grey Gum Court 100mm Water Main	8.75
WS20703	Hibiscus Street 100mm Water Main	13.125
WS20704	Coral Tree Court 100mm Water Main	13.125
WS20705	Grevillea Street 100mm Water Main	16.875
WS20706	Grevillea Street 100mm Water Main	11.25
WS20707	Bloodwood Street 100mm Water Main	22.5
WS20708	Grevillea Street 100mm Water Main	11.25
WS20709	Staghorn Street 100mm Water Main	22.5
WS20710	Grevillea Street 100mm Water Main	16.875
WS20711	Pangola Street 100mm Water Main	22.5
WS20712	Pangola Street 100mm Water Main	16.875
WS20713	Lillypilly Court 100mm Water Main	8.75
WS20714	Banksia Street 100mm Water Main	39.375
WS20715	Banksia Street 100mm Water Main	33.75
WS20716	Cypress Close 100mm Water Main	22.5
WS20717	Wattle Street 100mm Water Main	23.625
WS20718	Maple Street 100mm Water Main	16.875
WS20719	Acacia Street 100mm Water Main	22.5
WS20720	Coconut Lane 100mm Water Main	21

Asset No.	Asset Description	Criticality Score
WS20721	Cabon Road 100mm Water Main	4.5
WS20722	Cabon Road 100mm Water Main	4.5
WS20723	Bill Johnson Drive 100mm Water Main	3.75
WS20724	Forrest Drive 100mm Water Main	15
WS20725	Bellbird Close 100mm Water Main	5.625
WS20726	Allamanda Avenue 150mm Water Main	45
WS20727	Sheoak Street 150mm Water Main	26.25
WS20728	Willow Street 150mm Water Main	52.5
WS20729	Leichhardt Street 150mm Water Main	11.25
WS20730	Leichhardt Street 150mm Water Main	26.25
WS20731	Palm Street 150mm Water Main	16.875
WS20732	Leichhardt Street 150mm Water Main	27
WS20733	Wattle Street 150mm Water Main	11.25
WS20734	Wattle Street 150mm Water Main	16.875
WS20735	Pandanus Street 150mm Water Main	16.875
WS20736	Pandanus Street 150mm Water Main	11.25
WS20737	Pandanus Street 150mm Water Main	16.875
WS20738	Pandanus Street 150mm Water Main	16.875
WS20739	Pandanus Street 150mm Water Main	11.25
WS20740	Pandanus Street 150mm Water Main	11.25
WS20741	Wattle Street 150mm Water Main	16.875
WS20742	Wattle Street 150mm Water Main	21.875
WS20743	Pine Street 150mm Water Main	16.875
WS20744	Pine Street 150mm Water Main	11.25
WS20745	Pine Street 150mm Water Main	9.375
WS20746	Leichhardt Street 150mm Water Main	13.5
WS20747	Beatts Road 150mm Water Main	15
WS20748	Beatts Road 150mm Water Main	22.5
WS20749	Beatts Road 150mm Water Main	15
WS20750	Beatts Road 150mm Water Main	22.5
WS20751	Beatts Road 150mm Water Main	15
WS20752	Beatts Road 150mm Water Main	22.5
WS20753	Beatts Road 150mm Water Main	15
WS20754	Beatts Road 150mm Water Main	15
WS20755	Beatts Road 150mm Water Main	22.5
WS20756	Beatts Road 150mm Water Main	15
WS20757	Beatts Road 150mm Water Main	22.5
WS20758	Beatts Road 150mm Water Main	15
WS20759	Beatts Road 150mm Water Main	18.75
WS20760	Beatts Road 150mm Water Main	22.5
WS20761	Leichhardt Street 150mm Water Main	9
WS20762	Wattle Street 150mm Water Main	11.25

Asset No.	Asset Description	Criticality Score
WS20763	Beatts Road 150mm Water Main	18.75
WS20764	Beatts Road 150mm Water Main	18.75
WS20765	Beatts Road 150mm Water Main	12.5
WS20766	Beatts Road 150mm Water Main	12.5
WS20767	Beatts Road 150mm Water Main	18.75
WS20768	Beatts Road 150mm Water Main	25
WS20769	Beatts Road 150mm Water Main	22.5
WS20770	Cabon Road 150mm Water Main	6
WS20771	Beatts Road 150mm Water Main	22.5
WS20772	Leichhardt Street 200mm Water Main	13.5
WS20773	Leichhardt Street 200mm Water Main	13.5
WS20774	Leichhardt Street 200mm Water Main	20.25
WS20775	Leichhardt Street 200mm Water Main	20.25
WS20776	Leichhardt Street 200mm Water Main	20.25
WS20777	Leichhardt Street 200mm Water Main	13.5
WS20778	Leichhardt Street 200mm Water Main	20.25
WS20779	Wattle Street 200mm Water Main	15
WS20780	Leichhardt Street 200mm Water Main	11.25
WS20781	Leichhardt Street 200mm Water Main	27
WS20782	Forrest Beach Road 200mm Water Main	15
WS20783	Forrest Beach Road 200mm Water Main	3
WS20784	Forrest Beach Road 150mm Water Main	11.25
WS20785	Forrest Beach Road 200mm Water Main	3
WS20786	Wattle Street 200mm Water Main	15
WS20787	Forrest Beach Road 200mm Water Main	15
WS20788	Cabon Road 200mm Water Main	15
WS20789	Cabon Road 200mm Water Main	9
WS20790	Cabon Road 200mm Water Main	9
WS20791	Leichhardt Street 250mm Water Main	9
WS20792	Leichhardt Street 250mm Water Main	12
WS20793	Forrest Beach Road 250mm Water Main	6.25
WS20794	Forrest Beach Road 300mm Water Main	5
WS20795	Forrest Beach Road 300mm Water Main	2.25
WS20796	Forrest Beach Road 300mm Water Main	1.5
WS20797	Forrest Beach Road 300mm Water Main	15
WS20798	Forrest Beach Road 300mm Water Main	4.5
WS20799	Forrest Beach Road 300mm Water Main	9
WS20800	Hinchinbrook Court 63mm Water Main	7.5
WS20801	Scott Street - Halifax 63mm Water Main	7.5
WS20802	Stephensen Avenue 100mm Water Main	33.75
WS20803	Jessup Avenue 100mm Water Main	27
WS20804	Victoria Terrace 100mm Water Main	22.5

Asset No.	Asset Description	Criticality Score
WS20805	Victoria Terrace 100mm Water Main	16.875
WS20806	Rifle Range Road 100mm Water Main	20.25
WS20807	Rosendahl Street 100mm Water Main	27
WS20808	Argaet Street 100mm Water Main	16.875
WS20809	Anderssen Street 100mm Water Main	22.5
WS20810	Anderssen Street 100mm Water Main	27
WS20811	River Avenue 100mm Water Main	36
WS20812	River Avenue 100mm Water Main	11.25
WS20813	River Avenue 100mm Water Main	30.375
WS20814	Macrossan Street 100mm Water Main	30.375
WS20815	Rupp Street 100mm Water Main	27
WS20816	Macrossan Street 100mm Water Main	23.625
WS20817	Hoffensetz Street 100mm Water Main	13.5
WS20818	Mona Road 100mm Water Main	16.875
WS20819	Shaws Avenue 100mm Water Main	16.875
WS20820	Scott Street - Halifax 100mm Water Main	7.5
WS20821	Hinchinbrook Court 100mm Water Main	8.75
WS20822	Mona Road 100mm Water Main	16.875
WS20823	Herron Street 100mm Water Main	11.25
WS20824	Herron Street 100mm Water Main	16.875
WS20825	Mona Road 100mm Water Main	16.875
WS20826	Mambrini Street 100mm Water Main	16.875
WS20827	Acacia Road 100mm Water Main	16.875
WS20828	Mona Road 100mm Water Main	19.6875
WS20829	Acacia Road 100mm Water Main	8.4375
WS20830	Riverdowns Drive Offset Road 100mm Water Main	7
WS20831	Riverdowns Drive 100mm Water Main	7.5
WS20832	Riverdowns Drive 100mm Water Main	11.25
WS20833	Eddleston Drive 150mm Water Main	18
WS20834	Musgrave Street 150mm Water Main	27
WS20835	Musgrave Street 150mm Water Main	6.75
WS20836	Rosendahl Street 150mm Water Main	12
WS20837	Rosendahl Street 150mm Water Main	12
WS20838	Musgrave Street 150mm Water Main	6.75
WS20839	Eddleston Drive 150mm Water Main	4.5
WS20840	Eddleston Drive 150mm Water Main	3
WS20841	Eddleston Drive 150mm Water Main	4
WS20842	Eddleston Drive 150mm Water Main	6
WS20843	Eddleston Drive 150mm Water Main	20.25
WS20844	Eddleston Drive 150mm Water Main	22.5
WS20845	Musgrave Street 200mm Water Main	27
WS20846	Musgrave Street 200mm Water Main	20.25

Asset No.	Asset Description	Criticality Score
WS20847	Musgrave Street 200mm Water Main	13.5
WS20848	Musgrave Street 200mm Water Main	33.75
WS20849	Musgrave Street 200mm Water Main	36
WS20850	Scott Street - Halifax 200mm Water Main	11.25
WS20851	Scott Street - Halifax 200mm Water Main	36
WS20852	Scott Street - Halifax 200mm Water Main	33.75
WS20853	Scott Street - Halifax 200mm Water Main	15
WS20854	Scott Street - Halifax 200mm Water Main	36
WS20855	Scott Street - Halifax 200mm Water Main	27
WS20856	Scott Street - Halifax 100mm Water Main	18
WS20857	Scott Street - Halifax 200mm Water Main	27
WS20858	Scott Street - Halifax 200mm Water Main	27
WS20859	Lucinda Road 200mm Water Main	36
WS20860	Musgrave Street 200mm Water Main	11.25
WS20861	Lucinda Road 200mm Water Main	36
WS20862	Patterson Parade 100mm Water Main	45
WS20863	Pearson Street 100mm Water Main	11.25
WS20864	Pearson Street 100mm Water Main	22.5
WS20865	Carr Crescent 100mm Water Main	22.5
WS20866	Ogg Street 100mm Water Main	33.75
WS20867	Carr Crescent 100mm Water Main	33.75
WS20868	Patterson Parade 100mm Water Main	11.25
WS20869	Waring Street 100mm Water Main	16.875
WS20870	Bruce Parade 100mm Water Main	20.25
WS20871	Bruce Parade 100mm Water Main	20.25
WS20872	Vass Street 100mm Water Main	33.75
WS20873	Bruce Parade 100mm Water Main	20.25
WS20874	Rigby Street 100mm Water Main	54
WS20875	Bruce Parade 100mm Water Main	16.875
WS20876	Bruce Parade 100mm Water Main	11.25
WS20877	Bruce Parade 100mm Water Main	23.625
WS20878	Gossner Street 100mm Water Main	16.875
WS20879	Hobbs Street 100mm Water Main	16.875
WS20880	Gossner Street 100mm Water Main	16.875
WS20881	Dungeness Road 100mm Water Main	27
WS20882	Dungeness Road 100mm Water Main	11.25
WS20883	Dungeness Road 100mm Water Main	11.25
WS20884	Dungeness Road 100mm Water Main	13.5
WS20885	Dungeness Road 100mm Water Main	16.875
WS20886	Dungeness Road 100mm Water Main	22.5
WS20887	Dungeness Road 100mm Water Main	23.625
WS20888	Dungeness Road 100mm Water Main	23.625

Asset No.	Asset Description	Criticality Score
WS20889	Dungeness Road 100mm Water Main	56
WS20890	Denney Street 100mm Water Main	31.5
WS20891	Dungeness Road 100mm Water Main	20
WS20892	Dungeness Road 100mm Water Main	12
WS20893	Kangaroo Street 100mm Water Main	36
WS20894	Dungeness Road 100mm Water Main	45
WS20895	Carr Crescent 100mm Water Main	33.75
WS20896	Ogg Street 100mm Water Main	22.5
WS20897	Patterson Parade 150mm Water Main	22.5
WS20898	Patterson Parade 150mm Water Main	22.5
WS20899	Patterson Parade 150mm Water Main	16.875
WS20900	Dungeness Road 150mm Water Main	31.5
WS20901	Dungeness Road 150mm Water Main	21
WS20902	Dungeness Road 150mm Water Main	11.25
WS20903	Keast Street 150mm Water Main	36
WS20904	Keast Street 150mm Water Main	36
WS20905	Keast Street 150mm Water Main	22.5
WS20906	Keast Street 150mm Water Main	22.5
WS20907	Keast Street 150mm Water Main	22.5
WS20908	Keast Street 150mm Water Main	15
WS20909	Keast Street 150mm Water Main	30
WS20910	Dungeness Road 150mm Water Main	15
WS20911	Dungeness Road 150mm Water Main	23.625
WS20912	Ferrero Street 225mm Water Main	30
WS20913	Ferrero Street 225mm Water Main	22.5
WS20914	Ferrero Street 225mm Water Main	22.5
WS20915	Lucinda Road 225mm Water Main	54
WS20916	Fulton Drive 80mm Water Main	9
WS20917	Fulton Drive 100mm Water Main	40.5
WS20918	MacMillans Road 100mm Water Main	27
WS20919	Girgentis Road 100mm Water Main	13.5
WS20920	Fulton Drive 100mm Water Main	6
WS20921	Fulton Drive 150mm Water Main	23.625
WS20922	Fulton Drive 150mm Water Main	39.375
WS20923	Fulton Drive 150mm Water Main	21
WS20924	Neames Inlet Road 80mm Water Main	39.375
WS20925	Neames Inlet Road 80mm Water Main	13.5
WS20926	Neames Inlet Road 80mm Water Main	45
WS20927	Bullock Paddock Road 80mm Water Main	9
WS20928	Farrell Drive 80mm Water Main	9
WS20929	Bullock Paddock Road 100mm Water Main	39.375
WS20930	Bullock Paddock Road 100mm Water Main	20.25

Asset No.	Asset Description	Criticality Score
WS20931	Mill Road 100mm Water Main	42
WS20932	Mill Road 100mm Water Main	16.875
WS20933	Spencer Street 100mm Water Main	13.5
WS20934	Mill Road 100mm Water Main	18
WS20935	Farrell Drive 100mm Water Main	22.5
WS20936	Bullock Paddock Road 100mm Water Main	9
WS20937	Bullock Paddock Road 100mm Water Main	4.5
WS20938	Farrell Drive 150mm Water Main	45
WS20939	Marbelli Street 150mm Water Main	42
WS20940	Farrell Drive 150mm Water Main	18
WS20941	Mill Road 150mm Water Main	13.5
WS20942	Mill Road 150mm Water Main	31.5
WS20943	Farrell Drive 150mm Water Main	30
WS20944	Mill Road 150mm Water Main	39.375
WS20945	Farrell Drive 200mm Water Main	36
WS20946	Farrell Drive 200mm Water Main	22.5
WS20947	Farrell Drive 200mm Water Main	45
WS20948	Herring Street 100mm Water Main	16.875
WS20949	Trevally Street 100mm Water Main	11.25
WS20950	Barramundi Street 100mm Water Main	16.875
WS20951	Trevally Street 100mm Water Main	16.875
WS20952	Sardine Street 100mm Water Main	11.25
WS20953	Whiting Street 100mm Water Main	11.25
WS20954	Whiting Street 100mm Water Main	11.25
WS20955	Bream Street 100mm Water Main	16.875
WS20956	Salmon Street 100mm Water Main	16.875
WS20957	Groper Street 100mm Water Main	11.25
WS20958	John Dory Street 100mm Water Main	30
WS20959	Dolphin Crescent 100mm Water Main	16.875
WS20960	John Dory Street 100mm Water Main	22.5
WS20961	John Dory Street 100mm Water Main	22.5
WS20962	John Dory Street 150mm Water Main	30
WS20963	John Dory Street 150mm Water Main	31.5
WS20964	John Dory Street 150mm Water Main	31.5
WS20965	Taylors Beach Road 150mm Water Main	54
WS20966	John Dory Street 150mm Water Main	26.25
WS20967	John Dory Street 150mm Water Main	22.5
WS20968	Bruce Highway South 100mm Water Main	22.5
WS20969	Scovazzis Road 100mm Water Main	22.5
WS20970	Peebles Street 100mm Water Main	15
WS20971	Peri Street 100mm Water Main	7.5
WS20972	Masters Road 100mm Water Main	15

Asset No.	Asset Description	Criticality Score
WS20973	Toobanna Street 100mm Water Main	11.25
WS20974	Peri Street 100mm Water Main	7.5
WS20975	Bruce Highway South 100mm Water Main	32.8125
WS20976	Bruce Highway South 100mm Water Main	18.75
WS20977	Bruce Highway South 100mm Water Main	32.8125
WS20978	Jabiru Street 100mm Water Main	22.5
WS20979	Brolga Street 100mm Water Main	26.25
WS20980	Pelican Street 100mm Water Main	15
WS20981	Brolga Street 100mm Water Main	15
WS20982	Bruce Highway South 100mm Water Main	22.5
WS20983	Bruce Highway South 100mm Water Main	22.5
WS20984	Bruce Highway South 100mm Water Main	26.25
WS20985	Bruce Highway South 100mm Water Main	22.5
WS20986	Bruce Highway South 100mm Water Main	22.5
WS20987	Bruce Highway South 100mm Water Main	33.75
WS20988	Peri Street 150mm Water Main	11.25
WS20989	Peri Street 150mm Water Main	11.25
WS20990	Bruce Highway South 225mm Water Main	37.5
WS20991	Bruce Highway South 225mm Water Main	50
WS20992	Bruce Highway South 225mm Water Main	60
WS20993	Bruce Highway South 225mm Water Main	50
WS20994	Bruce Highway South 225mm Water Main	45
WS20995	Bruce Highway South 225mm Water Main	30
WS20996	Bruce Highway South 225mm Water Main	60
WS20997	Bruce Highway South 225mm Water Main	60
WS20998	Bruce Highway South 225mm Water Main	75
WS20999	Bruce Highway South 225mm Water Main	60
WS21000	Wallis Street 100mm Water Main	16.875
WS21001	Gorton Street 100mm Water Main	9
WS21002	Trebonne Road 100mm Water Main	27
WS21003	Abergowrie Road 100mm Water Main	22.5
WS21004	Stone River Road 100mm Water Main	11.25
WS21005	Britton Street 100mm Water Main	11.25
WS21006	Britton Street 100mm Water Main	22.5
WS21007	Meyer Street 100mm Water Main	16.875
WS21008	Stone River Road 100mm Water Main	13.5
WS21009	Stone River Road 100mm Water Main	15.75
WS21010	Kehls Road 100mm Water Main	73.5
WS21011	Stone River Road 100mm Water Main	27
WS21012	Trebonne Road 100mm Water Main	27
WS21013	Stone River Road 100mm Water Main	30.375
WS21014	Kehls Road 100mm Water Main	30

Asset No.	Asset Description	Criticality Score
WS21015	Trebonne Road 150mm Water Main	9
WS21016	Trebonne Road 150mm Water Main	24
WS21017	Sartoresi Street 150mm Water Main	16.875
WS21018	Abergowrie Road 150mm Water Main	22.5
WS21019	Sartoresi Street 150mm Water Main	9
WS21020	Rankin Street 150mm Water Main	16.875
WS21021	Rankin Street 150mm Water Main	16.875
WS21022	Rankin Street 150mm Water Main	22.5
WS21023	Gorton Street 150mm Water Main	27
WS21024	Sartoresi Street 150mm Water Main	23.625
WS21025	Doyle Street 150mm Water Main	16.875
WS21026	Trebonne Road 150mm Water Main	54
WS21027	Trebonne Road 150mm Water Main	9
WS21028	Trebonne Road 150mm Water Main	36
WS21029	Trebonne Road 150mm Water Main	9
WS21030	McIlwraith Street 225mm Water Main	20.25
WS21031	Forrest Beach Rd 100mm Water Main	11.25
WS21032	Forrest Beach Rd 150mm Water Main	11.25
WS21033	Forrest Beach Rd 150mm Water Main	16.875
WS21034	Forrest Beach Rd 100mm Water Main	16.875
WS21035	Forrest Beach Rd 200mm Water Main	13.5
WS21036	Forrest Beach Rd 200mm Water Main	6.75
WS21037	Forrest Beach Rd 200mm Water Main	10.125
WS21038	Forrest Beach Rd 200mm Water Main	6.75
WS21039	Forrest Beach Rd 200mm Water Main	16.875
WS21040	Lucinda Rd 100mm Water Main	11.25
WS21041	Lucinda Rd 100mm Water Main	11.25
WS21042	Lucinda Rd 150mm Water Main	27
WS21043	Lucinda Rd 150mm Water Main	18
WS21044	Lucinda Rd 150mm Water Main	13.5
WS21045	Lucinda Rd 200mm Water Main	27
WS21046	Lucinda Rd 200mm Water Main	33.75
WS21047	Lucinda Rd 200mm Water Main	13.5
WS21048	Lucinda Rd 100mm Water Main	22.5
WS21049	Lucinda Rd 100mm Water Main	22.5
WS21050	Shanahan Rd 225mm Water Main	81
WS21051	Larsens Rd 225mm Water Main	13.5
WS21052	Coppo Rd 225mm Water Main	101.25
WS21053	Bruce Highway South 225mm Water Main	13.5
WS21054	Bruce Highway South 225mm Water Main	60.75
WS21055	Bruce Highway South 225mm Water Main	13.5
WS21056	Bruce Highway South 225mm Water Main	60.75

Asset No.	Asset Description	Criticality Score
WS21057	Bruce Highway South 225mm Water Main	13.5
WS21058	Bruce Highway South 225mm Water Main	81
WS21059	Bruce Highway South 225mm Water Main	13.5
WS21060	Bruce Highway South 225mm Water Main	60.75
WS21061	Marbelli St 100mm Water Main	26.25
WS21062	Marbelli St 150mm Water Main	23.625
WS21063	Marbelli St 150mm Water Main	39.375
WS21064	Marbelli St 150mm Water Main	31.5
WS21065	Farrell Dr 150mm Water Main	9
WS21066	Mill Rd 150mm Water Main	36
WS21067	Bruce Highway (South) 100mm Water Main	22.5
WS21068	Atzeni Lane 40mm Water Main	15
WS21069	Lions Lookout Road 100mm Water Main	9
WS21070	Bosworths Road 150mm Water Main	3.5
WS21071	Bosworths Road 150mm Water Main	26.25
WS21072	Forrest Beach Road 100mm Water Main	4.5
WS21073	Forrest Beach Road 100mm Water Main	1.5
WS21074	Forrest Beach Road 100mm Water Main	4.5
WS21075	Forrest Beach Road 100mm Water Main	4.5
WS21076	Forrest Beach Road 100mm Water Main	4.5
WS21077	Forrest Beach Road 100mm Water Main	4.5
WS21078	Forrest Beach Road 100mm Water Main	4.5
WS21079	Forrest Beach Road 250mm Water Main	7.5
WS21080	Forrest Beach Road 250mm Water Main	5
WS21081	Forrest Beach Road 250mm Water Main	2.5
WS21082	Forrest Beach Road 250mm Water Main	5
WS21083	Forrest Beach Road 250mm Water Main	2.5
WS21084	Forrest Beach Road 250mm Water Main	3.75
WS21085	Forrest Beach Road 250mm Water Main	2.5
WS21086	Forrest Beach Road 250mm Water Main	2.5
WS21087	Forrest Beach Road 250mm Water Main	5
WS21088	Forrest Beach Road 250mm Water Main	9.375
WS21089	Forrest Beach Road 250mm Water Main	7.5
WS21090	Forrest Beach Road 100mm Water Main	6.75
WS21091	Forrest Beach Road 100mm Water Main	4.5
WS21092	Forrest Beach Road 100mm Water Main	4.5
WS21093	Forrest Beach Road 100mm Water Main	4.5
WS21094	Bosworth Road 150mm Water Main	3.5
WS21095	Bosworth Road 150mm Water Main	10.5
WS21096	Bosworth Road 150mm Water Main	3.5
WS21097	Bosworth Road 150mm Water Main	7
WS21098	Forrest Beach Rd 150mm Water Main	4

Asset No.	Asset Description	Criticality Score
WS21099	Forrest Beach Rd 150mm Water Main	2.5
WS21100	Forrest Beach Rd 150mm Water Main	2.5
WS21101	Forrest Beach Rd 150mm Water Main	2.5
WS21102	Forrest Beach Rd 150mm Water Main	2.5
WS21103	Forrest Beach Rd 150mm Water Main	2.5
WS21104	Forrest Beach Rd 250mm Water Main	7.5
WS21105	Forrest Beach Rd 250mm Water Main	2.5
WS21106	Forrest Beach Rd 250mm Water Main	3.75
WS21107	Forrest Beach Rd 250mm Water Main	2.5
WS21108	Forrest Beach Rd 250mm Water Main	3.75
WS21109	Forrest Beach Rd 250mm Water Main	5
WS21110	Forrest Beach Rd 250mm Water Main	2.5
WS21111	Forrest Beach Rd 250mm Water Main	5
WS21112	Forrest Beach Rd 250mm Water Main	7.5
WS21113	Forrest Beach Rd 250mm Water Main	6.25
WS21114	Forrest Beach Rd 250mm Water Main	2.5
WS21115	Forrest Beach Rd 250mm Water Main	5
WS21116	Forrest Beach Rd 250mm Water Main	2.5
WS21117	Forrest Beach Rd 250mm Water Main	5
WS21118	Forrest Beach Rd 250mm Water Main	5
WS21119	Forrest Beach Rd 250mm Water Main	2.5
WS21120	Forrest Beach Rd 250mm Water Main	2.5
WS21121	Forrest Beach Rd 250mm Water Main	2.5
WS21122	Forrest Beach Rd 250mm Water Main	3.75
WS21123	Forrest Beach Rd 250mm Water Main	3.75
WS21124	Forrest Beach Rd 250mm Water Main	3.75
WS21125	Forrest Beach Rd 250mm Water Main	2.5
WS21126	Forrest Beach Road 100mm Water Main	4.5
WS21127	Forrest Beach Road 100mm Water Main	4.5
WS21128	Forrest Beach Road 100mm Water Main	4.5
WS21129	Forrest Beach Rd 250mm Water Main	2.5
WS21130	Forrest Beach Rd 250mm Water Main	2.5
WS21131	Forrest Beach Rd 250mm Water Main	7.5
WS21132	Forrest Beach Rd 250mm Water Main	2.5
WS21133	Forrest Beach Rd 250mm Water Main	7.5
WS21134	Forrest Beach Rd 250mm Water Main	7.5
WS21135	Forrest Beach Rd 250mm Water Main	5
WS21157	Forrest Beach Rd 150mm Water Main	2.5
WS21158	Forrest Beach Rd 150mm Water Main	2.5
WS21159	Forrest Beach Rd 150mm Water Main	2.5
WS21160	Forrest Beach Rd 150mm Water Main	2.5
WS21161	Forrest Beach Rd 300mm Water Main	3.75

Asset No.	Asset Description	Criticality Score
WS21162	Forrest Beach Rd 100mm Water Main	2.5
WS21163	Dutton Street 100mm Water Main	5.625
WS21164	Dutton Street 100mm Water Main	3
WS21165	Dutton Street 100mm Water Main	3
WS21166	Dutton Street 100mm Water Main	4.5
WS21167	Dutton Street 100mm Water Main	3
WS21168	Tully Street 100mm Water Main Renew	6
WS21169	Tully Street 100mm Water Main	9
WS21170	Tully Street 100mm Water Main	6
WS21172	Tully Street - Ingham 63mm Water Main	12
WS51250	INGHAM RIVER HIGH LIFT STN SWITCHBOARD	151.875
WS51251	INGHAM RIVER HIGH LIFT SOFT STARTERS 1	78.75
WS51252	INGHAM RIVER HIGH LIFT SOFT STARTERS 2	78.75
WS51253	INGHAM RIVER HIGH LIFT SOFT STARTERS 3	78.75
WS51254	INGHAM RIVER LOW LIFT STN SWITCHBOARD	120
WS51255	INGHAM DEPOT WTP SWITCHBOARD	283.5
WS51256	INGHAM DEPOT WTP SOFT STARTERS 1	118.125
WS51257	INGHAM DEPOT WTP SOFT STARTERS 2	118.125
WS51258	TREBONNE BPS SWITCHBOARD	144
WS51261	HALIFAX DEPOT SWITCHBOARDS	168
WS51262	FORREST BEACH HIGH LIFT STN SWITCHBOARD	160
WS51263	FORREST BEACH HIGH LIFT SOFT STARTER 1	61.25
WS51264	FORREST BEACH HIGH LIFT SOFT STARTER 2	61.25
WS51265	FORREST BEACH WTP SWITCHBOARD	100
WS51266	FORREST BCH WELL 4 ELECTRICAL SERVICE	50
WS51267	FORREST BCH WELL 1,2&3 POWER CABLES	31.25
WS51268	FORREST BCH WELL No.6 ELECTRICAL SERVICE	62.5
WS51269	FORREST BCH WELL No.7 ELECTRICAL SERVICE	39.0625
WS51276	MACKNADE WTP MAIN SWITCHBOARD	140
WS51278	MACKNADE WTP WELL 1 ELECTRICAL SERVICE	56
WS51279	MACKNADE BORE 2 SWITCHBOARD	112
WS51280	MACKNADE WTP WELL 3 ELECTRICAL SERVICE	70
WS51281	MACKNADE WTP WELL 4 ELECTRICAL SERVICE	49
WS51282	MACKNADE WTP WELL 5 ELECTRICAL SERVICE	43.75
WS51284	ELECTRICAL CABLE TRAYS - HALIFAX TOWER	18
WS51285	FORREST BEACH WATER TOWER SWITCHBOARD	84
WS51286	FORREST BCH WATER TOWER ELECTRICAL CABLE	24
WS51287	HALIFAX WATER TOWER SWITCHBOARD	84
WS51288	HALIFAX WATER TOWER ELECTRICAL CABLE	24
WS51289	TOOBANNA WATER TOWER SWITCHBOARD	112
WS51290	INGHAM WATER TOWER SWITCHBOARD	192.9375
WS51294	MACKNADE WATER TREATMENT PLANT BORE 2A ELECTRICAL SERVICE	35

Asset No.	Asset Description	Criticality Score
WS51297	MACKNADE WATER TREATMENT PLANT BORE 3A SWITCHBOARD & SUB BOARD	49
WS51299	INGHAM LOW LIFT STATION BORE HOLE 1 STRUCTURE RENEWAL	60
WS51300	INGHAM LOW LIFT STATION BORE HOLE 2 STRUCTURE RENEWAL	60
WS51301	INGHAM LOW LIFT STATION BORE HOLE 3 STRUCTURE RENEWAL	60
WS51302	INGHAM LOW LIFT STATION OBSERVATION BORE HOLE 4 STRUCTURE	36
WS51303	INGHAM LOW LIFT STATION OBSERVATION BORE HOLE 5 STRUCTURE	36
WS51306	FORREST BEACH WATER TREATMENT PLANT CHEMICAL SHED SUB SWITCHBOARD	105
WS51500	INGHAM HIGH LIFT WATER PUMPING STATION PUMP 1	90
WS51501	INGHAM HIGH LIFT WATER PUMPING STATION PUMP 2	90
WS51502	INGHAM HIGH LIFT WATER PUMPING STATION PUMP 3	90
WS51503	INGHAM HIGH LIFT WATER PUMPING STATION RECIRCULATING	135
WS51504	INGHAM LOW LIFT WATER PUMPING STATION PUMP 1	105
WS51505	INGHAM LOW LIFT WATER PUMPING STATION PUMP 2	105
WS51506	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 1	47.25
WS51507	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT PUMP 2	47.25
WS51508	INGHAM DEPOT WATER TREATMENT PLANT HIGH LIFT RECIRCULATING PUMP	177.1875
WS51511	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 4	46.875
WS51512	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 6	54.6875
WS51513	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 7	46.875
WS51514	FORREST BEACH WATER TREATMENT PLANT BORE PUMP 7 SPARE	37.5
WS51515	FORREST BEACH WATER PUMPING STATION HIGH LIFT PUMP 1	52.5
WS51516	FORREST BEACH WATER PUMPING STATION HIGH LIFT PUMP 2	52.5
WS51521	HALIFAX DEPOT WATER PUMPING STATION HIGH LIFT PUMP 1	31.5
WS51522	HALIFAX DEPOT WATER PUMPING STATION HIGH LIFT PUMP 2	31.5
WS51523	HALIFAX DEPOT WATER PUMPING STATION RECIRCULATING PUMP	126
WS51532	MACKNADE WATER TREATMENT PLANT BORE PUMP 5	52.5
WS51534	TREBONNE PRESSURE PUMP 1	40.5
WS51535	TREBONNE PRESSURE PUMP 2	40.5
WS51536	TREBONNE PRESSURE PUMP 3	40.5
WS51537	TREBONNE PRESSURE PUMP 4	40.5
WS51538	MACKNADE WATER TREATMENT PLANT BORE 2A PUMP RENEWAL	52.5
WS51540	MACKNADE WATER TREATMENT PLANT BORE 2A & 3A PUMP RENEWAL	52.5
WS52005	INGHAM DEPOT WATER TREATMENT PLANT TELEMETERY	165.375
WS52006	INGHAM HIGH LIFT WATER PUMPING STATION TELEMETERY	47.25
WS52007	TREBONNE WATER PUMPING STATION TELEMETERY	78.75
WS52010	FORREST BEACH HIGH LIFT STATION TELEMETERY	32.8125
WS52012	HALIFAX DEPOT WATER PUMPING STATION TELEMETERY	91.875
WS52016	MACKNADE WATER TREATMENT PLANT TELEMETERY	61.25
WS52101	INGHAM WATER TOWER STRUCTURE	354.375
WS52102	INGHAM WATER TOWER LINING	275.625

Asset No.	Asset Description	Criticality Score
WS52103	FORREST BEACH WATER TOWER STRUCTURE	150
WS52104	HALIFAX WATER TOWER STRUCTURE	175
WS52105	TOKALON WATER TOWER STRUCTURE	140
WS52106	TOKALON WATER TOWER EXTERNAL REFURBISH	90
WS52107	INGHAM HIGH LIFT 17.6Ml RESERVOIR	180
WS52108	INGHAM HIGH LIFT 17.6Ml RESERVOIR ROOF	112.5
WS52109	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR STRUCTURE	91.125
WS52110	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR BOTTOM LINER	189
WS52111	DEPOT WATER TREATMENT PLANT 3.8Ml RESERVOIR ROOF LINER	121.5
WS52112	DEPOT WATER TREATMENT PLANT CONCRETE MAZE RESERVOIR	94.5
WS52113	HALIFAX DEPOT WATER PUMPING STATION RESERVOIR STRUCTURE	39.375
WS52114	HALIFAX DEPOT WATER PUMPING STATION RESERVOIR BOTTOM LINER	98.4375
WS52115	HALIFAX DEPOT WATER PUMPING STATION RESERVOIR ROOF LINER	87.5
WS52116	LUCINDA BOOSTER PUMPING STATION 3ML RESERVOIR SUB STRUCTURE includes reservoir walls, floor and associated pipework	240
WS52117	MACKNADE LOW LEVEL RESERVOIR 1 CONCRETE TANK	84
WS52118	MACKNADE LOW LEVEL RESERVOIR 2 STEEL TANK	52.5
WS52119	MACKNADE LOW LEVEL RESERVOIR 3 PLASTIC TANK	42
WS52120	MACKNADE HIGH LEVEL RESERVOIR 1 STEEL TANK	94.5
WS52121	MACKNADE HIGH LEVEL RESERVOIR 2 STEEL TANK	94.5
WS52122	WASHAWAY BOOSTER PUMPING STATION LOW LEVEL RESERVOIR 1 STEEL TANK	72
WS52123	WASHAWAY BOOSTER PUMPING STATION LOW LEVEL RESERVOIR 2 STEEL TANK	72
WS52124	FORREST BEACH WATER TREATMENT PLANT LOW LEVEL RESERVOIR	140
WS52125	FORREST BCH WATER PUMPING STATION 3.0Ml CONCRETE RESERVOIR	75
WS52126	FORREST BCH WATER PUMPING STATION 3.0Ml RESERVOIR EXTERNAL SEAL	45
WS52128	TREBONNE WATER PUMPING STATION LOW LEVEL STORAGE RESERVOIR	168
WS52140	MACKNADE WATER TREATMENT PLANT WELL 1 STRUCTURE	73.5
WS52143	MACKNADE WATER TREATMENT PLANT BORE 4 STRUCTURE	73.5
WS52144	MACKNADE WATER TREATMENT PLANT BORE 5 STRUCTURE	61.25
WS52145	FORREST BEACH WATER TREATMENT PLANT WELL 1 STRUCTURE	52.5
WS52146	FORREST BEACH WATER TREATMENT PLANT WELL 2 STRUCTURE	52.5
WS52147	FORREST BEACH WATER TREATMENT PLANT WELL 3 STRUCTURE	52.5
WS52148	FORREST BEACH WATER TREATMENT PLANT BORE 4 STRUCTURE	60
WS52149	FORREST BEACH WATER TREATMENT PLANT BORE 6 STRUCTURE	32.8125
WS52150	FORREST BEACH WATER TREATMENT PLANT BORE 7 STRUCTURE	32.8125
WS52155	INGHAM DEPOT WATER TREATMENT PLANT AERATOR BUND	212.625
WS52158	FORREST BEACH WATER TREATMENT PLANT SAND FILTER BEDS	160
WS52159	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER SUBSTRUCTURE	90
WS52160	INGHAM DEPOT WATER TREATMENT PLANT SAND FILTER BEDS	177.1875
WS52162	MACKNADE WATER TREATMENT PLANT SAND FILTER BEDS	224

Asset No.	Asset Description	Criticality Score
WS52163	INGHAM LOW LIFT STATION GALLERY	162
WS52164	INGHAM LOW LIFT STATION FOOT VALVE WELL	162
WS52165	MACKNADE WATER TREATMENT PLANT BORE 2A STRUCTURE RENEWAL	70
WS52166	MACKNADE WATER TREATMENT PLANT BORE 3A STRUCTURE RENEWAL	70
WS52169	MACKNADE WATER TREATMENT PLANT AERATOR renewal	98
WS52170	HALIFAX WATER TOWER LINING	140
WS52171	FORREST BEACH WATER TOWER LINING	105
WS52173	FORREST BEACH HIGHLIFT RESERVIOR ROOF FLASHING STAINLESS STEEL	76.5625
WS52175	INGHAM DEPOT WATER TREATMENT PLANT AERATOR;;Renewal	151.875
WS52176	CONCRETE EMBANKMENT INGHAM DEPOT WATER TREATMENT PLANT	45
WS52177	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER BAFFLE WALLS	120
WS52178	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER INLET LAUNDER NORTH;;STAINLESS STEEL	87.5
WS52179	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER INLET LAUNDER SOUTH;;STAINLESS STEEL	87.5
WS52180	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER OUTLET LAUNDER NORTH;;STAINLESS STEEL	87.5
WS52181	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER OUTLET LAUNDER SOUTH;;STAINLESS STEEL	87.5
WS52182	FORREST BEACH WATER TREATMENT PLANT;;CLARIFIER HANDRAIL;;GALVANISED	22.5
WS52183	FORREST BEACH WATER TREATMENT PLANT;;PENSTOCK GATE 1 SOUTH	32.8125
WS52184	FORREST BEACH WATER TREATMENT PLANT;;PENSTOCK GATE 2 NORTH	32.8125
WS52185	INGHAM DEPOT WATER TREATMENT PLANT CCTV SECURITY CAMERAS	33.75
WS52186	INGHAM RIVER PUMPING STATION CCTV SECURITY CAMERAS	22.5
WS53109	7 only Pressure Monitors installed at Forrest Bch	22.5
WS53111	Sodium Hypo Chemical Controller - Ingham WPS	141.75
WS53112	Sodium Hypo Chemical Controller - Depot WTP	212.625
WS53114	Sodium hypo Chemical Controller - Halifax Depot	147
WS53115	Sodium Hypo Chemical Controller - Forrest Bch WTP	105
WS53116	Sodium Hypo Chemical Controller - Macknade WTP	147
WS53124	Sodium Hypochlorite Chemical Tank and Safety Shower - Halifax Depot Water Pumping Station	126
WS53125	Sodium Hypochlorite Chemical Tank and Safety Shower - Ingham Depot Water Treatment Plant	182.25
WS53126	Sodium Hypochlorite Chemical Tank and Safety Shower - Macknade Water Treatment Plant	126
WS53128	Sodium Hypochlorite Chemical Tank and Safety Shower - Forrest Beach Water Treatment Plant	90
WS53129	Outlet Flowmeter Ingham River Water Pumping Station	27
WS53130	Outlet Flowmeter Forrest Beach Water Pumping Station	22.5

Asset No.	Asset Description	Criticality Score
WS53132	Sodium Hypochlorite Chemical Tank and Safety Shower - INGHAM RIVER WATER PUMPING STATION	121.5
WS53135	INLET Flowmeter Ingham River Water Pumping Station	22.5
WS75058	WATER DISTRBUTION PIPES - SAND FILTER FORREST BEACH WATER TREATMENT PLANT	33.75
WS75060	WATER DISTRBUTION PIPES - SAND FILTER MACKNADE WATER TREATMENT PLANT	47.25
WS75061	WATER DISTRBUTION PIPES - SAND FILTER INGHAM DEPOT WATER TREATMENT PLANT	67.5
WS75063	FORREST BEACH WATER TREATMENT PLANT TELEMETERY - RENEWAL	39.375
WS75064	WASHAWAY WATER PUMPING STATION TELEMETERY - RENEWAL	67.5
WS75065	LUCINDA WATER PUMPING STATION TELEMETERY - RENEWAL	67.5
WS75066	INGHAM TOWER TELEMETERY - RENEWAL	78.75
WS75067	HALIFAX TOWER TELEMETERY - RENEWAL	78.75
WS75068	FORREST BEACH TOWER TELEMETERY - RENEWAL	67.5
WS75069	TOKALON TOWER TELEMETERY - RENEWAL	45
WS75073	FORREST BEACH WATER PUMPING STATION RECIRCULATING PUMP	75
WS75074	FORREST BEACH WATER PUMPING STATION RECIRCULATING PUMP SHED	46.875
WS75075	FORREST BEACH WATER PUMPING STATION RECIRCULATING PUMP PLINTH / STAND	22.5
WS75076	CHEMICAL CONTROLLER 1 pH & CL2 - FORREST BEACH WATER PUMPING STATION - INGHAM INLET FLOW	105
WS75077	CHEMICAL CONTROLLER 2 pH & CL2 - FORREST BEACH WATER PUMPING STATION - RECIRCULATION FLOW	105
WS75078	DN 150 TRANSFER PUMP FLOW METER _ FOR BCH WTP - 150mm	22.5
WS75079	DN 250 INLET FLOWMETER - FORREST BEACH WATER PUMPING STATION FROM INGHAM - 250mm	22.5
WS75080	EMERGENCY GENERATOR _ FORREST BEACH WATER TREATMENT PLANT 110KVA	75
WS75081	EMERGENCY GENERATOR _ FORREST BEACH WATER PUMPING STATION 150KVA	75
WS75082	ALTITUDE VALVE - FORREST BEACH WATER PUMPING STATION RESERVOIR FILLING FROM INGHAM	90
WS75083	ALTITUDE VALVE - FORREST BEACH WATER PUMPING STATION RESERVOIR BYPASS TO TOWER FROM INGHAM	90
WS75084	ALTITUDE VALVE - FORREST BEACH WATER TOWER	78.75
WS75085	FORREST BEACH WPS PLC CONTROL in HIGHLIFT SWITCHBOARD	26.25

Appendix D2 –Ingham Water Scheme Criticality Ranking Results

Table D.2: Ingham Water Scheme Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS20497	Marina Parade 225mm Water Main	144
WS20526	Atkinson Street 300mm Water Main	112.5
WS20482	Marina Parade 225mm Water Main	108
WS20529	Atkinson Street 300mm Water Main	90
WS20531	Haig Street 300mm Water Main	90
WS20998	Bruce Highway South 225mm Water Main	75
WS20502	Davidson Street 225mm Water Main	75
WS20558	Chamberlain Street 450mm Water Main	75
WS21010	Kehls Road 100mm Water Main	73.5
WS20421	Challands Street 150mm Water Main	73.5
WS20296	Christie Street 100mm Water Main	72
WS20552	Gardiner Street 300mm Water Main	70
WS20046	Herbert Street 100mm Water Main	67.5
WS20201	Halifax Road 100mm Water Main	67.5
WS20015	Herbert Street 80mm Water Main	67.5
WS20543	Cartwright Street 300mm Water Main	67.5
WS20295	Herbert Street 100mm Water Main	67.5
WS20017	Herbert Street 80mm Water Main	67.5
WS20018	Herbert Street 80mm Water Main	67.5
WS20016	Herbert Street 80mm Water Main	67.5
WS20012	Herbert Street 80mm Water Main	67.5
WS20019	Herbert Street 80mm Water Main	67.5
WS20170	McIlwraith Street 100mm Water Main	67.5
WS20100	Cartwright Street 100mm Water Main	67.5
WS20530	Atkinson Street 300mm Water Main	67.5
WS20008	Herbert Street 80mm Water Main	67.5
WS20011	Herbert Street 80mm Water Main	67.5
WS20007	Lannercost Street 80mm Water Main	67.5
WS20326	Perkins Street 100mm Water Main	65.625
WS20097	Ann Street 100mm Water Main	65.625
WS20050	Churchill Street 100mm Water Main	65.625
WS20247	Townsville Road 100mm Water Main	63
WS20999	Bruce Highway South 225mm Water Main	60
WS20996	Bruce Highway South 225mm Water Main	60
WS20997	Bruce Highway South 225mm Water Main	60
WS20456	Fairford Road 150mm Water Main	60
WS20992	Bruce Highway South 225mm Water Main	60
WS20320	Chamberlain Street 100mm Water Main	60

Asset No.	Asset Description	Criticality Score
WS20197	McIlwraith Street 100mm Water Main	60
WS20474	Haig Street 225mm Water Main	60
WS20524	Hawkins Street 300mm Water Main	60
WS20545	McIlwraith Street 300mm Water Main	60
WS20538	Cartwright Street 300mm Water Main	60
WS20496	Marina Parade 225mm Water Main	60
WS20498	Marina Parade 225mm Water Main	60
WS20250	Martin Street 100mm Water Main	59.0625
WS20259	Eleanor Street 100mm Water Main	56.25
WS20077	White Street 100mm Water Main	56.25
WS20256	Industrial Avenue 100mm Water Main	55.125
WS20048	McIlwraith Street 100mm Water Main	55.125
WS21026	Trebonne Road 150mm Water Main	54
WS20534	Lannercost Street 300mm Water Main	54
WS20064	Lannercost Street 100mm Water Main	54
WS20271	Marina Parade 100mm Water Main	54
WS20137	Harvey Street 100mm Water Main	54
WS20533	Lannercost Street 300mm Water Main	54
WS20009	Lannercost Street 80mm Water Main	54
WS20010	Lannercost Street 80mm Water Main	54
WS20358	Ardrossan Street 150mm Water Main	52.5
WS20276	Covell Street 100mm Water Main	52.5
WS20258	Eleanor Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20252	Martin Street 100mm Water Main	50.625
WS20039	Lannercost Street 100mm Water Main	50.625
WS20034	Lannercost Street 100mm Water Main	50.625
WS20070	Herbert Street 100mm Water Main	50.625
WS20425	Herbert Street 150mm Water Main	50.625
WS20392	Herbert Street 150mm Water Main	50.625
WS20076	Herbert Street 100mm Water Main	50.625
WS20365	Herbert Street 150mm Water Main	50.625
WS20389	Herbert Street 150mm Water Main	50.625
WS20069	Herbert Street 100mm Water Main	50.625
WS20061	Herbert Street 100mm Water Main	50.625
WS20258	Eleanor Street 100mm Water Main	50.625
WS20086	Herbert Street 100mm Water Main	50.625
WS20521	Bruce Highway South 225mm Water Main	50

Asset No.	Asset Description	Criticality Score
WS20991	Bruce Highway South 225mm Water Main	50
WS20993	Bruce Highway South 225mm Water Main	50
WS20550	Warren Street 300mm Water Main	50
WS20523	Hawkins Street 300mm Water Main	50
WS20439	Origlasso Street 150mm Water Main	50
WS20293	Enterprise Street 100mm Water Main	47.25
WS20246	Cooper Street 100mm Water Main	47.25
WS20522	Victoria Mill Road 250mm Water Main	47.25
WS20200	Macrossan Avenue 100mm Water Main	47.25
WS20255	Industrial Avenue 100mm Water Main	47.25
WS20422	Challands Street 150mm Water Main	47.25
WS20249	Moretti Street 100mm Water Main	45.9375
WS20994	Bruce Highway South 225mm Water Main	45
WS20309	Abbott Street 100mm Water Main	45
WS20033	Hawkins Street 100mm Water Main	45
WS20227	McIlwraith Street 100mm Water Main	45
WS20388	Palm Terrace 150mm Water Main	45
WS20386	Palm Terrace 150mm Water Main	45
WS20401	Marina Parade 150mm Water Main	45
WS20107	Cartwright Street 100mm Water Main	45
WS20366	Cartwright Street 150mm Water Main	45
WS20369	Cartwright Street 150mm Water Main	45
WS20423	Cartwright Street 150mm Water Main	45
WS20541	Davidson Street 300mm Water Main	45
WS20101	Cartwright Street 100mm Water Main	45
WS20125	Burke Street 100mm Water Main	45
WS20090	Garbutt Street 100mm Water Main	45
WS20417	Herbert Street 150mm Water Main	45
WS20419	Origlasso Street 150mm Water Main	45
WS20248	Dalrymple Street 100mm Water Main	45
WS20243	Palmer Street 100mm Water Main	43.75
WS20035	Perkins Street 100mm Water Main	43.75
WS20435	Hamleigh Road 150mm Water Main	42
WS20283	Johnstone Street 100mm Water Main	42
WS20477	Lannercost Street 225mm Water Main	40.5
WS20573	Victoria Mill Road 150mm Water Main	40.5
WS20141	Victoria Mill Road 100mm Water Main	40.5
WS20532	Lannercost Street 300mm Water Main	40.5
WS20510	Menzies Street 225mm Water Main	40.5
WS20535	Lannercost Street 300mm Water Main	40.5
WS20440	Halifax Road 150mm Water Main	40
WS20475	Haig Street 225mm Water Main	40

Asset No.	Asset Description	Criticality Score
WS20508	Bruce Highway South 225mm Water Main	40
WS20298	Larsens Road 100mm Water Main	39.375
WS20096	Omalley Street 100mm Water Main	39.375
WS20233	King Street 100mm Water Main	39.375
WS20251	Martin Street 100mm Water Main	39.375
WS20059	George Street 100mm Water Main	39.375
WS20176	Morehead Street 100mm Water Main	39.375
WS20189	Gard Street 100mm Water Main	39.375
WS20279	McKenzie Street 100mm Water Main	39.375
WS20306	Morehead Street 100mm Water Main	39.375
WS20178	Robertson Street 100mm Water Main	39.375
WS20180	Fraser Street 100mm Water Main	39.375
WS20124	Burke Street 100mm Water Main	39.375
WS20274	Covell Street 100mm Water Main	39.375
WS20082	Heard Street 100mm Water Main	39.375
WS20990	Bruce Highway South 225mm Water Main	37.5
WS20418	Origlasso Street 150mm Water Main	37.5
WS20053	George Street 100mm Water Main	37.5
WS20130	Hardy Street 100mm Water Main	37.5
WS20557	Pump Station Road 450mm Water Main	37.5
WS20420	Origlasso Street 150mm Water Main	37.5
WS20254	Plywood Street 100mm Water Main	36.75
WS21028	Trebonne Road 150mm Water Main	36
WS20444	Trebonne Road 150mm Water Main	36
WS20436	Hamleigh Road 150mm Water Main	36
WS20437	Coates Road 150mm Water Main	36
WS20134	Hardy Street 100mm Water Main	36
WS20301	Lannercost Street 100mm Water Main	36
WS20547	Davidson Street 300mm Water Main	36
WS20542	Davidson Street 300mm Water Main	36
WS20528	River Easement 300mm Water Main	35
WS20987	Bruce Highway South 100mm Water Main	33.75
WS20352	Shanahan Road 100mm Water Main	33.75
WS20353	Martin Street 100mm Water Main	33.75
WS20054	Herbert Street 100mm Water Main	33.75
WS20319	Giugni Street 100mm Water Main	33.75
WS20426	Herbert Street 150mm Water Main	33.75
WS20394	Herbert Street 150mm Water Main	33.75
WS20062	Herbert Street 100mm Water Main	33.75
WS20060	Herbert Street 100mm Water Main	33.75
WS20041	Lannercost Street 100mm Water Main	33.75
WS20040	Lannercost Street 100mm Water Main	33.75

Asset No.	Asset Description	Criticality Score
WS20037	Berwick Street 100mm Water Main	33.75
WS20393	Herbert Street 150mm Water Main	33.75
WS20083	Herbert Street 100mm Water Main	33.75
WS20390	Herbert Street 150mm Water Main	33.75
WS20024	Hecht Street 100mm Water Main	33.75
WS20026	Townsend Street 100mm Water Main	33.75
WS20196	McIlwraith Street 100mm Water Main	33.75
WS20253	Martin Street 100mm Water Main	33.75
WS20261	Cartwright Street 100mm Water Main	33.75
WS20461	Alm Street 150mm Water Main	33.75
WS20106	Cartwright Street 100mm Water Main	33.75
WS20063	Herbert Street 100mm Water Main	33.75
WS20975	Bruce Highway South 100mm Water Main	32.8125
WS20977	Bruce Highway South 100mm Water Main	32.8125
WS20207	Dickson Street 100mm Water Main	31.5
WS20199	Macrossan Avenue 100mm Water Main	31.5
WS20238	Cooper Street 100mm Water Main	31.5
WS20551	Warren Street 300mm Water Main	31.5
WS20469	River Easement 225mm Water Main	31.25
WS20133	Stone Street 100mm Water Main	31.25
WS20553	Gardiner Street 375mm Water Main	31.25
WS20047	Perkins Street 100mm Water Main	30.625
WS21013	Stone River Road 100mm Water Main	30.375
WS20397	Lannercost Street 150mm Water Main	30.375
WS21014	Kehls Road 100mm Water Main	30
WS20995	Bruce Highway South 225mm Water Main	30
WS20000	Morehead Street 50mm Water Main	30
WS20450	Fairford Road 150mm Water Main	30
WS20282	Neilsen Street 100mm Water Main	30
WS20554	Churchill Street 375mm Water Main	30
WS20507	Martin Street 225mm Water Main	30
WS20150	Borello Street 100mm Water Main	30
WS20367	Cartwright Street 150mm Water Main	30
WS20289	Menzies Street 100mm Water Main	30
WS20371	Cartwright Street 150mm Water Main	30
WS20312	Fisher Street 100mm Water Main	30
WS20311	Fisher Street 100mm Water Main	30
WS20266	Burke Street Offset Road 100mm Water Main	30
WS20548	Davidson Street 300mm Water Main	30
WS20525	Chamberlain Street 300mm Water Main	30
WS20544	McIlwraith Street 300mm Water Main	30
WS20488	Alston Street 225mm Water Main	30

Asset No.	Asset Description	Criticality Score
WS20492	Cowley Street 225mm Water Main	30
WS20506	Martin Street 225mm Water Main	30
WS20370	Cartwright Street 150mm Water Main	30
WS20368	Cartwright Street 150mm Water Main	30
WS20267	Burke Street Offset Road 100mm Water Main	30
WS20268	Burke Street 100mm Water Main	30
WS20275	Scott Street - Ingham 100mm Water Main	30
WS20539	Cassady Street 300mm Water Main	30
WS20537	Cartwright Street 300mm Water Main	30
WS20179	Miles Street 100mm Water Main	28.125
WS20351	Cemetery Road 100mm Water Main	28.125
WS20325	Gardiner Street 100mm Water Main	28.125
WS20324	Neame Street 100mm Water Main	28.125
WS20322	Neame Street 100mm Water Main	28.125
WS20315	Warren Street 100mm Water Main	28.125
WS20188	Griffith Street 100mm Water Main	28.125
WS20527	Chamberlain Street 300mm Water Main	28.125
WS20384	McIlwraith Street 150mm Water Main	28.125
WS20204	Rutledge Street 100mm Water Main	28.125
WS20205	Philp Street 100mm Water Main	28.125
WS20065	Lynn Street 100mm Water Main	28.125
WS20052	George Street 100mm Water Main	28.125
WS20472	Atkinson Street 225mm Water Main	28.125
WS20473	Atkinson Street 225mm Water Main	28.125
WS20078	Lynch Street 100mm Water Main	28.125
WS20470	Atkinson Street 225mm Water Main	28.125
WS20471	Atkinson Street 225mm Water Main	28.125
WS20264	Hardy Street 100mm Water Main	28.125
WS20234	Rutledge Street 100mm Water Main	28.125
WS20153	Boyd Street 100mm Water Main	28.125
WS20155	Macdonald Street 100mm Water Main	28.125
WS20162	Alston Street 100mm Water Main	28.125
WS20181	Fraser Street 100mm Water Main	28.125
WS20194	Cooper Street 100mm Water Main	28.125
WS20338	Dutton Street 100mm Water Main	28.125
WS20147	Marina Parade 100mm Water Main	28.125
WS20098	Francis Street 100mm Water Main	28.125
WS20113	Cassady Street 100mm Water Main	28.125
WS20269	Bird Street 100mm Water Main	28.125
WS20131	Hardy Street 100mm Water Main	28.125
WS20117	Stone Street 100mm Water Main	28.125
WS20084	Allingham Street 100mm Water Main	28.125

Asset No.	Asset Description	Criticality Score
WS20088	Blamey Street 100mm Water Main	28.125
WS20460	Alm Street 150mm Water Main	28.125
WS20228	Cooper Street 100mm Water Main	27.5625
WS20354	Lannercost Street 100mm Water Main	27
WS20563	McDonaghs Road 100mm Water Main	27
WS20457	Townsville Road 150mm Water Main	27
WS20443	Trebonne Road 150mm Water Main	27
WS21023	Gorton Street 150mm Water Main	27
WS21012	Trebonne Road 100mm Water Main	27
WS21002	Trebonne Road 100mm Water Main	27
WS20468	Lannercost Street 225mm Water Main	27
WS20560	Crisps Road 100mm Water Main	27
WS20411	Gough Street 150mm Water Main	27
WS20232	Davidson Street 100mm Water Main	27
WS21011	Stone River Road 100mm Water Main	27
WS20297	Herbert Street 100mm Water Main	27
WS20206	Davidson Street 100mm Water Main	27
WS20410	Gough Street 150mm Water Main	27
WS20408	Townsville Road 150mm Water Main	27
WS20479	Cartwright Street 225mm Water Main	27
WS20381	Menzies Street 150mm Water Main	27
WS20075	Authurs Street 100mm Water Main	27
WS21071	Bosworths Road 150mm Water Main	26.25
WS20984	Bruce Highway South 100mm Water Main	26.25
WS20350	Sir Arthur Fadden Parade 100mm Water Main	26.25
WS20620	Foresthome Road 80mm Water Main	26.25
WS20623	Foresthome Road 100mm Water Main	26.25
WS20323	Neame Street 100mm Water Main	26.25
WS20099	Francis Street 100mm Water Main	26.25
WS20555	River Easement 375mm Water Main	26.25
WS20979	Brolga Street 100mm Water Main	26.25
WS20014	Marina Parade 80mm Water Main	26.25
WS20413	Bruce Highway South 150mm Water Main	26.25
WS20045	Lannercost Street 100mm Water Main	26.25
WS20169	Dutton Street 100mm Water Main	26.25
WS20112	Mahoney Street 100mm Water Main	26.25
WS20072	Gardiner Street 100mm Water Main	26.25
WS20031	Von Alpin Street 100mm Water Main	26.25
WS20049	Perkins Street 100mm Water Main	26.25
WS20110	Tilley Street 100mm Water Main	26.25
WS20126	Burke Street 100mm Water Main	26.25
WS20378	Forgan Street 150mm Water Main	26.25

Asset No.	Asset Description	Criticality Score
WS20094	Leckie Street 100mm Water Main	26.25
WS20377	Clay Street 150mm Water Main	25.3125
WS20376	Clay Street 150mm Water Main	25.3125
WS20379	Clay Street 150mm Water Main	25.3125
WS20380	Clay Street 150mm Water Main	25.3125
WS20348	Pindar Street 100mm Water Main	24
WS21016	Trebonne Road 150mm Water Main	24
WS20281	McIlwraith Street 100mm Water Main	24
WS20277	Cassady Street 100mm Water Main	24
WS21024	Sartoresi Street 150mm Water Main	23.625
WS20624	Halifax Road 100mm Water Main	23.4375
WS20185	Miles Street 100mm Water Main	22.5
WS21067	Bruce Highway (South) 100mm Water Main	22.5
WS20985	Bruce Highway South 100mm Water Main	22.5
WS20986	Bruce Highway South 100mm Water Main	22.5
WS20520	Griffith Street 225mm Water Main	22.5
WS20983	Bruce Highway South 100mm Water Main	22.5
WS20982	Bruce Highway South 100mm Water Main	22.5
WS20335	Palm Avenue 100mm Water Main	22.5
WS20626	Halifax Road 150mm Water Main	22.5
WS20570	Mudies Road 100mm Water Main	22.5
WS21006	Britton Street 100mm Water Main	22.5
WS21003	Abergowrie Road 100mm Water Main	22.5
WS21018	Abergowrie Road 150mm Water Main	22.5
WS20305	Morehead Street 100mm Water Main	22.5
WS20519	Palm Avenue 225mm Water Main	22.5
WS20262	Cartwright Street 100mm Water Main	22.5
WS20969	Scovazzis Road 100mm Water Main	22.5
WS20978	Jabiru Street 100mm Water Main	22.5
WS20302	Bruce Highway South 100mm Water Main	22.5
WS20968	Bruce Highway South 100mm Water Main	22.5
WS20187	Fisher Street 100mm Water Main	22.5
WS21022	Rankin Street 150mm Water Main	22.5
WS20345	Triton Street 100mm Water Main	22.5
WS20385	McIlwraith Street 150mm Water Main	22.5
WS20288	Ann Street 100mm Water Main	22.5
WS20278	Herbert Street 100mm Water Main	22.5
WS20148	Menzies Street 100mm Water Main	22.5
WS20285	Johnstone Street 100mm Water Main	22.5
WS20284	Johnstone Street 100mm Water Main	22.5
WS20128	Burke Street 100mm Water Main	22.5
WS20273	Covell Street 100mm Water Main	22.5

Asset No.	Asset Description	Criticality Score
WS20540	Cassady Street 300mm Water Main	22.5
WS20356	Churchill Street 150mm Water Main	22.5
WS20500	Davidson Street 225mm Water Main	22.5
WS20499	Davidson Street 225mm Water Main	22.5
WS20056	Fanning Street 100mm Water Main	22.5
WS20057	Gort Street 100mm Water Main	22.5
WS20081	Lynch Street 100mm Water Main	22.5
WS20404	Townsville Road 150mm Water Main	22.5
WS20028	Maria Court 100mm Water Main	22.5
WS20355	Ardrossan Street 150mm Water Main	22.5
WS20357	Ardrossan Street 150mm Water Main	22.5
WS20032	Yeldham Street 100mm Water Main	22.5
WS20549	Townsville Road 300mm Water Main	22.5
WS20198	McIlwraith Street 100mm Water Main	22.5
WS20195	Jane Street 100mm Water Main	22.5
WS20208	Dickson Street 100mm Water Main	22.5
WS20184	Griffith Street 100mm Water Main	22.5
WS20171	Miles Street 100mm Water Main	22.5
WS20290	McIlwraith Street 100mm Water Main	22.5
WS20104	Cartwright Street 100mm Water Main	22.5
WS20270	Menzies Street 100mm Water Main	22.5
WS20103	Menzies Street 100mm Water Main	22.5
WS20224	Clement Street 100mm Water Main	22.5
WS20399	Marina Parade 150mm Water Main	22.5
WS20223	Druery Street 100mm Water Main	22.5
WS20220	Kehl Street 100mm Water Main	22.5
WS20221	Row Street 100mm Water Main	22.5
WS20225	Lehane Street 100mm Water Main	22.5
WS20400	Marina Parade 150mm Water Main	22.5
WS20373	Cassady Street 150mm Water Main	22.5
WS20127	Blackburn Street 100mm Water Main	22.5
WS20129	Hardy Street 100mm Water Main	22.5
WS20119	Jesson Street 100mm Water Main	22.5
WS20136	Stallan Street 100mm Water Main	22.5
WS20058	Gort Street 100mm Water Main	22.5
WS20362	Mylrea Street 150mm Water Main	22.5
WS20085	Allingham Street 100mm Water Main	22.5
WS20383	Menzies Street 150mm Water Main	22.5
WS20491	McIlwraith Street 225mm Water Main	22.5
WS20546	McIlwraith Street 300mm Water Main	22.5
WS20236	Cooper Street 100mm Water Main	21
WS20597	Three Mile Road 150mm Water Main	21

Asset No.	Asset Description	Criticality Score
WS20013	Cooper Street 80mm Water Main	21
WS21030	McIlwraith Street 225mm Water Main	20.25
WS20427	Herbert Street 150mm Water Main	20.25
WS20395	Lannercost Street 150mm Water Main	20.25
WS20428	Lannercost Street 150mm Water Main	20.25
WS20387	Palm Terrace 150mm Water Main	20.25
WS20494	McIlwraith Street 225mm Water Main	20.25
WS20485	Palm Avenue 225mm Water Main	20.25
WS20484	Palm Avenue 225mm Water Main	20.25
WS20518	Palm Avenue 225mm Water Main	20.25
WS20489	McIlwraith Street 225mm Water Main	20.25
WS20487	McIlwraith Street 225mm Water Main	20.25
WS20342	Victoria Mill Road 100mm Water Main	20.25
WS20121	Morrissey Street 100mm Water Main	19.6875
WS20337	Duffy Street 100mm Water Main	19.6875
WS20414	Martin Street 150mm Water Main	19.6875
WS20044	Perkins Street 100mm Water Main	19.6875
WS20173	Miles Street 100mm Water Main	19.6875
WS20341	Dutton Street 100mm Water Main	19.6875
WS20216	Cockrell Street 100mm Water Main	19.6875
WS20214	Skinner Street 100mm Water Main	19.6875
WS20211	Philp Street 100mm Water Main	19.6875
WS20167	Dutton Street 100mm Water Main	19.6875
WS20174	Conroy Street 100mm Water Main	19.6875
WS20175	Morehead Street 100mm Water Main	19.6875
WS20160	Macdonald Street 100mm Water Main	19.6875
WS20156	Boyd Street 100mm Water Main	19.6875
WS20163	Dutton Street 100mm Water Main	19.6875
WS20166	Cooper Street 100mm Water Main	19.6875
WS20151	Roati Street 100mm Water Main	19.6875
WS20168	Dutton Street 100mm Water Main	19.6875
WS20115	Cassady Street 100mm Water Main	19.6875
WS20091	Garbutt Street 100mm Water Main	19.6875
WS20092	Garbutt Street 100mm Water Main	19.6875
WS20093	Garbutt Street 100mm Water Main	19.6875
WS20182	Miles Street 100mm Water Main	18.75
WS20441	Halifax Road 150mm Water Main	18.75
WS20621	Halifax Road 100mm Water Main	18.75
WS20067	Lynn Street 100mm Water Main	18.75
WS20318	Warren Street 100mm Water Main	18.75
WS20316	Warren Street 100mm Water Main	18.75
WS20193	Abbott Street 100mm Water Main	18.75

Asset No.	Asset Description	Criticality Score
WS20263	Hardy Street 100mm Water Main	18.75
WS20976	Bruce Highway South 100mm Water Main	18.75
WS20509	Bruce Highway South 225mm Water Main	18.75
WS20495	McIlwraith Street 225mm Water Main	18.75
WS20186	Griffith Street 100mm Water Main	18.75
WS20095	Cartwright Street 100mm Water Main	18.75
WS20190	Fraser Street 100mm Water Main	18.75
WS20074	Gardiner Street 100mm Water Main	18.75
WS20132	Hardy Street 100mm Water Main	18.75
WS20158	Alston Street 100mm Water Main	18.75
WS20159	Macdonald Street 100mm Water Main	18.75
WS20105	Cassady Street 100mm Water Main	18.75
WS20210	Philp Street 100mm Water Main	18.75
WS20203	Rutledge Street 100mm Water Main	18.75
WS20038	Perkins Street 100mm Water Main	18.75
WS20079	Cartwright Street 100mm Water Main	18.75
WS20294	Neame Street 100mm Water Main	18.75
WS20292	Warren Street 100mm Water Main	18.75
WS20073	Gardiner Street 100mm Water Main	18.75
WS20071	Gardiner Street 100mm Water Main	18.75
WS20157	Alston Street 100mm Water Main	18.75
WS20218	Rutledge Street 100mm Water Main	18.75
WS20191	Cooper Street 100mm Water Main	18.75
WS20152	Alston Street 100mm Water Main	18.75
WS20149	Alston Street 100mm Water Main	18.75
WS20504	Martin Street 225mm Water Main	18.75
WS20087	Venables Street 100mm Water Main	18.75
WS20287	Cooper Street 100mm Water Main	18.375
WS20458	Palm Avenue 150mm Water Main	18
WS20565	Blackrock Road 150mm Water Main	18
WS20515	Fairford Road 225mm Water Main	18
WS20559	Casanovas Road 100mm Water Main	18
WS20405	Macrossan Avenue 150mm Water Main	18
WS20382	Menzies Street 150mm Water Main	18
WS20598	Four Mile Road 150mm Water Main	18
WS20592	Three Mile Road 100mm Water Main	18
WS20571	Cooks Lane 150mm Water Main	18
WS20219	Davidson Street 100mm Water Main	18
WS20513	Fairford Road 225mm Water Main	18
WS20514	Fairford Road 225mm Water Main	18
WS20459	Marina Parade 150mm Water Main	18
WS20212	Davidson Street 100mm Water Main	18

Asset No.	Asset Description	Criticality Score
WS20493	Cowley Street 225mm Water Main	18
WS20363	Herbert Street 150mm Water Main	18
WS20536	Lynch Street 300mm Water Main	18
WS20517	Jane Street 225mm Water Main	16.875
WS20481	McIlwraith Street 225mm Water Main	16.875
WS20580	Victoria Mill Road 250mm Water Main	16.875
WS20618	Gairloch Road 50mm Water Main	16.875
WS20617	Foresthome Road 50mm Water Main	16.875
WS21025	Doyle Street 150mm Water Main	16.875
WS21017	Sartoresi Street 150mm Water Main	16.875
WS20511	McIlwraith Street 225mm Water Main	16.875
WS20564	Tokalon Road 150mm Water Main	16.875
WS21021	Rankin Street 150mm Water Main	16.875
WS21007	Meyer Street 100mm Water Main	16.875
WS21020	Rankin Street 150mm Water Main	16.875
WS21000	Wallis Street 100mm Water Main	16.875
WS20120	Jesson Street 100mm Water Main	16.875
WS20280	Dickson Street 100mm Water Main	16.875
WS20202	Markey Street 100mm Water Main	16.875
WS20398	Morehead Street 150mm Water Main	16.875
WS20144	Sir Arthur Fadden Parade 100mm Water Main	16.875
WS20415	Martin Street 150mm Water Main	16.875
WS20138	Covell Street 100mm Water Main	16.875
WS20257	Sir Arthur Fadden Parade 100mm Water Main	16.875
WS20146	Pindar Street 100mm Water Main	16.875
WS20143	Trojan Street 100mm Water Main	16.875
WS20478	Palm Terrace 225mm Water Main	16.875
WS20321	Lynn Street 100mm Water Main	15.75
WS21009	Stone River Road 100mm Water Main	15.75
WS20245	Cooper Street 100mm Water Main	15.75
WS20577	Victoria Mill Road 250mm Water Main	15.75
WS20213	Davidson Street 100mm Water Main	15.75
WS20237	Cooper Street 100mm Water Main	15.75
WS21068	Atzeni Lane 40mm Water Main	15
WS20429	Miles Street 150mm Water Main	15
WS20556	Pump Station Road 375mm Water Main	15
WS20299	Neilsen Street 100mm Water Main	15
WS20329	Halifax Road 100mm Water Main	15
WS20619	Fracchias Road 50mm Water Main	15
WS20438	Cassady Street 150mm Water Main	15
WS20308	Cooper Street 100mm Water Main	15
WS20972	Masters Road 100mm Water Main	15

Asset No.	Asset Description	Criticality Score
WS20412	Gough Street 150mm Water Main	15
WS20970	Peebles Street 100mm Water Main	15
WS20981	Brolga Street 100mm Water Main	15
WS20980	Pelican Street 100mm Water Main	15
WS20364	Allingham Street 150mm Water Main	15
WS20424	Menzies Street 150mm Water Main	15
WS20409	Palmer Street 150mm Water Main	15
WS20145	Badila Street 100mm Water Main	15
WS20066	Lynn Street 100mm Water Main	15
WS20222	Druery Street 100mm Water Main	15
WS20183	Duffy Street 100mm Water Main	15
WS20209	Dickson Street 100mm Water Main	15
WS20055	Gort Street 100mm Water Main	15
WS20360	Gardiner Street 150mm Water Main	15
WS20080	Lynch Street 100mm Water Main	15
WS20030	Marco Court 100mm Water Main	15
WS20359	Hawkins Street 150mm Water Main	15
WS20241	Cooper Street 100mm Water Main	15
WS20192	Cooper Street 100mm Water Main	15
WS20336	Griffith Street 100mm Water Main	15
WS20375	Cassady Street 150mm Water Main	15
WS20304	Morehead Street 100mm Water Main	15
WS20172	Cooper Street 100mm Water Main	15
WS20310	Fisher Street 100mm Water Main	15
WS20114	Cassady Street 100mm Water Main	15
WS20372	Cassady Street 100mm Water Main	15
WS20374	Cassady Street 150mm Water Main	15
WS20118	Hardy Street 100mm Water Main	15
WS20135	Stallan Street 100mm Water Main	15
WS20361	Mylrea Street 150mm Water Main	15
WS20625	Halifax Road 100mm Water Main	14.0625
WS20622	Halifax Road 100mm Water Main	14.0625
WS20442	Sachs Lane 150mm Water Main	14.0625
WS20291	McIlwraith Street 100mm Water Main	13.5
WS20001	Palm Avenue 50mm Water Main	13.5
WS20516	Fairford Road 225mm Water Main	13.5
WS20566	Orient Road 150mm Water Main	13.5
WS20331	Trebonne Road 100mm Water Main	13.5
WS21008	Stone River Road 100mm Water Main	13.5
WS20562	Blackrock Road 100mm Water Main	13.5
WS20567	Tokalon Road 200mm Water Main	13.5
WS20568	Tokalon Road 200mm Water Main	13.5

Asset No.	Asset Description	Criticality Score
WS20396	Lannercost Street 150mm Water Main	13.5
WS20583	Four Mile Road 100mm Water Main	13.5
WS20584	Four Mile Road 100mm Water Main	13.5
WS20585	Two Mile Road 100mm Water Main	13.5
WS20476	Herbert Street 225mm Water Main	13.5
WS20286	Lannercost Street 100mm Water Main	13.5
WS20490	McIlwraith Street 225mm Water Main	13.5
WS20343	Victoria Mill Road 100mm Water Main	13.5
WS20483	Menzies Street 225mm Water Main	13.5
WS20480	Cartwright Street 225mm Water Main	13.5
WS20503	Davidson Street 225mm Water Main	13.5
WS20116	Morrissey Street 100mm Water Main	13.125
WS20043	McIlwraith Street 100mm Water Main	13.125
WS20314	Renouf Street 100mm Water Main	13.125
WS20161	Cooper Street 100mm Water Main	13.125
WS20215	Skinner Street 100mm Water Main	13.125
WS20339	Griffith Street 100mm Water Main	13.125
WS20043	McIlwraith Street 100mm Water Main	13.125
WS20340	Dutton Street 100mm Water Main	13.125
WS20217	Skinner Street 100mm Water Main	13.125
WS20177	Miles Street 100mm Water Main	13.125
WS20154	Miles Street 100mm Water Main	13.125
WS20109	Mahoney Street 100mm Water Main	13.125
WS20108	Mahoney Street 100mm Water Main	13.125
WS20089	Venables Street 100mm Water Main	13.125
WS20505	Martin Street 225mm Water Main	12.5
WS20303	Morehead Street 100mm Water Main	12.25
WS00330	Hunter Street 100mm Water Main Renew	12
WS21172	Tully Street - Ingham 63mm Water Main	12
WS20432	Fairford Road 150mm Water Main	12
WS20051	Chamberlain Street 100mm Water Main	12
WS20122	Morrissey Street 100mm Water Main	11.25
WS20003	Palm Terrace 50mm Water Main	11.25
WS20464	Macrossan Avenue 150mm Water Main	11.25
WS20347	Pindar Street 100mm Water Main	11.25
WS20572	Sachs Lane 150mm Water Main	11.25
WS20317	Warren Street 100mm Water Main	11.25
WS20002	Palm Terrace 50mm Water Main	11.25
WS20988	Peri Street 150mm Water Main	11.25
WS20989	Peri Street 150mm Water Main	11.25
WS20973	Toobanna Street 100mm Water Main	11.25
WS20501	Davidson Street 225mm Water Main	11.25

Asset No.	Asset Description	Criticality Score
WS20346	Badila Street 100mm Water Main	11.25
WS21005	Britton Street 100mm Water Main	11.25
WS21004	Stone River Road 100mm Water Main	11.25
WS20036	Perkins Street 100mm Water Main	11.25
WS20029	Simpson Street 100mm Water Main	11.25
WS20575	Four Mile Road 250mm Water Main	11.25
WS20576	Four Mile Road 250mm Water Main	11.25
WS20025	Simpson Street 100mm Water Main	11.25
WS20027	Simpson Street 100mm Water Main	11.25
WS20512	McIlwraith Street 225mm Water Main	11.25
WS20486	Dutton Street 225mm Water Main	11.25
WS20142	Badila Street 100mm Water Main	11.25
WS20344	Badila Street 100mm Water Main	11.25
WS20140	Victoria Mill Road 100mm Water Main	11.25
WS20300	Enterprise Street 100mm Water Main	10.5
WS20006	Davidson Street 100mm Water Main	10.5
WS20453	Pump Station Road 150mm Water Main	10.5
WS20240	Cooper Street 100mm Water Main	10.5
WS20586	Four Mile Road 100mm Water Main	10.5
WS20589	Four Mile Road 100mm Water Main	10.5
WS20068	Gedge Street 100mm Water Main	10.5
WS20242	Cooper Street 100mm Water Main	10.5
WS20239	Cooper Street 100mm Water Main	10.5
WS20235	Cooper Street 100mm Water Main	10.5
WS20581	Five Mile Road 63mm Water Main	10.125
WS20599	Four Mile Road 150mm Water Main	10.125
WS21088	Forrest Beach Road 250mm Water Main	9.375
WS20462	Alm Street 150mm Water Main	9.375
WS20416	Martin Street 150mm Water Main	9.375
WS21069	Lions Lookout Road 100mm Water Main	9
WS20446	Fairford Road 150mm Water Main	9
WS20445	Fairford Road 150mm Water Main	9
WS21027	Trebonne Road 150mm Water Main	9
WS21029	Trebonne Road 150mm Water Main	9
WS21015	Trebonne Road 150mm Water Main	9
WS20561	Blackrock Road 100mm Water Main	9
WS21019	Sartoresi Street 150mm Water Main	9
WS21001	Gorton Street 100mm Water Main	9
WS20602	Four Mile Road 250mm Water Main	9
WS20588	Four Mile Road 100mm Water Main	9
WS20587	Four Mile Road 100mm Water Main	9
WS20590	Four Mile Road 100mm Water Main	9

Asset No.	Asset Description	Criticality Score
WS20595	Four Mile Road 100mm Water Main	9
WS20594	Four Mile Road 100mm Water Main	9
WS20603	Four Mile Road 250mm Water Main	9
WS20139	Victoria Mill Road 100mm Water Main	9
WS20102	Victoria Mill Road 100mm Water Main	9
WS20244	Palmer Street 100mm Water Main	8.75
WS20313	Renouf Street 100mm Water Main	8.75
WS20434	Townsville Road 150mm Water Main	8.75
WS20607	Four Mile Road 250mm Water Main	8.4375
WS20601	Four Mile Road 250mm Water Main	8.4375
WS20606	Four Mile Road 250mm Water Main	8.4375
WS20260	Eleanor Street 100mm Water Main	8.4375
WS20230	Palmer Street 100mm Water Main	7.875
WS20020	Warren Street 80mm Water Main	7.875
WS20582	Four Mile Road 100mm Water Main	7.875
WS20463	Ann Street 150mm Water Main	7.875
WS00268	Hunter Street 100mm Water Main Renew	7.5
WS21089	Forrest Beach Road 250mm Water Main	7.5
WS21079	Forrest Beach Road 250mm Water Main	7.5
WS21134	Forrest Beach Rd 250mm Water Main	7.5
WS21133	Forrest Beach Rd 250mm Water Main	7.5
WS21131	Forrest Beach Rd 250mm Water Main	7.5
WS20430	Warrens Hill Road 150mm Water Main	7.5
WS20349	Eros Street 100mm Water Main	7.5
WS20332	Palmer Street 100mm Water Main	7.5
WS20328	Moretti Street 100mm Water Main	7.5
WS20327	Berwick Street 100mm Water Main	7.5
WS20005	Renouf Street 63mm Water Main	7.5
WS20265	Pump Station Road 100mm Water Main	7.5
WS20433	Fairford Road 150mm Water Main	7.5
WS20974	Peri Street 100mm Water Main	7.5
WS20971	Peri Street 100mm Water Main	7.5
WS20004	Renouf Street 63mm Water Main	7.5
WS20574	Forrest Beach Road 250mm Water Main	7.5
WS20406	Townsville Road 150mm Water Main	6.75
WS20229	Townsville Road 100mm Water Main	6.75
WS20593	Four Mile Road 100mm Water Main	6.75
WS20596	Four Mile Road 150mm Water Main	6.75
WS20569	Four Mile Road 100mm Water Main	6.75
WS20591	Four Mile Road 100mm Water Main	6.75
WS20600	Four Mile Road 250mm Water Main	6.75
WS20391	Herbert Street 150mm Water Main	6.75

Asset No.	Asset Description	Criticality Score
WS21168	Tully Street 100mm Water Main Renew	6
WS21170	Tully Street 100mm Water Main	6
WS20042	Tully Street 100mm Water Main	6
WS20272	Cooper Street 100mm Water Main	6
WS20226	McIlwraith Street 100mm Water Main	6
WS20042	Tully Street 100mm Water Main	6
WS21163	Dutton Street 100mm Water Main	5.625
WS20431	Miles Street 150mm Water Main	5.625
WS20333	Palmer Street 100mm Water Main	5.625
WS20022	Neame Street 80mm Water Main	5.625
WS20021	Warren Street 80mm Water Main	5.625
WS20407	Rutledge Street 150mm Water Main	5.625
WS20604	Four Mile Road 250mm Water Main	5.625
WS20402	Townsville Road 150mm Water Main	5.625
WS21163	Dutton Street 100mm Water Main	5.625
WS20451	Pump Station Road 150mm Water Main	5.25
WS20307	Francis Street 100mm Water Main	5.25
WS21087	Forrest Beach Road 250mm Water Main	5
WS21080	Forrest Beach Road 250mm Water Main	5
WS21135	Forrest Beach Rd 250mm Water Main	5
WS21082	Forrest Beach Road 250mm Water Main	5
WS20448	Grove Street 150mm Water Main	5
WS20449	Grove Street 150mm Water Main	5
WS20465	Victoria Mill Road 100mm Water Main	4.5
WS21166	Dutton Street 100mm Water Main	4.5
WS21074	Forrest Beach Road 100mm Water Main	4.5
WS21127	Forrest Beach Road 100mm Water Main	4.5
WS21126	Forrest Beach Road 100mm Water Main	4.5
WS21077	Forrest Beach Road 100mm Water Main	4.5
WS21076	Forrest Beach Road 100mm Water Main	4.5
WS21075	Forrest Beach Road 100mm Water Main	4.5
WS21072	Forrest Beach Road 100mm Water Main	4.5
WS21128	Forrest Beach Road 100mm Water Main	4.5
WS20334	Davidson Street 100mm Water Main	4.5
WS20454	Pump Station Road 150mm Water Main	4.5
WS20455	Pump Station Road 150mm Water Main	4.5
WS00331	Morrissey Street 100mm Water Main Renew	3.75
WS21084	Forrest Beach Road 250mm Water Main	3.75
WS20330	Halifax Road 100mm Water Main	3.75
WS20023	Neame Street 80mm Water Main	3.75
WS20467	Tokalon Road 200mm Water Main	3.75
WS20466	Tokalon Road 200mm Water Main	3.75

Asset No.	Asset Description	Criticality Score
WS20231	Townsville Road 100mm Water Main	3.75
WS20123	Hunter Street 100mm Water Main	3.75
WS20403	McIlwraith Street 150mm Water Main	3.75
WS20579	Forrest Beach Road 250mm Water Main	3.75
WS20111	Lyons Street 100mm Water Main	3.75
WS20605	Four Mile Road 250mm Water Main	3.375
WS21167	Dutton Street 100mm Water Main	3
WS21164	Dutton Street 100mm Water Main	3
WS21165	Dutton Street 100mm Water Main	3
WS20447	Fairford Road 150mm Water Main	3
WS20452	Pump Station Road 150mm Water Main	3
WS20578	Cooks Lane 250mm Water Main	3
WS21086	Forrest Beach Road 250mm Water Main	2.5
WS21129	Forrest Beach Rd 250mm Water Main	2.5
WS21085	Forrest Beach Road 250mm Water Main	2.5
WS21083	Forrest Beach Road 250mm Water Main	2.5
WS21081	Forrest Beach Road 250mm Water Main	2.5
WS21132	Forrest Beach Rd 250mm Water Main	2.5
WS21130	Forrest Beach Rd 250mm Water Main	2.5
WS21073	Forrest Beach Road 100mm Water Main	1.5

Appendix D3 –Lower Herbert Water Scheme Criticality Ranking Results

Table D.3: Lower Herbert Water Scheme Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS20889	Dungeness Road 100mm Water Main	56
WS20915	Lucinda Road 225mm Water Main	54
WS20874	Rigby Street 100mm Water Main	54
WS20965	Taylors Beach Road 150mm Water Main	54
WS20894	Dungeness Road 100mm Water Main	45
WS20862	Patterson Parade 100mm Water Main	45
WS20938	Farrell Drive 150mm Water Main	45
WS20947	Farrell Drive 200mm Water Main	45
WS20926	Neames Inlet Road 80mm Water Main	45
WS20931	Mill Road 100mm Water Main	42
WS20939	Marbelli Street 150mm Water Main	42
WS20917	Fulton Drive 100mm Water Main	40.5
WS20944	Mill Road 150mm Water Main	39.375
WS20922	Fulton Drive 150mm Water Main	39.375
WS20929	Bullock Paddock Road 100mm Water Main	39.375
WS20924	Neames Inlet Road 80mm Water Main	39.375
WS20861	Lucinda Road 200mm Water Main	36
WS20893	Kangaroo Street 100mm Water Main	36
WS20859	Lucinda Road 200mm Water Main	36
WS20903	Keast Street 150mm Water Main	36
WS20904	Keast Street 150mm Water Main	36
WS20945	Farrell Drive 200mm Water Main	36
WS20811	River Avenue 100mm Water Main	36
WS20851	Scott Street - Halifax 200mm Water Main	36
WS20849	Musgrave Street 200mm Water Main	36
WS20854	Scott Street - Halifax 200mm Water Main	36
WS20895	Carr Crescent 100mm Water Main	33.75
WS20872	Vass Street 100mm Water Main	33.75
WS20866	Ogg Street 100mm Water Main	33.75
WS20867	Carr Crescent 100mm Water Main	33.75
WS20852	Scott Street - Halifax 200mm Water Main	33.75
WS20802	Stephensen Avenue 100mm Water Main	33.75
WS20848	Musgrave Street 200mm Water Main	33.75
WS20890	Denney Street 100mm Water Main	31.5
WS20900	Dungeness Road 150mm Water Main	31.5
WS20942	Mill Road 150mm Water Main	31.5
WS20963	John Dory Street 150mm Water Main	31.5

Asset No.	Asset Description	Criticality Score
WS20964	John Dory Street 150mm Water Main	31.5
WS20813	River Avenue 100mm Water Main	30.375
WS20814	Macrossan Street 100mm Water Main	30.375
WS20943	Farrell Drive 150mm Water Main	30
WS20909	Keast Street 150mm Water Main	30
WS20912	Ferrero Street 225mm Water Main	30
WS20962	John Dory Street 150mm Water Main	30
WS20958	John Dory Street 100mm Water Main	30
WS20609	Cordelia School Road 100mm Water Main	27
WS20881	Dungeness Road 100mm Water Main	27
WS20857	Scott Street - Halifax 200mm Water Main	27
WS20810	Anderssen Street 100mm Water Main	27
WS20815	Rupp Street 100mm Water Main	27
WS20858	Scott Street - Halifax 200mm Water Main	27
WS20855	Scott Street - Halifax 200mm Water Main	27
WS20918	MacMillans Road 100mm Water Main	27
WS20608	Stephensens Road 100mm Water Main	27
WS20803	Jessup Avenue 100mm Water Main	27
WS20807	Rosendahl Street 100mm Water Main	27
WS20834	Musgrave Street 150mm Water Main	27
WS20845	Musgrave Street 200mm Water Main	27
WS20614	Eddleston Drive 150mm Water Main	24
WS20610	Eddleston Drive 100mm Water Main	24
WS20616	Eddleston Drive 150mm Water Main	24
WS20888	Dungeness Road 100mm Water Main	23.625
WS20887	Dungeness Road 100mm Water Main	23.625
WS20911	Dungeness Road 150mm Water Main	23.625
WS20877	Bruce Parade 100mm Water Main	23.625
WS20921	Fulton Drive 150mm Water Main	23.625
WS20816	Macrossan Street 100mm Water Main	23.625
WS20896	Ogg Street 100mm Water Main	22.5
WS20946	Farrell Drive 200mm Water Main	22.5
WS20844	Eddleston Drive 150mm Water Main	22.5
WS20935	Farrell Drive 100mm Water Main	22.5
WS20967	John Dory Street 150mm Water Main	22.5
WS20906	Keast Street 150mm Water Main	22.5
WS20907	Keast Street 150mm Water Main	22.5
WS20886	Dungeness Road 100mm Water Main	22.5
WS20905	Keast Street 150mm Water Main	22.5
WS20914	Ferrero Street 225mm Water Main	22.5
WS20898	Patterson Parade 150mm Water Main	22.5
WS20913	Ferrero Street 225mm Water Main	22.5

Asset No.	Asset Description	Criticality Score
WS20865	Carr Crescent 100mm Water Main	22.5
WS20864	Pearson Street 100mm Water Main	22.5
WS20897	Patterson Parade 150mm Water Main	22.5
WS20804	Victoria Terrace 100mm Water Main	22.5
WS20809	Anderssen Street 100mm Water Main	22.5
WS20960	John Dory Street 100mm Water Main	22.5
WS20961	John Dory Street 100mm Water Main	22.5
WS20901	Dungeness Road 150mm Water Main	21
WS20923	Fulton Drive 150mm Water Main	21
WS20613	Stephensens Road 150mm Water Main	21
WS20843	Eddleston Drive 150mm Water Main	20.25
WS20871	Bruce Parade 100mm Water Main	20.25
WS20873	Bruce Parade 100mm Water Main	20.25
WS20870	Bruce Parade 100mm Water Main	20.25
WS20930	Bullock Paddock Road 100mm Water Main	20.25
WS20806	Rifle Range Road 100mm Water Main	20.25
WS20846	Musgrave Street 200mm Water Main	20.25
WS20891	Dungeness Road 100mm Water Main	20
WS20828	Mona Road 100mm Water Main	19.6875
WS20856	Scott Street - Halifax 100mm Water Main	18
WS20940	Farrell Drive 150mm Water Main	18
WS20934	Mill Road 100mm Water Main	18
WS20833	Eddleston Drive 150mm Water Main	18
WS20885	Dungeness Road 100mm Water Main	16.875
WS20824	Herron Street 100mm Water Main	16.875
WS20880	Gossner Street 100mm Water Main	16.875
WS20899	Patterson Parade 150mm Water Main	16.875
WS20869	Waring Street 100mm Water Main	16.875
WS20875	Bruce Parade 100mm Water Main	16.875
WS20878	Gossner Street 100mm Water Main	16.875
WS20879	Hobbs Street 100mm Water Main	16.875
WS20932	Mill Road 100mm Water Main	16.875
WS20818	Mona Road 100mm Water Main	16.875
WS20805	Victoria Terrace 100mm Water Main	16.875
WS20825	Mona Road 100mm Water Main	16.875
WS20827	Acacia Road 100mm Water Main	16.875
WS20819	Shaws Avenue 100mm Water Main	16.875
WS20822	Mona Road 100mm Water Main	16.875
WS20826	Mambrini Street 100mm Water Main	16.875
WS20808	Argaet Street 100mm Water Main	16.875
WS20950	Barramundi Street 100mm Water Main	16.875
WS20948	Herring Street 100mm Water Main	16.875

Asset No.	Asset Description	Criticality Score
WS20956	Salmon Street 100mm Water Main	16.875
WS20959	Dolphin Crescent 100mm Water Main	16.875
WS20951	Trevally Street 100mm Water Main	16.875
WS20955	Bream Street 100mm Water Main	16.875
WS20615	Eddleston Drive 150mm Water Main	15.75
WS20910	Dungeness Road 150mm Water Main	15
WS20908	Keast Street 150mm Water Main	15
WS20853	Scott Street - Halifax 200mm Water Main	15
WS20884	Dungeness Road 100mm Water Main	13.5
WS20941	Mill Road 150mm Water Main	13.5
WS20925	Neames Inlet Road 80mm Water Main	13.5
WS20919	Girgentis Road 100mm Water Main	13.5
WS20817	Hoffensetz Street 100mm Water Main	13.5
WS20933	Spencer Street 100mm Water Main	13.5
WS20847	Musgrave Street 200mm Water Main	13.5
WS20892	Dungeness Road 100mm Water Main	12
WS20837	Rosendahl Street 150mm Water Main	12
WS20836	Rosendahl Street 150mm Water Main	12
WS20860	Musgrave Street 200mm Water Main	11.25
WS20832	Riverdowns Drive 100mm Water Main	11.25
WS20902	Dungeness Road 150mm Water Main	11.25
WS20883	Dungeness Road 100mm Water Main	11.25
WS20882	Dungeness Road 100mm Water Main	11.25
WS20876	Bruce Parade 100mm Water Main	11.25
WS20868	Patterson Parade 100mm Water Main	11.25
WS20863	Pearson Street 100mm Water Main	11.25
WS20812	River Avenue 100mm Water Main	11.25
WS20850	Scott Street - Halifax 200mm Water Main	11.25
WS20823	Herron Street 100mm Water Main	11.25
WS20957	Groper Street 100mm Water Main	11.25
WS20949	Trevally Street 100mm Water Main	11.25
WS20953	Whiting Street 100mm Water Main	11.25
WS20954	Whiting Street 100mm Water Main	11.25
WS20952	Sardine Street 100mm Water Main	11.25
WS20928	Farrell Drive 80mm Water Main	9
WS20936	Bullock Paddock Road 100mm Water Main	9
WS20927	Bullock Paddock Road 80mm Water Main	9
WS20916	Fulton Drive 80mm Water Main	9
WS20612	Cooks Lane 150mm Water Main	9
WS20821	Hinchinbrook Court 100mm Water Main	8.75
WS20829	Acacia Road 100mm Water Main	8.4375
WS20831	Riverdowns Drive 100mm Water Main	7.5

Asset No.	Asset Description	Criticality Score
WS20800	Hinchinbrook Court 63mm Water Main	7.5
WS20820	Scott Street - Halifax 100mm Water Main	7.5
WS20801	Scott Street - Halifax 63mm Water Main	7.5
WS20830	Riverdowns Drive Offset Road 100mm Water Main	7
WS20835	Musgrave Street 150mm Water Main	6.75
WS20838	Musgrave Street 150mm Water Main	6.75
WS20842	Eddleston Drive 150mm Water Main	6
WS20920	Fulton Drive 100mm Water Main	6
WS20937	Bullock Paddock Road 100mm Water Main	4.5
WS20839	Eddleston Drive 150mm Water Main	4.5
WS20841	Eddleston Drive 150mm Water Main	4
WS20840	Eddleston Drive 150mm Water Main	3

Appendix D4 –Forrest beach Water Scheme Criticality Ranking Results

Table D.4: Forrest Beach Water Scheme Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS20728	Willow Street 150mm Water Main	52.5
WS20649	Bottlebrush Street 100mm Water Main	45
WS20726	Allamanda Avenue 150mm Water Main	45
WS20714	Banksia Street 100mm Water Main	39.375
WS20653	Blackbean Street 100mm Water Main	39.375
WS20660	Cedar Street 100mm Water Main	39.375
WS20694	Cassady Beach Road 100mm Water Main	35
WS20715	Banksia Street 100mm Water Main	33.75
WS20673	Macadamia Street 100mm Water Main	33.75
WS20652	Whiteapple Street 100mm Water Main	33.75
WS20650	Candlenut Street 100mm Water Main	33.75
WS20644	Fern Street 100mm Water Main	33.75
WS20659	Acacia Street 100mm Water Main	31.5
WS20732	Leichhardt Street 150mm Water Main	27
WS20781	Leichhardt Street 200mm Water Main	27
WS20674	Jacaranda Street 100mm Water Main	26.25
WS20730	Leichhardt Street 150mm Water Main	26.25
WS20727	Sheoak Street 150mm Water Main	26.25
WS20768	Beatts Road 150mm Water Main	25
WS20717	Wattle Street 100mm Water Main	23.625
WS20771	Beatts Road 150mm Water Main	22.5
WS20711	Pangola Street 100mm Water Main	22.5
WS20769	Beatts Road 150mm Water Main	22.5
WS20760	Beatts Road 150mm Water Main	22.5
WS20757	Beatts Road 150mm Water Main	22.5
WS20755	Beatts Road 150mm Water Main	22.5
WS20752	Beatts Road 150mm Water Main	22.5
WS20750	Beatts Road 150mm Water Main	22.5
WS20695	Poppis Road 100mm Water Main	22.5
WS20692	Coconut Lane Offset Road 100mm Water Main	22.5
WS20647	Cashew Close 100mm Water Main	22.5
WS20648	Quandong Street 100mm Water Main	22.5
WS20707	Bloodwood Street 100mm Water Main	22.5
WS20716	Cypress Close 100mm Water Main	22.5
WS20676	Jacaranda Street Offset Road 100mm Water Main	22.5
WS20675	Jacaranda Street Offset Road 100mm Water Main	22.5
WS20666	Orchid Street 100mm Water Main	22.5
WS20709	Staghorn Street 100mm Water Main	22.5

Asset No.	Asset Description	Criticality Score
WS20719	Acacia Street 100mm Water Main	22.5
WS20657	Tamarind Court 100mm Water Main	22.5
WS20748	Beatts Road 150mm Water Main	22.5
WS20742	Wattle Street 150mm Water Main	21.875
WS20720	Coconut Lane 100mm Water Main	21
WS20778	Leichhardt Street 200mm Water Main	20.25
WS20776	Leichhardt Street 200mm Water Main	20.25
WS20775	Leichhardt Street 200mm Water Main	20.25
WS20774	Leichhardt Street 200mm Water Main	20.25
WS20763	Beatts Road 150mm Water Main	18.75
WS20764	Beatts Road 150mm Water Main	18.75
WS20767	Beatts Road 150mm Water Main	18.75
WS20759	Beatts Road 150mm Water Main	18.75
WS20643	Sheoak Street 100mm Water Main	18
WS20679	Coconut Street 100mm Water Main	17.5
WS20662	Cedar Street 100mm Water Main	16.875
WS20741	Wattle Street 150mm Water Main	16.875
WS20737	Pandanus Street 150mm Water Main	16.875
WS20664	Maple Street 100mm Water Main	16.875
WS20646	Cassia Street 100mm Water Main	16.875
WS20738	Pandanus Street 150mm Water Main	16.875
WS20735	Pandanus Street 150mm Water Main	16.875
WS20665	Bauhinia Street 100mm Water Main	16.875
WS20712	Pangola Street 100mm Water Main	16.875
WS20710	Grevillea Street 100mm Water Main	16.875
WS20705	Grevillea Street 100mm Water Main	16.875
WS20731	Palm Street 150mm Water Main	16.875
WS20734	Wattle Street 150mm Water Main	16.875
WS20743	Pine Street 150mm Water Main	16.875
WS20718	Maple Street 100mm Water Main	16.875
WS20797	Forrest Beach Road 300mm Water Main	15
WS20786	Wattle Street 200mm Water Main	15
WS20724	Forrest Drive 100mm Water Main	15
WS20787	Forrest Beach Road 200mm Water Main	15
WS20788	Cabon Road 200mm Water Main	15
WS20797	Forrest Beach Road 300mm Water Main	15
WS20782	Forrest Beach Road 200mm Water Main	15
WS20753	Beatts Road 150mm Water Main	15
WS20758	Beatts Road 150mm Water Main	15
WS20756	Beatts Road 150mm Water Main	15
WS20754	Beatts Road 150mm Water Main	15
WS20672	Forrest Drive 100mm Water Main	15

Asset No.	Asset Description	Criticality Score
WS20671	Forrest Lane 100mm Water Main	15
WS20693	Coconut Lane Offset Road 100mm Water Main	15
WS20681	Coconut Street Offset Road 100mm Water Main	15
WS20680	Coconut Street Offset Road 100mm Water Main	15
WS20751	Beatts Road 150mm Water Main	15
WS20749	Beatts Road 150mm Water Main	15
WS20779	Wattle Street 200mm Water Main	15
WS20747	Beatts Road 150mm Water Main	15
WS20777	Leichhardt Street 200mm Water Main	13.5
WS20746	Leichhardt Street 150mm Water Main	13.5
WS20772	Leichhardt Street 200mm Water Main	13.5
WS20773	Leichhardt Street 200mm Water Main	13.5
WS20704	Coral Tree Court 100mm Water Main	13.125
WS20703	Hibiscus Street 100mm Water Main	13.125
WS20697	Marginata Court 100mm Water Main	13.125
WS20682	Rosella Street 100mm Water Main	13.125
WS20691	Mahogany Drive 100mm Water Main	13.125
WS20683	Rosella Street 100mm Water Main	13.125
WS20684	Melaleuca Close 100mm Water Main	13.125
WS20677	Chestnut Street 100mm Water Main	13.125
WS20678	Mistletoe Street 100mm Water Main	13.125
WS20766	Beatts Road 150mm Water Main	12.5
WS20765	Beatts Road 150mm Water Main	12.5
WS20792	Leichhardt Street 250mm Water Main	12
WS20780	Leichhardt Street 200mm Water Main	11.25
WS20706	Grevillea Street 100mm Water Main	11.25
WS20670	Forrest Drive 100mm Water Main	11.25
WS20669	Bill Johnson Drive 100mm Water Main	11.25
WS20739	Pandanus Street 150mm Water Main	11.25
WS20645	Cassia Street 100mm Water Main	11.25
WS20667	Bill Johnson Drive 100mm Water Main	11.25
WS20658	Poinciana Street 100mm Water Main	11.25
WS20740	Pandanus Street 150mm Water Main	11.25
WS20685	Mango Tree Court 100mm Water Main	11.25
WS20708	Grevillea Street 100mm Water Main	11.25
WS20762	Wattle Street 150mm Water Main	11.25
WS20733	Wattle Street 150mm Water Main	11.25
WS20744	Pine Street 150mm Water Main	11.25
WS20651	Blackbean Street 100mm Water Main	11.25
WS20736	Pandanus Street 150mm Water Main	11.25
WS20729	Leichhardt Street 150mm Water Main	11.25
WS20663	Maple Street 100mm Water Main	11.25

Asset No.	Asset Description	Criticality Score
WS21095	Bosworth Road 150mm Water Main	10.5
WS20745	Pine Street 150mm Water Main	9.375
WS20789	Cabon Road 200mm Water Main	9
WS20790	Cabon Road 200mm Water Main	9
WS20791	Leichhardt Street 250mm Water Main	9
WS20799	Forrest Beach Road 300mm Water Main	9
WS20761	Leichhardt Street 150mm Water Main	9
WS20701	Hibiscus Street 100mm Water Main	8.75
WS20702	Grey Gum Court 100mm Water Main	8.75
WS20696	Magnolia Court 100mm Water Main	8.75
WS20654	Blackbean Street 100mm Water Main	8.75
WS20668	Baileyana Street 100mm Water Main	8.75
WS20661	Cedar Street 100mm Water Main	8.75
WS20713	Lillypilly Court 100mm Water Main	8.75
WS20656	Jasmine Close 100mm Water Main	8.75
WS21112	Forrest Beach Rd 250mm Water Main	7.5
WS21104	Forrest Beach Rd 250mm Water Main	7.5
WS20641	Coral Tree Court 63mm Water Main	7.5
WS20640	Grey Gum Court 63mm Water Main	7.5
WS20639	Red Gum Court 63mm Water Main	7.5
WS20698	Moreton Bay Street 100mm Water Main	7.5
WS20638	Marginata Court 63mm Water Main	7.5
WS20637	Magnolia Court 63mm Water Main	7.5
WS20629	Baileyana Street 63mm Water Main	7.5
WS20628	Cedar Street 63mm Water Main	7.5
WS20634	Lillypilly Court 63mm Water Main	7.5
WS20700	Moreton Bay Street 100mm Water Main	7.5
WS20636	Mahogany Drive 63mm Water Main	7.5
WS20632	Melaleuca Close 63mm Water Main	7.5
WS20633	Rosella Street 63mm Water Main	7.5
WS20630	Chestnut Street 63mm Water Main	7.5
WS20631	Mistletoe Street 63mm Water Main	7.5
WS20627	Jasmine Close 63mm Water Main	7.5
WS20655	Blackbean Street 100mm Water Main	7.5
WS21090	Forrest Beach Road 100mm Water Main	6.75
WS21113	Forrest Beach Rd 250mm Water Main	6.25
WS20793	Forrest Beach Road 250mm Water Main	6.25
WS20770	Cabon Road 150mm Water Main	6
WS20725	Bellbird Close 100mm Water Main	5.625
WS20688	Bluegum Street 100mm Water Main	5.625
WS21111	Forrest Beach Rd 250mm Water Main	5
WS21109	Forrest Beach Rd 250mm Water Main	5

Asset No.	Asset Description	Criticality Score
WS21117	Forrest Beach Rd 250mm Water Main	5
WS21118	Forrest Beach Rd 250mm Water Main	5
WS21115	Forrest Beach Rd 250mm Water Main	5
WS20794	Forrest Beach Road 300mm Water Main	5
WS20699	Moreton Bay Street 100mm Water Main	5
WS21093	Forrest Beach Road 100mm Water Main	4.5
WS21091	Forrest Beach Road 100mm Water Main	4.5
WS21092	Forrest Beach Road 100mm Water Main	4.5
WS20721	Cabon Road 100mm Water Main	4.5
WS20722	Cabon Road 100mm Water Main	4.5
WS20798	Forrest Beach Road 300mm Water Main	4.5
WS21098	Forrest Beach Rd 150mm Water Main	4
WS21161	Forrest Beach Rd 300mm Water Main	3.75
WS21122	Forrest Beach Rd 250mm Water Main	3.75
WS21106	Forrest Beach Rd 250mm Water Main	3.75
WS21108	Forrest Beach Rd 250mm Water Main	3.75
WS21123	Forrest Beach Rd 250mm Water Main	3.75
WS21124	Forrest Beach Rd 250mm Water Main	3.75
WS20642	Mahogany Drive 63mm Water Main	3.75
WS20723	Bill Johnson Drive 100mm Water Main	3.75
WS20690	Mahogany Drive 100mm Water Main	3.75
WS20687	Lantana Street 100mm Water Main	3.75
WS20686	Holly Street 100mm Water Main	3.75
WS20689	Lantana Street 100mm Water Main	3.75
WS20635	Mahogany Drive 63mm Water Main	3.75
WS21094	Bosworth Road 150mm Water Main	3.5
WS20783	Forrest Beach Road 200mm Water Main	3
WS20785	Forrest Beach Road 200mm Water Main	3
WS21100	Forrest Beach Rd 150mm Water Main	2.5
WS21116	Forrest Beach Rd 250mm Water Main	2.5
WS21114	Forrest Beach Rd 250mm Water Main	2.5
WS21107	Forrest Beach Rd 250mm Water Main	2.5
WS21103	Forrest Beach Rd 150mm Water Main	2.5
WS21100	Forrest Beach Rd 150mm Water Main	2.5
WS21102	Forrest Beach Rd 150mm Water Main	2.5
WS21099	Forrest Beach Rd 150mm Water Main	2.5
WS21101	Forrest Beach Rd 150mm Water Main	2.5
WS21160	Forrest Beach Rd 150mm Water Main	2.5
WS21120	Forrest Beach Rd 250mm Water Main	2.5
WS21119	Forrest Beach Rd 250mm Water Main	2.5
WS21121	Forrest Beach Rd 250mm Water Main	2.5
WS21110	Forrest Beach Rd 250mm Water Main	2.5

Asset No.	Asset Description	Criticality Score
WS21125	Forrest Beach Rd 250mm Water Main	2.5
WS21105	Forrest Beach Rd 250mm Water Main	2.5
WS21159	Forrest Beach Rd 150mm Water Main	2.5
WS20795	Forrest Beach Road 300mm Water Main	2.25
WS20796	Forrest Beach Road 300mm Water Main	1.5

Appendix E – Sewerage Criticality Analysis Results

Appendix E1 –Combine Sewer Criticality Ranking Results

Table E.1: Combine Sewer Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS00146	LSTP FLOW METER _ IRRIGATION LINE	22.5
WS00147	LSTP FLOW METER _ OCEAN LINE	22.5
WS00171	ISTP Claridigestor 2 Handrails Renewal	18.75
WS00172	ISTP Claridigestor 2 Sidedoor Renewal	26.25
WS00173	ISTP Claridigestor 2 Electrical Renewal	105
WS00201	ISTP CCTV	18
WS00202	ISTP AUTOMATIC VEHICLE GATE	18.75
WS00203	ISTP CARD ACCESS AND ALARM SYSTEM	27
WS00307	ISTP GRIT CHAMBER Handrails	18.75
WS00308	ISTP Handrails and Stairs	18.75
WS00412	ISTP - Washdown Pump	28.125
WS00417	ISTP Contact Tank Handrails RENEW	18.75
WS00418	ISTP HUMUS TANK INLET BOX HANDRAILS	15
WS00438	ISTP TELEMETERY	9
WS00439	ISTP - Main Switchboard RENEW	168.75
WS00443	ISTP Filter Distribution Arms RENEW	144
WS00444	ISTP Filter Distribution Well	126
WS00445	ISTP Trickling Filter Access Stairs	56.25
WS35121	LSTP Rising Main	108
WS40007	LSTP - Switchboard	180
WS40008	LSTP TELEMETRY UNIT	31.5
WS40009	LSTP PLC SWITCHBOARD	31.5
WS40054	ISTP - Conatct Tank Switchboard	183.75
WS40769	ISTP - Recirculaing Pump	135
WS40770	ISTP - Sludge Pump	112.5
WS40771	ISTP - Wetlands Pump No.1	31.5
WS40772	ISTP - Wetlands Pump No.2	31.5
WS40773	LSTP - Blower No.1	55.125
WS40774	LSTP - Blower No.2	47.25
WS40775	LSTP - Blower No.3	47.25
WS41831	ISTP Grit Chamber	180
WS41832	ISTP Mechanical Screen	183.75
WS41833	ISTP Inlet Structure	270
WS41834	ISTP Claridigestor 1 Structure	120
WS41835	ISTP Claridigestor 1 Walkway	48

Asset No.	Asset Description	Criticality Score
WS41836	ISTP Claridigestor 1 Gearbox and Stirrer	108
WS41840	ISTP Claridigestor 2 Structure	120
WS41841	ISTP Claridigestor 2 Walkway	48
WS41842	ISTP Claridigestor 2 Gearbox and Stirrer	108
WS41846	ISTP Trickling Filter Structure	337.5
WS41847	ISTP Trickling Filter Bearing	240
WS41848	ISTP Trickling Filter Distribution Arms	270
WS41849	ISTP Trickling Filter Struct Rehab	157.5
WS41850	ISTP Sludge Pump Well	189
WS41851	ISTP Humus Tank Structure	270
WS41853	ISTP Humus Tank Gearbox and Stirrer	216
WS41856	ISTP Contact Tank Structure	337.5
WS41858	ISTP Contact Tank Coating System	105
WS41859	ISTP Sludge Beds Structure	212.625
WS41860	ISTP Sludge Beds Race	189
WS41861	ISTP STORMWATER PIPE	27
WS41862	ISTP Outfall	189
WS41863	LSTP Inlet Structure	183.75
WS41864	LSTP Aeration Tank 1	84
WS41865	LSTP Aeration Tank 2	81
WS41866	LSTP Blower Air Lines	157.5
WS41867	LSTP Walkways	26.25
WS41868	LSTP Settling Tank	210
WS41869	LSTP Handrails	26.25
WS41871	LSTP Sprinkler Tank	183.75
WS41872	LSTP - Sump Pump Tank	202.5
WS41873	LSTP CONTACT TANK POLYTHENE	180
WS41876	ISTP HUMUS TANK ELECTRICAL RENEWAL	50.625
WS41877	ISTP HUMUS TANK WALKWAY RENEWAL	67.5
WS41878	ISTP HUMUS TANK HANDRAILS RENEWAL	56.25
WS41879	ISTP Claridigestor 1 Handrails Renewal	18.75
WS41880	ISTP Claridigestor 1 Sidedoor Renewal	22.5
WS41881	ISTP Claridigestor 1 Electrical Renewal	75
WS41882	ISTP Claridigestor 1 & 2 Access Stairs	15
WS41883	LSTP Sludge Drying Beds	56.25
WS41884	LSTP pH Sensors	67.5
WS51004	ISTP Generator 40KVA	90
WS51010	ISTP INLET FLOWMETER	22.5
WS52020	TELEMETRY pH & DO Anaylser ISTP	31.5
WS53133	Hypo Chem Tank & Safe Shower - ING STP	135
WS53134	Hypo Chem Tank & Safe Shower - LUC STP	135
WS36500	2/1C to 2/1B Gravity Sewer	30

Asset No.	Asset Description	Criticality Score
WS36501	2400/END to 2400/3 Gravity Sewer	63
WS36502	IE1/MH1 to IE1/PS56 Gravity Sewer	36.75
WS36503	IE2/END to IE2/1JUNC Gravity Sewer	36.75
WS36504	IE3/END to IE2/1JUNC Gravity Sewer	55.125
WS36505	IE2/1JUNC to IE1/MH1 Gravity Sewer	55.125
WS36506	IE4/END to IE1/MH1 Gravity Sewer	73.5
WS36507	IE5/END to IE5/PS58 Gravity Sewer	63
WS36508	IE6/END to IE5/PS58 Gravity Sewer	63
WS36509	IE7/END to IE7/PS59 Gravity Sewer	55.125
WS36510	MR3/END to MR3/PS53 Gravity Sewer	47.25
WS36511	243E/END to 243/3JUNC Gravity Sewer	31.5
WS36512	243/1JUNC to 243/4JUNC Gravity Sewer	24.5
WS36513	243/2JUNC to 234/1JUNC Gravity Sewer	24.5
WS36514	67/END to 52/5 Gravity Sewer	26.25
WS36515	88/END to 67/END Gravity Sewer	22.5
WS36516	172/4 to 172/3 Gravity Sewer	28
WS36517	TR3A/END to TR3/3JUNC Gravity Sewer	26.25
WS36518	TR4/END to TR1/1JUNC Gravity Sewer	39.375
WS36519	TR15A/END to TR15/PS48 Gravity Sewer	20.25
WS36520	TR5/END to TR5/PS43 Gravity Sewer	45
WS36521	TR8B/END to TR8/12Junc Gravity Sewer	22.5
WS36522	TR8A/END to TR8/12Junc Gravity Sewer	26.25
WS36523	TR8/12Junc to TR7/11Junc Gravity Sewer	31.5
WS36524	TR13/END to TR13/PS47 Gravity Sewer	36
WS36525	TR14/END to TR14/PS46 Gravity Sewer	18
WS36526	TR10/14Junc to TR9/13Junc Gravity Sewer	26.25
WS36527	TR9/13Junc to TR1/MH3 Gravity Sewer	39.375
WS36528	TR6A/END to TR6A/7JUNC Gravity Sewer	63
WS36529	TR3/3JUNC to TR1/MH1 Gravity Sewer	31.5
WS36530	TR20/END to TR20/PS42 Gravity Sewer	22.5
WS36531	TR15/END to TR15/PS48 Gravity Sewer	20.25
WS36532	TR12/END to TR11/15Junc Gravity Sewer	33.75
WS36533	TR10B/END to TR10/14Junc Gravity Sewer	33.75
WS36534	TR10A/END to TR10/14Junc Gravity Sewer	22.5
WS36535	TR11/15Junc to TR9/13Junc Gravity Sewer	39.375
WS36536	TR3B/END to TR3/3JUNC Gravity Sewer	47.25
WS36537	TR7A/END to TR7/11Junc Gravity Sewer	33.75
WS36538	TR7/11Junc to TR1/MH2 Gravity Sewer	39.375
WS36539	TR2A/END to TR2/2JUNC Gravity Sewer	45
WS36540	243/4JUNC - SPS SHOWGROUND Gravity Sewer	31.5
WS36541	300C3/END to 400C/3 Gravity Sewer	22.5
WS36542	BLR/06 to BLR/07 Gravity Sewer	22.5

Asset No.	Asset Description	Criticality Score
WS36543	BLR/07 to BLR/08 Gravity Sewer	26.25
WS36544	243A/END to 243/3JUNC Gravity Sewer	18
WS36545	243D/END to 243/2JUNC Gravity Sewer	27
WS36546	243B/END to 243/1JUNC Gravity Sewer	27
WS36547	243/3JUNC to 243/2JUNC Gravity Sewer	21
WS36548	243C/END to 243/4JUNC Gravity Sewer	27
WS36549	TR1/MH1 to TR1/PS44 Gravity Sewer	18
WS36550	TR1/1JUNC to TR1/MH1 Gravity Sewer	21
WS36551	TR6A/7JUNC to TR6/4JUNC Gravity Sewer	21
WS36552	TR1/MH3 to TR6/4JUNC Gravity Sewer	39.375
WS36553	TR6/4JUNC to TR1/MH2 Gravity Sewer	39.375
WS36554	TR1/MH2 to TR1/MH1 Gravity Sewer	52.5
WS36555	TR2/2JUNC to TR1/1JUNC Gravity Sewer	52.5
WS36556	22/2 to 22/1 Gravity Sewer	39.375
WS36557	22/3 to 22/2 Gravity Sewer	47.25
WS36558	22/1 to 23/1 Gravity Sewer	59.0625
WS36559	23/1 to M1/28 Gravity Sewer	67.5
WS36560	23/2 to 23/1 Gravity Sewer	59.0625
WS36561	111B/3 to 111B/2 Gravity Sewer	47.25
WS36562	111B/4 to 111B/3 Gravity Sewer	23.625
WS36563	111B3/END to 111B/3 Gravity Sewer	40.5
WS36564	111B2/1 to 111B/3 Gravity Sewer	60.75
WS36565	111B/2 to 111B/1 Gravity Sewer	47.25
WS36566	111B1/END to 111B1/2 Gravity Sewer	33.75
WS36567	113/1 to PS3/MH Gravity Sewer	70.875
WS36568	111/PS3 to 111/OF3B Gravity Sewer	40.5
WS36569	113/2 to 113/1 Gravity Sewer	70.875
WS36570	113/3 to 113/2 Gravity Sewer	94.5
WS36571	113/4 to 113/3 Gravity Sewer	94.5
WS36572	113/5 to 113/4 Gravity Sewer	60.75
WS36573	300C1/1 to 300C/1 Gravity Sewer	54
WS36574	300C/1 to 300/4 Gravity Sewer	59.0625
WS36575	300/5 to 300/4 Gravity Sewer	59.0625
WS36576	300/3 to 300/2 Gravity Sewer	47.25
WS36577	111B/1 to 111/2 Gravity Sewer	94.5
WS36578	111A/1 to 111/2 Gravity Sewer	52.5
WS36579	111A/2 to 111A/1 Gravity Sewer	26.25
WS36580	111A1/1 to 111A/3 Gravity Sewer	22.5
WS36581	111A/3 to 111A/2 Gravity Sewer	26.25
WS36582	111A/5 to 111A/4 Gravity Sewer	14
WS36583	111A/4 to 111A/3 Gravity Sewer	59.0625
WS36584	111A/6 to 111A/5 Gravity Sewer	22.5

Asset No.	Asset Description	Criticality Score
WS36585	23/3 to 23/2 Gravity Sewer	59.0625
WS36586	23/END to 23/3 Gravity Sewer	33.75
WS36587	301/2 to 301/2A Gravity Sewer	47.25
WS36588	301/END to 301/2 Gravity Sewer	40.5
WS36589	301/2A to 301/1 Gravity Sewer	39.375
WS36590	301/1 to 301/PS9 Gravity Sewer	39.375
WS36591	300/1 to 301/PS9 Gravity Sewer	59.0625
WS36592	301/2AEND to 301/2A Gravity Sewer	40.5
WS36593	241H/1 to 241/6 Gravity Sewer	33.75
WS36594	241/7 to 241/6 Gravity Sewer	33.75
WS36595	241/6 to 241/5 Gravity Sewer	31.5
WS36596	241F/1 to 241/5 Gravity Sewer	16.875
WS36597	241G/1 to 241/5 Gravity Sewer	16.875
WS36598	241E/END to 241E/1 Gravity Sewer	11.25
WS36599	241E/1 to 241/4 Gravity Sewer	22.5
WS36600	241/5 to 241/4 Gravity Sewer	18
WS36601	241/4 to 241/3 Gravity Sewer	31.5
WS36602	241D/1 to 241/4 Gravity Sewer	16.875
WS36603	241C/1 to 241/3 Gravity Sewer	33.75
WS36604	241B/1 to 241/3 Gravity Sewer	33.75
WS36605	241B/END to 241B/1 Gravity Sewer	22.5
WS36606	241A/3 to 241A/2 Gravity Sewer	33.75
WS36607	241A/2 to 241A/1 Gravity Sewer	39.375
WS36608	241A/1 to 241/2 Gravity Sewer	39.375
WS36609	241/3 to 241/2 Gravity Sewer	31.5
WS36610	241/2 to 241/1 Gravity Sewer	39.375
WS36611	242/2 to 242/1 Gravity Sewer	31.5
WS36612	242A/1 to 242/1 Gravity Sewer	39.375
WS36613	242A/2 to 242A/1 Gravity Sewer	39.375
WS36614	242A/3 to 242A/2 Gravity Sewer	39.375
WS36615	242A/4 to 242A/3 Gravity Sewer	39.375
WS36616	242A/5 to 242A/4 Gravity Sewer	39.375
WS36617	242/5 to 242/4 Gravity Sewer	33.75
WS36618	242A/6 to 242A/5 Gravity Sewer	39.375
WS36619	242A/7 to 242A/6 Gravity Sewer	39.375
WS36620	241/OF7 to 241/OF7B Gravity Sewer	24
WS36621	242A/8 to 242A/7 Gravity Sewer	31.5
WS36622	242A/9 to 242A/8 Gravity Sewer	31.5
WS36623	300A/11 to 300A/10 Gravity Sewer	45
WS36624	242/1 to PS7/MH Gravity Sewer	39.375
WS36625	241/1 to PS7/MH Gravity Sewer	39.375
WS36626	PS7/MH to 241/PS7 Gravity Sewer	28

Asset No.	Asset Description	Criticality Score
WS36627	123/END to M5/16 Gravity Sewer	36
WS36628	221/END to 221/4 Gravity Sewer	48
WS36629	221/4 to 221/3 Gravity Sewer	52.5
WS36630	221A/1 to 221/1 Gravity Sewer	45
WS36631	242A/10 to 242A/9 Gravity Sewer	18
WS36632	228C/1 to 228/2 Gravity Sewer	45
WS36633	228/3 to 228/2 Gravity Sewer	52.5
WS36634	228/4 to 228/3 Gravity Sewer	45
WS36635	228A/1 to 228/1 Gravity Sewer	52.5
WS36636	228/2 to 228/1 Gravity Sewer	36
WS36637	227/1 to M5/10 Gravity Sewer	45
WS36638	225/1 to M5/9 Gravity Sewer	52.5
WS36639	218/END to 218/2 Gravity Sewer	30
WS36640	218/1 to M5/7 Gravity Sewer	52.5
WS36641	217/2 to 217/1 Gravity Sewer	45
WS36642	217/1 to M5/6 Gravity Sewer	52.5
WS36643	224/1 to M5/17 Gravity Sewer	52.5
WS36644	224/2 to 224/1 Gravity Sewer	45
WS36645	222/1 to M5/16 Gravity Sewer	63
WS36646	222/2 to 222/1 Gravity Sewer	54
WS36647	219/4 to 219/3 Gravity Sewer	52.5
WS36648	219B/END to 219/4 Gravity Sewer	30
WS36649	219A/END to 219/4 Gravity Sewer	45
WS36650	219/6 to 219/5 Gravity Sewer	45
WS36651	219/5 to 219/4 Gravity Sewer	52.5
WS36652	221/1 to M5/13 Gravity Sewer	52.5
WS36653	216A/3 to 216A/2 Gravity Sewer	52.5
WS36654	216A1/END to 216A/4 Gravity Sewer	30
WS36655	216A/2 to 216A/1 Gravity Sewer	52.5
WS36656	216A/1 to 216/3 Gravity Sewer	52.5
WS36657	216/4 to 216/3 Gravity Sewer	42
WS36658	216B/1 to 216/3 Gravity Sewer	52.5
WS36659	216B/END to 216B/1 Gravity Sewer	45
WS36660	216B1/END to 216B/3 Gravity Sewer	30
WS36661	216B/3 to 216B/2 Gravity Sewer	52.5
WS36662	216B/4 to 216B/3 Gravity Sewer	42
WS36663	216B/5 to 216B/4 Gravity Sewer	81
WS36664	216B2/1 to 216B/4 Gravity Sewer	54
WS36665	216C/2 to 216C/1 Gravity Sewer	35
WS36666	216C/3 to 216C/2 Gravity Sewer	13.125
WS36667	216D/1 to 216/5 Gravity Sewer	45
WS36668	216/6 to 216/5 Gravity Sewer	42

Asset No.	Asset Description	Criticality Score
WS36669	216/7 to 216/6 Gravity Sewer	52.5
WS36670	216/8 to 216/7 Gravity Sewer	70.875
WS36671	216G/1 to 216/8 Gravity Sewer	36
WS36672	216/9 to 216/8 Gravity Sewer	94.5
WS36673	216/10 to 216/9 Gravity Sewer	54
WS36674	215A/3 to 215A/2 Gravity Sewer	45
WS36675	215A1/2 to 215A1/1 Gravity Sewer	45
WS36676	215A/2 to 215A/1 Gravity Sewer	52.5
WS36677	215A1/1 to 215A/1 Gravity Sewer	35
WS36678	215A/1 to 215/3 Gravity Sewer	52.5
WS36679	215/3 to 215/2 Gravity Sewer	52.5
WS36680	211/7 to 211/6 Gravity Sewer	28.125
WS36681	211D/END to 211/6 Gravity Sewer	18.75
WS36682	211/6 to 211/5 Gravity Sewer	21.875
WS36683	211B/END to 211/5 Gravity Sewer	28.125
WS36684	211C/1 to 211/5 Gravity Sewer	18.75
WS36685	211/5 to 211/4 Gravity Sewer	17.5
WS36686	211A/END to 211/4 Gravity Sewer	28.125
WS36687	211/4 to 211/3 Gravity Sewer	32.8125
WS36688	211/3 to 211/2 Gravity Sewer	39.375
WS36689	211/2 to 211/1 Gravity Sewer	36
WS36690	211/1 to PS5/MH Gravity Sewer	40
WS36691	212/1 to M5/1 Gravity Sewer	70
WS36692	212/4 to 212/3 Gravity Sewer	52.5
WS36693	212/3 to 212/2 Gravity Sewer	52.5
WS36694	212/2 to 212/1 Gravity Sewer	52.5
WS36695	212/END to 212/4 Gravity Sewer	30
WS36696	212A/2 to 212A/1 Gravity Sewer	52.5
WS36697	212A/3 to 212A/2 Gravity Sewer	45
WS36698	213A/1 to 213/2 Gravity Sewer	45
WS36699	213Z/1 to 213/2 Gravity Sewer	45
WS36700	214/3 to 214/2 Gravity Sewer	45
WS36701	214/2 to 214/1 Gravity Sewer	52.5
WS36702	213/2 to 213/1 Gravity Sewer	52.5
WS36703	214/1 to M5/3 Gravity Sewer	52.5
WS36704	215D/2 to 215D/1 Gravity Sewer	36
WS36705	215/2 to 215/1 Gravity Sewer	42
WS36706	215/1 to M5/4 Gravity Sewer	52.5
WS36707	215/4 to 215/3 Gravity Sewer	42
WS36708	215/5 to 215/4 Gravity Sewer	52.5
WS36709	215/6 to 215/5 Gravity Sewer	42
WS36710	215B/1 to 215/4 Gravity Sewer	52.5

Asset No.	Asset Description	Criticality Score
WS36711	215B/2 to 215B/1 Gravity Sewer	45
WS36712	215C/1 to 215/5 Gravity Sewer	52.5
WS36713	215C/2 to 215C/1 Gravity Sewer	45
WS36714	215/7 to 215/6 Gravity Sewer	35
WS36715	215E/1 to 215/6 Gravity Sewer	52.5
WS36716	215E/2 to 215E/1 Gravity Sewer	45
WS36717	216E/1 to 216/6 Gravity Sewer	52.5
WS36718	216E1/1 to 216E/1 Gravity Sewer	45
WS36719	216E/2 to 216E/1 Gravity Sewer	42
WS36720	216E/3 to 216E/2 Gravity Sewer	28
WS36721	216E2/1 to 216E/3 Gravity Sewer	30
WS36722	216E/4 to 216E/3 Gravity Sewer	52.5
WS36723	216E/5 to 216E/4 Gravity Sewer	52.5
WS36724	122/7 to 122/6 Gravity Sewer	52.5
WS36725	122/6 to 122/5 Gravity Sewer	52.5
WS36726	122/5 to 122/4 Gravity Sewer	52.5
WS36727	122/4 to 122/3 Gravity Sewer	70.875
WS36728	122A/2 to 122A/1JUNC Gravity Sewer	33.75
WS36729	122A/1JUNC to 122A/1 Gravity Sewer	59.0625
WS36730	122A/END to 122A/1JUNC Gravity Sewer	33.75
WS36731	122A/1 to 122/4 Gravity Sewer	47.25
WS36732	123/1 to M3/2 Gravity Sewer	59.0625
WS36733	151/3 to 151/2 Gravity Sewer	60.75
WS36734	151/2 to 151/1 Gravity Sewer	70.875
WS36735	151/1 to M4/3 Gravity Sewer	94.5
WS36736	122/1 to M4/1 Gravity Sewer	59.0625
WS36737	121/1 to PS4/MH Gravity Sewer	32.8125
WS36738	215F/4 to 215F/3 Gravity Sewer	45
WS36739	215F/3 to 215F/2 Gravity Sewer	32.8125
WS36740	215H/1 to 215/PS16 Gravity Sewer	32.8125
WS36741	190/1 to 190/PS19 Gravity Sewer	36
WS36742	122/2 to 122/1 Gravity Sewer	47.25
WS36743	122/3 to 122/2 Gravity Sewer	106.3125
WS36744	122B/END to 122/2 Gravity Sewer	45
WS36745	215H/2 to 215H/1 Gravity Sewer	32.8125
WS36746	215H/3 to 215H/2 Gravity Sewer	37.5
WS36747	215G1/1 to 215G/1 Gravity Sewer	22.5
WS36748	215G/1 to 215/PS16 Gravity Sewer	35
WS36749	129E/1 to 129/2 Gravity Sewer	21.875
WS36750	129C/1 to 129/2 Gravity Sewer	21.875
WS36751	129F/END to 129/3 Gravity Sewer	18.75
WS36752	129E/END to 129E/1 Gravity Sewer	18.75

Asset No.	Asset Description	Criticality Score
WS36753	129D/END to 129C/1 Gravity Sewer	18.75
WS36754	129B/END to 129/1 Gravity Sewer	18.75
WS36755	126B/1 to 126B-OF11 Gravity Sewer	40.5
WS36756	126B/1 to 126/3 Gravity Sewer	26.25
WS36757	126A/1 to 126/1 Gravity Sewer	28.125
WS36758	129/1 to 125/PS11 Gravity Sewer	39.375
WS36759	215D/4 to 215D/1 Gravity Sewer	18
WS36760	215G/2 to 215G/1 Gravity Sewer	26.25
WS36761	215G/3 to 215G/2 Gravity Sewer	26.25
WS36762	215G/4 to 215G/3 Gravity Sewer	22.5
WS36763	215G/OF16 to OF/16 Gravity Sewer	22.5
WS36764	171/4 to 171/3 Gravity Sewer	32.8125
WS36765	171/3 to 171/2 Gravity Sewer	32.8125
WS36766	171/2 to 171/1 Gravity Sewer	32.8125
WS36767	171B/1 to 171/1 Gravity Sewer	28.125
WS36768	171A/1 to 171/1 Gravity Sewer	32.8125
WS36769	171A/1 to OF12/MH1 Gravity Sewer	21.875
WS36770	171/1 to 171/PS12 Gravity Sewer	26.25
WS36771	170/1 to 171/PS12 Gravity Sewer	31.5
WS36772	170B/1 to 170/1 Gravity Sewer	28.125
WS36773	170A/1 to 170/1 Gravity Sewer	28.125
WS36774	170/2 to 170/1 Gravity Sewer	26.25
WS36775	170C/1 to 170/2 Gravity Sewer	28.125
WS36776	170D/END to 170/2 Gravity Sewer	18.75
WS36777	170/4 to 170/3 Gravity Sewer	45.9375
WS36778	170/3 to 170/2 Gravity Sewer	26.25
WS36779	OF12/MH1 to OF12/MH2 Gravity Sewer	32.8125
WS36780	153/1 to M4/5 Gravity Sewer	47.25
WS36781	155/1 to M4/7 Gravity Sewer	50.625
WS36782	154/1 to M4/7 Gravity Sewer	50.625
WS36783	158/END to 158/4 Gravity Sewer	15
WS36784	158/4 to 158/3 Gravity Sewer	26.25
WS36785	159/2 to 159/1 Gravity Sewer	22.5
WS36786	159/1 to 158/1 Gravity Sewer	26.25
WS36787	158/3 to 158/2 Gravity Sewer	26.25
WS36788	158/1 to 160/1 Gravity Sewer	26.25
WS36789	164/1 to 160/2 Gravity Sewer	26.25
WS36790	164A/1 to 164/1 Gravity Sewer	15
WS36791	203/6 to 203/5 Gravity Sewer	33.75
WS36792	203/5 to 203/4 Gravity Sewer	39.375
WS36793	203E/1 to 203/4 Gravity Sewer	22.5
WS36794	203/4 to 203/3 Gravity Sewer	31.5

Asset No.	Asset Description	Criticality Score
WS36795	203C/OF15 to 203C/0F15B Gravity Sewer	33.75
WS36796	203/3 to 203/2 Gravity Sewer	31.5
WS36797	201A/2 to 201A/OF6 Gravity Sewer	21.875
WS36798	201A/2 to 201A/1 Gravity Sewer	26.25
WS36799	203/2 to 203/1 Gravity Sewer	31.5
WS36800	201A/1 to 201B/1 Gravity Sewer	14
WS36801	203/1 to 203/PS15 Gravity Sewer	31.5
WS36802	204/1 to 203/PS15 Gravity Sewer	31.5
WS36803	204B/1 to 204/1 Gravity Sewer	33.75
WS36804	204A/END to 204/1 Gravity Sewer	33.75
WS36805	204/2 to 204/1 Gravity Sewer	31.5
WS36806	204/3 to 204/2 Gravity Sewer	21
WS36807	204/4 to 204/3 Gravity Sewer	31.5
WS36808	204/5 to 204/4 Gravity Sewer	26.25
WS36809	204/6 to 204/5 Gravity Sewer	39.375
WS36810	204/7 to 204/6 Gravity Sewer	39.375
WS36811	204/8 to 204/7 Gravity Sewer	31.5
WS36812	204C/1 to 204/4 Gravity Sewer	40.5
WS36813	202A1/1 to 202A/1 Gravity Sewer	22.5
WS36814	202/2 to 202/1 Gravity Sewer	21
WS36815	201A2/END to PS6/MH Gravity Sewer	15
WS36816	202/3 to 202/2 Gravity Sewer	26.25
WS36817	202B/1 to 202/3 Gravity Sewer	26.25
WS36818	202B/2 to 202B/1 Gravity Sewer	36.75
WS36819	165/END to 160/4 Gravity Sewer	15
WS36820	164/END to 164/1 Gravity Sewer	15
WS36821	202/4 to 202/3 Gravity Sewer	26.25
WS36822	202/6 to 202/5 Gravity Sewer	22.5
WS36823	201B/5 to 201B/4 Gravity Sewer	22.5
WS36824	201B1/1 to 201B/3 Gravity Sewer	22.5
WS36825	201B/4 to 201B/3 Gravity Sewer	26.25
WS36826	201C/3 to 201C/OF14B Gravity Sewer	27
WS36827	201C/3 to 201C/2 Gravity Sewer	39.375
WS36828	201C/END to 201C/3 Gravity Sewer	22.5
WS36829	201D/2 to 201D/1 Gravity Sewer	33.75
WS36830	201D/1 to 201/1 Gravity Sewer	39.375
WS36831	201E/1 to 201/1 Gravity Sewer	39.375
WS36832	201C/2 to 201C/1 Gravity Sewer	39.375
WS36833	201/1 to 201/PS14 Gravity Sewer	31.5
WS36834	201C/1 to 201/PS14 Gravity Sewer	31.5
WS36835	201CI/END to 201C/1 Gravity Sewer	22.5
WS36836	201/2 to 201/1 Gravity Sewer	31.5

Asset No.	Asset Description	Criticality Score
WS36837	201/3 to 201/2 Gravity Sewer	39.375
WS36838	201/4 to 201/3 Gravity Sewer	39.375
WS36839	201F/1 to 201/3 Gravity Sewer	31.5
WS36840	201F/2 to 201F/1 Gravity Sewer	26.25
WS36841	162/OF13 to 201F/2 Gravity Sewer	17.5
WS36842	163/END to 163/2 Gravity Sewer	15
WS36843	163/2 to 163/1 Gravity Sewer	26.25
WS36844	163/1 to 160/1 Gravity Sewer	26.25
WS36845	162A/2 to 162A/1 Gravity Sewer	22.5
WS36846	162/2 to 162/1 Gravity Sewer	26.25
WS36847	201/END to 201/4 Gravity Sewer	22.5
WS36848	204A/2 to 204A/1 Gravity Sewer	33.75
WS36849	204A/1 to 204/3 Gravity Sewer	31.5
WS36850	310/4 to 310/3 Gravity Sewer	59.0625
WS36851	310A/OF8 to 310A/OF8B Gravity Sewer	27
WS36852	310A/1 to 310/4 Gravity Sewer	59.0625
WS36853	310/5 to 310/4 Gravity Sewer	59.0625
WS36854	310/6 to 310/5 Gravity Sewer	32.8125
WS36855	310/7 to 310/6 Gravity Sewer	50.625
WS36856	310/3 to 310/2 Gravity Sewer	59.0625
WS36857	310/1 to 310/1A Gravity Sewer	14
WS36858	310/2 to 310/1 Gravity Sewer	32.8125
WS36859	310/1A to PS8/MH Gravity Sewer	14
WS36860	PS8/MH to 310/PS8 Gravity Sewer	31.5
WS36861	311/1 to 310/1 Gravity Sewer	67.5
WS36862	311/2 to 311/1 Gravity Sewer	67.5
WS36863	311/3 to 311/2 Gravity Sewer	90
WS36864	311/4 to 311/3 Gravity Sewer	42.1875
WS36865	2200/1 to 2200/PS22 Gravity Sewer	45.9375
WS36866	2200/2 to 2200/1 Gravity Sewer	45.9375
WS36867	2200/3 to 2200/2 Gravity Sewer	45.9375
WS36868	2200/4 to 2200/3 Gravity Sewer	45.9375
WS36869	123/5 to 123/4 Gravity Sewer	60.75
WS36870	123/4 to 123/6 Gravity Sewer	94.5
WS36871	123A/2 to 123A/1 Gravity Sewer	59.0625
WS36872	123A/1 to 123A/3 Gravity Sewer	39.375
WS36873	123A/3 to 123/2 Gravity Sewer	94.5
WS36874	123/6 to 123A/3 Gravity Sewer	94.5
WS36875	123/2 to 123/1 Gravity Sewer	59.0625
WS36876	123C/1 to 123B/1 Gravity Sewer	59.0625
WS36877	123B/1 to 123/2 Gravity Sewer	94.5
WS36878	123B/3 to 123B/1 Gravity Sewer	59.0625

Asset No.	Asset Description	Criticality Score
WS36879	123B/2 to 123B/3 Gravity Sewer	33.75
WS36880	123C/2 to 123C/3 Gravity Sewer	60.75
WS36881	123C/3 to 123B/3 Gravity Sewer	39.375
WS36882	123C/END to 123C/1 Gravity Sewer	60.75
WS36883	123D/1 to 123C/1 Gravity Sewer	60.75
WS36884	124A/3 to 124A/2 Gravity Sewer	26.25
WS36885	124A/4 to 124A/3 Gravity Sewer	33.75
WS36886	121A/6 to 121A/5 Gravity Sewer	63
WS36887	121A/7 to 121A/6 Gravity Sewer	54
WS36888	121A/3 to 121D/2 Gravity Sewer	35
WS36889	121A/END to 121A/1 Gravity Sewer	81
WS36890	121A/1 to 121D/1 Gravity Sewer	35
WS36891	121D/2 to 121D/1 Gravity Sewer	63
WS36892	121A1/END to 121A1/1 Gravity Sewer	60
WS36893	121/4 to 121/3 Gravity Sewer	52.5
WS36894	121/3 to 121/2 Gravity Sewer	84
WS36895	121C1/1 to 121C/1 Gravity Sewer	72
WS36896	121C/2 to 121C/1 Gravity Sewer	81
WS36897	122/9 to 122/8 Gravity Sewer	50.625
WS36898	103B/1 to 103/1 Gravity Sewer	36.75
WS36899	103/6 to 103/5 Gravity Sewer	42
WS36900	103/5 to 103/4 Gravity Sewer	31.5
WS36901	103/OF2 to 103/2 Gravity Sewer	15
WS36902	103/2 to 103/1 Gravity Sewer	26.25
WS36903	103/4 to 103/3 Gravity Sewer	31.5
WS36904	103/3 to 103/2 Gravity Sewer	26.25
WS36905	103B/2 to 103B/1 Gravity Sewer	47.25
WS36906	103B/3 to 103B/2 Gravity Sewer	28
WS36907	103B/6 to 103B/5 Gravity Sewer	24
WS36908	103/1 to PS2/MH Gravity Sewer	15
WS36909	PS2/MH to 103/PS2 Gravity Sewer	12
WS36910	102/1 to PS2/MH Gravity Sewer	26.25
WS36911	102/2 to 102/1 Gravity Sewer	11.25
WS36912	103B/4 to 103B/3 Gravity Sewer	42
WS36913	103B/5 to 103B/4 Gravity Sewer	26.25
WS36914	102/3 to 102/2 Gravity Sewer	15
WS36915	101/2 to 101/1 Gravity Sewer	14
WS36916	101/1 to PS2/MH Gravity Sewer	26.25
WS36917	101/3 to 101/2 Gravity Sewer	26.25
WS36918	101/4 to 101/3 Gravity Sewer	36
WS36919	10D/5 to 10D/4 Gravity Sewer	94.5
WS36920	111E/1 to 111/10 Gravity Sewer	91.125

Asset No.	Asset Description	Criticality Score
WS36921	111D/1 to 111/9 Gravity Sewer	106.3125
WS36922	111B/5 to 111B/4 Gravity Sewer	81
WS36923	127/END to 127/3 Gravity Sewer	30
WS36924	127/3 to 127/2 Gravity Sewer	52.5
WS36925	127/2 to 127/1 Gravity Sewer	45.9375
WS36926	128/2 to 128/1 Gravity Sewer	50.625
WS36927	127/1 to 125/2 Gravity Sewer	32.8125
WS36928	128/1 to 125/3 Gravity Sewer	32.8125
WS36929	125/3 to 125/2 Gravity Sewer	32.8125
WS36930	125/2 to 125/1 Gravity Sewer	26.25
WS36931	125/4 to 125/3 Gravity Sewer	45.9375
WS36932	125/5 to 125/4 Gravity Sewer	39.375
WS36933	125A/1 to 125/2 Gravity Sewer	33.75
WS36934	126C/1 to 126/4 Gravity Sewer	39.375
WS36935	124A/2 to 124A/1 Gravity Sewer	59.0625
WS36936	124A/1 to 124/1 Gravity Sewer	45.9375
WS36937	124/1 to 128/1 Gravity Sewer	39.375
WS36938	124Z/2 to 124Z/1 Gravity Sewer	21.875
WS36939	124Z/1 to 124/2 Gravity Sewer	26.25
WS36940	124/2 to 124/1 Gravity Sewer	32.8125
WS36941	124/3 to 124/2 Gravity Sewer	32.8125
WS36942	124/4 to 124/3 Gravity Sewer	32.8125
WS36943	124/5 to 124/4 Gravity Sewer	32.8125
WS36944	124/6 to 124/5 Gravity Sewer	45
WS36945	300/6 to 300/5 Gravity Sewer	70.875
WS36946	300/7 to 300/6 Gravity Sewer	60.75
WS36947	300B/1 to 300/2 Gravity Sewer	59.0625
WS36948	300B/2 to 300B/1 Gravity Sewer	59.0625
WS36949	400C/3 to 400C/2 Gravity Sewer	39.375
WS36950	400C/2 to 400C/1 Gravity Sewer	39.375
WS36951	400/4 to 400/3 Gravity Sewer	33.75
WS36952	400/3 to 400/2 Gravity Sewer	21
WS36953	121A/5 to 121A/4 Gravity Sewer	63
WS36954	121A/4 to 121A/3 Gravity Sewer	94.5
WS36955	111C/1 to 111/7 Gravity Sewer	91.125
WS36956	111D/2 to 111D/1 Gravity Sewer	60.75
WS36957	400/2 to 400/1 Gravity Sewer	39.375
WS36958	400C/1 to 400/PS34 Gravity Sewer	26.25
WS36959	300A5/1 to 300A/8 Gravity Sewer	33.75
WS36960	400/1 to 300A/8 Gravity Sewer	28
WS36961	300A/9 to 400/1 Gravity Sewer	28
WS36962	300A6/1 to 300A/9 Gravity Sewer	45

Asset No.	Asset Description	Criticality Score
WS36963	300A/10 to 300A/9 Gravity Sewer	42
WS36964	300A1/6 to 300A1/5 Gravity Sewer	45
WS36965	300A1/5 to 300A1/4 Gravity Sewer	52.5
WS36966	300A1/4 to 300A1/3 Gravity Sewer	59.0625
WS36967	300A1/3 to 300A1/2 Gravity Sewer	59.0625
WS36968	300A/8 to 300A/6 Gravity Sewer	59.0625
WS36969	300A/7 to 300A/6 Gravity Sewer	50.625
WS36970	300A4/END to 300A/5 Gravity Sewer	33.75
WS36971	300A/6 to 300A/5 Gravity Sewer	59.0625
WS36972	300A/4 to 300A/3 Gravity Sewer	31.5
WS36973	300A/3 to 300A/2 Gravity Sewer	47.25
WS36974	300A/2 to 300A/1 Gravity Sewer	47.25
WS36975	300A/OF9 to 300A/OF9B Gravity Sewer	40.5
WS36976	300A1/2 to 300A1/1 Gravity Sewer	59.0625
WS36977	22/4 to 22/3 Gravity Sewer	47.25
WS36978	1002/7 to 1002/6 Gravity Sewer	52.5
WS36979	1002/8 to 1002/7 Gravity Sewer	52.5
WS36980	1002/5 to 1002/4 Gravity Sewer	70
WS36981	1002/6 to 1002/5 Gravity Sewer	52.5
WS36982	1002/3B to 1002/3A Gravity Sewer	45
WS36983	1002/3A to 1002/3 Gravity Sewer	42
WS36984	1002/4 to 1002/3 Gravity Sewer	42
WS36985	1002D/2 to 1002D/1 Gravity Sewer	45
WS36986	1002D/1 to 1002/4 Gravity Sewer	52.5
WS36987	1002/3 to 1002/2 Gravity Sewer	42
WS36988	1001A/1 to 1001/4 Gravity Sewer	54
WS36989	1001/END to 1001/5 Gravity Sewer	45
WS36990	1001/5 to 1001/4 Gravity Sewer	52.5
WS36991	1001/4 to 1001/3 Gravity Sewer	63
WS36992	1001/3 to 1001/2 Gravity Sewer	63
WS36993	1001/2 to 1001/1 Gravity Sewer	126
WS36994	1001/1 to 1000/1 Gravity Sewer	52.5
WS36995	1002A/1 to 1002/1 Gravity Sewer	33.75
WS36996	1002/2 to 1002/1 Gravity Sewer	42
WS36997	1002/1 to 1000/2 Gravity Sewer	52.5
WS36998	51A/5 to 51A/4 Gravity Sewer	15.75
WS36999	51A/4 to 51A/3 Gravity Sewer	63
WS37000	51A4/1 to 51A/2 Gravity Sewer	52.5
WS37001	51A/3 to 51A/2 Gravity Sewer	63
WS37002	51A3/1 to 51A/2 Gravity Sewer	50.625
WS37003	305/3 to 305/2 Gravity Sewer	39.375
WS37004	305/END to 305/3 Gravity Sewer	33.75

Asset No.	Asset Description	Criticality Score
WS37005	305/2 to 305/1 Gravity Sewer	39.375
WS37006	305A/1 to 305/1 Gravity Sewer	33.75
WS37007	305/1 to PS10/MH Gravity Sewer	32.8125
WS37008	PS10/MH to 305/PS10 Gravity Sewer	39.375
WS37009	51D/1 to 51/5 Gravity Sewer	33.75
WS37010	51B/1 to 51/4 Gravity Sewer	39.375
WS37011	51B/2 to 51B/1 Gravity Sewer	39.375
WS37012	51B/END to 51B/2 Gravity Sewer	33.75
WS37013	52/1 to 51/PS18 Gravity Sewer	26.25
WS37014	51C/1 to 51/2 Gravity Sewer	45
WS37015	51A/2 to 51A/1 Gravity Sewer	47.25
WS37016	51A/1 to 51/1 Gravity Sewer	47.25
WS37017	51A1/END to 51A/1 Gravity Sewer	33.75
WS37018	51A2/END to 51A/1 Gravity Sewer	33.75
WS37019	52A1/END to 52A/1 Gravity Sewer	28.125
WS37020	52A/END to 52A/1 Gravity Sewer	28.125
WS37021	51A4/2 to 51A4/1 Gravity Sewer	45
WS37022	2000/5 to 2000/4 Gravity Sewer	30
WS37023	2000/3 to 2000/2 Gravity Sewer	52.5
WS37024	2000A/1 to 2000/1 Gravity Sewer	52.5
WS37025	2000A/2 to 2000A/1 Gravity Sewer	45
WS37026	2000/1 to 2000/PS20 Gravity Sewer	42
WS37027	52B1/END to 52B/2 Gravity Sewer	30
WS37028	52B2/END to 52B/2 Gravity Sewer	28.125
WS37029	60/END to 60/3 Gravity Sewer	30
WS37030	52/7 to 52/6 Gravity Sewer	28.125
WS37031	52/6 to 52/5 Gravity Sewer	32.8125
WS37032	52/4 to 52/3 Gravity Sewer	26.25
WS37033	52/5 to 52/4 Gravity Sewer	32.8125
WS37034	52E/END to 52/3 Gravity Sewer	28.125
WS37035	1Z/END to M2/3 Gravity Sewer	36
WS37036	1F/3 to 1F/2 Gravity Sewer	28.125
WS37037	1A/2 to 1A/1 Gravity Sewer	32.8125
WS37038	1C/2 to 1C/1 Gravity Sewer	32.8125
WS37039	1C/3 to 1C/2 Gravity Sewer	28.125
WS37040	1A/3 to 1A/2 Gravity Sewer	28.125
WS37041	1C/1 to 1/2 Gravity Sewer	43.75
WS37042	58/1 to M2/10 Gravity Sewer	32.8125
WS37043	58/2 to 58/1 Gravity Sewer	28.125
WS37044	56A/2 to 56A/1 Gravity Sewer	45
WS37045	56/2 to 56/1 Gravity Sewer	10.5
WS37046	56A/1 to 56/2 Gravity Sewer	52.5

Asset No.	Asset Description	Criticality Score
WS37047	52D1/END to 52D/1 Gravity Sewer	28.125
WS37048	52D/1 to 52/2 Gravity Sewer	26.25
WS37049	52/2 to 52/1 Gravity Sewer	35
WS37050	52D/2 to 52D/1 Gravity Sewer	28.125
WS37051	52C1/END to 52C/1 Gravity Sewer	28.125
WS37052	52C/1 to 52/2 Gravity Sewer	43.75
WS37053	56/3 to 56/2 Gravity Sewer	10.5
WS37054	56/4 to 56/3 Gravity Sewer	13.125
WS37055	56B/1 to 56/3 Gravity Sewer	13.125
WS37056	56B/2 to 56B/1 Gravity Sewer	52.5
WS37057	56B/END to 56B/2 Gravity Sewer	30
WS37058	51A5/2 to 51A5/1 Gravity Sewer	45
WS37059	51A/6 to 51A/5 Gravity Sewer	63
WS37060	51A5/1 to 51A/4 Gravity Sewer	42
WS37061	51A6/END to 51A5/1 Gravity Sewer	30
WS37062	51A/7 to 51A/6 Gravity Sewer	45
WS37063	56E/END to 56E/2 Gravity Sewer	30
WS37064	56E/2 to 56E/1 Gravity Sewer	52.5
WS37065	56E1/1 to 56E/1 Gravity Sewer	52.5
WS37066	56E1/2 to 56E1/1 Gravity Sewer	45
WS37067	56/7 to 56/6 Gravity Sewer	13.5
WS37068	56E/1 to 56/4 Gravity Sewer	52.5
WS37069	56/6 to 56/5 Gravity Sewer	15.75
WS37070	56/5 to 56/4 Gravity Sewer	13.125
WS37071	56D/1 to 56/4 Gravity Sewer	26.25
WS37072	56D1/END to 56D/1 Gravity Sewer	28.125
WS37073	56D/4 to 56D/3 Gravity Sewer	33.75
WS37074	61/1 to M2/15 Gravity Sewer	32.8125
WS37075	63A/1 to 63/1 Gravity Sewer	33.75
WS37076	63/2 to 63/1 Gravity Sewer	39.375
WS37077	63/1 to M2/17 Gravity Sewer	32.8125
WS37078	62/END to M2/16 Gravity Sewer	28.125
WS37079	63/3 to 63/2 Gravity Sewer	33.75
WS37080	64/1 to M2/20 Gravity Sewer	28.125
WS37081	103/7 to 103/6 Gravity Sewer	42
WS37082	103/8 to 103/7 Gravity Sewer	21
WS37083	103/END to 103/8 Gravity Sewer	18
WS37084	10E/1 to 10/7 Gravity Sewer	15
WS37085	10/END to 10/7 Gravity Sewer	15
WS37086	10/6 to 10/5 Gravity Sewer	42
WS37087	10/7 to 10/6 Gravity Sewer	42
WS37088	59/1 to M2/13 Gravity Sewer	43.75

Asset No.	Asset Description	Criticality Score
WS37089	1B2/1 to 1B1/2 Gravity Sewer	28.125
WS37090	1B1/3 to 1B1/2 Gravity Sewer	28.125
WS37091	1B1/1 to 1B/1 Gravity Sewer	32.8125
WS37092	1B1/2 to 1B1/1 Gravity Sewer	32.8125
WS37093	1B3/5 to 1B3/4 Gravity Sewer	28.125
WS37094	1B3/4 to 1B3/3 Gravity Sewer	32.8125
WS37095	1B3/2 to 1B3/1 Gravity Sewer	32.8125
WS37096	1B3/3 to 1B3/2 Gravity Sewer	32.8125
WS37097	1B3/1 to 1B3/PS17 Gravity Sewer	26.25
WS37098	1B/1 to 1B3/PS17 Gravity Sewer	32.8125
WS37099	1B/2 to 1B/1 Gravity Sewer	32.8125
WS37100	1B/3 to 1B/2 Gravity Sewer	28.125
WS37101	1B4/1 to 1B3/2 Gravity Sewer	32.8125
WS37102	1B4/2 to 1B4/1 Gravity Sewer	21.875
WS37103	1B4/OF17 to 1/6 Gravity Sewer	17.5
WS37104	1A/1 to 1/3 Gravity Sewer	43.75
WS37105	1E/2 to 1E/1 Gravity Sewer	45
WS37106	1E/1 to 1/5 Gravity Sewer	52.5
WS37107	1D/1 to 1/5 Gravity Sewer	54
WS37108	9/2 to 9/1 Gravity Sewer	59.0625
WS37109	9/1 to M1/7 Gravity Sewer	59.0625
WS37110	8/1 to M1/7 Gravity Sewer	31.5
WS37111	8/2 to 8/1 Gravity Sewer	40.5
WS37112	2B/1 to 2/3 Gravity Sewer	59.0625
WS37113	2/3 to 2/2 Gravity Sewer	47.25
WS37114	2A/3 to 2A/2 Gravity Sewer	59.0625
WS37115	2A/4 to 2A/3 Gravity Sewer	50.625
WS37116	3/7 to 3/6 Gravity Sewer	70.875
WS37117	3A/5 to 3/5 Gravity Sewer	33.75
WS37118	3/6 to 3/5 Gravity Sewer	59.0625
WS37119	3/5 to 3/4 Gravity Sewer	47.25
WS37120	2/5 to 2/4 Gravity Sewer	47.25
WS37121	2/6 to 2/5 Gravity Sewer	59.0625
WS37122	3A/4 to 3/4 Gravity Sewer	11.25
WS37123	2D/5 to 2D/4 Gravity Sewer	45
WS37124	2D/4 to 2D/1 Gravity Sewer	52.5
WS37125	2D/1 to 3/5 Gravity Sewer	42
WS37126	2D/2 to 2D/1 Gravity Sewer	42
WS37127	2D/3 to 2D/2 Gravity Sewer	52.5
WS37128	510/1 to 510/PS31 Gravity Sewer	52.5
WS37129	510/2 to 510/1 Gravity Sewer	45
WS37130	500/7 to 500/6 Gravity Sewer	45

Asset No.	Asset Description	Criticality Score
WS37131	500/6 to 500/5 Gravity Sewer	52.5
WS37132	500/5 to 500/5A Gravity Sewer	52.5
WS37133	500/4 to 500/3 Gravity Sewer	52.5
WS37134	500/3 to 500/PS32 Gravity Sewer	52.5
WS37135	500/1 to 500/PS32 Gravity Sewer	52.5
WS37136	500/2 to 500/1 Gravity Sewer	73.5
WS37137	2B/2 to 2B/1 Gravity Sewer	39.375
WS37138	2B/END to 2B/2 Gravity Sewer	11.25
WS37139	3/4 to 3/3 Gravity Sewer	47.25
WS37140	3/3 to 3/2 Gravity Sewer	59.0625
WS37141	2C/END to 2C/1 Gravity Sewer	33.75
WS37142	22/7 to 22/6 Gravity Sewer	39.375
WS37143	22/8 to 22/7 Gravity Sewer	33.75
WS37144	22/6 to 22/5 Gravity Sewer	59.0625
WS37145	22/5 to 22/4 Gravity Sewer	39.375
WS37146	22B/2 to 22B/1 Gravity Sewer	30
WS37147	25/1 to M1/27 Gravity Sewer	50.625
WS37148	21/1 to M1/26 Gravity Sewer	84
WS37149	20/2 to 20/1 Gravity Sewer	50.625
WS37150	20A/END to 20/1 Gravity Sewer	33.75
WS37151	21/END to 21/2 Gravity Sewer	72
WS37152	21/2 to 21/1 Gravity Sewer	84
WS37153	21/3 to 21/2 Gravity Sewer	72
WS37154	19/3 to 19/2 Gravity Sewer	50.625
WS37155	19/1 to M1/24 Gravity Sewer	59.0625
WS37156	20/1 to 19/1 Gravity Sewer	31.5
WS37157	19/2 to 19/1 Gravity Sewer	59.0625
WS37158	18/1 to M1/23 Gravity Sewer	47.25
WS37159	17/1 to M1/19 Gravity Sewer	59.0625
WS37160	17/3 to 17/2 Gravity Sewer	50.625
WS37161	17/2 to 17/1 Gravity Sewer	39.375
WS37162	16/1 to M1/18 Gravity Sewer	59.0625
WS37163	16/3 to 16/2 Gravity Sewer	52.5
WS37164	16/2 to 16/1 Gravity Sewer	52.5
WS37165	16/END to 16/3 Gravity Sewer	45
WS37166	15/2 to 15/1 Gravity Sewer	52.5
WS37167	15/3 to 15/2 Gravity Sewer	45
WS37168	14A/2 to 14A/1 Gravity Sewer	28
WS37169	14A/1 to 14/1 Gravity Sewer	42
WS37170	14/2 to 14/1 Gravity Sewer	59.0625
WS37171	18/2 to 18/1 Gravity Sewer	82.6875
WS37172	18/3 to 18/2 Gravity Sewer	82.6875

Asset No.	Asset Description	Criticality Score
WS37173	18/4 to 18/3 Gravity Sewer	50.625
WS37174	18A/END to 18A/1 Gravity Sewer	50.625
WS37175	18A1/END to 18A/1 Gravity Sewer	33.75
WS37176	18A/1 to 18/1 Gravity Sewer	59.0625
WS37177	14B/4 to 14B/3 Gravity Sewer	39.375
WS37178	14B/END to 14B/4 Gravity Sewer	33.75
WS37179	14C/END to 14C/1 Gravity Sewer	50.625
WS37180	14B/1 to 14/4 Gravity Sewer	59.0625
WS37181	14C/1 to 14/4 Gravity Sewer	59.0625
WS37182	14/7 to 14/6 Gravity Sewer	106.3125
WS37183	14/END to 14/7 Gravity Sewer	60.75
WS37184	14D/1 to 14/6 Gravity Sewer	91.125
WS37185	14/6 to 14/5 Gravity Sewer	47.25
WS37186	14/4 to 14/3 Gravity Sewer	47.25
WS37187	14/3 to 14/2 Gravity Sewer	59.0625
WS37188	14A/END to 14A/5 Gravity Sewer	91.125
WS37189	14A2/END to 14A/5 Gravity Sewer	60.75
WS37190	14A/5 to 14A/4 Gravity Sewer	106.3125
WS37191	10/5 to 10/4 Gravity Sewer	26.25
WS37192	10D1/1 to 10D/2 Gravity Sewer	63
WS37193	10D/4 to 10D/3 Gravity Sewer	63
WS37194	10D/2 to 10D/1 Gravity Sewer	59.0625
WS37195	10D2/4 to 10D2/3 Gravity Sewer	91.125
WS37196	10D2/3 to 10D2/2 Gravity Sewer	106.3125
WS37197	10D2/2 to 10D2/1 Gravity Sewer	94.5
WS37198	10D2/1 to 10D/2 Gravity Sewer	59.0625
WS37199	10D3/END to 10D2/1 Gravity Sewer	60.75
WS37200	10D1/END to 10D1/2 Gravity Sewer	60.75
WS37201	14A1/1 to 14A/3 Gravity Sewer	60.75
WS37202	14A/4 to 14A/3 Gravity Sewer	106.3125
WS37203	14A/3 to 14A/2 Gravity Sewer	59.0625
WS37204	6/1 to M1/5 Gravity Sewer	40.5
WS37205	3/2 to 3/1 Gravity Sewer	78.75
WS37206	3/1 to M1/4 Gravity Sewer	78.75
WS37207	7/2 to 7/1 Gravity Sewer	59.0625
WS37208	7/3 to 7/2 Gravity Sewer	59.0625
WS37209	7A/1 to 7/1 Gravity Sewer	59.0625
WS37210	7/4 to 7/3 Gravity Sewer	50.625
WS37211	7A/2 to 7A/1 Gravity Sewer	50.625
WS37212	5/END to M1/4 Gravity Sewer	60.75
WS37213	9A/1 to 9/3 Gravity Sewer	59.0625
WS37214	9/4 to 9/3 Gravity Sewer	39.375

Asset No.	Asset Description	Criticality Score
WS37215	9/3 to 9/2 Gravity Sewer	59.0625
WS37216	9A1/END to 9A/1 Gravity Sewer	50.625
WS37217	9/5 to 9/4 Gravity Sewer	59.0625
WS37218	9/END to 9/5 Gravity Sewer	33.75
WS37219	11A/2 to 11A/1 Gravity Sewer	60.75
WS37220	11A/1 to 11/2 Gravity Sewer	59.0625
WS37221	11/2 to 11/1 Gravity Sewer	31.5
WS37222	11/1 to M1/13 Gravity Sewer	59.0625
WS37223	11/4 to 11/3 Gravity Sewer	50.625
WS37224	11/3 to 11/2 Gravity Sewer	59.0625
WS37225	14/1 to M1/16 Gravity Sewer	59.0625
WS37226	13/2 to 13/1 Gravity Sewer	82.6875
WS37227	13/1 to M1/15 Gravity Sewer	59.0625
WS37228	12/1 to M1/14 Gravity Sewer	50.625
WS37229	10A/END to 10A/4 Gravity Sewer	54
WS37230	10A/1 to 10/2 Gravity Sewer	59.0625
WS37231	10C/1 to 10/2 Gravity Sewer	50.625
WS37232	10B/3 to 10B/2 Gravity Sewer	33.75
WS37233	10B1/1 to 10B/2 Gravity Sewer	63
WS37234	10B1/2 to 10B1/1 Gravity Sewer	54
WS37235	2400/1 to IE/PS24 Gravity Sewer	126
WS37236	101A/1 to 101/3 Gravity Sewer	91.125
WS37237	2400/2JUNC to 2400/1 Gravity Sewer	94.5
WS37238	242/4 to 242/3 Gravity Sewer	22.5
WS37239	242/3 to 242/2 Gravity Sewer	39.375
WS37240	221/2 to 221/1 Gravity Sewer	52.5
WS37241	221/3 to 221/2 Gravity Sewer	52.5
WS37242	228/1 to M5/10 Gravity Sewer	42
WS37243	228B/1 to 228/1 Gravity Sewer	45
WS37244	228A/2 to 228A/1 Gravity Sewer	11.25
WS37245	225/2 to 225/1 Gravity Sewer	45
WS37246	218/2 to 218/1 Gravity Sewer	52.5
WS37247	220/1 to M5/12 Gravity Sewer	52.5
WS37248	220/2 to 220/1 Gravity Sewer	45
WS37249	219/1 to M5/12 Gravity Sewer	52.5
WS37250	219/2 to 219/1 Gravity Sewer	52.5
WS37251	219/3 to 219/2 Gravity Sewer	52.5
WS37252	216A/5 to 216A/4 Gravity Sewer	54
WS37253	216A/4 to 216A/3 Gravity Sewer	52.5
WS37254	213/1 to M5/1 Gravity Sewer	70
WS37255	212A/1 to 213/1 Gravity Sewer	52.5
WS37256	216B/2 to 216B/1 Gravity Sewer	52.5

Asset No.	Asset Description	Criticality Score
WS37257	216C/1 to 216/4 Gravity Sewer	52.5
WS37258	216/5 to 216/4 Gravity Sewer	52.5
WS37259	216C/4 to 216C/3 Gravity Sewer	13.5
WS37260	170/5 to 170/4 Gravity Sewer	45
WS37261	162A/1 to 162/1 Gravity Sewer	26.25
WS37262	162/1 to 162/PS13 Gravity Sewer	21
WS37263	201B/3 to 201B/2 Gravity Sewer	26.25
WS37264	203A/1 to 203/1 Gravity Sewer	33.75
WS37265	158/2 to 158/1 Gravity Sewer	26.25
WS37266	201A/OF6 to 201A/OF6B Gravity Sewer	15
WS37267	203C/1 to 203/2 Gravity Sewer	39.375
WS37268	203D/1 to 203/2 Gravity Sewer	33.75
WS37269	201E/2 to 201E/1 Gravity Sewer	33.75
WS37270	202/5 to 202/4 Gravity Sewer	26.25
WS37271	202B/3 to 202B/2 Gravity Sewer	22.5
WS37272	129A/1 to 129/1 Gravity Sewer	33.75
WS37273	129/2 to 129/1 Gravity Sewer	32.8125
WS37274	129/3 to 129/2 Gravity Sewer	32.8125
WS37275	129/4 to 129/3 Gravity Sewer	28.125
WS37276	129C/END to 129C/1 Gravity Sewer	18.75
WS37277	122/8 to 122/7 Gravity Sewer	63
WS37278	124Z/3 to 124Z/2 Gravity Sewer	28.125
WS37279	124Z/END to 124Z/1 Gravity Sewer	28.125
WS37280	300B/3 to 300B/2 Gravity Sewer	50.625
WS37281	300/2 to 300/1 Gravity Sewer	59.0625
WS37282	300A2/1 to 300A/2 Gravity Sewer	50.625
WS37283	300A3/1 to 300A/2 Gravity Sewer	50.625
WS37284	300A/5 to 300A/4 Gravity Sewer	52.5
WS37285	300/4 to 300/3 Gravity Sewer	94.5
WS37286	300C/2 to 300C/1 Gravity Sewer	81
WS37287	111B1/1 to 111B/1 Gravity Sewer	39.375
WS37288	111B1/2 to 111B1/1 Gravity Sewer	39.375
WS37289	300A/1 to 300/1 Gravity Sewer	59.0625
WS37290	300A1/1 to 300A/1 Gravity Sewer	59.0625
WS37291	22B/1 to 22/2 Gravity Sewer	52.5
WS37292	22A/1 to 22/1 Gravity Sewer	67.5
WS37293	121C/1 to 121/4 Gravity Sewer	63
WS37294	121/5 to 121/4 Gravity Sewer	63
WS37295	121/6 to 121/5 Gravity Sewer	72
WS37296	121A1/1 to 121A/3 Gravity Sewer	94.5
WS37297	121D/1 to 121/1 Gravity Sewer	84
WS37298	121/2 to 121/1 Gravity Sewer	84

Asset No.	Asset Description	Criticality Score
WS37299	121B/1 to 121/2 Gravity Sewer	63
WS37300	14/5 to 14/4 Gravity Sewer	59.0625
WS37301	14B/2 to 14B/1 Gravity Sewer	59.0625
WS37302	14B/3 to 14B/2 Gravity Sewer	39.375
WS37303	15/1 to M1/17 Gravity Sewer	59.0625
WS37304	10D/END to 10D/5 Gravity Sewer	81
WS37305	10D/3 to 10D/2 Gravity Sewer	82.6875
WS37306	10D1/2 to 10D1/1 Gravity Sewer	94.5
WS37307	215F/2 to 215F/1 Gravity Sewer	43.75
WS37308	215F/1 to 215/PS16 Gravity Sewer	43.75
WS37309	2200/6 to 2200/5 Gravity Sewer	33.75
WS37310	216F/1 to 216/9 Gravity Sewer	45
WS37311	219C/END to 219/5 Gravity Sewer	30
WS37312	10B/2 to 10B/1 Gravity Sewer	59.0625
WS37313	10B/1 to 10/3 Gravity Sewer	59.0625
WS37314	10/3 to 10/2 Gravity Sewer	59.0625
WS37315	10/4 to 10/3 Gravity Sewer	59.0625
WS37316	10D/1 to 10/4 Gravity Sewer	59.0625
WS37317	10A/4 to 10A/3 Gravity Sewer	59.0625
WS37318	10A/3 to 10A/2 Gravity Sewer	59.0625
WS37319	10A/2 to 10A/1 Gravity Sewer	59.0625
WS37320	10/1 to M1/9 Gravity Sewer	59.0625
WS37321	10/2 to 10/1 Gravity Sewer	59.0625
WS37322	9A/2 to 9A/1 Gravity Sewer	50.625
WS37323	7/1 to M1/6 Gravity Sewer	59.0625
WS37324	2A/2 to 2A/1 Gravity Sewer	59.0625
WS37325	2A/1 to 2/2 Gravity Sewer	59.0625
WS37326	2/4 to 2/3 Gravity Sewer	59.0625
WS37327	2C/1 to 2/4 Gravity Sewer	59.0625
WS37328	1F/1 to 1/1 Gravity Sewer	43.75
WS37329	1F/2 to 1F/1 Gravity Sewer	43.75
WS37330	2000B/1 to 2000/2 Gravity Sewer	45
WS37331	2000/2 to 2000/1 Gravity Sewer	52.5
WS37332	2000/4 to 2000/3 Gravity Sewer	52.5
WS37333	56D/2 to 56D/1 Gravity Sewer	32.8125
WS37334	56D2/1 to 56D/1 Gravity Sewer	28.125
WS37335	61/2 to 61/1 Gravity Sewer	28.125
WS37336	56D/3 to 56D/2 Gravity Sewer	32.8125
WS37337	52C/2 to 52C/1 Gravity Sewer	28.125
WS37338	52A/1 to 52/1 Gravity Sewer	43.75
WS37339	52B/1 to 52/1 Gravity Sewer	43.75
WS37340	52B/2 to 52B/1 Gravity Sewer	43.75

Asset No.	Asset Description	Criticality Score
WS37341	59/2 to 59/1 Gravity Sewer	28.125
WS37342	400A/1 to 400C/1 Gravity Sewer	33.75
WS37343	215D/3 to 215D/1JUNC Gravity Sewer	24
WS37344	215D/1 to 215D/1JUNC Gravity Sewer	28
WS37345	215D/1JUNC to 215/5 Gravity Sewer	42
WS37346	216E/6 to 216E/5 Gravity Sewer	45
WS37347	111F/1 to 111/4 Gravity Sewer	54
WS37348	203B/1 to 203/1 Gravity Sewer	33.75
WS37349	172/3 to 172/2 Gravity Sewer	21
WS37350	172/2 to 172/1 Gravity Sewer	17.5
WS37351	172/1 to 171/2 Gravity Sewer	17.5
WS37352	1002C/1 to 1002C/2 Gravity Sewer	39.375
WS37353	1002C/2 to 1002/3 Gravity Sewer	42
WS37354	52/3 to 52/2 Gravity Sewer	32.8125
WS37355	750/10 to 750/13 Gravity Sewer	73.5
WS37356	750/13 to 750/14 Gravity Sewer	49
WS37357	750C/11 to 750/13 Gravity Sewer	73.5
WS37358	750D/8 to 750/10 Gravity Sewer	73.5
WS37359	750D1/9 to 750/10 Gravity Sewer	73.5
WS37360	750/14 to 750/PS65 Gravity Sewer	49
WS37361	750B/2 to 750/3 Gravity Sewer	73.5
WS37362	750A/5 to 750/6 Gravity Sewer	73.5
WS37363	752/END to 752/PS66 Gravity Sewer	33.75
WS37364	753/1JUNC to 753/PS62 Gravity Sewer	39.375
WS37365	753/END to 753/PS62 Gravity Sewer	33.75
WS37366	750/3 to 750/6 Gravity Sewer	73.5
WS37367	750B1/1 to 750/3 Gravity Sewer	73.5
WS37368	750/7 to 750/14 Gravity Sewer	49
WS37369	750/6 to 750/7 Gravity Sewer	73.5
WS37370	754/9 to 754/7 Gravity Sewer	63
WS37371	754/7 to 754/6 Gravity Sewer	28
WS37372	754A/8 to 754/6 Gravity Sewer	63
WS37373	754/6 to 754/5 Gravity Sewer	73.5
WS37374	754B/1 to 754B/2 Gravity Sewer	72
WS37375	754/5 to 754/4 Gravity Sewer	28
WS37376	754/4 to 754/3 Gravity Sewer	52.5
WS37377	754B/2 to 754/3 Gravity Sewer	52.5
WS37378	62/1 to M2/11A Gravity Sewer	26.25
WS37379	62/3 to 62/1 Gravity Sewer	15
WS37380	62/4 to 62/1 Gravity Sewer	22.5
WS37381	62/2 to 62/1 Gravity Sewer	22.5
WS37382	218B-END to M5/7 Gravity Sewer	26.25

Asset No.	Asset Description	Criticality Score
WS37383	201H/2 to 201H/1 Gravity Sewer	28.125
WS37384	201H/1 to PS72 Gravity Sewer	26.25
WS37385	201G/1 to PS72 Gravity Sewer	28.125
WS37386	750A1/4 to 750/6 Gravity Sewer	73.5
WS37387	750C1/12 to 750/13 Gravity Sewer	73.5
WS37388	BLR/13 to BLR/12 Gravity Sewer	22.5
WS37389	BLR/12 to PS71 Gravity Sewer	26.25
WS37390	BLR/11 to PS71 Gravity Sewer	26.25
WS37391	BLR/10 to BLR/11 Gravity Sewer	26.25
WS37392	BLR/09 to BLR/10 Gravity Sewer	26.25
WS37393	BLR/08 to BLR/09 Gravity Sewer	26.25
WS37394	BLR1/END to PS70 Gravity Sewer	22.5
WS37395	BLR2/END to BLR/04 Gravity Sewer	22.5
WS37396	BLR/04 to BLR/05 Gravity Sewer	26.25
WS37397	BLR/05 to PS70 Gravity Sewer	26.25
WS37398	BLR3/END to PS69 Gravity Sewer	15
WS37399	BLR/01 to PS69 Gravity Sewer	26.25
WS37400	BLR/02 to BLR/01 Gravity Sewer	26.25
WS37401	BLR/03 to BLR/02 Gravity Sewer	35
WS37402	BLR/03 to PS68 Gravity Sewer	35
WS37403	754/3 to 754/PS64 Gravity Sewer	35
WS37404	753/2JUNC to 753/1JUNC Gravity Sewer	26.25
WS37405	753B/END to 753/2JUNC Gravity Sewer	22.5
WS37406	750D/END to 750D/8 Gravity Sewer	42
WS37407	750C/END to 750C/11 Gravity Sewer	42
WS37408	750D1/END to 750D1/9 Gravity Sewer	42
WS37409	750C1/END to 750C1/12 Gravity Sewer	42
WS37410	750A/END to 750A/5 Gravity Sewer	42
WS37411	750B/END to 750B/2 Gravity Sewer	42
WS37412	750A1/END to 750A1/4 Gravity Sewer	42
WS37413	750B1/END to 750B1/1 Gravity Sewer	42
WS37414	753A/3JUNC to 753/PS62 Gravity Sewer	21
WS37415	753A/END to 753A/3JUNC Gravity Sewer	22.5
WS37416	500-1END to 500/5A Gravity Sewer	22.5
WS37417	500/5A to 500/4 Gravity Sewer	31.5
WS37418	2200/5 to 2200/4 Gravity Sewer	45.9375
WS37419	124Z1/END to 124/3 Gravity Sewer	22.5
WS37420	2B/END to 2/5 Gravity Sewer	33.75
WS37421	2/2 to 2/1B Gravity Sewer	31.5
WS37422	2/1B to 2/1A Gravity Sewer	42
WS37423	2/1A to M1/2 Gravity Sewer	31.5
WS37424	DC/MH to 56/1 Gravity Sewer	12

Asset No.	Asset Description	Criticality Score
WS37425	56/1 to M2/9 Gravity Sewer	13.125
WS37426	1/6 to 1/5 Gravity Sewer	21
WS37427	1/5 to 1/4 Gravity Sewer	26.25
WS37428	1/4 to 1/3 Gravity Sewer	26.25
WS37429	1/3 to 1/2 Gravity Sewer	26.25
WS37430	1/2 to 1/1 Gravity Sewer	27
WS37431	1/1 to M2/3 Gravity Sewer	12
WS37432	1/OF1 to OF/1 Gravity Sewer	15
WS37433	24/3 to 24/2 Gravity Sewer	13.125
WS37434	24/2 to 24/1 Gravity Sewer	13.125
WS37435	24/1 to M1/30 Gravity Sewer	13.125
WS37436	111/11 to 111/10 Gravity Sewer	23.625
WS37437	111/10 to 111/9A Gravity Sewer	23.625
WS37438	111/9A to 111/9 Gravity Sewer	23.625
WS37439	111/9 to 111/8 Gravity Sewer	23.625
WS37440	111/8 to 111/7 Gravity Sewer	23.625
WS37441	111/7 to 111/6 Gravity Sewer	23.625
WS37442	111/6 to 111/5 Gravity Sewer	23.625
WS37443	111/5 to 111/4 Gravity Sewer	15.75
WS37444	111/4 to 111/3 Gravity Sewer	15.75
WS37445	111/3 to 111/2 Gravity Sewer	15.75
WS37446	111/2 to 111/1 Gravity Sewer	23.625
WS37447	111/1 to PS3/MH Gravity Sewer	23.625
WS37448	PS3/MH to 111/PS3 Gravity Sewer	18
WS37449	111/PS3B to PS3/MH Gravity Sewer	27
WS37450	51/8 to 51/7 Gravity Sewer	54
WS37451	51/7 to 51/6 Gravity Sewer	63
WS37452	51/6 to 51/5 Gravity Sewer	52.5
WS37453	51/5 to 51/4 Gravity Sewer	39.375
WS37454	51/4 to 51/3 Gravity Sewer	42
WS37455	51/3 to 51/2 Gravity Sewer	39.375
WS37456	51/2 to 51/1 Gravity Sewer	42
WS37457	51/1 to 51/PS18 Gravity Sewer	26.25
WS37458	51/3 to 51/OF18 Gravity Sewer	22.5
WS37459	1000/2 to 1000/1 Gravity Sewer	43.75
WS37460	1000/1 to 1000/PS21 Gravity Sewer	32.8125
WS37461	156/2 to OF12/2 Gravity Sewer	42
WS37462	OF12/2 to 156/1 Gravity Sewer	14
WS37463	156/1 to M4/8 Gravity Sewer	13.125
WS37464	M4/9 to M4/8 Gravity Sewer	13.125
WS37465	M4/8 to M4/7 Gravity Sewer	10.5
WS37466	M4/7 to M4/6 Gravity Sewer	10.5

Asset No.	Asset Description	Criticality Score
WS37467	M4/6 to M4/5 Gravity Sewer	10.5
WS37468	M4/5 to M4/4 Gravity Sewer	10.5
WS37469	M4/4 to M4/3 Gravity Sewer	15
WS37470	M4/3 to M4/2 Gravity Sewer	15
WS37471	M4/2 to M4/1 Gravity Sewer	15
WS37472	M3/4 to M3/3 Gravity Sewer	81
WS37473	M3/3 to M3/2 Gravity Sewer	81
WS37474	M3/2 to M3/1 Gravity Sewer	24
WS37475	M3/1 to M4/1 Gravity Sewer	20
WS37476	201B/1 to PS6/MH Gravity Sewer	26.25
WS37477	201B/2 to 201B/1 Gravity Sewer	21
WS37478	201B2/2 to 201B2/1 Gravity Sewer	26.25
WS37479	201B2/1 to 201B/2 Gravity Sewer	26.25
WS37480	202A/2 to 202A/1 Gravity Sewer	26.25
WS37481	202A/1 to 202/1 Gravity Sewer	26.25
WS37482	202/1 to PS6/MH Gravity Sewer	21
WS37483	PS6/MH to 201/PS6 Gravity Sewer	14
WS37484	126/5 to 126/4 Gravity Sewer	48
WS37485	126/4 to 126/3 Gravity Sewer	30
WS37486	126/3 to 126/2 Gravity Sewer	36
WS37487	126/2 to 126/1 Gravity Sewer	36
WS37488	126/1 to 125/1 Gravity Sewer	21
WS37489	125/1 to 125/PS11 Gravity Sewer	21
WS37490	160/5 to 160/4 Gravity Sewer	21
WS37491	160/3 to 160/2 Gravity Sewer	26.25
WS37492	160/2 to 160/1 Gravity Sewer	26.25
WS37493	160/1 to 162/PS13 Gravity Sewer	26.25
WS37494	160/4 to 160/3 Gravity Sewer	31.5
WS37495	M5/18 to M5/17 Gravity Sewer	26.25
WS37496	M5/17 to M5/16 Gravity Sewer	26.25
WS37497	M5/16 to M5/15 Gravity Sewer	26.25
WS37498	M5/15 to M5/14 Gravity Sewer	30
WS37499	M5/14 to M5/13 Gravity Sewer	30
WS37500	M5/13 to M5/12 Gravity Sewer	35
WS37501	M5/12 to M5/11 Gravity Sewer	24
WS37502	M5/11 to M5/10 Gravity Sewer	35
WS37503	M5/10 to M5/9 Gravity Sewer	35
WS37504	226/1 to M5/9 Gravity Sewer	26.25
WS37505	M5/9 to M5/8 Gravity Sewer	24
WS37506	M5/8 to M5/7 Gravity Sewer	24
WS37507	M5/7 to M5/6 Gravity Sewer	32
WS37508	M5/6 to M5/5 Gravity Sewer	24

Asset No.	Asset Description	Criticality Score
WS37509	216/3 to 216/2 Gravity Sewer	26.25
WS37510	216/2 to 216/1 Gravity Sewer	26.25
WS37511	216/1 to M5/5 Gravity Sewer	26.25
WS37512	M5/5 to M5/4 Gravity Sewer	40
WS37513	226/OF5 to 226/OF5B Gravity Sewer	18.75
WS37514	PS5/MH to M5/PS5 Gravity Sewer	32
WS37515	M5/1 to PS5/MH Gravity Sewer	40
WS37516	M5/2 to M5/1 Gravity Sewer	50
WS37517	M5/3 to M5/2 Gravity Sewer	50
WS37518	M5/4 to M5/3 Gravity Sewer	35
WS37519	M4/1 to PS4/MH Gravity Sewer	20
WS37520	PS4/MH to M4/PS4 Gravity Sewer	20
WS37521	60/4 to 60/3 Gravity Sewer	28
WS37522	60/1 to M2/6 Gravity Sewer	17.5
WS37523	M2/7 to M2/6 Gravity Sewer	17.5
WS37524	M2/6 to M2/5 Gravity Sewer	17.5
WS37525	M2/5 to M2/4 Gravity Sewer	17.5
WS37526	M2/3 to M2/2 Gravity Sewer	32
WS37527	M2/4 to M2/3 Gravity Sewer	20
WS37528	M2/2 to M2/1 Gravity Sewer	32
WS37529	M2/1 to PS1/MH Gravity Sewer	32
WS37530	M2/10 to M2/9 Gravity Sewer	17.5
WS37531	M2/11 to M2/10 Gravity Sewer	17.5
WS37532	M2/12 to M2/11A Gravity Sewer	17.5
WS37533	M2/11A to M2/11 Gravity Sewer	26.25
WS37534	M2/13 to M2/12A Gravity Sewer	15
WS37535	M2/14 to M2/13 Gravity Sewer	17.5
WS37536	M2/18 to M2/17 Gravity Sewer	17.5
WS37537	M2/17 to M2/16 Gravity Sewer	17.5
WS37538	M2/19 to M2/18 Gravity Sewer	17.5
WS37539	M2/20 to M2/19 Gravity Sewer	20
WS37540	M2/15 to M2/14 Gravity Sewer	12.5
WS37541	M2/16 to M2/15 Gravity Sewer	12.5
WS37542	M2/21 to M2/20 Gravity Sewer	20
WS37543	M2/9 to M2/8 Gravity Sewer	21.875
WS37544	M2/8 to M2/7 Gravity Sewer	21.875
WS37545	60/3 to 60/2 Gravity Sewer	28
WS37546	60/2 to 60/1 Gravity Sewer	28
WS37547	M1/31 to M1/30 Gravity Sewer	15.625
WS37548	M1/32 to M1/31 Gravity Sewer	12.5
WS37549	M1/33 to M1/32 Gravity Sewer	12.5
WS37550	M1/34 to M1/33 Gravity Sewer	15.625

Asset No.	Asset Description	Criticality Score
WS37551	M1/35 to M1/34 Gravity Sewer	12.5
WS37552	M1/36 to M1/35 Gravity Sewer	12.5
WS37553	M1/28 to M1/27 Gravity Sewer	20
WS37554	M1/6 to M1/5 Gravity Sewer	25
WS37555	M1/9 to M1/8 Gravity Sewer	20
WS37556	M1/8 to M1/7 Gravity Sewer	16
WS37557	M1/7 to M1/6 Gravity Sewer	20
WS37558	M1/5 to M1/4A Gravity Sewer	16
WS37559	M1/26 to M1/25 Gravity Sewer	16
WS37560	M1/25 to M1/24 Gravity Sewer	16
WS37561	M1/23 to M1/22 Gravity Sewer	25
WS37562	M1/20 to M1/19 Gravity Sewer	16
WS37563	M1/19 to M1/18 Gravity Sewer	25
WS37564	M1/18 to M1/17 Gravity Sewer	25
WS37565	M1/2 to M1/1 Gravity Sewer	30
WS37566	M1/1 to PS1/MH Gravity Sewer	30
WS37567	M1/3 to M1/2 Gravity Sewer	30
WS37568	M1/4 to M1/3 Gravity Sewer	20
WS37569	M1/4A to M1/4 Gravity Sewer	20
WS37570	M1/13 to M1/12 Gravity Sewer	45
WS37571	M1/14 to M1/13 Gravity Sewer	22.5
WS37572	M1/17 to M1/16 Gravity Sewer	20
WS37573	M1/16 to M1/15 Gravity Sewer	22.5
WS37574	M1/15 to M1/14 Gravity Sewer	28.125
WS37575	M1/27 to M1/26 Gravity Sewer	25
WS37576	M1/30 to M1/28 Gravity Sewer	20
WS37577	M1/22 to M1/21 Gravity Sewer	25
WS37578	M1/21 to M1/20 Gravity Sewer	25
WS37579	M1/12 to M1/11 Gravity Sewer	40
WS37580	M1/11 to M1/10 Gravity Sewer	25
WS37581	M1/10 to M1/9 Gravity Sewer	25
WS37582	M1/24 to M1/23 Gravity Sewer	16
WS37583	PS1/MH to PS/1 Gravity Sewer	33.75
WS37586	122B/1 to 122/1 Gravity Sewer	42
WS37587	122B/2 to 122B/1 Gravity Sewer	42
WS37588	122B/3 to 122B/2 Gravity Sewer	45
WS37589	IE8/END to IE7/PS58 Gravity Sewer	47.25
WS37590	MR4A/END to MR4/PS52 Gravity Sewer	36
WS37591	MR4B/END to MR4/PS52 Gravity Sewer	63
WS37592	M2/12A to M2/12 Gravity Sewer	70
WS37593	Sewer Vent to 750B1/1 Gravity Sewer	36.75
WS35000	PS8 Rising Main	30

Asset No.	Asset Description	Criticality Score
WS35001	SPS Dog Pound Rising Main	21.875
WS35002	SPS Showgrounds Rising Main	31.5
WS35003	SPS1 Rising Main	24.5
WS35004	SPS1 Rising Main S1	80
WS35005	SPS1 Rising Main S2	140
WS35006	SPS1 Rising Main S3	60
WS35007	SPS10 Rising Main	52.5
WS35008	SPS100 DiBellas RM	31.5
WS35009	WETLANDS RISING MAIN 2	24
WS35010	WETLANDS RISING MAIN 1	81
WS35011	WETLANDS RISING MAIN 3	27
WS35012	SPS11 Rising Main	52.5
WS35013	SPS12 Rising Main	36.75
WS35014	SPS13 Rising Main	42
WS35015	SPS14 Rising Main	36.75
WS35016	SPS15 Rising Main	42
WS35017	SPS16 Rising Main	36.75
WS35018	SPS17 Rising Main	36.75
WS35019	SPS18 Rising Main	36.75
WS35020	SPS18 Rising Main Bypass	24.5
WS35021	SPS19 Rising Main	24.5
WS35022	SPS2 Rising Main	42
WS35023	SPS20 Rising Main	24.5
WS35024	SPS21 Rising Main	49
WS35025	SPS22 Rising Main	14
WS35026	SPS22 Rising Main S1	36
WS35027	SPS22 Rising Main S2	24
WS35028	SPS23 Rising Main S1	13.5
WS35029	SPS23 Rising Main S2	18
WS35030	SPS24 Rising Main	61.25
WS35031	SPS25 Rising Main	18
WS35032	SPS26 Rising Main S1	18
WS35033	SPS26 Rising Main S2	24
WS35034	SPS27 Rising Main S1	18
WS35035	SPS27 Rising Main S2	21
WS35036	SPS28 Rising Main S1	27
WS35037	SPS28 Rising Main S2	21
WS35038	SPS29 Rising Main	18
WS35039	SPS3 Rising Main	36.75
WS35040	SPS3 Rising Main	24
WS35041	SPS30 Rising Main	40.5
WS35042	SPS31 Rising Main	21

Asset No.	Asset Description	Criticality Score
WS35043	SPS32 Rising Main	31.5
WS35044	SPS33 Rising Main	22.5
WS35045	SPS34 Rising Main	17.5
WS35046	SPS35 Rising Main S1	9
WS35047	SPS35 Rising Main S2	18
WS35048	SPS36 Rising Main S1	9
WS35049	SPS36 Rising Main S2	18
WS35050	SPS37 Rising Main S1	9
WS35051	SPS37 Rising Main S2	12
WS35052	SPS38 Rising Main S1	9
WS35053	SPS38 Rising Main S2	12
WS35054	SPS39 Rising Main S1	9
WS35055	SPS39 Rising Main S2	16
WS35056	SPS4 Bypass RM	31.25
WS35057	SPS4 Rising Main	40
WS35058	SPS40 Rising Main S1	9
WS35059	SPS40 Rising Main S2	16
WS35060	SPS41 Rising Main S1	9
WS35061	SPS41 Rising Main S2	21
WS35062	SPS42 Rising Main	13.5
WS35063	SPS43 Rising Main	14
WS35064	SPS44 BypassRM/SPS22	18
WS35065	SPS44 Rising Main	16
WS35066	SPS4-5 Bypass RM	54
WS35067	SPS45 Rising Main S1	9
WS35068	SPS45 Rising Main S2	9
WS35069	SPS46 Rising Main	31.5
WS35070	SPS47 Rising Main	15.75
WS35071	SPS48 Rising Main S1	7
WS35072	SPS48 Rising Main S2	21
WS35073	SPS49 Rising Main S1	9
WS35074	SPS49 Rising Main S2	21
WS35075	SPS5 Rising Main	70
WS35076	SPS50 Rising Main	13.5
WS35077	SPS51 Rising Main	9
WS35078	SPS52 Rising Main S1	17.5
WS35079	SPS52 Rising Main S2	26.25
WS35080	SPS53 Rising Main S1	17.5
WS35081	SPS53 Rising Main S2	26.25
WS35082	SPS54 Rising Main	26.25
WS35083	SPS55 Rising Main S1	26.25
WS35084	SPS55 Rising Main S2	17.5

Asset No.	Asset Description	Criticality Score
WS35121	LSTP Rising Main	108

Appendix E2 –Ingham Sewerage Scheme Criticality Ranking Results

Table E.2: Ingham Sewerage Scheme Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS35005	SPS1 Rising Main S2	140
WS36993	1001/2 to 1001/1 Gravity Sewer	126
WS37235	2400/1 to IE/PS24 Gravity Sewer	126
WS36743	122/3 to 122/2 Gravity Sewer	106.3125
WS36921	111D/1 to 111/9 Gravity Sewer	106.3125
WS37182	14/7 to 14/6 Gravity Sewer	106.3125
WS37190	14A/5 to 14A/4 Gravity Sewer	106.3125
WS37196	10D2/3 to 10D2/2 Gravity Sewer	106.3125
WS37202	14A/4 to 14A/3 Gravity Sewer	106.3125
WS36570	113/3 to 113/2 Gravity Sewer	94.5
WS36571	113/4 to 113/3 Gravity Sewer	94.5
WS36577	111B/1 to 111/2 Gravity Sewer	94.5
WS36672	216/9 to 216/8 Gravity Sewer	94.5
WS36735	151/1 to M4/3 Gravity Sewer	94.5
WS36870	123/4 to 123/6 Gravity Sewer	94.5
WS36873	123A/3 to 123/2 Gravity Sewer	94.5
WS36874	123/6 to 123A/3 Gravity Sewer	94.5
WS36877	123B/1 to 123/2 Gravity Sewer	94.5
WS36919	10D/5 to 10D/4 Gravity Sewer	94.5
WS36954	121A/4 to 121A/3 Gravity Sewer	94.5
WS37197	10D2/2 to 10D2/1 Gravity Sewer	94.5
WS37237	2400/2JUNC to 2400/1 Gravity Sewer	94.5
WS37285	300/4 to 300/3 Gravity Sewer	94.5
WS37296	121A1/1 to 121A/3 Gravity Sewer	94.5
WS37306	10D1/2 to 10D1/1 Gravity Sewer	94.5
WS36920	111E/1 to 111/10 Gravity Sewer	91.125
WS36955	111C/1 to 111/7 Gravity Sewer	91.125
WS37184	14D/1 to 14/6 Gravity Sewer	91.125
WS37188	14A/END to 14A/5 Gravity Sewer	91.125
WS37195	10D2/4 to 10D2/3 Gravity Sewer	91.125
WS37236	101A/1 to 101/3 Gravity Sewer	91.125
WS36863	311/3 to 311/2 Gravity Sewer	90
WS36894	121/3 to 121/2 Gravity Sewer	84
WS37148	21/1 to M1/26 Gravity Sewer	84
WS37152	21/2 to 21/1 Gravity Sewer	84
WS37297	121D/1 to 121/1 Gravity Sewer	84
WS37298	121/2 to 121/1 Gravity Sewer	84
WS37171	18/2 to 18/1 Gravity Sewer	82.6875

WS37172	18/3 to 18/2 Gravity Sewer	82.6875
WS37226	13/2 to 13/1 Gravity Sewer	82.6875
WS37305	10D/3 to 10D/2 Gravity Sewer	82.6875
WS35010	WETLANDS RISING MAIN 1	81
WS36663	216B/5 to 216B/4 Gravity Sewer	81
WS36889	121A/END to 121A/1 Gravity Sewer	81
WS36896	121C/2 to 121C/1 Gravity Sewer	81
WS36922	111B/5 to 111B/4 Gravity Sewer	81
WS37286	300C/2 to 300C/1 Gravity Sewer	81
WS37304	10D/END to 10D/5 Gravity Sewer	81
WS37473	M3/3 to M3/2 Gravity Sewer	81
WS37472	M3/4 to M3/3 Gravity Sewer	81
WS35004	SPS1 Rising Main S1	80
WS37205	3/2 to 3/1 Gravity Sewer	78.75
WS37206	3/1 to M1/4 Gravity Sewer	78.75
WS36506	IE4/END to IE1/MH1 Gravity Sewer	73.5
WS37136	500/2 to 500/1 Gravity Sewer	73.5
WS36895	121C1/1 to 121C/1 Gravity Sewer	72
WS37151	21/END to 21/2 Gravity Sewer	72
WS37153	21/3 to 21/2 Gravity Sewer	72
WS37295	121/6 to 121/5 Gravity Sewer	72
WS36567	113/1 to PS3/MH Gravity Sewer	70.875
WS36569	113/2 to 113/1 Gravity Sewer	70.875
WS36670	216/8 to 216/7 Gravity Sewer	70.875
WS36727	122/4 to 122/3 Gravity Sewer	70.875
WS36734	151/2 to 151/1 Gravity Sewer	70.875
WS36945	300/6 to 300/5 Gravity Sewer	70.875
WS37116	3/7 to 3/6 Gravity Sewer	70.875
WS35075	SPS5 Rising Main	70
WS36691	212/1 to M5/1 Gravity Sewer	70
WS36980	1002/5 to 1002/4 Gravity Sewer	70
WS37254	213/1 to M5/1 Gravity Sewer	70
WS37592	M2/12A to M2/12 Gravity Sewer	70
WS36559	23/1 to M1/28 Gravity Sewer	67.5
WS36861	311/1 to 310/1 Gravity Sewer	67.5
WS36862	311/2 to 311/1 Gravity Sewer	67.5
WS37292	22A/1 to 22/1 Gravity Sewer	67.5
WS36501	2400/END to 2400/3 Gravity Sewer	63
WS36507	IE5/END to IE5/PS58 Gravity Sewer	63
WS36508	IE6/END to IE5/PS58 Gravity Sewer	63
WS36528	TR6A/END to TR6A/7JUNC Gravity Sewer	63
WS37591	MR4B/END to MR4/PS52 Gravity Sewer	63
WS36645	222/1 to M5/16 Gravity Sewer	63
WS36886	121A/6 to 121A/5 Gravity Sewer	63

WS36891	121D/2 to 121D/1 Gravity Sewer	63
WS36953	121A/5 to 121A/4 Gravity Sewer	63
WS36991	1001/4 to 1001/3 Gravity Sewer	63
WS36992	1001/3 to 1001/2 Gravity Sewer	63
WS36999	51A/4 to 51A/3 Gravity Sewer	63
WS37001	51A/3 to 51A/2 Gravity Sewer	63
WS37059	51A/6 to 51A/5 Gravity Sewer	63
WS37192	10D1/1 to 10D/2 Gravity Sewer	63
WS37193	10D/4 to 10D/3 Gravity Sewer	63
WS37233	10B1/1 to 10B/2 Gravity Sewer	63
WS37277	122/8 to 122/7 Gravity Sewer	63
WS37293	121C/1 to 121/4 Gravity Sewer	63
WS37294	121/5 to 121/4 Gravity Sewer	63
WS37299	121B/1 to 121/2 Gravity Sewer	63
WS37451	51/7 to 51/6 Gravity Sewer	63
WS35030	SPS24 Rising Main	61.25
WS36564	111B2/1 to 111B/3 Gravity Sewer	60.75
WS36572	113/5 to 113/4 Gravity Sewer	60.75
WS36733	151/3 to 151/2 Gravity Sewer	60.75
WS36869	123/5 to 123/4 Gravity Sewer	60.75
WS36880	123C/2 to 123C/3 Gravity Sewer	60.75
WS36882	123C/END to 123C/1 Gravity Sewer	60.75
WS36883	123D/1 to 123C/1 Gravity Sewer	60.75
WS36946	300/7 to 300/6 Gravity Sewer	60.75
WS36956	111D/2 to 111D/1 Gravity Sewer	60.75
WS37183	14/END to 14/7 Gravity Sewer	60.75
WS37189	14A2/END to 14A/5 Gravity Sewer	60.75
WS37199	10D3/END to 10D2/1 Gravity Sewer	60.75
WS37200	10D1/END to 10D1/2 Gravity Sewer	60.75
WS37201	14A1/1 to 14A/3 Gravity Sewer	60.75
WS37212	5/END to M1/4 Gravity Sewer	60.75
WS37219	11A/2 to 11A/1 Gravity Sewer	60.75
WS35006	SPS1 Rising Main S3	60
WS36892	121A1/END to 121A1/1 Gravity Sewer	60
WS36558	22/1 to 23/1 Gravity Sewer	59.0625
WS36560	23/2 to 23/1 Gravity Sewer	59.0625
WS36574	300C/1 to 300/4 Gravity Sewer	59.0625
WS36575	300/5 to 300/4 Gravity Sewer	59.0625
WS36583	111A/4 to 111A/3 Gravity Sewer	59.0625
WS36585	23/3 to 23/2 Gravity Sewer	59.0625
WS36591	300/1 to 301/PS9 Gravity Sewer	59.0625
WS36729	122A/1JUNC to 122A/1 Gravity Sewer	59.0625
WS36732	123/1 to M3/2 Gravity Sewer	59.0625
WS36736	122/1 to M4/1 Gravity Sewer	59.0625

WS36850	310/4 to 310/3 Gravity Sewer	59.0625
WS36852	310A/1 to 310/4 Gravity Sewer	59.0625
WS36853	310/5 to 310/4 Gravity Sewer	59.0625
WS36856	310/3 to 310/2 Gravity Sewer	59.0625
WS36871	123A/2 to 123A/1 Gravity Sewer	59.0625
WS36875	123/2 to 123/1 Gravity Sewer	59.0625
WS36876	123C/1 to 123B/1 Gravity Sewer	59.0625
WS36878	123B/3 to 123B/1 Gravity Sewer	59.0625
WS36935	124A/2 to 124A/1 Gravity Sewer	59.0625
WS36947	300B/1 to 300/2 Gravity Sewer	59.0625
WS36948	300B/2 to 300B/1 Gravity Sewer	59.0625
WS36966	300A1/4 to 300A1/3 Gravity Sewer	59.0625
WS36967	300A1/3 to 300A1/2 Gravity Sewer	59.0625
WS36968	300A/8 to 300A/6 Gravity Sewer	59.0625
WS36971	300A/6 to 300A/5 Gravity Sewer	59.0625
WS36976	300A1/2 to 300A1/1 Gravity Sewer	59.0625
WS37108	9/2 to 9/1 Gravity Sewer	59.0625
WS37109	9/1 to M1/7 Gravity Sewer	59.0625
WS37112	2B/1 to 2/3 Gravity Sewer	59.0625
WS37114	2A/3 to 2A/2 Gravity Sewer	59.0625
WS37118	3/6 to 3/5 Gravity Sewer	59.0625
WS37121	2/6 to 2/5 Gravity Sewer	59.0625
WS37140	3/3 to 3/2 Gravity Sewer	59.0625
WS37144	22/6 to 22/5 Gravity Sewer	59.0625
WS37155	19/1 to M1/24 Gravity Sewer	59.0625
WS37157	19/2 to 19/1 Gravity Sewer	59.0625
WS37159	17/1 to M1/19 Gravity Sewer	59.0625
WS37162	16/1 to M1/18 Gravity Sewer	59.0625
WS37170	14/2 to 14/1 Gravity Sewer	59.0625
WS37176	18A/1 to 18/1 Gravity Sewer	59.0625
WS37180	14B/1 to 14/4 Gravity Sewer	59.0625
WS37181	14C/1 to 14/4 Gravity Sewer	59.0625
WS37187	14/3 to 14/2 Gravity Sewer	59.0625
WS37194	10D/2 to 10D/1 Gravity Sewer	59.0625
WS37198	10D2/1 to 10D/2 Gravity Sewer	59.0625
WS37203	14A/3 to 14A/2 Gravity Sewer	59.0625
WS37207	7/2 to 7/1 Gravity Sewer	59.0625
WS37208	7/3 to 7/2 Gravity Sewer	59.0625
WS37209	7A/1 to 7/1 Gravity Sewer	59.0625
WS37213	9A/1 to 9/3 Gravity Sewer	59.0625
WS37215	9/3 to 9/2 Gravity Sewer	59.0625
WS37217	9/5 to 9/4 Gravity Sewer	59.0625
WS37220	11A/1 to 11/2 Gravity Sewer	59.0625
WS37222	11/1 to M1/13 Gravity Sewer	59.0625

WS37224	11/3 to 11/2 Gravity Sewer	59.0625
WS37225	14/1 to M1/16 Gravity Sewer	59.0625
WS37227	13/1 to M1/15 Gravity Sewer	59.0625
WS37230	10A/1 to 10/2 Gravity Sewer	59.0625
WS37281	300/2 to 300/1 Gravity Sewer	59.0625
WS37289	300A/1 to 300/1 Gravity Sewer	59.0625
WS37290	300A1/1 to 300A/1 Gravity Sewer	59.0625
WS37300	14/5 to 14/4 Gravity Sewer	59.0625
WS37301	14B/2 to 14B/1 Gravity Sewer	59.0625
WS37303	15/1 to M1/17 Gravity Sewer	59.0625
WS37312	10B/2 to 10B/1 Gravity Sewer	59.0625
WS37313	10B/1 to 10/3 Gravity Sewer	59.0625
WS37314	10/3 to 10/2 Gravity Sewer	59.0625
WS37315	10/4 to 10/3 Gravity Sewer	59.0625
WS37316	10D/1 to 10/4 Gravity Sewer	59.0625
WS37317	10A/4 to 10A/3 Gravity Sewer	59.0625
WS37318	10A/3 to 10A/2 Gravity Sewer	59.0625
WS37319	10A/2 to 10A/1 Gravity Sewer	59.0625
WS37320	10/1 to M1/9 Gravity Sewer	59.0625
WS37321	10/2 to 10/1 Gravity Sewer	59.0625
WS37323	7/1 to M1/6 Gravity Sewer	59.0625
WS37324	2A/2 to 2A/1 Gravity Sewer	59.0625
WS37325	2A/1 to 2/2 Gravity Sewer	59.0625
WS37326	2/4 to 2/3 Gravity Sewer	59.0625
WS37327	2C/1 to 2/4 Gravity Sewer	59.0625
WS36504	IE3/END to IE2/1JUNC Gravity Sewer	55.125
WS36505	IE2/1JUNC to IE1/MH1 Gravity Sewer	55.125
WS36509	IE7/END to IE7/PS59 Gravity Sewer	55.125
WS35066	SPS4-5 Bypass RM	54
WS36573	300C1/1 to 300C/1 Gravity Sewer	54
WS36646	222/2 to 222/1 Gravity Sewer	54
WS36664	216B2/1 to 216B/4 Gravity Sewer	54
WS36673	216/10 to 216/9 Gravity Sewer	54
WS36887	121A/7 to 121A/6 Gravity Sewer	54
WS36988	1001A/1 to 1001/4 Gravity Sewer	54
WS37107	1D/1 to 1/5 Gravity Sewer	54
WS37229	10A/END to 10A/4 Gravity Sewer	54
WS37234	10B1/2 to 10B1/1 Gravity Sewer	54
WS37252	216A/5 to 216A/4 Gravity Sewer	54
WS37347	111F/1 to 111/4 Gravity Sewer	54
WS37450	51/8 to 51/7 Gravity Sewer	54
WS35012	SPS11 Rising Main	52.5
WS35007	SPS10 Rising Main	52.5
WS36554	TR1/MH2 to TR1/MH1 Gravity Sewer	52.5

WS36555	TR2/2JUNC to TR1/1JUNC Gravity Sewer	52.5
WS36578	111A/1 to 111/2 Gravity Sewer	52.5
WS36629	221/4 to 221/3 Gravity Sewer	52.5
WS36633	228/3 to 228/2 Gravity Sewer	52.5
WS36635	228A/1 to 228/1 Gravity Sewer	52.5
WS36638	225/1 to M5/9 Gravity Sewer	52.5
WS36640	218/1 to M5/7 Gravity Sewer	52.5
WS36642	217/1 to M5/6 Gravity Sewer	52.5
WS36643	224/1 to M5/17 Gravity Sewer	52.5
WS36647	219/4 to 219/3 Gravity Sewer	52.5
WS36651	219/5 to 219/4 Gravity Sewer	52.5
WS36652	221/1 to M5/13 Gravity Sewer	52.5
WS36653	216A/3 to 216A/2 Gravity Sewer	52.5
WS36655	216A/2 to 216A/1 Gravity Sewer	52.5
WS36656	216A/1 to 216/3 Gravity Sewer	52.5
WS36658	216B/1 to 216/3 Gravity Sewer	52.5
WS36661	216B/3 to 216B/2 Gravity Sewer	52.5
WS36669	216/7 to 216/6 Gravity Sewer	52.5
WS36676	215A/2 to 215A/1 Gravity Sewer	52.5
WS36678	215A/1 to 215/3 Gravity Sewer	52.5
WS36679	215/3 to 215/2 Gravity Sewer	52.5
WS36692	212/4 to 212/3 Gravity Sewer	52.5
WS36693	212/3 to 212/2 Gravity Sewer	52.5
WS36694	212/2 to 212/1 Gravity Sewer	52.5
WS36696	212A/2 to 212A/1 Gravity Sewer	52.5
WS36701	214/2 to 214/1 Gravity Sewer	52.5
WS36702	213/2 to 213/1 Gravity Sewer	52.5
WS36703	214/1 to M5/3 Gravity Sewer	52.5
WS36706	215/1 to M5/4 Gravity Sewer	52.5
WS36708	215/5 to 215/4 Gravity Sewer	52.5
WS36710	215B/1 to 215/4 Gravity Sewer	52.5
WS36712	215C/1 to 215/5 Gravity Sewer	52.5
WS36715	215E/1 to 215/6 Gravity Sewer	52.5
WS36717	216E/1 to 216/6 Gravity Sewer	52.5
WS36722	216E/4 to 216E/3 Gravity Sewer	52.5
WS36723	216E/5 to 216E/4 Gravity Sewer	52.5
WS36724	122/7 to 122/6 Gravity Sewer	52.5
WS36725	122/6 to 122/5 Gravity Sewer	52.5
WS36726	122/5 to 122/4 Gravity Sewer	52.5
WS36893	121/4 to 121/3 Gravity Sewer	52.5
WS36924	127/3 to 127/2 Gravity Sewer	52.5
WS36965	300A1/5 to 300A1/4 Gravity Sewer	52.5
WS36978	1002/7 to 1002/6 Gravity Sewer	52.5
WS36979	1002/8 to 1002/7 Gravity Sewer	52.5

WS36981	1002/6 to 1002/5 Gravity Sewer	52.5
WS36986	1002D/1 to 1002/4 Gravity Sewer	52.5
WS36990	1001/5 to 1001/4 Gravity Sewer	52.5
WS36994	1001/1 to 1000/1 Gravity Sewer	52.5
WS36997	1002/1 to 1000/2 Gravity Sewer	52.5
WS37000	51A4/1 to 51A/2 Gravity Sewer	52.5
WS37023	2000/3 to 2000/2 Gravity Sewer	52.5
WS37024	2000A/1 to 2000/1 Gravity Sewer	52.5
WS37046	56A/1 to 56/2 Gravity Sewer	52.5
WS37056	56B/2 to 56B/1 Gravity Sewer	52.5
WS37064	56E/2 to 56E/1 Gravity Sewer	52.5
WS37065	56E1/1 to 56E/1 Gravity Sewer	52.5
WS37068	56E/1 to 56/4 Gravity Sewer	52.5
WS37106	1E/1 to 1/5 Gravity Sewer	52.5
WS37124	2D/4 to 2D/1 Gravity Sewer	52.5
WS37127	2D/3 to 2D/2 Gravity Sewer	52.5
WS37128	510/1 to 510/PS31 Gravity Sewer	52.5
WS37131	500/6 to 500/5 Gravity Sewer	52.5
WS37132	500/5 to 500/5A Gravity Sewer	52.5
WS37133	500/4 to 500/3 Gravity Sewer	52.5
WS37134	500/3 to 500/PS32 Gravity Sewer	52.5
WS37135	500/1 to 500/PS32 Gravity Sewer	52.5
WS37163	16/3 to 16/2 Gravity Sewer	52.5
WS37164	16/2 to 16/1 Gravity Sewer	52.5
WS37166	15/2 to 15/1 Gravity Sewer	52.5
WS37240	221/2 to 221/1 Gravity Sewer	52.5
WS37241	221/3 to 221/2 Gravity Sewer	52.5
WS37246	218/2 to 218/1 Gravity Sewer	52.5
WS37247	220/1 to M5/12 Gravity Sewer	52.5
WS37249	219/1 to M5/12 Gravity Sewer	52.5
WS37250	219/2 to 219/1 Gravity Sewer	52.5
WS37251	219/3 to 219/2 Gravity Sewer	52.5
WS37253	216A/4 to 216A/3 Gravity Sewer	52.5
WS37255	212A/1 to 213/1 Gravity Sewer	52.5
WS37256	216B/2 to 216B/1 Gravity Sewer	52.5
WS37257	216C/1 to 216/4 Gravity Sewer	52.5
WS37258	216/5 to 216/4 Gravity Sewer	52.5
WS37284	300A/5 to 300A/4 Gravity Sewer	52.5
WS37291	22B/1 to 22/2 Gravity Sewer	52.5
WS37331	2000/2 to 2000/1 Gravity Sewer	52.5
WS37332	2000/4 to 2000/3 Gravity Sewer	52.5
WS37452	51/6 to 51/5 Gravity Sewer	52.5
WS36781	155/1 to M4/7 Gravity Sewer	50.625
WS36782	154/1 to M4/7 Gravity Sewer	50.625

WS36855	310/7 to 310/6 Gravity Sewer	50.625
WS36897	122/9 to 122/8 Gravity Sewer	50.625
WS36926	128/2 to 128/1 Gravity Sewer	50.625
WS36969	300A/7 to 300A/6 Gravity Sewer	50.625
WS37002	51A3/1 to 51A/2 Gravity Sewer	50.625
WS37115	2A/4 to 2A/3 Gravity Sewer	50.625
WS37147	25/1 to M1/27 Gravity Sewer	50.625
WS37149	20/2 to 20/1 Gravity Sewer	50.625
WS37154	19/3 to 19/2 Gravity Sewer	50.625
WS37160	17/3 to 17/2 Gravity Sewer	50.625
WS37173	18/4 to 18/3 Gravity Sewer	50.625
WS37174	18A/END to 18A/1 Gravity Sewer	50.625
WS37179	14C/END to 14C/1 Gravity Sewer	50.625
WS37210	7/4 to 7/3 Gravity Sewer	50.625
WS37211	7A/2 to 7A/1 Gravity Sewer	50.625
WS37216	9A1/END to 9A/1 Gravity Sewer	50.625
WS37223	11/4 to 11/3 Gravity Sewer	50.625
WS37228	12/1 to M1/14 Gravity Sewer	50.625
WS37231	10C/1 to 10/2 Gravity Sewer	50.625
WS37280	300B/3 to 300B/2 Gravity Sewer	50.625
WS37282	300A2/1 to 300A/2 Gravity Sewer	50.625
WS37283	300A3/1 to 300A/2 Gravity Sewer	50.625
WS37322	9A/2 to 9A/1 Gravity Sewer	50.625
WS37516	M5/2 to M5/1 Gravity Sewer	50
WS37517	M5/3 to M5/2 Gravity Sewer	50
WS35024	SPS21 Rising Main	49
WS36628	221/END to 221/4 Gravity Sewer	48
WS37484	126/5 to 126/4 Gravity Sewer	48
WS36510	MR3/END to MR3/PS53 Gravity Sewer	47.25
WS36536	TR3B/END to TR3/3JUNC Gravity Sewer	47.25
WS36557	22/3 to 22/2 Gravity Sewer	47.25
WS36561	111B/3 to 111B/2 Gravity Sewer	47.25
WS36565	111B/2 to 111B/1 Gravity Sewer	47.25
WS36576	300/3 to 300/2 Gravity Sewer	47.25
WS36587	301/2 to 301/2A Gravity Sewer	47.25
WS36731	122A/1 to 122/4 Gravity Sewer	47.25
WS36742	122/2 to 122/1 Gravity Sewer	47.25
WS36780	153/1 to M4/5 Gravity Sewer	47.25
WS36905	103B/2 to 103B/1 Gravity Sewer	47.25
WS36973	300A/3 to 300A/2 Gravity Sewer	47.25
WS36974	300A/2 to 300A/1 Gravity Sewer	47.25
WS36977	22/4 to 22/3 Gravity Sewer	47.25
WS37015	51A/2 to 51A/1 Gravity Sewer	47.25
WS37016	51A/1 to 51/1 Gravity Sewer	47.25

WS37113	2/3 to 2/2 Gravity Sewer	47.25
WS37119	3/5 to 3/4 Gravity Sewer	47.25
WS37120	2/5 to 2/4 Gravity Sewer	47.25
WS37139	3/4 to 3/3 Gravity Sewer	47.25
WS37158	18/1 to M1/23 Gravity Sewer	47.25
WS37185	14/6 to 14/5 Gravity Sewer	47.25
WS37186	14/4 to 14/3 Gravity Sewer	47.25
WS37589	IE8/END to IE7/PS58 Gravity Sewer	47.25
WS36777	170/4 to 170/3 Gravity Sewer	45.9375
WS36865	2200/1 to 2200/PS22 Gravity Sewer	45.9375
WS36866	2200/2 to 2200/1 Gravity Sewer	45.9375
WS36867	2200/3 to 2200/2 Gravity Sewer	45.9375
WS36868	2200/4 to 2200/3 Gravity Sewer	45.9375
WS36925	127/2 to 127/1 Gravity Sewer	45.9375
WS36931	125/4 to 125/3 Gravity Sewer	45.9375
WS36936	124A/1 to 124/1 Gravity Sewer	45.9375
WS37418	2200/5 to 2200/4 Gravity Sewer	45.9375
WS36520	TR5/END to TR5/PS43 Gravity Sewer	45
WS36539	TR2A/END to TR2/2JUNC Gravity Sewer	45
WS36623	300A/11 to 300A/10 Gravity Sewer	45
WS36630	221A/1 to 221/1 Gravity Sewer	45
WS36632	228C/1 to 228/2 Gravity Sewer	45
WS36634	228/4 to 228/3 Gravity Sewer	45
WS36637	227/1 to M5/10 Gravity Sewer	45
WS36641	217/2 to 217/1 Gravity Sewer	45
WS36644	224/2 to 224/1 Gravity Sewer	45
WS36649	219A/END to 219/4 Gravity Sewer	45
WS36650	219/6 to 219/5 Gravity Sewer	45
WS36659	216B/END to 216B/1 Gravity Sewer	45
WS36667	216D/1 to 216/5 Gravity Sewer	45
WS36674	215A/3 to 215A/2 Gravity Sewer	45
WS36675	215A1/2 to 215A1/1 Gravity Sewer	45
WS36697	212A/3 to 212A/2 Gravity Sewer	45
WS36698	213A/1 to 213/2 Gravity Sewer	45
WS36699	213Z/1 to 213/2 Gravity Sewer	45
WS36700	214/3 to 214/2 Gravity Sewer	45
WS36711	215B/2 to 215B/1 Gravity Sewer	45
WS36713	215C/2 to 215C/1 Gravity Sewer	45
WS36716	215E/2 to 215E/1 Gravity Sewer	45
WS36718	216E1/1 to 216E/1 Gravity Sewer	45
WS36738	215F/4 to 215F/3 Gravity Sewer	45
WS36744	122B/END to 122/2 Gravity Sewer	45
WS36944	124/6 to 124/5 Gravity Sewer	45
WS36962	300A6/1 to 300A/9 Gravity Sewer	45

WS36964	300A1/6 to 300A1/5 Gravity Sewer	45
WS36982	1002/3B to 1002/3A Gravity Sewer	45
WS36985	1002D/2 to 1002D/1 Gravity Sewer	45
WS36989	1001/END to 1001/5 Gravity Sewer	45
WS37014	51C/1 to 51/2 Gravity Sewer	45
WS37021	51A4/2 to 51A4/1 Gravity Sewer	45
WS37025	2000A/2 to 2000A/1 Gravity Sewer	45
WS37044	56A/2 to 56A/1 Gravity Sewer	45
WS37058	51A5/2 to 51A5/1 Gravity Sewer	45
WS37062	51A/7 to 51A/6 Gravity Sewer	45
WS37066	56E1/2 to 56E1/1 Gravity Sewer	45
WS37105	1E/2 to 1E/1 Gravity Sewer	45
WS37123	2D/5 to 2D/4 Gravity Sewer	45
WS37129	510/2 to 510/1 Gravity Sewer	45
WS37130	500/7 to 500/6 Gravity Sewer	45
WS37165	16/END to 16/3 Gravity Sewer	45
WS37167	15/3 to 15/2 Gravity Sewer	45
WS37243	228B/1 to 228/1 Gravity Sewer	45
WS37245	225/2 to 225/1 Gravity Sewer	45
WS37248	220/2 to 220/1 Gravity Sewer	45
WS37260	170/5 to 170/4 Gravity Sewer	45
WS37310	216F/1 to 216/9 Gravity Sewer	45
WS37330	2000B/1 to 2000/2 Gravity Sewer	45
WS37346	216E/6 to 216E/5 Gravity Sewer	45
WS37588	122B/3 to 122B/2 Gravity Sewer	45
WS37570	M1/13 to M1/12 Gravity Sewer	45
WS37041	1C/1 to 1/2 Gravity Sewer	43.75
WS37052	52C/1 to 52/2 Gravity Sewer	43.75
WS37088	59/1 to M2/13 Gravity Sewer	43.75
WS37104	1A/1 to 1/3 Gravity Sewer	43.75
WS37307	215F/2 to 215F/1 Gravity Sewer	43.75
WS37308	215F/1 to 215/PS16 Gravity Sewer	43.75
WS37328	1F/1 to 1/1 Gravity Sewer	43.75
WS37329	1F/2 to 1F/1 Gravity Sewer	43.75
WS37338	52A/1 to 52/1 Gravity Sewer	43.75
WS37339	52B/1 to 52/1 Gravity Sewer	43.75
WS37340	52B/2 to 52B/1 Gravity Sewer	43.75
WS37459	1000/2 to 1000/1 Gravity Sewer	43.75
WS36864	311/4 to 311/3 Gravity Sewer	42.1875
WS35016	SPS15 Rising Main	42
WS35022	SPS2 Rising Main	42
WS35014	SPS13 Rising Main	42
WS36657	216/4 to 216/3 Gravity Sewer	42
WS36662	216B/4 to 216B/3 Gravity Sewer	42

WS36668	216/6 to 216/5 Gravity Sewer	42
WS36705	215/2 to 215/1 Gravity Sewer	42
WS36707	215/4 to 215/3 Gravity Sewer	42
WS36709	215/6 to 215/5 Gravity Sewer	42
WS36719	216E/2 to 216E/1 Gravity Sewer	42
WS36899	103/6 to 103/5 Gravity Sewer	42
WS36912	103B/4 to 103B/3 Gravity Sewer	42
WS36963	300A/10 to 300A/9 Gravity Sewer	42
WS36983	1002/3A to 1002/3 Gravity Sewer	42
WS36984	1002/4 to 1002/3 Gravity Sewer	42
WS36987	1002/3 to 1002/2 Gravity Sewer	42
WS36996	1002/2 to 1002/1 Gravity Sewer	42
WS37026	2000/1 to 2000/PS20 Gravity Sewer	42
WS37060	51A5/1 to 51A/4 Gravity Sewer	42
WS37081	103/7 to 103/6 Gravity Sewer	42
WS37086	10/6 to 10/5 Gravity Sewer	42
WS37087	10/7 to 10/6 Gravity Sewer	42
WS37125	2D/1 to 3/5 Gravity Sewer	42
WS37126	2D/2 to 2D/1 Gravity Sewer	42
WS37169	14A/1 to 14/1 Gravity Sewer	42
WS37242	228/1 to M5/10 Gravity Sewer	42
WS37345	215D/1JUNC to 215/5 Gravity Sewer	42
WS37353	1002C/2 to 1002/3 Gravity Sewer	42
WS37586	122B/1 to 122/1 Gravity Sewer	42
WS37587	122B/2 to 122B/1 Gravity Sewer	42
WS37461	156/2 to OF12/2 Gravity Sewer	42
WS37456	51/2 to 51/1 Gravity Sewer	42
WS37454	51/4 to 51/3 Gravity Sewer	42
WS37422	2/1B to 2/1A Gravity Sewer	42
WS35041	SPS30 Rising Main	40.5
WS36563	111B3/END to 111B/3 Gravity Sewer	40.5
WS36568	111/PS3 to 111/OF3B Gravity Sewer	40.5
WS36588	301/END to 301/2 Gravity Sewer	40.5
WS36592	301/2AEND to 301/2A Gravity Sewer	40.5
WS36755	126B/1 to 126B-OF11 Gravity Sewer	40.5
WS36812	204C/1 to 204/4 Gravity Sewer	40.5
WS36975	300A/OF9 to 300A/OF9B Gravity Sewer	40.5
WS37111	8/2 to 8/1 Gravity Sewer	40.5
WS37204	6/1 to M1/5 Gravity Sewer	40.5
WS35057	SPS4 Rising Main	40
WS36690	211/1 to PS5/MH Gravity Sewer	40
WS37512	M5/5 to M5/4 Gravity Sewer	40
WS37515	M5/1 to PS5/MH Gravity Sewer	40
WS37579	M1/12 to M1/11 Gravity Sewer	40

WS36518	TR4/END to TR1/1JUNC Gravity Sewer	39.375
WS36527	TR9/13Junc to TR1/MH3 Gravity Sewer	39.375
WS36535	TR11/15Junc to TR9/13Junc Gravity Sewer	39.375
WS36538	TR7/11Junc to TR1/MH2 Gravity Sewer	39.375
WS36552	TR1/MH3 to TR6/4JUNC Gravity Sewer	39.375
WS36553	TR6/4JUNC to TR1/MH2 Gravity Sewer	39.375
WS36556	22/2 to 22/1 Gravity Sewer	39.375
WS36589	301/2A to 301/1 Gravity Sewer	39.375
WS36590	301/1 to 301/PS9 Gravity Sewer	39.375
WS36607	241A/2 to 241A/1 Gravity Sewer	39.375
WS36608	241A/1 to 241/2 Gravity Sewer	39.375
WS36610	241/2 to 241/1 Gravity Sewer	39.375
WS36612	242A/1 to 242/1 Gravity Sewer	39.375
WS36613	242A/2 to 242A/1 Gravity Sewer	39.375
WS36614	242A/3 to 242A/2 Gravity Sewer	39.375
WS36615	242A/4 to 242A/3 Gravity Sewer	39.375
WS36616	242A/5 to 242A/4 Gravity Sewer	39.375
WS36618	242A/6 to 242A/5 Gravity Sewer	39.375
WS36619	242A/7 to 242A/6 Gravity Sewer	39.375
WS36624	242/1 to PS7/MH Gravity Sewer	39.375
WS36625	241/1 to PS7/MH Gravity Sewer	39.375
WS36688	211/3 to 211/2 Gravity Sewer	39.375
WS36758	129/1 to 125/PS11 Gravity Sewer	39.375
WS36792	203/5 to 203/4 Gravity Sewer	39.375
WS36809	204/6 to 204/5 Gravity Sewer	39.375
WS36810	204/7 to 204/6 Gravity Sewer	39.375
WS36827	201C/3 to 201C/2 Gravity Sewer	39.375
WS36830	201D/1 to 201/1 Gravity Sewer	39.375
WS36831	201E/1 to 201/1 Gravity Sewer	39.375
WS36832	201C/2 to 201C/1 Gravity Sewer	39.375
WS36837	201/3 to 201/2 Gravity Sewer	39.375
WS36838	201/4 to 201/3 Gravity Sewer	39.375
WS36872	123A/1 to 123A/3 Gravity Sewer	39.375
WS36881	123C/3 to 123B/3 Gravity Sewer	39.375
WS36932	125/5 to 125/4 Gravity Sewer	39.375
WS36934	126C/1 to 126/4 Gravity Sewer	39.375
WS36937	124/1 to 128/1 Gravity Sewer	39.375
WS36949	400C/3 to 400C/2 Gravity Sewer	39.375
WS36950	400C/2 to 400C/1 Gravity Sewer	39.375
WS36957	400/2 to 400/1 Gravity Sewer	39.375
WS37003	305/3 to 305/2 Gravity Sewer	39.375
WS37005	305/2 to 305/1 Gravity Sewer	39.375
WS37008	PS10/MH to 305/PS10 Gravity Sewer	39.375
WS37010	51B/1 to 51/4 Gravity Sewer	39.375

WS37011	51B/2 to 51B/1 Gravity Sewer	39.375
WS37076	63/2 to 63/1 Gravity Sewer	39.375
WS37137	2B/2 to 2B/1 Gravity Sewer	39.375
WS37142	22/7 to 22/6 Gravity Sewer	39.375
WS37145	22/5 to 22/4 Gravity Sewer	39.375
WS37161	17/2 to 17/1 Gravity Sewer	39.375
WS37177	14B/4 to 14B/3 Gravity Sewer	39.375
WS37214	9/4 to 9/3 Gravity Sewer	39.375
WS37239	242/3 to 242/2 Gravity Sewer	39.375
WS37267	203C/1 to 203/2 Gravity Sewer	39.375
WS37287	111B1/1 to 111B/1 Gravity Sewer	39.375
WS37288	111B1/2 to 111B1/1 Gravity Sewer	39.375
WS37302	14B/3 to 14B/2 Gravity Sewer	39.375
WS37352	1002C/1 to 1002C/2 Gravity Sewer	39.375
WS37453	51/5 to 51/4 Gravity Sewer	39.375
WS37455	51/3 to 51/2 Gravity Sewer	39.375
WS36746	215H/3 to 215H/2 Gravity Sewer	37.5
WS35017	SPS16 Rising Main	36.75
WS35015	SPS14 Rising Main	36.75
WS35013	SPS12 Rising Main	36.75
WS35039	SPS3 Rising Main	36.75
WS35018	SPS17 Rising Main	36.75
WS35019	SPS18 Rising Main	36.75
WS36502	IE1/MH1 to IE1/PS56 Gravity Sewer	36.75
WS36503	IE2/END to IE2/1JUNC Gravity Sewer	36.75
WS36818	202B/2 to 202B/1 Gravity Sewer	36.75
WS36898	103B/1 to 103/1 Gravity Sewer	36.75
WS35026	SPS22 Rising Main S1	36
WS36524	TR13/END to TR13/PS47 Gravity Sewer	36
WS37590	MR4A/END to MR4/PS52 Gravity Sewer	36
WS36627	123/END to M5/16 Gravity Sewer	36
WS36636	228/2 to 228/1 Gravity Sewer	36
WS36671	216G/1 to 216/8 Gravity Sewer	36
WS36689	211/2 to 211/1 Gravity Sewer	36
WS36704	215D/2 to 215D/1 Gravity Sewer	36
WS36741	190/1 to 190/PS19 Gravity Sewer	36
WS36918	101/4 to 101/3 Gravity Sewer	36
WS37035	1Z/END to M2/3 Gravity Sewer	36
WS37486	126/3 to 126/2 Gravity Sewer	36
WS37487	126/2 to 126/1 Gravity Sewer	36
WS36665	216C/2 to 216C/1 Gravity Sewer	35
WS36677	215A1/1 to 215A/1 Gravity Sewer	35
WS36714	215/7 to 215/6 Gravity Sewer	35
WS36748	215G/1 to 215/PS16 Gravity Sewer	35

WS36888	121A/3 to 121D/2 Gravity Sewer	35
WS36890	121A/1 to 121D/1 Gravity Sewer	35
WS37049	52/2 to 52/1 Gravity Sewer	35
WS37401	BLR/03 to BLR/02 Gravity Sewer	35
WS37402	BLR/03 to PS68 Gravity Sewer	35
WS37503	M5/10 to M5/9 Gravity Sewer	35
WS37502	M5/11 to M5/10 Gravity Sewer	35
WS37500	M5/13 to M5/12 Gravity Sewer	35
WS37518	M5/4 to M5/3 Gravity Sewer	35
WS36532	TR12/END to TR11/15Junc Gravity Sewer	33.75
WS36533	TR10B/END to TR10/14Junc Gravity Sewer	33.75
WS36537	TR7A/END to TR7/11Junc Gravity Sewer	33.75
WS36566	111B1/END to 111B1/2 Gravity Sewer	33.75
WS36586	23/END to 23/3 Gravity Sewer	33.75
WS36593	241H/1 to 241/6 Gravity Sewer	33.75
WS36594	241/7 to 241/6 Gravity Sewer	33.75
WS36603	241C/1 to 241/3 Gravity Sewer	33.75
WS36604	241B/1 to 241/3 Gravity Sewer	33.75
WS36606	241A/3 to 241A/2 Gravity Sewer	33.75
WS36617	242/5 to 242/4 Gravity Sewer	33.75
WS36728	122A/2 to 122A/1JUNC Gravity Sewer	33.75
WS36730	122A/END to 122A/1JUNC Gravity Sewer	33.75
WS36791	203/6 to 203/5 Gravity Sewer	33.75
WS36795	203C/OF15 to 203C/0F15B Gravity Sewer	33.75
WS36803	204B/1 to 204/1 Gravity Sewer	33.75
WS36804	204A/END to 204/1 Gravity Sewer	33.75
WS36829	201D/2 to 201D/1 Gravity Sewer	33.75
WS36848	204A/2 to 204A/1 Gravity Sewer	33.75
WS36879	123B/2 to 123B/3 Gravity Sewer	33.75
WS36885	124A/4 to 124A/3 Gravity Sewer	33.75
WS36933	125A/1 to 125/2 Gravity Sewer	33.75
WS36951	400/4 to 400/3 Gravity Sewer	33.75
WS36959	300A5/1 to 300A/8 Gravity Sewer	33.75
WS36970	300A4/END to 300A/5 Gravity Sewer	33.75
WS36995	1002A/1 to 1002/1 Gravity Sewer	33.75
WS37004	305/END to 305/3 Gravity Sewer	33.75
WS37006	305A/1 to 305/1 Gravity Sewer	33.75
WS37009	51D/1 to 51/5 Gravity Sewer	33.75
WS37012	51B/END to 51B/2 Gravity Sewer	33.75
WS37017	51A1/END to 51A/1 Gravity Sewer	33.75
WS37018	51A2/END to 51A/1 Gravity Sewer	33.75
WS37073	56D/4 to 56D/3 Gravity Sewer	33.75
WS37075	63A/1 to 63/1 Gravity Sewer	33.75
WS37079	63/3 to 63/2 Gravity Sewer	33.75

WS37117	3A/5 to 3/5 Gravity Sewer	33.75
WS37141	2C/END to 2C/1 Gravity Sewer	33.75
WS37143	22/8 to 22/7 Gravity Sewer	33.75
WS37150	20A/END to 20/1 Gravity Sewer	33.75
WS37175	18A1/END to 18A/1 Gravity Sewer	33.75
WS37178	14B/END to 14B/4 Gravity Sewer	33.75
WS37218	9/END to 9/5 Gravity Sewer	33.75
WS37232	10B/3 to 10B/2 Gravity Sewer	33.75
WS37264	203A/1 to 203/1 Gravity Sewer	33.75
WS37268	203D/1 to 203/2 Gravity Sewer	33.75
WS37269	201E/2 to 201E/1 Gravity Sewer	33.75
WS37272	129A/1 to 129/1 Gravity Sewer	33.75
WS37309	2200/6 to 2200/5 Gravity Sewer	33.75
WS37342	400A/1 to 400C/1 Gravity Sewer	33.75
WS37348	203B/1 to 203/1 Gravity Sewer	33.75
WS37420	2B/END to 2/5 Gravity Sewer	33.75
WS37583	PS1/MH to PS/1 Gravity Sewer	33.75
WS36687	211/4 to 211/3 Gravity Sewer	32.8125
WS36737	121/1 to PS4/MH Gravity Sewer	32.8125
WS36739	215F/3 to 215F/2 Gravity Sewer	32.8125
WS36740	215H/1 to 215/PS16 Gravity Sewer	32.8125
WS36745	215H/2 to 215H/1 Gravity Sewer	32.8125
WS36764	171/4 to 171/3 Gravity Sewer	32.8125
WS36765	171/3 to 171/2 Gravity Sewer	32.8125
WS36766	171/2 to 171/1 Gravity Sewer	32.8125
WS36768	171A/1 to 171/1 Gravity Sewer	32.8125
WS36779	OF12/MH1 to OF12/MH2 Gravity Sewer	32.8125
WS36854	310/6 to 310/5 Gravity Sewer	32.8125
WS36858	310/2 to 310/1 Gravity Sewer	32.8125
WS36927	127/1 to 125/2 Gravity Sewer	32.8125
WS36928	128/1 to 125/3 Gravity Sewer	32.8125
WS36929	125/3 to 125/2 Gravity Sewer	32.8125
WS36940	124/2 to 124/1 Gravity Sewer	32.8125
WS36941	124/3 to 124/2 Gravity Sewer	32.8125
WS36942	124/4 to 124/3 Gravity Sewer	32.8125
WS36943	124/5 to 124/4 Gravity Sewer	32.8125
WS37007	305/1 to PS10/MH Gravity Sewer	32.8125
WS37031	52/6 to 52/5 Gravity Sewer	32.8125
WS37033	52/5 to 52/4 Gravity Sewer	32.8125
WS37037	1A/2 to 1A/1 Gravity Sewer	32.8125
WS37038	1C/2 to 1C/1 Gravity Sewer	32.8125
WS37042	58/1 to M2/10 Gravity Sewer	32.8125
WS37074	61/1 to M2/15 Gravity Sewer	32.8125
WS37077	63/1 to M2/17 Gravity Sewer	32.8125

WS37091	1B1/1 to 1B/1 Gravity Sewer	32.8125
WS37092	1B1/2 to 1B1/1 Gravity Sewer	32.8125
WS37094	1B3/4 to 1B3/3 Gravity Sewer	32.8125
WS37095	1B3/2 to 1B3/1 Gravity Sewer	32.8125
WS37096	1B3/3 to 1B3/2 Gravity Sewer	32.8125
WS37098	1B/1 to 1B3/PS17 Gravity Sewer	32.8125
WS37099	1B/2 to 1B/1 Gravity Sewer	32.8125
WS37101	1B4/1 to 1B3/2 Gravity Sewer	32.8125
WS37273	129/2 to 129/1 Gravity Sewer	32.8125
WS37274	129/3 to 129/2 Gravity Sewer	32.8125
WS37333	56D/2 to 56D/1 Gravity Sewer	32.8125
WS37336	56D/3 to 56D/2 Gravity Sewer	32.8125
WS37354	52/3 to 52/2 Gravity Sewer	32.8125
WS37460	1000/1 to 1000/PS21 Gravity Sewer	32.8125
WS37507	M5/7 to M5/6 Gravity Sewer	32
WS37514	PS5/MH to M5/PS5 Gravity Sewer	32
WS37526	M2/3 to M2/2 Gravity Sewer	32
WS37528	M2/2 to M2/1 Gravity Sewer	32
WS37529	M2/1 to PS1/MH Gravity Sewer	32
WS35002	SPS Showgrounds Rising Main	31.5
WS35043	SPS32 Rising Main	31.5
WS35069	SPS46 Rising Main	31.5
WS35008	SPS100 DiBellas RM	31.5
WS36511	243E/END to 243/3JUNC Gravity Sewer	31.5
WS36523	TR8/12Junc to TR7/11Junc Gravity Sewer	31.5
WS36529	TR3/3JUNC to TR1/MH1 Gravity Sewer	31.5
WS36540	243/4JUNC - SPS SHOWGROUND Gravity Sewer	31.5
WS36595	241/6 to 241/5 Gravity Sewer	31.5
WS36601	241/4 to 241/3 Gravity Sewer	31.5
WS36609	241/3 to 241/2 Gravity Sewer	31.5
WS36611	242/2 to 242/1 Gravity Sewer	31.5
WS36621	242A/8 to 242A/7 Gravity Sewer	31.5
WS36622	242A/9 to 242A/8 Gravity Sewer	31.5
WS36771	170/1 to 171/PS12 Gravity Sewer	31.5
WS36794	203/4 to 203/3 Gravity Sewer	31.5
WS36796	203/3 to 203/2 Gravity Sewer	31.5
WS36799	203/2 to 203/1 Gravity Sewer	31.5
WS36801	203/1 to 203/PS15 Gravity Sewer	31.5
WS36802	204/1 to 203/PS15 Gravity Sewer	31.5
WS36805	204/2 to 204/1 Gravity Sewer	31.5
WS36807	204/4 to 204/3 Gravity Sewer	31.5
WS36811	204/8 to 204/7 Gravity Sewer	31.5
WS36833	201/1 to 201/PS14 Gravity Sewer	31.5
WS36834	201C/1 to 201/PS14 Gravity Sewer	31.5

WS36836	201/2 to 201/1 Gravity Sewer	31.5
WS36839	201F/1 to 201/3 Gravity Sewer	31.5
WS36849	204A/1 to 204/3 Gravity Sewer	31.5
WS36860	PS8/MH to 310/PS8 Gravity Sewer	31.5
WS36900	103/5 to 103/4 Gravity Sewer	31.5
WS36903	103/4 to 103/3 Gravity Sewer	31.5
WS36972	300A/4 to 300A/3 Gravity Sewer	31.5
WS37110	8/1 to M1/7 Gravity Sewer	31.5
WS37156	20/1 to 19/1 Gravity Sewer	31.5
WS37221	11/2 to 11/1 Gravity Sewer	31.5
WS37417	500/5A to 500/4 Gravity Sewer	31.5
WS37494	160/4 to 160/3 Gravity Sewer	31.5
WS37423	2/1A to M1/2 Gravity Sewer	31.5
WS37421	2/2 to 2/1B Gravity Sewer	31.5
WS35056	SPS4 Bypass RM	31.25
WS35000	PS8 Rising Main	30
WS36500	2/1C to 2/1B Gravity Sewer	30
WS36639	218/END to 218/2 Gravity Sewer	30
WS36648	219B/END to 219/4 Gravity Sewer	30
WS36654	216A1/END to 216A/4 Gravity Sewer	30
WS36660	216B1/END to 216B/3 Gravity Sewer	30
WS36695	212/END to 212/4 Gravity Sewer	30
WS36721	216E2/1 to 216E/3 Gravity Sewer	30
WS36923	127/END to 127/3 Gravity Sewer	30
WS37022	2000/5 to 2000/4 Gravity Sewer	30
WS37027	52B1/END to 52B/2 Gravity Sewer	30
WS37029	60/END to 60/3 Gravity Sewer	30
WS37057	56B/END to 56B/2 Gravity Sewer	30
WS37061	51A6/END to 51A5/1 Gravity Sewer	30
WS37063	56E/END to 56E/2 Gravity Sewer	30
WS37146	22B/2 to 22B/1 Gravity Sewer	30
WS37311	219C/END to 219/5 Gravity Sewer	30
WS37499	M5/14 to M5/13 Gravity Sewer	30
WS37485	126/4 to 126/3 Gravity Sewer	30
WS37498	M5/15 to M5/14 Gravity Sewer	30
WS37565	M1/2 to M1/1 Gravity Sewer	30
WS37566	M1/1 to PS1/MH Gravity Sewer	30
WS37567	M1/3 to M1/2 Gravity Sewer	30
WS36680	211/7 to 211/6 Gravity Sewer	28.125
WS36683	211B/END to 211/5 Gravity Sewer	28.125
WS36686	211A/END to 211/4 Gravity Sewer	28.125
WS36757	126A/1 to 126/1 Gravity Sewer	28.125
WS36767	171B/1 to 171/1 Gravity Sewer	28.125
WS36772	170B/1 to 170/1 Gravity Sewer	28.125

WS36773	170A/1 to 170/1 Gravity Sewer	28.125
WS36775	170C/1 to 170/2 Gravity Sewer	28.125
WS37019	52A1/END to 52A/1 Gravity Sewer	28.125
WS37020	52A/END to 52A/1 Gravity Sewer	28.125
WS37028	52B2/END to 52B/2 Gravity Sewer	28.125
WS37030	52/7 to 52/6 Gravity Sewer	28.125
WS37034	52E/END to 52/3 Gravity Sewer	28.125
WS37036	1F/3 to 1F/2 Gravity Sewer	28.125
WS37039	1C/3 to 1C/2 Gravity Sewer	28.125
WS37040	1A/3 to 1A/2 Gravity Sewer	28.125
WS37043	58/2 to 58/1 Gravity Sewer	28.125
WS37047	52D1/END to 52D/1 Gravity Sewer	28.125
WS37050	52D/2 to 52D/1 Gravity Sewer	28.125
WS37051	52C1/END to 52C/1 Gravity Sewer	28.125
WS37072	56D1/END to 56D/1 Gravity Sewer	28.125
WS37078	62/END to M2/16 Gravity Sewer	28.125
WS37080	64/1 to M2/20 Gravity Sewer	28.125
WS37089	1B2/1 to 1B1/2 Gravity Sewer	28.125
WS37090	1B1/3 to 1B1/2 Gravity Sewer	28.125
WS37093	1B3/5 to 1B3/4 Gravity Sewer	28.125
WS37100	1B/3 to 1B/2 Gravity Sewer	28.125
WS37275	129/4 to 129/3 Gravity Sewer	28.125
WS37278	124Z/3 to 124Z/2 Gravity Sewer	28.125
WS37279	124Z/END to 124Z/1 Gravity Sewer	28.125
WS37334	56D2/1 to 56D/1 Gravity Sewer	28.125
WS37335	61/2 to 61/1 Gravity Sewer	28.125
WS37337	52C/2 to 52C/1 Gravity Sewer	28.125
WS37341	59/2 to 59/1 Gravity Sewer	28.125
WS37383	201H/2 to 201H/1 Gravity Sewer	28.125
WS37385	201G/1 to PS72 Gravity Sewer	28.125
WS37574	M1/15 to M1/14 Gravity Sewer	28.125
WS36516	172/4 to 172/3 Gravity Sewer	28
WS36626	PS7/MH to 241/PS7 Gravity Sewer	28
WS36720	216E/3 to 216E/2 Gravity Sewer	28
WS36906	103B/3 to 103B/2 Gravity Sewer	28
WS36960	400/1 to 300A/8 Gravity Sewer	28
WS36961	300A/9 to 400/1 Gravity Sewer	28
WS37168	14A/2 to 14A/1 Gravity Sewer	28
WS37344	215D/1 to 215D/1JUNC Gravity Sewer	28
WS37521	60/4 to 60/3 Gravity Sewer	28
WS37545	60/3 to 60/2 Gravity Sewer	28
WS37546	60/2 to 60/1 Gravity Sewer	28
WS35036	SPS28 Rising Main S1	27
WS35011	WETLANDS RISING MAIN 3	27

WS36545	243D/END to 243/2JUNC Gravity Sewer	27
WS36546	243B/END to 243/1JUNC Gravity Sewer	27
WS36548	243C/END to 243/4JUNC Gravity Sewer	27
WS36826	201C/3 to 201C/OF14B Gravity Sewer	27
WS36851	310A/OF8 to 310A/OF8B Gravity Sewer	27
WS37449	111/PS3B to PS3/MH Gravity Sewer	27
WS37430	1/2 to 1/1 Gravity Sewer	27
WS35083	SPS55 Rising Main S1	26.25
WS35081	SPS53 Rising Main S2	26.25
WS35082	SPS54 Rising Main	26.25
WS35079	SPS52 Rising Main S2	26.25
WS36514	67/END to 52/5 Gravity Sewer	26.25
WS36517	TR3A/END to TR3/3JUNC Gravity Sewer	26.25
WS36522	TR8A/END to TR8/12Junc Gravity Sewer	26.25
WS36526	TR10/14Junc to TR9/13Junc Gravity Sewer	26.25
WS36543	BLR/07 to BLR/08 Gravity Sewer	26.25
WS36579	111A/2 to 111A/1 Gravity Sewer	26.25
WS36581	111A/3 to 111A/2 Gravity Sewer	26.25
WS36756	126B/1 to 126/3 Gravity Sewer	26.25
WS36760	215G/2 to 215G/1 Gravity Sewer	26.25
WS36761	215G/3 to 215G/2 Gravity Sewer	26.25
WS36770	171/1 to 171/PS12 Gravity Sewer	26.25
WS36774	170/2 to 170/1 Gravity Sewer	26.25
WS36778	170/3 to 170/2 Gravity Sewer	26.25
WS36784	158/4 to 158/3 Gravity Sewer	26.25
WS36786	159/1 to 158/1 Gravity Sewer	26.25
WS36787	158/3 to 158/2 Gravity Sewer	26.25
WS36788	158/1 to 160/1 Gravity Sewer	26.25
WS36789	164/1 to 160/2 Gravity Sewer	26.25
WS36798	201A/2 to 201A/1 Gravity Sewer	26.25
WS36808	204/5 to 204/4 Gravity Sewer	26.25
WS36816	202/3 to 202/2 Gravity Sewer	26.25
WS36817	202B/1 to 202/3 Gravity Sewer	26.25
WS36821	202/4 to 202/3 Gravity Sewer	26.25
WS36825	201B/4 to 201B/3 Gravity Sewer	26.25
WS36840	201F/2 to 201F/1 Gravity Sewer	26.25
WS36843	163/2 to 163/1 Gravity Sewer	26.25
WS36844	163/1 to 160/1 Gravity Sewer	26.25
WS36846	162/2 to 162/1 Gravity Sewer	26.25
WS36884	124A/3 to 124A/2 Gravity Sewer	26.25
WS36902	103/2 to 103/1 Gravity Sewer	26.25
WS36904	103/3 to 103/2 Gravity Sewer	26.25
WS36910	102/1 to PS2/MH Gravity Sewer	26.25
WS36913	103B/5 to 103B/4 Gravity Sewer	26.25

WS36916	101/1 to PS2/MH Gravity Sewer	26.25
WS36917	101/3 to 101/2 Gravity Sewer	26.25
WS36930	125/2 to 125/1 Gravity Sewer	26.25
WS36939	124Z/1 to 124/2 Gravity Sewer	26.25
WS36958	400C/1 to 400/PS34 Gravity Sewer	26.25
WS37013	52/1 to 51/PS18 Gravity Sewer	26.25
WS37032	52/4 to 52/3 Gravity Sewer	26.25
WS37048	52D/1 to 52/2 Gravity Sewer	26.25
WS37071	56D/1 to 56/4 Gravity Sewer	26.25
WS37097	1B3/1 to 1B3/PS17 Gravity Sewer	26.25
WS37191	10/5 to 10/4 Gravity Sewer	26.25
WS37261	162A/1 to 162/1 Gravity Sewer	26.25
WS37263	201B/3 to 201B/2 Gravity Sewer	26.25
WS37265	158/2 to 158/1 Gravity Sewer	26.25
WS37270	202/5 to 202/4 Gravity Sewer	26.25
WS37378	62/1 to M2/11A Gravity Sewer	26.25
WS37382	218B-END to M5/7 Gravity Sewer	26.25
WS37384	201H/1 to PS72 Gravity Sewer	26.25
WS37389	BLR/12 to PS71 Gravity Sewer	26.25
WS37390	BLR/11 to PS71 Gravity Sewer	26.25
WS37391	BLR/10 to BLR/11 Gravity Sewer	26.25
WS37392	BLR/09 to BLR/10 Gravity Sewer	26.25
WS37393	BLR/08 to BLR/09 Gravity Sewer	26.25
WS37396	BLR/04 to BLR/05 Gravity Sewer	26.25
WS37397	BLR/05 to PS70 Gravity Sewer	26.25
WS37399	BLR/01 to PS69 Gravity Sewer	26.25
WS37400	BLR/02 to BLR/01 Gravity Sewer	26.25
WS37495	M5/18 to M5/17 Gravity Sewer	26.25
WS37496	M5/17 to M5/16 Gravity Sewer	26.25
WS37504	226/1 to M5/9 Gravity Sewer	26.25
WS37510	216/2 to 216/1 Gravity Sewer	26.25
WS37511	216/1 to M5/5 Gravity Sewer	26.25
WS37509	216/3 to 216/2 Gravity Sewer	26.25
WS37492	160/2 to 160/1 Gravity Sewer	26.25
WS37491	160/3 to 160/2 Gravity Sewer	26.25
WS37480	202A/2 to 202A/1 Gravity Sewer	26.25
WS37481	202A/1 to 202/1 Gravity Sewer	26.25
WS37478	201B2/2 to 201B2/1 Gravity Sewer	26.25
WS37493	160/1 to 162/PS13 Gravity Sewer	26.25
WS37457	51/1 to 51/PS18 Gravity Sewer	26.25
WS37429	1/3 to 1/2 Gravity Sewer	26.25
WS37428	1/4 to 1/3 Gravity Sewer	26.25
WS37427	1/5 to 1/4 Gravity Sewer	26.25
WS37497	M5/16 to M5/15 Gravity Sewer	26.25

WS37479	201B2/1 to 201B/2 Gravity Sewer	26.25
WS37476	201B/1 to PS6/MH Gravity Sewer	26.25
WS37533	M2/11A to M2/11 Gravity Sewer	26.25
WS37554	M1/6 to M1/5 Gravity Sewer	25
WS37561	M1/23 to M1/22 Gravity Sewer	25
WS37563	M1/19 to M1/18 Gravity Sewer	25
WS37564	M1/18 to M1/17 Gravity Sewer	25
WS37575	M1/27 to M1/26 Gravity Sewer	25
WS37577	M1/22 to M1/21 Gravity Sewer	25
WS37578	M1/21 to M1/20 Gravity Sewer	25
WS37580	M1/11 to M1/10 Gravity Sewer	25
WS37581	M1/10 to M1/9 Gravity Sewer	25
WS35021	SPS19 Rising Main	24.5
WS35023	SPS20 Rising Main	24.5
WS35020	SPS18 Rising Main Bypass	24.5
WS35003	SPS1 Rising Main	24.5
WS36512	243/1JUNC to 243/4JUNC Gravity Sewer	24.5
WS36513	243/2JUNC to 234/1JUNC Gravity Sewer	24.5
WS35033	SPS26 Rising Main S2	24
WS35040	SPS3 Rising Main	24
WS35027	SPS22 Rising Main S2	24
WS35009	WETLANDS RISING MAIN 2	24
WS36620	241/OF7 to 241/OF7B Gravity Sewer	24
WS36907	103B/6 to 103B/5 Gravity Sewer	24
WS37343	215D/3 to 215D/1JUNC Gravity Sewer	24
WS37505	M5/9 to M5/8 Gravity Sewer	24
WS37506	M5/8 to M5/7 Gravity Sewer	24
WS37508	M5/6 to M5/5 Gravity Sewer	24
WS37474	M3/2 to M3/1 Gravity Sewer	24
WS37501	M5/12 to M5/11 Gravity Sewer	24
WS36562	111B/4 to 111B/3 Gravity Sewer	23.625
WS37447	111/1 to PS3/MH Gravity Sewer	23.625
WS37446	111/2 to 111/1 Gravity Sewer	23.625
WS37436	111/11 to 111/10 Gravity Sewer	23.625
WS37437	111/10 to 111/9A Gravity Sewer	23.625
WS37438	111/9A to 111/9 Gravity Sewer	23.625
WS37439	111/9 to 111/8 Gravity Sewer	23.625
WS37440	111/8 to 111/7 Gravity Sewer	23.625
WS37441	111/7 to 111/6 Gravity Sewer	23.625
WS37442	111/6 to 111/5 Gravity Sewer	23.625
WS35044	SPS33 Rising Main	22.5
WS36515	88/END to 67/END Gravity Sewer	22.5
WS36521	TR8B/END to TR8/12Junc Gravity Sewer	22.5
WS36530	TR20/END to TR20/PS42 Gravity Sewer	22.5

WS36534	TR10A/END to TR10/14Junc Gravity Sewer	22.5
WS36541	300C3/END to 400C/3 Gravity Sewer	22.5
WS36542	BLR/06 to BLR/07 Gravity Sewer	22.5
WS36580	111A1/1 to 111A/3 Gravity Sewer	22.5
WS36584	111A/6 to 111A/5 Gravity Sewer	22.5
WS36599	241E/1 to 241/4 Gravity Sewer	22.5
WS36605	241B/END to 241B/1 Gravity Sewer	22.5
WS36747	215G1/1 to 215G/1 Gravity Sewer	22.5
WS36762	215G/4 to 215G/3 Gravity Sewer	22.5
WS36763	215G/OF16 to OF/16 Gravity Sewer	22.5
WS36785	159/2 to 159/1 Gravity Sewer	22.5
WS36793	203E/1 to 203/4 Gravity Sewer	22.5
WS36813	202A1/1 to 202A/1 Gravity Sewer	22.5
WS36822	202/6 to 202/5 Gravity Sewer	22.5
WS36823	201B/5 to 201B/4 Gravity Sewer	22.5
WS36824	201B1/1 to 201B/3 Gravity Sewer	22.5
WS36828	201C/END to 201C/3 Gravity Sewer	22.5
WS36835	201CI/END to 201C/1 Gravity Sewer	22.5
WS36845	162A/2 to 162A/1 Gravity Sewer	22.5
WS36847	201/END to 201/4 Gravity Sewer	22.5
WS37238	242/4 to 242/3 Gravity Sewer	22.5
WS37271	202B/3 to 202B/2 Gravity Sewer	22.5
WS37380	62/4 to 62/1 Gravity Sewer	22.5
WS37381	62/2 to 62/1 Gravity Sewer	22.5
WS37388	BLR/13 to BLR/12 Gravity Sewer	22.5
WS37394	BLR1/END to PS70 Gravity Sewer	22.5
WS37395	BLR2/END to BLR/04 Gravity Sewer	22.5
WS37416	500-1END to 500/5A Gravity Sewer	22.5
WS37419	124Z1/END to 124/3 Gravity Sewer	22.5
WS37458	51/3 to 51/OF18 Gravity Sewer	22.5
WS37571	M1/14 to M1/13 Gravity Sewer	22.5
WS37573	M1/16 to M1/15 Gravity Sewer	22.5
WS35001	SPS Dog Pound Rising Main	21.875
WS36682	211/6 to 211/5 Gravity Sewer	21.875
WS36749	129E/1 to 129/2 Gravity Sewer	21.875
WS36750	129C/1 to 129/2 Gravity Sewer	21.875
WS36769	171A/1 to OF12/MH1 Gravity Sewer	21.875
WS36797	201A/2 to 201A/OF6 Gravity Sewer	21.875
WS36938	124Z/2 to 124Z/1 Gravity Sewer	21.875
WS37102	1B4/2 to 1B4/1 Gravity Sewer	21.875
WS37543	M2/9 to M2/8 Gravity Sewer	21.875
WS37544	M2/8 to M2/7 Gravity Sewer	21.875
WS35035	SPS27 Rising Main S2	21
WS35037	SPS28 Rising Main S2	21

WS35042	SPS31 Rising Main	21
WS35072	SPS48 Rising Main S2	21
WS35074	SPS49 Rising Main S2	21
WS35061	SPS41 Rising Main S2	21
WS36547	243/3JUNC to 243/2JUNC Gravity Sewer	21
WS36550	TR1/1JUNC to TR1/MH1 Gravity Sewer	21
WS36551	TR6A/7JUNC to TR6/4JUNC Gravity Sewer	21
WS36806	204/3 to 204/2 Gravity Sewer	21
WS36814	202/2 to 202/1 Gravity Sewer	21
WS36952	400/3 to 400/2 Gravity Sewer	21
WS37082	103/8 to 103/7 Gravity Sewer	21
WS37262	162/1 to 162/PS13 Gravity Sewer	21
WS37349	172/3 to 172/2 Gravity Sewer	21
WS37488	126/1 to 125/1 Gravity Sewer	21
WS37489	125/1 to 125/PS11 Gravity Sewer	21
WS37482	202/1 to PS6/MH Gravity Sewer	21
WS37490	160/5 to 160/4 Gravity Sewer	21
WS37477	201B/2 to 201B/1 Gravity Sewer	21
WS37426	1/6 to 1/5 Gravity Sewer	21
WS36519	TR15A/END to TR15/PS48 Gravity Sewer	20.25
WS36531	TR15/END to TR15/PS48 Gravity Sewer	20.25
WS37475	M3/1 to M4/1 Gravity Sewer	20
WS37519	M4/1 to PS4/MH Gravity Sewer	20
WS37520	PS4/MH to M4/PS4 Gravity Sewer	20
WS37527	M2/4 to M2/3 Gravity Sewer	20
WS37539	M2/20 to M2/19 Gravity Sewer	20
WS37542	M2/21 to M2/20 Gravity Sewer	20
WS37553	M1/28 to M1/27 Gravity Sewer	20
WS37555	M1/9 to M1/8 Gravity Sewer	20
WS37557	M1/7 to M1/6 Gravity Sewer	20
WS37568	M1/4 to M1/3 Gravity Sewer	20
WS37569	M1/4A to M1/4 Gravity Sewer	20
WS37572	M1/17 to M1/16 Gravity Sewer	20
WS37576	M1/30 to M1/28 Gravity Sewer	20
WS36681	211D/END to 211/6 Gravity Sewer	18.75
WS36684	211C/1 to 211/5 Gravity Sewer	18.75
WS36751	129F/END to 129/3 Gravity Sewer	18.75
WS36752	129E/END to 129E/1 Gravity Sewer	18.75
WS36753	129D/END to 129C/1 Gravity Sewer	18.75
WS36754	129B/END to 129/1 Gravity Sewer	18.75
WS36776	170D/END to 170/2 Gravity Sewer	18.75
WS37276	129C/END to 129C/1 Gravity Sewer	18.75
WS37513	226/OF5 to 226/OF5B Gravity Sewer	18.75
WS35034	SPS27 Rising Main S1	18

WS35032	SPS26 Rising Main S1	18
WS35038	SPS29 Rising Main	18
WS35031	SPS25 Rising Main	18
WS35049	SPS36 Rising Main S2	18
WS35064	SPS44 BypassRM/SPS22	18
WS35047	SPS35 Rising Main S2	18
WS35029	SPS23 Rising Main S2	18
WS36525	TR14/END to TR14/PS46 Gravity Sewer	18
WS36544	243A/END to 243/3JUNC Gravity Sewer	18
WS36549	TR1/MH1 to TR1/PS44 Gravity Sewer	18
WS36600	241/5 to 241/4 Gravity Sewer	18
WS36631	242A/10 to 242A/9 Gravity Sewer	18
WS36759	215D/4 to 215D/1 Gravity Sewer	18
WS37083	103/END to 103/8 Gravity Sewer	18
WS37448	PS3/MH to 111/PS3 Gravity Sewer	18
WS35078	SPS52 Rising Main S1	17.5
WS35084	SPS55 Rising Main S2	17.5
WS35080	SPS53 Rising Main S1	17.5
WS35045	SPS34 Rising Main	17.5
WS36685	211/5 to 211/4 Gravity Sewer	17.5
WS36841	162/OF13 to 201F/2 Gravity Sewer	17.5
WS37103	1B4/OF17 to 1/6 Gravity Sewer	17.5
WS37350	172/2 to 172/1 Gravity Sewer	17.5
WS37351	172/1 to 171/2 Gravity Sewer	17.5
WS37522	60/1 to M2/6 Gravity Sewer	17.5
WS37523	M2/7 to M2/6 Gravity Sewer	17.5
WS37524	M2/6 to M2/5 Gravity Sewer	17.5
WS37525	M2/5 to M2/4 Gravity Sewer	17.5
WS37530	M2/10 to M2/9 Gravity Sewer	17.5
WS37531	M2/11 to M2/10 Gravity Sewer	17.5
WS37532	M2/12 to M2/11A Gravity Sewer	17.5
WS37535	M2/14 to M2/13 Gravity Sewer	17.5
WS37536	M2/18 to M2/17 Gravity Sewer	17.5
WS37537	M2/17 to M2/16 Gravity Sewer	17.5
WS37538	M2/19 to M2/18 Gravity Sewer	17.5
WS36596	241F/1 to 241/5 Gravity Sewer	16.875
WS36597	241G/1 to 241/5 Gravity Sewer	16.875
WS36602	241D/1 to 241/4 Gravity Sewer	16.875
WS35055	SPS39 Rising Main S2	16
WS35059	SPS40 Rising Main S2	16
WS35065	SPS44 Rising Main	16
WS37556	M1/8 to M1/7 Gravity Sewer	16
WS37558	M1/5 to M1/4A Gravity Sewer	16
WS37559	M1/26 to M1/25 Gravity Sewer	16

WS37560	M1/25 to M1/24 Gravity Sewer	16
WS37562	M1/20 to M1/19 Gravity Sewer	16
WS37582	M1/24 to M1/23 Gravity Sewer	16
WS35070	SPS47 Rising Main	15.75
WS36998	51A/5 to 51A/4 Gravity Sewer	15.75
WS37069	56/6 to 56/5 Gravity Sewer	15.75
WS37445	111/3 to 111/2 Gravity Sewer	15.75
WS37444	111/4 to 111/3 Gravity Sewer	15.75
WS37443	111/5 to 111/4 Gravity Sewer	15.75
WS37547	M1/31 to M1/30 Gravity Sewer	15.625
WS37550	M1/34 to M1/33 Gravity Sewer	15.625
WS36783	158/END to 158/4 Gravity Sewer	15
WS36790	164A/1 to 164/1 Gravity Sewer	15
WS36815	201A2/END to PS6/MH Gravity Sewer	15
WS36819	165/END to 160/4 Gravity Sewer	15
WS36820	164/END to 164/1 Gravity Sewer	15
WS36842	163/END to 163/2 Gravity Sewer	15
WS36901	103/OF2 to 103/2 Gravity Sewer	15
WS36908	103/1 to PS2/MH Gravity Sewer	15
WS36914	102/3 to 102/2 Gravity Sewer	15
WS37084	10E/1 to 10/7 Gravity Sewer	15
WS37085	10/END to 10/7 Gravity Sewer	15
WS37266	201A/OF6 to 201A/OF6B Gravity Sewer	15
WS37379	62/3 to 62/1 Gravity Sewer	15
WS37398	BLR3/END to PS69 Gravity Sewer	15
WS37469	M4/4 to M4/3 Gravity Sewer	15
WS37471	M4/2 to M4/1 Gravity Sewer	15
WS37470	M4/3 to M4/2 Gravity Sewer	15
WS37432	1/OF1 to OF/1 Gravity Sewer	15
WS37534	M2/13 to M2/12A Gravity Sewer	15
WS35063	SPS43 Rising Main	14
WS35025	SPS22 Rising Main	14
WS36582	111A/5 to 111A/4 Gravity Sewer	14
WS36800	201A/1 to 201B/1 Gravity Sewer	14
WS36857	310/1 to 310/1A Gravity Sewer	14
WS36859	310/1A to PS8/MH Gravity Sewer	14
WS36915	101/2 to 101/1 Gravity Sewer	14
WS37462	OF12/2 to 156/1 Gravity Sewer	14
WS37483	PS6/MH to 201/PS6 Gravity Sewer	14
WS35076	SPS50 Rising Main	13.5
WS35062	SPS42 Rising Main	13.5
WS35028	SPS23 Rising Main S1	13.5
WS37067	56/7 to 56/6 Gravity Sewer	13.5
WS37259	216C/4 to 216C/3 Gravity Sewer	13.5

WS36666	216C/3 to 216C/2 Gravity Sewer	13.125
WS37054	56/4 to 56/3 Gravity Sewer	13.125
WS37055	56B/1 to 56/3 Gravity Sewer	13.125
WS37070	56/5 to 56/4 Gravity Sewer	13.125
WS37435	24/1 to M1/30 Gravity Sewer	13.125
WS37434	24/2 to 24/1 Gravity Sewer	13.125
WS37433	24/3 to 24/2 Gravity Sewer	13.125
WS37463	156/1 to M4/8 Gravity Sewer	13.125
WS37464	M4/9 to M4/8 Gravity Sewer	13.125
WS37425	56/1 to M2/9 Gravity Sewer	13.125
WS37540	M2/15 to M2/14 Gravity Sewer	12.5
WS37541	M2/16 to M2/15 Gravity Sewer	12.5
WS37548	M1/32 to M1/31 Gravity Sewer	12.5
WS37549	M1/33 to M1/32 Gravity Sewer	12.5
WS37551	M1/35 to M1/34 Gravity Sewer	12.5
WS37552	M1/36 to M1/35 Gravity Sewer	12.5
WS35051	SPS37 Rising Main S2	12
WS35053	SPS38 Rising Main S2	12
WS36909	PS2/MH to 103/PS2 Gravity Sewer	12
WS37431	1/1 to M2/3 Gravity Sewer	12
WS37424	DC/MH to 56/1 Gravity Sewer	12
WS36598	241E/END to 241E/1 Gravity Sewer	11.25
WS36911	102/2 to 102/1 Gravity Sewer	11.25
WS37122	3A/4 to 3/4 Gravity Sewer	11.25
WS37138	2B/END to 2B/2 Gravity Sewer	11.25
WS37244	228A/2 to 228A/1 Gravity Sewer	11.25
WS37045	56/2 to 56/1 Gravity Sewer	10.5
WS37053	56/3 to 56/2 Gravity Sewer	10.5
WS37468	M4/5 to M4/4 Gravity Sewer	10.5
WS37467	M4/6 to M4/5 Gravity Sewer	10.5
WS37466	M4/7 to M4/6 Gravity Sewer	10.5
WS37465	M4/8 to M4/7 Gravity Sewer	10.5
WS35054	SPS39 Rising Main S1	9
WS35052	SPS38 Rising Main S1	9
WS35046	SPS35 Rising Main S1	9
WS35048	SPS36 Rising Main S1	9
WS35050	SPS37 Rising Main S1	9
WS35073	SPS49 Rising Main S1	9
WS35068	SPS45 Rising Main S2	9
WS35060	SPS41 Rising Main S1	9
WS35067	SPS45 Rising Main S1	9
WS35058	SPS40 Rising Main S1	9
WS35077	SPS51 Rising Main	9
WS35071	SPS48 Rising Main S1	7

Appendix E3 –Lucinda Sewerage Scheme Criticality Ranking Results

Table E.3: Lucinda Sewerage Scheme Criticality Ranking Results

Asset No.	Asset Description	Criticality Score
WS37355	750/10 to 750/13 Gravity Sewer	73.5
WS37357	750C/11 to 750/13 Gravity Sewer	73.5
WS37358	750D/8 to 750/10 Gravity Sewer	73.5
WS37359	750D1/9 to 750/10 Gravity Sewer	73.5
WS37361	750B/2 to 750/3 Gravity Sewer	73.5
WS37362	750A/5 to 750/6 Gravity Sewer	73.5
WS37366	750/3 to 750/6 Gravity Sewer	73.5
WS37367	750B1/1 to 750/3 Gravity Sewer	73.5
WS37369	750/6 to 750/7 Gravity Sewer	73.5
WS37373	754/6 to 754/5 Gravity Sewer	73.5
WS37386	750A1/4 to 750/6 Gravity Sewer	73.5
WS37387	750C1/12 to 750/13 Gravity Sewer	73.5
WS37374	754B/1 to 754B/2 Gravity Sewer	72
WS37370	754/9 to 754/7 Gravity Sewer	63
WS37372	754A/8 to 754/6 Gravity Sewer	63
WS37376	754/4 to 754/3 Gravity Sewer	52.5
WS37377	754B/2 to 754/3 Gravity Sewer	52.5
WS37356	750/13 to 750/14 Gravity Sewer	49
WS37360	750/14 to 750/PS65 Gravity Sewer	49
WS37368	750/7 to 750/14 Gravity Sewer	49
WS37406	750D/END to 750D/8 Gravity Sewer	42
WS37407	750C/END to 750C/11 Gravity Sewer	42
WS37408	750D1/END to 750D1/9 Gravity Sewer	42
WS37409	750C1/END to 750C1/12 Gravity Sewer	42
WS37410	750A/END to 750A/5 Gravity Sewer	42
WS37411	750B/END to 750B/2 Gravity Sewer	42
WS37412	750A1/END to 750A1/4 Gravity Sewer	42
WS37413	750B1/END to 750B1/1 Gravity Sewer	42
WS37364	753/1JUNC to 753/PS62 Gravity Sewer	39.375
WS37593	Sewer Vent to 750B1/1 Gravity Sewer	36.75
WS37403	754/3 to 754/PS64 Gravity Sewer	35
WS37365	753/END to 753/PS62 Gravity Sewer	33.75
WS37363	752/END to 752/PS66 Gravity Sewer	33.75
WS37371	754/7 to 754/6 Gravity Sewer	28
WS37375	754/5 to 754/4 Gravity Sewer	28
WS37404	753/2JUNC to 753/1JUNC Gravity Sewer	26.25
WS37405	753B/END to 753/2JUNC Gravity Sewer	22.5
WS37415	753A/END to 753A/3JUNC Gravity Sewer	22.5

WS37414	753A/3JUNC to 753/PS62 Gravity Sewer	21

Appendix F – Research Project Risk Assessment

RISK CALCULATOR					
Likelihood \ Consequence	1 - Insignificant No injury No-low $ cost	2 - Minor First aid treatment, Low-medium $ cost	3 - Moderate Medical treatment, Medium-high $ cost	4 - Major Serious injuries Major $ cost	5 - Catastrophic Death Huge $ cost
5 - Almost Certain Expected to occur at most times	H	H	E	E	E
4 - Likely Will probably occur at most times	M	H	H	E	E
3 - Possible Might occur at some time	L	M	H	E	E
2 - Unlikely Could occur at some time	L	L	M	H	E
1 - Rare May occur in rare conditions	L	L	M	H	E

Figure F.1: Project Risk Matrix

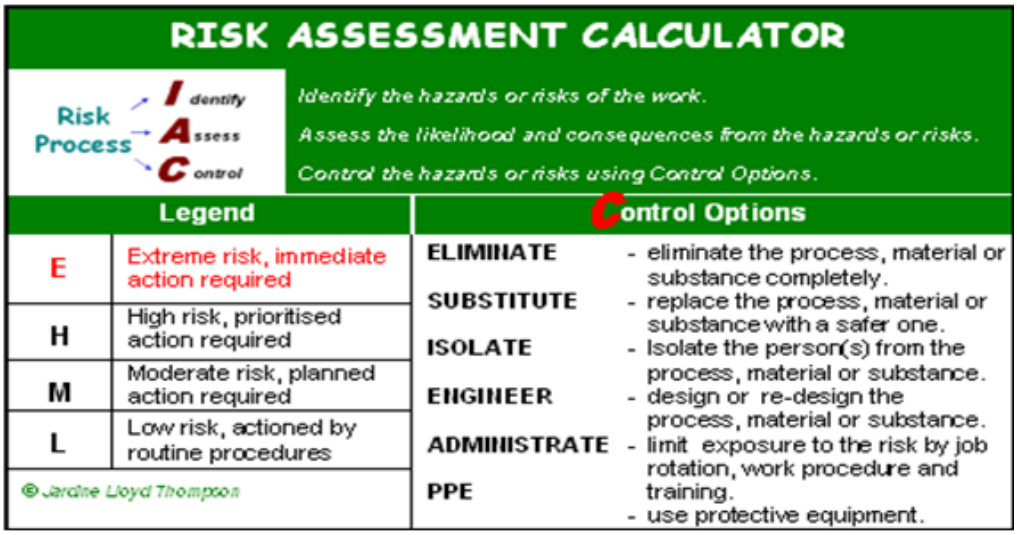


Figure F.2: Project Risk Assessment Calculator

Table F.0.1: Risk Identification and Management

Risk	Risk Score	Mitigation Measures	New Risk Score
Project Preparation			
Approval not obtained from HSC or USQ	E	Enter into early discussions with both HSC and USQ regarding research topic to ensure approval is received	M
Data Review and Correction Phase			
Incomplete or incorrect asset data	H	Before finalising assets to be reviewed ensure all required information is available or can be sourced.	L
Data Collection Phase			
HSC asset data base cannot be accessed	H	Ensure HSC routinely backs up asset system in case system does not work.	L
Loss of Data	H	Ensure results are regularly backed up on both a physical storage system (e.g. USB, Hard Drive) and a cloud based storage system	L
Injury when collecting data in the field	H	Follow HSC safe work method statements.	M
Data Analysis Phase			
Incorrect entry of data entered into model	H	Ensure data entered is accurate and undertake a full review to check all data before finalisation.	L
Loss of Results	E	Ensure results are regularly backed up on both a physical storage system (e.g. USB, Hard Drive) and a cloud based storage system	L
Dissertation			
Loss of dissertation	E	Ensure dissertation is regularly backed up on both a physical storage system (e.g. USB, Hard Drive) and a cloud based storage system	L