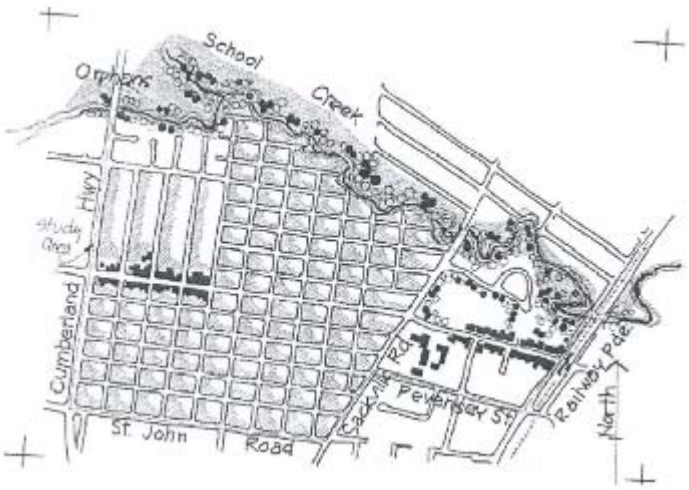
# Canley Corridor Overland Flood Study




- Final
- December 2009

In association with

FAIRFIELD CONSULTING SERVICES
A Division of Fairfield City Council

# Canley Corridor Overland Flood Study

- Final
- December 2009

Sinclair Knight Merz
ABN 37 001 024 095
100 Christie Street
PO Box 164
St Leonards NSW
Australia 1590
Tel: +61 2 9928 2100
Fax: +61 2 9928 2500
Web: www.skmconsulting.com

# Contents

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# Executive Summary

The NSW Floodplain Development Manual (2005) states that local overland flow is a significant problem that should be considered alongside mainstream river and creek flooding. Identifying overland flow flooding within an entire Local Government Area (LGA) is a major undertaking, and instead of doing this for the entire LGA in one step, Fairfield City Council (FCC) has decided to undertake a number of separate overland flow studies.

The Canley Corridor Overland Flood Study is the first detailed overland flow flood study to be carried out by FCC. The primary objectives of the study are to:

- test the sensitivity of overland flood modelling to different assumptions about the capacity of the existing stormwater drainage system, and use the conclusions to establish a methodology for future overland flood studies
- identify major overland flow paths within the Canley Corridor catchment study area, and properties at risk from local overland flooding
- produce flood extent and flood risk precinct maps for the study area

Investigations of different stormwater system modelling approaches compared the precision of results and the cost and time required to carry out the work. It was found that the best outcome was achieved by a combined hydrological and stormwater pipe network model that included larger pipes and structures in the stormwater network, and which took into account known historical trouble spots. While detailed modelling of the entire stormwater network yielded more precise results, it did not affect which areas were identified as being at high risk. The additional cost involved in collecting data and constructing a detailed model was not considered worthwhile for the increase in precision this gave. This information will help guide data collection and model development for the remaining local overland flow studies FCC will be carrying out.

Flood Risk Precinct Maps have been produced as the key output from the study. These maps are based on modelling of the 100 year Average Recurrence Interval (ARI) and Probable Maximum Flood (PMF) events, and use the FCC Development Control Plan flood risk precinct categories. This mapping identified:

- areas of High Risk Precinct in the middle of the catchment around McBurney Road, along Freeman Avenue adjacent to Orphan School Creek, and along major overland flow paths on Railway Parade and Sackville Street;
- areas of Medium Risk Precinct running from southwest to northeast from Cabramatta Road, across Cumberland Highway, and covering much of the Canley Vale Road East and Sackville Street area;
- areas of Low Risk Precinct following the outline of the Medium Risk Precinct closely, although extending significantly beyond the Medium Risk Precinct between Canley Vale Road

East, Gladstone Road and Sackville Street, and in localised areas on either side of Railway Parade.

Peak flood depths on most properties are less than 0.5 metres, although there are some areas in the upper catchment where depths are between 0.5 and 1.0 metres. Similarly, flow velocities across most properties are generally below 0.5 metres per second, although higher velocities are seen in many streets and across some upper catchment properties.

A “Zone of Significant Flow” has also been identified where it is important that overland flowpaths are kept clear. It contains much of the 100 year ARI extent in the upper catchment, where flowpath blockage caused by fences, large buildings and debris can significantly increase water levels and divert water onto nearby properties.

These maps only represent flooding due to runoff from within the Canley Corridor catchment. Those parts of the Corridor along the banks of Orphan School Creek may also be at risk from mainstream flooding, generated in the upper Orphan School Creek catchment to the north and west of the Canley Corridor. Mainstream flood extents for Orphan School Creek are reported in the *Flood Study for Orphan School Creek, Green Valley Creek and Clear Paddock Creek* (Sinclair Knight Merz & Fairfield Consulting Services, 2008).

# 1. Introduction

## 1.1 Overview

Fairfield City Council (FCC) commissioned Sinclair Knight Merz (SKM) in August 2005 to undertake an Overland Flood Study for the Canley Corridor area to define flood behaviour, identify properties at risk of flooding and to map the flood risk. The study was to be undertaken in accordance with the NSW Government's Flood Prone Lands Policy as documented in the 2005 Floodplain Development Manual. This study was undertaken by SKM in association with Fairfield Consulting Services (FCS), a business unit division of FCC.

The manual focuses on providing direction and solutions to existing flooding problems in developed areas, to ensure new developments are compatible with flood hazard and do not create additional flooding problems in other areas. The manual also gives guidelines for the implementation of a floodplain risk management process. It now adopts as a matter of policy consideration of the full range of flood events beyond the 100 year and up to the Probable Maximum Flood (PMF). The 2001 manual was also the first to address local overland flow as a significant problem that should be considered alongside mainstream river and creek flooding.

## 1.2 Structure of this Report

This report is structured as follows:

- **Section 1 – Introduction**
- **Section 2 – Background**: Explanation of the need for this overland flow study, of Fairfield's overland flow study program, the situation of this study area, the study objectives, and the history of flooding in the catchment
- **Section 3 – Available Data**: Overview of the data collection process for this study
- **Section 4 – Catchment and Stormwater Model Development**: Explanation of the development of the different hydrological and stormwater modelling approaches used in this study
- **Section 5 – Hydraulic Modelling**: Background to the development of the two-dimensional hydraulic model used in this study
- **Section 6 – Sensitivity of Hydrological Modelling**: Evaluation of the different hydrological and stormwater modelling approaches and comparison of their results
- **Section 7 –Flood Mapping Results**: Use of the study modelling to derive flood extent mapping and flood risk precinct mapping
- **Section 8 –Conclusions**: Key conclusions from the study regarding modelling methodology and results.

# 2. Background

## 2.1 Context of Overland Flood Studies

Fairfield LGA covers an area of around 102.5 $km^2$ and approximately 191,000 people live in the municipality according to the 1999 census report. Within the LGA there are typically old watercourses and tributaries that have been piped over the years. Unfortunately, most of the flow paths are in urban areas with direct impact and potential for damage to properties and hazard to residents.

The NSW Floodplain Development Manual (2005) discusses the different types of local flooding problem and concludes that it is a matter of scale. At the lower end of the scale, minor flooding may result from a number of sources including blockage of drainage pits and pipes. At the upper end of the scale, major flooding can occur due to water flowing along natural floodways or across land due to the runoff exceeding the capacity of the trunk drainage system.

FCC has been using the information available in drainage complaint registers, drainage studies, mapping of the major trunk drainage systems, etc. to identify 'major' flow paths within the LGA. Currently FCC advises property owners affected by overland flooding by way of notification on Section 149 (2). In addition, there is a reference on the Section 149 (2) Certificate that advises further information is available on the Section 149 (5) Certificate. The additional information such as flood levels is given through a "Flood Information Sheet" which is attached to the Section 149 (5) Certificate only. However, FCC is concerned that insufficient information is available to adequately identify overland flooding and the properties that may be affected because of local overland flooding. FCC is also concerned about the potential legal exposure that may accompany this situation. FCC is also required to manage the risk of overland flooding as required by the NSW Government's floodplain risk management policy.

Identifying properties at risk of overland flooding within the entire LGA is a major undertaking. Instead of undertaking the study for the entire LGA in one step, FCC decided to undertake the overland flood study in a number of stages.

## 2.2 FCC Overland Flood Studies Program

FCC has identified 31 creeks and overland flow paths within the LGA, which still require assessment to determine flood levels, areas inundated and identification of flood prone properties. Flood prone properties near the major creeks have been identified from previous flood studies but the location of major overland flow paths and the risk posed by them is not well understood.

In 2003-2004, SKM undertook the Fairfield City Overland Flood Study (SKM, 2004). This was a preliminary assessment of the urban areas within the Fairfield Local Government Area (LGA).

The study divided the LGA into eighteen sub-catchments and ranked each sub-catchment in terms of the potential severity of overland flooding (i.e. the number of properties under the high hazard category for the 1% AEP storm event).

The Canley Heights sub-catchment (Subcatchment No.15) was ranked 4th out of the 18 sub-catchments identified across the city in the preliminary Overland Flood Study. Approximately 116 properties were identified as flood liable in this sub-catchment in the study, with 108 of these properties being classified as high hazard. Currently there are 148 complaints on the local flooding complaints database.

This detailed study will identify the scale of the problem at the local level. FCC is also currently engaged in an urban renewal study to the two town centres of Canley Heights and Canley Vale and the corridor linking the two (Canley Corridor). The existing risk and future risk due to potential increases in imperviousness of the catchment, the increased density of population and the need for setting development controls needs to be assessed urgently. For these reasons FCC chose to undertake a detailed study of the Canley Corridor as the first of a series of detailed overland flood studies in the Fairfield LGA.

## 2.3 Study Objectives

Key objectives of this study are:

1) To test the sensitivity of overland flood modelling using different assumptions of the capacity of the existing stormwater drainage system. It will compare the drainage system at different levels of detail, and evaluate the benefit provided by increasingly detailed models. Conclusions from this study will establish the methodology of subsequent studies for the remainder of the LGA catchments
2) To identify the major overland flow paths within the Canley Corridor catchment study area. The study area is detailed in Section 2.4 and includes parts of sub-catchments 13, 14, 15 and 16 as identified in the preliminary city-wide Overland Flood Study (SKM, 2004). The Canley Corridor study area is shown in Figure 1-1.

Other objectives of the study are to:

- Identify properties at risk of local overland flooding
- Assess provisional flood hazard to identified properties due to local overland flooding for the 1% AEP (Annual Exceedance Probability) and the PMF (Probable Maximum Flood)
- Carry out field verification of identified overland flow paths at selected locations
- Prepare flood extent and flood risk precinct maps for the study area for the 1% AEP and PMF events

- Produce flood results (flood level, velocity and flow) for the 5, 20, 100 ARI year and PMF events

## 2.4 Study Area

The study area for Canley Corridor Overland Flood Study is located south west of Orphan School Creek, between the suburbs of Canley Vale and Canley Heights and Cabramatta. The Canley Corridor catchment has a north easterly aspect and drains overland into Orphan School Creek, which is the main tributary of Prospect Creek.

The 258 hectare catchment has a range of land uses including residential, commercial and light industrial. The upper and mid catchment area is largely medium density residential. The lower catchment includes a range of commercial and industrial areas, separated from Orphan School Creek by an open space corridor.

The Canley Corridor extends along Canley Vale Road between Canley Vale and Canley Heights and is bounded by Orphan School Creek to the north, Railway Parade, Pevensey Street and Sackville Street to the east, St Johns Road to the south and the Cumberland Highway to the west. The Canley Corridor area can be divided into a number of sub-catchments. In terms of the sub-catchments defined in the phase one overland flood study, the Canley Corridor includes parts of sub-catchments 13, 14, 15 and 16. The Canley Corridor study area is shown in Figure 1-1.

Initially the study focused on sub-catchment 15. This was studied in detail and the results were then used to refine the overland flood study methodology for the remainder of the area (sub-catchments 13, 14 and 16).

- *Figure 1-1: Canley Corridor and Study Area*

## 2.5 History of Flooding

Incidence of past events in Orphan School Creek form a part of the larger Prospect Creek catchment. Major flooding occurred along Prospect Creek and Orphan School Creek in August 1986, April-May 1988 and February 2001. These floods caused serious financial losses and hardship to a large number of families and businesses in the area. The 1986 flood caused a total damage of approximately $4.8 million on Prospect Creek alone (Willing & Partners, 1990). The 1986 and 1988 floods produced strong community pressure for measures to control flooding in the area. Previous to this, the last known major flood in Fairfield was in 1956 (Willing & Partners, 1990).

Generally, local flooding also occurs in flood events of this magnitude, however, there have been incidences where local flooding has occurred independently of these large flood events. These are usually flash flood events that happen within 20 minutes of a storm, therefore the response time can be quite different to the larger duration flood events. These local floods can also cause damage to property and infrastructure and place the lives of people at risk. These kinds of events happen much more frequently than larger flood events, and potentially have a cumulative impact as significant as the larger floods.

## 2.6 Previous Studies

In 1990, Council engaged hydraulic consultants Dalland & Lucas to carry out a drainage study on the Canley Heights catchment (*Canley Vale Cabramatta - Drainage Investigation,* 1990). This study involved survey of the pit and pipe network throughout the catchment. Major overland flowpaths were identified and the peak 20-year and 100-year ARI flows were calculated in each section of overland flowpath. An ILSAX model was used to conduct this exercise, and while the model itself is no longer available, a summary of the basic input data and results has been retrieved in hard copy format.

The 1990 study only identified major overland flowpaths that carried more than 1 cubic metre per second in the 100-year storm event. Given the technology of the time it was not possible or cost effective to be able to quantify the width, depth and extent of these flow paths.

In April 2003, FCC commissioned SKM to undertake a Stage 1 of the Local Overland Flood Study for the entire catchment area of Prospect Creek and Cabramatta Creek. This study was undertaken jointly by SKM and Fairfield Consulting Services (FCS) (SKM, 2003).

This city-wide study identified 31 creeks and overland flow paths within the LGA, which need to be assessed to determine flood levels, areas inundated and identification of flood prone properties. Flood prone properties near major creeks have been identified from previous flood studies, but until this study, the location and risk posed by the major overland flow paths were not as well understood. FCC has been using the information available in the 1990 study, the drainage

investigations database, mapping of the major trunk drainage systems, and anecdotal evidence to estimate the scale of the problem.

The objectives of the study were to:

- identify major overland flow paths;
- identify properties at risk of local overland flooding; and
- assess flood hazard and identify properties subject to local overland flooding for the 5%, 1% and PMF events.

The outcome of the first phase city-wide study identified 18 sub-catchments based on hydraulic hazard. Ranking of the sub-catchments was based primarily on the number of properties under the high hazard category for the 5% AEP flood event. Secondary consideration was given to the number of properties under the high hazard category for the 1% AEP in the overall ranking. The Canley Heights catchment is ranked No. 4 in priority, regardless of whether the 5% or 1% event is used.

## 2.7 Overview of Study Methodology

One of the key objectives of this study was to test the sensitivity of overland flood modelling to different assumptions about the capacity of the existing stormwater drainage system. This was done by comparing the modelling outcome when the drainage system was represented at different levels of detail. This allowed an evaluation of the benefit provided by increasingly detailed models. Conclusions from this study are now helping to establish the methodology of subsequent studies for the remainder of the LGA catchments.

The overall approach was to establish three different models representing part of the study area (Subcatchment 15) in different ways. The modelling approaches used were:

- **Detailed DRAINS hydrological and stormwater system modelling**: This approach involved representing almost all pits and pipes in the subcatchment within the DRAINS model, identifying subcatchment areas for each pit or set of pits, and using the model to calculate the overflow at each pit due to either pipe capacity or inlet limitations. This overflow was then used as input to the hydraulic model.
- **Limited DRAINS hydrological and stormwater system modelling**: This approach was similar to the Detailed DRAINS modelling, except that only pipes greater than or equal to 900 mm diameter and pits connected to these pipes were included in the model.
- **RAFTS hydrological modelling**: This approach involved setting up an RAFTS model of all the subcatchments represented in the Limited DRAINS model, and using the resulting subcatchment runoffs as input to the hydraulic model. This model did not include any representation of the stormwater system.

These overflows from the hydrological models were used as inputs into a detailed TUFLOW two-dimensional model of the catchment area represented by the modelled pit and pipe network. The overflow time series were placed onto the two-dimensional grid at the location of the pit in the stormwater system network.

This process was carried out for a range of storm durations. As the hydraulic model covers the extent of the pit and pipe network, different points in the catchment will have different critical storm durations.

Once these overflow series were routed across the terrain in the two-dimensional model, a grid of maximum depth and velocity across all storm durations was prepared for each of the three modelling approaches. This was then used to calculate the Provisional Hydraulic Hazard Categories as specified in the NSW Floodplain Development Manual (2005). Flood extent and provisional hydraulic hazard were used as the basis for comparing the three different approaches.

# 3. Available Data

The following data were collated and reviewed to identify any gaps in the data:

- Airborne Laser Survey (ALS);
- AusImage Aerial photography;
- SKM Building Polygon data set;
- 0.5m digital contours;
- Digital FCC Cadastre and Fairfield Local Environment Plan (LEP);
- GIS layer of drainage pits and pipes and FCC drainage design plans ;
- Rainfall Data from Australian Rainfall and Runoff and FCC for input into the DRAINS model;
- Fairfield City Overland Flood Study (SKM, April 2004); and

The relevance and use made of the data is described below.

## 3.1 Airborne Laser Survey

The ALS data that was used in this study was collected for the entire LGA in January 2003. The thinned ground points were used. Following initial data collection, a data reduction process was undertaken to reduce the density of the points. Also, removal of non-ground points was carried out. This included the removal of levels on buildings, bridges and over/underpasses.

A validation process was carried out on this data at the outset of this study, by generating 0.5m contours over the area and ground-truthing 100 random points over the data area.

The ALS and 0.5m contours were used in the following stages of the study:

- Calculation and validation of pit and pipe attributes (ie. depths, invert levels and slopes) for input into the DRAINS and TUFLOW models
- Initial definition of sub-catchment boundaries and calculation of runoff travel times
- Set up of the hydraulic Tuflow model
- Validation of selection of potentially affected properties
- Preparation of flood inundation and hazard maps.

## 3.2 AusImage Aerial Photography

Aerial Photography was used extensively in this study, mainly for data validation. The aerial photography that was used was flown for FCC by SKM in January 2005. This photography was at a resolution of 0.15m. The photography was used in the following stages of the process:

- Validation of pit and pipe locations in the digitising of the pit and pipe GIS layers

- Definition and validation of sub-catchment boundaries and catchment parameters (particularly pervious/impervious fraction)
- Set up of the hydraulic TUFLOW model
- Validation of selection of potentially affected properties
- Estimation of clear width of the overland flow path
- Preparation of flood inundation and hazard maps
- Presentation of results.

### 3.3 SKM Building Polygon Data Set

This study also made use of a data set containing building polygons that had been generated by SKM. This data was generated by on-screen digitising of buildings from the AusImage aerial photography. The 2005 photography was also used in this process.

As part of the same process trees, parks and open areas, and hard-stand areas were also digitised. This data as well as the FCC cadastre and LEP information in GIS were used in the calculation of impervious and pervious fractions for catchment areas.

### 3.4 Drainage Information Dataset

Historical stormwater drainage network data and site validation was used as the basis of the models for this project. Site validation was required to ensure pit and pipe locations were as close as possible to actual locations.

In 1986, FCC used people from a Government assisted employment scheme to collect stormwater pit and pipe locations and sizes for FCC's stormwater system throughout the Fairfield LGA. This information was copied onto A1 film sheets at a scale of 1:2000. The data collected was not verified by Council's engineers. The sheets were then indexed into approximately 20 individual sheets. In the early 1990's FCC subsequently digitised these drainage maps into a "Drainage Layer" database for use in its Land Information System (LIS).

In 1990 the "Canley Vale - Cabramatta Drainage Investigation" was undertaken by consultants Dalland and Lucas. This study was a large scale detailed catchment analysis using the ILSAX hydrological model. Extensive ground surveying took place as part of this study to record stormwater pit locations, pit inverts and pipe diameters.

It was intended to use the Dalland and Lucas study data in the Canley Corridor Overland Flood Study. Initially it was not known whether the LIS "Drainage Layer" was consistent with Dalland and Lucas' plans. To ensure an approach consistent with the Dalland and Lucas study it was decided to digitise the pit and pipe network from the available plans. FCS scanned the Dalland and

Lucas drainage pit and pipe maps, registered them into MapInfo (GIS software used by FCC) and overlayed the scanned registered plans onto FCC's LIS Drainage Layer. The maps matched FCC's LIS Drainage Layer (i.e. the 1986 data). However, the project team decided that this data was not accurate enough to construct a detailed hydrological and stormwater system model.

Consequently on-site data collection was undertaken to increase the accuracy of the existing drainage system data. With use of 2005 aerial photos and on-site ground-truthing, the locations of the pits and pipes were moved to their correct locations in the LIS Drainage Layer. The only exceptions to this were 190 buried junction pits or pits on private property, which could not be accessed. The existing location of these pits in the LIS Drainage Layer had to be assumed.

For the study catchment area of 285.86 hectares, a total of 780 pits were digitised for the Detailed DRAINS model and 260 pits for the Limited DRAINS model. The Dalland and Lucas study included limited data for only around 600 pits of the catchment pits.

### 3.5 Cadastral and LEP information

The cadastral and LEP data was used in this study to help calculate impervious and pervious fractions for catchment areas in the presentation of results.

### 3.6 Previous Studies

The local drainage study *Canley Vale-Cabramatta Drainage Investigation* (Dalland & Lucas, 1990) report was available to use in this study. The pit and data information from the Dalland & Lucas study were compared with the on-ground information validated by FCC staff. A number of pit inverts and pipe sizes surveyed in the Dalland & Lucas study were used in the DRAINS model.

Data from the SKM (2004) *Fairfield City Overland Flood Study* was used initially to obtain the catchment boundaries for Catchments 13, 14, 15 and 16 that were delineated in the SKM study using a ground surface elevation digital terrain model (DTM).

### 3.7 Record of Historical of Overland Flow Problems

FCC has kept a record of 'troubles spots' where the public has identified past surface flooding problems. This record includes a number within the Canley Corridor study area.

Based on investigations into these problem areas, FCC has subsequently developed tables of properties historically affected by overland flooding. These are used by FCC as input into the planning and development control system.

Both these datasets have been made available for the study. They were used to verify the accuracy and extent of the flood modelling and mapping.

### 3.8 Design Rainfall Data

This study uses design rainfall intensity – duration curves derived for 33.875 degree South and 150.925 degrees East (near Fairfield), issued April 1997 by the Hydrometeorological Advisory Service of the Bureau of Meteorology.

# 4. Catchment and Stormwater System Model Development

## 4.1 Overview

A key objective of this study was to test the sensitivity of overland flood modelling to different assumptions of the capacity of the existing stormwater drainage system. The study compares the drainage system at different levels of detail and evaluates the benefits of increasingly detailed models. By comparing the outcomes of different modelling approaches and levels of detail, Council will be provided with guidance on:

- Choosing appropriate subcatchment sizes;
- Deciding whether to model the entire pit and pipe system, or whether it is sufficient to model only the larger parts of it;
- The potential error that arises when the drainage network is not modelled; and
- Using past flooding information to set the extent of modelling.

Conclusions from this study are now being used to establish methodologies for studies in the remainder of FCC catchments.

Three modelling options were investigated for this study. Two models were set up using the DRAINS hydraulic modelling software that includes the drainage system. One DRAINS model represents the entire drainage system, while the second includes only larger pipes and associated pits. The third approach was creation of an RAFTS hydrological model that excludes the drainage system. Outputs from both these models were then input into a TUFLOW hydraulic model of the catchment, and the results from the different approaches compared.

## 4.2 Model Calibration and Verification

The nature of overland flow studies means rigorous model calibration and verification cannot be carried out. Records of historical flooding generally only include peak levels measured after the flood has passed, for which there is no accurate way of estimating flows. In addition, urban floodplains change continuously as development rebuilding occurs, making modelling the local conditions which have caused past flooding unreliable.

FCC has maps showing past flooding ‘trouble spots’, which identify the location of known problems. These maps have been used to in this study to provide some check on the performance of the model, and as an indication of whether the two dimensional hydraulic model extends far enough into the catchment. This comparison is documented in Section 6 of the report.

## 4.3 DRAINS Model

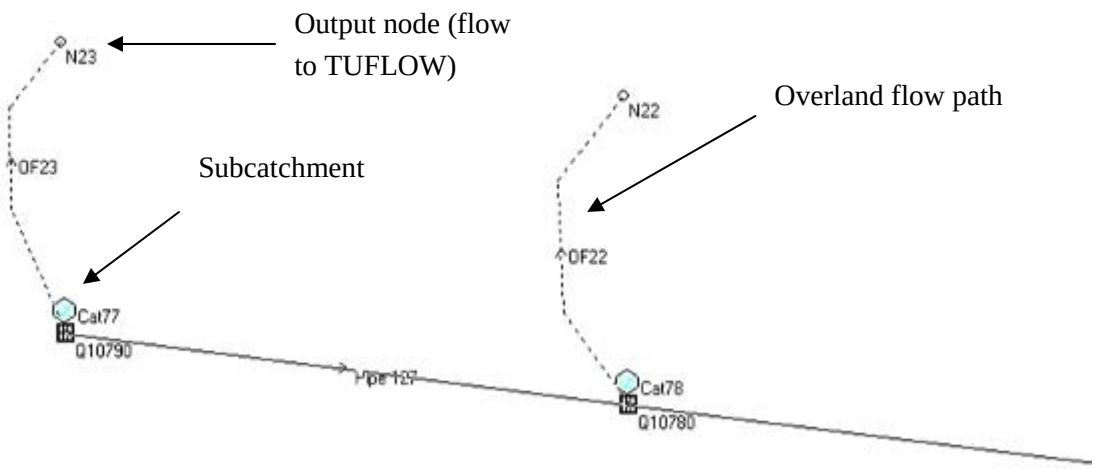
### 4.3.1 Approach

DRAINS models of Subcatchment 15 in Canley Corridor were developed to:

- Represent the subcatchment at a detailed level (the'Detailed' model): This included modelling every pit and pipe, and every subcatchment at a corresponding scale. The layout of this Detailed DRAINS model is shown in Figure 4-2. Stormwater pits are represented by purple dots, and subcatchments are represented by blue polygons.
- Represent the subcatchment at a coarser scale (the 'Limited' model): Only pipes greater than or equal to 900 mm and associated pits were included in this model. The corresponding pits are shown in red in Figure 4-3. The figure also shows the aggregation of subcatchments to match the reduced extent of the modelled network. The inlet capacity of the pits was also altered to match the inlet capacity of the Detailed DRAINS model.

The output from the DRAINS models is an overflow hydrograph at each local catchment, or at each pit in the downstream stormwater system. The structure in the DRAINS model used to produce these outflows is shown in Figure 4-1. These overflow hydrographs were then incorporated into the TUFLOW hydrodynamic model as point inflows onto the grid.

- *Figure 4-1: Example of DRAINS model structure*




DRAINS was chosen for this project as it has the capacity to simulate the small scale urban subcatchment hydrology, as well as the hydraulics of the stormwater pit and pipe system. DRAINS is a Stormwater Drainage System design and analysis program, co-developed by Watercom and Dr. Geoffrey O'Loughlin, developer of the ILSAX program. It is a much advanced version of the earlier ILSAX program which has been widely used in the past for urban stormwater system design

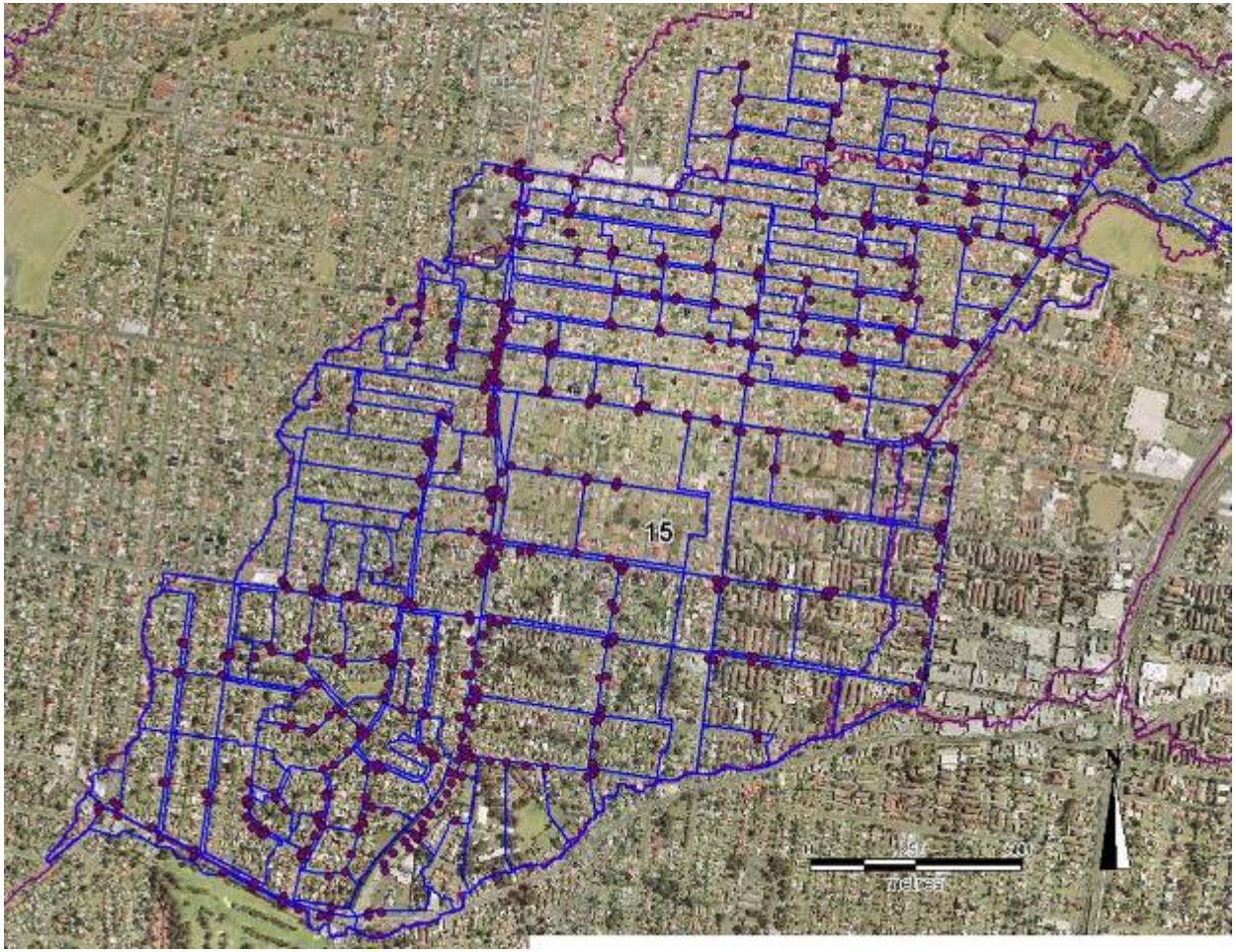
and analysis in Australia and New Zealand. The DRAINS program can perform hydraulic grade line analyses, design stormwater drainage systems and produce summary graphs and tables, and pipe long section drawings.

### 4.3.2 Drainage Network Layout

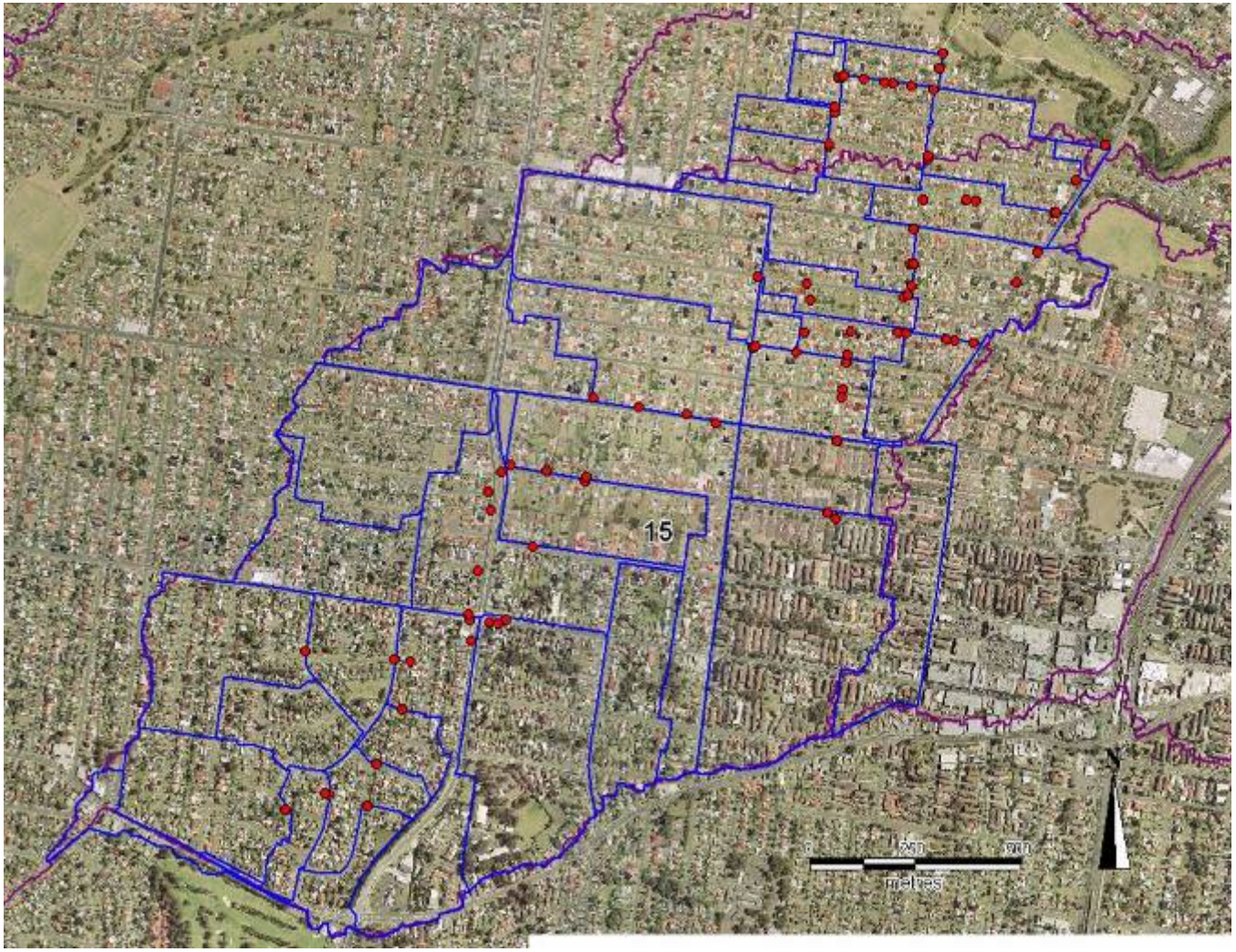
FCS carried out extensive on-site validation of its digital stormwater network data prior to developing the DRAINS models. For the study catchment area of 285.86 hectares, a total of 780 pits were digitised for the Detailed DRAINS model and 260 pits for the Limited DRAINS model. The validation and data management process used for the stormwater system data entered into the Detailed DRAINS model was:

- Pipe diameters were validated by comparing the Dalland and Lucas data against Council's drainage layer and available Works as Executed (WAE) plans.
- The above validation process was also used to obtain the pit invert levels.
- Pipe lengths were calculated in MapInfo.
- A number of pipe upstream invert levels were included in the Dalland and Lucas data set. Downstream invert levels (and therefore, pipe slopes) were generally estimated on the basis that the downstream invert level is likely to be the same as the upstream invert level of the next pipe downstream. This presented a problem where a small pipe joined with a large pipe. Generally designers make this a drop from the smaller pipe into the larger pipe. In these occasions, the inverts had to be changed to avoid getting a false grade (i.e. negative grades or unacceptable pipe slopes).
- Council's Airborne Laser Survey (ALS) data was used to determine natural surface elevations near pits and to help calculate assumed pit inverts for the numerous numbers of non-accessible pits. A minimum cover of 600mm to the obvert of the pipe was assumed to calculate the pit inverts where Dalland & Lucas data was incorrect or not available.
- Any missing pit and pipe sizes and levels were estimated based on the configuration of the surrounding system or a conservative assumption where no information was available.
- A worksheet of the pit and pipe data was created with columns which included Dalland and Lucas data. The Dalland and Lucas data was then compared and validated in this spreadsheet and changed where required.
- This data was added to the GIS, using the pit names as a key

- *Figure 4-2: Layout of Detailed DRAINS model (showing subcatchments and inflow boundaries from DRAINS to 2D hydraulic model)*



- *Figure 4-3: Layout of Limited DRAINS and RAFTS models (showing subcatchments and inflow boundaries to 2D hydraulic model)*

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### 4.3.3 Network Parameters

The layout, dimensions and levels of the stormwater network were extracted from the GIS layer prepared by FCS and imported into DRAINS (as discussed in Section 3). Once the network had been imported the DRAINS model parameters were set. Parameter values were chosen on the following basis:

- Standard pressure loss $K_u$ parameters were used for the pits, based on whether they were at the head of a stormwater line (where a value of 4.8 was used) or a junction or inlet pit (where a value of 1.5 was used). The DRAINS User Manual (2004) was used as a reference for these values.
- A minimal amount of ponding at each sag pit was assumed (5 $m^3$) in order to ensure stability of the DRAINS models. The actual storage volume within the street is more accurately represented within the TUFLOW model.
- The pit hydraulic characteristics were assumed to be similar to standard characteristics referenced in the DRAINS User Manual (2004), as FCC does not have its own standard pit characteristic. Pits were grouped into the following sizes:
    - Hornsby Council pit database: 0.9, 1.2, 1.8, 2.4, 3.0, 3.6, 4.2m (internal dimensions)
    - Sutherland Council's "Grated Sag" pits were selected for the sag pits
    - Department of Housing RM7 3% cross fall 4% grade pits were selected for the bolt down lid pits.
- Blocking factors for on-grade and sag pits adopted for the model were 30% in the 20-year ARI and 50% in both the 100-year and PMF events.
- For the limited DRAINS model, extra inlet capacity was included at the upstream end of each major drainage line in the model. This accounted for the reduction in inlet capacity resulting from pipes smaller than 900 mm diameter and their associated inlet pits being removed from the model. This avoids this artificial constraint on system inlet capacity.

A summary of the pit data for the Detailed DRAINS model is included as Table A1 in Appendix A. A summary of the corresponding pipe data is included as Table A2.

### 4.3.4 Catchment data

The catchments were initially delineated on the basis of the ALS data, using an automatic subroutine in ArcMap. The automation using this process was felt not to best delineate the existing catchment contributing areas. By using the natural surface to define a contributing catchment, the process may not:

- delineate the catchment areas to the appropriate pits

- pick up potential flooded areas that are bypassed
- recognise the road centreline as a crest (centrelines of roads define weirs and potential areas of ponding and flood water diversion)
- correctly represent the hydrologic processes

To define road centrelines, the automated process would require a break-line to be inserted into the DTM for it to recognise that it cannot cross it.

It was decided that the catchments be defined manually, validated in the field and digitised in GIS.

Rather than defining catchments for every one of the 780 pits in the study area, critical pits were selected for both the detailed and limited DRAINS models. The placing of critical pits in select locations was essential in having the proper overland flow accounted for. The critical pits were selected based on local knowledge of the study area, anecdotal evidence of problem areas and at most sag pits where ponding problems would occur.

Once the catchment boundaries were finalised in the GIS, the following parameters were measured and/or estimated for each catchment:

- Catchment areas were measured in the GIS
- Impervious fractions were estimated using SKM's building polygon data set to define areas of different land uses in each catchment, plus estimated typical impervious fractions for each land use category. A check was then made that the overall catchment impervious fraction remains consistent with that used in the previous broad overland flowpath study
- Runoff travel times were estimated based on the length of each catchment and an estimated flow velocity (based on the slope, surface roughness, etc.)
- The catchment data was imported into DRAINS via spreadsheet so that a catchment is defined at every pit. The DRAINS data was then exported into GIS for input into Tuflow.

A summary of the catchment data for the Detailed DRAINS model is included as Table A3 in Appendix A.

### 4.3.5 Overland flowpaths

An overland flowpath was defined from every pit in the DRAINS model. Instead of travelling to the next downstream pit (which is the normal practice), overland flows actually leave the model. The DRAINS model was set up so that each of these overland flowpaths travel to a dummy node next to each pit, as overland flow routing and flowpath analysis will take place in TUFLOW rather than in DRAINS. TUFLOW reads these individual exported hydrographs and feeds them into the DTM where it adds it to the next individual node.

A default travel time of 0.1 minutes was defined for each of these overland flowpaths.

Initially, DRAINS was only capable of exporting one hydrograph at a time. This was a problem which was taken up with Watercom. FCS engaged Watercom to add a module in DRAINS to extract the overflow route and pipe hydrographs in one step. DRAINS can now export ASCII hydrograph files suitable for importing into 2D models such as TUFLOW. It will export 3 files per storm: one for pipes, one for overflow routes and channels, and one for sub-catchments. The module does not perform any calculations to create a "local" hydrograph if the overflow routes are connected from pit to pit in DRAINS.

### 4.3.6 Rainfall data

Temporal patterns for the synthetic design storms were derived from Book 2 of Australian Rainfall and Runoff (IEAust, 1999). FCC has developed its own Intensity-Frequency-Duration curve for the Fairfield LGA using rainfall data sourced from the Bureau of Meteorology, 1987. Adoption of these standard values was considered desirable for consistency with other local studies that have been undertaken. Table 4-1 details the range of design storm events which were run in DRAINS.

- *Table 4-1: Storm Events set up in DRAINS*

| ARI | Duration |
|---|---|
| 5 yr | 10, 20, 25 & 45 min, 1, 1.5, 2, 3, 4.5 & 6 hr |
| 20 yr | 10, 20, 25 & 45 min, 1, 1.5, 2, 3, 4.5 & 6 hr |
| 50 yr | 10, 20, 25 & 45 min, 1, 1.5, 2, 3, 4.5 & 6 hr |
| 100 yr | 10, 20, 25 & 45 min, 1, 1.5, 2, 3, 4.5 & 6 hr |
| PMF | 15, 30 & 45 min, 1, 1.5, 2, 2.5, 3, 4, 5 & 6 hr |

For the PMP storm, the intensities were entered manually into the DRAINS rainfall data area as per normal. However, rainfall data on any catchments that fell outside of the central ellipse (“Ellipse A”) were entered on the individual catchment data as a "customised storm".

Appropriate soil type and antecedent moisture conditions, as well as other catchment-wide parameters, were selected for use in the DRAINS model. An antecedent moisture content of 3 was adopted for the standard flood events and this was increased to 4 for the PMF event, as the catchment would be fully saturated.

### 4.3.7 Estimation of PMP Storms

The Probable Maximum Precipitation (PMP) for the Canley Corridor catchment was derived using *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short Duration*

*Method* (Bureau of Meteorology, 2003). The PMP was estimated using the GSDM procedure, and was spatially distributed through the ellipses that covered the catchment, using a step function approach. The mean values found for each PMP storm and ellipse are detailed in Table 4-2. The catchment is 90% smooth and 10% rough. It also had an elevation adjustment factor of 1 and a moisture adjustment factor of 0.7.

**Table 4-2: Mean PMP rainfall depth between ellipses (mm)**

| | **Catchment area between ellipses ($km^2$)** | **Rainfall Event (hrs)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.25 | 0.5 | 0.75 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 |
| Ellipse A | 2.16 | 165 | 238 | 298 | 347 | 400 | 453 | 480 | 511 | 561 | 609 | 636 |
| Ellipse B | 0.61 | 149 | 222 | 282 | 331 | 384 | 437 | 464 | 494 | 545 | 578 | 620 |

### 4.3.8 Development of the Limited DRAINS model

Once the Detailed DRAINS model had been developed, this was used to develop the Limited DRAINS model. The Limited DRAINS model only includes "major" pipes and their associated pits. For the study, the major pipes were defined as all pipes greater than or equal to 900mm diameter. In addition, the Limited model represents subcatchments at a coarser scale than the Detailed DRAINS model, as shown in Figure 4-3.

The Detailed DRAINS model was modified to form the Limited DRAINS model as follows:

- Pipes smaller than 900 mm diameter and associated pits were removed from the model;
- The most upstream remaining pit inlet on each stormwater network branch had its capacity increased, to represent the combined capacity of the pits omitted from the Limited DRAINS model;
- The pit sub-catchments upstream of this point were merged in GIS and the DRAINS model;
- Subcatchment runoff times were modified to account for the updated model layout and slower overland travel times resulting from removal of pipes from the model;
- Impervious and pervious areas were updated to reflect the new subcatchment boundaries;

- No blockages were included in the artificially large inlet pit at the upstream end of the system, although all other pits in the system were blocked as in the Detailed DRAINS model
- The DRAINS model was re-run with this limited data.

Alteration of the catchment runoff travel times in the Limited DRAINS model was estimated using either:

- expected pipe flow times and overland flow times within the extended subcatchment; or
- gutter travel times and expected overland flow times.

A sample catchment using both methods was carried out. This confirmed that taking into account travel times through the pipe network resulted in contributing catchment times shorter than those estimated using overland flow travel times alone. For this study, the latter method was adopted as it more closely represents what will happen within the Canley Corridor catchment.

Summary tables of the pit, pipe and subcatchment data for the Limited DRAINS model are included in Tables A4, A5 and A6 of Appendix A.

## 4.4 RAFTS Model

### 4.4.1 Overview

The third hydrological modelling approach investigated in this study was using RAFTS to model individual subcatchments. This approach involved development of a model at a similar scale to the Limited DRAINS model, but without representation of the stormwater network. In the RAFTS model all runoff from the catchment is assumed to flow overland. As such, this model illustrates whether flood mapping results are sensitive to the inclusion of the stormwater system network in the modelling.

The RAFTS model produces output hydrographs at the same locations as the Limited DRAINS model. These were used as inputs to the same TUFLOW model used for the DRAINS modelling.

XP-RAFTS (or RAFTS) is a non-linear rainfall-runoff flood routing model developed by XP Software (XP-RAFTS User Manual, 2001). RAFTS models hydrological processes in a different way to DRAINS. A number of the subcatchment parameters developed for the DRAINS models were re-used directly in the RAFTS model, however some have had to be adjusted to take into account the differences in the model processes.

A summary of the model parameters used in the subcatchments is included as Table A7 in Appendix A.

### 4.4.2 Subcatchment delineation

Limited DRAINS catchment areas were used to produce RAFTS catchments. These are the subcatchments shown in Figure 4-3. Unlike the Limited DRAINS model, for each subcatchment there is only one inflow node from the RAFTS model into the two dimensional TUFLOW flood model.

The impervious and pervious proportions are modelled separately in each of the subcatchments. A different set of rainfall loss and surface roughness parameters are used for each area, and separate runoff hydrographs are generated for each impervious and pervious subcatchment. This enables the model to distinguish between the rapid response of the impervious area and the slower response of the pervious areas.

### 4.4.3 Rainfall losses

RAFTS uses a simple initial and continuing rainfall loss model. This assumes an initial depth in millimetres is lost from the rainfall, and that no runoff occurs until this loss is satisfied. Once this depth has been lost, the model continuously losses a certain depth per hour from the rainfall that falls onto the subcatchment. By comparison, DRAINS uses the Horton infiltration model. This uses soil type and antecedent moisture condition parameters to calculate a time varying infiltration rate that decreases as the storm progresses.

In this study the RAFTS initial and continual losses where chosen to reproduce the observed loss behaviour of the DRAINS model. As one of the key objectives of this study is hydrological model comparison, the loss in the two types of model should be a similar as possible, in order to reduce the effect this has on the overall conclusions of the study.

For the RAFTS model in this study the following loss parameters were used:

- In pervious areas an initial loss of 10 mm and a continuing loss of 6 mm/hr
- In impervious areas an initial loss of 0 mm and a continuing loss of 0 mm/hr

### 4.4.4 Surface roughness parameters

For the DRAINS hydrological model, surface roughness (Mannings n) is used to calculate the travel time to the concentration point of the catchment. In RAFTS, surface roughness is used in a different form (‘Pern’, XP-RAFTS User Manual, 2002), to determine the amount of storage within a subcatchment, affecting the routing of flows. Surface roughness values were adjusted in the RAFTS model to reflect this.

For the RAFTS model in this study the following surface roughness ‘Pern’ parameters were used:

- In pervious areas a value of 0.025 was used
- In impervious areas a value of 0.015 was used.

### 4.4.5 Vectored Slopes

Vectored slopes estimates are required for RAFTS models, in order to estimate subcatchment storage and routing. Subcatchment peak runoff in RAFTS is very sensitive to vectored slope, especially where catchments have variations in topography across their surface.

Vectored slope was estimated using the detailed topographic grid of the catchment derived using ALS data. The calculation of the slope was carried out as specified in *Australian Rainfall and Runoff* (1998).

# 5. Hydraulic Modelling

## 5.1 Overview

Two dimensional modelling is used in this study to quantify the difference between the different hydrological and stormwater system models, and to provide flood mapping outputs.

Two dimensional hydraulic modelling software takes overflow hydrographs from the DRAINS and RAFTS models, routes them across the catchment topography. This allows direct comparison of the flooding predicted by each of the three hydrological and stormwater modelling approaches.

Following completion of this comparison, the flood modelling results will be used to prepare flood mapping and flood risk precincts for Canley Corridor.

## 5.2 Modelling Software

TUFLOW (Two-dimensional Unsteady FLOW) is combined two-dimensional (2D) and one-dimensional (1D) flood and tide simulation software. It simulates the hydrodynamics of water bodies using 2D and 1D free-surface flow equations. TUFLOW is specifically orientated towards establishing flow patterns in coastal waters, estuaries, rivers and floodplains where the flow patterns are essentially 2D in nature and cannot or are difficult to represent accurately using a 1D network model.

## 5.3 Model Setup

### 5.3.1 Background

The TUFLOW model for this study is based on a larger scale mainstream flood model developed for three tributaries of Prospect Creek, including Green Valley Creek, Orphan School Creek and Clear Paddock Creek. The Canley Corridor model utilises part of the larger model between Orphan School Creek and Green Valley Creek watercourses. The Canley Corridor area drains towards the north east into Orphan School Creek. In the three tributaries model, Orphan School Creek is represented as a one-dimensional watercourse, and this aspect of the three tributaries model has been preserved unchanged in the Canley Corridor model.

### 5.3.2 Digital Terrain Model

The topography of the catchment is represented in the model using a two metre grid. This level of precision in the grid was considered necessary in order to represent detailed flood behaviour in a fully developed residential catchment. Representing individual buildings and roads requires a fine grid structure, with grid spacing at least as small as typical opening between properties, and able to represent the full flow width of the road. The basis of the topographic grid used in the TUFLOW model is an ALS survey carried out by FCC. Figure 5-1 shows ground elevations within the Canley Corridor catchment based on this data.

### 5.3.3 Building Polygons

This study has treated buildings as solid objects in the floodplain, within which floodwater cannot flow or be stored. This means that buildings form impermeable boundaries within the model, and that while water can flow around buildings, it cannot flow across their footprint.

This is considered more realistic than including these areas within the active floodplain. While some floodwater may enter buildings during a flood, in an overland flow with the depths expected at Canley Corridor, this volume is not considered to be significant. In addition, the limited depths expected makes it unlikely that most large buildings would collapse.

The buildings were removed using a GIS dataset of building polygons generated by SKM. This was superimposed on the model grid, and used to make model computational cells inactive. Figure 5-2 shows a sample from the catchment of this building polygon dataset.

### 5.3.4 Property Fencelines

Fencelines have not been included in the model, and floodwater can flow across them freely. Fences may be an important obstruction to overland flood flows in some parts of the catchment, and the potential effect is considered in later in Flood Results section of this report. However, the data collection and model development required to accurately represent individual fences would have significantly increased the scope of the study. Including fence lines would have required on-site identification of fence type, blockage and structural strength for individual properties. In addition, representing fences in the hydraulic model requires making unvalidated assumptions about depths at which fences overflow or fail.

### 5.3.5 Surface Roughness

All parts of the catchment within the TUFLOW model were assigned hydraulic roughness values according to land use types. These are based on standard reference values for Mannings n (Chow, 1959)

- *Table 5-1: TUFLOW Model Grid Hydraulic Roughness Values*

| Land Use Type | Assumed Mannings n Roughness |
|---|---|
| Roads or Car parks | 0.02 |
| Commercial / Industrial / High Density Residential | 0.2 |
| Open Space (with trees) | 0.05 |
| Open Space (grass only) | 0.035 |
| Medium and low density Residential | 0.15 |
| Heavily vegetated areas | 0.1 |

### 5.3.6 Boundary Conditions

The TUFLOW model has three sets of boundary conditions, representing fluxes into and out of the hydraulic model. These boundary conditions are:

- **Overland Flow from Hydrological / Stormwater Models**: Overflows from the DRAINS models and subcatchment flows from the RAFTS model are applied to the TUFLOW model grid. The generation of these flows is discussed in Section 4. The inflow series are applied as point inflows directly onto the grid. Applying inflows onto a two-dimensional grid in this way can overestimate the depth of the flooding at particular points. However, in this instance the subcatchments are relatively small, and the error associated with this simplification was found to be small.
- **Orphan School Creek Inflows**: Orphan School Creek runs along the northern edge of the Canley Corridor model. The Canley Corridor catchment drains overland into the creek, as can be seen from the terrain model in Figure 5-1. Consequently, Orphan School Creek acts as a hydraulic boundary to the overland flow flood outlines being prepared for this study. The creek itself is represented as a one-dimensional part of the TUFLOW model, however the inflow at the upstream end and water level at the downstream end have to be specified as boundary conditions. It is not intended to reproduce the Orphan School Creek flood extents exactly, as has been done as part of the FCC mainstream flood study of the three tributaries. However in order to apply a realistic boundary at the creek, inflows into Green Valley Creek and Orphan School Creek have been taken from the three tributaries model and applied to the Canley Corridor model. Inflow hydrographs were taken from the three tributaries model for the 30 minute, 1 hour, 90 minute and 2 hour storm events.
- **Orphan School Creek Downstream Boundary**: The downstream boundary of the one-dimensional Orphan School Creek part of the model is a time series of water levels near the Orphan School Creek and Prospect Creek boundary. The water level time series was extracted from the Prospect Creek Floodplain Management Plan and Flood Study Review (Bewsher Consulting, March 2006). The time series available which were suitable for use in conjunction with the Canley Corridor model were the 25 minute and 2 hour duration events. The 25 minute water level boundary was used as the downstream boundary for Canley Corridor storm events up to 1 hour duration, and the 2 hour water level boundary was used for Canley Corridor events greater than 1 hour duration.

### 5.3.7 Stormwater Network Representation

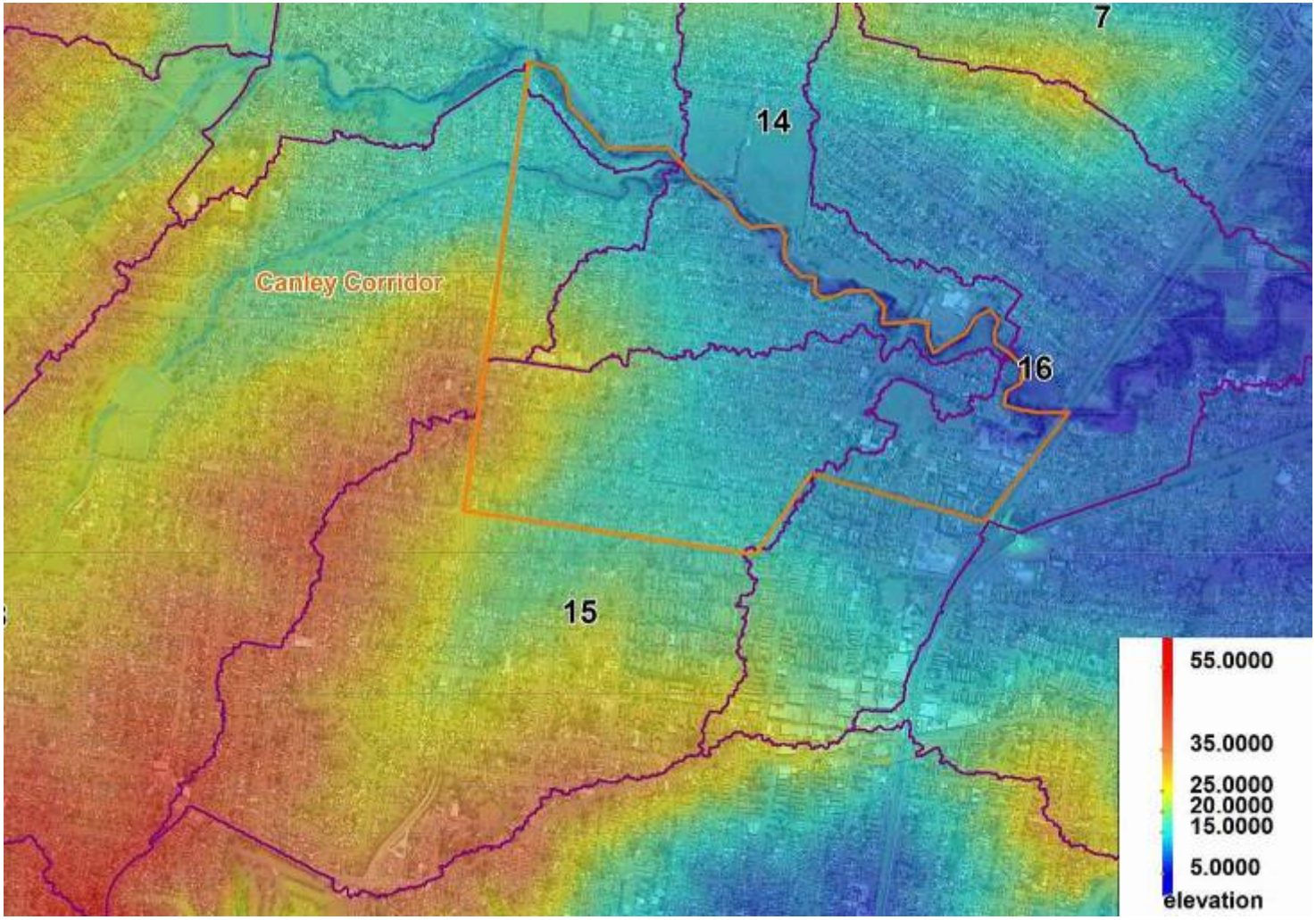
The TUFLOW model does not include representation of the stormwater network, or of the potential for system overflows to re-enter the pipe network. The DRAINS models calculate overflow from each pit using pit inlet capacity and pipe capacity. The overflow time series from the DRAINS models is then imported into TUFLOW. This approach means that any overflow from a pit in the DRAINS model is assumed to have no further opportunity to re-enter the stormwater system at

points further down the catchment. In reality some part of this overflow may be recaptured depending on the size and configuration of the stormwater system.

### 5.3.8 Hydraulic Model Calibration and Verification

As discussed in Section 4, rigorous model calibration and verification cannot be carried out for overland flow studies. However FCC maps showing past flooding 'trouble spots' have been used to in this study to provide some check on the performance of the model. This comparison is documented in Section 6 of the report.

- *Figure 5-1: Two-Dimensional Model Topography of Canley Corridor Catchment*

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- *Figure 5-2: Example Building Polygon Outlines in the Canley Corridor Catchment*

# 6. Sensitivity of Hydrological Modelling

## 6.1 Overview

In order to compare the three hydrological modelling approaches outlined in the study methodology, the TUFLOW model was used to route stormwater system overflows (for the DRAINS model) and subcatchment runoff (for the RAFTS model). This section outlines the results of this modelling, and summarises the conclusions drawn from it.

## 6.2 Peak Flood Depth

Figures 6-1, 6-2 and 6-3 show the peak depth of flooding over the storm for the Detailed DRAINS, Limited DRAINS and RAFTS models respectively. Comparison of the three figures shows the following:

- The Detailed DRAINS model shows a much wider extent of flooding. This reflects the significantly greater number of catchments, and wider distribution of inflow boundaries across the grid.
- The Limited DRAINS and RAFTS models show very similar flood extents, with the RAFTS the slightly greater of the two. The Limited DRAINS model includes the stormwater pipe drainage system, leading to lower overland flows in the 100 year ARI storm event.
- All three models generally show very similar depths of flooding along the main overland flow path, which runs from south west to north east. The less detailed models show more deeper flooding along the main overland flow route.

An enlarged view of Figure 6-1 is shown in Figure 6-4. This shows an example of an area where flooding occurs in the Detailed DRAINS model in the 100 year ARI event, but where it is not captured in the Limited DRAINS or RAFTS models.

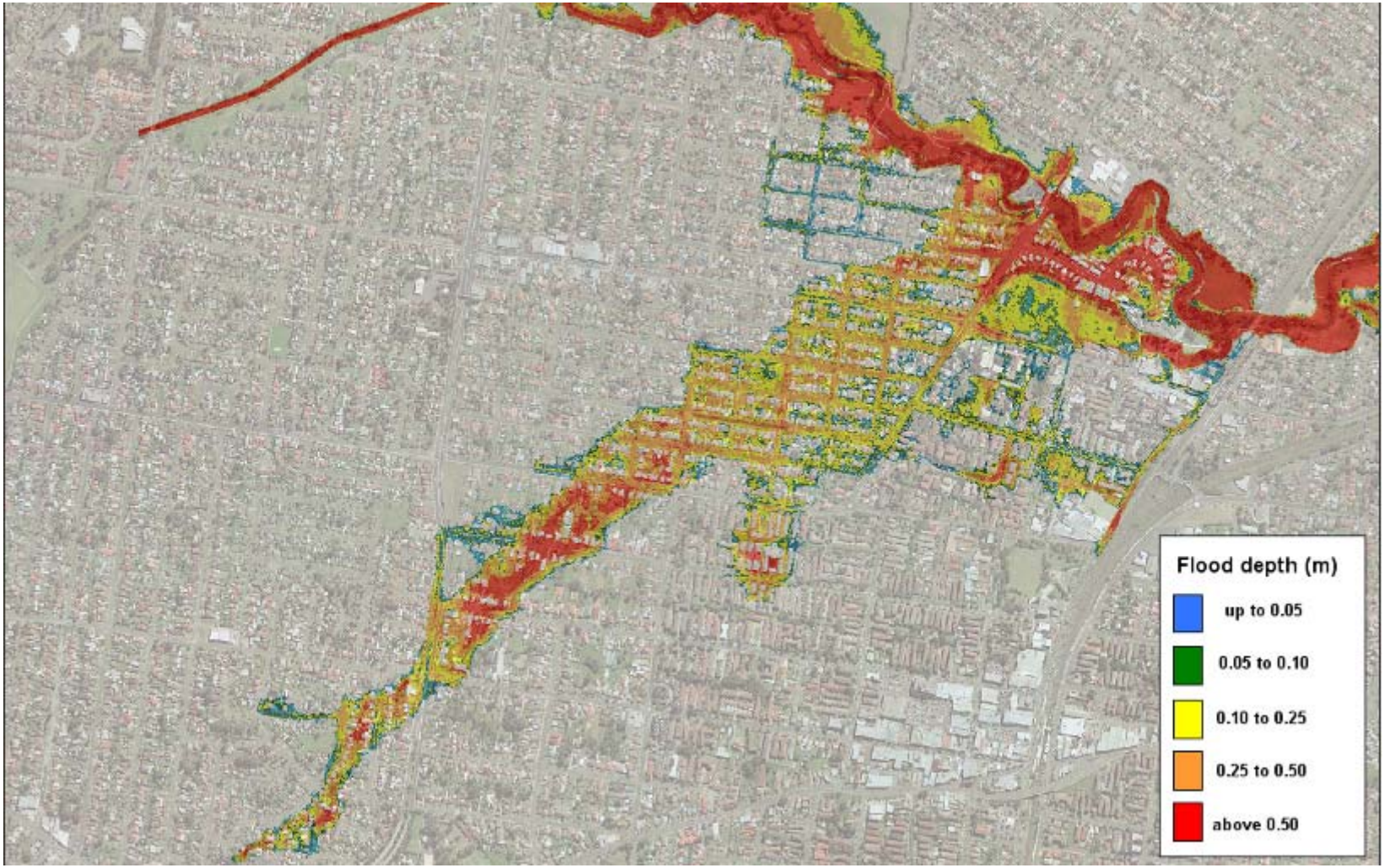
## 6.3 Difference in Peak Flood Depth between Hydrological Models

In order to compare the flood depth results in greater detail, the difference in peak flood levels between hydrological models has also been calculated for the 100 year ARI 30 minute duration storm event. The resulting grids are shown in Figures 6-5, 6-6 and 6-7. In addition, an enlarged example view of Figure 6-5 shown in Figure 6-8.

For each figure, the title indicates which two results are being compared, and the plotted colours show the magnitude of the difference in peak level. An explanation of the peak flood behaviour seen in each of the figures is given in Table 6-1. The table outlines the scale of the difference between the modelling approaches, and why this arises.

- *Figure 6-1 Detailed DRAINS model Peak of Peak Water Level for 100 year ARI – all storm durations*

- *Figure 6-2 Limited Model Peak of Peak Water Level for 100 year ARI – all storm durations*

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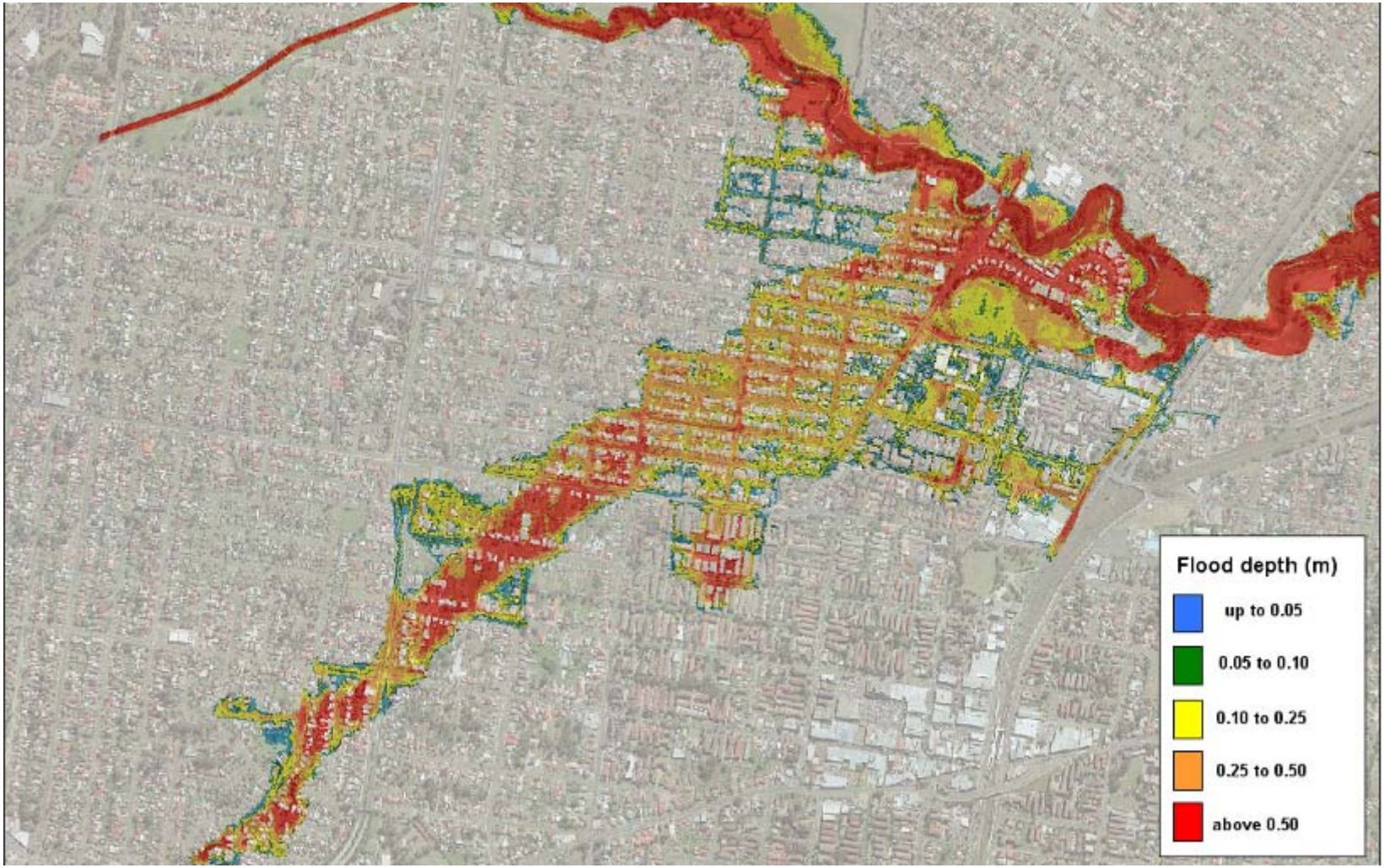
- *Figure 6-3 RAFTS Model Peak of Peak Water Level for 100 year ARI – all storm durations*



- *Figure 6-4 Detailed DRAINS Model Peak of Peak Water Level for 100 year ARI – all storm durations*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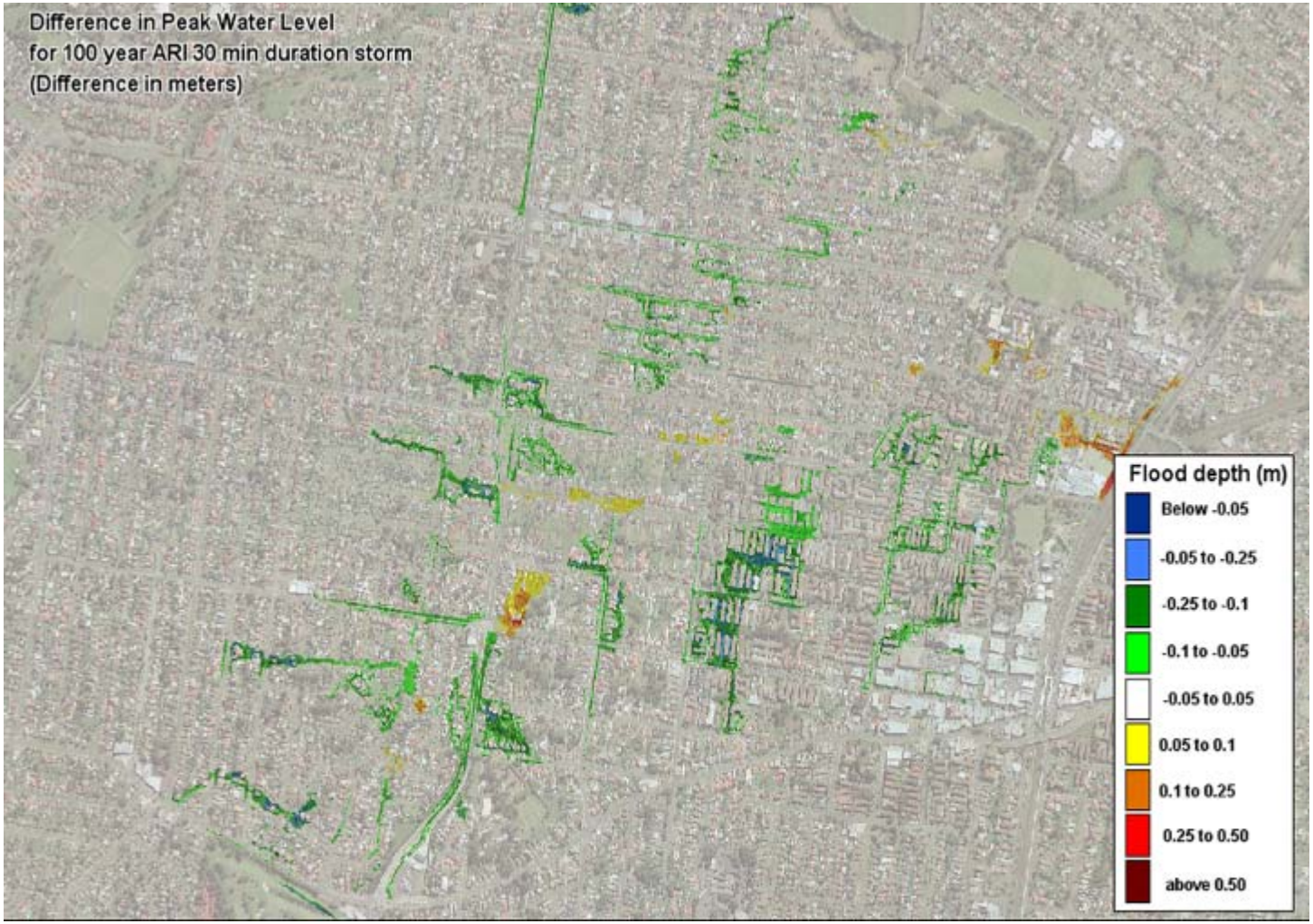
- *Table 6-1: Comparison of Peak Flood Water Levels in Two Dimensional Modelling of Detailed DRAINS, Limited DRAINS and RAFTS models*

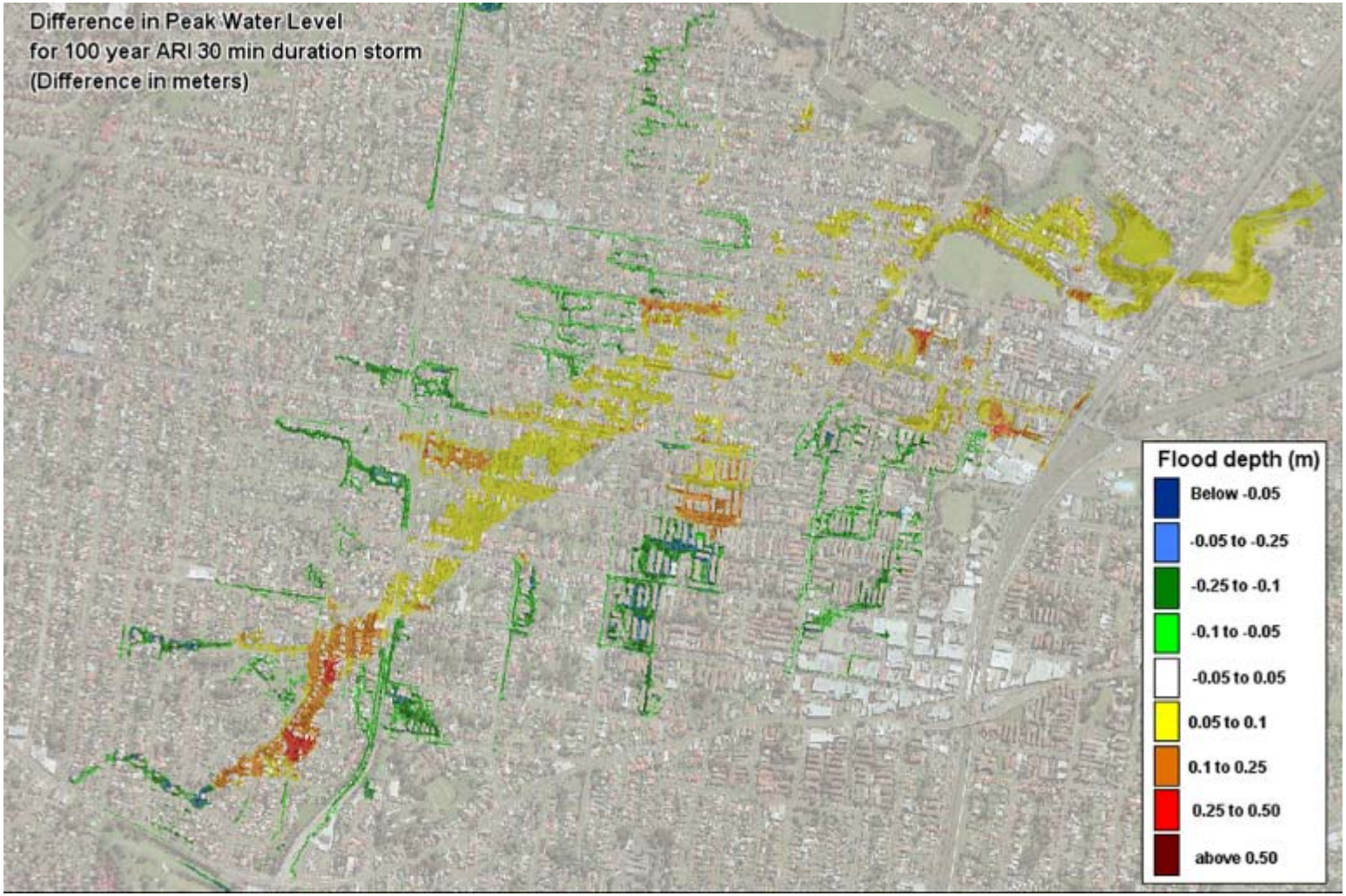
| Case | Difference between models | What the figure shows – blue / green areas | What the figure shows - red / yellow areas |
|---|---|---|---|
| Limited DRAINS – Detailed DRAINS<br>(Figure 5-4) | Both models include representations of the main stormwater drains of diameter 900 mm or greater, however the detailed model also includes smaller diameter pipes. | Areas are where the limited DRAINS model of the pipe network does not extend. This demonstrates the level of under prediction of peak flood depth in the limited model, solely because of it omitting smaller parts of the stormwater system.<br>**Typical values**: limited DRAINS model underestimates by 5 to 25 cm<br>**Higher values**: Some areas where limited DRAINS model under predicts by up to 50 cm | Areas where limited DRAINS peak flood levels exceed detailed DRAINS peak flood levels. These are due to water along the main overland flow path being concentrated by the limited DRAINS model. This demonstrates the difference between the models in the time taken for water to runoff along streets and into the overland sag.<br>**Typical values**: Generally limited model over predicts by less than 5 cm<br>**Higher values**: Small number of points where limited model over predicts by up to 50 cm |
| RAFTS – Detailed DRAINS (Figure 5-5) | Only the detailed DRAINS model represents the stormwater system. The RAFTS model consider surface runoff only. | Areas where the RAFTS model does not extend, but which are covered by the detailed DRAINS model. This is where the RAFTS model will under predict peak flood levels.<br>**Typical values**: RAFTS model underestimates by 5 to 25 cm<br>**Higher values**: Some areas where limited DRAINS model under predicts by up to 50 cm | Areas where peak flood levels in the RAFTS model exceed those in the detailed DRAINS model. This shows the impact neglecting the major pipe drainage network has on peak flood levels.<br>As with the limited DRAINS model, the difference is partly due to the difference in the time taken for water to reach the sag.<br>**Typical values**: Generally RAFTS over predicts by 5 to 10 cm along much of main overland flow path<br>**Higher values**: Over predicts by 25 to 50 cm in some upper parts of the main overland flow path |

| Case | Difference between models | What the figure shows – blue / green areas | What the figure shows - red / yellow areas |
|---|---|---|---|
| RAFTS – limited DRAINS (Figure 5-6) | Both models represent subcatchments at roughly the same scale (compared to the detailed DRAINS model, which has much finer and smaller subcatchments). The limited model includes stormwater drains of diameter 900 mm or greater, whereas all flood flow in the RAFTS model is conveyed overland. | Areas where peak flood levels in the limited DRAINS model exceed those in the RAFTS model. The few instances of this are due to the slightly more detailed representation of the overflows from the subcatchments in DRAINS.<br>**Typical values**: Isolated points only<br>**Higher values**: Isolated points only | Areas where peak floods levels in the RAFTS model exceed those in the limited DRAINS model. This shows the difference between two models which represent subcatchments at the same level of detail, but one of which includes the major pipe drainage network.<br>**Typical values**: along the sides and at the top of the main overland path, RAFTS can over predict relative to the limited DRAINS model by 10 to 25 cm<br>**Higher values**: RAFTS exceeds limited DRAINS results by up to 50 cm in places near the top of the main overland flow path |

- *Figure 6-5 Limited DRAINS Model – Detailed DRAINS Model (Difference in Peak Water Level)*



- *Figure 6-6 RAFTS Model – Detailed DRAINS Model (Difference in Peak Water Level)*

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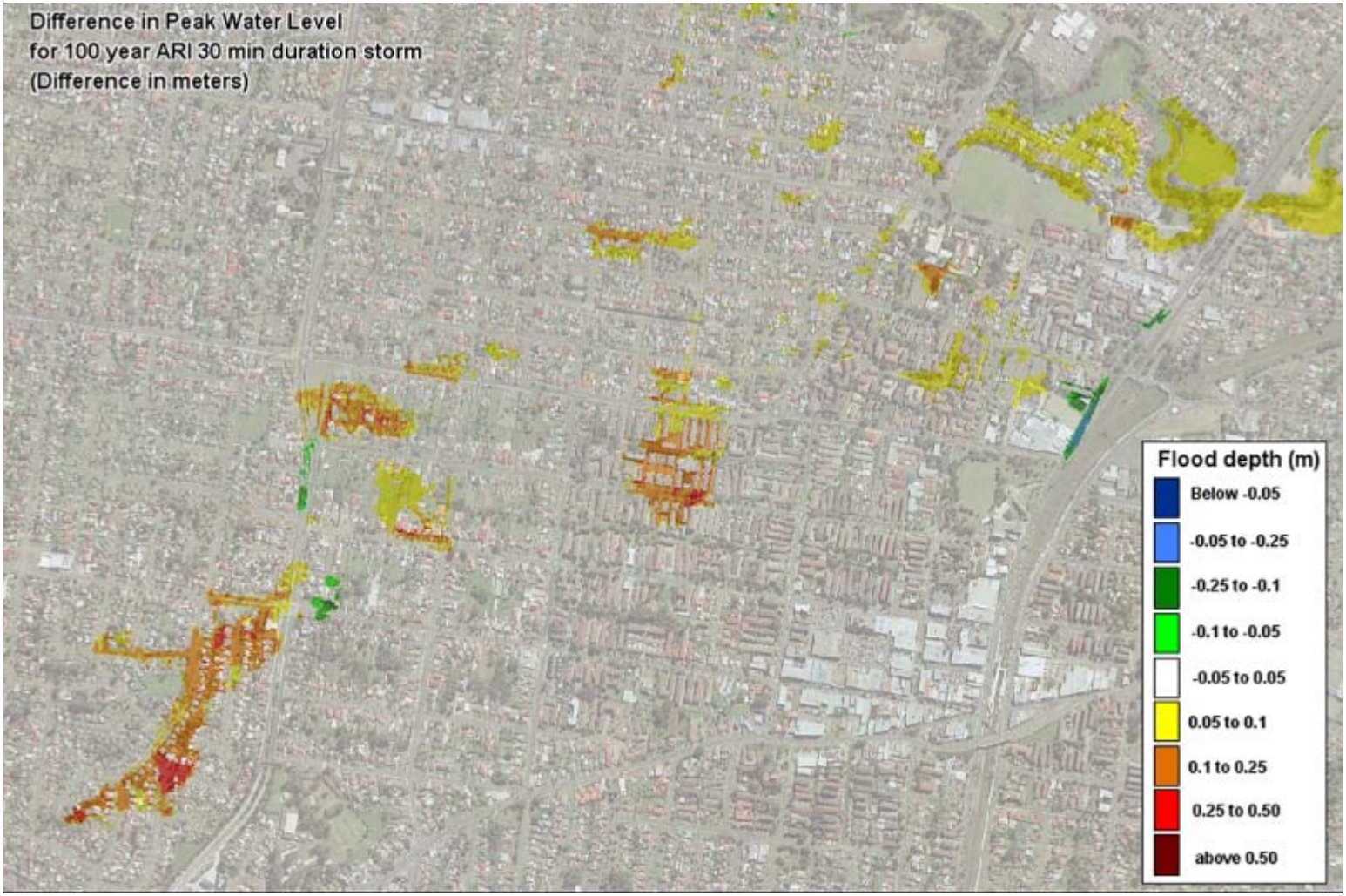
- *Figure 6-7 RAFTS Model – Limited DRAINS Model (Difference in Peak Water Level)*

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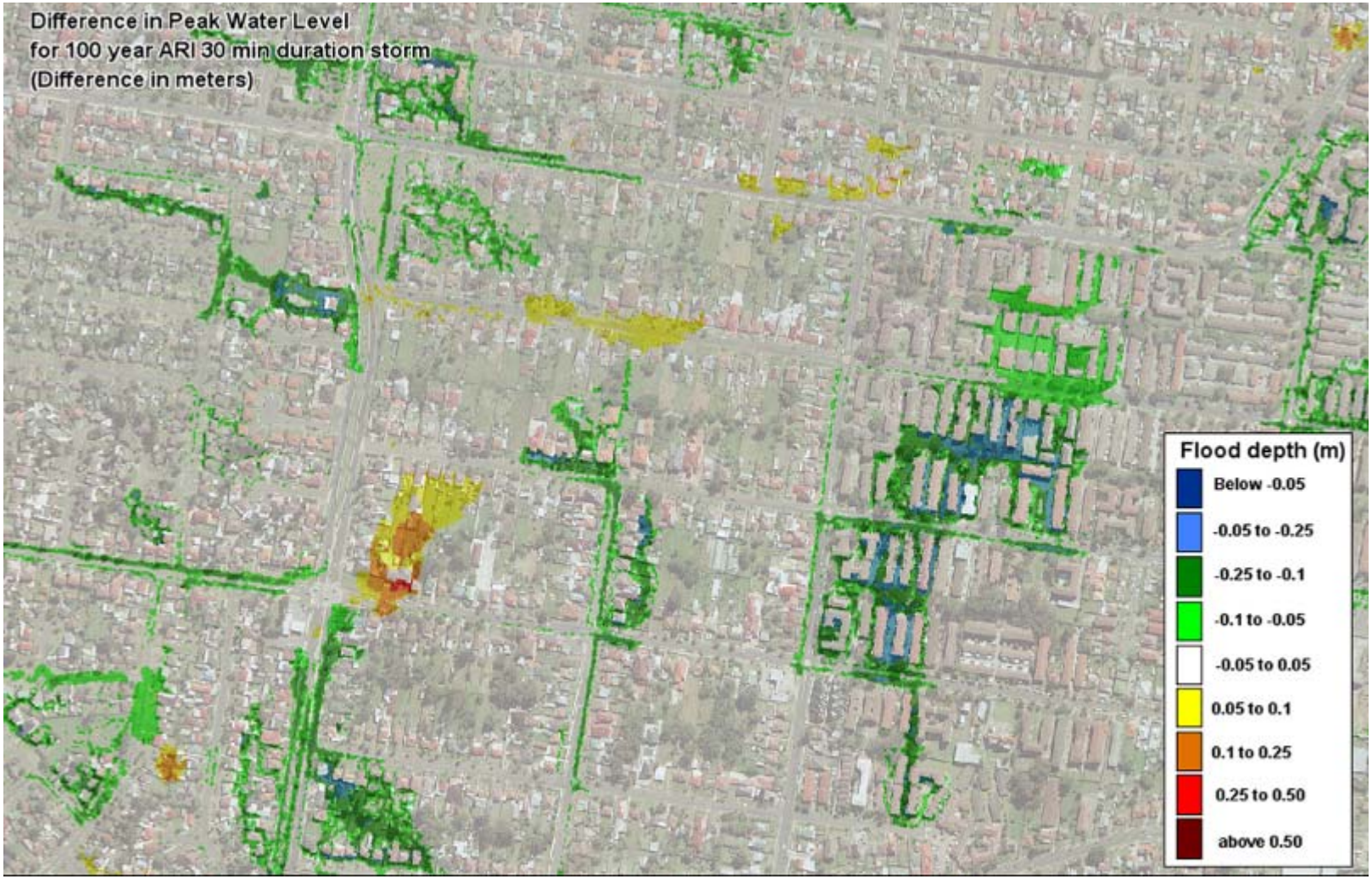
- *Figure 6-8 (Zoom View) Limited DRAINS Model – Detailed DRAINS Model (Difference in Peak Water Level)*

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The comparison of differences in Table 6-1 gives an indication of the level of precision of the Limited DRAINS and RAFTS modelling approaches. In this case, the error resulting from the less detailed models is typically of the order of 5 to 25 cm, although it can be up to 50 cm in some areas.

The less detailed models miss potential flooding away from the main drainage routes in the catchment, with the Detailed DRAINS model showing a significantly larger flood footprint. In some places, such as the blue areas on the lower right hand side of Figure 6-5, the Detailed DRAINS models has picked up substantial depths of flooding missed in the other models.

However, much of the additional flooding in the Detailed DRAINS model is around the fringes of the main overland flow paths, and is confined to the streetscape or local drainage lines between buildings. Modelling these fringe areas has benefits in terms of getting overland travel times in the catchment correct, however would probably only have minimal impact on setting floor levels for flood risk planning.

The Limited DRAINS and RAFTS models also over estimate the depth of flooding along the main overland flow routes, such as the orange and red areas on the lower left hand side of Figures 6-5 and 6-6. Much of this is simply due to the difference in the level of detail in the two dimensional model. By introducing flows onto the grid at a greater number of points and further up the catchment, the more detailed model is able to identify areas where floodwater will accumulate or encounter obstacles blocking flow paths. However, some difference is also due to the hydrological modelling in the Limited DRAINS and RAFTS software. RAFTS, and the hydrological part of DRAINS, rely on conceptual modelling of floodplain storage and overland flow travel times. These will almost always produce different results to a two dimensional hydraulic grid, which is able to take into account the actual geometric layout of the catchment and the surface friction characteristics of overland flow paths.

## 6.4 Draft Flood Risk Precinct Result Sensitivity

### 6.4.1 Risk Categories

To illustrate the sensitivity of flood planning outcomes to hydrological modelling, FCC Draft High and Medium Risk Categories were calculated for each of the three modelling approaches. FCC define the risk categories as:

- High Risk: The area of land below the 100 year ARI flood outline that is subject to high hydraulic hazard (for preparation of the interim flood risk precincts, this has been taken as the provisional ‘High Hazard’ zone in Figure L2 of Appendix L in the NSW Floodplain Development Manual (2005))
- Medium Risk: Land below the 100 year ARI flood outline that is not in the High Risk Precinct

- Low Risk: All other land within the floodplain (i.e. within the extent of the PMF) but not identified within either the High Risk or Medium Risk Precincts

The high and medium risk categories are shown in Figures 6-9, 6-10 and 6-11 for the three hydrological modelling approaches. A more detailed view of an area of higher risk in the catchment is shown in Figures 6-12, 6-13 and 6-14.

### 6.4.2 Sensitivity Mapping

Figure 6-9 shows the hazard in the wider catchment for Detailed DRAINS model. The high risk areas are generally confined to the main overland flow route running from south west to north east. The Detailed DRAINS model shows no significant areas of high risk outside of this area.

Figures 6-10 and 6-11 for the Limited DRAINS and RAFTS models show very similar patterns for the flood risk. In particular, all of the major areas identified as high risk in the detailed model are also identified as high risk in the limited DRAINS and RAFTS models.

However the two less detailed models do show additional high risk areas which are not in the Detailed DRAINS model results. This is due to the coarser representation of catchments, and the location of the inflows from the Limited DRAINS and RAFTS model onto the TUFLOW grid. As there are fewer inflow boundaries into TUFLOW for these less detailed models, each boundary puts more flow onto the hydraulic model grid than the corresponding Detailed DRAINS model boundary does. This leads to artificial concentration of flows on the TUFLOW grid in the less detailed models, and produces isolated points where velocities, depths and risk are artificially high.

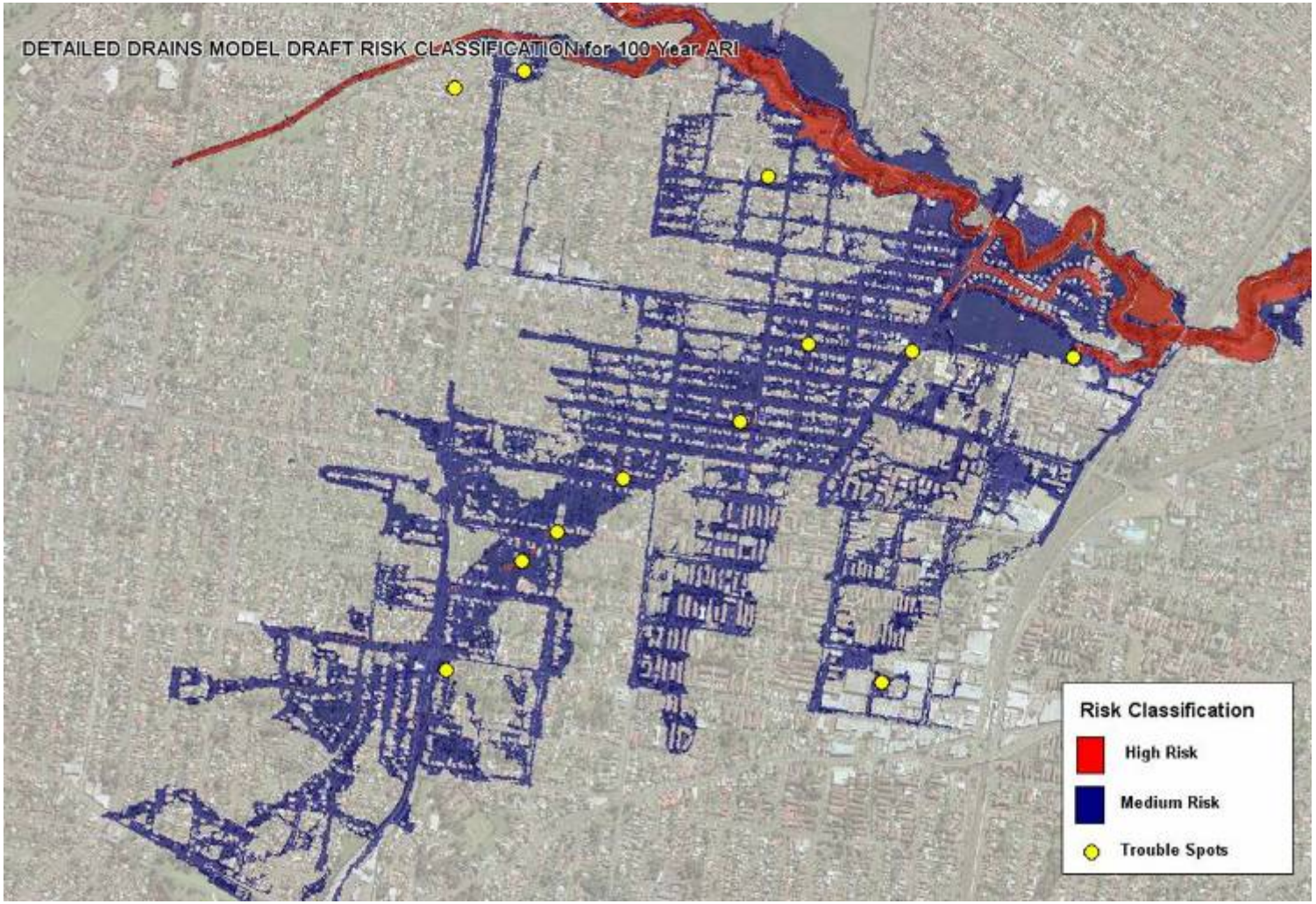
This is demonstrated in the detailed Figures 6-12, 6-13 and 6-14. In the Detailed DRAINS model (Figure 6-12), there is an area of high flood risk near the centre of the figure. This is reproduced in both Limited DRAINS (Figure 6-13) and RAFTS (Figure 6-14) models. However the RAFTS model also indicates high flood risk areas to the south west of this area. This is partly due to the location of the model boundaries at this point, artificially concentrating flow.

## 6.5 Verification of Results

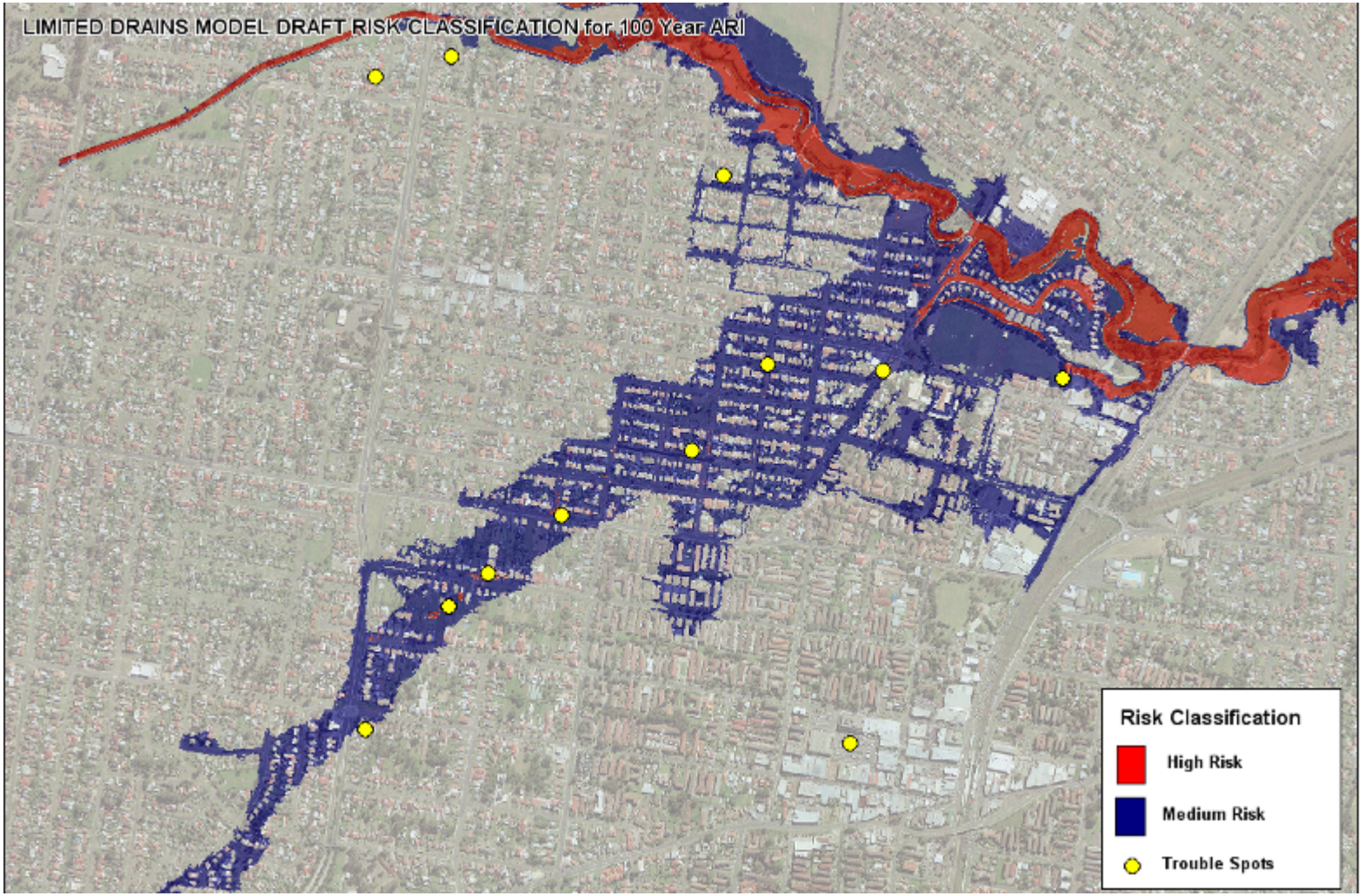
Also shown in Figures 6-9 through to 6-14 are known overland flooding spots within the catchment. These provide a check on whether the different types of model are consistent with past flooding behaviour. Comparison of the trouble spots with the model results indicates:

- All three hydrological models picked most known trouble spots in the catchment.
- The Detailed DRAINS model picked up one spot in the south eastern corner of the catchment the other models did not pick up. Council's investigation database indicates that this location is within a shopping complex prone to localised flooding due to drainage blockages rather than overland flooding.

- *Figure 6-9 Detailed DRAINS Model Risk Classification for 100 year ARI*



- *Figure 6-10 Limited DRAINS Model Risk Classification for 100 year ARI*

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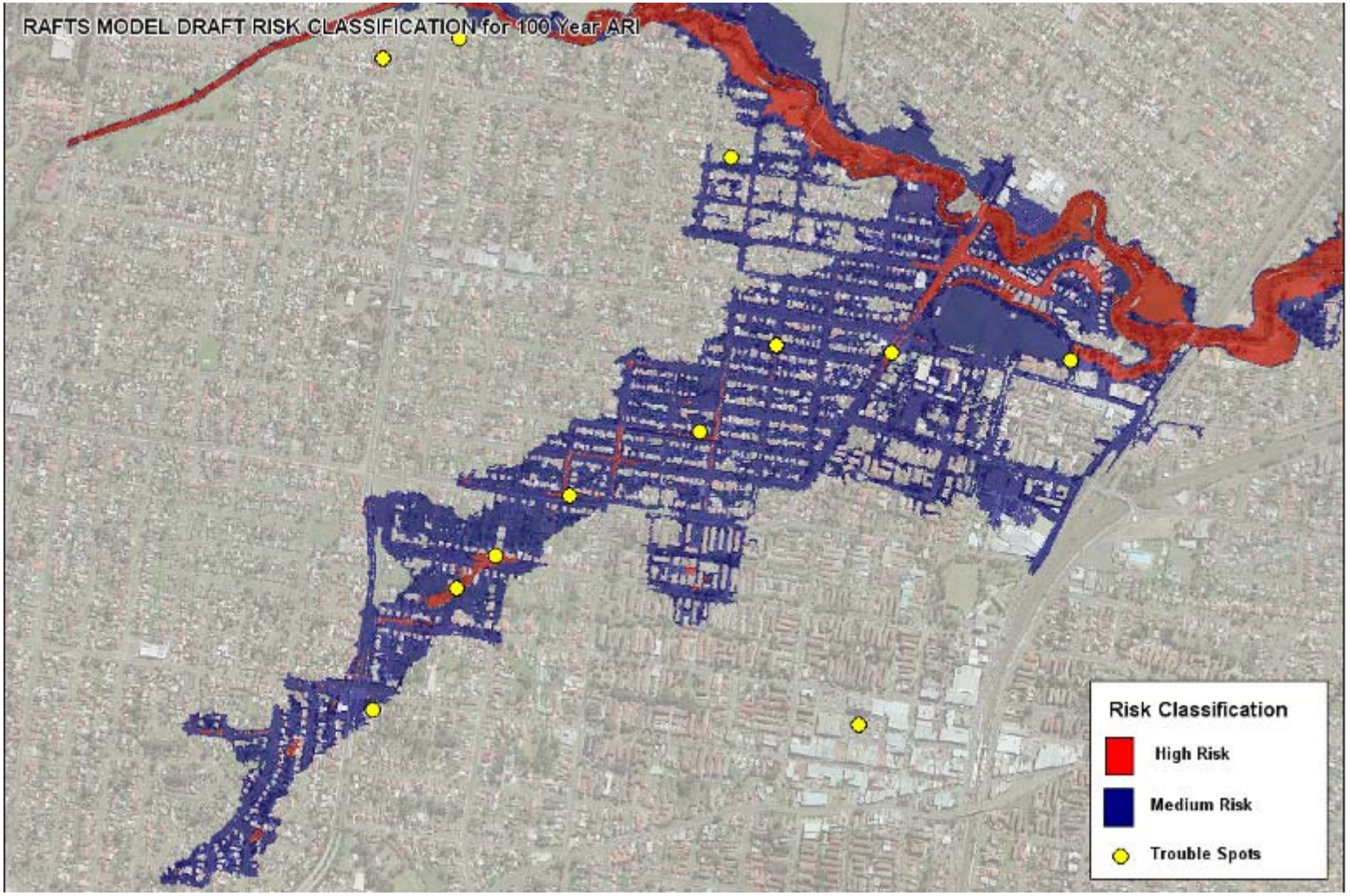
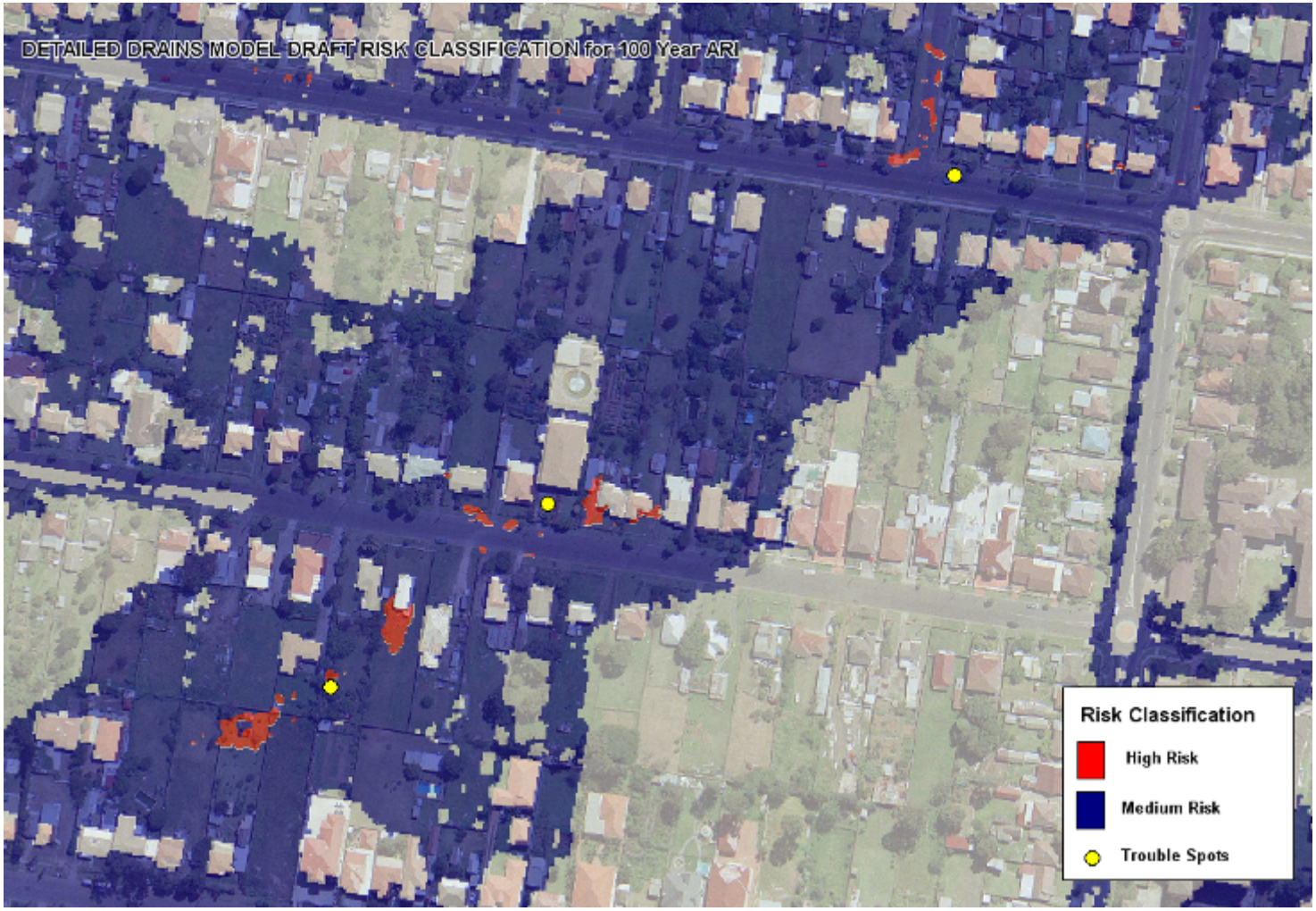
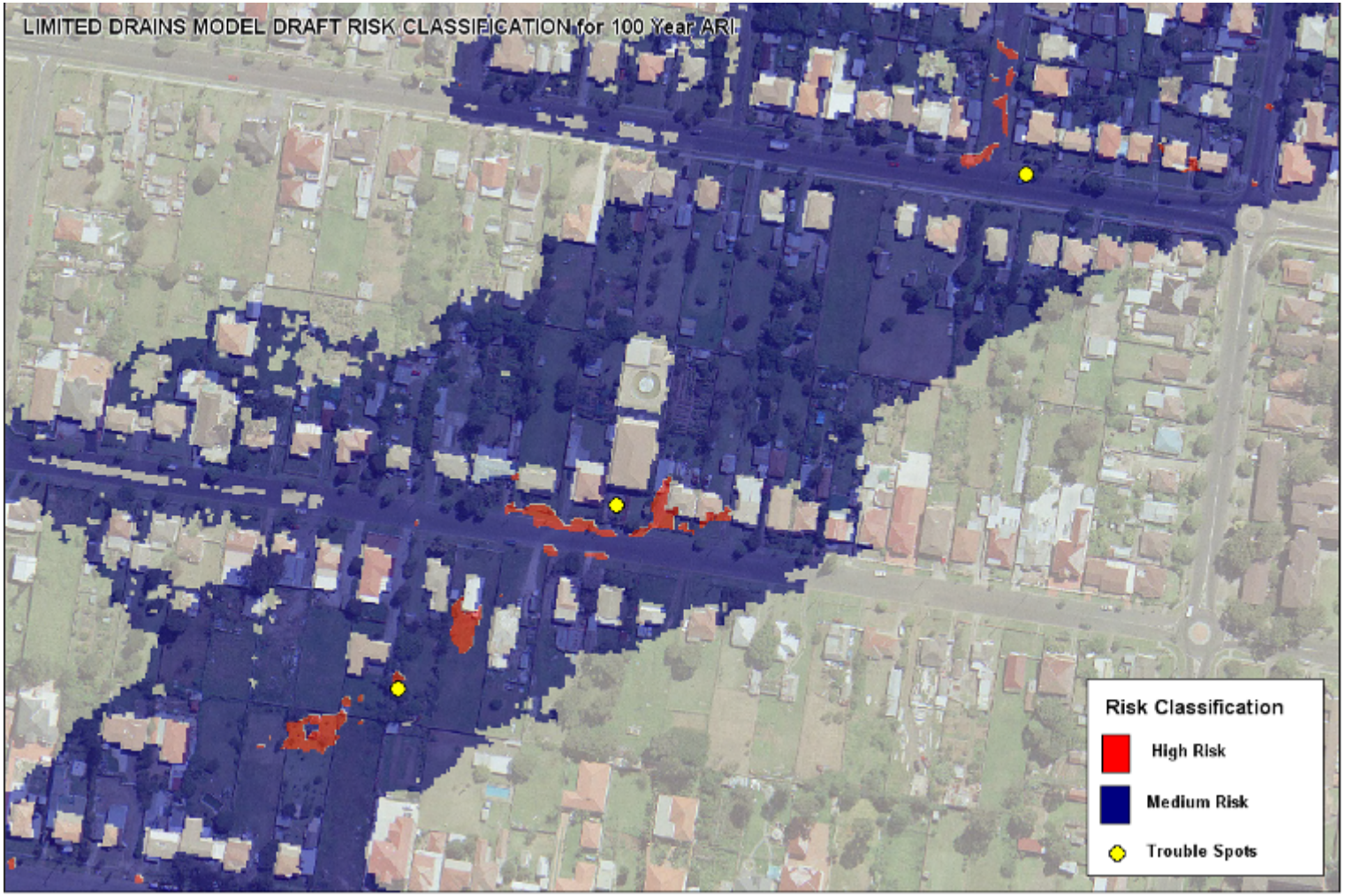
- *Figure 6-11 RAFTS Model Risk Classification for 100 year ARI*



- *Figure 6-12 (Zoom View) Detailed DRAINS Model Risk Classification for 100 year ARI*



- *Figure 6-13 (Zoom View) Limited DRAINS Model Risk Classification for 100 year ARI*



- *Figure 6-14 (Zoom View) RAFTS Model Risk Classification for 100 year ARI*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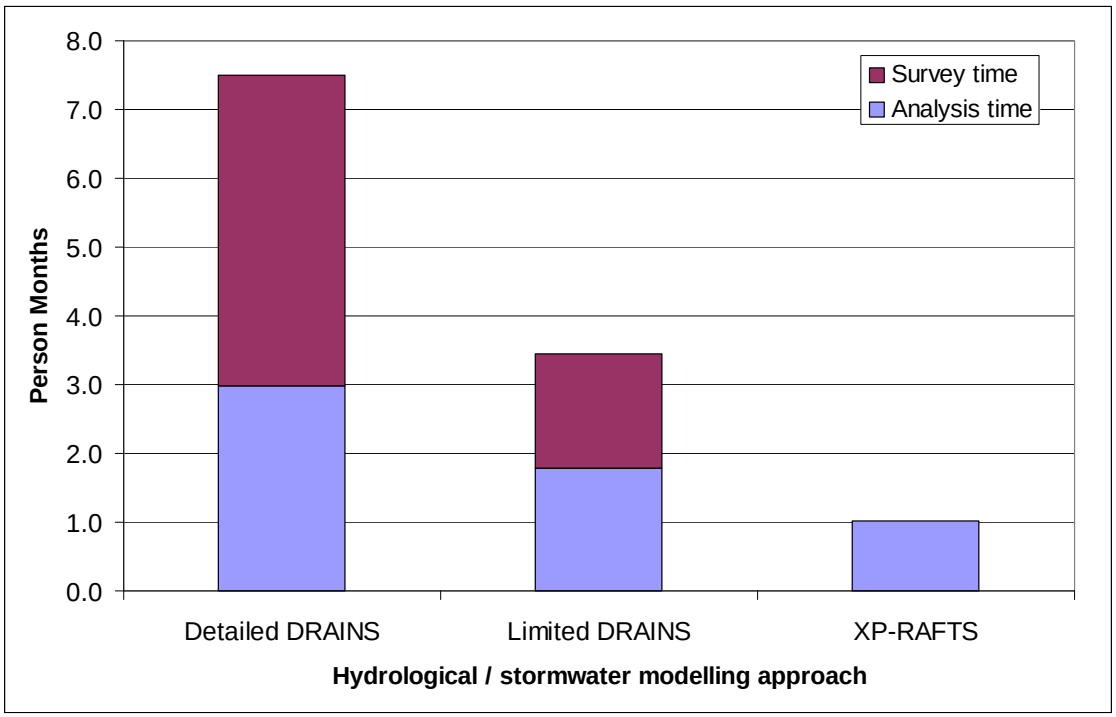
## 6.6 Model Development Costs

The costs involved in developing each catchment / stormwater system model have been estimated for this report. This information allows a comparison of the effort involved in collecting data, estimating modelling parameters and developing models for each of the approaches.

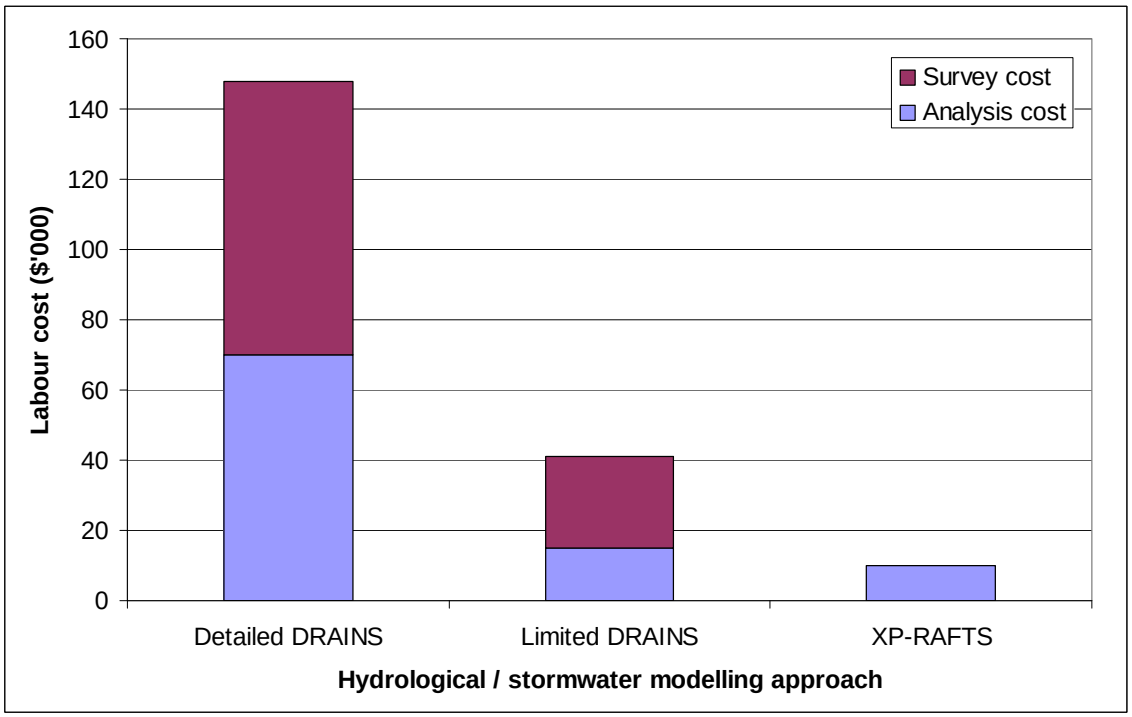
Figure 6-15 shows estimates of the time required to develop each of the models in a study of this size. Time has been apportioned between the Detailed and Limited DRAINS model, according to the total number of pits and pipes that had to be captured for each type of model. Development of the RAFTS model required no ground survey, although it does rely on Airborne Laser Survey (ALS) and aerial photography being available in order to estimate model parameters. The additional time required to collect information for the Detailed DRAINS model is significant. In this study, programming and carrying out this work led to delays in initiating the hydrological modelling.

Figure 6-16 shows the labour cost estimated to be required in survey and in developing the models. A number of tasks were common to all three modelling approaches, and costs have been split according to the level of detail required for each model. Developing the Detailed DRAINS model is significantly more expensive and time consuming than developing either the Limited DRAINS or RAFTS model. The Detailed DRAINS model is approximately three to four times as expensive as the Limited DRAINS model, and approximately fourteen times as expensive as the RAFTS model.

- *Figure 6-15: Labour time involved in Model Development for Hydrological / Stormwater Network Models*




- *Figure 6-16: Labour Cost of Model Development for Hydrological / Stormwater Network Models*



## 6.7 Sensitivity of Hydrological Modelling - Conclusions

General conclusions from comparison of the different modelling approaches are:

- Detailed modelling of the catchment and stormwater system provides a significantly more precise picture of flooding in the flood fringe and streetscape
- Despite the difference in modelled flood extent this did not translate into significantly different assessments of flood risk between the three approaches, or indicate that significantly different flood planning controls would be adopted
- High flood risk areas located along the main overland flow paths were generally captured by all the models
- In some cases the simplified models overstated flood risk due to poorer modelling of flow travel times, and artificial concentration of floodwater at coarser inflow boundaries
- In this study Detailed DRAINS model development was estimated to be four to five times as expensive as Limited DRAINS model development, and approximately fourteen times as expensive as RAFTS model development
- In similar studies in the future, the additional flooding identified by the Detailed DRAINS model is unlikely to justify the additional data collection and model development costs
- While there are instances where the detailed model does identify significant flooding, such areas could be identified through local knowledge of particular flood prone areas, detailed catchment site inspections, or small extensions to initial modelling and mapping in sensitive areas
- Flood planning controls such as flood freeboard levels will address some of the uncertainty surrounding the location of the flood fringe in the simplified models.

## 6.8 Sensitivity of Hydrological Modelling - Recommendations

Based on the outcomes of this study it is recommended that:

- A Limited DRAINS type approach be favoured for overland flood studies by FCC in the future, as:
    - It captures most significant ‘trouble spots’ within the catchment
    - Significantly less data capture is involved than is required for a detailed model
    - It represents a compromise between cost and level of detail
    - Model extent can be adapted to include known historical ‘trouble spots’ during project scoping
    - The model can be extended in the future should this be required
- Ground truthing and reality testing against known Council information is key in defining model extent, reviewing model results, and identification of flood hazard.

# 7. Flood Mapping Results

## 7.1 Background

The Limited DRAINS hydrological model of the entire Canley Corridor area (including sections of sub-catchments 14 and 16) was used to provide draft flood mapping for overland flow and to prepare interim flood risk precinct outlines. This model was based on the Limited DRAINS model developed for the comparison of the three different modelling approaches.

This section of the report details how the flood outline mapping and the flood risk precinct mapping was prepared for the 100 year ARI and PMF events.

## 7.2 Flood Outline Mapping

Detailed flood depth mapping for the 100 year ARI flood is included in Appendix D. The mapping is based on the following approach:

- A Limited DRAINS model was used, with parameters and inputs as discussed in earlier sections of this report
- The combined Limited DRAINS and TUFLOW model was run for storm durations including 15 minutes, 30 minutes, 45 minutes, 60 minutes, 90 minutes and 2 hours
- The peak water level of each storm duration at each grid point in the TUFLOW model of the catchment was extracted, and used to form a 'peak of peaks' grid of flood depth
- The critical storm duration varies across the catchment area, however along the main flow path within the catchment it is generally between 1.5 and 2 hours

Results for the 5 and 20 year ARI events are also tabulated in Appendices B and C.

## 7.3 Peak Flows across Selected Roads

The peak flow crossing a number of the larger roads in the catchment is reported in Appendix C. The flow given is the total flow at the road crossing (not including pipe flows) at the peak of the 5, 20, 100 year ARI and PMF events. This is reported for the storm duration giving the highest peak flow for the selected event.

## 7.4 The Impact of Fencing on Flood Outline Mapping

Results produced for this study have not included the effect of fences as potential barriers to overland flood flows. Accurate representation of fences would have required significant additional data collection, as well as making a number of assumptions in the flood modelling that could not be validated in the time available.

However, a sensitivity test on the 100 year storm was carried out to assess the potential impact of 'solid' fences in the upper catchment. The type of fences between properties in the upper catchment was assessed on-site, and is shown in Appendix F Figure F1. Lengths of continuous and solid (brick or "Colourbond") fencing were represented as solid boundaries in the model for the sensitivity test. It was assumed that these would retain water up to 1.0 metre depth, and then overflow freely. The modelled fence boundaries are shown in Figure F2.

The peak flood depth in the 100 year ARI event with the fence blockages included is shown in Figure F3 (this can be compared to the corresponding flood depth map in Appendix D for the no-fence situation). The peak flood depth adjacent to the blockages is raised to the assumed overflow level of 1.0 metre at the fence boundary. In areas where most of the flow is conveyed across properties rather than along streets, the blockages significantly increase water levels in upstream properties. The increased depth due to the fences is therefore directly related to the assumed depth at which the fence overflows or fails.

Figure F4 shows the increase in the extent of the provisional high hazard area, as defined in the Floodplain Development Manual (NSW Government, 2005). As the fences increase flooding upstream, the area classified as high hazard according to the provisional Floodplain Development Manual also increases accordingly. This illustrates the potential additional risk solid fence obstructions may have within the floodplain.

## 7.5 Flood Risk Precinct Mapping Process

Flood risk precinct mapping has been prepared for the Canley Corridor catchment. This mapping is based on GIS analysis of the 100 year ARI and PMF peak depth and velocity grids, in accordance with the FCC DCP flood risk precinct categories described in Table 9-1. The resulting flood risk precinct maps are included in Appendix E. These maps are the refined versions of the interim flood risk precinct maps issued in the 2007 study report.

**Table 9-1 FCC Flood Risk Precincts (Fairfield City Wide DCP, 2006)**

| Risk Precinct | Description |
|---|---|
| High | The area of land below the 100 year ARI flood outline that is subject to high hydraulic hazard (for preparation of the draft flood risk precincts, this has been taken as the provisional 'High Hazard' zone Figure L2 of Appendix L in the NSW Floodplain Development Manual (2005)) |
| Medium | Land below the 100 year ARI flood outline that is not in the High Risk Flood Precinct |
| Low | All other land within the floodplain (i.e. within the extent of the PMF) but not identified within either the High Risk or Medium Risk Precincts. |

### 7.5.1 Interim Flood Risk Precinct Map Production

Council has set definitions for flood risk precinct mapping for mainstream flooding, based in part on the experience gained in preparing maps for the Prospect Creek and Cabramatta Creek mainstream flood studies. However, overland flooding is more complicated than mainstream flooding. Several factors (buildings, fences, roads, stormwater pits and pipes, debris blockages) can affect the way the flood behaves in an overland flowpath, as opposed to mainstream flooding where the floodplain normally follows the creek shape. This will ultimately also affect how the flood risk precincts will be defined for an overland floodplain.

To produce the interim flood risk precinct mapping in 2007, SKM and FCS followed established DCP mainstream flooding definitions. These definitions for flood risk precincts are detailed in Chapter 11 of the DCP. In producing the interim maps, a number of difficulties were found in applying the mainstream mapping methodologies overland flooding mapping. Evacuation difficulties, higher ground level "islands", and mapping localised, shallow depth flooding were not fully considered when these interim maps were produced. In January 2009 Council reviewed the interim precincts in order to address these specific mapping issues, which are detailed below.

### 7.5.2 Final Flood Risk Precinct Map Production

Specific refinements to the interim flood risk precinct maps were made as follows:

- **Medium Risk Areas changed to Low or No Risk**: 'Islands' of low risk surrounded by a medium risk precinct were originally mapped as continuous areas of medium risk. The maps were updated to show these 'islands' as low (or no) risk. Most of the properties affected by this change are located in the area between Canley Vale Road, Sackville Street and Railway Parade.
- **Medium Risk Areas changed to High Risk**: Areas of medium risk surrounded by high risk were originally left as medium risk. During the refinement process, evacuation difficulties in these areas were assessed resulting in some areas being changed to high risk. For instance, 66 properties on Freeman Avenue at the northern end of the catchment were reclassified as high risk.

  Sackville Street and Railway Parade were also identified as being affected by high flood depths (greater than 1 metre depth) and high velocities (greater than 2 m/s) during the 100 year ARI event. Due to the potential of these roads being used as evacuation routes sections of these roads were reclassified as high risk.
- **Removal of Nuisance or Local Flooding in Outer Fringes**: Isolated areas of small depths away from the main flow paths may be contained within the street or reflect the assumptions made in setting up the flood model, and consequently including them in the mapping may not

be appropriate. A review was therefore undertaken to determine areas which could be considered "nuisance" or "localised" flooding caused by local drainage issues rather than actual overland flooding.

The Floodplain Development Manual (2005) defines local drainage problems as invariably involving "shallow depths (less than 0.3 m) with generally little danger to personal safety". It is likely that the FDM based the 300 mm flood depth cut-off on the Building Code of Australia (BCA) which, at the time of publication of the FDM, required that house slabs were to be built to a minimum 300 mm above ground level (although the BCA have recently revised the minimum slab height to150 mm).

SKM, in consultation with Council, decided to adopt a more conservative depth of 150 mm to define shallow depths outside the main flowpaths for the following reasons:

- Council's kerb heights are generally 150 mm so any water flow below that depth would more than likely be contained on the street
- Building Code of Australia (BCA) now specifies slab heights for residential development at 150 mm
- The error in the Aerial Laser Survey (ALS) in which the Digital Terrain Model (DTM) for Canley Corridor is based on is between 100 and 200 mm
- Removing anything greater than 150 mm depth from the maps will produce disconnected pockets on the map and large areas of flooding not being shown
- Existing fencing on properties was not modelled (which would potentially increase flood depths and flood risk as discussed in Section 7.4) therefore a more conservative approach is required when looking at the extent of flooding.

- **Mapping Building Polygon Outlines**: As noted in Section 5.3.3, buildings were treated as solid objects in the floodplain and not subject to flooding. This means that the flood depth and velocity maps show building footprints as blank areas within the floodplain.

  As Council provides the risk coding on the entire property and not just the building on it, the risk precinct maps required the appropriate risk to be shown across the entire property (as well as through the building footprint). In order to do this, two methods were used:

  - A line was drawn connecting each end of the flood profile across the building for standard residential buildings
  - For larger developments ground levels across the property were reviewed and compared to the flood level. Risk precincts/flood extents were extended across the building footprint where appropriate.

## 7.6 Mapping the Zone of Significant Flow

Flood depth and precinct mapping has highlighted some of the areas where it is important that overland flowpaths are kept clear. In these areas flowpath blockage can significantly increase upstream water levels and the level of risk to adjacent properties.

In addition to the flood risk precincts defined in the FCC DCP, this study defines a 'Zone of Significant Flow'. This identifies areas where measures may be necessary on properties to keep overland flow paths clear. Any measures applied in the Zone of Significant Flow would be in addition to those applied to flood risk precincts. The outline of the Zone of Significant Flow is shown in Appendix E.

The Zone of Significant Flow differs from the flood risk precincts as it defined by flood conveyance considerations rather than risk considerations. The outline was developed by comparing the relative importance of properties and roads as flowpaths. In the upper catchment most floodwater runs across properties rather than along roads. In these areas blockage of flowpaths within the properties can significantly increase water levels upstream and divert water onto other properties. In the lower catchment most floodwater runs along roads rather than across properties. Generally, in the lower floodplain blockage within the average property will have less effect on upstream water levels and the flood extent. However it is important to note that properties outside the Zone of Significant Flow can still experience inundation, and there may be unidentified properties where measures are necessary to ensure overland flowpaths remain unobstructed.

It is expected that options to ensure flowpaths are kept relatively free of obstructions will be discussed with the community during preparation of the Floodplain Risk Management Study and Plan as the next stage of the floodplain management process. One such management measure may be to open up the bottom section of fences in properties. Council has successfully implemented this in the past and assisted people with this management measure.

## 7.7 Summary of Mapping Outcomes

The flood depth and velocity mapping reveals the following:

- The higher depths and fastest flows are in the upper catchment.
- In the lower parts of the catchment, floodwaters spread out along the streets and depths are shallower.
- The majority of properties affected are residential, although a number of business properties, parks and recreational facilities are also affected
- All parcels zoned "business" within this floodplain will be affected by the 100 year flood event. These businesses are located along Canley Vale Road in Canley Vale between Sackville Street and Railway Parade.

- The calculated flood depths are less than 1m in all properties. In fact, the majority of properties within the extents of flooding will be affected by less than 0.5m depth of water, with the exception of some properties with depths up to 1m in the upper end between Abercrombie Street and St Johns Road (in the "Zone of Significant Flow"), on McBurney Road between Gladstone Street and Hill Street and in Freeman Avenue.
- Flood depths on the roadway in Freeman Avenue and Railway Parade, just downstream of Bartley Street, exceed 1m.
- Flood velocities within properties are generally less than 0.5 m/s, though with isolated areas of between 0.5 and 1 m/s across some properties in the upper catchment. The higher velocity flows (greater than 1 m/s) are mainly contained within the roads.

The final flood precinct mapping shows:

- An estimated 2,596 properties are flood prone up to the PMF flood event. This includes:
  - 165 parcels in the High (or partially high) risk precinct
  - 1627 parcels in the Medium (or partially medium) risk precinct
  - 804 parcels in the Low (or partially low) risk precinct
- The Zone of Significant Flow encompasses approximately 242 properties. These are also located within either the high or medium risk precincts
- Areas of high risk include all properties along Freeman Avenue (due to evacuation difficulties and Orphan School Creek flooding), sections of Railway Parade and Sackville Street (two major roads which act as significant overland flow paths), and an isolated area between McBurney Road and Hughes Street along the main flow path within the upper part of the catchment.
- The medium risk precinct extends in a southwest to northeast direction from Cabramatta Road, across Cumberland Highway, covering much of the Canley Vale Road East and Sackville Street area. There is also a low point running southwards from the end of Sackville Street into McBurney Road which is medium risk.
- The low risk precinct follows the outline of the medium risk precinct closely, although it extends significantly beyond the Medium Risk Precinct between Canley Vale Road East, Gladstone Road and Sackville Street, and in localised areas on either side of Railway Parade.

The extent of the flood risk precincts reflects the topography of the catchment, with the precincts being narrow and confined in the steeper upper parts of the catchment to the south, and spreading out across the flatter lower parts of the catchment in the south. These features of the topography also explain the close similarity of the medium and low risk precincts in the upper catchment, and why the low risk precinct outline spreads comparatively further in the lower parts of the catchment.

# 8. Conclusions

## 8.1 Hydrologic Modelling Methodology

Comparison of the different hydrologic models indicates that while detailed modelling provides a more precise picture of flooding, this would not necessarily translate into a different assessment of flood risk, or in significantly different planning controls being applied. All three hydrologic modelling approaches (Detailed DRAINS, Limited DRAINS and RAFTS) resulted in similar high flood risk areas being identified along the main overland flow paths, and reproduced the known historical 'trouble spots' within the catchment. However the simpler models tended to overestimate flood risk due to coarser representation of flow travel times and artificial concentration of flows at fewer inflow boundaries.

Production of a detailed DRAINS model including all pits and pipes in the catchment was estimated to be four to five times more expensive than production of a limited DRAINS model, and approximately 14 times more expensive than production of a RAFTS model. This reflects the different amount of survey data required and the complexity of the model construction.

The preferred approach identified by the study is a limited DRAINS model representing larger sized pipes in the stormwater network. This approach can be as acceptable in determining significant areas of risk as a detailed DRAINS model approach, if the extent of the modelling stormwater network reflects known trouble spots in the catchment, and represents the major elements of the trunk drainage system.

## 8.2 Canley Corridor Flood Behaviour and Risk

Peak flood depths on most properties are less than 0.5 metres, although there are some areas in the upper catchment where depths are between 0.5 and 1.0 metres. Similarly, flow velocities across most properties are generally below 0.5 metres per second, although higher velocities are seen in many streets and across some upper catchment properties.

A "Zone of Significant Flow" has also been identified where it is important that overland flowpaths are kept clear. It contains much of the 100 year ARI extent in the upper catchment, where flowpath blockage caused by fences, large buildings and debris can significantly increase water levels and divert water onto nearby properties.

These maps only represent flooding due to runoff from within the Canley Corridor catchment. Those parts of the Corridor along the banks of Orphan School Creek may also be at risk from mainstream flooding, generated in the upper Orphan School Creek catchment to the north and west of the Canley Corridor. Mainstream flood extents for Orphan School Creek are reported in the *Flood Study for Orphan School Creek, Green Valley Creek and Clear Paddock Creek* (Sinclair Knight Merz & Fairfield Consulting Services, 2008).

The Canley Corridor Overland Flood Study has been successful in achieving its objectives which were to:

- test the sensitivity of overland flood modelling to different assumptions about the capacity of the stormwater drainage system
- define flood behaviour and identify the major overland flow paths within the Canley Corridor catchment, and
- identify properties at risk of local overland flooding and to prepare flood risk precinct maps.

The study has also:

- established methodologies for modelling and flood risk mapping for future overland flood studies for Fairfield LGA
- provided maps which are more meaningful to Council officers, development proponents and the community
- provided a good foundation from which to prepare the floodplain risk management study and plan, particularly with regards to flood emergency response, as the next step in the floodplain risk management process

# 9. Glossary

| Term | Description |
|---|---|
| Annual Exceedance Probability (AEP) | Term used to describe the chance of a flood of a given or larger size occurring in any one year, expressed as a percentage. Eg. a 1% AEP flood means there is a 1% (ie. one-in-100) chance of a flood of that size or larger occurring in any one year (see ARI). |
| Australian Height Datum (AHD) | A common national plain of level corresponding approximately to mean sea level. All flood levels, floor levels and ground levels are normally provided in metres AHD (m AHD) |
| Average Recurrence Interval (ARI) | The long-term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event. |
| catchment | A catchment is the area of land from which rainwater drains into a common point such as a reservoir, pond, lake, river or creek. In urban areas such as Fairfield, the majority of the rainwater is collected by gutters and pipes and then flows through stormwater drains into the stormwater system. |
| conveyance | A direct measure of the flow carrying capacity of a particular cross-section of a stream or stormwater channel. (For example, if the conveyance of a channel cross-section is reduced by half, then the flow carrying capacity of that channel cross-section will also be halved). |
| discharge | The rate of flow of water measured in terms of volume per unit time, eg. cubic metres per second ($m^3/s$). Also known as **flow**. Discharge is different from the speed/velocity of flow which is a measure of how fast the water is moving. |
| extreme flood | An estimate of the probable maximum flood, which is the largest flood likely to ever occur. |
| flood | A relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage as defined by the FDM before entering a watercourse. |
| flood awareness | An appreciation of the likely effects of flooding and a knowledge of the relevant flood warning and evacuation procedures. |
| flood hazard | The potential for damage to property or harm to persons during a flood or a situation with a potential to cause loss. In relation to this plan, the hazard is flooding which has the potential to cause harm or loss to the community. Flood hazard is a key tool used to determine flood severity and is used for assessing the suitability of future types of land use. |
| flood level | The height of the flood described as either a depth of water above a particular location (eg. 1m above floor level) or as a depth of water related to a standard level such as Australian Height Datum (eg. flood level is 5m AHD). |
| flood liable/flood prone land | Land susceptible to flooding up to the PMF. The term flood liable or flood prone land covers the entire floodplain. |

| Term | Description |
|---|---|
| floodplain | The area of land that is subject to inundation by floods up to and including the PMF event. |
| Floodplain Development Manual (FDM) | Refers to the document dated April 2005, published by the New South Wales Government and entitled “Floodplain Development Manual: the management of flood liable land”. |
| Floodplain Risk Management Plan (FRMP) | A plan prepared for one or more floodplains in accordance with the requirements of the FDM or its predecessors. |
| Floodplain Risk Management Study (FRMS) | A study prepared for one or more floodplains in accordance with the requirements of the FDM or its predecessors. |
| flood risk | The chance of something happening that will have an impact. It is measured in terms of consequences and probability (likelihood). In the context of this plan, it is the likelihood of consequences arising from the interaction of floods, communities and the environment. |
| flood risk precinct | An area of land with similar flood risks and where similar development controls may be applied by a Council to manage the flood risk. The flood risk is determined based on the existing development in the precinct or assuming the precinct is developed with normal residential uses. Usually the floodplain is categorised into three flood risk precincts 'low', 'medium' and 'high', although other classifications can sometimes be used.<br><br>*High Flood Risk: T*his has been defined as the area of land below the 100-year flood event that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties.<br><br>*Medium Flood Risk:* This has been defined as land below the 100-year flood level that is not within a High Flood Risk Precinct. This is land that is not subject to a high hydraulic hazard or where there are no significant evacuation difficulties.<br><br>*Low Flood Risk:* This has been defined as all land within the floodplain (i.e. within the extent of the probable maximum flood) but not identified within either a High Flood Risk or a Medium Flood Risk Precinct. The Low Flood Risk Precinct is that area above the 100-year flood event. |
| flood study | A study that investigates flood behaviour, including identification of flood extents, flood levels and flood velocities for a range of flood events. |
| hydraulics | The study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity. |
| hydraulic hazard | The hazard as determined by the provisional criteria outlined in the FDM in a 100 year flood event. |
| hydrology | The study of rainfall and runoff process; in particular, the evaluation of peak discharges, flow volumes and the derivation of hydrographs (graphs that show how the discharge or stage/flood level at any particular location varies with time during a flood). |

| Term | Description |
|---|---|
| local drainage | Term given to small scale inundation in urban areas outside the definition of major drainage as defined in the FDM. Local drainage problem invariably involve shallow depths (less than 0.3m) with generally little danger to personal safety. |
| local overland flooding | The inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam. |
| mainstream flooding | The inundation of normally dry land by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam. |
| overland flow path | The path that floodwaters can follow if they leave the confines of the main flow channel or pipe system. Overland flow paths can occur through private properties or along roads. |
| peak discharge | The maximum discharge or flow during a flood measured in cubic metres per second ($m^3/s$). |
| probable maximum flood (PMF) | The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation. |
| probable maximum precipitation (PMP) | The greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to the estimation of the probable maximum flood. |
| probability | A statistical measure of the expected chance of flooding (see ARI). |
| risk | See *flood risk.* |
| runoff | The amount of rainfall that ends up as flow in a stream. Also known as rainfall excess. |
| velocity | The term used to describe the speed of floodwaters, usually in metres per second (m/s). |
| water level | See *flood level.* |
| water surface profile | A graph showing the height of the flood (ie. water level or flood level) at any given location along a watercourse at a particular time. |
| zone of significant flow | That area of the floodplain where a significant discharge of water occurs during floods. Should the area within this boundary be fully or partially blocked, a significant distribution of flood flows or increase in flood levels would occur. |

# 10. References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- XP Software (2002) *XP-RAFTS User Manual*

# Appendix A Hydrological / Stormwater Model Data

**Table A1: Detailed DRAINS model Stormwater Pit Data**

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q271050 | OnGrade | RM.7 Grated Pit | 19.32 | 4.8 | - | - | 0.5 | No |
| Q271040 | OnGrade | 1.8 m lintel | 19.06 | 1.5 | - | - | 0.5 | No |
| Q271030 | OnGrade | 1.8 m lintel | 17.64 | 1.5 | - | - | 0.5 | No |
| Q271020 | OnGrade | 1.8 m lintel | 16.1 | 1.5 | - | - | 0.5 | No |
| QIn2 | Node | - | 15.8 | - | - | - | - | - |
| Q273010 | OnGrade | RM.7 Grated Pit | 16.14 | 4.8 | - | - | 0.5 | No |
| Q274010 | OnGrade | 0.9 m lintel | 17.76 | 4.8 | - | - | 0.5 | No |
| Q23005 | OnGrade | 0.9 m lintel | 30.65 | 4.8 | - | - | 0.5 | No |
| Q23015J | OnGrade | RM.7 Grated Pit | 30.35 | 1.5 | - | - | 0.5 | Yes |
| Q46005J | OnGrade | RM.7 Grated Pit | 30.2 | 1.5 | - | - | 0.5 | Yes |
| Q46001 | OnGrade | 1.8 m lintel | 30 | 1.5 | - | - | 0.5 | No |
| Qin1 | Node | - | 28.5 | - | - | - | - | - |
| Q117030 | OnGrade | 1.8 m lintel | 32.5 | 4.8 | - | - | 0.5 | No |
| Q117010 | Sag | 3.0 m lintel | 32.69 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q117020 | OnGrade | RM.7 Grated Pit | 32.7 | 1.5 | - | - | 0.5 | No |
| Q1100140 | OnGrade | RM.7 Grated Pit | 32.26 | 1.5 | - | - | 0.5 | No |
| Q1100130 | OnGrade | RM.7 Grated Pit | 31.88 | 1.5 | - | - | 0.5 | No |
| Q1100120 | OnGrade | RM.7 Grated Pit | 31.55 | 1.5 | - | - | 0.5 | No |
| Q1100110 | OnGrade | RM.7 Grated Pit | 31.25 | 1.5 | - | - | 0.5 | No |
| Q1100100 | OnGrade | RM.7 Grated Pit | 30.98 | 1.5 | - | - | 0.5 | No |
| Q110090 | OnGrade | RM.7 Grated Pit | 30.86 | 1.5 | - | - | 0.5 | No |
| Q110080 | OnGrade | 1.8 m lintel | 30.42 | 1.5 | - | - | 0.5 | No |
| Q110070 | OnGrade | 1.8 m lintel | 29.46 | 1.5 | - | - | 0.5 | No |
| Q110060 | OnGrade | 1.8 m lintel | 28.73 | 1.5 | - | - | 0.5 | No |
| Q110050 | OnGrade | 1.8 m lintel | 27.82 | 1.5 | - | - | 0.5 | No |
| Q110040 | OnGrade | RM.7 Grated Pit | 26.4 | 1.5 | - | - | 0.5 | No |
| Q110030 | OnGrade | RM.7 Grated Pit | 25.33 | 1.5 | - | - | 0.5 | No |
| Q110020 | OnGrade | RM.7 Grated Pit | 24.13 | 1.5 | - | - | 0.5 | No |
| Q110010 | Sag | 0.9 m x 0.45 m Grated pit | 23.75 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10450J | OnGrade | RM.7 Grated Pit | 23.85 | 1.5 | - | - | 0.5 | Yes |
| Q10440J | OnGrade | RM.7 Grated Pit | 23.25 | 1.5 | - | - | 0.5 | Yes |
| Q101010 | Sag | 4.2 m lintel | 22.65 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10420 | Sag | 1.2 m lintel | 22.76 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10410J | OnGrade | RM.7 Grated Pit | 21.57 | 1.5 | - | - | 0.5 | Yes |
| Q10400J | OnGrade | RM.7 Grated Pit | 21.47 | 1.5 | - | - | 0.5 | Yes |
| Q10390J | OnGrade | RM.7 Grated Pit | 21.1 | 1.5 | - | - | 0.5 | Yes |
| Q95010 | Sag | 1.8 m lintel | 20.74 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10380J | OnGrade | RM.7 Grated Pit | 20.85 | 1.5 | - | - | 0.5 | Yes |
| Q10370 | OnGrade | RM.7 Grated Pit | 20.6 | 1.5 | - | - | 0.5 | Yes |
| Q10360J | OnGrade | RM.7 Grated Pit | 20.3 | 1.5 | - | - | 0.5 | Yes |
| Q10350J | OnGrade | RM.7 Grated Pit | 20 | 1.5 | - | - | 0.5 | Yes |
| Q10340 | OnGrade | 1.8 m lintel | 19.2 | 1.5 | - | - | 0.5 | No |
| Q10330 | OnGrade | 1.8 m lintel | 19.26 | 1.5 | - | - | 0.5 | No |
| Q10320 | OnGrade | RM.7 Grated Pit | 19.3 | 1.5 | - | - | 0.5 | Yes |
| Q10310 | OnGrade | RM.7 Grated Pit | 19.2 | 1.5 | - | - | 0.5 | Yes |
| Q10300 | OnGrade | RM.7 Grated Pit | 18.55 | 1.5 | - | - | 0.5 | Yes |
| Q10290 | OnGrade | RM.7 Grated Pit | 18.08 | 1.5 | - | - | 0.5 | Yes |
| Q10280 | OnGrade | RM.7 Grated Pit | 18.2 | 1.5 | - | - | 0.5 | Yes |
| Q10270J | OnGrade | RM.7 Grated Pit | 17.25 | 1.5 | - | - | 0.5 | Yes |
| Q10260J | OnGrade | RM.7 Grated Pit | 17.2 | 1.5 | - | - | 0.5 | Yes |
| Q10250 | OnGrade | 0.9 m lintel | 17.03 | 1.5 | - | - | 0.5 | No |
| Q10240J | OnGrade | RM.7 Grated Pit | 17.5 | 1.5 | - | - | 0.5 | Yes |
| Q10235J | OnGrade | RM.7 Grated Pit | 17.5 | 1.5 | - | - | 0.5 | Yes |
| Q10230J | OnGrade | RM.7 Grated Pit | 17.2 | 1.5 | - | - | 0.5 | Yes |
| Q10220J | OnGrade | RM.7 Grated Pit | 16.31 | 1.5 | - | - | 0.5 | Yes |
| Q10210J | OnGrade | RM.7 Grated Pit | 16.1 | 1.5 | - | - | 0.5 | Yes |
| Q10200J | OnGrade | RM.7 Grated Pit | 16 | 1.5 | - | - | 0.5 | Yes |
| Q10190 | OnGrade | 1.8 m lintel | 15.59 | 1.5 | - | - | 0.5 | No |
| Q10180 | OnGrade | 1.8 m lintel | 15.55 | 1.5 | - | - | 0.5 | No |
| Q10170 | OnGrade | 1.8 m lintel | 15.06 | 1.5 | - | - | 0.5 | No |
| Q10165J | OnGrade | RM.7 Grated Pit | 15 | 1.5 | - | - | 0.5 | Yes |
| Q10161 | Sag | 0.9 m x 0.45 m Grated pit | 14.54 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10160J | OnGrade | RM.7 Grated Pit | 14.9 | 1.5 | - | - | 0.5 | Yes |
| Q10150J | OnGrade | RM.7 Grated Pit | 14.85 | 1.5 | - | - | 0.5 | Yes |
| Q10140 | Sag | 0.9 m x 0.45 m Grated pit | 14.44 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10120J | OnGrade | RM.7 Grated Pit | 14.23 | 1.5 | - | - | 0.5 | Yes |
| Q10110J | OnGrade | RM.7 Grated Pit | 13.82 | 1.5 | - | - | 0.5 | Yes |
| Q10100J | OnGrade | RM.7 Grated Pit | 13.55 | 1.5 | - | - | 0.5 | Yes |
| Q1090 | OnGrade | 1.8 m lintel | 13 | 1.5 | - | - | 0.5 | No |
| Q1080 | OnGrade | RM.7 Grated Pit | 13 | 1.5 | - | - | 0.5 | No |
| Q1075 | OnGrade | RM.7 Grated Pit | 12.65 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q1070 | OnGrade | 1.2 m lintel | 12.65 | 1.5 | - | - | 0.5 | No |
| Q1050J | OnGrade | RM.7 Grated Pit | 12.35 | 1.5 | - | - | 0.5 | Yes |
| Q2410110 | Sag | 1.2 m lintel | 11.91 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1040 | OnGrade | 1.2 m lintel | 12.64 | 1.5 | - | - | 0.5 | No |
| Q1030 | OnGrade | RM.7 Grated Pit | 11.99 | 1.5 | - | - | 0.5 | No |
| Q1020J | OnGrade | RM.7 Grated Pit | 11.2 | 1.5 | - | - | 0.5 | Yes |
| Q1010 | OnGrade | 1.2 m lintel | 11.4 | 1.5 | - | - | 0.5 | No |
| Q1000 | Node | - | 9.07 | - | - | - | - | - |
| Q116010 | OnGrade | 1.8 m lintel | 31.72 | 4.8 | - | - | 0.5 | No |
| Q115040 | Sag | 3.6 m lintel | 33.95 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q115030J | OnGrade | RM.7 Grated Pit | 34.2 | 1.5 | - | - | 0.5 | Yes |
| Q115020J | OnGrade | RM.7 Grated Pit | 33.18 | 1.5 | - | - | 0.5 | Yes |
| Q118010 | Sag | 0.9 m x 0.45 m Grated pit | 32.22 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1100150 | OnGrade | RM.7 Grated Pit | 32.83 | 1.5 | - | - | 0.5 | No |
| Q119010 | OnGrade | 3.0 m lintel | 33.4 | 4.8 | - | - | 0.5 | No |
| Q1100170 | OnGrade | 0.9 m lintel | 33.83 | 1.5 | - | - | 0.5 | No |
| Q1100160 | OnGrade | RM.7 Grated Pit | 33.19 | 1.5 | - | - | 0.5 | No |
| Q1100180 | OnGrade | RM.7 Grated Pit | 34.44 | 4.8 | - | - | 0.5 | Yes |
| Q155020 | OnGrade | 0.9 m lintel | 34.8 | 1.5 | - | - | 0.5 | No |
| Q155010 | Sag | 0.9 m lintel | 34.39 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q150070 | OnGrade | RM.7 Grated Pit | 35.28 | 1.5 | - | - | 0.5 | Yes |
| Q150060 | OnGrade | RM.7 Grated Pit | 32.21 | 1.5 | - | - | 0 | Yes |
| Q150050 | OnGrade | 2.4 m lintel | 31.8 | 1.5 | - | - | 0.5 | No |
| Q150040 | OnGrade | 1.8 m lintel | 30.75 | 1.5 | - | - | 0.5 | No |
| Q150030 | OnGrade | 1.8 m lintel | 29.37 | 1.5 | - | - | 0.5 | No |
| Q150020 | OnGrade | SA1 (Type 2) | 29.2 | 1.5 | - | - | 0 | No |
| Q150015 | OnGrade | 1.8 m lintel | 29.85 | 1.5 | - | - | 0.5 | No |
| Q150010 | OnGrade | 1.8 m lintel | 28.5 | 1.5 | - | - | 0 | Yes |
| Q10610J | OnGrade | RM.7 Grated Pit | 28.15 | 1.5 | - | - | 0.5 | Yes |
| Q10600J | OnGrade | RM.7 Grated Pit | 27.45 | 1.5 | - | - | 0.5 | Yes |
| Q10580 | Sag | 3.6 m lintel | 27.07 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10570J | OnGrade | RM.7 Grated Pit | 26.81 | 1.5 | - | - | 0.5 | Yes |
| Q10560J | OnGrade | RM.7 Grated Pit | 26.58 | 1.5 | - | - | 0.5 | Yes |
| Q10550J | OnGrade | RM.7 Grated Pit | 26.4 | 1.5 | - | - | 0.5 | Yes |
| Q10540J | OnGrade | 1.8 m lintel | 26.46 | 1.5 | - | - | 0.5 | Yes |
| Q10530 | OnGrade | RM.7 Grated Pit | 25.3 | 1.5 | - | - | 0.5 | Yes |
| Q10520 | OnGrade | RM.7 Grated Pit | 24.87 | 1.5 | - | - | 0.5 | Yes |
| Q10510J | OnGrade | RM.7 Grated Pit | 24.1 | 1.5 | - | - | 0.5 | Yes |
| Q10500J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10490J | OnGrade | RM.7 Grated Pit | 23.35 | 1.5 | - | - | 0.5 | Yes |
| Q10480J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10470J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10460J | OnGrade | RM.7 Grated Pit | 23.4 | 1.5 | - | - | 0.5 | Yes |
| Q156010 | Sag | 0.9 m lintel | 34.54 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q157010 | Sag | 0.9 m lintel | 34.65 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q120010 | Sag | 3.0 m lintel | 23.22 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q112010 | OnGrade | 3.0 m lintel | 26.55 | 4.8 | - | - | 0.5 | No |
| Q107020 | Sag | 1.8 m lintel | 25.42 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q107010 | OnGrade | 1.8 m lintel | 25.52 | 1.5 | - | - | 0.5 | No |
| Q106030 | OnGrade | RM.7 Grated Pit | 24.8 | 1.5 | - | - | 0.5 | No |
| Q106020 | OnGrade | 1.8 m lintel | 23.69 | 1.5 | - | - | 0.5 | No |
| Q106010 | Sag | 1.8 m lintel | 23.05 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q111010 | OnGrade | 3.0 m lintel | 24.17 | 4.8 | - | - | 0.5 | No |
| Q102010 | OnGrade | 0.9 m lintel | 22.61 | 1.5 | - | - | 0.5 | No |
| Q101020 | OnGrade | 0.9 m lintel | 22.7 | 1.5 | - | - | 0.5 | No |
| Q109010 | OnGrade | RM.7 Grated Pit | 30.44 | 1.5 | - | - | 0.5 | Yes |
| Q1060100 | OnGrade | 0.9 m lintel | 30 | 1.5 | - | - | 0.5 | No |
| Q106090 | Sag | 1.8 m lintel | 29.87 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q106080 | OnGrade | RM.7 Grated Pit | 29.87 | 1.5 | - | - | 0.5 | Yes |
| Q106070 | OnGrade | 0.9 m lintel | 29.71 | 1.5 | - | - | 0.5 | No |
| Q106060 | OnGrade | 1.8 m lintel | 29.12 | 1.5 | - | - | 0.5 | No |
| Q106050 | OnGrade | 1.8 m lintel | 26.89 | 1.5 | - | - | 0.5 | No |
| Q106040 | OnGrade | 1.8 m lintel | 25.38 | 1.5 | - | - | 0.5 | No |
| Q108010 | OnGrade | 1.8 m lintel | 29.59 | 4.8 | - | - | 0.5 | No |
| Q113010 | OnGrade | 3.0 m lintel | 30.49 | 4.8 | - | - | 0.5 | No |
| Q114010 | Sag | 0.9 m x 0.45 m Grated pit | 31.11 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q98030 | OnGrade | 1.8 m lintel | 21.86 | 4.8 | - | - | 0.5 | No |
| Q98020 | OnGrade | RM.7 Grated Pit | 21.58 | 1.5 | - | - | 0.5 | No |
| Q96030J | OnGrade | RM.7 Grated Pit | 22.1 | 1.5 | - | - | 0.5 | Yes |
| Q96020 | OnGrade | 1.8 m lintel | 21.69 | 1.5 | - | - | 0.5 | No |
| Q96010 | OnGrade | 1.8 m lintel | 20.87 | 1.5 | - | - | 0.5 | No |
| Q99020 | OnGrade | 1.8 m lintel | 21.87 | 4.8 | - | - | 0.5 | No |
| Q99010 | OnGrade | 1.8 m lintel | 21.86 | 1.5 | - | - | 0.5 | No |
| Q99070 | OnGrade | 1.8 m lintel | 21.96 | 4.8 | - | - | 0.5 | No |
| Q99060 | Sag | 1.8 m lintel | 22.06 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q99050 | OnGrade | 1.8 m lintel | 21.99 | 1.5 | - | - | 0.5 | No |
| Q99040 | OnGrade | 1.8 m lintel | 21.87 | 1.5 | - | - | 0.5 | No |
| Q83070 | OnGrade | 0.9 m lintel | 25.75 | 1.5 | - | - | 0.5 | No |
| Q83060 | OnGrade | 0.9 m lintel | 25.5 | 1.5 | - | - | 0.5 | No |
| Q83050 | OnGrade | 0.9 m lintel | 25.31 | 1.5 | - | - | 0.5 | No |
| Q83040 | OnGrade | 0.9 m lintel | 25.15 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q83030 | OnGrade | 0.9 m lintel | 25.05 | 1.5 | - | - | 0.5 | No |
| Q83020J | OnGrade | 0.9 m lintel | 24.85 | 1.5 | - | - | 0.5 | Yes |
| Q83010 | OnGrade | 1.8 m lintel | 24.4 | 1.5 | - | - | 0.5 | No |
| Q82030 | OnGrade | 1.8 m lintel | 24.14 | 1.5 | - | - | 0.5 | No |
| Q82020 | OnGrade | 1.8 m lintel | 22.62 | 1.5 | - | - | 0.5 | No |
| Q82010 | OnGrade | 1.8 m lintel | 20.99 | 1.5 | - | - | 0.5 | No |
| Q84010 | OnGrade | 1.8 m lintel | 25.01 | 4.8 | - | - | 0.5 | No |
| Q96090 | OnGrade | 1.8 m lintel | 23.04 | 4.8 | - | - | 0.5 | No |
| Q96080 | Sag | 1.8 m lintel | 23.26 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q96070 | Sag | 1.8 m lintel | 22.99 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q96060 | OnGrade | 1.8 m lintel | 23.04 | 1.5 | - | - | 0.5 | No |
| Q96050 | OnGrade | 1.8 m lintel | 22.54 | 1.5 | - | - | 0.5 | No |
| Q96040 | OnGrade | 1.8 m lintel | 21.96 | 1.5 | - | - | 0.5 | No |
| Q97030 | OnGrade | RM.7 Grated Pit | 23.1 | 4.8 | - | - | 0.5 | No |
| Q97020 | OnGrade | 1.8 m lintel | 23.56 | 1.5 | - | - | 0.5 | No |
| Q97010 | OnGrade | 1.8 m lintel | 22.07 | 1.5 | - | - | 0.5 | No |
| Q71020 | OnGrade | 1.8 m lintel | 26.82 | 4.8 | - | - | 0.5 | No |
| Q71010 | Sag | 1.8 m lintel | 26.93 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q640105J | OnGrade | RM.7 Grated Pit | 26.7 | 1.5 | - | - | 0.5 | Yes |
| Q640100 | OnGrade | 1.8 m lintel | 26.07 | 1.5 | - | - | 0.5 | No |
| Q64090J | OnGrade | RM.7 Grated Pit | 25.5 | 1.5 | - | - | 0.5 | Yes |
| Q64080 | OnGrade | 1.8 m lintel | 22.62 | 1.5 | - | - | 0.5 | No |
| Q64070J | OnGrade | RM.7 Grated Pit | 22.6 | 1.5 | - | - | 0.5 | Yes |
| Q64060J | OnGrade | RM.7 Grated Pit | 22.4 | 1.5 | - | - | 0.5 | Yes |
| Q64050 | OnGrade | 1.8 m lintel | 20.24 | 1.5 | - | - | 0.5 | No |
| Q64044J | OnGrade | RM.7 Grated Pit | 19.95 | 1.5 | - | - | 0.5 | Yes |
| Q64042J | OnGrade | RM.7 Grated Pit | 19.64 | 1.5 | - | - | 0.5 | Yes |
| Q64040 | OnGrade | 1.8 m lintel | 17.88 | 1.5 | - | - | 0.5 | No |
| Q64030J | OnGrade | RM.7 Grated Pit | 17.95 | 1.5 | - | - | 0.5 | Yes |
| Q64020J | OnGrade | RM.7 Grated Pit | 17.8 | 1.5 | - | - | 0.5 | Yes |
| Q64010 | OnGrade | 1.8 m lintel | 17.24 | 1.5 | - | - | 0.5 | No |
| Q74010 | OnGrade | 1.8 m lintel | 27.21 | 4.8 | - | - | 0.5 | No |
| Q72050 | Sag | 0.9 m x 0.45 m Grated pit | 26.7 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q72040 | OnGrade | RM.7 Grated Pit | 27.11 | 1.5 | - | - | 0.5 | No |
| Q72030 | OnGrade | 0.9 m lintel | 26.95 | 1.5 | - | - | 0.5 | No |
| Q72020 | OnGrade | 0.9 m lintel | 26.86 | 1.5 | - | - | 0.5 | No |
| Q72010 | OnGrade | 0.9 m lintel | 26.73 | 1.5 | - | - | 0.5 | No |
| Q640110 | OnGrade | 0.9 m lintel | 26.64 | 1.5 | - | - | 0.5 | No |
| Q73010 | OnGrade | 0.9 m lintel | 27.02 | 4.8 | - | - | 0.5 | No |
| Q75010 | OnGrade | 1.8 m lintel | 27.14 | 4.8 | - | - | 0.5 | No |
| Q72060 | OnGrade | RM.7 Grated Pit | 27.14 | 1.5 | - | - | 0.5 | No |
| Q240140 | OnGrade | 1.8 m lintel | 30.6 | 4.8 | - | - | 0.5 | No |
| Q46010 | OnGrade | 3.0 m lintel | 30.9 | 1.5 | - | - | 0.5 | No |
| Q240170 | OnGrade | 1.8 m lintel | 32.3 | 4.8 | - | - | 0.5 | No |
| Q240160 | OnGrade | 1.8 m lintel | 31.4 | 1.5 | - | - | 0.5 | No |
| Q240150 | Sag | 0.9 m x 0.45 m Grated pit | 30.65 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q22005 | OnGrade | 1.8 m lintel | 30.5 | 4.8 | - | - | 0.5 | No |
| Q47010 | OnGrade | 1.8 m lintel | 32.1 | 4.8 | - | - | 0.5 | No |
| Q46020 | OnGrade | 1.8 m lintel | 32.15 | 1.5 | - | - | 0.5 | No |
| Q46040 | OnGrade | 1.8 m lintel | 33.3 | 4.8 | - | - | 0.5 | No |
| Q46030 | OnGrade | 1.8 m lintel | 33.2 | 1.5 | - | - | 0.5 | No |
| Q76010 | OnGrade | 1.8 m lintel | 30.95 | 4.8 | - | - | 0.5 | No |
| Q720100 | OnGrade | RM.7 Grated Pit | 29.87 | 1.5 | - | - | 0.5 | No |
| Q72090 | OnGrade | RM.7 Grated Pit | 28.57 | 1.5 | - | - | 0.5 | No |
| Q72080 | OnGrade | RM.7 Grated Pit | 27.51 | 1.5 | - | - | 0.5 | No |
| Q720110 | OnGrade | 1.8 m lintel | 30.72 | 4.8 | - | - | 0.5 | No |
| Q180510 | Sag | 1.8 m lintel | 11.63 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1800110J | OnGrade | RM.7 Grated Pit | 11.63 | 1.5 | - | - | 0.5 | Yes |
| Q1800100 | Sag | 1.8 m lintel | 10.47 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q180090J | OnGrade | RM.7 Grated Pit | 10.67 | 1.5 | - | - | 0.5 | Yes |
| Q180080J | OnGrade | RM.7 Grated Pit | 10.53 | 1.5 | - | - | 0.5 | Yes |
| Q180060J | OnGrade | RM.7 Grated Pit | 10.1 | 1.5 | - | - | 0.5 | Yes |
| Q180050J | OnGrade | RM.7 Grated Pit | 10.28 | 1.5 | - | - | 0.5 | Yes |
| Q180040J | OnGrade | RM.7 Grated Pit | 10.5 | 1.5 | - | - | 0.5 | Yes |
| Q180030J | OnGrade | RM.7 Grated Pit | 10.4 | 1.5 | - | - | 0.5 | Yes |
| Q180020J | OnGrade | RM.7 Grated Pit | 10.22 | 1.5 | - | - | 0.5 | Yes |
| Q180010J | OnGrade | RM.7 Grated Pit | 10.25 | 1.5 | - | - | 0.5 | Yes |
| Q180000 | Node | - | 9.9 | - | - | - | - | - |
| Q0510 | Sag | 0.9 m lintel | 12.82 | 4.8 | 5 | 0.5 | 0.5 | No |
| T3570150 | OnGrade | 1.8 m lintel | 35.33 | 4.8 | - | - | 0.5 | No |
| T3570140 | OnGrade | RM.7 Grated Pit | 34.85 | 1.5 | - | - | 0.5 | No |
| T3570130 | OnGrade | 1.8 m lintel | 34 | 1.5 | - | - | 0.5 | No |
| T3570120 | Node | - | 34.05 | - | - | - | - | - |
| Q79110 | OnGrade | 1.8 m lintel | 32.58 | 4.8 | - | - | 0.5 | No |
| Q79010 | OnGrade | 1.8 m lintel | 31.78 | 1.5 | - | - | 0.5 | No |
| Q640160 | Sag | 1.8 m lintel | 29.16 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q640150 | Sag | 1.8 m lintel | 29.14 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q640140J | OnGrade | RM.7 Grated Pit | 27.5 | 1.5 | - | - | 0.5 | Yes |
| Q640130 | OnGrade | 1.8 m lintel | 27.06 | 1.5 | - | - | 0.5 | No |
| Q640120 | OnGrade | 1.8 m lintel | 26.91 | 1.5 | - | - | 0.5 | No |
| Q77010 | Sag | 1.8 m lintel | 26.83 | 1.5 | 5 | 0.5 | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| H14010 | Sag | 2.4 m lintel | 48 | 4.8 | 5 | 0.5 | 0.5 | No |
| H11030J | OnGrade | RM.7 Grated Pit | 47.92 | 1.5 | - | - | 0.5 | Yes |
| H11020 | OnGrade | 1.8 m lintel | 46.05 | 1.5 | - | - | 0.5 | No |
| H11010 | OnGrade | 2.4 m lintel | 41.8 | 1.5 | - | - | 0.5 | No |
| Q1500140 | OnGrade | 1.8 m lintel | 38.7 | 1.5 | - | - | 0.5 | No |
| Q1500130 | OnGrade | 1.8 m lintel | 37.1 | 1.5 | - | - | 0.5 | No |
| Q1500120 | OnGrade | 3.0 m lintel | 36.05 | 1.5 | - | - | 0.5 | No |
| Q1500115 | OnGrade | 1.8 m lintel | 35.5 | 1.5 | - | - | 0.5 | No |
| Q1500110 | OnGrade | 1.8 m lintel | 35.45 | 1.5 | - | - | 0.5 | No |
| Q1500100 | OnGrade | 1.8 m lintel | 35.25 | 1.5 | - | - | 0.5 | No |
| Q150090 | Sag | 3.0 m lintel | 34.8 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q150080 | OnGrade | RM.7 Grated Pit | 35.15 | 1.5 | - | - | 0.5 | Yes |
| Q68110 | Sag | 0.9 m x 0.45 m Grated pit | 19.74 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q68210 | Sag | 0.9 m x 0.45 m Grated pit | 19.98 | 4.8 | 5 | 0.5 | 0.5 | No |
| H11040 | OnGrade | 1.8 m lintel | 47.95 | 4.8 | - | - | 0.5 | No |
| Q85070 | Sag | 1.8 m lintel | 39.7 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q85066J | OnGrade | RM.7 Grated Pit | 39.15 | 1.5 | - | - | 0.5 | Yes |
| Q85063J | OnGrade | 3.6 m lintel | 38.6 | 1.5 | - | - | 0.5 | Yes |
| Q85060 | Sag | 1.8 m lintel | 35.5 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q85050 | Sag | 1.8 m lintel | 35.4 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q85040J | OnGrade | RM.7 Grated Pit | 35.54 | 1.5 | - | - | 0.5 | Yes |
| Q85036J | OnGrade | RM.7 Grated Pit | 29.6 | 1.5 | - | - | 0.5 | Yes |
| Q85034J | OnGrade | RM.7 Grated Pit | 28.7 | 1.5 | - | - | 0.5 | Yes |
| Q85032J | OnGrade | RM.7 Grated Pit | 28.7 | 1.5 | - | - | 0.5 | Yes |
| Q85030 | OnGrade | 1.8 m lintel | 27.7 | 1.5 | - | - | 0.5 | No |
| Q85020 | Sag | 1.8 m lintel | 27.6 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q85010 | OnGrade | RM.7 Grated Pit | 27.7 | 1.5 | - | - | 0.5 | Yes |
| Q82050 | OnGrade | RM.7 Grated Pit | 25.98 | 1.5 | - | - | 0.5 | Yes |
| Q82040 | OnGrade | RM.7 Grated Pit | 25.26 | 1.5 | - | - | 0.5 | Yes |
| Q210520 | OnGrade | 1.8 m lintel | 16.45 | 4.8 | - | - | 0.5 | No |
| Q210510J | OnGrade | RM.7 Grated Pit | 16.7 | 1.5 | - | - | 0.5 | Yes |
| Q207060 | OnGrade | 1.2 m lintel | 15.6 | 1.5 | - | - | 0.5 | No |
| Q207050 | OnGrade | 1.2 m lintel | 14.22 | 1.5 | - | - | 0.5 | No |
| Q207040J | OnGrade | RM.7 Grated Pit | 14.27 | 1.5 | - | - | 0.5 | Yes |
| Q207030 | OnGrade | 1.2 m lintel | 13.06 | 1.5 | - | - | 0.5 | No |
| Q207020J | OnGrade | RM.7 Grated Pit | 13.05 | 1.5 | - | - | 0.5 | Yes |
| Q207010 | OnGrade | 1.2 m lintel | 12.65 | 1.5 | - | - | 0.5 | No |
| Q1800150 | OnGrade | RM.7 Grated Pit | 12.8 | 1.5 | - | - | 0.5 | Yes |
| Q1800140J | OnGrade | RM.7 Grated Pit | 12.25 | 1.5 | - | - | 0.5 | Yes |
| Q1800130J | OnGrade | RM.7 Grated Pit | 12.38 | 1.5 | - | - | 0.5 | Yes |
| Q1800120 | Sag | 1.8 m lintel | 11.61 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q230520 | OnGrade | RM.7 Grated Pit | 18.25 | 4.8 | - | - | 0.5 | No |
| Q230510 | OnGrade | RM.7 Grated Pit | 18.29 | 1.5 | - | - | 0.5 | No |
| Q230010 | OnGrade | 1.8 m lintel | 16.8 | 1.5 | - | - | 0.5 | No |
| Q1800360 | Sag | 3.0 m lintel | 15.91 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800340J | OnGrade | RM.7 Grated Pit | 16.47 | 1.5 | - | - | 0.5 | Yes |
| Q1800330J | OnGrade | RM.7 Grated Pit | 15.97 | 1.5 | - | - | 0.5 | Yes |
| Q1800320 | Sag | 1.8 m lintel | 14.96 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800310J | OnGrade | RM.7 Grated Pit | 15.2 | 1.5 | - | - | 0.5 | Yes |
| Q1800300 | Sag | 0.9 m x 0.45 m Grated pit | 14.93 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800290 | Sag | 1.8 m lintel | 14.19 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800280J | OnGrade | RM.7 Grated Pit | 14.4 | 1.5 | - | - | 0.5 | Yes |
| Q1800275J | OnGrade | RM.7 Grated Pit | 14.54 | 1.5 | - | - | 0.5 | Yes |
| Q1800270 | Sag | 0.9 m x 0.45 m Grated pit | 14.16 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800260 | OnGrade | RM.7 Grated Pit | 13.92 | 1.5 | - | - | 0.5 | No |
| Q1800250J | OnGrade | RM.7 Grated Pit | 13.9 | 1.5 | - | - | 0.5 | Yes |
| Q1800230 | OnGrade | 1.8 m lintel | 13.79 | 1.5 | - | - | 0.5 | Yes |
| Q1800220 | OnGrade | 1.8 m lintel | 13.54 | 1.5 | - | - | 0.5 | No |
| Q1800210J | OnGrade | RM.7 Grated Pit | 13.6 | 1.5 | - | - | 0.5 | Yes |
| Q1800200 | OnGrade | 1.8 m lintel | 13.5 | 1.5 | - | - | 0.5 | No |
| Q1800180 | OnGrade | 1.8 m lintel | 12.99 | 1.5 | - | - | 0.5 | No |
| Q1800170 | OnGrade | 1.8 m lintel | 12.91 | 1.5 | - | - | 0.5 | No |
| Q1800160 | Sag | 1.8 m lintel | 12.66 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q144040J | OnGrade | RM.7 Grated Pit | 33.5 | 4.8 | - | - | 0.5 | Yes |
| Q144030 | OnGrade | 1.8 m lintel | 32.91 | 1.5 | - | - | 0.5 | No |
| Q144020 | OnGrade | 1.8 m lintel | 31.1 | 1.5 | - | - | 0.5 | No |
| Q144010 | OnGrade | 1.8 m lintel | 30.11 | 1.5 | - | - | 0.5 | No |
| Q141050J | OnGrade | RM.7 Grated Pit | 28.5 | 1.5 | - | - | 0.5 | Yes |
| Q141040 | OnGrade | 1.8 m lintel | 28.35 | 1.5 | - | - | 0.5 | No |
| Q141030 | Sag | 3.0 m lintel | 27.06 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q141020 | OnGrade | 1.8 m lintel | 27.17 | 1.5 | - | - | 0.5 | No |
| Q141010J | OnGrade | RM.7 Grated Pit | 27 | 1.5 | - | - | 0.5 | Yes |
| H13020 | Sag | 1.8 m lintel | 46.25 | 4.8 | 5 | 0.5 | 0.5 | No |
| H13010 | Sag | 2.4 m lintel | 46.05 | 1.5 | 5 | 0.5 | 0.5 | No |
| H12010 | OnGrade | 1.8 m lintel | 42.9 | 1.5 | - | - | 0.5 | No |
| Q1410110 | OnGrade | 1.2 m lintel | 33.89 | 1.5 | - | - | 0.5 | No |
| Q1410100 | OnGrade | 1.2 m lintel | 33.45 | 1.5 | - | - | 0.5 | No |
| Q141090 | OnGrade | 1.2 m lintel | 30.63 | 1.5 | - | - | 0.5 | No |
| Q141080 | OnGrade | 1.2 m lintel | 28.96 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q141060J | OnGrade | RM.7 Grated Pit | 28.43 | 1.5 | - | - | 0.5 | Yes |
| Q208010 | Sag | 1.2 m lintel | 12.98 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q127010 | Sag | 3.0 m lintel | 25.24 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q123020J | OnGrade | RM.7 Grated Pit | 25.6 | 1.5 | - | - | 0.5 | Yes |
| Q123010 | Sag | 1.8 m lintel | 25.5 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q65010 | Sag | 0.9 m x 0.45 m Grated pit | 17.64 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q66010 | Sag | 0.9 m x 0.45 m Grated pit | 17.86 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1800470 | Sag | 1.2 m lintel | 26.02 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1800460J | OnGrade | RM.7 Grated Pit | 26.2 | 1.5 | - | - | 0.5 | Yes |
| Q1800450 | OnGrade | 0.9 m lintel | 25.57 | 1.5 | - | - | 0.5 | No |
| Q1800440 | Sag | 0.9 m lintel | 25.2 | 1.5 | 5 | 0 | 0.5 | No |
| Q1800430 | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q1800425J | OnGrade | RM.7 Grated Pit | 23.65 | 1.5 | - | - | 0.5 | Yes |
| Q1800420J | OnGrade | RM.7 Grated Pit | 21.47 | 1.5 | - | - | 0.5 | Yes |
| Q1800410 | OnGrade | 1.8 m lintel | 21.47 | 1.5 | - | - | 0.5 | No |
| Q1800400 | Sag | 1.8 m lintel | 21.27 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800390 | Sag | 1.8 m lintel | 21.09 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1800380 | OnGrade | 1.8 m lintel | 18.01 | 1.5 | - | - | 0.5 | No |
| Q1800370 | Sag | 0.9 m lintel | 18.18 | 1.5 | 5 | 0 | 0.5 | No |
| Q240010 | OnGrade | 1.8 m lintel | 25.98 | 4.8 | - | - | 0.5 | No |
| Q238040 | Sag | 1.8 m lintel | 30 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q238030 | Sag | 1.8 m lintel | 29.92 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q238020 | OnGrade | 1.8 m lintel | 25.36 | 1.5 | - | - | 0.5 | No |
| Q238010 | Sag | 1.8 m lintel | 25.05 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q239010 | Sag | 1.8 m lintel | 25.16 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q234010 | Sag | 1.8 m lintel | 21.23 | 1.5 | 5 | 0 | 0.5 | No |
| Q233010 | Sag | 1.8 m lintel | 21.21 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q235010 | Sag | 1.8 m lintel | 21.45 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q236050 | OnGrade | 1.2 m lintel | 23.2 | 4.8 | - | - | 0.5 | No |
| Q236030 | Sag | 0.9 m lintel | 23.33 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q236020J | OnGrade | RM.7 Grated Pit | 23.31 | 1.5 | - | - | 0.5 | Yes |
| Q236010 | OnGrade | 1.8 m lintel | 22 | 1.5 | - | - | 0.5 | No |
| Q237010 | OnGrade | 1.2 m lintel | 23.16 | 4.8 | - | - | 0.5 | No |
| Q231020 | Sag | 1.8 m lintel | 18.3 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q231010J | OnGrade | RM.7 Grated Pit | 18.3 | 1.5 | - | - | 0.5 | Yes |
| Q232010 | OnGrade | 1.8 m lintel | 18.31 | 4.8 | - | - | 0.5 | No |
| Q210010 | OnGrade | 1.8 m lintel | 15.92 | 4.8 | - | - | 0.5 | No |
| Q207070 | OnGrade | RM.7 Grated Pit | 16.24 | 1.5 | - | - | 0.5 | Yes |
| Q209010 | Sag | 1.2 m lintel | 14.07 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q225010 | Sag | 1.8 m lintel | 14.9 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q224010 | OnGrade | 1.8 m lintel | 14.97 | 4.8 | - | - | 0.5 | No |
| Q226010 | Sag | 0.9 m x 0.45 m Grated pit | 15.06 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q228010 | Sag | 1.8 m lintel | 16.18 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q227010 | OnGrade | 1.8 m lintel | 15.75 | 4.8 | - | - | 0.5 | No |
| Q229010 | Sag | 1.8 m lintel | 16.16 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q230020 | OnGrade | 1.8 m lintel | 17.05 | 4.8 | - | - | 0.5 | No |
| Q60010 | OnGrade | 1.8 m lintel | 17.47 | 4.8 | - | - | 0.5 | No |
| Q59010J | OnGrade | RM.7 Grated Pit | 17.48 | 1.5 | - | - | 0.5 | Yes |
| Q61010 | OnGrade | 1.8 m lintel | 17.45 | 4.8 | - | - | 0.5 | No |
| Q59020J | OnGrade | RM.7 Grated Pit | 17.47 | 1.5 | - | - | 0.5 | Yes |
| Q62010 | OnGrade | 1.8 m lintel | 17.22 | 4.8 | - | - | 0.5 | No |
| Q80010 | OnGrade | 1.8 m lintel | 17.09 | 4.8 | - | - | 0.5 | No |
| Q67010 | OnGrade | 1.8 m lintel | 17.88 | 4.8 | - | - | 0.5 | No |
| Q68010 | OnGrade | 1.8 m lintel | 19.99 | 4.8 | - | - | 0.5 | No |
| Q81020 | Sag | 1.8 m lintel | 19 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q81010 | Sag | 1.8 m lintel | 18.92 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q86030 | OnGrade | 1.8 m lintel | 29.21 | 4.8 | - | - | 0.5 | No |
| Q86020 | Sag | 3.6 m lintel | 28.33 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q86010J | OnGrade | RM.7 Grated Pit | 28 | 1.5 | - | - | 0.5 | Yes |
| Q85510 | OnGrade | 1.8 m lintel | 27.75 | 4.8 | - | - | 0.5 | No |
| Q820150 | Sag | 1.8 m lintel | 29.02 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q820140 | OnGrade | 3.6 m lintel | 28.89 | 1.5 | - | - | 0.5 | No |
| Q820130J | OnGrade | RM.7 Grated Pit | 29 | 1.5 | - | - | 0.5 | Yes |
| Q820120 | OnGrade | 1.8 m lintel | 28.35 | 1.5 | - | - | 0.5 | No |
| Q820110 | Sag | 3.6 m lintel | 27.92 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q820100 | OnGrade | 3.6 m lintel | 27.76 | 1.5 | - | - | 0.5 | No |
| Q82090J | OnGrade | RM.7 Grated Pit | 28.04 | 1.5 | - | - | 0.5 | Yes |
| Q82080 | Sag | 3.0 m lintel | 27.36 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q82070 | Sag | 3.0 m lintel | 27.38 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q82060 | OnGrade | RM.7 Grated Pit | 27.43 | 1.5 | - | - | 0.5 | Yes |
| Q93010 | OnGrade | 1.8 m lintel | 28.09 | 4.8 | - | - | 0.5 | No |
| Q870110 | OnGrade | 1.8 m lintel | 27.86 | 1.5 | - | - | 0.5 | No |
| Q870100 | Sag | 3.0 m lintel | 26.03 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q87090J | OnGrade | RM.7 Grated Pit | 26.25 | 1.5 | - | - | 0.5 | Yes |
| Q87080J | OnGrade | RM.7 Grated Pit | 25.9 | 1.5 | - | - | 0.5 | Yes |
| Q87070 | OnGrade | RM.7 Grated Pit | 24.4 | 1.5 | - | - | 0.5 | No |
| Q87060 | OnGrade | 1.8 m lintel | 24.05 | 1.5 | - | - | 0.5 | No |
| Q87050 | OnGrade | 1.8 m lintel | 22.3 | 1.5 | - | - | 0.5 | No |
| Q87040J | OnGrade | RM.7 Grated Pit | 22.2 | 1.5 | - | - | 0.5 | Yes |
| Q87030 | OnGrade | 1.8 m lintel | 21.94 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q87020 | OnGrade | 1.8 m lintel | 21.3 | 1.5 | - | - | 0.5 | No |
| Q87010 | OnGrade | RM.7 Grated Pit | 21.25 | 1.5 | - | - | 0.5 | Yes |
| Q94010 | OnGrade | 1.8 m lintel | 31.14 | 4.8 | - | - | 0.5 | No |
| Q870140 | OnGrade | 1.8 m lintel | 31.07 | 1.5 | - | - | 0.5 | No |
| Q870130 | Sag | 1.8 m lintel | 30.88 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q870120 | OnGrade | 1.8 m lintel | 30.06 | 1.5 | - | - | 0.5 | No |
| Q870200 | OnGrade | 1.8 m lintel | 33.97 | 4.8 | - | - | 0.5 | No |
| Q870190 | OnGrade | 1.8 m lintel | 33.95 | 1.5 | - | - | 0.5 | No |
| Q870180 | Sag | 1.8 m lintel | 33.9 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q870170 | OnGrade | 1.8 m lintel | 33.95 | 1.5 | - | - | 0.5 | No |
| Q870160 | OnGrade | 0.9 m lintel | 33.58 | 1.5 | - | - | 0.5 | No |
| Q870150 | OnGrade | 0.9 m lintel | 32.71 | 1.5 | - | - | 0.5 | No |
| Q92010 | OnGrade | 1.8 m lintel | 26.12 | 4.8 | - | - | 0.5 | No |
| Q91010 | OnGrade | 1.8 m lintel | 25.82 | 4.8 | - | - | 0.5 | No |
| Q90010 | OnGrade | 1.8 m lintel | 26.12 | 4.8 | - | - | 0.5 | No |
| Q89010 | Sag | 1.8 m lintel | 22.4 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q88010 | OnGrade | 1.8 m lintel | 22.55 | 4.8 | - | - | 0.5 | No |
| Q95020 | Sag | 1.8 m lintel | 20.72 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q100030 | OnGrade | 2.4 m lintel | 23.87 | 4.8 | - | - | 0.5 | No |
| Q100020 | Sag | 1.8 m lintel | 21.87 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q100010 | OnGrade | 1.8 m lintel | 21.87 | 1.5 | - | - | 0.5 | No |
| Q103070 | Sag | 3.0 m lintel | 28.51 | 4.8 | 1 | 0.5 | 0.5 | No |
| Q103060J | OnGrade | RM.7 Grated Pit | 28.9 | 1.5 | - | - | 0.5 | Yes |
| Q103050J | OnGrade | RM.7 Grated Pit | 28.2 | 1.5 | - | - | 0.5 | Yes |
| Q103040J | OnGrade | RM.7 Grated Pit | 27.25 | 1.5 | - | - | 0.5 | Yes |
| Q103030J | OnGrade | RM.7 Grated Pit | 26.55 | 1.5 | - | - | 0.5 | Yes |
| Q103020 | OnGrade | 3.0 m lintel | 26.28 | 1.5 | - | - | 0.5 | No |
| Q103010 | OnGrade | 3.0 m lintel | 26.21 | 1.5 | - | - | 0.5 | No |
| Q101050 | OnGrade | 1.8 m lintel | 25.76 | 1.5 | - | - | 0.5 | No |
| Q101040 | Sag | 3.0 m lintel | 23.03 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q101030 | Sag | 0.9 m lintel | 22.96 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q125020 | OnGrade | 1.8 m lintel | 26.06 | 4.8 | - | - | 0.5 | No |
| Q125010 | OnGrade | 1.8 m lintel | 25.33 | 1.5 | - | - | 0.5 | No |
| Q122020 | Sag | 1.8 m lintel | 23.96 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q122010 | Sag | 1.8 m lintel | 24 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q140010 | OnGrade | 0.9 m lintel | 26.1 | 1.5 | - | - | 0.5 | No |
| Q139010 | OnGrade | RM.7 Grated Pit | 26.15 | 1.5 | - | - | 0.5 | No |
| Q139005J | OnGrade | RM.7 Grated Pit | 26.45 | 1.5 | - | - | 0.5 | Yes |
| Q126010 | Sag | 3.0 m lintel | 25.26 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q139060 | OnGrade | RM.7 Grated Pit | 28.77 | 4.8 | - | - | 0.5 | No |
| Q139050 | OnGrade | RM.7 Grated Pit | 28.48 | 1.5 | - | - | 0.5 | No |
| Q139040 | OnGrade | RM.7 Grated Pit | 27.97 | 1.5 | - | - | 0.5 | No |
| Q139030 | Sag | 0.9 m lintel | 27.53 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1060130 | OnGrade | 1.2 m lintel | 31.01 | 4.8 | - | - | 0.5 | No |
| Q1060120 | OnGrade | 1.2 m lintel | 30.41 | 1.5 | - | - | 0.5 | No |
| Q1060110 | OnGrade | 1.2 m lintel | 30.25 | 1.5 | - | - | 0.5 | No |
| Q205010 | OnGrade | 1.2 m lintel | 12.3 | 4.8 | - | - | 0.5 | No |
| Q204010 | Sag | 1.2 m lintel | 12.22 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q215020 | Sag | 1.8 m lintel | 12.84 | 1.5 | 5 | 0 | 0.5 | No |
| Q215010J | OnGrade | RM.7 Grated Pit | 13.16 | 1.5 | - | - | 0.5 | Yes |
| Q216010 | Sag | 1.2 m lintel | 12.97 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q16040 | OnGrade | 1.8 m lintel | 13.25 | 1.5 | - | - | 0.5 | No |
| Q16030 | OnGrade | 1.8 m lintel | 13.15 | 1.5 | - | - | 0.5 | No |
| Q16010 | Sag | 0.9 m x 0.45 m Grated pit | 12.83 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q14035J | OnGrade | RM.7 Grated Pit | 12.92 | 1.5 | - | - | 0.5 | Yes |
| Q14030J | OnGrade | RM.7 Grated Pit | 13 | 1.5 | - | - | 0.5 | Yes |
| Q14020 | OnGrade | 1.8 m lintel | 12.71 | 1.5 | - | - | 0.5 | No |
| Q14010 | OnGrade | 0.9 m lintel | 12.25 | 1.5 | - | - | 0.5 | No |
| Q19020 | OnGrade | 1.8 m lintel | 12.91 | 4.8 | - | - | 0.5 | No |
| Q19010 | OnGrade | 1.8 m lintel | 12.6 | 1.5 | - | - | 0.5 | No |
| Q18910 | OnGrade | 3.6 m lintel | 12.71 | 4.8 | - | - | 0.5 | No |
| Q189030 | OnGrade | 1.8 m lintel | 11.88 | 4.8 | - | - | 0.5 | No |
| Q189020J | OnGrade | RM.7 Grated Pit | 12 | 1.5 | - | - | 0.5 | Yes |
| Q189010J | OnGrade | RM.7 Grated Pit | 11.35 | 1.5 | - | - | 0.5 | Yes |
| Q188030 | OnGrade | 1.8 m lintel | 11.22 | 1.5 | - | - | 0.5 | No |
| Q188020 | OnGrade | 1.8 m lintel | 10.58 | 1.5 | - | - | 0.5 | No |
| Q188010 | OnGrade | 0.9 m lintel | 10.51 | 1.5 | - | - | 0.5 | No |
| Q200010 | Sag | 1.8 m lintel | 11.84 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q190020 | OnGrade | 1.2 m lintel | 11.86 | 4.8 | - | - | 0.5 | No |
| Q188050 | OnGrade | 1.8 m lintel | 11.87 | 4.8 | - | - | 0.5 | No |
| Q188040J | OnGrade | 0.9 m lintel | 11.68 | 1.5 | - | - | 0.5 | No |
| Q246020J | OnGrade | RM.7 Grated Pit | 11.85 | 4.8 | - | - | 0.5 | Yes |
| Q246010 | OnGrade | 0.9 m lintel | 11.31 | 1.5 | - | - | 0.5 | No |
| Q241080J | OnGrade | RM.7 Grated Pit | 11.36 | 1.5 | - | - | 0.5 | Yes |
| Q241070 | OnGrade | 0.9 m lintel | 11.19 | 1.5 | - | - | 0.5 | No |
| Q241060 | Sag | 1.8 m lintel | 10.1 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q241050 | Sag | 3.0 m lintel | 10.08 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q241040J | OnGrade | RM.7 Grated Pit | 10.43 | 1.5 | - | - | 0.5 | Yes |
| Q241030J | OnGrade | RM.7 Grated Pit | 10.45 | 1.5 | - | - | 0.5 | Yes |
| Q241020 | OnGrade | 1.8 m lintel | 9.91 | 1.5 | - | - | 0.5 | Yes |
| Q241010J | OnGrade | RM.7 Grated Pit | 9.95 | 1.5 | - | - | 0.5 | Yes |
| Q241000 | Node | - | 9.62 | - | - | - | - | - |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q244050 | OnGrade | 1.8 m lintel | 11.08 | 4.8 | - | - | 0.5 | No |
| Q244040 | Sag | 0.9 m lintel | 10.8 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q244030 | Sag | 0.9 m lintel | 10.81 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q244020J | OnGrade | RM.7 Grated Pit | 11.4 | 1.5 | - | - | 0.5 | Yes |
| Q244010 | OnGrade | RM.7 Grated Pit | 10.75 | 1.5 | - | - | 0.5 | Yes |
| Q2070 | Sag | 0.9 m x 0.45 m Grated pit | 12.08 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q2060J | OnGrade | RM.7 Grated Pit | 11.95 | 1.5 | - | - | 0.5 | Yes |
| Q2080 | Sag | 1.8 m lintel | 11.92 | 1.5 | 5 | 0 | 0.5 | No |
| Q13010 | OnGrade | 1.2 m lintel | 12.35 | 4.8 | - | - | 0.5 | No |
| Q2055 | OnGrade | 1.8 m lintel | 12.05 | 1.5 | - | - | 0.5 | No |
| Q2050 | OnGrade | 1.2 m lintel | 12.66 | 1.5 | - | - | 0.5 | No |
| Q2040 | OnGrade | RM.7 Grated Pit | 12 | 1.5 | - | - | 0.5 | No |
| Q2030J | OnGrade | RM.7 Grated Pit | 12.43 | 1.5 | - | - | 0.5 | Yes |
| Q2020 | Sag | 1.8 m lintel | 11.05 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q2010J | OnGrade | RM.7 Grated Pit | 11.65 | 1.5 | - | - | 0.5 | Yes |
| Q2000 | Node | - | 6.2 | - | - | - | - | - |
| Q15010 | Sag | 0.9 m x 0.45 m Grated pit | 13 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q17020 | Sag | 1.8 m lintel | 13 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q17010 | OnGrade | 3.6 m lintel | 12.94 | 1.5 | - | - | 0.5 | No |
| Q14040 | OnGrade | 1.8 m lintel | 12.94 | 1.5 | - | - | 0.5 | No |
| Q14070 | OnGrade | 1.8 m lintel | 14.99 | 4.8 | - | - | 0.5 | No |
| Q14060 | OnGrade | 0.9 m lintel | 14.53 | 1.5 | - | - | 0.5 | No |
| Q14050 | OnGrade | 1.8 m lintel | 12.96 | 1.5 | - | - | 0.5 | No |
| Q30160 | OnGrade | 3.0 m lintel | 14.99 | 4.8 | - | - | 0.5 | No |
| Q30150 | OnGrade | RM.7 Grated Pit | 14.29 | 1.5 | - | - | 0.5 | Yes |
| Q30140 | OnGrade | 1.8 m lintel | 14.48 | 1.5 | - | - | 0.5 | No |
| Q30130 | OnGrade | 1.8 m lintel | 14.42 | 1.5 | - | - | 0.5 | No |
| Q30120 | OnGrade | 1.8 m lintel | 14.27 | 1.5 | - | - | 0.5 | No |
| Q30111J | Sag | 3.0 m lintel | 14.31 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q30110 | OnGrade | 1.8 m lintel | 14.26 | 1.5 | - | - | 0.5 | No |
| Q30100 | OnGrade | 1.8 m lintel | 13.92 | 1.5 | - | - | 0.5 | No |
| Q3090 | OnGrade | 3.0 m lintel | 13.96 | 1.5 | - | - | 0.5 | No |
| Q3080 | OnGrade | 1.8 m lintel | 13.99 | 1.5 | - | - | 0.5 | No |
| Q3070 | OnGrade | 1.8 m lintel | 13.26 | 1.5 | - | - | 0.5 | No |
| Q3071 | OnGrade | RM.7 Grated Pit | 13.34 | 1.5 | - | - | 0.5 | Yes |
| Q3060 | OnGrade | 1.8 m lintel | 13.13 | 1.5 | - | - | 0.5 | No |
| Q3050 | OnGrade | 1.8 m lintel | 12.58 | 1.5 | - | - | 0.5 | No |
| Q3040 | OnGrade | 1.8 m lintel | 12.21 | 1.5 | - | - | 0.5 | No |
| Q3030 | Sag | 1.8 m lintel | 12.02 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q3020 | OnGrade | 1.8 m lintel | 12.19 | 1.5 | - | - | 0.5 | No |
| Q3010 | OnGrade | 1.8 m lintel | 12.12 | 1.5 | - | - | 0.5 | No |
| Q11020 | OnGrade | 1.8 m lintel | 14.7 | 4.8 | - | - | 0.5 | No |
| Q11010 | OnGrade | 1.8 m lintel | 14.68 | 1.5 | - | - | 0.5 | No |
| Q9030 | OnGrade | 1.8 m lintel | 14.29 | 4.8 | - | - | 0.5 | No |
| Q10010 | Sag | 0.9 m x 0.45 m Grated pit | 14.32 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q7010 | Sag | 0.9 m x 0.45 m Grated pit | 13.97 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q12010 | OnGrade | 1.2 m lintel | 12.02 | 4.8 | - | - | 0.5 | No |
| Q6010 | Sag | 0.9 m x 0.45 m Grated pit | 13.29 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q5010 | OnGrade | 0.9 m lintel | 13.35 | 4.8 | - | - | 0.5 | No |
| Q4020 | OnGrade | 1.2 m lintel | 13.31 | 1.5 | - | - | 0.5 | No |
| Q4010 | OnGrade | 1.2 m lintel | 13.3 | 1.5 | - | - | 0.5 | No |
| Q4040 | OnGrade | 1.2 m lintel | 13.35 | 1.5 | - | - | 0.5 | No |
| Q4030 | Sag | 0.9 m x 0.45 m Grated pit | 13.34 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1110 | Sag | 1.2 m lintel | 11.24 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q22010 | Sag | 0.9 m x 0.45 m Grated pit | 13.56 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q21010 | Sag | 0.9 m x 0.45 m Grated pit | 13.76 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q23010 | OnGrade | 1.8 m lintel | 14.33 | 4.8 | - | - | 0.5 | No |
| Q31020 | OnGrade | 3.6 m lintel | 16.19 | 4.8 | - | - | 0.5 | No |
| Q31010 | Sag | 3.6 m lintel | 16.12 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q24010J | OnGrade | RM.7 Grated Pit | 15.78 | 1.5 | - | - | 0.5 | Yes |
| Q48010 | OnGrade | 1.8 m lintel | 14.34 | 1.5 | - | - | 0.5 | No |
| Q37010 | Sag | 3.0 m lintel | 18.43 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q24040J | OnGrade | RM.7 Grated Pit | 18.4 | 1.5 | - | - | 0.5 | Yes |
| Q24030J | OnGrade | RM.7 Grated Pit | 18.2 | 1.5 | - | - | 0.5 | Yes |
| Q24020 | OnGrade | 1.8 m lintel | 16.13 | 1.5 | - | - | 0.5 | No |
| Q36010 | OnGrade | 1.8 m lintel | 18.54 | 4.8 | - | - | 0.5 | No |
| Q35010 | OnGrade | 1.8 m lintel | 19.55 | 4.8 | - | - | 0.5 | No |
| Q33030 | OnGrade | 1.8 m lintel | 19.66 | 1.5 | - | - | 0.5 | No |
| Q33020J | OnGrade | RM.7 Grated Pit | 19.4 | 1.5 | - | - | 0.5 | Yes |
| Q33010 | Sag | 0.9 m x 0.45 m Grated pit | 18.37 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q34010 | OnGrade | 1.8 m lintel | 19.54 | 4.8 | - | - | 0.5 | No |
| Q33060 | OnGrade | 1.8 m lintel | 24.1 | 4.8 | - | - | 0.5 | No |
| Q33050 | OnGrade | 1.8 m lintel | 20.64 | 1.5 | - | - | 0.5 | No |
| Q33045J | OnGrade | RM.7 Grated Pit | 20.63 | 1.5 | - | - | 0.5 | Yes |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q33040 | Sag | 1.8 m lintel | 19.35 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q39010 | OnGrade | 1.8 m lintel | 21.14 | 4.8 | - | - | 0.5 | No |
| Q24050J | OnGrade | RM.7 Grated Pit | 21.25 | 1.5 | - | - | 0.5 | Yes |
| Q38020 | OnGrade | RM.7 Grated Pit | 21.16 | 4.8 | - | - | 0.5 | No |
| Q38010 | OnGrade | 1.8 m lintel | 21.09 | 1.5 | - | - | 0.5 | No |
| Q40020 | Sag | 0.9 m x 0.45 m Grated pit | 23.8 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q40010 | OnGrade | 1.8 m lintel | 23.78 | 1.5 | - | - | 0.5 | No |
| Q24060J | OnGrade | RM.7 Grated Pit | 24.14 | 1.5 | - | - | 0.5 | Yes |
| Q41010 | OnGrade | 1.8 m lintel | 23.99 | 4.8 | - | - | 0.5 | No |
| Q42010 | OnGrade | 0.9 m lintel | 26.76 | 4.8 | - | - | 0.5 | No |
| Q24070J | OnGrade | RM.7 Grated Pit | 26.96 | 1.5 | - | - | 0.5 | Yes |
| Q43010 | Sag | 0.9 m x 0.45 m Grated pit | 27.49 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q24090 | Sag | 0.9 m x 0.45 m Grated pit | 27.53 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q24080J | OnGrade | RM.7 Grated Pit | 28.3 | 1.5 | - | - | 0.5 | Yes |
| Q44010 | OnGrade | 1.8 m lintel | 28.95 | 4.8 | - | - | 0.5 | No |
| Q240100J | OnGrade | RM.7 Grated Pit | 28.9 | 1.5 | - | - | 0.5 | Yes |
| Q45010 | OnGrade | 1.8 m lintel | 28.82 | 4.8 | - | - | 0.5 | No |
| Q240105J | OnGrade | 1.8 m lintel | 28.7 | 1.5 | - | - | 0.5 | Yes |
| Q240130 | Sag | 1.8 m lintel | 28.1 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q240120 | Sag | 0.9 m lintel | 28.04 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q240110 | Sag | 0.9 m x 0.45 m Grated pit | 28.75 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q53050 | OnGrade | 1.8 m lintel | 22.85 | 4.8 | - | - | 0.5 | No |
| Q53040 | OnGrade | 1.8 m lintel | 22.62 | 1.5 | - | - | 0.5 | No |
| Q53030 | OnGrade | 1.8 m lintel | 18.58 | 1.5 | - | - | 0.5 | No |
| Q53020 | OnGrade | 1.8 m lintel | 16.36 | 1.5 | - | - | 0.5 | No |
| Q53015 | OnGrade | 1.8 m lintel | 15.75 | 1.5 | - | - | 0.5 | No |
| Q53010 | Sag | 1.8 m lintel | 15.44 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q25090 | OnGrade | 1.8 m lintel | 23.44 | 4.8 | - | - | 0.5 | No |
| Q25080 | OnGrade | 1.8 m lintel | 23.3 | 1.5 | - | - | 0.5 | No |
| Q25070 | OnGrade | 1.8 m lintel | 20.54 | 1.5 | - | - | 0.5 | No |
| Q25060 | OnGrade | 1.8 m lintel | 19.1 | 1.5 | - | - | 0.5 | No |
| Q25050 | OnGrade | 1.8 m lintel | 17.28 | 1.5 | - | - | 0.5 | No |
| Q25040 | OnGrade | 1.8 m lintel | 15.63 | 1.5 | - | - | 0.5 | No |
| Q25030 | Sag | 1.8 m lintel | 15.5 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q25020J | OnGrade | RM.7 Grated Pit | 15.6 | 1.5 | - | - | 0.5 | Yes |
| Q25010J | OnGrade | RM.7 Grated Pit | 15.98 | 1.5 | - | - | 0.5 | Yes |
| Q30010 | OnGrade | 1.8 m lintel | 20.79 | 4.8 | - | - | 0.5 | No |
| Q29010 | OnGrade | 1.8 m lintel | 19.2 | 4.8 | - | - | 0.5 | No |
| Q55010 | OnGrade | 1.8 m lintel | 18.77 | 4.8 | - | - | 0.5 | No |
| Q54010 | OnGrade | 1.8 m lintel | 16.56 | 4.8 | - | - | 0.5 | No |
| Q28010 | OnGrade | 1.8 m lintel | 17.38 | 4.8 | - | - | 0.5 | No |
| Q27010 | OnGrade | 1.8 m lintel | 15.47 | 4.8 | - | - | 0.5 | No |
| Q26010J | OnGrade | RM.7 Grated Pit | 15.55 | 1.5 | - | - | 0.5 | Yes |
| Q26020 | OnGrade | 1.2 m lintel | 15.25 | 4.8 | - | - | 0.5 | No |
| Q52010 | Sag | 1.8 m lintel | 15.36 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q51010 | OnGrade | 1.8 m lintel | 15.04 | 4.8 | - | - | 0.5 | No |
| Q50010 | OnGrade | 1.8 m lintel | 14.71 | 4.8 | - | - | 0.5 | No |
| Q49010 | OnGrade | 1.8 m lintel | 14.74 | 4.8 | - | - | 0.5 | No |
| Q221020 | OnGrade | 1.8 m lintel | 14.26 | 4.8 | - | - | 0.5 | No |
| Q221010 | OnGrade | 1.8 m lintel | 14.24 | 1.5 | - | - | 0.5 | No |
| Q223010 | OnGrade | 1.8 m lintel | 14.19 | 4.8 | - | - | 0.5 | No |
| Q222010 | OnGrade | 1.8 m lintel | 14.12 | 4.8 | - | - | 0.5 | No |
| Q219010 | OnGrade | 1.8 m lintel | 13.92 | 4.8 | - | - | 0.5 | No |
| Q220010 | OnGrade | 1.8 m lintel | 13.93 | 4.8 | - | - | 0.5 | No |
| Q217010 | Sag | 0.9 m x 0.45 m Grated pit | 13.54 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q218010 | OnGrade | 1.8 m lintel | 13.49 | 4.8 | - | - | 0.5 | No |
| Q57010 | Sag | 1.8 m lintel | 15.81 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q56010 | Sag | 1.8 m lintel | 15.79 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q58010 | OnGrade | 1.2 m lintel | 15.74 | 1.5 | - | - | 0.5 | No |
| Q69010 | Sag | 0.9 m x 0.45 m Grated pit | 22.36 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q70060 | Sag | 0.9 m x 0.45 m Grated pit | 25.63 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q70050 | Sag | 0.9 m x 0.45 m Grated pit | 25.44 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q70040 | Sag | 1.8 m lintel | 25.03 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q70030 | Sag | 1.8 m lintel | 25.08 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q70020 | Sag | 0.9 m x 0.45 m Grated pit | 24.85 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q70010 | Sag | 0.9 m x 0.45 m Grated pit | 22.43 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q78010 | OnGrade | 1.8 m lintel | 29.47 | 4.8 | - | - | 0.5 | No |
| Q640170 | Sag | 1.8 m lintel | 32.3 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q640166J | OnGrade | RM.7 Grated Pit | 32 | 1.5 | - | - | 0.5 | Yes |
| Q640164J | OnGrade | RM.7 Grated Pit | 31.85 | 1.5 | - | - | 0.5 | Yes |
| Q640162J | OnGrade | RM.7 Grated Pit | 31.35 | 1.5 | - | - | 0.5 | Yes |
| Q79030 | OnGrade | 1.8 m lintel | 33.92 | 1.5 | - | - | 0.5 | No |
| Q79020 | OnGrade | 1.8 m lintel | 33.94 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| G1278030 | Sag | 1.8 m lintel | 8.99 | 4.8 | 5 | 0.5 | 0.5 | No |
| G1278020 | Sag | 2.4 m lintel | 8.92 | 1.5 | 5 | 0.5 | 0.5 | No |
| G1278010 | OnGrade | RM.7 Grated Pit | 9.5 | 1.5 | - | - | 0.5 | Yes |
| G1278000 | Node | - | 7.5 | - | - | - | - | - |
| G158040 | Sag | 1.8 m lintel | 8.44 | 4.8 | 5 | 0.5 | 0.5 | No |
| G158030 | Sag | 2.4 m lintel | 8.42 | 1.5 | 5 | 0.5 | 0.5 | No |
| G158020 | OnGrade | RM.7 Grated Pit | 8.85 | 1.5 | - | - | 0.5 | Yes |
| G158010 | Node | - | 7.2 | - | - | - | - | - |
| Q202010 | OnGrade | 3.0 m lintel | 10.48 | 4.8 | - | - | 0.5 | No |
| Q201010J | OnGrade | RM.7 Grated Pit | 11 | 1.5 | - | - | 0.5 | Yes |
| Q203010 | Sag | 3.0 m lintel | 10.22 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q201020 | OnGrade | RM.7 Grated Pit | 10.5 | 1.5 | - | - | 0.5 | Yes |
| Q201030 | Sag | 1.8 m lintel | 10.15 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q187010 | OnGrade | 1.8 m lintel | 10.02 | 4.8 | - | - | 0.5 | No |
| Q185010 | OnGrade | 1.8 m lintel | 9.75 | 4.8 | - | - | 0.5 | No |
| Q186010 | OnGrade | 1.8 m lintel | 9.88 | 1.5 | - | - | 0.5 | No |
| Q242010 | OnGrade | 1.8 m lintel | 9.84 | 4.8 | - | - | 0.5 | No |
| Q243010 | Sag | 1.8 m lintel | 9.71 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q183030 | OnGrade | 0.9 m lintel | 9.63 | 4.8 | - | - | 0.5 | No |
| Q183020 | OnGrade | 0.9 m lintel | 9.92 | 1.5 | - | - | 0.5 | No |
| Q183010 | Sag | 1.8 m lintel | 9.76 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q182010 | Sag | 1.8 m lintel | 10.2 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q181010 | Sag | 1.8 m lintel | 10.04 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q245060 | OnGrade | 1.2 m lintel | 10.37 | 4.8 | - | - | 0.5 | No |
| Q245050 | Sag | 1.8 m lintel | 10.37 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q245040 | Sag | 1.8 m lintel | 10.38 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q245030 | OnGrade | RM.7 Grated Pit | 10.24 | 1.5 | - | - | 0.5 | No |
| Q245020 | OnGrade | 1.8 m lintel | 10.23 | 1.5 | - | - | 0.5 | No |
| Q245010 | OnGrade | 1.8 m lintel | 10.18 | 1.5 | - | - | 0.5 | No |
| Q152030 | OnGrade | 1.8 m lintel | 29.15 | 4.8 | - | - | 0.5 | No |
| Q152020 | OnGrade | 2.4 m lintel | 28.49 | 1.5 | - | - | 0.5 | No |
| Q152010 | Sag | 3.6 m lintel | 28.3 | 1.5 | 5 | 0 | 0.5 | No |
| Q104020 | OnGrade | 1.8 m lintel | 30.63 | 4.8 | - | - | 0.5 | No |
| Q104010 | OnGrade | 3.0 m lintel | 30.45 | 1.5 | - | - | 0.5 | No |
| Q101070 | OnGrade | RM.7 Grated Pit | 30.25 | 1.5 | - | - | 0.5 | No |
| Q101060 | OnGrade | 1.8 m lintel | 26.4 | 1.5 | - | - | 0.5 | No |
| Q105020 | OnGrade | 1.8 m lintel | 33.48 | 4.8 | - | - | 0.5 | No |
| Q105010 | OnGrade | 1.8 m lintel | 33.3 | 1.5 | - | - | 0.5 | No |
| Q101090 | OnGrade | 1.2 m lintel | 32.98 | 1.5 | - | - | 0.5 | No |
| Q101080 | OnGrade | 0.9 m lintel | 31.09 | 1.5 | - | - | 0.5 | No |
| Q1010140 | Sag | 1.8 m lintel | 36.14 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1010130 | Sag | 1.8 m lintel | 36.1 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q1010120 | OnGrade | 1.8 m lintel | 35.95 | 1.5 | - | - | 0.5 | No |
| Q1010110 | OnGrade | 1.8 m lintel | 35.78 | 1.5 | - | - | 0.5 | No |
| Q1010100 | OnGrade | 1.8 m lintel | 33.67 | 1.5 | - | - | 0.5 | No |
| Q128010 | OnGrade | 1.8 m lintel | 25.72 | 4.8 | - | - | 0.5 | No |
| Q123030J | OnGrade | RM.7 Grated Pit | 25.6 | 1.5 | - | - | 0.5 | Yes |
| Q124030 | OnGrade | RM.7 Grated Pit | 25.76 | 4.8 | - | - | 0.5 | No |
| Q124020 | OnGrade | 1.8 m lintel | 25.54 | 1.5 | - | - | 0.5 | No |
| Q124010 | OnGrade | 1.8 m lintel | 25.29 | 1.5 | - | - | 0.5 | No |
| Q129010 | Sag | 3.0 m lintel | 27.61 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q123040J | OnGrade | RM.7 Grated Pit | 27.65 | 1.5 | - | - | 0.5 | Yes |
| Q130010 | OnGrade | 1.8 m lintel | 27.6 | 4.8 | - | - | 0.5 | No |
| Q131010 | OnGrade | 1.8 m lintel | 28.04 | 4.8 | - | - | 0.5 | No |
| Q123050J | OnGrade | RM.7 Grated Pit | 28.15 | 1.5 | - | - | 0.5 | Yes |
| Q132020 | OnGrade | 1.8 m lintel | 30.24 | 4.8 | - | - | 0.5 | No |
| Q132010 | Sag | 3.0 m lintel | 29.93 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q123070J | OnGrade | RM.7 Grated Pit | 30.15 | 1.5 | - | - | 0.5 | Yes |
| Q134010 | OnGrade | 1.8 m lintel | 30.18 | 4.8 | - | - | 0.5 | No |
| Q123080J | OnGrade | RM.7 Grated Pit | 30.2 | 1.5 | - | - | 0.5 | Yes |
| Q133010 | Sag | 3.0 m lintel | 30.01 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q135010 | OnGrade | 1.8 m lintel | 30.32 | 4.8 | - | - | 0.5 | No |
| Q136020 | OnGrade | 1.8 m lintel | 32.24 | 4.8 | - | - | 0.5 | No |
| Q136010 | OnGrade | 1.8 m lintel | 32.09 | 1.5 | - | - | 0.5 | No |
| Q1230100J | OnGrade | RM.7 Grated Pit | 31.55 | 1.5 | - | - | 0.5 | Yes |
| Q138010 | Sag | 1.8 m lintel | 35.02 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q1230130 | OnGrade | 1.8 m lintel | 35.09 | 1.5 | - | - | 0.5 | No |
| Q1230126J | OnGrade | RM.7 Grated Pit | 35.15 | 1.5 | - | - | 0.5 | Yes |
| Q1230123J | OnGrade | RM.7 Grated Pit | 33.35 | 1.5 | - | - | 0.5 | Yes |
| Q1230120J | OnGrade | RM.7 Grated Pit | 32.75 | 1.5 | - | - | 0.5 | No |
| Q1230110J | OnGrade | RM.7 Grated Pit | 32.31 | 1.5 | - | - | 0.5 | Yes |
| Q137030 | Sag | 1.8 m lintel | 38.67 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q127020 | Sag | 1.8 m lintel | 38.51 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q137010 | OnGrade | RM.7 Grated Pit | 35.45 | 1.5 | - | - | 0.5 | Yes |
| Q1230180 | OnGrade | 0.9 m lintel | 39.27 | 4.8 | - | - | 0.5 | No |
| Q1230170 | OnGrade | RM.7 Grated Pit | 39.14 | 1.5 | - | - | 0.5 | No |
| Q1230160J | OnGrade | RM.7 Grated Pit | 36.4 | 1.5 | - | - | 0.5 | Yes |
| Q1230150 | OnGrade | 1.8 m lintel | 35.98 | 1.5 | - | - | 0.5 | No |
| Q1230140 | OnGrade | 1.8 m lintel | 35.11 | 1.5 | - | - | 0.5 | No |
| Q145010 | OnGrade | 1.2 m lintel | 31.37 | 4.8 | - | - | 0.5 | No |
| Q141070 | Sag | 3.0 m lintel | 28.26 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q143010 | OnGrade | 1.8 m lintel | 27.12 | 4.8 | - | - | 0.5 | No |
| Q142040 | OnGrade | RM.7 Grated Pit | 29.67 | 4.8 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q142030 | OnGrade | 1.8 m lintel | 29 | 1.5 | - | - | 0.5 | No |
| Q142020 | OnGrade | 1.8 m lintel | 28.2 | 1.5 | - | - | 0.5 | No |
| Q142010 | OnGrade | 1.8 m lintel | 27.34 | 1.5 | - | - | 0.5 | No |
| Q10590 | Sag | 3.0 m lintel | 27.08 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q14710 | OnGrade | 3.0 m lintel | 27.27 | 4.8 | - | - | 0.5 | No |
| Q148010 | Sag | 3.6 m lintel | 27.28 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q149010 | OnGrade | 1.8 m lintel | 28.11 | 1.5 | - | - | 0.5 | No |
| Q153010 | OnGrade | 1.8 m lintel | 29.46 | 1.5 | - | - | 0.5 | No |
| Q154010 | OnGrade | 2.4 m lintel | 32.71 | 4.8 | - | - | 0.5 | No |
| Q158010 | OnGrade | 1.8 m lintel | 35.6 | 4.8 | - | - | 0.5 | No |
| Q161020 | Sag | 1.8 m lintel | 30.63 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q161010 | OnGrade | 1.8 m lintel | 30.6 | 1.5 | - | - | 0.5 | No |
| Q160020 | OnGrade | RM.7 Grated Pit | 30.5 | 1.5 | - | - | 0.5 | No |
| Q160010 | OnGrade | RM.7 Grated Pit | 29.4 | 1.5 | - | - | 0.5 | No |
| Q10630 | Sag | 1.8 m lintel | 29.43 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10620J | OnGrade | RM.7 Grated Pit | 28.5 | 1.5 | - | - | 0.5 | Yes |
| Q162010 | OnGrade | 1.8 m lintel | 31.24 | 4.8 | - | - | 0.5 | No |
| Q160030 | OnGrade | 1.8 m lintel | 31.1 | 1.5 | - | - | 0.5 | No |
| Q160060 | OnGrade | 1.8 m lintel | 33.03 | 4.8 | - | - | 0.5 | No |
| Q160050 | OnGrade | RM.7 Grated Pit | 32.6 | 1.5 | - | - | 0.5 | No |
| Q160040 | OnGrade | 1.8 m lintel | 31.72 | 1.5 | - | - | 0.5 | No |
| Q163020 | Sag | 1.8 m lintel | 32.74 | 4.8 | 5 | 1 | 0.5 | No |
| Q163010 | Sag | 1.8 m lintel | 32.71 | 1.5 | 5 | 1 | 0.5 | No |
| Q165030 | Sag | 3.0 m lintel | 32.79 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q165020 | Sag | 3.0 m lintel | 32.59 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q165010J | OnGrade | RM.7 Grated Pit | 31.4 | 1.5 | - | - | 0.5 | Yes |
| Q10670J | OnGrade | RM.7 Grated Pit | 31.15 | 1.5 | - | - | 0.5 | No |
| Q10660J | OnGrade | RM.7 Grated Pit | 30.55 | 1.5 | - | - | 0.5 | Yes |
| Q10650J | OnGrade | RM.7 Grated Pit | 31.3 | 1.5 | - | - | 0.5 | Yes |
| Q10640 | Sag | 2.4 m lintel | 29.17 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q166030 | OnGrade | 1.8 m lintel | 35.87 | 1.5 | - | - | 0.5 | No |
| Q166020 | OnGrade | 1.8 m lintel | 35.09 | 1.5 | - | - | 0.5 | No |
| Q166010 | OnGrade | 1.8 m lintel | 34.85 | 1.5 | - | - | 0.5 | No |
| Q10680J | OnGrade | RM.7 Grated Pit | 31.8 | 1.5 | - | - | 0.5 | Yes |
| Q167010 | OnGrade | 1.8 m lintel | 34.94 | 1.5 | - | - | 0.5 | No |
| Q169010 | Sag | 3.0 m lintel | 32.35 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q168010 | Sag | 1.8 m lintel | 32.4 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10690J | OnGrade | RM.7 Grated Pit | 32.35 | 1.5 | - | - | 0.5 | Yes |
| Q168020 | OnGrade | 1.8 m lintel | 32.49 | 4.8 | - | - | 0.5 | No |
| Q159010 | OnGrade | 1.8 m lintel | 36.05 | 4.8 | - | - | 0.5 | No |
| Q1500150 | OnGrade | RM.7 Grated Pit | 38.85 | 4.8 | - | - | 0.5 | No |
| Q10790 | Sag | 2.4 m lintel | 39.69 | 4.8 | 5 | 0.5 | 0.5 | No |
| Q10780 | Sag | 1.8 m lintel | 39.67 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10776J | OnGrade | RM.7 Grated Pit | 38 | 1.5 | - | - | 0.5 | Yes |
| Q10773J | OnGrade | RM.7 Grated Pit | 37.8 | 1.5 | - | - | 0.5 | Yes |
| Q10770J | OnGrade | RM.7 Grated Pit | 36.4 | 1.5 | - | - | 0.5 | Yes |
| Q10760 | Sag | 1.8 m lintel | 36.6 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10750 | Sag | 1.8 m lintel | 36.34 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q10740J | OnGrade | RM.7 Grated Pit | 34.95 | 1.5 | - | - | 0.5 | Yes |
| Q10730J | OnGrade | RM.7 Grated Pit | 34.9 | 1.5 | - | - | 0.5 | Yes |
| Q10720 | OnGrade | 3.0 m lintel | 33.77 | 1.5 | - | - | 0.5 | No |
| Q10710 | OnGrade | 1.8 m lintel | 32.96 | 1.5 | - | - | 0.5 | No |
| Q10700 | OnGrade | 1.8 m lintel | 32.87 | 1.5 | - | - | 0.5 | No |
| Q212020 | OnGrade | SA1 (Type 2) | 18.5 | 4.8 | - | - | 0 | No |
| Q212010 | OnGrade | SA1 (Type 2) | 18.5 | 1.5 | - | - | 0 | No |
| Q2170140 | OnGrade | SA1 (Type 2) | 18.3 | 1.5 | - | - | 0 | No |
| Q2070130 | OnGrade | SA1 (Type 2) | 25 | 1.5 | - | - | 0 | No |
| Q2070120 | OnGrade | 1.8 m lintel | 17 | 1.5 | - | - | 0.5 | No |
| Q2070110 | Sag | 1.8 m lintel | 15.67 | 1.5 | 5 | 0.5 | 0.5 | No |
| Q2070100J | OnGrade | 1.8 m lintel | 15.45 | 1.5 | - | - | 0.5 | Yes |
| Q207090J | OnGrade | RM.7 Grated Pit | 15.63 | 1.5 | - | - | 0.5 | Yes |
| Q207080 | OnGrade | 1.8 m lintel | 15.28 | 1.5 | - | - | 0.5 | No |
| Q213020 | OnGrade | SA1 (Type 2) | 21.5 | 4.8 | - | - | 0 | No |
| Q213010 | OnGrade | SA1 (Type 2) | 21.5 | 1.5 | - | - | 0 | No |
| Q2170180 | OnGrade | SA1 (Type 2) | 21.5 | 1.5 | - | - | 0 | No |
| Q2070170 | OnGrade | SA1 (Type 2) | 21.5 | 1.5 | - | - | 0 | No |
| Q2070160 | OnGrade | SA1 (Type 2) | 20.05 | 1.5 | - | - | 0 | No |
| Q2070150 | OnGrade | SA1 (Type 2) | 18.65 | 1.5 | - | - | 0 | No |
| Q2070230 | OnGrade | SA1 (Type 2) | 24.55 | 4.8 | - | - | 0 | No |
| Q2070220 | OnGrade | SA1 (Type 2) | 24.6 | 1.5 | - | - | 0 | Yes |
| Q2070210 | OnGrade | SA1 (Type 2) | 24.1 | 1.5 | - | - | 0 | No |
| Q2070200 | OnGrade | SA1 (Type 2) | 22.45 | 1.5 | - | - | 0 | No |
| Q2070190 | OnGrade | SA1 (Type 2) | 21.55 | 1.5 | - | - | 0 | No |
| Q214010 | OnGrade | SA1 (Type 2) | 24.75 | 4.8 | - | - | 0 | No |
| Q2110100 | OnGrade | SA1 (Type 2) | 16.4 | 4.8 | - | - | 0 | No |
| Q2410100J | OnGrade | RM.7 Grated Pit | 11.75 | 1.5 | - | - | 0.5 | Yes |
| Q241090 | OnGrade | 3.0 m lintel | 11.08 | 1.5 | - | - | 0.5 | No |

**Table A2: Detailed DRAINS Stormwater Pipe Data**

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 756 | Q271050 | Q271040 | 9.72 | 18.42 | 18.09 | 3.4 | 375 |
| Pipe 755 | Q271040 | Q271030 | 83.00 | 17.79 | 16.21 | 1.9 | 375 |
| Pipe 754 | Q271030 | Q271020 | 80.60 | 16.21 | 14.69 | 1.9 | 375 |
| Pipe 753 | Q271020 | QIn2 | 19.13 | 14.69 | 14.60 | 0.5 | 375 |
| Pipe 758 | Q273010 | Q271020 | 9.11 | 15.12 | 15.00 | 1.3 | 375 |
| Pipe 757 | Q274010 | Q271030 | 9.80 | 16.71 | 16.60 | 1.1 | 375 |
| Pipe 726 | Q23005 | Q23015J | 5.53 | 29.68 | 29.53 | 2.7 | 375 |
| Pipe 727 | Q23015J | Q46005J | 11.38 | 29.38 | 29.23 | 1.3 | 375 |
| Pipe 687 | Q46005J | Q46001 | 7.81 | 29.15 | 28.95 | 2.6 | 450 |
| Pipe 665 | Q46001 | Qin1 | 57.29 | 28.95 | 27.45 | 2.6 | 450 |
| Pipe 682 | Q117030 | Q117010 | 19.89 | 31.80 | 31.70 | 0.5 | 375 |
| Pipe 683 | Q117010 | Q117020 | 6.30 | 31.70 | 31.63 | 1.1 | 375 |
| Pipe 627 | Q117020 | Q1100140 | 12.34 | 31.63 | 31.29 | 2.8 | 375 |
| Pipe 629 | Q1100140 | Q1100130 | 30.14 | 30.96 | 30.66 | 1.0 | 525 |
| Pipe 577 | Q1100130 | Q1100120 | 29.98 | 30.66 | 30.34 | 1.1 | 525 |
| Pipe 630 | Q1100120 | Q1100110 | 30.16 | 30.34 | 30.04 | 1.0 | 525 |
| Pipe 578 | Q1100110 | Q1100100 | 30.02 | 30.04 | 29.79 | 0.8 | 525 |
| Pipe 584 | Q1100100 | Q110090 | 30.38 | 29.79 | 29.38 | 1.4 | 600 |
| Pipe 634 | Q110090 | Q110080 | 22.73 | 29.38 | 29.11 | 1.2 | 600 |
| Pipe 585 | Q110080 | Q110070 | 32.46 | 29.11 | 28.15 | 3.0 | 600 |
| Pipe 637 | Q110070 | Q110060 | 30.13 | 28.15 | 27.53 | 2.1 | 600 |
| Pipe 588 | Q110060 | Q110050 | 28.79 | 27.22 | 26.46 | 2.6 | 600 |
| Pipe 590 | Q110050 | Q110040 | 45.94 | 26.46 | 25.20 | 2.7 | 600 |
| Pipe 591 | Q110040 | Q110030 | 35.91 | 24.69 | 23.60 | 3.0 | 600 |
| Pipe 589 | Q110030 | Q110020 | 63.62 | 23.60 | 22.60 | 1.6 | 600 |
| Pipe 594 | Q110020 | Q110010 | 49.61 | 22.60 | 22.11 | 1.0 | 750 |
| Pipe 593 | Q110010 | Q10450J | 38.66 | 22.60 | 22.20 | 1.0 | 750 |
| Pipe 677 | Q10450J | Q10440J | 15.37 | 20.53 | 20.45 | 0.5 | 1800 |
| Pipe 336 | Q10440J | Q101010 | 43.70 | 20.45 | 20.20 | 0.6 | 1800 |
| Pipe 475 | Q101010 | Q10420 | 21.64 | 20.11 | 19.96 | 0.7 | 1800 |
| Pipe 335 | Q10420 | Q10410J | 78.50 | 19.91 | 19.35 | 0.7 | 1800 |
| Pipe 330 | Q10410J | Q10400J | 19.38 | 19.27 | 19.13 | 0.7 | 1800 |
| Pipe 331 | Q10400J | Q10390J | 73.98 | 19.05 | 18.52 | 0.7 | 1800 |
| Pipe 332 | Q10390J | Q95010 | 28.17 | 18.45 | 18.26 | 0.7 | 1800 |
| Pipe 469 | Q95010 | Q10380J | 8.64 | 18.26 | 18.20 | 0.7 | 375 |
| Pipe 333 | Q10380J | Q10370 | 64.74 | 18.20 | 17.78 | 0.7 | 1800 |
| Pipe 471 | Q10370 | Q10360J | 16.43 | 17.78 | 17.67 | 0.7 | 1800 |
| Pipe 334 | Q10360J | Q10350J | 88.06 | 17.67 | 17.06 | 0.7 | 1800 |
| Pipe 337 | Q10350J | Q10340 | 83.83 | 17.06 | 16.82 | 0.3 | 1800 |
| Pipe 482 | Q10340 | Q10330 | 12.14 | 16.82 | 16.78 | 0.3 | 1800 |
| Pipe 338 | Q10330 | Q10320 | 69.99 | 16.78 | 16.55 | 0.3 | 1800 |
| Pipe 483 | Q10320 | Q10310 | 15.10 | 16.55 | 16.50 | 0.3 | 1800 |
| Pipe 484 | Q10310 | Q10300 | 62.90 | 16.50 | 16.30 | 0.3 | 1800 |
| Pipe 339 | Q10300 | Q10290 | 130.63 | 16.30 | 15.50 | 0.6 | 1800 |
| Pipe 486 | Q10290 | Q10280 | 20.31 | 15.50 | 15.33 | 0.8 | 1800 |
| Pipe 340 | Q10280 | Q10270J | 71.90 | 15.33 | 14.90 | 0.6 | 1800 |
| Pipe 488 | Q10270J | Q10260J | 8.72 | 14.90 | 14.85 | 0.6 | 1800 |
| Pipe 343 | Q10260J | Q10250 | 53.99 | 14.85 | 14.53 | 0.6 | 1800 |
| Pipe 342 | Q10250 | Q10240J | 47.56 | 14.53 | 14.25 | 0.6 | 1800 |
| Pipe 713 | Q10240J | Q10235J | 5.56 | 14.25 | 14.22 | 0.5 | 1800 |
| Pipe 494 | Q10235J | Q10230J | 12.98 | 14.22 | 14.15 | 0.5 | 1800 |
| Pipe 341 | Q10230J | Q10220J | 41.38 | 14.15 | 13.90 | 0.6 | 1800 |
| Pipe 315 | Q10220J | Q10210J | 51.81 | 13.90 | 13.60 | 0.6 | 1800 |
| Pipe 707 | Q10210J | Q10200J | 10.14 | 13.60 | 13.54 | 0.6 | 1800 |
| Pipe 314 | Q10200J | Q10190 | 68.63 | 13.54 | 13.11 | 0.6 | 1800 |
| Pipe 398 | Q10190 | Q10180 | 6.29 | 13.11 | 13.03 | 1.3 | 1800 |
| Pipe 316 | Q10180 | Q10170 | 97.28 | 13.03 | 12.45 | 0.6 | 1800 |
| Pipe 702 | Q10170 | Q10165J | 18.07 | 12.45 | 12.35 | 0.6 | 1800 |
| Pipe 704 | Q10165J | Q10161 | 39.59 | 12.35 | 12.15 | 0.5 | 1800 |
| Pipe 703 | Q10161 | Q10160J | 31.51 | 12.15 | 11.97 | 0.6 | 1800 |
| Pipe 317 | Q10160J | Q10150J | 7.94 | 11.97 | 11.93 | 0.5 | 1800 |
| Pipe 321 | Q10150J | Q10140 | 38.83 | 11.93 | 11.74 | 0.5 | 1800 |
| Pipe 540 | Q10140 | Q10120J | 35.61 | 11.74 | 11.56 | 0.5 | 1800 |
| Pipe 320 | Q10120J | Q10110J | 105.12 | 11.56 | 11.10 | 0.4 | 1800 |
| Pipe 712 | Q10110J | Q10100J | 11.33 | 11.10 | 11.05 | 0.4 | 375 |
| Pipe 319 | Q10100J | Q1090 | 102.08 | 11.05 | 10.60 | 0.4 | 1800 |
| Pipe 322 | Q1090 | Q1080 | 12.65 | 10.60 | 10.45 | 1.2 | 1800 |
| Pipe 752 | Q1080 | Q1075 | 22.64 | 10.45 | 10.30 | 0.7 | 1800 |
| Pipe 323 | Q1075 | Q1070 | 51.24 | 10.30 | 9.95 | 0.7 | 1800 |
| Pipe 324 | Q1070 | Q1050J | 83.17 | 10.15 | 9.86 | 0.4 | 1800 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 325 | Q1050J | Q2410110 | 71.24 | 9.86 | 9.62 | 0.3 | 1800 |
| Pipe 351 | Q2410110 | Q1040 | 97.22 | 9.21 | 7.77 | 1.5 | 1800 |
| Pipe 329 | Q2410110 | Q2410100J | 21.60 | 9.24 | 9.05 | 0.9 | 1800 |
| Pipe 354 | Q1040 | Q1030 | 90.39 | 7.77 | 7.39 | 0.4 | 1800 |
| Pipe 357 | Q1030 | Q1020J | 131.00 | 7.74 | 6.50 | 1.0 | 1800 |
| Pipe 359 | Q1020J | Q1010 | 31.49 | 6.50 | 6.26 | 0.8 | 1800 |
| Pipe 360 | Q1010 | Q1000 | 28.42 | 6.26 | 6.15 | 0.4 | 1800 |
| Pipe 628 | Q116010 | Q1100120 | 13.01 | 30.87 | 30.68 | 1.5 | 375 |
| Pipe 633 | Q115040 | Q115030J | 9.14 | 33.01 | 32.86 | 1.6 | 375 |
| Pipe 632 | Q115030J | Q115020J | 32.06 | 32.86 | 32.30 | 1.8 | 375 |
| Pipe 631 | Q115020J | Q1100100 | 30.80 | 32.30 | 30.16 | 7.0 | 375 |
| Pipe 626 | Q118010 | Q1100150 | 18.32 | 31.48 | 31.26 | 1.2 | 375 |
| Pipe 576 | Q1100150 | Q1100140 | 30.03 | 31.26 | 30.96 | 1.0 | 525 |
| Pipe 615 | Q119010 | Q1100170 | 15.67 | 32.60 | 32.48 | 0.8 | 375 |
| Pipe 616 | Q1100170 | Q1100160 | 34.93 | 32.48 | 31.85 | 1.8 | 525 |
| Pipe 625 | Q1100160 | Q1100150 | 36.83 | 31.85 | 31.26 | 1.6 | 525 |
| Pipe 614 | Q1100180 | Q1100170 | 64.12 | 33.59 | 32.48 | 1.7 | 525 |
| Pipe 613 | Q155020 | Q155010 | 28.69 | 33.82 | 33.20 | 2.2 | 375 |
| Pipe 611 | Q155010 | Q150070 | 49.16 | 33.20 | 32.01 | 2.4 | 375 |
| Pipe 166 | Q150070 | Q150060 | 69.13 | 32.01 | 31.24 | 1.1 | 525 |
| Pipe 167 | Q150060 | Q150050 | 26.33 | 30.95 | 30.54 | 1.6 | 525 |
| Pipe 168 | Q150050 | Q150040 | 45.41 | 30.55 | 29.85 | 1.5 | 525 |
| Pipe 197 | Q150040 | Q150030 | 60.83 | 29.75 | 28.07 | 2.8 | 600 |
| Pipe877 | Q150030 | Q150020 | 16.65 | 28.24 | 27.96 | 1.7 | 750 |
| Pipe879 | Q150020 | Q150015 | 15.39 | 27.96 | 27.70 | 1.7 | 750 |
| Pipe 235 | Q150015 | Q150010 | 29.39 | 27.70 | 27.21 | 1.7 | 750 |
| Pipe 550 | Q150010 | Q10610J | 16.54 | 27.07 | 26.86 | 1.3 | 900 |
| Pipe 296 | Q10610J | Q10600J | 71.12 | 26.41 | 25.55 | 1.2 | 1350 |
| Pipe 294 | Q10600J | Q10580 | 19.99 | 25.55 | 25.19 | 1.8 | 1350 |
| Pipe 308 | Q10580 | Q10570J | 70.66 | 25.19 | 24.65 | 0.8 | 1500 |
| Pipe 307 | Q10570J | Q10560J | 36.75 | 24.65 | 24.12 | 1.4 | 1350 |
| Pipe 305 | Q10560J | Q10550J | 36.47 | 24.12 | 23.89 | 0.6 | 1350 |
| Pipe 738 | Q10550J | Q10540J | 4.79 | 23.89 | 23.84 | 1.0 | 375 |
| Pipe 306 | Q10540J | Q10530 | 113.04 | 23.84 | 22.63 | 1.1 | 1350 |
| Pipe 531 | Q10530 | Q10520 | 3.48 | 22.58 | 22.49 | 2.6 | 1350 |
| Pipe 532 | Q10520 | Q10510J | 65.23 | 21.94 | 21.38 | 0.9 | 1800 |
| Pipe 605 | Q10510J | Q10500J | 30.58 | 21.38 | 21.20 | 0.6 | 1800 |
| Pipe 680 | Q10500J | Q10490J | 18.98 | 21.20 | 21.10 | 0.5 | 1800 |
| Pipe 681 | Q10490J | Q10480J | 14.33 | 21.10 | 21.03 | 0.5 | 1800 |
| Pipe 604 | Q10480J | Q10470J | 13.31 | 21.03 | 20.93 | 0.8 | 1800 |
| Pipe 606 | Q10470J | Q10460J | 12.36 | 20.97 | 20.92 | 0.4 | 1800 |
| Pipe 676 | Q10460J | Q10450J | 14.12 | 20.60 | 20.53 | 0.5 | 1800 |
| Pipe 612 | Q156010 | Q155010 | 8.69 | 33.56 | 33.42 | 1.6 | 375 |
| Pipe 610 | Q157010 | Q150070 | 41.83 | 33.50 | 32.90 | 1.4 | 375 |
| Pipe 648 | Q120010 | Q10460J | 4.65 | 22.40 | 22.35 | 1.1 | 375 |
| Pipe 651 | Q112010 | Q110040 | 12.88 | 25.68 | 25.45 | 1.8 | 375 |
| Pipe 650 | Q107020 | Q107010 | 11.84 | 24.41 | 24.25 | 1.4 | 375 |
| Pipe 649 | Q107010 | Q106030 | 11.98 | 23.98 | 23.70 | 2.3 | 600 |
| Pipe 598 | Q106030 | Q106020 | 62.29 | 23.09 | 22.20 | 1.4 | 825 |
| Pipe 597 | Q106020 | Q106010 | 65.60 | 22.20 | 21.17 | 1.6 | 825 |
| Pipe 701 | Q106010 | Q10440J | 2.12 | 21.17 | 21.15 | 0.9 | 825 |
| Pipe 647 | Q111010 | Q110020 | 12.39 | 23.15 | 23.00 | 1.2 | 375 |
| Pipe 646 | Q102010 | Q101020 | 12.22 | 21.54 | 21.22 | 2.6 | 375 |
| Pipe 601 | Q101020 | Q101010 | 21.33 | 21.22 | 21.10 | 0.6 | 1050 |
| Pipe 452 | Q109010 | Q1060100 | 4.64 | 28.93 | 28.66 | 5.8 | 450 |
| Pipe 218 | Q1060100 | Q106090 | 33.93 | 28.66 | 28.46 | 0.6 | 675 |
| Pipe 587 | Q106090 | Q106080 | 6.68 | 28.46 | 28.43 | 0.5 | 675 |
| Pipe 639 | Q106080 | Q106070 | 24.75 | 28.43 | 28.33 | 0.4 | 675 |
| Pipe 586 | Q106070 | Q106060 | 12.98 | 28.27 | 27.77 | 3.9 | 675 |
| Pipe 595 | Q106060 | Q106050 | 61.10 | 27.60 | 25.47 | 3.5 | 750 |
| Pipe 596 | Q106050 | Q106040 | 54.63 | 25.47 | 24.06 | 2.6 | 750 |
| Pipe 599 | Q106040 | Q106030 | 28.65 | 24.06 | 23.38 | 2.4 | 825 |
| Pipe 638 | Q108010 | Q106060 | 11.60 | 28.25 | 28.15 | 0.9 | 375 |
| Pipe 635 | Q113010 | Q110080 | 12.87 | 29.64 | 29.45 | 1.5 | 375 |
| Pipe 636 | Q114010 | Q110080 | 17.96 | 30.21 | 29.60 | 3.4 | 375 |
| Pipe 565 | Q98030 | Q98020 | 21.71 | 20.97 | 20.71 | 1.2 | 375 |
| Pipe 572 | Q98020 | Q96030J | 15.45 | 20.71 | 20.50 | 1.4 | 450 |
| Pipe 678 | Q96030J | Q96020 | 9.63 | 20.20 | 19.99 | 2.2 | 675 |
| Pipe 221 | Q96020 | Q96010 | 49.65 | 19.99 | 19.80 | 0.4 | 675 |
| Pipe 517 | Q96010 | Q10390J | 4.73 | 19.80 | 19.75 | 1.1 | 675 |
| Pipe 570 | Q99020 | Q99010 | 16.39 | 20.53 | 20.45 | 0.5 | 375 |
| Pipe 569 | Q99010 | Q96030J | 25.88 | 20.45 | 20.00 | 1.7 | 375 |
| Pipe 566 | Q99070 | Q99060 | 10.35 | 21.25 | 21.20 | 0.5 | 375 |
| Pipe 567 | Q99060 | Q99050 | 9.36 | 21.20 | 21.08 | 1.3 | 375 |
| Pipe 568 | Q99050 | Q99040 | 9.51 | 21.08 | 21.01 | 0.7 | 375 |
| Pipe 679 | Q99040 | Q99010 | 29.53 | 21.01 | 20.50 | 1.7 | 375 |
| Pipe 662 | Q83070 | Q83060 | 14.06 | 24.80 | 24.65 | 1.1 | 375 |
| Pipe 661 | Q83060 | Q83050 | 15.17 | 24.65 | 24.33 | 2.1 | 375 |
| Pipe 660 | Q83050 | Q83040 | 15.50 | 24.33 | 24.15 | 1.2 | 375 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 659 | Q83040 | Q83030 | 13.66 | 24.15 | 24.11 | 0.3 | 375 |
| Pipe 658 | Q83030 | Q83020J | 20.71 | 24.11 | 23.88 | 1.1 | 375 |
| Pipe 685 | Q83020J | Q83010 | 14.34 | 23.23 | 23.15 | 0.6 | 375 |
| Pipe 656 | Q83010 | Q82030 | 92.91 | 23.15 | 22.40 | 0.8 | 375 |
| Pipe 600 | Q82030 | Q82020 | 25.48 | 21.28 | 21.04 | 0.9 | 900 |
| Pipe 278 | Q82020 | Q82010 | 86.22 | 21.04 | 19.45 | 1.8 | 900 |
| Pipe 277 | Q82010 | Q10330 | 94.87 | 19.45 | 17.30 | 2.3 | 900 |
| Pipe 657 | Q84010 | Q83020J | 9.80 | 23.48 | 23.23 | 2.6 | 375 |
| Pipe 571 | Q96090 | Q96080 | 10.08 | 22.23 | 22.18 | 0.5 | 375 |
| Pipe 655 | Q96080 | Q96070 | 9.70 | 22.18 | 22.02 | 1.7 | 375 |
| Pipe 684 | Q96070 | Q96060 | 9.32 | 22.22 | 22.03 | 2.0 | 450 |
| Pipe 654 | Q96060 | Q96050 | 27.65 | 21.44 | 21.18 | 0.9 | 525 |
| Pipe 580 | Q96050 | Q96040 | 69.62 | 21.18 | 20.50 | 1.0 | 525 |
| Pipe 579 | Q96040 | Q96030J | 30.02 | 20.50 | 20.00 | 1.7 | 525 |
| Pipe 653 | Q97030 | Q97020 | 23.26 | 22.51 | 22.19 | 1.4 | 375 |
| Pipe 652 | Q97020 | Q97010 | 95.36 | 22.19 | 20.86 | 1.4 | 375 |
| Pipe 645 | Q97010 | Q96020 | 20.99 | 20.86 | 20.60 | 1.2 | 375 |
| Pipe 553 | Q71020 | Q71010 | 12.48 | 25.91 | 25.67 | 1.9 | 375 |
| Pipe 575 | Q71010 | Q640105J | 10.05 | 25.67 | 25.51 | 1.6 | 525 |
| Pipe 724 | Q640105J | Q640100 | 22.57 | 25.51 | 25.06 | 2.0 | 375 |
| Pipe 582 | Q640100 | Q64090J | 15.29 | 25.06 | 24.03 | 6.7 | 600 |
| Pipe 581 | Q64090J | Q64080 | 90.64 | 23.96 | 21.36 | 2.9 | 675 |
| Pipe 729 | Q64080 | Q64070J | 3.71 | 21.36 | 21.25 | 3.0 | 675 |
| Pipe 252 | Q64070J | Q64060J | 10.00 | 21.10 | 20.90 | 2.0 | 825 |
| Pipe 260 | Q64060J | Q64050 | 99.32 | 20.90 | 18.41 | 2.5 | 825 |
| Pipe 689 | Q64050 | Q64044J | 7.35 | 18.41 | 18.27 | 1.9 | 825 |
| Pipe 688 | Q64044J | Q64042J | 9.09 | 18.21 | 18.05 | 1.8 | 825 |
| Pipe 259 | Q64042J | Q64040 | 99.70 | 18.05 | 16.45 | 1.6 | 1050 |
| Pipe 730 | Q64040 | Q64030J | 6.84 | 16.45 | 16.33 | 1.8 | 1050 |
| Pipe 287 | Q64030J | Q64020J | 9.50 | 16.33 | 16.27 | 0.6 | 1050 |
| Pipe 286 | Q64020J | Q64010 | 97.98 | 16.27 | 15.62 | 0.7 | 1050 |
| Pipe 285 | Q64010 | Q10260J | 20.15 | 15.62 | 14.82 | 4.0 | 1050 |
| Pipe 554 | Q74010 | Q72050 | 18.21 | 26.46 | 26.27 | 1.0 | 375 |
| Pipe 622 | Q72050 | Q72040 | 13.56 | 26.27 | 26.07 | 1.5 | 375 |
| Pipe 620 | Q72040 | Q72030 | 12.23 | 26.07 | 25.76 | 2.5 | 375 |
| Pipe 619 | Q72030 | Q72020 | 15.87 | 25.76 | 25.62 | 0.9 | 450 |
| Pipe 618 | Q72020 | Q72010 | 20.45 | 25.62 | 25.43 | 0.9 | 450 |
| Pipe 617 | Q72010 | Q640110 | 17.05 | 25.43 | 25.15 | 1.6 | 450 |
| Pipe 725 | Q640110 | Q640100 | 17.73 | 25.15 | 25.06 | 0.5 | 450 |
| Pipe 621 | Q73010 | Q72040 | 2.17 | 26.17 | 26.14 | 1.4 | 375 |
| Pipe 557 | Q75010 | Q72060 | 20.56 | 26.65 | 26.59 | 0.3 | 375 |
| Pipe 555 | Q72060 | Q72050 | 26.09 | 26.59 | 26.27 | 1.2 | 375 |
| Pipe 663 | Q240140 | Q46010 | 25.37 | 29.63 | 29.35 | 1.1 | 375 |
| Pipe 664 | Q46010 | Q46005J | 26.01 | 29.85 | 29.30 | 2.1 | 450 |
| Pipe 667 | Q240170 | Q240160 | 29.78 | 31.33 | 30.43 | 3.0 | 375 |
| Pipe 624 | Q240160 | Q240150 | 16.81 | 30.43 | 29.78 | 3.9 | 375 |
| Pipe 666 | Q240150 | Q23015J | 7.26 | 29.68 | 29.53 | 2.1 | 375 |
| Pipe 668 | Q22005 | Q46001 | 11.09 | 29.53 | 29.03 | 4.5 | 375 |
| Pipe 564 | Q47010 | Q46020 | 28.47 | 31.13 | 30.80 | 1.2 | 375 |
| Pipe 573 | Q46020 | Q46010 | 66.00 | 31.18 | 29.93 | 1.9 | 450 |
| Pipe 562 | Q46040 | Q46030 | 27.51 | 32.33 | 32.00 | 1.2 | 375 |
| Pipe 563 | Q46030 | Q46020 | 82.98 | 32.00 | 31.18 | 1.0 | 375 |
| Pipe 561 | Q76010 | Q720100 | 12.70 | 29.92 | 29.05 | 6.9 | 375 |
| Pipe 559 | Q720100 | Q72090 | 19.12 | 28.49 | 27.60 | 4.7 | 375 |
| Pipe 686 | Q72090 | Q72080 | 23.82 | 27.60 | 26.83 | 3.2 | 375 |
| Pipe 556 | Q72080 | Q72060 | 27.62 | 26.83 | 26.59 | 0.9 | 375 |
| Pipe 560 | Q720110 | Q720100 | 16.23 | 29.91 | 29.10 | 5.0 | 375 |
| Pipe 386 | Q180510 | Q1800110J | 8.97 | 10.42 | 10.30 | 1.3 | 450 |
| Pipe 297 | Q1800110J | Q1800100 | 78.99 | 9.38 | 8.75 | 0.8 | 1350 |
| Pipe 695 | Q1800100 | Q180090J | 17.95 | 8.65 | 8.55 | 0.6 | 450 |
| Pipe 309 | Q180090J | Q180080J | 8.38 | 8.55 | 8.46 | 1.1 | 1500 |
| Pipe 310 | Q180080J | Q180060J | 78.92 | 8.46 | 7.99 | 0.6 | 1500 |
| Pipe 390 | Q180060J | Q180050J | 13.76 | 7.66 | 7.49 | 1.2 | 1500 |
| Pipe 350 | Q180050J | Q180040J | 29.74 | 7.49 | 7.25 | 0.8 | 1800 |
| Pipe 345 | Q180040J | Q180030J | 116.28 | 7.25 | 6.32 | 0.8 | 1800 |
| Pipe 346 | Q180030J | Q180020J | 22.04 | 6.32 | 6.14 | 0.8 | 1800 |
| Pipe 347 | Q180020J | Q180010J | 10.49 | 6.14 | 6.05 | 0.9 | 1800 |
| Pipe 348 | Q180010J | Q180000 | 22.51 | 6.05 | 5.84 | 0.9 | 1800 |
| Pipe 539 | Q0510 | Q1090 | 36.62 | 12.00 | 11.77 | 0.6 | 300 |
| Pipe 533 | T3570150 | T3570140 | 18.06 | 34.36 | 33.88 | 2.7 | 375 |
| Pipe 179 | T3570140 | T3570130 | 68.94 | 33.73 | 32.88 | 1.2 | 525 |
| Pipe 451 | T3570130 | T3570120 | 7.04 | 33.08 | 33.03 | 0.7 | 375 |
| Pipe 734 | Q79110 | Q79010 | 10.76 | 31.00 | 30.66 | 3.2 | 375 |
| Pipe 71 | Q79010 | Q640160 | 49.79 | 30.89 | 28.03 | 5.7 | 375 |
| Pipe 171 | Q640160 | Q640150 | 6.59 | 28.03 | 27.91 | 1.8 | 525 |
| Pipe 170 | Q640150 | Q640140J | 84.46 | 27.91 | 26.70 | 1.4 | 525 |
| Pipe 623 | Q640140J | Q640130 | 11.26 | 26.70 | 26.01 | 6.1 | 525 |
| Pipe 583 | Q640130 | Q640120 | 42.50 | 26.01 | 25.53 | 1.1 | 600 |
| Pipe 558 | Q640120 | Q77010 | 17.71 | 25.53 | 25.35 | 1.0 | 600 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 723 | Q77010 | Q640105J | 8.23 | 25.99 | 25.88 | 1.3 | 600 |
| Pipe 731 | H14010 | H11030J | 9.51 | 46.99 | 46.95 | 0.4 | 100 |
| Pipe 7 | H11030J | H11020 | 48.79 | 46.95 | 45.07 | 3.9 | 375 |
| Pipe 4 | H11020 | H11010 | 109.22 | 45.08 | 40.82 | 3.9 | 375 |
| Pipe 6 | H11010 | Q1500140 | 89.45 | 40.82 | 37.65 | 3.5 | 375 |
| Pipe 9 | Q1500140 | Q1500130 | 81.64 | 37.65 | 36.05 | 2.0 | 375 |
| Pipe 10 | Q1500130 | Q1500120 | 79.42 | 36.05 | 35.00 | 1.3 | 375 |
| Pipe 551 | Q1500120 | Q1500115 | 76.81 | 35.00 | 34.38 | 0.8 | 375 |
| Pipe 607 | Q1500115 | Q1500110 | 40.39 | 34.38 | 34.05 | 0.8 | 450 |
| Pipe 733 | Q1500110 | Q1500100 | 56.55 | 34.05 | 33.55 | 0.9 | 450 |
| Pipe 608 | Q1500100 | Q150090 | 18.34 | 33.55 | 33.40 | 0.8 | 450 |
| Pipe 574 | Q150090 | Q150080 | 43.34 | 33.40 | 32.55 | 2.0 | 525 |
| Pipe 609 | Q150080 | Q150070 | 27.61 | 32.55 | 32.01 | 2.0 | 525 |
| Pipe 691 | Q68110 | Q64042J | 6.30 | 18.67 | 18.57 | 1.6 | 450 |
| Pipe 690 | Q68210 | Q64044J | 6.48 | 18.88 | 18.78 | 1.5 | 450 |
| Pipe 732 | H11040 | H11030J | 7.41 | 47.00 | 46.95 | 0.7 | 375 |
| Pipe 1 | Q85070 | Q85066J | 29.81 | 38.74 | 37.70 | 3.5 | 300 |
| Pipe 521 | Q85066J | Q85063J | 10.65 | 37.70 | 37.13 | 5.4 | 300 |
| Pipe 522 | Q85063J | Q85060 | 47.77 | 37.13 | 34.53 | 5.4 | 300 |
| Pipe 38 | Q85060 | Q85050 | 6.91 | 34.53 | 34.49 | 0.6 | 375 |
| Pipe 39 | Q85050 | Q85040J | 11.83 | 34.49 | 34.42 | 0.6 | 375 |
| Pipe 40 | Q85040J | Q85036J | 159.01 | 34.42 | 28.15 | 3.9 | 375 |
| Pipe 735 | Q85036J | Q85034J | 20.05 | 28.15 | 27.67 | 2.4 | 375 |
| Pipe 736 | Q85034J | Q85032J | 17.71 | 27.67 | 27.27 | 2.3 | 375 |
| Pipe 737 | Q85032J | Q85030 | 16.70 | 27.27 | 26.89 | 2.3 | 375 |
| Pipe 151 | Q85030 | Q85020 | 11.62 | 26.89 | 26.62 | 2.3 | 450 |
| Pipe 481 | Q85020 | Q85010 | 15.42 | 26.62 | 26.56 | 0.4 | 450 |
| Pipe 188 | Q85010 | Q82050 | 46.94 | 26.56 | 24.93 | 3.5 | 525 |
| Pipe 226 | Q82050 | Q82040 | 25.97 | 24.93 | 24.15 | 3.0 | 600 |
| Pipe 592 | Q82040 | Q82030 | 107.89 | 24.15 | 21.28 | 2.7 | 600 |
| Pipe 121 | Q210520 | Q210510J | 67.83 | 15.52 | 14.18 | 2.0 | 375 |
| Pipe 747 | Q210510J | Q207060 | 32.28 | 14.18 | 13.52 | 2.0 | 375 |
| Pipe 247 | Q207060 | Q207050 | 67.86 | 13.15 | 12.58 | 0.8 | 750 |
| Pipe 700 | Q207050 | Q207040J | 8.99 | 12.59 | 12.52 | 0.8 | 375 |
| Pipe 248 | Q207040J | Q207030 | 78.09 | 12.52 | 11.94 | 0.7 | 750 |
| Pipe 240 | Q207030 | Q207020J | 9.74 | 11.94 | 11.89 | 0.5 | 750 |
| Pipe 238 | Q207020J | Q207010 | 84.37 | 11.89 | 11.55 | 0.4 | 750 |
| Pipe 538 | Q207010 | Q1800150 | 9.48 | 11.47 | 11.34 | 1.4 | 825 |
| Pipe 303 | Q1800150 | Q1800140J | 83.97 | 10.81 | 10.14 | 0.8 | 1350 |
| Pipe 698 | Q1800140J | Q1800130J | 6.90 | 10.14 | 10.08 | 0.9 | 375 |
| Pipe 304 | Q1800130J | Q1800120 | 80.46 | 10.08 | 9.45 | 0.8 | 1350 |
| Pipe 543 | Q1800120 | Q1800110J | 8.92 | 9.45 | 9.38 | 0.8 | 1350 |
| Pipe 123 | Q230520 | Q230510 | 6.89 | 17.32 | 17.23 | 1.3 | 375 |
| Pipe 122 | Q230510 | Q230010 | 88.18 | 17.23 | 16.12 | 1.3 | 375 |
| Pipe 193 | Q230010 | Q1800360 | 141.39 | 15.97 | 14.51 | 1.0 | 525 |
| Pipe 284 | Q1800360 | Q1800340J | 12.13 | 14.51 | 14.24 | 2.2 | 1050 |
| Pipe 708 | Q1800340J | Q1800330J | 5.93 | 14.24 | 14.10 | 2.4 | 375 |
| Pipe 288 | Q1800330J | Q1800320 | 85.82 | 14.10 | 13.20 | 1.1 | 1050 |
| Pipe 728 | Q1800320 | Q1800310J | 6.42 | 13.11 | 13.06 | 0.8 | 1200 |
| Pipe 293 | Q1800310J | Q1800300 | 11.72 | 13.06 | 12.98 | 0.7 | 1200 |
| Pipe 292 | Q1800300 | Q1800290 | 65.27 | 12.98 | 12.52 | 0.7 | 1200 |
| Pipe 290 | Q1800290 | Q1800280J | 4.85 | 12.52 | 12.49 | 0.6 | 1200 |
| Pipe 748 | Q1800280J | Q1800275J | 9.15 | 12.49 | 12.44 | 0.6 | 375 |
| Pipe 749 | Q1800275J | Q1800270 | 3.76 | 12.44 | 12.42 | 0.5 | 375 |
| Pipe 318 | Q1800270 | Q1800260 | 57.00 | 12.42 | 12.10 | 0.6 | 1350 |
| Pipe 699 | Q1800260 | Q1800250J | 8.58 | 12.10 | 12.05 | 0.6 | 1350 |
| Pipe 298 | Q1800250J | Q1800230 | 8.82 | 12.05 | 11.99 | 0.7 | 1350 |
| Pipe 299 | Q1800230 | Q1800220 | 99.65 | 11.99 | 11.55 | 0.4 | 1350 |
| Pipe 535 | Q1800220 | Q1800210J | 5.04 | 11.55 | 11.53 | 0.4 | 1350 |
| Pipe 403 | Q1800210J | Q1800200 | 14.11 | 11.53 | 11.47 | 0.4 | 1350 |
| Pipe 300 | Q1800200 | Q1800180 | 96.35 | 11.47 | 11.13 | 0.4 | 1350 |
| Pipe 536 | Q1800180 | Q1800170 | 19.81 | 11.13 | 11.04 | 0.5 | 1350 |
| Pipe 302 | Q1800170 | Q1800160 | 45.32 | 11.04 | 10.86 | 0.4 | 1350 |
| Pipe 422 | Q1800160 | Q1800150 | 8.36 | 10.86 | 10.81 | 0.6 | 1350 |
| Pipe 511 | Q144040J | Q144030 | 11.66 | 32.63 | 32.06 | 4.9 | 375 |
| Pipe 375 | Q144030 | Q144020 | 42.78 | 32.06 | 29.96 | 4.9 | 375 |
| Pipe 374 | Q144020 | Q144010 | 18.66 | 29.89 | 29.36 | 2.8 | 375 |
| Pipe 128 | Q144010 | Q141050J | 75.29 | 29.36 | 27.38 | 2.6 | 450 |
| Pipe 159 | Q141050J | Q141040 | 14.18 | 26.83 | 26.67 | 1.1 | 525 |
| Pipe 160 | Q141040 | Q141030 | 62.85 | 26.67 | 25.92 | 1.2 | 525 |
| Pipe 199 | Q141030 | Q141020 | 13.35 | 25.77 | 25.63 | 1.1 | 675 |
| Pipe 236 | Q141020 | Q141010J | 32.57 | 25.63 | 25.39 | 0.7 | 750 |
| Pipe 366 | Q141010J | Q10570J | 19.53 | 25.39 | 25.25 | 0.7 | 750 |
| Pipe 2 | H13020 | H13010 | 13.97 | 45.32 | 45.20 | 0.9 | 375 |
| Pipe 3 | H13010 | H11020 | 25.24 | 45.20 | 45.07 | 0.5 | 375 |
| Pipe 5 | H12010 | H11010 | 28.87 | 41.80 | 40.82 | 3.4 | 375 |
| Pipe 512 | Q1410110 | Q1410100 | 16.16 | 32.89 | 32.60 | 1.8 | 375 |
| Pipe 373 | Q1410100 | Q141090 | 54.76 | 32.60 | 29.40 | 5.8 | 375 |
| Pipe 371 | Q141090 | Q141080 | 47.08 | 29.40 | 27.79 | 3.4 | 375 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 370 | Q141080 | Q141060J | 24.46 | 27.79 | 26.95 | 3.4 | 375 |
| Pipe 369 | Q141060J | Q141050J | 4.68 | 26.95 | 26.83 | 2.6 | 375 |
| Pipe 423 | Q208010 | Q207020J | 7.96 | 12.18 | 12.05 | 1.6 | 375 |
| Pipe 461 | Q127010 | Q123020J | 7.19 | 21.70 | 21.60 | 1.4 | 375 |
| Pipe 530 | Q123020J | Q123010 | 6.99 | 24.10 | 24.07 | 0.4 | 1200 |
| Pipe 291 | Q123010 | Q10520 | 38.14 | 23.93 | 22.63 | 3.4 | 1200 |
| Pipe 496 | Q65010 | Q64020J | 5.84 | 16.56 | 16.47 | 1.5 | 450 |
| Pipe 497 | Q66010 | Q64030J | 6.09 | 16.78 | 16.70 | 1.3 | 450 |
| Pipe 709 | Q1800470 | Q1800460J | 8.90 | 25.13 | 25.00 | 1.5 | 525 |
| Pipe 195 | Q1800460J | Q1800450 | 26.09 | 25.00 | 24.61 | 1.5 | 525 |
| Pipe 230 | Q1800450 | Q1800440 | 67.18 | 24.54 | 23.90 | 1.0 | 600 |
| Pipe 229 | Q1800440 | Q1800430 | 71.59 | 23.81 | 22.38 | 2.0 | 600 |
| Pipe 228 | Q1800430 | Q1800425J | 20.33 | 22.38 | 21.88 | 2.5 | 675 |
| Pipe 710 | Q1800425J | Q1800420J | 85.65 | 21.88 | 20.04 | 2.2 | 375 |
| Pipe 245 | Q1800420J | Q1800410 | 13.29 | 19.97 | 19.90 | 0.5 | 750 |
| Pipe 244 | Q1800410 | Q1800400 | 123.34 | 19.90 | 19.19 | 0.6 | 750 |
| Pipe 242 | Q1800400 | Q1800390 | 13.25 | 19.19 | 19.03 | 1.2 | 750 |
| Pipe 243 | Q1800390 | Q1800380 | 169.45 | 19.03 | 16.62 | 1.4 | 750 |
| Pipe 279 | Q1800380 | Q1800370 | 24.08 | 16.62 | 16.29 | 1.4 | 900 |
| Pipe 280 | Q1800370 | Q1800360 | 171.21 | 16.29 | 14.51 | 1.0 | 900 |
| Pipe 507 | Q240010 | Q1800460J | 7.37 | 25.29 | 25.20 | 1.2 | 375 |
| Pipe 125 | Q238040 | Q238030 | 11.81 | 29.05 | 28.88 | 1.4 | 375 |
| Pipe 124 | Q238030 | Q238020 | 166.64 | 28.88 | 24.46 | 2.7 | 375 |
| Pipe 505 | Q238020 | Q238010 | 35.38 | 24.46 | 23.94 | 1.5 | 450 |
| Pipe 231 | Q238010 | Q1800440 | 13.19 | 23.94 | 23.81 | 1.0 | 600 |
| Pipe 506 | Q239010 | Q1800440 | 11.12 | 24.06 | 23.90 | 1.4 | 375 |
| Pipe 153 | Q234010 | Q1800400 | 13.45 | 20.22 | 20.00 | 1.6 | 450 |
| Pipe 116 | Q233010 | Q1800390 | 15.34 | 20.28 | 20.10 | 1.2 | 375 |
| Pipe 118 | Q235010 | Q1800410 | 12.32 | 20.50 | 20.30 | 1.6 | 375 |
| Pipe 504 | Q236050 | Q236030 | 16.69 | 22.45 | 22.38 | 0.4 | 375 |
| Pipe 503 | Q236030 | Q236020J | 4.89 | 22.38 | 22.36 | 0.4 | 375 |
| Pipe 119 | Q236020J | Q236010 | 14.07 | 22.36 | 21.43 | 6.7 | 375 |
| Pipe 246 | Q236010 | Q1800420J | 97.27 | 21.05 | 19.97 | 1.1 | 750 |
| Pipe 120 | Q237010 | Q236030 | 7.45 | 22.28 | 22.18 | 1.3 | 375 |
| Pipe 711 | Q231020 | Q231010J | 1.01 | 17.32 | 17.30 | 2.0 | 375 |
| Pipe 489 | Q231010J | Q1800370 | 11.23 | 17.30 | 17.20 | 0.9 | 450 |
| Pipe 117 | Q232010 | Q231010J | 40.23 | 17.39 | 17.20 | 0.5 | 375 |
| Pipe 508 | Q210010 | Q207070 | 7.64 | 14.42 | 14.30 | 1.6 | 375 |
| Pipe 233 | Q207070 | Q207060 | 22.81 | 13.39 | 13.22 | 0.8 | 675 |
| Pipe 510 | Q209010 | Q207040J | 10.55 | 13.37 | 13.26 | 1.0 | 375 |
| Pipe 500 | Q225010 | Q1800310J | 9.17 | 13.90 | 13.76 | 1.5 | 450 |
| Pipe 501 | Q224010 | Q1800300 | 9.77 | 13.79 | 13.72 | 0.7 | 600 |
| Pipe 499 | Q226010 | Q1800320 | 8.61 | 14.09 | 14.00 | 1.1 | 375 |
| Pipe 491 | Q228010 | Q1800330J | 9.30 | 14.83 | 14.74 | 1.0 | 375 |
| Pipe 502 | Q227010 | Q1800330J | 8.12 | 14.91 | 14.80 | 1.4 | 450 |
| Pipe 490 | Q229010 | Q1800340J | 8.63 | 15.59 | 15.50 | 1.0 | 375 |
| Pipe 492 | Q230020 | Q230010 | 17.53 | 16.20 | 15.97 | 1.3 | 375 |
| Pipe 194 | Q60010 | Q59010J | 5.75 | 16.53 | 16.43 | 1.7 | 450 |
| Pipe 705 | Q59010J | Q10235J | 9.38 | 15.98 | 15.80 | 1.9 | 525 |
| Pipe 706 | Q61010 | Q59020J | 4.99 | 16.92 | 16.85 | 1.4 | 375 |
| Pipe 493 | Q59020J | Q59010J | 12.54 | 16.46 | 16.30 | 1.3 | 450 |
| Pipe 495 | Q62010 | Q10250 | 11.47 | 16.18 | 16.06 | 1.1 | 375 |
| Pipe 487 | Q80010 | Q10260J | 13.70 | 16.29 | 16.15 | 1.0 | 450 |
| Pipe 498 | Q67010 | Q64040 | 11.34 | 16.82 | 16.70 | 1.1 | 450 |
| Pipe 227 | Q68010 | Q64050 | 11.89 | 19.01 | 18.80 | 1.8 | 450 |
| Pipe 485 | Q81020 | Q81010 | 11.72 | 17.81 | 17.74 | 0.6 | 525 |
| Pipe 192 | Q81010 | Q10300 | 81.32 | 17.74 | 17.27 | 0.6 | 525 |
| Pipe 152 | Q86030 | Q86020 | 22.84 | 28.15 | 27.15 | 4.4 | 450 |
| Pipe 190 | Q86020 | Q86010J | 27.35 | 27.13 | 26.52 | 2.2 | 525 |
| Pipe 189 | Q86010J | Q82050 | 63.03 | 26.62 | 24.93 | 2.7 | 525 |
| Pipe 115 | Q85510 | Q85030 | 7.39 | 27.00 | 26.89 | 1.5 | 300 |
| Pipe 477 | Q820150 | Q820140 | 9.98 | 28.31 | 28.21 | 1.0 | 375 |
| Pipe 478 | Q820140 | Q820130J | 10.07 | 28.21 | 28.08 | 1.3 | 375 |
| Pipe 479 | Q820130J | Q820120 | 58.72 | 28.08 | 27.30 | 1.3 | 375 |
| Pipe 480 | Q820120 | Q820110 | 11.11 | 27.30 | 27.16 | 1.3 | 375 |
| Pipe 524 | Q820110 | Q820100 | 9.11 | 27.01 | 26.88 | 1.4 | 525 |
| Pipe 185 | Q820100 | Q82090J | 7.17 | 26.88 | 26.80 | 1.1 | 525 |
| Pipe 186 | Q82090J | Q82080 | 54.78 | 26.88 | 26.46 | 0.8 | 525 |
| Pipe 191 | Q82080 | Q82070 | 7.80 | 26.46 | 26.28 | 2.3 | 525 |
| Pipe 523 | Q82070 | Q82060 | 6.42 | 26.28 | 26.20 | 1.3 | 525 |
| Pipe 187 | Q82060 | Q82050 | 36.26 | 26.20 | 24.93 | 3.5 | 525 |
| Pipe 476 | Q93010 | Q870110 | 14.68 | 27.37 | 27.00 | 2.5 | 375 |
| Pipe 184 | Q870110 | Q870100 | 77.72 | 26.80 | 25.14 | 2.1 | 525 |
| Pipe 715 | Q870100 | Q87090J | 5.99 | 25.14 | 25.02 | 2.0 | 525 |
| Pipe 714 | Q87090J | Q87080J | 12.03 | 25.02 | 24.78 | 2.0 | 375 |
| Pipe 183 | Q87080J | Q87070 | 61.59 | 24.78 | 23.55 | 2.0 | 525 |
| Pipe 473 | Q87070 | Q87060 | 19.83 | 23.55 | 23.16 | 2.0 | 525 |
| Pipe 225 | Q87060 | Q87050 | 87.88 | 23.16 | 21.45 | 2.0 | 600 |
| Pipe 515 | Q87050 | Q87040J | 6.80 | 21.45 | 21.26 | 2.8 | 675 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 223 | Q87040J | Q87030 | 16.91 | 21.26 | 20.77 | 2.9 | 675 |
| Pipe 224 | Q87030 | Q87020 | 79.77 | 20.77 | 19.91 | 1.1 | 675 |
| Pipe 472 | Q87020 | Q87010 | 8.41 | 19.91 | 19.74 | 2.0 | 675 |
| Pipe 222 | Q87010 | Q10350J | 79.10 | 19.74 | 18.19 | 2.0 | 675 |
| Pipe 114 | Q94010 | Q870140 | 13.12 | 30.08 | 29.90 | 1.4 | 375 |
| Pipe 148 | Q870140 | Q870130 | 8.51 | 29.70 | 29.45 | 2.9 | 450 |
| Pipe 149 | Q870130 | Q870120 | 19.91 | 29.45 | 28.95 | 2.5 | 450 |
| Pipe 150 | Q870120 | Q870110 | 77.59 | 28.95 | 26.80 | 2.8 | 450 |
| Pipe 108 | Q870200 | Q870190 | 11.84 | 32.89 | 32.70 | 1.6 | 375 |
| Pipe 109 | Q870190 | Q870180 | 8.35 | 32.70 | 32.57 | 1.6 | 375 |
| Pipe 110 | Q870180 | Q870170 | 9.58 | 32.57 | 32.41 | 1.7 | 375 |
| Pipe 111 | Q870170 | Q870160 | 13.51 | 32.41 | 32.19 | 1.6 | 375 |
| Pipe 112 | Q870160 | Q870150 | 45.10 | 32.19 | 31.71 | 1.1 | 375 |
| Pipe 113 | Q870150 | Q870140 | 60.74 | 31.71 | 29.90 | 3.0 | 375 |
| Pipe 474 | Q92010 | Q870100 | 12.21 | 25.40 | 25.14 | 2.1 | 375 |
| Pipe 107 | Q91010 | Q87090J | 5.50 | 25.29 | 25.13 | 2.9 | 375 |
| Pipe 106 | Q90010 | Q87080J | 5.50 | 25.06 | 24.79 | 4.9 | 375 |
| Pipe 104 | Q89010 | Q87050 | 15.12 | 21.82 | 21.45 | 2.5 | 375 |
| Pipe 105 | Q88010 | Q87040J | 23.54 | 22.12 | 21.40 | 3.1 | 300 |
| Pipe 470 | Q95020 | Q10390J | 21.32 | 19.95 | 19.60 | 1.6 | 375 |
| Pipe 642 | Q100030 | Q100020 | 33.60 | 22.80 | 20.80 | 6.0 | 375 |
| Pipe 643 | Q100020 | Q100010 | 7.38 | 20.80 | 20.69 | 1.5 | 375 |
| Pipe 644 | Q100010 | Q96040 | 9.19 | 20.69 | 20.50 | 2.1 | 375 |
| Pipe 468 | Q103070 | Q103060J | 7.62 | 28.02 | 27.83 | 2.5 | 300 |
| Pipe 525 | Q103060J | Q103050J | 14.28 | 27.83 | 27.54 | 2.0 | 300 |
| Pipe 526 | Q103050J | Q103040J | 30.54 | 27.54 | 26.35 | 3.9 | 300 |
| Pipe 467 | Q103040J | Q103030J | 52.47 | 26.35 | 25.70 | 1.2 | 300 |
| Pipe 516 | Q103030J | Q103020 | 1.39 | 25.42 | 25.37 | 3.6 | 300 |
| Pipe 466 | Q103020 | Q103010 | 6.87 | 25.32 | 25.16 | 2.3 | 375 |
| Pipe 465 | Q103010 | Q101050 | 13.22 | 25.11 | 24.60 | 3.9 | 375 |
| Pipe 241 | Q101050 | Q101040 | 132.64 | 24.43 | 21.81 | 2.0 | 675 |
| Pipe 603 | Q101040 | Q101030 | 14.10 | 21.51 | 21.36 | 1.1 | 1050 |
| Pipe 602 | Q101030 | Q101020 | 46.33 | 21.36 | 21.22 | 0.3 | 1050 |
| Pipe 464 | Q125020 | Q125010 | 66.53 | 25.45 | 24.57 | 1.3 | 300 |
| Pipe 460 | Q125010 | Q123010 | 14.20 | 24.57 | 24.35 | 1.6 | 375 |
| Pipe 641 | Q122020 | Q122010 | 9.11 | 22.98 | 22.93 | 0.6 | 300 |
| Pipe 640 | Q122010 | Q10510J | 3.97 | 22.91 | 22.83 | 2.0 | 375 |
| Pipe 463 | Q140010 | Q139010 | 9.43 | 25.63 | 25.44 | 2.0 | 300 |
| Pipe 741 | Q139010 | Q139005J | 5.17 | 25.60 | 25.53 | 1.4 | 450 |
| Pipe 462 | Q139005J | Q10540J | 40.98 | 25.53 | 24.75 | 1.9 | 450 |
| Pipe 529 | Q126010 | Q123020J | 5.88 | 24.47 | 24.39 | 1.4 | 375 |
| Pipe 454 | Q139060 | Q139050 | 11.84 | 27.80 | 27.70 | 0.8 | 300 |
| Pipe 455 | Q139050 | Q139040 | 19.47 | 27.68 | 27.17 | 2.6 | 300 |
| Pipe 456 | Q139040 | Q139030 | 11.36 | 26.92 | 26.53 | 3.4 | 300 |
| Pipe 458 | Q139030 | Q139010 | 59.34 | 26.11 | 25.60 | 0.9 | 375 |
| Pipe 453 | Q1060130 | Q1060120 | 47.75 | 29.91 | 29.63 | 0.6 | 525 |
| Pipe 181 | Q1060120 | Q1060110 | 45.58 | 29.63 | 29.02 | 1.3 | 525 |
| Pipe 219 | Q1060110 | Q1060100 | 40.43 | 29.02 | 28.66 | 0.9 | 600 |
| Pipe 450 | Q205010 | Q1800140J | 3.56 | 11.45 | 11.30 | 4.2 | 450 |
| Pipe 449 | Q204010 | Q1800130J | 10.86 | 11.26 | 10.95 | 2.9 | 450 |
| Pipe 537 | Q215020 | Q215010J | 8.95 | 12.01 | 11.90 | 1.2 | 375 |
| Pipe 91 | Q215010J | Q1800170 | 7.08 | 11.95 | 11.90 | 0.7 | 375 |
| Pipe 421 | Q216010 | Q215010J | 4.84 | 12.33 | 12.28 | 1.0 | 375 |
| Pipe 430 | Q16040 | Q16030 | 5.62 | 12.59 | 12.44 | 2.7 | 375 |
| Pipe 176 | Q16030 | Q16010 | 64.41 | 12.44 | 12.20 | 0.4 | 525 |
| Pipe 429 | Q16010 | Q14035J | 5.35 | 12.20 | 12.13 | 1.3 | 525 |
| Pipe 427 | Q14035J | Q14030J | 9.14 | 12.13 | 12.03 | 1.1 | 525 |
| Pipe 213 | Q14030J | Q14020 | 43.99 | 11.94 | 11.55 | 0.9 | 675 |
| Pipe 214 | Q14020 | Q14010 | 59.37 | 11.55 | 11.19 | 0.6 | 675 |
| Pipe 431 | Q14010 | Q1050J | 11.46 | 11.19 | 11.08 | 1.0 | 675 |
| Pipe 239 | Q19020 | Q19010 | 23.06 | 11.51 | 10.99 | 2.3 | 750 |
| Pipe 266 | Q19010 | Q1070 | 7.57 | 10.99 | 10.90 | 1.2 | 900 |
| Pipe 175 | Q18910 | Q1070 | 15.61 | 11.71 | 11.41 | 1.9 | 525 |
| Pipe778 | Q189030 | Q189020J | 5.65 | 11.25 | 11.16 | 1.6 | 375 |
| Pipe 177 | Q189020J | Q189010J | 72.26 | 11.05 | 10.52 | 0.7 | 525 |
| Pipe 178 | Q189010J | Q188030 | 15.22 | 10.52 | 10.41 | 0.7 | 525 |
| Pipe 95 | Q188030 | Q188020 | 69.90 | 10.41 | 9.54 | 1.2 | 375 |
| Pipe 696 | Q188020 | Q188010 | 17.88 | 9.54 | 9.34 | 1.1 | 375 |
| Pipe 169 | Q188010 | Q180080J | 17.63 | 9.34 | 9.10 | 1.4 | 525 |
| Pipe 433 | Q200010 | Q189020J | 5.59 | 11.21 | 11.16 | 0.9 | 375 |
| Pipe 147 | Q190020 | Q189020J | 11.67 | 11.24 | 11.10 | 1.2 | 450 |
| Pipe 432 | Q188050 | Q188040J | 32.10 | 11.33 | 11.03 | 0.9 | 375 |
| Pipe 94 | Q188040J | Q188030 | 56.11 | 11.03 | 10.41 | 1.1 | 375 |
| Pipe 215 | Q246020J | Q246010 | 32.26 | 10.95 | 10.15 | 2.5 | 600 |
| Pipe 547 | Q246010 | Q241080J | 6.18 | 10.15 | 10.12 | 0.5 | 600 |
| Pipe 327 | Q241080J | Q241070 | 13.96 | 8.58 | 8.50 | 0.6 | 1800 |
| Pipe 326 | Q241070 | Q241060 | 188.49 | 8.50 | 7.63 | 0.5 | 1800 |
| Pipe 548 | Q241060 | Q241050 | 4.30 | 7.63 | 7.59 | 0.9 | 1800 |
| Pipe 313 | Q241050 | Q241040J | 12.05 | 7.59 | 7.49 | 0.8 | 1800 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 349 | Q241040J | Q241030J | 40.02 | 7.49 | 7.13 | 0.9 | 1800 |
| Pipe 363 | Q241030J | Q241020 | 38.94 | 7.15 | 6.82 | 0.9 | 1800 |
| Pipe 719 | Q241020 | Q241010J | 6.57 | 6.82 | 6.76 | 0.9 | 1800 |
| Pipe 344 | Q241010J | Q241000 | 114.63 | 6.76 | 5.84 | 0.8 | 1800 |
| Pipe 434 | Q244050 | Q244040 | 24.75 | 10.68 | 10.23 | 1.8 | 375 |
| Pipe 435 | Q244040 | Q244030 | 8.93 | 10.23 | 10.11 | 1.3 | 375 |
| Pipe 436 | Q244030 | Q244020J | 32.13 | 10.11 | 9.90 | 0.7 | 450 |
| Pipe 96 | Q244020J | Q244010 | 76.87 | 9.90 | 9.42 | 0.6 | 375 |
| Pipe 136 | Q244010 | Q241030J | 114.91 | 9.42 | 8.56 | 0.8 | 450 |
| Pipe 815 | Q2070 | Q2060J | 2.15 | 9.79 | 9.77 | 1.2 | 1800 |
| Pipe 694 | Q2060J | Q2410110 | 6.47 | 10.45 | 10.37 | 1.2 | 525 |
| Pipe 352 | Q2060J | Q2055 | 25.31 | 9.77 | 9.50 | 1.1 | 1800 |
| Pipe 437 | Q2080 | Q2060J | 2.34 | 10.52 | 10.45 | 3.0 | 525 |
| Pipe 438 | Q13010 | Q2055 | 5.68 | 10.45 | 10.35 | 1.8 | 525 |
| Pipe 353 | Q2055 | Q2050 | 82.56 | 8.60 | 7.88 | 0.9 | 1800 |
| Pipe 355 | Q2050 | Q2040 | 74.47 | 7.88 | 7.36 | 0.7 | 1800 |
| Pipe 356 | Q2040 | Q2030J | 83.33 | 7.55 | 6.96 | 0.7 | 1800 |
| Pipe 358 | Q2030J | Q2020 | 47.84 | 6.96 | 6.60 | 0.8 | 1800 |
| Pipe 361 | Q2020 | Q2010J | 39.89 | 6.60 | 6.35 | 0.6 | 1800 |
| Pipe 362 | Q2010J | Q2000 | 28.95 | 6.35 | 6.15 | 0.7 | 1800 |
| Pipe 428 | Q15010 | Q14030J | 6.99 | 12.12 | 12.05 | 1.0 | 300 |
| Pipe 93 | Q17020 | Q17010 | 6.83 | 12.47 | 12.18 | 4.3 | 300 |
| Pipe 92 | Q17010 | Q14040 | 12.42 | 12.18 | 11.90 | 2.3 | 300 |
| Pipe 545 | Q14040 | Q14035J | 4.38 | 12.15 | 12.13 | 0.5 | 300 |
| Pipe 145 | Q14070 | Q14060 | 21.19 | 14.17 | 13.60 | 2.7 | 450 |
| Pipe 146 | Q14060 | Q14050 | 95.90 | 13.60 | 12.20 | 1.5 | 450 |
| Pipe 544 | Q14050 | Q14040 | 1.21 | 12.20 | 12.15 | 4.1 | 450 |
| Pipe 424 | Q30160 | Q30150 | 11.93 | 13.61 | 12.98 | 5.3 | 450 |
| Pipe 425 | Q30150 | Q30140 | 61.56 | 12.98 | 12.67 | 0.5 | 450 |
| Pipe 216 | Q30140 | Q30130 | 13.81 | 12.67 | 12.46 | 1.5 | 600 |
| Pipe 217 | Q30130 | Q30120 | 68.94 | 12.46 | 12.01 | 0.7 | 600 |
| Pipe 267 | Q30120 | Q30111J | 4.44 | 12.01 | 11.95 | 1.4 | 900 |
| Pipe 716 | Q30111J | Q30110 | 9.08 | 11.70 | 11.63 | 0.8 | 900 |
| Pipe 268 | Q30110 | Q30100 | 68.32 | 11.63 | 11.17 | 0.7 | 900 |
| Pipe 751 | Q30100 | Q3090 | 5.98 | 11.17 | 11.10 | 1.2 | 900 |
| Pipe 443 | Q3090 | Q3080 | 7.02 | 11.10 | 11.06 | 0.6 | 900 |
| Pipe 269 | Q3080 | Q3070 | 68.73 | 11.06 | 10.85 | 0.3 | 900 |
| Pipe 750 | Q3070 | Q3071 | 8.72 | 10.85 | 10.60 | 2.9 | 900 |
| Pipe 270 | Q3071 | Q3060 | 6.55 | 10.60 | 10.50 | 1.5 | 900 |
| Pipe 271 | Q3060 | Q3050 | 46.34 | 10.63 | 10.39 | 0.5 | 900 |
| Pipe 272 | Q3050 | Q3040 | 50.25 | 10.39 | 9.96 | 0.9 | 900 |
| Pipe 273 | Q3040 | Q3030 | 19.01 | 9.96 | 9.91 | 0.3 | 900 |
| Pipe 274 | Q3030 | Q3020 | 44.09 | 9.91 | 9.73 | 0.4 | 900 |
| Pipe 275 | Q3020 | Q3010 | 53.85 | 9.73 | 8.36 | 2.5 | 900 |
| Pipe 276 | Q3010 | Q2030J | 7.16 | 8.36 | 8.30 | 0.8 | 900 |
| Pipe 426 | Q11020 | Q11010 | 7.40 | 13.87 | 13.75 | 1.6 | 375 |
| Pipe 439 | Q11010 | Q30130 | 11.61 | 13.59 | 13.45 | 1.2 | 375 |
| Pipe 441 | Q9030 | Q30111J | 3.57 | 13.53 | 13.45 | 2.2 | 375 |
| Pipe 440 | Q10010 | Q30120 | 6.42 | 13.50 | 13.30 | 3.1 | 375 |
| Pipe 442 | Q7010 | Q30100 | 6.20 | 13.27 | 13.10 | 2.7 | 375 |
| Pipe 448 | Q12010 | Q2040 | 7.34 | 11.12 | 11.03 | 1.2 | 375 |
| Pipe 444 | Q6010 | Q3071 | 3.31 | 12.40 | 12.36 | 1.2 | 375 |
| Pipe 447 | Q5010 | Q4020 | 8.50 | 12.40 | 12.24 | 1.9 | 375 |
| Pipe 98 | Q4020 | Q4010 | 13.96 | 12.24 | 12.10 | 1.0 | 375 |
| Pipe 446 | Q4010 | Q3060 | 10.30 | 12.10 | 12.00 | 1.0 | 375 |
| Pipe 97 | Q4040 | Q4030 | 8.37 | 12.45 | 12.34 | 1.3 | 375 |
| Pipe 99 | Q4030 | Q4020 | 18.67 | 12.34 | 12.24 | 0.5 | 375 |
| Pipe 445 | Q1110 | Q1020J | 6.96 | 10.44 | 10.23 | 3.0 | 375 |
| Pipe 208 | Q22010 | Q10110J | 4.27 | 12.51 | 12.45 | 1.4 | 600 |
| Pipe 404 | Q21010 | Q10100J | 4.29 | 12.81 | 12.76 | 1.2 | 450 |
| Pipe 237 | Q23010 | Q10120J | 15.67 | 12.93 | 12.73 | 1.3 | 750 |
| Pipe 174 | Q31020 | Q31010 | 8.16 | 15.05 | 14.84 | 2.6 | 525 |
| Pipe 209 | Q31010 | Q24010J | 17.42 | 14.87 | 14.66 | 1.2 | 675 |
| Pipe 301 | Q24010J | Q48010 | 101.36 | 13.05 | 12.39 | 0.7 | 1350 |
| Pipe 405 | Q48010 | Q10120J | 12.65 | 12.39 | 12.23 | 1.3 | 450 |
| Pipe 86 | Q37010 | Q24040J | 8.20 | 17.23 | 17.15 | 1.0 | 600 |
| Pipe 542 | Q24040J | Q24030J | 10.91 | 16.92 | 16.65 | 2.5 | 450 |
| Pipe 265 | Q24030J | Q24020 | 104.52 | 16.48 | 14.05 | 2.3 | 900 |
| Pipe 541 | Q24020 | Q24010J | 15.31 | 14.05 | 13.90 | 1.0 | 900 |
| Pipe 410 | Q36010 | Q24040J | 1.23 | 17.44 | 17.41 | 2.4 | 450 |
| Pipe 102 | Q35010 | Q33030 | 3.09 | 18.98 | 18.92 | 1.9 | 375 |
| Pipe 211 | Q33030 | Q33020J | 10.82 | 17.94 | 17.72 | 2.0 | 675 |
| Pipe 212 | Q33020J | Q33010 | 69.52 | 17.72 | 16.62 | 1.6 | 675 |
| Pipe 210 | Q33010 | Q24030J | 13.65 | 16.62 | 16.48 | 1.0 | 675 |
| Pipe 90 | Q34010 | Q33020J | 5.11 | 18.46 | 18.35 | 2.2 | 450 |
| Pipe 89 | Q33060 | Q33050 | 115.89 | 23.12 | 19.38 | 3.2 | 375 |
| Pipe 745 | Q33050 | Q33045J | 7.50 | 19.38 | 19.28 | 1.3 | 375 |
| Pipe 746 | Q33045J | Q33040 | 63.24 | 19.28 | 18.32 | 1.5 | 375 |
| Pipe 180 | Q33040 | Q33030 | 7.91 | 18.34 | 18.16 | 2.3 | 450 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 722 | Q39010 | Q24050J | 3.96 | 19.74 | 19.60 | 3.5 | 375 |
| Pipe 253 | Q24050J | Q24040J | 116.23 | 19.61 | 16.85 | 2.4 | 825 |
| Pipe 87 | Q38020 | Q38010 | 8.15 | 20.41 | 20.09 | 3.9 | 375 |
| Pipe 100 | Q38010 | Q24050J | 5.22 | 20.04 | 19.85 | 3.6 | 300 |
| Pipe 88 | Q40020 | Q40010 | 7.59 | 22.89 | 22.78 | 1.5 | 375 |
| Pipe 101 | Q40010 | Q24060J | 5.18 | 22.68 | 22.56 | 2.3 | 375 |
| Pipe 254 | Q24060J | Q24050J | 117.46 | 22.50 | 19.76 | 2.3 | 825 |
| Pipe 721 | Q41010 | Q24060J | 3.91 | 22.69 | 22.59 | 2.6 | 750 |
| Pipe 420 | Q42010 | Q24070J | 3.85 | 25.90 | 25.85 | 1.3 | 375 |
| Pipe 257 | Q24070J | Q24060J | 77.59 | 25.16 | 22.50 | 3.4 | 825 |
| Pipe 416 | Q43010 | Q24090 | 8.53 | 26.56 | 25.50 | 12.4 | 375 |
| Pipe 255 | Q24090 | Q24080J | 36.46 | 25.43 | 25.28 | 0.4 | 825 |
| Pipe 258 | Q24080J | Q24070J | 31.07 | 25.28 | 25.16 | 0.4 | 825 |
| Pipe 417 | Q44010 | Q240100J | 4.95 | 27.87 | 27.80 | 1.4 | 375 |
| Pipe 256 | Q240100J | Q24090 | 42.08 | 25.61 | 25.43 | 0.4 | 825 |
| Pipe 419 | Q45010 | Q240105J | 6.34 | 27.85 | 27.78 | 1.1 | 375 |
| Pipe 720 | Q240105J | Q240100J | 8.78 | 25.65 | 25.61 | 0.5 | 375 |
| Pipe 415 | Q240130 | Q240120 | 9.29 | 25.99 | 25.95 | 0.4 | 375 |
| Pipe 760 | Q240120 | Q240110 | 59.75 | 25.95 | 25.68 | 0.5 | 375 |
| Pipe 418 | Q240110 | Q240105J | 6.68 | 25.68 | 25.65 | 0.5 | 375 |
| Pipe 394 | Q53050 | Q53040 | 10.48 | 21.96 | 21.41 | 5.3 | 375 |
| Pipe 395 | Q53040 | Q53030 | 112.40 | 21.41 | 17.48 | 3.5 | 375 |
| Pipe 397 | Q53030 | Q53020 | 121.52 | 17.48 | 15.43 | 1.7 | 375 |
| Pipe 172 | Q53020 | Q53015 | 48.57 | 15.43 | 14.95 | 1.0 | 525 |
| Pipe 693 | Q53015 | Q53010 | 38.27 | 14.95 | 14.58 | 1.0 | 525 |
| Pipe 692 | Q53010 | Q10180 | 19.47 | 14.58 | 14.22 | 1.9 | 525 |
| Pipe 411 | Q25090 | Q25080 | 8.99 | 22.55 | 21.96 | 6.6 | 375 |
| Pipe 413 | Q25080 | Q25070 | 90.12 | 21.96 | 18.83 | 3.5 | 375 |
| Pipe 412 | Q25070 | Q25060 | 47.76 | 18.83 | 18.22 | 1.3 | 375 |
| Pipe 408 | Q25060 | Q25050 | 95.03 | 18.22 | 16.12 | 2.2 | 375 |
| Pipe 144 | Q25050 | Q25040 | 80.73 | 15.83 | 14.65 | 1.5 | 450 |
| Pipe 142 | Q25040 | Q25030 | 11.41 | 14.65 | 14.49 | 1.4 | 450 |
| Pipe 196 | Q25030 | Q25020J | 17.88 | 14.49 | 14.24 | 1.4 | 525 |
| Pipe 173 | Q25020J | Q25010J | 47.26 | 14.24 | 14.03 | 0.4 | 525 |
| Pipe 406 | Q25010J | Q24010J | 13.97 | 14.03 | 13.96 | 0.5 | 525 |
| Pipe 414 | Q30010 | Q25070 | 8.93 | 19.86 | 19.50 | 4.0 | 375 |
| Pipe 409 | Q29010 | Q25060 | 7.57 | 18.45 | 18.22 | 3.0 | 375 |
| Pipe 396 | Q55010 | Q53030 | 8.97 | 17.57 | 17.48 | 1.0 | 375 |
| Pipe 77 | Q54010 | Q53020 | 9.39 | 15.65 | 15.43 | 2.3 | 375 |
| Pipe 85 | Q28010 | Q25050 | 8.79 | 16.44 | 16.12 | 3.6 | 375 |
| Pipe 143 | Q27010 | Q26010J | 10.10 | 14.51 | 14.40 | 1.1 | 450 |
| Pipe 407 | Q26010J | Q25020J | 24.60 | 14.35 | 14.24 | 0.5 | 375 |
| Pipe 534 | Q26020 | Q26010J | 8.87 | 14.39 | 14.35 | 0.5 | 450 |
| Pipe 205 | Q52010 | Q10180 | 20.98 | 14.55 | 14.22 | 1.6 | 675 |
| Pipe 399 | Q51010 | Q10170 | 8.64 | 14.07 | 13.98 | 1.0 | 375 |
| Pipe 400 | Q50010 | Q10160J | 11.89 | 13.44 | 13.30 | 1.2 | 575 |
| Pipe 401 | Q49010 | Q10150J | 14.54 | 13.37 | 13.20 | 1.2 | 675 |
| Pipe 81 | Q221020 | Q221010 | 8.93 | 13.26 | 13.19 | 0.8 | 375 |
| Pipe 80 | Q221010 | Q1800270 | 6.71 | 13.19 | 13.14 | 0.8 | 375 |
| Pipe 82 | Q223010 | Q1800280J | 12.22 | 13.44 | 13.30 | 1.2 | 375 |
| Pipe 79 | Q222010 | Q1800275J | 10.79 | 12.98 | 12.87 | 1.0 | 375 |
| Pipe 84 | Q219010 | Q1800230 | 18.93 | 12.94 | 11.99 | 5.0 | 375 |
| Pipe 402 | Q220010 | Q1800250J | 4.82 | 13.08 | 13.00 | 1.7 | 375 |
| Pipe 207 | Q217010 | Q1800200 | 22.61 | 12.65 | 12.40 | 1.1 | 375 |
| Pipe 83 | Q218010 | Q1800210J | 8.29 | 12.44 | 12.35 | 1.1 | 375 |
| Pipe 206 | Q57010 | Q10210J | 11.67 | 14.66 | 14.54 | 1.0 | 675 |
| Pipe 141 | Q56010 | Q10200J | 12.12 | 14.94 | 14.70 | 2.0 | 450 |
| Pipe 78 | Q58010 | Q10210J | 4.69 | 14.67 | 14.60 | 1.5 | 375 |
| Pipe 140 | Q69010 | Q64060J | 5.62 | 21.26 | 21.23 | 0.5 | 450 |
| Pipe 76 | Q70060 | Q70050 | 11.97 | 25.08 | 24.77 | 2.6 | 375 |
| Pipe 75 | Q70050 | Q70040 | 9.36 | 24.76 | 24.25 | 5.5 | 375 |
| Pipe 74 | Q70040 | Q70030 | 8.50 | 24.20 | 24.08 | 1.4 | 375 |
| Pipe 73 | Q70030 | Q70020 | 8.54 | 24.16 | 23.83 | 3.9 | 375 |
| Pipe 204 | Q70020 | Q70010 | 84.99 | 24.25 | 21.43 | 3.3 | 600 |
| Pipe 139 | Q70010 | Q64070J | 6.18 | 21.38 | 21.35 | 0.5 | 450 |
| Pipe 70 | Q78010 | Q640160 | 24.02 | 28.39 | 28.03 | 1.5 | 375 |
| Pipe 72 | Q640170 | Q640166J | 11.63 | 31.37 | 30.95 | 3.6 | 375 |
| Pipe 742 | Q640166J | Q640164J | 13.28 | 30.95 | 30.46 | 3.7 | 375 |
| Pipe 743 | Q640164J | Q640162J | 10.48 | 30.46 | 30.08 | 3.6 | 375 |
| Pipe 744 | Q640162J | Q640160 | 51.06 | 30.08 | 28.20 | 3.7 | 375 |
| Pipe 312 | Q79030 | Q79020 | 9.19 | 33.25 | 33.12 | 1.4 | 375 |
| Pipe 311 | Q79020 | Q79010 | 86.06 | 32.90 | 30.89 | 2.3 | 375 |
| Pipe 67 | G1278030 | G1278020 | 7.22 | 8.41 | 8.32 | 1.3 | 375 |
| Pipe 66 | G1278020 | G1278010 | 6.98 | 8.32 | 8.23 | 1.3 | 375 |
| Pipe 132 | G1278010 | G1278000 | 63.05 | 8.23 | 8.12 | 0.2 | 450 |
| Pipe 65 | G158040 | G158030 | 7.22 | 7.69 | 7.63 | 0.8 | 375 |
| Pipe 759 | G158030 | G158020 | 6.48 | 7.63 | 7.55 | 1.2 | 375 |
| Pipe 64 | G158020 | G158010 | 51.18 | 7.55 | 6.58 | 1.9 | 375 |
| Pipe 63 | Q202010 | Q201010J | 14.71 | 9.24 | 9.02 | 1.5 | 375 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 697 | Q201010J | Q180090J | 7.38 | 9.02 | 8.95 | 1.0 | 375 |
| Pipe 62 | Q203010 | Q201020 | 9.17 | 9.25 | 9.19 | 0.7 | 375 |
| Pipe 60 | Q201020 | Q201010J | 34.65 | 9.19 | 9.02 | 0.5 | 375 |
| Pipe 61 | Q201030 | Q201020 | 11.75 | 9.25 | 9.19 | 0.5 | 375 |
| Pipe 391 | Q187010 | Q180060J | 2.34 | 7.70 | 7.66 | 1.7 | 375 |
| Pipe 393 | Q185010 | Q186010 | 20.92 | 9.28 | 8.95 | 1.6 | 375 |
| Pipe 392 | Q186010 | Q180040J | 10.27 | 9.28 | 9.15 | 1.3 | 375 |
| Pipe 389 | Q242010 | Q241010J | 4.91 | 8.73 | 8.70 | 0.6 | 375 |
| Pipe 549 | Q243010 | Q241020 | 1.52 | 9.07 | 9.00 | 4.6 | 300 |
| Pipe 135 | Q183030 | Q183020 | 25.26 | 8.88 | 8.65 | 0.9 | 450 |
| Pipe 134 | Q183020 | Q183010 | 20.18 | 8.63 | 8.48 | 0.7 | 450 |
| Pipe 133 | Q183010 | Q180030J | 15.18 | 8.65 | 8.15 | 3.3 | 450 |
| Pipe 387 | Q182010 | Q180020J | 2.80 | 8.48 | 8.45 | 1.1 | 375 |
| Pipe 388 | Q181010 | Q180010J | 10.83 | 9.20 | 9.00 | 1.9 | 375 |
| Pipe 69 | Q245060 | Q245050 | 8.98 | 9.96 | 9.92 | 0.5 | 375 |
| Pipe 68 | Q245050 | Q245040 | 8.38 | 9.92 | 9.88 | 0.5 | 375 |
| Pipe 138 | Q245040 | Q245030 | 70.74 | 9.88 | 9.64 | 0.3 | 450 |
| Pipe 718 | Q245030 | Q245020 | 4.17 | 9.64 | 9.56 | 1.9 | 450 |
| Pipe 717 | Q245020 | Q245010 | 8.61 | 9.64 | 9.60 | 0.5 | 450 |
| Pipe 137 | Q245010 | Q244010 | 35.74 | 9.60 | 9.42 | 0.5 | 450 |
| Pipe 154 | Q152030 | Q152020 | 37.93 | 28.24 | 27.42 | 2.2 | 675 |
| Pipe 198 | Q152020 | Q152010 | 11.71 | 27.42 | 27.29 | 1.1 | 675 |
| Pipe 203 | Q152010 | Q150010 | 8.93 | 27.29 | 26.94 | 3.9 | 675 |
| Pipe 33 | Q104020 | Q104010 | 9.52 | 29.57 | 29.37 | 2.1 | 375 |
| Pipe 34 | Q104010 | Q101070 | 8.23 | 29.37 | 29.28 | 1.1 | 375 |
| Pipe 182 | Q101070 | Q101060 | 111.84 | 29.05 | 25.00 | 3.6 | 525 |
| Pipe 220 | Q101060 | Q101050 | 22.30 | 24.97 | 24.58 | 1.8 | 600 |
| Pipe 36 | Q105020 | Q105010 | 9.29 | 32.81 | 32.63 | 1.9 | 375 |
| Pipe 35 | Q105010 | Q101090 | 8.30 | 32.03 | 31.73 | 3.6 | 375 |
| Pipe 162 | Q101090 | Q101080 | 55.42 | 31.73 | 30.04 | 3.1 | 525 |
| Pipe 161 | Q101080 | Q101070 | 27.39 | 30.04 | 29.05 | 3.6 | 525 |
| Pipe 365 | Q1010140 | Q1010130 | 3.38 | 35.16 | 35.10 | 1.8 | 375 |
| Pipe 385 | Q1010130 | Q1010120 | 9.05 | 35.10 | 35.02 | 0.9 | 375 |
| Pipe 384 | Q1010120 | Q1010110 | 11.70 | 34.94 | 34.86 | 0.7 | 375 |
| Pipe 383 | Q1010110 | Q1010100 | 60.04 | 34.86 | 32.89 | 3.3 | 450 |
| Pipe 130 | Q1010100 | Q101090 | 20.68 | 32.89 | 31.86 | 5.0 | 450 |
| Pipe 58 | Q128010 | Q123030J | 1.28 | 24.94 | 24.92 | 1.6 | 375 |
| Pipe 528 | Q123030J | Q123020J | 18.67 | 24.20 | 24.10 | 0.5 | 1200 |
| Pipe 59 | Q124030 | Q124020 | 34.63 | 24.90 | 24.63 | 0.8 | 300 |
| Pipe 103 | Q124020 | Q124010 | 45.00 | 24.63 | 24.22 | 0.9 | 375 |
| Pipe 459 | Q124010 | Q123010 | 15.42 | 24.22 | 24.00 | 1.4 | 450 |
| Pipe 57 | Q129010 | Q123040J | 12.45 | 26.80 | 26.70 | 0.8 | 375 |
| Pipe 289 | Q123040J | Q123030J | 92.99 | 26.20 | 24.20 | 2.2 | 1200 |
| Pipe 32 | Q130010 | Q123040J | 9.52 | 26.71 | 26.59 | 1.3 | 300 |
| Pipe 382 | Q131010 | Q123050J | 1.64 | 27.03 | 27.01 | 1.2 | 375 |
| Pipe 264 | Q123050J | Q123040J | 20.24 | 26.90 | 26.50 | 2.0 | 900 |
| Pipe 23 | Q132020 | Q132010 | 32.77 | 29.35 | 29.01 | 1.0 | 375 |
| Pipe 381 | Q132010 | Q123070J | 8.09 | 29.01 | 28.70 | 3.8 | 375 |
| Pipe 263 | Q123070J | Q123050J | 70.79 | 28.30 | 26.90 | 2.0 | 900 |
| Pipe 25 | Q134010 | Q123080J | 1.50 | 28.96 | 28.94 | 1.3 | 375 |
| Pipe 251 | Q123080J | Q123070J | 14.63 | 28.65 | 28.37 | 1.9 | 825 |
| Pipe 24 | Q133010 | Q123070J | 11.68 | 29.13 | 28.65 | 4.1 | 375 |
| Pipe 26 | Q135010 | Q123080J | 9.28 | 29.61 | 29.20 | 4.4 | 300 |
| Pipe 380 | Q136020 | Q136010 | 13.01 | 31.50 | 31.20 | 2.3 | 375 |
| Pipe 37 | Q136010 | Q1230100J | 10.68 | 31.20 | 30.65 | 5.2 | 300 |
| Pipe 250 | Q1230100J | Q123080J | 60.27 | 30.32 | 28.65 | 2.8 | 825 |
| Pipe 377 | Q138010 | Q1230130 | 8.73 | 33.80 | 33.64 | 1.8 | 375 |
| Pipe 520 | Q1230130 | Q1230126J | 5.46 | 32.99 | 32.86 | 2.4 | 525 |
| Pipe 519 | Q1230126J | Q1230123J | 45.90 | 32.86 | 31.90 | 2.1 | 525 |
| Pipe 518 | Q1230123J | Q1230120J | 11.71 | 31.90 | 31.61 | 2.5 | 525 |
| Pipe 379 | Q1230120J | Q1230110J | 29.10 | 31.61 | 30.89 | 2.5 | 825 |
| Pipe 249 | Q1230110J | Q1230100J | 20.40 | 30.89 | 30.32 | 2.8 | 825 |
| Pipe 56 | Q137030 | Q127020 | 10.38 | 37.55 | 37.39 | 1.5 | 375 |
| Pipe 55 | Q127020 | Q137010 | 90.65 | 37.39 | 33.80 | 4.0 | 375 |
| Pipe 54 | Q137010 | Q1230130 | 19.45 | 33.80 | 33.49 | 1.6 | 375 |
| Pipe 53 | Q1230180 | Q1230170 | 10.73 | 38.02 | 37.70 | 3.0 | 375 |
| Pipe 52 | Q1230170 | Q1230160J | 90.79 | 37.62 | 34.85 | 3.1 | 375 |
| Pipe 376 | Q1230160J | Q1230150 | 7.49 | 34.80 | 34.76 | 0.5 | 375 |
| Pipe 131 | Q1230150 | Q1230140 | 45.28 | 34.52 | 33.73 | 1.7 | 450 |
| Pipe 378 | Q1230140 | Q1230130 | 14.45 | 33.71 | 33.49 | 1.5 | 375 |
| Pipe 372 | Q145010 | Q141090 | 16.95 | 30.14 | 29.66 | 2.8 | 375 |
| Pipe 527 | Q141070 | Q141060J | 1.39 | 27.40 | 27.38 | 1.4 | 450 |
| Pipe 364 | Q143010 | Q141030 | 9.80 | 26.34 | 26.25 | 0.9 | 300 |
| Pipe 31 | Q142040 | Q142030 | 28.23 | 28.70 | 28.22 | 1.7 | 300 |
| Pipe 30 | Q142030 | Q142020 | 44.89 | 28.22 | 27.23 | 2.2 | 375 |
| Pipe 29 | Q142020 | Q142010 | 46.54 | 27.23 | 26.40 | 1.8 | 375 |
| Pipe 129 | Q142010 | Q141020 | 13.97 | 26.40 | 26.00 | 2.9 | 450 |
| Pipe 27 | Q10590 | Q10580 | 9.11 | 26.27 | 26.20 | 0.8 | 450 |
| Pipe 28 | Q14710 | Q10580 | 15.17 | 26.63 | 26.45 | 1.2 | 375 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 368 | Q148010 | Q10600J | 7.05 | 26.34 | 26.31 | 0.4 | 450 |
| Pipe 367 | Q149010 | Q10610J | 1.33 | 27.15 | 27.00 | 11.3 | 375 |
| Pipe 11 | Q153010 | Q150030 | 11.66 | 28.41 | 28.17 | 2.1 | 375 |
| Pipe 51 | Q154010 | Q150050 | 39.78 | 31.76 | 30.60 | 2.9 | 375 |
| Pipe 552 | Q158010 | Q1500115 | 15.53 | 34.62 | 34.38 | 1.6 | 375 |
| Pipe 14 | Q161020 | Q161010 | 9.56 | 29.60 | 29.55 | 0.5 | 375 |
| Pipe 13 | Q161010 | Q160020 | 9.42 | 29.62 | 29.40 | 2.3 | 375 |
| Pipe 12 | Q160020 | Q160010 | 40.90 | 29.56 | 28.30 | 3.1 | 375 |
| Pipe 165 | Q160010 | Q10630 | 11.26 | 28.30 | 28.20 | 0.9 | 525 |
| Pipe 281 | Q10630 | Q10620J | 74.79 | 27.57 | 25.40 | 2.9 | 1050 |
| Pipe 295 | Q10620J | Q10610J | 8.70 | 26.59 | 26.41 | 2.1 | 1350 |
| Pipe 49 | Q162010 | Q160030 | 10.76 | 30.29 | 30.15 | 1.3 | 375 |
| Pipe 15 | Q160030 | Q160020 | 23.05 | 30.20 | 29.55 | 2.8 | 375 |
| Pipe 50 | Q160060 | Q160050 | 23.06 | 32.03 | 31.42 | 2.6 | 375 |
| Pipe 17 | Q160050 | Q160040 | 41.18 | 31.44 | 30.52 | 2.2 | 375 |
| Pipe 16 | Q160040 | Q160030 | 29.29 | 30.67 | 30.20 | 1.6 | 375 |
| Pipe 19 | Q163020 | Q163010 | 9.17 | 31.69 | 31.61 | 0.9 | 375 |
| Pipe 18 | Q163010 | Q160050 | 9.64 | 31.53 | 31.46 | 0.7 | 375 |
| Pipe 22 | Q165030 | Q165020 | 12.73 | 31.97 | 31.77 | 1.6 | 375 |
| Pipe 46 | Q165020 | Q165010J | 25.48 | 31.20 | 30.58 | 2.4 | 375 |
| Pipe 45 | Q165010J | Q10670J | 16.07 | 29.30 | 29.20 | 0.6 | 375 |
| Pipe 262 | Q10670J | Q10660J | 28.74 | 29.92 | 29.43 | 1.7 | 900 |
| Pipe 261 | Q10660J | Q10650J | 25.05 | 29.43 | 29.00 | 1.7 | 900 |
| Pipe 283 | Q10650J | Q10640 | 73.67 | 29.00 | 27.75 | 1.7 | 1050 |
| Pipe 282 | Q10640 | Q10630 | 9.90 | 27.75 | 27.57 | 1.8 | 1050 |
| Pipe 47 | Q166030 | Q166020 | 40.34 | 35.05 | 34.33 | 1.8 | 375 |
| Pipe 43 | Q166020 | Q166010 | 14.80 | 34.33 | 33.87 | 3.1 | 375 |
| Pipe 42 | Q166010 | Q10680J | 61.04 | 33.87 | 31.00 | 4.7 | 375 |
| Pipe 200 | Q10680J | Q10670J | 31.81 | 30.76 | 30.22 | 1.7 | 600 |
| Pipe 44 | Q167010 | Q166010 | 9.87 | 34.19 | 34.10 | 0.9 | 375 |
| Pipe 21 | Q169010 | Q168010 | 10.99 | 31.65 | 31.60 | 0.5 | 375 |
| Pipe 48 | Q168010 | Q10690J | 21.52 | 31.81 | 31.60 | 1.0 | 375 |
| Pipe 202 | Q10690J | Q10680J | 24.25 | 31.17 | 30.76 | 1.7 | 600 |
| Pipe 20 | Q168020 | Q168010 | 9.63 | 31.79 | 31.60 | 2.0 | 375 |
| Pipe 41 | Q159010 | Q1500120 | 12.81 | 35.10 | 35.00 | 0.8 | 375 |
| Pipe 8 | Q1500150 | Q1500140 | 12.61 | 37.87 | 37.65 | 1.7 | 375 |
| Pipe 127 | Q10790 | Q10780 | 10.36 | 38.47 | 38.30 | 1.6 | 450 |
| Pipe 126 | Q10780 | Q10776J | 47.46 | 38.30 | 37.00 | 2.7 | 450 |
| Pipe 740 | Q10776J | Q10773J | 10.84 | 37.00 | 36.75 | 2.3 | 450 |
| Pipe 739 | Q10773J | Q10770J | 38.21 | 36.75 | 35.84 | 2.4 | 450 |
| Pipe 158 | Q10770J | Q10760 | 8.49 | 35.63 | 35.54 | 1.1 | 525 |
| Pipe 513 | Q10760 | Q10750 | 20.35 | 35.54 | 35.34 | 1.0 | 525 |
| Pipe 157 | Q10750 | Q10740J | 45.58 | 35.33 | 33.90 | 3.1 | 525 |
| Pipe 156 | Q10740J | Q10730J | 12.76 | 33.90 | 33.53 | 2.9 | 525 |
| Pipe 155 | Q10730J | Q10720 | 40.44 | 33.53 | 32.42 | 2.7 | 525 |
| Pipe 163 | Q10720 | Q10710 | 28.27 | 32.32 | 31.67 | 2.3 | 525 |
| Pipe 164 | Q10710 | Q10700 | 9.98 | 31.66 | 31.52 | 1.4 | 525 |
| Pipe 201 | Q10700 | Q10690J | 23.35 | 31.55 | 31.17 | 1.6 | 600 |
| Pipe767 | Q212020 | Q212010 | 11.26 | 17.38 | 16.59 | 7.0 | 375 |
| Pipe768 | Q212010 | Q2170140 | 12.46 | 16.59 | 16.32 | 2.2 | 375 |
| Pipe769 | Q2170140 | Q2070130 | 8.29 | 16.07 | 16.02 | 0.6 | 600 |
| Pipe766 | Q2070130 | Q2070120 | 79.79 | 16.02 | 15.40 | 0.8 | 675 |
| Pipe 234 | Q2070120 | Q2070110 | 93.99 | 15.40 | 14.27 | 1.2 | 600 |
| Pipe 761 | Q2070110 | Q2070100J | 3.11 | 14.27 | 14.19 | 2.6 | 600 |
| Pipe 514 | Q2070100J | Q207090J | 3.25 | 14.19 | 14.10 | 2.8 | 600 |
| Pipe 509 | Q207090J | Q207080 | 7.77 | 14.10 | 13.88 | 2.8 | 600 |
| Pipe 232 | Q207080 | Q207070 | 60.78 | 13.88 | 13.39 | 0.8 | 600 |
| Pipe827 | Q213020 | Q213010 | 12.38 | 20.83 | 19.69 | 9.2 | 375 |
| Pipe830 | Q213010 | Q2170180 | 15.29 | 19.69 | 19.06 | 4.1 | 375 |
| Pipe835 | Q2170180 | Q2070170 | 7.82 | 18.89 | 18.88 | 0.2 | 525 |
| Pipe838 | Q2070170 | Q2070160 | 62.47 | 18.88 | 17.67 | 1.9 | 525 |
| Pipe772 | Q2070160 | Q2070150 | 68.91 | 17.67 | 16.39 | 1.9 | 525 |
| Pipe765 | Q2070150 | Q2170140 | 30.34 | 16.39 | 16.07 | 1.1 | 525 |
| Pipe780 | Q2070230 | Q2070220 | 14.28 | 24.05 | 24.02 | 0.2 | 375 |
| Pipe792 | Q2070220 | Q2070210 | 17.49 | 24.02 | 22.77 | 7.2 | 375 |
| Pipe793 | Q2070210 | Q2070200 | 78.14 | 22.70 | 21.38 | 1.7 | 450 |
| Pipe794 | Q2070200 | Q2070190 | 70.66 | 21.38 | 19.38 | 2.8 | 450 |
| Pipe819 | Q2070190 | Q2170180 | 34.03 | 19.38 | 18.88 | 1.5 | 525 |
| Pipe779 | Q214010 | Q2070220 | 23.52 | 24.15 | 24.02 | 0.6 | 375 |
| Pipe784 | Q2110100 | Q2070120 | 4.67 | 15.89 | 15.85 | 0.9 | 375 |
| Pipe 328 | Q2410100J | Q241090 | 82.59 | 9.05 | 8.62 | 0.5 | 1800 |
| Pipe 546 | Q241090 | Q241080J | 8.03 | 8.62 | 8.58 | 0.5 | 1800 |

**Table A3: Detailed DRAINS Subcatchment Data**

| Name | Pit/Node | Sub-Catchment Area (ha) | % Paved Area | % Grassed Area | Paved Time | Grassed Time |
|---|---|---|---|---|---|---|
| Cat109 | Q271050 | 0.98 | 53.4 | 46.6 | 2.9 | 5.8 |
| Cat108 | Q273010 | 1.60 | 54.6 | 45.4 | 3.4 | 6.8 |
| Cat68 | Q1100140 | 2.49 | 67.0 | 33.0 | 4.1 | 8.2 |
| Cat66 | Q110080 | 1.56 | 71.0 | 29.0 | 4.0 | 8.0 |
| Cat33 | Q101010 | 5.54 | 59.4 | 40.6 | 7.2 | 14.4 |
| Cat30 | Q10420 | 0.27 | 89.1 | 10.9 | 4.0 | 8.1 |
| Cat28 | Q95010 | 1.06 | 89.9 | 10.1 | 7.4 | 14.8 |
| Cat27 | Q10340 | 3.65 | 30.0 | 70.0 | 7.0 | 14.0 |
| Cat187 | Q10250 | 3.54 | 58.6 | 41.4 | 8.1 | 16.3 |
| Cat141 | Q1080 | 1.07 | 64.9 | 35.1 | 6.9 | 13.8 |
| Cat140 | Q1070 | 1.89 | 61.6 | 38.4 | 5.8 | 11.6 |
| Cat127 | Q1040 | 0.45 | 60.2 | 39.8 | 2.5 | 4.9 |
| Cat119 | Q1030 | 0.42 | 57.9 | 42.1 | 1.9 | 3.8 |
| Cat67 | Q115040 | 1.39 | 63.4 | 36.6 | 4.1 | 8.3 |
| Cat69 | Q155010 | 1.12 | 73.0 | 27.0 | 3.5 | 7.0 |
| Cat73 | Q150050 | 1.03 | 56.3 | 43.7 | 3.0 | 6.0 |
| Cat74 | Q150030 | 0.98 | 56.0 | 44.0 | 3.4 | 6.8 |
| Cat62 | Q10580 | 0.17 | 89.8 | 10.2 | 1.9 | 3.8 |
| Cat59 | Q10540J | 1.39 | 50.1 | 49.9 | 4.0 | 7.9 |
| Cat58 | Q10520 | 0.42 | 50.2 | 49.8 | 2.3 | 4.7 |
| Cat72 | Q157010 | 0.22 | 89.3 | 10.7 | 1.5 | 3.0 |
| Cat56 | Q120010 | 2.95 | 62.1 | 37.9 | 4.9 | 9.9 |
| Cat34 | Q107020 | 4.46 | 59.5 | 40.5 | 7.4 | 14.8 |
| Cat65 | Q106090 | 2.51 | 51.0 | 49.0 | 6.4 | 12.8 |
| Cat211 | Q99070 | 3.23 | 59.5 | 40.5 | 4.0 | 7.9 |
| Cat10 | Q84010 | 2.04 | 60.6 | 39.4 | 6.8 | 13.6 |
| Cat14 | Q96090 | 1.47 | 58.9 | 41.1 | 3.1 | 6.1 |
| Cat4 | Q71010 | 2.11 | 76.9 | 23.1 | 6.4 | 12.7 |
| Cat197 | Q64040 | 1.05 | 58.9 | 41.1 | 2.6 | 5.2 |
| Cat7 | Q72050 | 0.25 | 10.0 | 90.0 | 3.5 | 7.0 |
| Cat1 | Q240150 | 3.32 | 55.3 | 44.7 | 4.9 | 9.8 |
| Cat2 | Q76010 | 0.92 | 54.5 | 45.5 | 2.6 | 5.2 |
| Cat177 | Q180510 | 1.12 | 63.6 | 36.4 | 3.4 | 6.8 |
| Cat176 | Q1800100 | 1.43 | 63.2 | 36.8 | 4.1 | 8.2 |
| Cat144 | Q0510 | 1.01 | 58.1 | 41.9 | 3.4 | 6.8 |
| Cat212 | Q640160 | 2.00 | 54.0 | 46.0 | 3.8 | 7.6 |
| Cat3 | Q640150 | 0.45 | 75.3 | 24.7 | 4.5 | 9.0 |
| Cat6 | Q640130 | 1.19 | 55.1 | 44.9 | 2.6 | 5.2 |
| Cat90 | H14010 | 0.58 | 68.1 | 31.9 | 2.9 | 5.7 |
| Cat91 | H11010 | 0.64 | 63.6 | 36.4 | 3.4 | 6.7 |
| Cat93 | Q1500120 | 0.48 | 40.0 | 60.0 | 4.3 | 8.7 |
| Cat92 | Q150090 | 0.56 | 70.0 | 30.0 | 3.2 | 6.4 |
| Cat106 | Q68210 | 1.24 | 61.0 | 39.0 | 5.4 | 10.9 |
| Cat8 | Q85070 | 0.30 | 71.0 | 29.0 | 1.4 | 2.7 |
| Cat9 | Q85060 | 1.81 | 57.1 | 42.9 | 3.7 | 7.5 |
| Cat12 | Q85020 | 1.53 | 60.4 | 39.6 | 4.8 | 9.5 |
| Cat13 | Q82040 | 0.68 | 23.6 | 76.4 | 1.9 | 3.9 |
| Cat190 | Q210520 | 0.96 | 52.4 | 47.6 | 2.9 | 5.9 |
| Cat188 | Q230010 | 1.55 | 70.0 | 30.0 | 4.2 | 8.5 |
| Cat189 | Q1800360 | 4.18 | 70.0 | 30.0 | 3.7 | 7.4 |
| Cat160 | Q1800300 | 0.40 | 74.2 | 25.8 | 5.0 | 10.1 |
| Cat151 | Q1800200 | 0.99 | 62.7 | 37.3 | 3.3 | 6.6 |
| Cat152 | Q1800160 | 1.39 | 64.0 | 36.0 | 4.8 | 9.5 |
| Cat94 | Q144030 | 1.68 | 59.9 | 40.1 | 5.0 | 9.9 |
| Cat49 | Q144020 | 0.19 | 90.0 | 10.0 | 3.5 | 7.0 |
| Cat51 | Q141030 | 2.27 | 58.2 | 41.8 | 5.2 | 10.4 |
| Cat89 | H13010 | 0.56 | 84.4 | 15.6 | 1.8 | 3.6 |
| Cat161 | Q208010 | 1.57 | 62.8 | 37.2 | 4.2 | 8.4 |
| Cat52 | Q127010 | 1.59 | 45.2 | 54.8 | 4.2 | 8.4 |
| Cat54 | Q123010 | 0.27 | 89.6 | 10.4 | 3.9 | 7.9 |
| Cat205 | Q1800470 | 2.76 | 58.7 | 41.3 | 6.1 | 12.2 |
| Cat213 | Q1800440 | 0.33 | 89.7 | 10.3 | 3.6 | 7.2 |
| Cat201 | Q1800410 | 3.23 | 70.0 | 30.0 | 4.8 | 9.7 |
| Cat200 | Q1800400 | 3.51 | 70.0 | 30.0 | 4.7 | 9.4 |
| Cat203 | Q1800370 | 0.32 | 87.7 | 12.3 | 3.8 | 7.6 |
| Cat199 | Q238030 | 1.56 | 60.7 | 39.3 | 3.8 | 7.6 |
| Cat198 | Q238010 | 5.51 | 70.0 | 30.0 | 5.1 | 10.1 |
| Cat204 | Q236030 | 1.66 | 59.0 | 41.0 | 4.3 | 8.5 |
| Cat202 | Q231020 | 7.02 | 70.0 | 30.0 | 6.7 | 13.5 |
| Cat191 | Q207070 | 1.17 | 70.0 | 30.0 | 3.4 | 6.9 |
| Cat186 | Q209010 | 1.38 | 60.3 | 39.7 | 4.0 | 7.9 |

| Name | Pit/Node | Sub-Catchment Area (ha) | % Paved Area | % Grassed Area | Paved Time | Grassed Time |
|---|---|---|---|---|---|---|
| Cat185 | Q225010 | 3.20 | 61.3 | 38.7 | 5.4 | 10.8 |
| Cat196 | Q80010 | 7.44 | 40.0 | 60.0 | 7.6 | 15.2 |
| Cat206 | Q81020 | 4.86 | 30.0 | 70.0 | 4.8 | 9.6 |
| Cat11 | Q86020 | 0.82 | 64.1 | 35.9 | 5.0 | 10.0 |
| Cat18 | Q820150 | 0.88 | 58.5 | 41.5 | 4.6 | 9.2 |
| Cat17 | Q820110 | 2.45 | 59.2 | 40.8 | 6.2 | 12.4 |
| Cat16 | Q82080 | 2.49 | 58.9 | 41.1 | 6.5 | 12.9 |
| Cat25 | Q82070 | 0.16 | 89.5 | 10.5 | 2.4 | 4.7 |
| Cat35 | Q870130 | 2.21 | 57.4 | 42.6 | 4.6 | 9.2 |
| Cat36 | Q870180 | 0.75 | 64.9 | 35.1 | 2.6 | 5.1 |
| Cat32 | Q91010 | 2.80 | 57.9 | 42.1 | 5.8 | 11.5 |
| Cat31 | Q89010 | 2.73 | 56.2 | 43.8 | 5.1 | 10.2 |
| Cat29 | Q95020 | 5.27 | 56.5 | 43.5 | 6.4 | 12.8 |
| Cat15 | Q100020 | 1.70 | 58.4 | 41.6 | 3.2 | 6.5 |
| Cat22 | Q103070 | 0.78 | 54.2 | 45.8 | 2.3 | 4.7 |
| Cat23 | Q103020 | 0.91 | 61.0 | 39.0 | 3.8 | 7.5 |
| Cat24 | Q101050 | 0.80 | 64.2 | 35.8 | 3.8 | 7.6 |
| Cat55 | Q122020 | 1.49 | 55.1 | 44.9 | 3.1 | 6.3 |
| Cat57 | Q122010 | 0.17 | 89.7 | 10.3 | 2.6 | 5.1 |
| Cat61 | Q140010 | 0.75 | 58.7 | 41.3 | 2.5 | 4.9 |
| Cat60 | Q139010 | 0.11 | 89.9 | 10.1 | 1.9 | 3.7 |
| Cat43 | Q126010 | 1.75 | 59.5 | 40.5 | 5.2 | 10.4 |
| Cat210 | Q139030 | 0.39 | 62.5 | 37.5 | 1.5 | 3.0 |
| Cat63 | Q1060130 | 1.61 | 55.0 | 45.0 | 4.8 | 9.5 |
| Cat64 | Q1060110 | 2.68 | 30.0 | 70.0 | 5.6 | 11.1 |
| Cat178 | Q204010 | 0.79 | 65.6 | 34.4 | 2.7 | 5.5 |
| Cat133 | Q16040 | 0.89 | 62.1 | 37.9 | 4.9 | 9.8 |
| Cat136 | Q14010 | 0.62 | 65.4 | 34.6 | 2.4 | 4.8 |
| Cat137 | Q18910 | 0.42 | 62.2 | 37.8 | 2.2 | 4.5 |
| Cat173 | Q188030 | 0.30 | 60.3 | 39.7 | 1.6 | 3.2 |
| Cat174 | Q188010 | 0.38 | 61.5 | 38.5 | 1.6 | 3.3 |
| Cat138 | Q200010 | 2.66 | 61.5 | 38.5 | 4.3 | 8.6 |
| Cat132 | Q188050 | 0.20 | 89.9 | 10.1 | 3.8 | 7.6 |
| Cat171 | Q241070 | 2.06 | 59.4 | 40.6 | 5.1 | 10.1 |
| Cat172 | Q241050 | 0.79 | 62.4 | 37.6 | 2.1 | 4.2 |
| Cat168 | Q244050 | 0.82 | 62.5 | 37.5 | 2.4 | 4.9 |
| Cat128 | Q13010 | 1.46 | 62.3 | 37.7 | 5.0 | 10.0 |
| Cat121 | Q2050 | 0.22 | 63.9 | 36.1 | 1.9 | 3.8 |
| Cat120 | Q2040 | 0.67 | 58.7 | 41.3 | 3.1 | 6.1 |
| Cat114 | Q2020 | 2.25 | 60.9 | 39.1 | 6.8 | 13.7 |
| Cat131 | Q17010 | 1.11 | 63.2 | 36.8 | 3.3 | 6.6 |
| Cat135 | Q14040 | 0.57 | 63.4 | 36.6 | 2.5 | 5.0 |
| Cat134 | Q14070 | 0.45 | 60.4 | 39.6 | 2.1 | 4.2 |
| Cat110 | Q30160 | 1.36 | 61.2 | 38.8 | 5.5 | 11.1 |
| Cat125 | Q30130 | 0.35 | 69.5 | 30.5 | 3.8 | 7.6 |
| Cat123 | Q30110 | 0.50 | 63.0 | 37.0 | 3.8 | 7.6 |
| Cat117 | Q3040 | 2.00 | 63.1 | 36.9 | 4.7 | 9.3 |
| Cat118 | Q3010 | 0.47 | 61.4 | 38.6 | 3.0 | 6.0 |
| Cat129 | Q11020 | 0.87 | 61.1 | 38.9 | 4.2 | 8.4 |
| Cat124 | Q9030 | 1.51 | 59.1 | 40.9 | 5.0 | 9.9 |
| Cat122 | Q7010 | 1.34 | 59.7 | 40.3 | 5.2 | 10.5 |
| Cat116 | Q6010 | 0.94 | 61.2 | 38.8 | 3.3 | 6.5 |
| Cat113 | Q4010 | 0.58 | 62.7 | 37.3 | 2.0 | 4.0 |
| Cat143 | Q21010 | 0.96 | 62.1 | 37.9 | 2.4 | 4.8 |
| Cat208 | Q31010 | 2.67 | 67.8 | 32.2 | 11.2 | 22.3 |
| Cat142 | Q48010 | 0.48 | 56.1 | 43.9 | 1.8 | 3.6 |
| Cat209 | Q37010 | 0.98 | 57.9 | 42.1 | 2.9 | 5.7 |
| Cat139 | Q24020 | 1.48 | 62.7 | 37.3 | 6.3 | 12.7 |
| Cat96 | Q33060 | 1.02 | 90.0 | 10.0 | 4.7 | 9.4 |
| Cat111 | Q33050 | 0.46 | 85.1 | 14.9 | 2.5 | 5.0 |
| Cat207 | Q33040 | 1.97 | 63.1 | 36.9 | 7.8 | 15.7 |
| Cat98 | Q38010 | 0.89 | 59.1 | 40.9 | 3.5 | 6.9 |
| Cat97 | Q40010 | 1.35 | 58.2 | 41.8 | 3.9 | 7.7 |
| Cat100 | Q41010 | 0.35 | 56.6 | 43.4 | 1.5 | 3.0 |
| Cat99 | Q42010 | 0.61 | 65.2 | 34.8 | 3.2 | 6.4 |
| Cat95 | Q240130 | 0.58 | 90.0 | 10.0 | 3.0 | 6.1 |
| Cat103 | Q53050 | 1.82 | 60.3 | 39.7 | 5.3 | 10.6 |
| Cat105 | Q53040 | 0.25 | 80.3 | 19.7 | 4.2 | 8.3 |
| Cat153 | Q53010 | 3.67 | 60.8 | 39.2 | 7.6 | 15.1 |
| Cat101 | Q25090 | 1.00 | 63.2 | 36.8 | 4.7 | 9.5 |
| Cat102 | Q25080 | 0.20 | 89.9 | 10.1 | 4.2 | 8.3 |
| Cat156 | Q25070 | 0.07 | 88.8 | 11.2 | 1.6 | 3.2 |
| Cat155 | Q25050 | 0.11 | 90.0 | 10.0 | 2.1 | 4.1 |
| Cat157 | Q30010 | 0.44 | 59.6 | 40.4 | 1.7 | 3.4 |
| Cat158 | Q55010 | 0.87 | 58.9 | 41.1 | 2.9 | 5.8 |
| Cat154 | Q28010 | 0.92 | 60.9 | 39.1 | 3.2 | 6.3 |
| Cat147 | Q26020 | 0.63 | 58.6 | 41.4 | 2.1 | 4.3 |
| Cat146 | Q52010 | 1.13 | 59.7 | 40.3 | 4.5 | 9.1 |
| Cat148 | Q51010 | 0.43 | 62.9 | 37.1 | 3.0 | 5.9 |
| Cat149 | Q50010 | 0.46 | 56.6 | 43.4 | 2.2 | 4.5 |

| Name | Pit/Node | Sub-Catchment Area (ha) | % Paved Area | % Grassed Area | Paved Time | Grassed Time |
|---|---|---|---|---|---|---|
| Cat159 | Q221020 | 2.03 | 59.6 | 40.4 | 3.7 | 7.4 |
| Cat214 | Q221010 | 0.14 | 89.9 | 10.1 | 2.0 | 4.0 |
| Cat150 | Q219010 | 0.86 | 58.8 | 41.2 | 2.8 | 5.6 |
| Cat145 | Q218010 | 0.60 | 72.0 | 28.0 | 6.9 | 13.8 |
| Cat183 | Q57010 | 2.82 | 62.9 | 37.1 | 0.0 | 0.0 |
| Cat104 | Q70040 | 0.90 | 62.7 | 37.3 | 3.1 | 6.1 |
| Cat107 | Q70010 | 1.22 | 60.6 | 39.4 | 3.5 | 7.0 |
| Cat5 | Q640170 | 0.83 | 59.1 | 40.9 | 1.7 | 3.4 |
| Cat180 | G1278020 | 2.40 | 58.5 | 41.5 | 3.7 | 7.5 |
| Cat179 | G158030 | 2.08 | 60.1 | 39.9 | 2.6 | 5.2 |
| Cat181 | Q203010 | 2.34 | 54.8 | 45.2 | 4.5 | 9.0 |
| Cat182 | Q201030 | 0.28 | 60.9 | 39.1 | 2.0 | 4.0 |
| Cat170 | Q186010 | 0.71 | 58.5 | 41.5 | 2.9 | 5.9 |
| Cat166 | Q242010 | 0.56 | 61.0 | 39.0 | 2.7 | 5.3 |
| Cat169 | Q243010 | 0.63 | 57.7 | 42.3 | 2.6 | 5.2 |
| Cat165 | Q183010 | 0.65 | 52.8 | 47.2 | 2.5 | 5.0 |
| Cat162 | Q245050 | 1.95 | 62.4 | 37.6 | 4.9 | 9.9 |
| Cat163 | Q245040 | 1.58 | 62.8 | 37.2 | 4.9 | 9.8 |
| Cat164 | Q245020 | 0.60 | 59.8 | 40.2 | 4.1 | 8.2 |
| Cat167 | Q245010 | 0.98 | 62.1 | 37.9 | 4.3 | 8.5 |
| Cat71 | Q152010 | 1.35 | 56.9 | 43.1 | 3.4 | 6.8 |
| Cat21 | Q101070 | 1.43 | 58.9 | 41.1 | 3.7 | 7.3 |
| Cat20 | Q101090 | 1.89 | 63.8 | 36.2 | 5.1 | 10.1 |
| Cat19 | Q1010130 | 1.98 | 67.0 | 33.0 | 6.7 | 13.4 |
| Cat53 | Q124030 | 0.56 | 65.2 | 34.8 | 4.6 | 9.2 |
| Cat42 | Q129010 | 1.06 | 59.0 | 41.0 | 3.6 | 7.3 |
| Cat37 | Q132010 | 1.41 | 60.8 | 39.2 | 5.3 | 10.6 |
| Cat41 | Q133010 | 1.12 | 55.4 | 44.6 | 2.5 | 5.1 |
| Cat38 | Q136020 | 1.07 | 52.8 | 47.2 | 2.8 | 5.5 |
| Cat39 | Q138010 | 0.24 | 89.9 | 10.1 | 2.9 | 5.8 |
| Cat40 | Q1230120 | 0.45 | 50.0 | 50.0 | 1.5 | 3.1 |
| Cat45 | Q137030 | 1.65 | 55.4 | 44.6 | 4.3 | 8.6 |
| Cat46 | Q127020 | 0.30 | 89.8 | 10.2 | 3.6 | 7.2 |
| Cat47 | Q1230180 | 0.90 | 57.0 | 43.0 | 3.5 | 6.9 |
| Cat48 | Q1230150 | 1.43 | 54.5 | 45.5 | 3.5 | 7.0 |
| Cat44 | Q1230140 | 2.45 | 55.2 | 44.8 | 6.3 | 12.6 |
| Cat50 | Q141070 | 1.12 | 59.1 | 40.9 | 3.3 | 6.6 |
| Cat70 | Q10590 | 1.28 | 57.3 | 42.7 | 3.8 | 7.6 |
| Cat75 | Q148010 | 1.42 | 56.6 | 43.4 | 3.6 | 7.2 |
| Cat85 | Q161020 | 0.45 | 60.5 | 39.5 | 13.7 | 27.4 |
| Cat76 | Q10630 | 0.18 | 90.0 | 10.0 | 3.1 | 6.3 |
| Cat88 | Q163010 | 1.15 | 66.3 | 33.7 | 5.9 | 11.8 |
| Cat81 | Q165030 | 0.60 | 60.2 | 39.8 | 2.3 | 4.7 |
| Cat82 | Q165020 | 0.18 | 78.6 | 21.4 | 1.2 | 2.3 |
| Cat84 | Q10670J | 0.70 | 50.0 | 50.0 | 1.5 | 2.9 |
| Cat83 | Q10640 | 1.10 | 57.3 | 42.7 | 2.6 | 5.3 |
| Cat86 | Q169010 | 3.30 | 53.4 | 46.6 | 4.2 | 8.3 |
| Cat87 | Q168010 | 0.12 | 89.7 | 10.3 | 2.1 | 4.2 |
| Cat77 | Q10790 | 2.11 | 57.2 | 42.8 | 3.7 | 7.4 |
| Cat78 | Q10780 | 0.22 | 89.8 | 10.2 | 2.0 | 4.0 |
| Cat79 | Q10760 | 2.49 | 55.5 | 44.5 | 4.0 | 8.0 |
| Cat80 | Q10750 | 0.29 | 90.0 | 10.0 | 2.5 | 5.0 |
| Cat193 | Q212020 | 2.33 | 70.0 | 30.0 | 4.3 | 8.6 |
| Cat192 | Q2070110 | 1.39 | 70.0 | 30.0 | 5.1 | 10.2 |
| Cat194 | Q213020 | 2.17 | 70.0 | 30.0 | 6.1 | 12.3 |
| Cat195 | Q2070230 | 1.62 | 54.4 | 45.6 | 3.7 | 7.4 |

**Table A4: Limited DRAINS Stormwater Pit Data**

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q1800380 | OnGrade | 1.8 m lintel | 18.01 | 1.5 | - | - | 0.5 | No |
| Q1800370 | OnGrade | Large | 18.18 | 1.5 | - | - | 0 | No |
| Q1800360 | Sag | 3.0 m lintel | 15.91 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800340J | OnGrade | RM.7 Grated Pit | 16.47 | 1.5 | - | - | 0.5 | Yes |
| Q1800330J | OnGrade | RM.7 Grated Pit | 15.97 | 1.5 | - | - | 0.5 | Yes |
| Q1800320 | Sag | 1.8 m lintel | 14.96 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800310J | OnGrade | RM.7 Grated Pit | 15.2 | 1.5 | - | - | 0.5 | Yes |
| Q1800300 | Sag | 0.9 m x 0.45 m Grated pit | 14.93 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800290 | Sag | 3.0 m lintel | 14.19 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800280J | OnGrade | RM.7 Grated Pit | 14.4 | 1.5 | - | - | 0.5 | Yes |
| Q1800275J | OnGrade | RM.7 Grated Pit | 14.54 | 1.5 | - | - | 0.5 | Yes |
| Q1800270 | Sag | Grated pit | 14.16 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800260 | OnGrade | RM.7 Grated Pit | 13.92 | 1.5 | - | - | 0.5 | No |
| Q1800250J | OnGrade | RM.7 Grated Pit | 13.9 | 1.5 | - | - | 0.5 | Yes |
| Q1800230 | OnGrade | 1.8 m lintel | 13.79 | 1.5 | - | - | 0.5 | Yes |
| Q1800220 | OnGrade | 1.8 m lintel | 13.54 | 1.5 | - | - | 0.5 | No |
| Q1800210J | OnGrade | RM.7 Grated Pit | 13.6 | 1.5 | - | - | 0.5 | Yes |
| Q1800200 | Sag | 3.0 m lintel | 13.5 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800180 | OnGrade | 1.8 m lintel | 12.99 | 1.5 | - | - | 0.5 | No |
| Q1800170 | OnGrade | 1.8 m lintel | 12.91 | 1.5 | - | - | 0.5 | No |
| Q1800160 | Sag | 4.2 m lintel | 12.66 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800150 | OnGrade | RM.7 Grated Pit | 12.8 | 1.5 | - | - | 0.5 | Yes |
| Q1800140J | OnGrade | RM.7 Grated Pit | 12.25 | 1.5 | - | - | 0.5 | Yes |
| Q1800130J | OnGrade | RM.7 Grated Pit | 12.38 | 1.5 | - | - | 0.5 | Yes |
| Q1800120 | Sag | 1.8 m lintel | 11.61 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1800110J | OnGrade | RM.7 Grated Pit | 11.63 | 1.5 | - | - | 0.5 | Yes |
| Q1800100 | Sag | 4.2 m lintel | 10.47 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q180090J | OnGrade | RM.7 Grated Pit | 10.67 | 1.5 | - | - | 0.5 | Yes |
| Q180080J | OnGrade | RM.7 Grated Pit | 10.53 | 1.5 | - | - | 0.5 | Yes |
| Q180060J | OnGrade | RM.7 Grated Pit | 10.1 | 1.5 | - | - | 0.5 | Yes |
| Q180050J | OnGrade | RM.7 Grated Pit | 10.28 | 1.5 | - | - | 0.5 | Yes |
| Q180040J | OnGrade | RM.7 Grated Pit | 10.5 | 1.5 | - | - | 0.5 | Yes |
| Q180030J | OnGrade | RM.7 Grated Pit | 10.4 | 1.5 | - | - | 0.5 | Yes |
| Q180020J | OnGrade | RM.7 Grated Pit | 10.22 | 1.5 | - | - | 0.5 | No |
| Q180010J | OnGrade | RM.7 Grated Pit | 10.25 | 1.5 | - | - | 0.5 | Yes |
| Q180000 | Node | - | 9.9 | - | - | - | - | - |
| Q19010 | OnGrade | 1.8 m lintel | 12.6 | 1.5 | - | - | 0.5 | No |
| Q1070 | OnGrade | 1.2 m lintel | 12.65 | 1.5 | - | - | 0.5 | No |
| Q1050J | Sag | 4.2 m lintel | 12.35 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q2410110 | Sag | 1.2 m lintel | 11.91 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1040 | OnGrade | 1.2 m lintel | 12.64 | 1.5 | - | - | 0.5 | No |
| Q1030 | OnGrade | RM.7 Grated Pit | 11.99 | 1.5 | - | - | 0.5 | No |
| Q1020J | OnGrade | RM.7 Grated Pit | 11.2 | 1.5 | - | - | 0.5 | Yes |
| Q1010 | OnGrade | 1.2 m lintel | 11.4 | 1.5 | - | - | 0.5 | No |
| Q1000 | Node | - | 9.07 | - | - | - | - | - |
| Q30120 | OnGrade | 1.8 m lintel | 14.27 | 1.5 | - | - | 0.5 | No |
| Q30111J | OnGrade | Large | 14.31 | 1.5 | - | - | 0 | No |
| Q30110 | OnGrade | 1.8 m lintel | 14.26 | 1.5 | - | - | 0.5 | No |
| Q30100 | Sag | 2.4 m lintel | 13.92 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q3090 | OnGrade | 3.0 m lintel | 13.96 | 1.5 | - | - | 0.5 | No |
| Q3080 | OnGrade | 1.8 m lintel | 13.99 | 1.5 | - | - | 0.5 | No |
| Q3070 | OnGrade | 1.8 m lintel | 13.26 | 1.5 | - | - | 0.5 | No |
| Q3071 | Sag | 1.8 m lintel | 13.34 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q3060 | OnGrade | 1.8 m lintel | 13.13 | 1.5 | - | - | 0.5 | No |
| Q3050 | OnGrade | 1.8 m lintel | 12.58 | 1.5 | - | - | 0.5 | No |
| Q3040 | OnGrade | 1.8 m lintel | 12.21 | 1.5 | - | - | 0.5 | No |
| Q3030 | Sag | 1.8 m lintel | 12.02 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q3020 | OnGrade | 1.8 m lintel | 12.19 | 1.5 | - | - | 0.5 | No |
| Q3010 | Sag | 4.2 m lintel | 12.12 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q2030J | OnGrade | RM.7 Grated Pit | 12.43 | 1.5 | - | - | 0.5 | Yes |
| Q2020 | Sag | 1.8 m lintel | 11.05 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q2010J | OnGrade | RM.7 Grated Pit | 11.65 | 1.5 | - | - | 0.5 | Yes |
| Q2000 | Node | - | 9.07 | - | - | - | - | - |
| Q24030J | OnGrade | RM.7 Grated Pit | 18.2 | 1.5 | - | - | 0.5 | Yes |
| Q24020 | OnGrade | Large | 16.13 | 1.5 | - | - | 0 | No |
| Q24010J | OnGrade | RM.7 Grated Pit | 15.78 | 1.5 | - | - | 0.5 | Yes |
| Q48010 | OnGrade | 1.8 m lintel | 14.34 | 1.5 | - | - | 0.5 | No |
| Q10120J | OnGrade | RM.7 Grated Pit | 14.23 | 1.5 | - | - | 0.5 | Yes |
| Q10110J | OnGrade | RM.7 Grated Pit | 13.82 | 1.5 | - | - | 0.5 | Yes |
| Q10100J | OnGrade | RM.7 Grated Pit | 13.55 | 1.5 | - | - | 0.5 | Yes |
| Q1090 | OnGrade | 1.8 m lintel | 13 | 1.5 | - | - | 0.5 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q1080 | Sag | 4.2 m lintel | 13 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q1075 | OnGrade | RM.7 Grated Pit | 12.65 | 1.5 | - | - | 0.5 | No |
| Q2070 | Sag | 0.9 m x 0.45 m Grated pit | 12.08 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q2060J | OnGrade | RM.7 Grated Pit | 11.95 | 1.5 | - | - | 0.5 | Yes |
| Q2055 | OnGrade | 1.8 m lintel | 12.05 | 1.5 | - | - | 0.5 | No |
| Q2050 | OnGrade | 1.2 m lintel | 12.66 | 1.5 | - | - | 0.5 | No |
| Q2040 | OnGrade | RM.7 Grated Pit | 12 | 1.5 | - | - | 0.5 | No |
| Q10670J | OnGrade | Large | 31.15 | 1.5 | - | - | 0 | No |
| Q10660J | OnGrade | RM.7 Grated Pit | 30.55 | 1.5 | - | - | 0.5 | Yes |
| Q10650J | OnGrade | RM.7 Grated Pit | 31.3 | 1.5 | - | - | 0.5 | Yes |
| Q10640 | Sag | 2.4 m lintel | 29.17 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10630 | Sag | 4.2 m lintel | 29.43 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10620J | OnGrade | RM.7 Grated Pit | 28.5 | 1.5 | - | - | 0.5 | Yes |
| Q10610J | OnGrade | RM.7 Grated Pit | 28.15 | 1.5 | - | - | 0.5 | Yes |
| Q10600J | OnGrade | RM.7 Grated Pit | 27.45 | 1.5 | - | - | 0.5 | Yes |
| Q10580 | Sag | 4.2 m lintel | 27.07 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10570J | OnGrade | RM.7 Grated Pit | 26.81 | 1.5 | - | - | 0.5 | Yes |
| Q10560J | OnGrade | RM.7 Grated Pit | 26.58 | 1.5 | - | - | 0.5 | Yes |
| Q10550J | OnGrade | RM.7 Grated Pit | 26.4 | 1.5 | - | - | 0.5 | Yes |
| Q10540J | Sag | 4.2 m lintel | 26.46 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10530 | OnGrade | RM.7 Grated Pit | 25.3 | 1.5 | - | - | 0.5 | Yes |
| Q10520 | OnGrade | RM.7 Grated Pit | 24.87 | 1.5 | - | - | 0.5 | Yes |
| Q10510J | OnGrade | RM.7 Grated Pit | 24.1 | 1.5 | - | - | 0.5 | Yes |
| Q10500J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10490J | OnGrade | RM.7 Grated Pit | 23.35 | 1.5 | - | - | 0.5 | Yes |
| Q10480J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10470J | OnGrade | RM.7 Grated Pit | 23.7 | 1.5 | - | - | 0.5 | Yes |
| Q10460J | Sag | 4.2 m lintel | 23.4 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10450J | OnGrade | RM.7 Grated Pit | 23.85 | 1.5 | - | - | 0.5 | Yes |
| Q10440J | OnGrade | RM.7 Grated Pit | 23.25 | 1.5 | - | - | 0.5 | Yes |
| Q101010 | Sag | 4.2 m lintel | 22.65 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10420 | Sag | 4.2 m lintel | 22.76 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10410J | OnGrade | RM.7 Grated Pit | 21.57 | 1.5 | - | - | 0.5 | Yes |
| Q10400J | OnGrade | RM.7 Grated Pit | 21.47 | 1.5 | - | - | 0.5 | Yes |
| Q10390J | OnGrade | RM.7 Grated Pit | 21.1 | 1.5 | - | - | 0.5 | Yes |
| Q95010 | Sag | 4.2 m lintel | 20.74 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10380J | OnGrade | RM.7 Grated Pit | 20.85 | 1.5 | - | - | 0.5 | Yes |
| Q10370 | OnGrade | RM.7 Grated Pit | 20.6 | 1.5 | - | - | 0.5 | Yes |
| Q10360J | OnGrade | RM.7 Grated Pit | 20.3 | 1.5 | - | - | 0.5 | Yes |
| Q10350J | Sag | 4.2 m lintel | 20 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10340 | OnGrade | 1.8 m lintel | 19.2 | 1.5 | - | - | 0.5 | No |
| Q10330 | OnGrade | 1.8 m lintel | 19.26 | 1.5 | - | - | 0.5 | No |
| Q10320 | OnGrade | RM.7 Grated Pit | 19.3 | 1.5 | - | - | 0.5 | Yes |
| Q10310 | OnGrade | RM.7 Grated Pit | 19.2 | 1.5 | - | - | 0.5 | Yes |
| Q10300 | OnGrade | RM.7 Grated Pit | 18.55 | 1.5 | - | - | 0.5 | Yes |
| Q10290 | OnGrade | RM.7 Grated Pit | 18.08 | 1.5 | - | - | 0.5 | Yes |
| Q10280 | OnGrade | RM.7 Grated Pit | 18.2 | 1.5 | - | - | 0.5 | Yes |
| Q10270J | OnGrade | RM.7 Grated Pit | 17.25 | 1.5 | - | - | 0.5 | Yes |
| Q10260J | OnGrade | RM.7 Grated Pit | 17.2 | 1.5 | - | - | 0.5 | Yes |
| Q10250 | Sag | 4.2 m lintel | 17.03 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10240J | OnGrade | RM.7 Grated Pit | 17.5 | 1.5 | - | - | 0.5 | Yes |
| Q10235J | OnGrade | RM.7 Grated Pit | 17.5 | 1.5 | - | - | 0.5 | Yes |
| Q10230J | OnGrade | RM.7 Grated Pit | 17.2 | 1.5 | - | - | 0.5 | Yes |
| Q10220J | OnGrade | RM.7 Grated Pit | 16.31 | 1.5 | - | - | 0.5 | Yes |
| Q10210J | OnGrade | RM.7 Grated Pit | 16.1 | 1.5 | - | - | 0.5 | Yes |
| Q10200J | OnGrade | RM.7 Grated Pit | 16 | 1.5 | - | - | 0.5 | Yes |
| Q10190 | Sag | 4.2 m lintel | 15.59 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10180 | OnGrade | 1.8 m lintel | 15.55 | 1.5 | - | - | 0.5 | No |
| Q10170 | OnGrade | 1.8 m lintel | 15.06 | 1.5 | - | - | 0.5 | No |
| Q10165J | OnGrade | RM.7 Grated Pit | 15 | 1.5 | - | - | 0.5 | Yes |
| Q10161 | Sag | 0.9 m x 0.45 m Grated pit | 14.54 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q10160J | OnGrade | RM.7 Grated Pit | 14.9 | 1.5 | - | - | 0.5 | Yes |
| Q10150J | OnGrade | RM.7 Grated Pit | 14.85 | 1.5 | - | - | 0.5 | Yes |
| Q10140 | Sag | 0.9 m x 0.45 m Grated pit | 14.44 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q123070J | OnGrade | Large | 30.15 | 1.5 | - | - | 0 | No |
| Q123050J | OnGrade | RM.7 Grated Pit | 28.15 | 1.5 | - | - | 0.5 | Yes |
| Q123040J | OnGrade | RM.7 Grated Pit | 27.65 | 1.5 | - | - | 0.5 | Yes |
| Q123030J | OnGrade | RM.7 Grated Pit | 25.6 | 1.5 | - | - | 0.5 | Yes |
| Q123020J | OnGrade | RM.7 Grated Pit | 25.6 | 1.5 | - | - | 0.5 | Yes |
| Q123010 | Sag | 4.2 m lintel | 25.5 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q101040 | OnGrade | Large | 23.03 | 1.5 | - | - | 0 | No |
| Q101030 | Sag | 0.9 m lintel | 22.96 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q101020 | OnGrade | 0.9 m lintel | 22.7 | 1.5 | - | - | 0.5 | No |
| Q150010 | Sag | 4.2 m lintel | 28.5 | 1.5 | 5 | 0.2 | 0 | No |
| Q82030 | OnGrade | Large | 24.14 | 1.5 | - | - | 0 | No |
| Q82020 | OnGrade | 1.8 m lintel | 22.62 | 1.5 | - | - | 0.5 | No |
| Q82010 | OnGrade | 1.8 m lintel | 20.99 | 1.5 | - | - | 0.5 | No |
| Q64042J | OnGrade | Large | 19.64 | 1.5 | - | - | 0 | No |

| Pit Name | Pit Type | Pit Size | Surface Elevation | Ku | Ponding Vol | Max Ponding Depth | Blocking Factor | Bolt down lid |
|---|---|---|---|---|---|---|---|---|
| Q64040 | OnGrade | 1.8 m lintel | 17.88 | 1.5 | - | - | 0.5 | No |
| Q64030J | OnGrade | RM.7 Grated Pit | 17.95 | 1.5 | - | - | 0.5 | Yes |
| Q64020J | OnGrade | RM.7 Grated Pit | 17.8 | 1.5 | - | - | 0.5 | Yes |
| Q64010 | OnGrade | 1.8 m lintel | 17.24 | 1.5 | - | - | 0.5 | No |
| Q260080 | OnGrade | Large | 14.6 | 1.5 | - | - | 0 | No |
| Q260070J | Sag | RM.7 Grated Pit | 14.58 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| Q260060J | Sag | 4.2 m lintel | 14 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q260050J | Sag | RM.7 Grated Pit | 13.9 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| Q264010J | Sag | RM.7 Grated Pit | 13.25 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| Q263010 | Sag | 4.2 m lintel | 12.98 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q260020J | OnGrade | 3.6 m lintel | 12.9 | 1.5 | - | - | 0.5 | No |
| Q260010J | Sag | RM.7 Grated Pit | 12.2 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| Q260000 | Node | - | 9.4 | - | - | - | - | - |
| N1050 | Sag | 1.8 m lintel | 7.12 | 1.5 | 5 | 0.2 | 0 | No |
| N1040 | Sag | 1.8 m lintel | 7.2 | 1.5 | 5 | 0.2 | 0.5 | No |
| N1030 | Sag | 1.2 m lintel | 6.72 | 1.5 | 5 | 0.2 | 0.5 | No |
| N1000 | Node | - | 2 | - | - | - | - | - |
| N5040 | OnGrade | Large | 6.9 | 1.5 | - | - | 0 | No |
| N5030J | Sag | RM.7 Grated Pit | 7 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| N5020 | Sag | 1.2 m lintel | 7.1 | 1.5 | 5 | 0.2 | 0.5 | No |
| N5010 | Sag | 1.2 m lintel | 7.15 | 1.5 | 5 | 0.2 | 0.5 | No |
| N5000 | Node | - | 5.1 | - | | | | |
| G1470180 | OnGrade | Large | 11.15 | 1.5 | - | - | 0 | No |
| G1470170 | Sag | 1.8 m lintel | 11.03 | 1.5 | 5 | 0.2 | 0.5 | No |
| G1470160 | Sag | 1.8 m lintel | 11.1 | 1.5 | 5 | 0.2 | 0.5 | No |
| G1470150 | Sag | 1.8 m lintel | 11.2 | 1.5 | 5 | 0.2 | 0.5 | No |
| G1470140 | Sag | 4.2 m lintel | 11.4 | 1.5 | 5 | 0.2 | 0.5 | No |
| G1470130 | OnGrade | 1.8 m lintel | 11.46 | 1.5 | - | - | 0.5 | No |
| G1470125 | OnGrade | 1.8 m lintel | 11.42 | 1.5 | - | - | 0.5 | No |
| G1470120 | OnGrade | 1.8 m lintel | 11.38 | 1.5 | - | - | 0.5 | No |
| G1470110 | Sag | 1.8 m lintel | 11.2 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147090 | Sag | 1.8 m lintel | 11.29 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147080 | OnGrade | 4.2 m lintel | 10.95 | 1.5 | - | - | 0.5 | No |
| G147070 | Sag | 1.8 m lintel | 11.03 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147060J | Sag | RM.7 Grated Pit | 9.8 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G147050J | Sag | 4.2 m lintel | 8.45 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147040 | Sag | 1.8 m lintel | 6.8 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147030 | Sag | 0.9 m x 0.45 m Grated pit | 6.67 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147020 | Sag | 0.9 m x 0.45 m Grated pit | 6.55 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147010 | Sag | 2.4 m lintel | 6.31 | 1.5 | 5 | 0.2 | 0.5 | No |
| G147000 | Node | - | 6 | | - | - | - | - |
| G110170 | OnGrade | Large | 12.86 | 1.5 | - | - | 0 | No |
| G110160 | OnGrade | 1.8 m lintel | 11.1 | 1.5 | - | - | 0.5 | No |
| G110150J | Sag | RM.7 Grated Pit | 10.4 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G110140 | OnGrade | 4.2 m lintel | 10.3 | 1.5 | - | - | 0.5 | No |
| G110130 | Sag | 1.8 m lintel | 10.15 | 1.5 | 5 | 0.2 | 0.5 | No |
| G110110 | OnGrade | 1.2 m lintel | 10 | 1.5 | - | - | 0.5 | No |
| G110100 | Sag | 1.8 m lintel | 10.23 | 1.5 | 5 | 0.2 | 0.5 | No |
| G11090J | Sag | RM.7 Grated Pit | 10.4 | 1.5 | 6 | 0.2 | 0.5 | Yes |
| G11080J | Sag | RM.7 Grated Pit | 10.25 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G11070J | Sag | RM.7 Grated Pit | 10.4 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G11040J | Sag | RM.7 Grated Pit | 10.12 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G11030J | Sag | RM.7 Grated Pit | 10.3 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G11020J | Sag | RM.7 Grated Pit | 9.43 | 1.5 | 5 | 0.2 | 0.5 | Yes |
| G11010 | Sag | 2.4 m lintel | 9.2 | 1.5 | 5 | 0.2 | 0.5 | No |
| G11000 | Node | - | 8.15 | - | - | - | - | - |
| Q2410100J | OnGrade | RM.7 Grated Pit | 11.75 | 1.5 | - | - | 0.5 | Yes |
| Q241090 | OnGrade | 3.0 m lintel | 11.08 | 1.5 | - | - | 0.5 | No |
| Q241080J | OnGrade | RM.7 Grated Pit | 11.36 | 1.5 | - | - | 0.5 | Yes |
| Q241070 | OnGrade | 0.9 m lintel | 11.19 | 1.5 | - | - | 0.5 | No |
| Q241060 | Sag | 1.8 m lintel | 10.1 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q241050 | Sag | 4.2 m lintel | 10.08 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q241040J | OnGrade | RM.7 Grated Pit | 10.43 | 1.5 | - | - | 0.5 | Yes |
| Q241030J | OnGrade | RM.7 Grated Pit | 10.45 | 1.5 | - | - | 0.5 | Yes |
| Q241020 | Sag | 1.8 m lintel | 9.91 | 1.5 | 5 | 0.2 | 0.5 | No |
| Q241010J | OnGrade | RM.7 Grated Pit | 9.95 | 1.5 | - | - | 0.5 | Yes |
| Q241000 | Node | - | 9.9 | | - | - | - | - |

**Table A5: Limited DRAINS Stormwater Pipe Data**

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 279 | Q1800380 | Q1800370 | 24.08 | 16.62 | 16.29 | 1.37 | 900 |
| Pipe 280 | Q1800370 | Q1800360 | 171.21 | 16.29 | 14.51 | 1.04 | 900 |
| Pipe 284 | Q1800360 | Q1800340J | 12.13 | 14.51 | 14.24 | 2.23 | 1050 |
| Pipe 708 | Q1800340J | Q1800330J | 5.93 | 14.24 | 14.10 | 2.36 | 1050 |
| Pipe 288 | Q1800330J | Q1800320 | 85.82 | 14.10 | 13.20 | 1.05 | 1050 |
| Pipe 728 | Q1800320 | Q1800310J | 6.42 | 13.11 | 13.06 | 0.78 | 1200 |
| Pipe 293 | Q1800310J | Q1800300 | 11.72 | 13.06 | 12.98 | 0.68 | 1200 |
| Pipe 292 | Q1800300 | Q1800290 | 65.27 | 12.98 | 12.52 | 0.70 | 1200 |
| Pipe 290 | Q1800290 | Q1800280J | 4.85 | 12.52 | 12.49 | 0.62 | 1200 |
| Pipe 748 | Q1800280J | Q1800275J | 9.15 | 12.49 | 12.44 | 0.55 | 1200 |
| Pipe 749 | Q1800275J | Q1800270 | 3.76 | 12.44 | 12.42 | 0.53 | 1200 |
| Pipe 318 | Q1800270 | Q1800260 | 57.00 | 12.42 | 12.10 | 0.56 | 1350 |
| Pipe 699 | Q1800260 | Q1800250J | 8.58 | 12.10 | 12.05 | 0.58 | 1350 |
| Pipe 298 | Q1800250J | Q1800230 | 8.82 | 12.05 | 11.99 | 0.68 | 1350 |
| Pipe 299 | Q1800230 | Q1800220 | 99.65 | 11.99 | 11.55 | 0.44 | 1350 |
| Pipe 535 | Q1800220 | Q1800210J | 5.04 | 11.55 | 11.53 | 0.40 | 1350 |
| Pipe 403 | Q1800210J | Q1800200 | 14.11 | 11.53 | 11.47 | 0.43 | 1350 |
| Pipe 300 | Q1800200 | Q1800180 | 96.35 | 11.47 | 11.13 | 0.35 | 1350 |
| Pipe 536 | Q1800180 | Q1800170 | 19.81 | 11.13 | 11.04 | 0.45 | 1350 |
| Pipe 302 | Q1800170 | Q1800160 | 45.32 | 11.04 | 10.86 | 0.40 | 1350 |
| Pipe 422 | Q1800160 | Q1800150 | 8.36 | 10.86 | 10.81 | 0.60 | 1350 |
| Pipe 303 | Q1800150 | Q1800140J | 83.97 | 10.81 | 10.14 | 0.80 | 1350 |
| Pipe 698 | Q1800140J | Q1800130J | 6.90 | 10.14 | 10.08 | 0.87 | 1350 |
| Pipe 304 | Q1800130J | Q1800120 | 80.46 | 10.08 | 9.45 | 0.78 | 1350 |
| Pipe 543 | Q1800120 | Q1800110J | 8.92 | 9.45 | 9.38 | 0.78 | 1350 |
| Pipe 297 | Q1800110J | Q1800100 | 78.99 | 9.38 | 8.75 | 0.80 | 1350 |
| Pipe 695 | Q1800100 | Q180090J | 17.95 | 8.65 | 8.55 | 0.56 | 1350 |
| Pipe 309 | Q180090J | Q180080J | 8.38 | 8.55 | 8.46 | 1.07 | 1500 |
| Pipe 310 | Q180080J | Q180060J | 78.92 | 8.46 | 7.99 | 0.60 | 1500 |
| Pipe 390 | Q180060J | Q180050J | 13.76 | 7.66 | 7.49 | 1.24 | 1500 |
| Pipe 350 | Q180050J | Q180040J | 29.74 | 7.49 | 7.25 | 0.81 | 1800 |
| Pipe 345 | Q180040J | Q180030J | 116.28 | 7.25 | 6.32 | 0.80 | 1800 |
| Pipe 346 | Q180030J | Q180020J | 22.04 | 6.32 | 6.14 | 0.82 | 1800 |
| Pipe 347 | Q180020J | Q180010J | 10.49 | 6.14 | 6.05 | 0.86 | 1800 |
| Pipe 348 | Q180010J | Q180000 | 22.51 | 6.05 | 5.84 | 0.93 | 1800 |
| Pipe 266 | Q19010 | Q1070 | 7.57 | 10.99 | 10.90 | 1.19 | 900 |
| Pipe 324 | Q1070 | Q1050J | 83.17 | 10.15 | 9.86 | 0.35 | 1800 |
| Pipe 325 | Q1050J | Q2410110 | 71.24 | 9.86 | 9.62 | 0.34 | 1800 |
| Pipe 351 | Q2410110 | Q1040 | 97.22 | 9.21 | 7.77 | 1.48 | 1800 |
| Pipe 329 | Q2410110 | Q2410100J | 21.60 | 9.24 | 9.05 | 0.88 | 1800 |
| Pipe 354 | Q1040 | Q1030 | 90.39 | 7.77 | 7.39 | 0.42 | 1800 |
| Pipe 357 | Q1030 | Q1020J | 131.00 | 7.74 | 6.50 | 0.95 | 1800 |
| Pipe 359 | Q1020J | Q1010 | 31.49 | 6.50 | 6.26 | 0.76 | 1800 |
| Pipe 360 | Q1010 | Q1000 | 28.42 | 6.26 | 6.15 | 0.39 | 1800 |
| Pipe 267 | Q30120 | Q30111J | 4.44 | 12.01 | 11.95 | 1.35 | 900 |
| Pipe 716 | Q30111J | Q30110 | 9.08 | 11.70 | 11.63 | 0.77 | 900 |
| Pipe 268 | Q30110 | Q30100 | 68.32 | 11.63 | 11.17 | 0.67 | 900 |
| Pipe 751 | Q30100 | Q3090 | 5.98 | 11.17 | 11.10 | 1.17 | 900 |
| Pipe 443 | Q3090 | Q3080 | 7.02 | 11.10 | 11.06 | 0.57 | 900 |
| Pipe 269 | Q3080 | Q3070 | 68.73 | 11.06 | 10.85 | 0.31 | 900 |
| Pipe 750 | Q3070 | Q3071 | 8.72 | 10.85 | 10.60 | 2.87 | 900 |
| Pipe 270 | Q3071 | Q3060 | 6.55 | 10.60 | 10.50 | 1.53 | 900 |
| Pipe 271 | Q3060 | Q3050 | 46.34 | 10.63 | 10.39 | 0.52 | 900 |
| Pipe 272 | Q3050 | Q3040 | 50.25 | 10.39 | 9.96 | 0.86 | 900 |
| Pipe 273 | Q3040 | Q3030 | 19.01 | 9.96 | 9.91 | 0.26 | 900 |
| Pipe 274 | Q3030 | Q3020 | 44.09 | 9.91 | 9.73 | 0.41 | 900 |
| Pipe 275 | Q3020 | Q3010 | 53.85 | 9.73 | 8.36 | 2.54 | 900 |
| Pipe 276 | Q3010 | Q2030J | 7.16 | 8.36 | 8.30 | 0.84 | 900 |
| Pipe 358 | Q2030J | Q2020 | 47.84 | 6.96 | 6.60 | 0.75 | 1800 |
| Pipe 361 | Q2020 | Q2010J | 39.89 | 6.60 | 6.35 | 0.63 | 1800 |
| Pipe 362 | Q2010J | Q2000 | 28.95 | 6.35 | 6.15 | 0.69 | 1800 |
| Pipe 265 | Q24030J | Q24020 | 104.52 | 16.48 | 14.05 | 2.32 | 900 |
| Pipe 541 | Q24020 | Q24010J | 15.31 | 14.05 | 13.90 | 0.98 | 900 |
| Pipe 301 | Q24010J | Q48010 | 101.36 | 13.05 | 12.39 | 0.65 | 1350 |
| Pipe 405 | Q48010 | Q10120J | 12.65 | 12.39 | 12.23 | 1.26 | 1350 |
| Pipe 320 | Q10120J | Q10110J | 105.12 | 11.56 | 11.10 | 0.44 | 1800 |
| Pipe 712 | Q10110J | Q10100J | 11.33 | 11.10 | 11.05 | 0.44 | 1800 |
| Pipe 319 | Q10100J | Q1090 | 102.08 | 11.05 | 10.60 | 0.44 | 1800 |
| Pipe 322 | Q1090 | Q1080 | 12.65 | 10.60 | 10.45 | 1.19 | 1800 |
| Pipe 752 | Q1080 | Q1075 | 22.64 | 10.45 | 10.30 | 0.66 | 1800 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 323 | Q1075 | Q1070 | 51.24 | 10.30 | 9.95 | 0.68 | 1800 |
| Pipe 815 | Q2070 | Q2060J | 2.15 | 9.79 | 9.77 | 1.16 | 1800 |
| Pipe 352 | Q2060J | Q2055 | 25.31 | 9.77 | 9.50 | 1.05 | 1800 |
| Pipe 353 | Q2055 | Q2050 | 82.56 | 8.60 | 7.88 | 0.87 | 1800 |
| Pipe 355 | Q2050 | Q2040 | 74.47 | 7.88 | 7.36 | 0.70 | 1800 |
| Pipe 356 | Q2040 | Q2030J | 83.33 | 7.55 | 6.96 | 0.71 | 1800 |
| Pipe889 | N2570 | Q10670J | 5.00 | 30.01 | 29.92 | 1.70 | 900 |
| Pipe 262 | Q10670J | Q10660J | 28.74 | 29.92 | 29.43 | 1.70 | 900 |
| Pipe 261 | Q10660J | Q10650J | 25.05 | 29.43 | 29.00 | 1.72 | 900 |
| Pipe 283 | Q10650J | Q10640 | 73.67 | 29.00 | 27.75 | 1.70 | 1050 |
| Pipe 282 | Q10640 | Q10630 | 9.90 | 27.75 | 27.57 | 1.82 | 1050 |
| Pipe 281 | Q10630 | Q10620J | 74.79 | 27.57 | 25.40 | 2.90 | 1050 |
| Pipe 295 | Q10620J | Q10610J | 8.70 | 26.59 | 26.41 | 2.07 | 1350 |
| Pipe 296 | Q10610J | Q10600J | 71.12 | 26.41 | 25.55 | 1.21 | 1350 |
| Pipe 294 | Q10600J | Q10580 | 19.99 | 25.55 | 25.19 | 1.80 | 1350 |
| Pipe 308 | Q10580 | Q10570J | 70.66 | 25.19 | 24.65 | 0.76 | 1500 |
| Pipe 307 | Q10570J | Q10560J | 36.75 | 24.65 | 24.12 | 1.44 | 1350 |
| Pipe 305 | Q10560J | Q10550J | 36.47 | 24.12 | 23.89 | 0.63 | 1350 |
| Pipe 738 | Q10550J | Q10540J | 4.79 | 23.89 | 23.84 | 1.04 | 1350 |
| Pipe 306 | Q10540J | Q10530 | 113.04 | 23.84 | 22.63 | 1.07 | 1350 |
| Pipe 531 | Q10530 | Q10520 | 3.48 | 22.58 | 22.49 | 2.59 | 1350 |
| Pipe 532 | Q10520 | Q10510J | 65.23 | 21.94 | 21.38 | 0.86 | 1800 |
| Pipe 605 | Q10510J | Q10500J | 30.58 | 21.38 | 21.20 | 0.59 | 1800 |
| Pipe 680 | Q10500J | Q10490J | 18.98 | 21.20 | 21.10 | 0.53 | 1800 |
| Pipe 681 | Q10490J | Q10480J | 14.33 | 21.10 | 21.03 | 0.49 | 1800 |
| Pipe 604 | Q10480J | Q10470J | 13.31 | 21.03 | 20.93 | 0.75 | 1800 |
| Pipe 606 | Q10470J | Q10460J | 12.36 | 20.97 | 20.92 | 0.40 | 1800 |
| Pipe 676 | Q10460J | Q10450J | 14.12 | 20.60 | 20.53 | 0.50 | 1800 |
| Pipe 677 | Q10450J | Q10440J | 15.37 | 20.53 | 20.45 | 0.52 | 1800 |
| Pipe 336 | Q10440J | Q101010 | 43.70 | 20.45 | 20.20 | 0.57 | 1800 |
| Pipe 475 | Q101010 | Q10420 | 21.64 | 20.11 | 19.96 | 0.69 | 1800 |
| Pipe 335 | Q10420 | Q10410J | 78.50 | 19.91 | 19.35 | 0.71 | 1800 |
| Pipe 330 | Q10410J | Q10400J | 19.38 | 19.27 | 19.13 | 0.72 | 1800 |
| Pipe 331 | Q10400J | Q10390J | 73.98 | 19.05 | 18.52 | 0.72 | 1800 |
| Pipe 332 | Q10390J | Q95010 | 28.17 | 18.45 | 18.26 | 0.67 | 1800 |
| Pipe 469 | Q95010 | Q10380J | 8.64 | 18.26 | 18.20 | 0.69 | 1800 |
| Pipe 333 | Q10380J | Q10370 | 64.74 | 18.20 | 17.78 | 0.65 | 1800 |
| Pipe 471 | Q10370 | Q10360J | 16.43 | 17.78 | 17.67 | 0.67 | 1800 |
| Pipe 334 | Q10360J | Q10350J | 88.06 | 17.67 | 17.06 | 0.69 | 1800 |
| Pipe 337 | Q10350J | Q10340 | 83.83 | 17.06 | 16.82 | 0.29 | 1800 |
| Pipe 482 | Q10340 | Q10330 | 12.14 | 16.82 | 16.78 | 0.33 | 1800 |
| Pipe 338 | Q10330 | Q10320 | 69.99 | 16.78 | 16.55 | 0.33 | 1800 |
| Pipe 483 | Q10320 | Q10310 | 15.10 | 16.55 | 16.50 | 0.33 | 1800 |
| Pipe 484 | Q10310 | Q10300 | 62.90 | 16.50 | 16.30 | 0.32 | 1800 |
| Pipe 339 | Q10300 | Q10290 | 130.63 | 16.30 | 15.50 | 0.61 | 1800 |
| Pipe 486 | Q10290 | Q10280 | 20.31 | 15.50 | 15.33 | 0.84 | 1800 |
| Pipe 340 | Q10280 | Q10270J | 71.90 | 15.33 | 14.90 | 0.60 | 1800 |
| Pipe 488 | Q10270J | Q10260J | 8.72 | 14.90 | 14.85 | 0.57 | 1800 |
| Pipe 343 | Q10260J | Q10250 | 53.99 | 14.85 | 14.53 | 0.59 | 1800 |
| Pipe 342 | Q10250 | Q10240J | 47.56 | 14.53 | 14.25 | 0.59 | 1800 |
| Pipe 713 | Q10240J | Q10235J | 5.56 | 14.25 | 14.22 | 0.54 | 1800 |
| Pipe 494 | Q10235J | Q10230J | 12.98 | 14.22 | 14.15 | 0.54 | 1800 |
| Pipe 341 | Q10230J | Q10220J | 41.38 | 14.15 | 13.90 | 0.60 | 1800 |
| Pipe 315 | Q10220J | Q10210J | 51.81 | 13.90 | 13.60 | 0.58 | 1800 |
| Pipe 707 | Q10210J | Q10200J | 10.14 | 13.60 | 13.54 | 0.59 | 1800 |
| Pipe 314 | Q10200J | Q10190 | 68.63 | 13.54 | 13.11 | 0.63 | 1800 |
| Pipe 398 | Q10190 | Q10180 | 6.29 | 13.11 | 13.03 | 1.27 | 1800 |
| Pipe 316 | Q10180 | Q10170 | 97.28 | 13.03 | 12.45 | 0.60 | 1800 |
| Pipe 702 | Q10170 | Q10165J | 18.07 | 12.45 | 12.35 | 0.55 | 1800 |
| Pipe 704 | Q10165J | Q10161 | 39.59 | 12.35 | 12.15 | 0.51 | 1800 |
| Pipe 703 | Q10161 | Q10160J | 31.51 | 12.15 | 11.97 | 0.57 | 1800 |
| Pipe 317 | Q10160J | Q10150J | 7.94 | 11.97 | 11.93 | 0.50 | 1800 |
| Pipe 321 | Q10150J | Q10140 | 38.83 | 11.93 | 11.74 | 0.49 | 1800 |
| Pipe 540 | Q10140 | Q10120J | 35.61 | 11.74 | 11.56 | 0.51 | 1800 |
| Pipe891 | N2571 | Q123070J | 5.00 | 28.40 | 28.30 | 2.00 | 900 |
| Pipe 263 | Q123070J | Q123050J | 70.79 | 28.30 | 26.90 | 1.98 | 900 |
| Pipe 264 | Q123050J | Q123040J | 20.24 | 26.90 | 26.50 | 1.98 | 900 |
| Pipe 289 | Q123040J | Q123030J | 92.99 | 26.20 | 24.20 | 2.15 | 1200 |
| Pipe 528 | Q123030J | Q123020J | 18.67 | 24.20 | 24.10 | 0.54 | 1200 |
| Pipe 530 | Q123020J | Q123010 | 6.99 | 24.10 | 24.07 | 0.43 | 1200 |
| Pipe 291 | Q123010 | Q10520 | 38.14 | 23.93 | 22.63 | 3.41 | 1200 |
| Pipe893 | N2572 | Q101040 | 5.00 | 21.57 | 21.51 | 1.10 | 1050 |
| Pipe 603 | Q101040 | Q101030 | 14.10 | 21.51 | 21.36 | 1.06 | 1050 |
| Pipe 602 | Q101030 | Q101020 | 46.33 | 21.36 | 21.22 | 0.30 | 1050 |
| Pipe 601 | Q101020 | Q101010 | 21.33 | 21.22 | 21.10 | 0.56 | 1050 |
| Pipe895 | N2574 | Q150010 | 5.00 | 27.15 | 27.07 | 1.50 | 900 |
| Pipe 550 | Q150010 | Q10610J | 16.54 | 27.07 | 26.86 | 1.27 | 900 |
| Pipe897 | N2575 | Q82030 | 5.00 | 21.33 | 21.28 | 1.00 | 900 |
| Pipe 600 | Q82030 | Q82020 | 25.48 | 21.28 | 21.04 | 0.94 | 900 |

| Pipe Name | From Pit | To Pit | Length (m) | U/S IL | D/S IL | Slope (%) | Nom. Diameter (mm) |
|---|---|---|---|---|---|---|---|
| Pipe 278 | Q82020 | Q82010 | 86.22 | 21.04 | 19.45 | 1.84 | 900 |
| Pipe 277 | Q82010 | Q10330 | 94.87 | 19.45 | 17.30 | 2.27 | 900 |
| Pipe899 | N2576 | Q64042J | 5.00 | 18.13 | 18.05 | 1.60 | 1050 |
| Pipe 259 | Q64042J | Q64040 | 99.70 | 18.05 | 16.45 | 1.60 | 1050 |
| Pipe 730 | Q64040 | Q64030J | 6.84 | 16.45 | 16.33 | 1.75 | 1050 |
| Pipe 287 | Q64030J | Q64020J | 9.50 | 16.33 | 16.27 | 0.63 | 1050 |
| Pipe 286 | Q64020J | Q64010 | 97.98 | 16.27 | 15.62 | 0.66 | 1050 |
| Pipe 285 | Q64010 | Q10260J | 20.15 | 15.62 | 14.82 | 3.97 | 1050 |
| Pipe901 | N2577 | Q24020 | 5.00 | 14.10 | 14.05 | 1.00 | 900 |
| Pipe903 | N2579 | Q30111J | 5.00 | 11.75 | 11.70 | 1.00 | 900 |
| Pipe905 | N2580 | Q1800370 | 5.00 | 16.34 | 16.29 | 1.00 | 900 |
| Q260080P | Q260080 | Q260070J | 16.46 | 12.50 | 12.23 | 1.64 | 1200 |
| Q260070JP | Q260070J | Q260060J | 100.24 | 12.23 | 10.57 | 1.66 | 1200 |
| Q260060JP | Q260060J | Q260050J | 8.65 | 10.57 | 10.43 | 1.62 | 1200 |
| Q260050JP | Q260050J | Q264010J | 83.17 | 10.43 | 9.60 | 1.00 | 1200 |
| Q264010JP | Q264010J | Q263010 | 31.40 | 9.60 | 9.28 | 1.02 | 1350 |
| Q263010P | Q263010 | Q260020J | 52.08 | 9.28 | 8.85 | 0.83 | 1350 |
| Q260020JP | Q260020J | Q260010J | 65.89 | 8.85 | 8.30 | 0.83 | 1350 |
| Q260010JP | Q260010J | Q260000 | 36.23 | 8.30 | 8.00 | 0.83 | 1350 |
| N1050p | N1050 | N1040 | 21.23 | 4.67 | 4.54 | 0.61 | 900 |
| N1040p | N1040 | N1030 | 89.84 | 4.54 | 4.01 | 0.59 | 900 |
| N1030p | N1030 | N1000 | 125.79 | 4.01 | 1.10 | 2.31 | 900 |
| N5040p | N5040 | N5030J | 6.47 | 4.90 | 4.89 | 0.15 | 900 |
| N5030Jp | N5030J | N5020 | 18.47 | 4.89 | 4.86 | 0.16 | 900 |
| N5020p | N5020 | N5010 | 120.35 | 4.86 | 4.69 | 0.14 | 900 |
| N5010p | N5010 | N5000 | 114.20 | 4.69 | 3.90 | 0.69 | 900 |
| G1470180P | G1470180 | G1470170 | 31.95 | 9.80 | 9.68 | 0.38 | 900 |
| G1470170P | G1470170 | G1470160 | 30.98 | 9.68 | 9.45 | 0.74 | 900 |
| G1470160P | G1470160 | G1470150 | 27.59 | 9.45 | 9.38 | 0.25 | 900 |
| G1470150P | G1470150 | G1470140 | 49.76 | 9.38 | 9.26 | 0.24 | 900 |
| G1470140P | G1470140 | G1470130 | 24.61 | 9.26 | 9.10 | 0.65 | 900 |
| G1470130P | G1470130 | G1470125 | 27.31 | 9.10 | 9.00 | 0.37 | 900 |
| G1470125P | G1470125 | G1470120 | 28.02 | 9.00 | 8.88 | 0.43 | 900 |
| G1470120P | G1470120 | G1470110 | 13.72 | 8.88 | 8.83 | 0.36 | 900 |
| G1470110P | G1470110 | G147090 | 75.81 | 8.83 | 8.55 | 0.37 | 900 |
| G147090P | G147090 | G147080 | 119.95 | 8.55 | 8.10 | 0.38 | 900 |
| G147080P | G147080 | G147070 | 64.09 | 8.10 | 7.85 | 0.39 | 900 |
| G147070P | G147070 | G147060J | 135.81 | 7.85 | 6.14 | 1.26 | 900 |
| G147060JP | G147060J | G147050J | 25.24 | 6.14 | 5.82 | 1.27 | 1200 |
| G147050JP | G147050J | G147040 | 46.27 | 5.82 | 5.20 | 1.34 | 1200 |
| G147040P | G147040 | G147030 | 18.50 | 5.20 | 4.97 | 1.24 | 1200 |
| G147030P | G147030 | G147020 | 28.37 | 4.97 | 4.61 | 1.27 | 1200 |
| G147020p | G147020 | G147010 | 23.44 | 4.61 | 4.32 | 1.24 | 1200 |
| G147010p | G147010 | G147000 | 27.48 | 4.32 | 4.00 | 1.16 | 1200 |
| G110170P | G110170 | G110160 | 84.77 | 11.56 | 9.29 | 2.68 | 900 |
| G110160P | G110160 | G110150J | 91.55 | 8.84 | 8.44 | 0.44 | 1350 |
| G110150JP | G110150J | G110140 | 23.13 | 8.44 | 8.34 | 0.43 | 1350 |
| G110140P | G110140 | G110130 | 42.06 | 8.34 | 8.15 | 0.45 | 1350 |
| G110130P | G110130 | G110110 | 18.04 | 8.15 | 8.08 | 0.39 | 1350 |
| G110110P | G110110 | G110100 | 63.73 | 8.08 | 7.83 | 0.39 | 1350 |
| G110100P | G110100 | G11090J | 85.86 | 7.53 | 7.32 | 0.24 | 1500 |
| G11090JP | G11090J | G11080J | 38.58 | 7.32 | 7.22 | 0.26 | 1800 |
| G11080JP | G11080J | G11070J | 62.44 | 7.22 | 7.06 | 0.26 | 1800 |
| G11070JP | G11070J | G11040J | 54.61 | 7.06 | 6.92 | 0.26 | 1800 |
| G11040JP | G11040J | G11030J | 73.05 | 6.92 | 6.73 | 0.26 | 1800 |
| G11030JP | G11030J | G11020J | 100.93 | 6.73 | 6.40 | 0.33 | 1800 |
| G11020JP | G11020J | G11010 | 2.90 | 6.40 | 6.27 | 4.48 | 1800 |
| G11010P | G11010 | G11000 | 11.74 | 6.27 | 5.75 | 4.43 | 1800 |
| Pipe 328 | Q2410100J | Q241090 | 82.59 | 9.05 | 8.62 | 0.52 | 1800 |
| Pipe 546 | Q241090 | Q241080J | 8.03 | 8.62 | 8.58 | 0.50 | 1800 |
| Pipe 327 | Q241080J | Q241070 | 13.96 | 8.58 | 8.50 | 0.57 | 1800 |
| Pipe 326 | Q241070 | Q241060 | 188.49 | 8.50 | 7.63 | 0.46 | 1800 |
| Pipe 548 | Q241060 | Q241050 | 4.30 | 7.63 | 7.59 | 0.93 | 1800 |
| Pipe 313 | Q241050 | Q241040J | 12.05 | 7.59 | 7.49 | 0.83 | 1800 |
| Pipe 349 | Q241040J | Q241030J | 40.02 | 7.49 | 7.13 | 0.90 | 1800 |
| Pipe 363 | Q241030J | Q241020 | 38.94 | 7.15 | 6.82 | 0.85 | 1800 |
| Pipe 719 | Q241020 | Q241010J | 6.57 | 6.82 | 6.76 | 0.91 | 1800 |
| Pipe 344 | Q241010J | Q241000 | 114.63 | 6.76 | 5.84 | 0.80 | 1800 |

**Table A6: Limited DRAINS Subcatchment Data**

| Name | Pit/Node | Sub-Catchment Area (ha) | % Paved Area | % Grassed Area | Paved Time | Grassed Time |
|---|---|---|---|---|---|---|
| Cat189 | Q1800360 | 5.73 | 70.0 | 30.0 | 9.2 | 13.5 |
| Cat159 | Q1800290 | 5.62 | 61.6 | 38.4 | 6.5 | 11.9 |
| Cat151 | Q1800200 | 2.58 | 65.0 | 35.0 | 7.0 | 13.9 |
| Cat152 | Q1800160 | 13.98 | 64.6 | 35.4 | 16.0 | 19.7 |
| Cat176 | Q1800100 | 8.62 | 60.6 | 39.4 | 9.3 | 13.6 |
| Cat165 | Q180020J | 0.65 | 52.8 | 47.2 | 2.5 | 5.0 |
| Cat136 | Q1050J | 7.32 | 62.3 | 37.7 | 11.5 | 17.1 |
| Cat122 | Q30100 | 1.84 | 60.6 | 39.4 | 5.2 | 10.5 |
| Cat116 | Q3071 | 1.52 | 61.8 | 38.2 | 3.3 | 6.5 |
| Cat118 | Q3010 | 5.70 | 61.7 | 38.3 | 12.5 | 17.5 |
| Cat114 | Q2020 | 2.25 | 60.9 | 39.1 | 6.8 | 13.7 |
| Cat141 | Q1080 | 4.40 | 60.7 | 39.3 | 9.8 | 11.6 |
| Cat84 | N2570 | 10.01 | 57.6 | 42.4 | 19.0 | 24.0 |
| Cat76 | Q10630 | 2.88 | 63.5 | 36.5 | 8.9 | 14.8 |
| Cat62 | Q10580 | 3.85 | 58.2 | 41.8 | 7.4 | 10.8 |
| Cat59 | Q10540J | 7.90 | 58.7 | 41.3 | 9.5 | 14.4 |
| Cat56 | Q10460J | 11.58 | 64.6 | 35.4 | 13.5 | 17.0 |
| Cat30 | Q10420 | 17.08 | 53.6 | 46.4 | 12.0 | 18.4 |
| Cat28 | Q95010 | 12.72 | 60.6 | 39.4 | 6.6 | 13.0 |
| Cat31 | Q10350J | 8.49 | 57.8 | 42.2 | 11.6 | 16.2 |
| Cat27 | Q10340 | 8.52 | 30.0 | 70.0 | 7.8 | 12.6 |
| Cat187 | Q10250 | 15.41 | 49.7 | 50.3 | 16.4 | 22.5 |
| Cat153 | Q10190 | 11.60 | 61.2 | 38.8 | 11.8 | 17.1 |
| Cat37 | N2571 | 11.02 | 57.3 | 42.7 | 18.3 | 22.6 |
| Cat54 | Q123010 | 5.24 | 57.2 | 42.8 | 5.4 | 10.6 |
| Cat24 | N2572 | 7.79 | 62.5 | 37.5 | 12.0 | 17.7 |
| Cat71 | N2574 | 5.42 | 62.8 | 37.2 | 21.4 | 24.2 |
| Cat13 | N2575 | 13.18 | 58.3 | 41.7 | 12.6 | 19.0 |
| Cat106 | N2576 | 11.11 | 61.0 | 39.0 | 19.3 | 21.0 |
| Cat139 | N2577 | 15.74 | 66.5 | 33.5 | 13.8 | 16.9 |
| Cat124 | N2579 | 2.73 | 61.1 | 38.9 | 6.7 | 10.9 |
| Cat203 | N2580 | 21.48 | 69.9 | 30.1 | 30.1 | 33.9 |
| Cat215 | Q260080 | 12.64 | 60.6 | 39.4 | 10.0 | 24.5 |
| Cat216 | Q260060J | 1.90 | 61.6 | 38.4 | 5.5 | 13.0 |
| Cat217 | Q263010 | 1.89 | 63.4 | 36.5 | 5.5 | 13.0 |
| Cat218 | Q260020J | 0.27 | 62.1 | 35.3 | 3.0 | 13.0 |
| Cat228 | N1050 | 0.62 | 59.3 | 40.7 | 3.5 | 15.5 |
| Cat230 | N1030 | 0.96 | 63.6 | 36.4 | 5.0 | 17.0 |
| Cat226 | N5040 | 6.27 | 57.2 | 36.5 | 10.0 | 22.0 |
| Cat227 | N5020 | 0.34 | 90.0 | 10.0 | 10.0 | 13.0 |
| Cat229 | N5010 | 0.10 | 100.0 | 0.0 | 5.0 | 0.0 |
| Cat220 | G1470180 | 4.04 | 50.3 | 49.9 | 4.0 | 16.5 |
| Cat232 | G1470140 | 4.08 | 57.0 | 43.1 | 10.0 | 24.0 |
| Cat222 | G147080 | 4.63 | 63.1 | 36.9 | 10.0 | 23.0 |
| Cat224 | G147050J | 8.84 | 35.7 | 64.2 | 10.0 | 28.0 |
| Cat225 | G147010 | 2.75 | 82.9 | 16.9 | 3.0 | 8.0 |
| Cat219 | G110170 | 16.51 | 79.2 | 20.8 | 10.0 | 22.5 |
| Cat231 | G110140 | 11.31 | 50.7 | 49.2 | 10.0 | 25.0 |
| Cat221 | G11090J | 8.69 | 60.1 | 39.6 | 10.0 | 18.0 |
| Cat223 | G11040J | 2.28 | 74.6 | 27.7 | 5.5 | 17.5 |
| Cat172 | Q241050 | 4.55 | 62.1 | 37.9 | 10.4 | 15.4 |
| Cat169 | Q241020 | 7.00 | 61.3 | 38.7 | 7.4 | 12.4 |

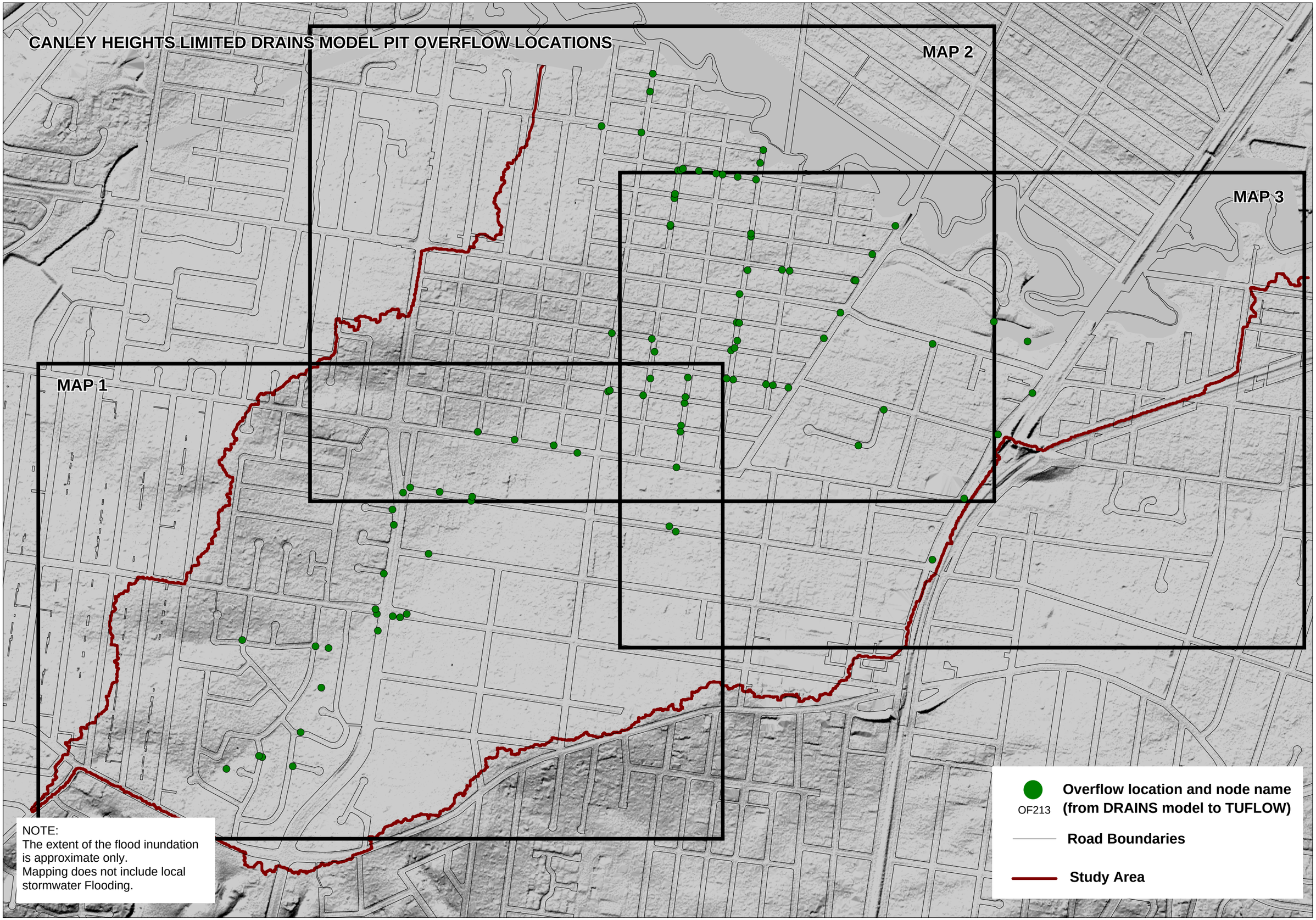
**Table A7: XP-RAFTS Model Subcatchment Parameters**

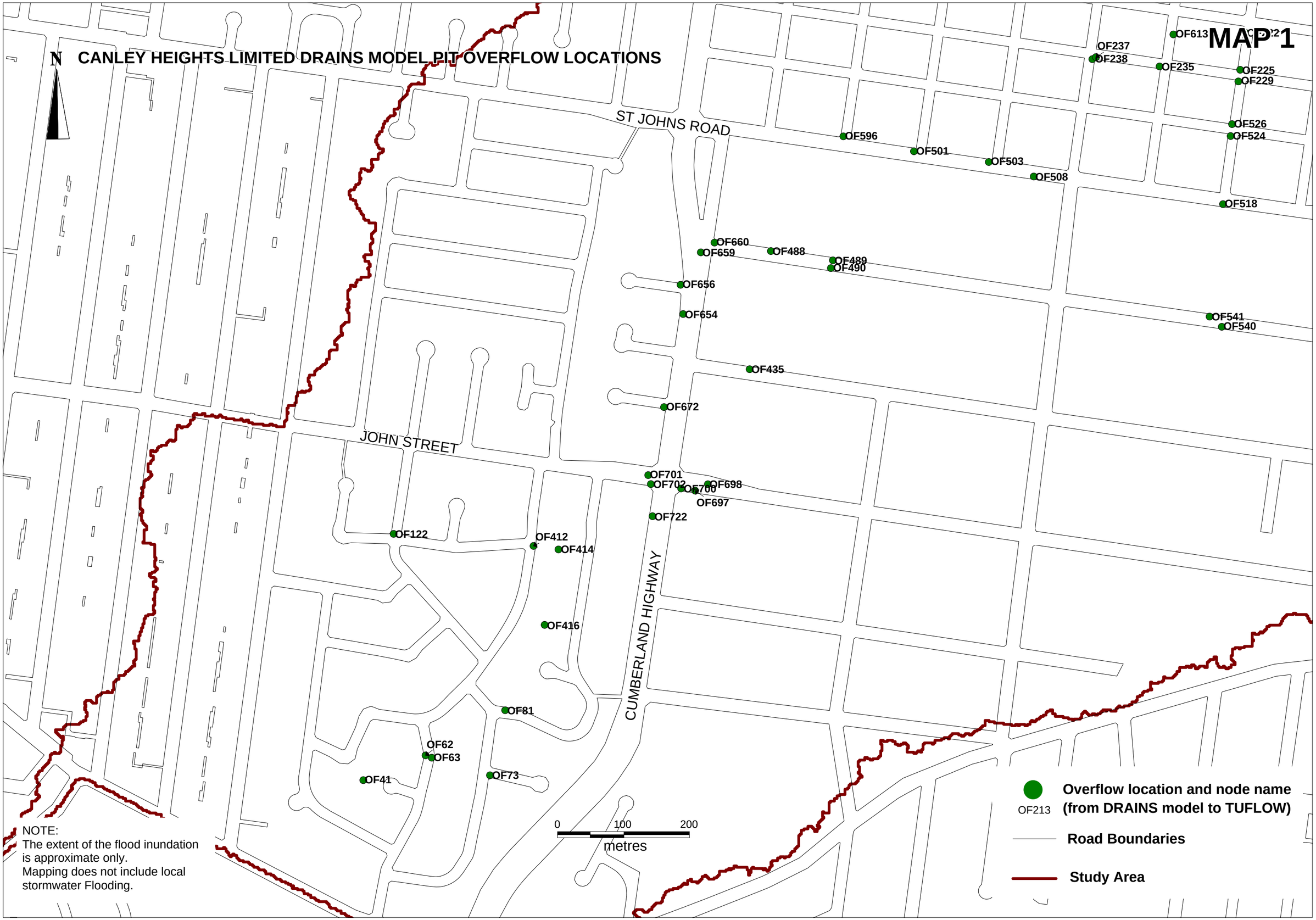
| Catchment Name | Total Area [ha] | Rainfall Loss | | Surface Roughness ('Pern') | Percentage Impervious [%] | Catchment Slope [%] |
|---|---|---|---|---|---|---|
| | | Initial Loss (mm) | Continuing Loss (mm/hr) | | | |
| cat189 [Subcatch 1] | 1.72 | 10 | 6 | 0.025 | 0 | 2.3 |
| cat189 [Subcatch 2] | 4.01 | 0 | 0 | 0.015 | 100 | 2.3 |
| cat159 [Subcatch 1] | 2.16 | 10 | 6 | 0.025 | 0 | 0.5 |
| cat159 [Subcatch 2] | 3.46 | 0 | 0 | 0.015 | 100 | 0.5 |
| cat151 [Subcatch 1] | 0.9 | 10 | 6 | 0.025 | 0 | 0.9 |
| cat151 [Subcatch 2] | 1.68 | 0 | 0 | 0.015 | 100 | 0.9 |
| cat71 [Subcatch 1] | 2.01 | 10 | 6 | 0.025 | 0 | 0.8 |
| cat71 [Subcatch 2] | 3.4 | 0 | 0 | 0.015 | 100 | 0.8 |
| cat84 [Subcatch 1] | 4.24 | 10 | 6 | 0.025 | 0 | 1.8 |
| cat84 [Subcatch 2] | 5.77 | 0 | 0 | 0.015 | 100 | 1.8 |
| cat76 [Subcatch 1] | 1.05 | 10 | 6 | 0.025 | 0 | 2.5 |
| cat76 [Subcatch 2] | 1.83 | 0 | 0 | 0.015 | 100 | 2.5 |
| cat62 [Subcatch 1] | 1.61 | 10 | 6 | 0.025 | 0 | 3.3 |
| cat62 [Subcatch 2] | 2.24 | 0 | 0 | 0.015 | 100 | 3.3 |
| cat59 [Subcatch 1] | 3.26 | 10 | 6 | 0.025 | 0 | 1.0 |
| cat59 [Subcatch 2] | 4.64 | 0 | 0 | 0.015 | 100 | 1.0 |
| cat37 [Subcatch 1] | 4.7 | 10 | 6 | 0.025 | 0 | 2.6 |
| cat37 [Subcatch 2] | 6.31 | 0 | 0 | 0.015 | 100 | 2.6 |
| cat54 [Subcatch 1] | 2.24 | 10 | 6 | 0.025 | 0 | 0.4 |
| cat54 [Subcatch 2] | 3 | 0 | 0 | 0.015 | 100 | 0.4 |
| cat56 [Subcatch 1] | 4.1 | 10 | 6 | 0.025 | 0 | 0.5 |
| cat56 [Subcatch 2] | 7.48 | 0 | 0 | 0.015 | 100 | 0.5 |
| cat24 [Subcatch 1] | 2.92 | 10 | 6 | 0.025 | 0 | 1.5 |
| cat24 [Subcatch 2] | 4.87 | 0 | 0 | 0.015 | 100 | 1.5 |
| cat30 [Subcatch 1] | 7.92 | 10 | 6 | 0.025 | 0 | 0.7 |
| cat30 [Subcatch 2] | 9.15 | 0 | 0 | 0.015 | 100 | 0.7 |
| cat28 [Subcatch 1] | 5.01 | 10 | 6 | 0.025 | 0 | 0.7 |
| cat28 [Subcatch 2] | 7.71 | 0 | 0 | 0.015 | 100 | 0.7 |
| cat31 [Subcatch 1] | 3.58 | 10 | 6 | 0.04 | 0 | 0.3 |
| cat31 [Subcatch 2] | 4.91 | 0 | 0 | 0.015 | 100 | 0.3 |
| cat27 [Subcatch 1] | 5.96 | 10 | 6 | 0.025 | 0 | 0.6 |
| cat27 [Subcatch 2] | 2.56 | 0 | 0 | 0.015 | 100 | 0.6 |
| cat13 [Subcatch 1] | 5.5 | 10 | 6 | 0.025 | 0 | 0.5 |
| cat13 [Subcatch 2] | 7.68 | 0 | 0 | 0.015 | 100 | 0.5 |
| cat203 [Subcatch 1] | 6.47 | 10 | 6 | 0.025 | 0 | 0.5 |
| cat203 [Subcatch 2] | 15.01 | 0 | 0 | 0.015 | 100 | 0.5 |
| cat187 [Subcatch 1] | 7.75 | 10 | 6 | 0.025 | 0 | 0.6 |
| cat187 [Subcatch 2] | 7.66 | 0 | 0 | 0.015 | 100 | 0.6 |
| cat106 [Subcatch 1] | 4.33 | 10 | 6 | 0.025 | 0 | 0.7 |
| cat106 [Subcatch 2] | 6.77 | 0 | 0 | 0.015 | 100 | 0.7 |
| cat153 [Subcatch 1] | 4.5 | 10 | 6 | 0.025 | 0 | 1.3 |
| cat153 [Subcatch 2] | 7.1 | 0 | 0 | 0.015 | 100 | 1.3 |
| cat139 [Subcatch 1] | 5.27 | 10 | 6 | 0.025 | 0 | 2.6 |
| cat139 [Subcatch 2] | 10.47 | 0 | 0 | 0.015 | 100 | 2.6 |
| cat141 [Subcatch 1] | 1.73 | 10 | 6 | 0.025 | 0 | 0.6 |
| cat141 [Subcatch 2] | 2.67 | 0 | 0 | 0.015 | 100 | 0.6 |
| cat152 [Subcatch 1] | 4.95 | 10 | 6 | 0.025 | 0 | 0.7 |
| cat152 [Subcatch 2] | 9.03 | 0 | 0 | 0.015 | 100 | 0.7 |
| cat176 [Subcatch 1] | 3.4 | 10 | 6 | 0.025 | 0 | 2.3 |
| cat176 [Subcatch 2] | 5.23 | 0 | 0 | 0.015 | 100 | 2.3 |
| cat136 [Subcatch 1] | 2.76 | 10 | 6 | 0.025 | 0 | 2.1 |
| cat136 [Subcatch 2] | 4.56 | 0 | 0 | 0.015 | 100 | 2.1 |
| cat172 [Subcatch 1] | 1.73 | 10 | 6 | 0.025 | 0 | 2.7 |
| cat172 [Subcatch 2] | 2.83 | 0 | 0 | 0.015 | 100 | 2.7 |
| cat124 [Subcatch 1] | 1.06 | 10 | 6 | 0.025 | 0 | 1.9 |
| cat124 [Subcatch 2] | 1.67 | 0 | 0 | 0.015 | 100 | 1.9 |
| cat122 [Subcatch 1] | 0.72 | 10 | 6 | 0.025 | 0 | 1.5 |
| cat122 [Subcatch 2] | 1.11 | 0 | 0 | 0.015 | 100 | 1.5 |
| cat118 [Subcatch 1] | 2.18 | 10 | 6 | 0.025 | 0 | 0.8 |
| cat118 [Subcatch 2] | 3.52 | 0 | 0 | 0.015 | 100 | 0.8 |
| cat116 [Subcatch 1] | 0.58 | 10 | 6 | 0.025 | 0 | 1.3 |
| cat116 [Subcatch 2] | 0.94 | 0 | 0 | 0.015 | 100 | 1.3 |
| cat114 [Subcatch 1] | 0.88 | 10 | 6 | 0.025 | 0 | 1.9 |
| cat114 [Subcatch 2] | 1.37 | 0 | 0 | 0.015 | 100 | 1.9 |
| cat169 [Subcatch 1] | 2.71 | 10 | 6 | 0.025 | 0 | 1.3 |
| cat169 [Subcatch 2] | 4.29 | 0 | 0 | 0.015 | 100 | 1.3 |
| cat165 [Subcatch 1] | 0.31 | 10 | 6 | 0.025 | 0 | 2.2 |
| cat165 [Subcatch 2] | 0.34 | 0 | 0 | 0.015 | 100 | 2.2 |

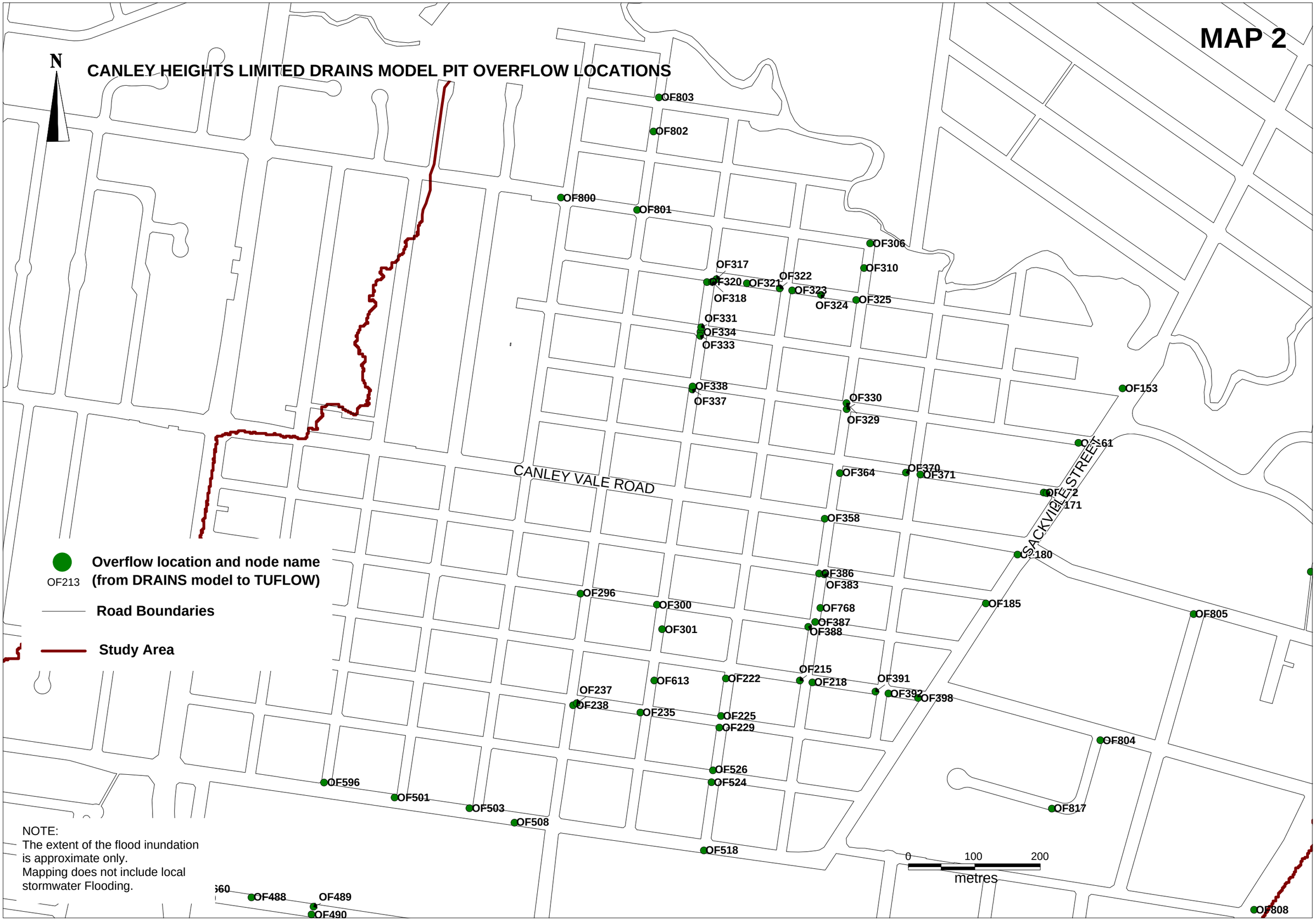
# Appendix B Hydrological / Stormwater Model Flows

This appendix contains:

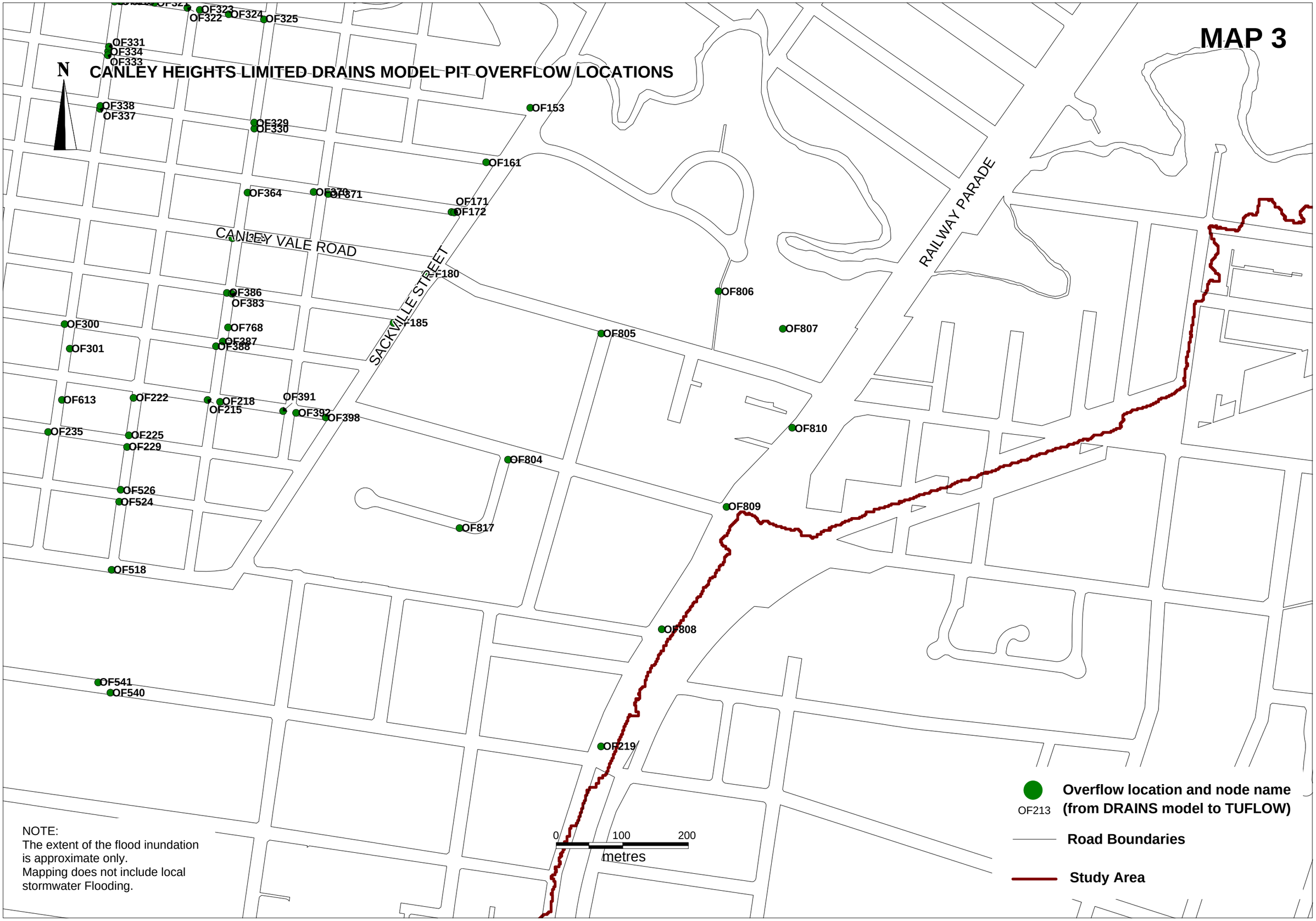
- Peak overflows from the stormwater pipe network (from the DRAINS model into the TUFLOW model)
- Peak catchment outflows from the DRAINS model


CANLEY HEIGHTS LIMITED DRAINS MODEL PIT OVERFLOW LOCATIONS
MAP 1
MAP 2
MAP 3
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
OF213
Overflow location and node name (from DRAINS model to TUFLOW)
Road Boundaries
Study Area


MAP 1
N
CANLEY HEIGHTS LIMITED DRAINS MODEL PIT OVERFLOW LOCATIONS
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
OF613
OF237
OF238
OF235
OF225
OF229
OF526
OF524
OF596
OF501
OF503
OF508
OF518
OF660
OF659
OF488
OF489
OF490
OF656
OF654
OF541
OF540
OF435
OF672
OF701
OF702
OF698
OF700
OF697
OF722
OF122
OF412
OF414
OF416
OF81
OF62
OF63
OF41
OF73
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
OF213
Overflow location and node name (from DRAINS model to TUFLOW)
Road Boundaries
Study Area




NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

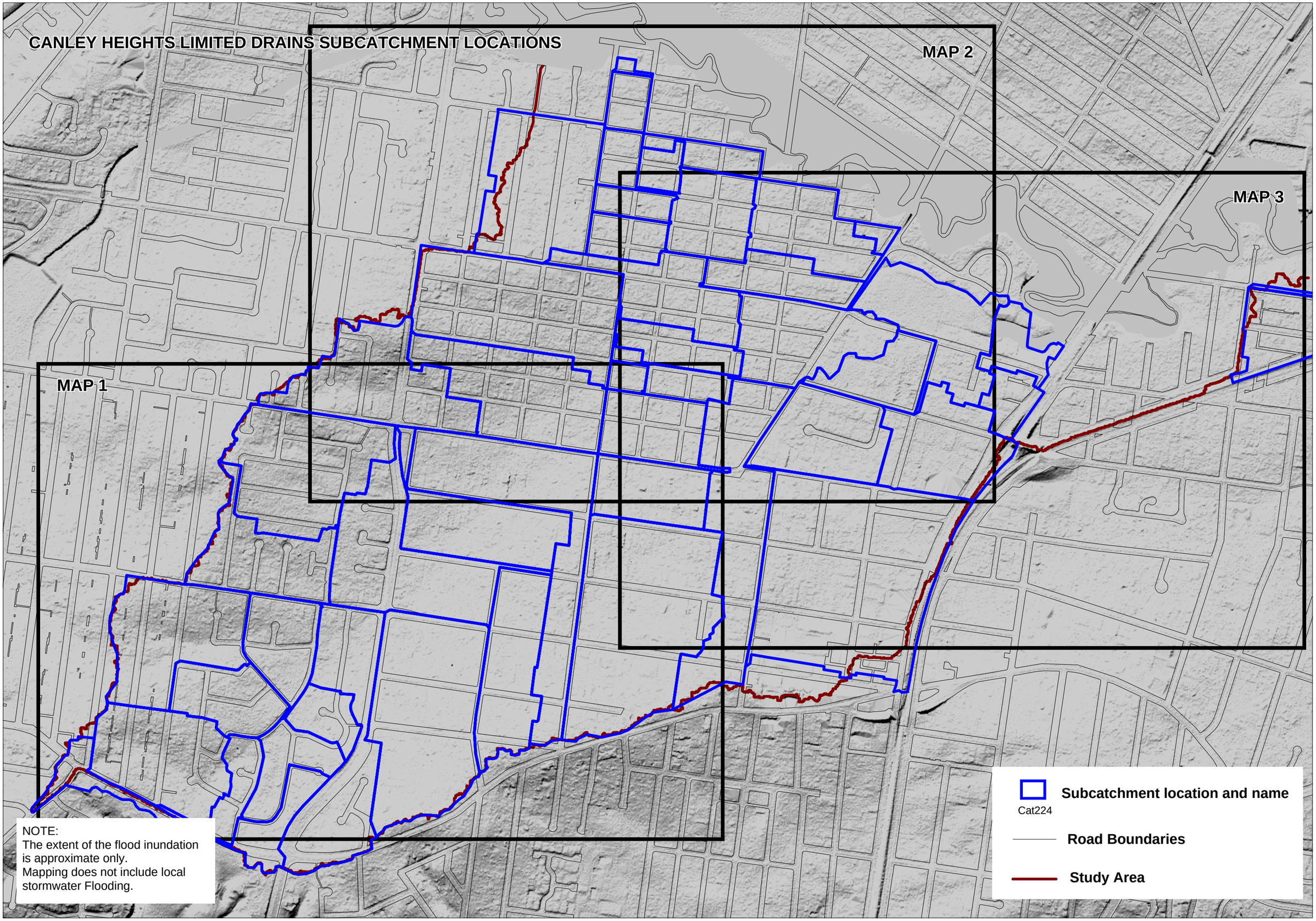

MAP 3
CANLEY HEIGHTS LIMITED DRAINS MODEL PIT OVERFLOW LOCATIONS
N
OF322
OF323
OF324
OF325
OF331
OF334
OF333
OF338
OF337
OF329
OF330
OF153
OF161
OF364
OF370
OF371
OF171
OF172
CANLEY VALE ROAD
SACKVILLE STREET
OF180
OF185
OF386
OF383
OF300
OF768
OF387
OF388
OF301
OF613
OF222
OF218
OF215
OF391
OF392
OF398
OF235
OF225
OF229
OF526
OF524
OF518
OF541
OF540
OF806
OF807
OF805
OF810
OF804
OF809
OF817
OF808
OF219
RAILWAY PARADE
0
100
200
metres
Overflow location and node name
OF213
(from DRAINS model to TUFLOW)
Road Boundaries
Study Area
NOTE:
The extent of the flood inundation
is approximate only.
Mapping does not include local
stormwater Flooding.

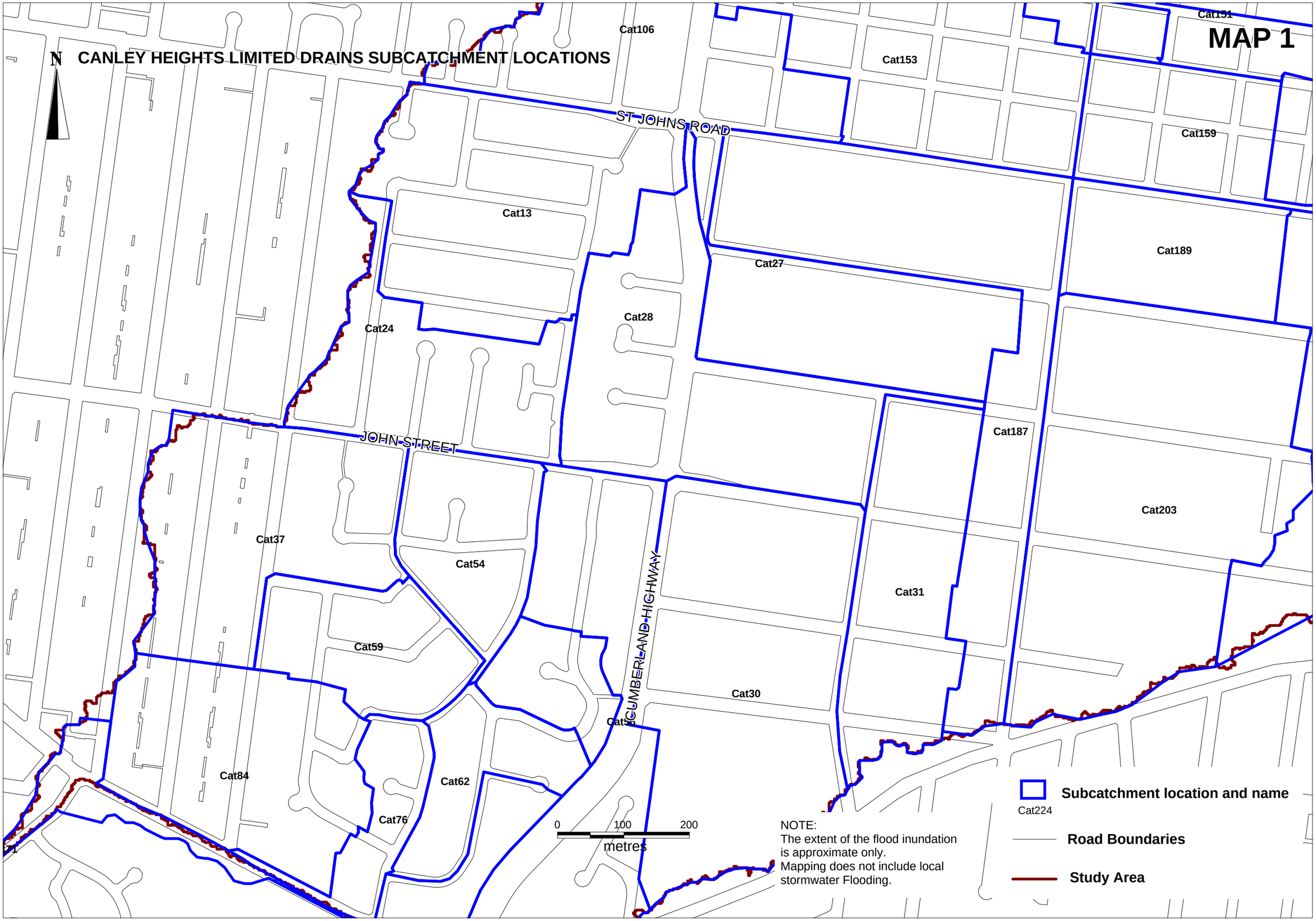
**Peak Overflows from Stormwater Pipe Network for Selected ARI Events and Storm Durations**
**$m^3/s$**

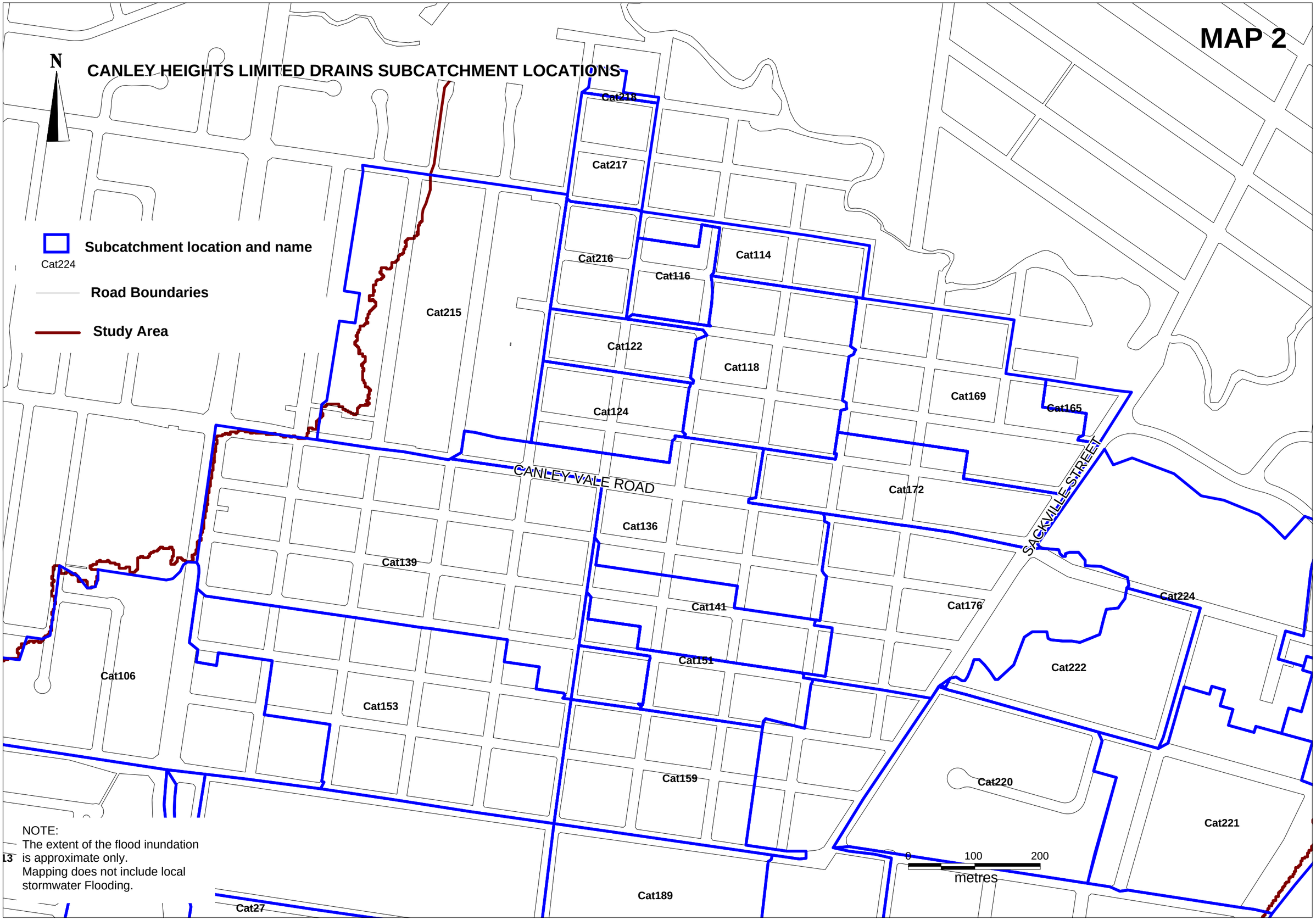
| | 5 Year ARI Event | | | | | | | | | | | 20 Year ARI Event | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Storm Duration (mins)** | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 |
| **Overflow node** | | | | | | | | | | | | | | | | | | | | | | |
| OF802 | 0.10 | 0.18 | 0.17 | 0.19 | 0.10 | 0.16 | 0.21 | 0.16 | 0.00 | 0.00 | 0.00 | 0.24 | 0.34 | 0.32 | 0.35 | 0.23 | 0.33 | 0.36 | 0.33 | 0.10 | 0.06 | 0.00 |
| OF540 | 0.00 | 0.10 | 0.43 | 0.83 | 0.83 | 0.83 | 0.83 | 0.83 | 0.66 | 0.60 | 0.20 | 0.00 | 0.72 | 0.83 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.83 | 0.83 | 0.00 |
| OF541 | 0.00 | 0.00 | 0.00 | 0.06 | 0.28 | 0.37 | 0.35 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 1.01 | 1.26 | 1.39 | 1.38 | 1.23 | 0.71 | 0.62 | 0.00 |
| OF518 | 0.60 | 1.37 | 1.59 | 1.56 | 1.38 | 1.44 | 1.55 | 1.62 | 1.12 | 0.97 | 0.76 | 0.89 | 1.93 | 2.12 | 2.09 | 1.86 | 1.88 | 1.96 | 2.06 | 1.45 | 1.31 | 0.30 |
| OF524 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF526 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF229 | 0.79 | 1.50 | 1.52 | 1.56 | 1.32 | 1.47 | 1.55 | 1.50 | 1.05 | 0.97 | 0.75 | 1.16 | 1.91 | 1.95 | 1.99 | 1.72 | 1.90 | 1.95 | 1.94 | 1.33 | 1.22 | 0.34 |
| OF225 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF222 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF215 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF218 | 0.23 | 0.40 | 0.41 | 0.42 | 0.32 | 0.36 | 0.42 | 0.40 | 0.20 | 0.15 | 0.06 | 0.39 | 0.61 | 0.62 | 0.63 | 0.50 | 0.57 | 0.61 | 0.62 | 0.33 | 0.28 | 0.03 |
| OF391 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF392 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF398 | 0.80 | 2.02 | 2.29 | 2.27 | 2.13 | 2.27 | 2.23 | 2.26 | 1.74 | 1.50 | 1.16 | 1.23 | 2.82 | 3.17 | 3.13 | 2.94 | 3.15 | 3.12 | 3.12 | 2.51 | 2.19 | 0.69 |
| OF185 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF180 | 0.80 | 1.56 | 1.72 | 1.68 | 1.44 | 1.48 | 1.62 | 1.72 | 1.06 | 0.92 | 0.59 | 1.22 | 2.20 | 2.41 | 2.36 | 2.05 | 2.11 | 2.21 | 2.36 | 1.50 | 1.33 | 0.43 |
| OF153 | 0.13 | 0.16 | 0.14 | 0.16 | 0.11 | 0.15 | 0.17 | 0.16 | 0.06 | 0.06 | 0.03 | 0.19 | 0.24 | 0.22 | 0.22 | 0.18 | 0.21 | 0.23 | 0.22 | 0.10 | 0.08 | 0.05 |
| OF386 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF383 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF358 | 0.46 | 1.13 | 1.29 | 1.24 | 1.09 | 1.09 | 1.17 | 1.24 | 0.81 | 0.67 | 0.46 | 0.75 | 1.61 | 1.81 | 1.75 | 1.56 | 1.58 | 1.69 | 1.78 | 1.21 | 1.04 | 0.27 |
| OF364 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF330 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF306 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF337 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF338 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF656 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF333 | 0.23 | 0.31 | 0.29 | 0.32 | 0.21 | 0.30 | 0.34 | 0.29 | 0.12 | 0.09 | 0.02 | 0.38 | 0.47 | 0.44 | 0.49 | 0.35 | 0.45 | 0.49 | 0.45 | 0.21 | 0.18 | 0.03 |
| OF334 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF331 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF320 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF318 | 0.27 | 0.32 | 0.29 | 0.33 | 0.22 | 0.30 | 0.33 | 0.30 | 0.11 | 0.09 | 0.03 | 0.41 | 0.48 | 0.44 | 0.46 | 0.36 | 0.43 | 0.47 | 0.43 | 0.19 | 0.16 | 0.07 |
| OF317 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF321 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF322 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF323 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF324 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF325 | 0.25 | 0.77 | 0.89 | 0.86 | 0.75 | 0.77 | 0.80 | 0.86 | 0.56 | 0.45 | 0.29 | 0.46 | 1.14 | 1.28 | 1.24 | 1.11 | 1.15 | 1.20 | 1.25 | 0.87 | 0.74 | 0.13 |
| OF310 | 0.25 | 0.39 | 0.40 | 0.41 | 0.32 | 0.37 | 0.42 | 0.40 | 0.23 | 0.19 | 0.11 | 0.39 | 0.57 | 0.58 | 0.59 | 0.48 | 0.55 | 0.59 | 0.59 | 0.34 | 0.30 | 0.08 |
| OF296 | 0.00 | 0.51 | 0.82 | 0.73 | 0.46 | 0.56 | 0.54 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 1.52 | 1.90 | 1.79 | 1.45 | 1.61 | 1.61 | 1.69 | 0.78 | 0.42 | 0.00 |
| OF300 | 0.00 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.51 | 0.20 | 0.00 | 0.03 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.00 |
| OF388 | 0.90 | 1.21 | 1.21 | 1.29 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 0.83 | 0.71 | 1.20 | 1.21 | 1.20 | 1.21 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 0.83 | 0.46 |
| OF387 | 0.25 | 0.66 | 0.78 | 0.75 | 0.63 | 0.63 | 0.70 | 0.78 | 0.39 | 0.33 | 0.16 | 0.47 | 1.00 | 1.16 | 1.11 | 0.97 | 0.96 | 1.00 | 1.12 | 0.62 | 0.53 | 0.09 |
| OF768 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF329 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF41 | 0.00 | 0.00 | 0.21 | 0.24 | 0.21 | 0.32 | 0.35 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.46 | 0.75 | 0.78 | 0.75 | 0.89 | 0.96 | 0.89 | 0.49 | 0.34 | 0.00 |
| OF62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF63 | 0.09 | 0.34 | 0.38 | 0.37 | 0.28 | 0.29 | 0.35 | 0.37 | 0.16 | 0.10 | 0.00 | 0.23 | 0.55 | 0.60 | 0.59 | 0.48 | 0.50 | 0.55 | 0.59 | 0.31 | 0.25 | 0.00 |
| OF672 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF81 | 0.30 | 0.60 | 0.62 | 0.65 | 0.49 | 0.70 | 0.84 | 0.77 | 0.30 | 0.25 | 0.10 | 0.53 | 0.96 | 1.20 | 1.23 | 1.01 | 1.26 | 1.45 | 1.37 | 0.77 | 0.52 | 0.07 |
| OF416 | 0.66 | 1.34 | 1.51 | 1.46 | 1.25 | 1.29 | 1.41 | 1.50 | 0.93 | 0.79 | 0.51 | 1.03 | 1.91 | 2.13 | 2.07 | 1.81 | 1.86 | 1.95 | 2.09 | 1.34 | 1.19 | 0.35 |
| OF414 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF722 | 0.78 | 1.91 | 2.43 | 2.35 | 2.15 | 2.26 | 2.26 | 2.37 | 1.55 | 1.25 | 0.91 | 1.19 | 2.96 | 3.25 | 3.16 | 2.91 | 3.03 | 3.05 | 3.12 | 2.43 | 2.17 | 0.58 |
| OF697 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF698 | 1.24 | 2.68 | 3.03 | 2.93 | 2.62 | 2.68 | 2.86 | 3.03 | 2.14 | 1.83 | 1.43 | 1.86 | 3.74 | 4.18 | 4.05 | 3.67 | 3.82 | 4.06 | 4.27 | 3.10 | 2.70 | 0.90 |

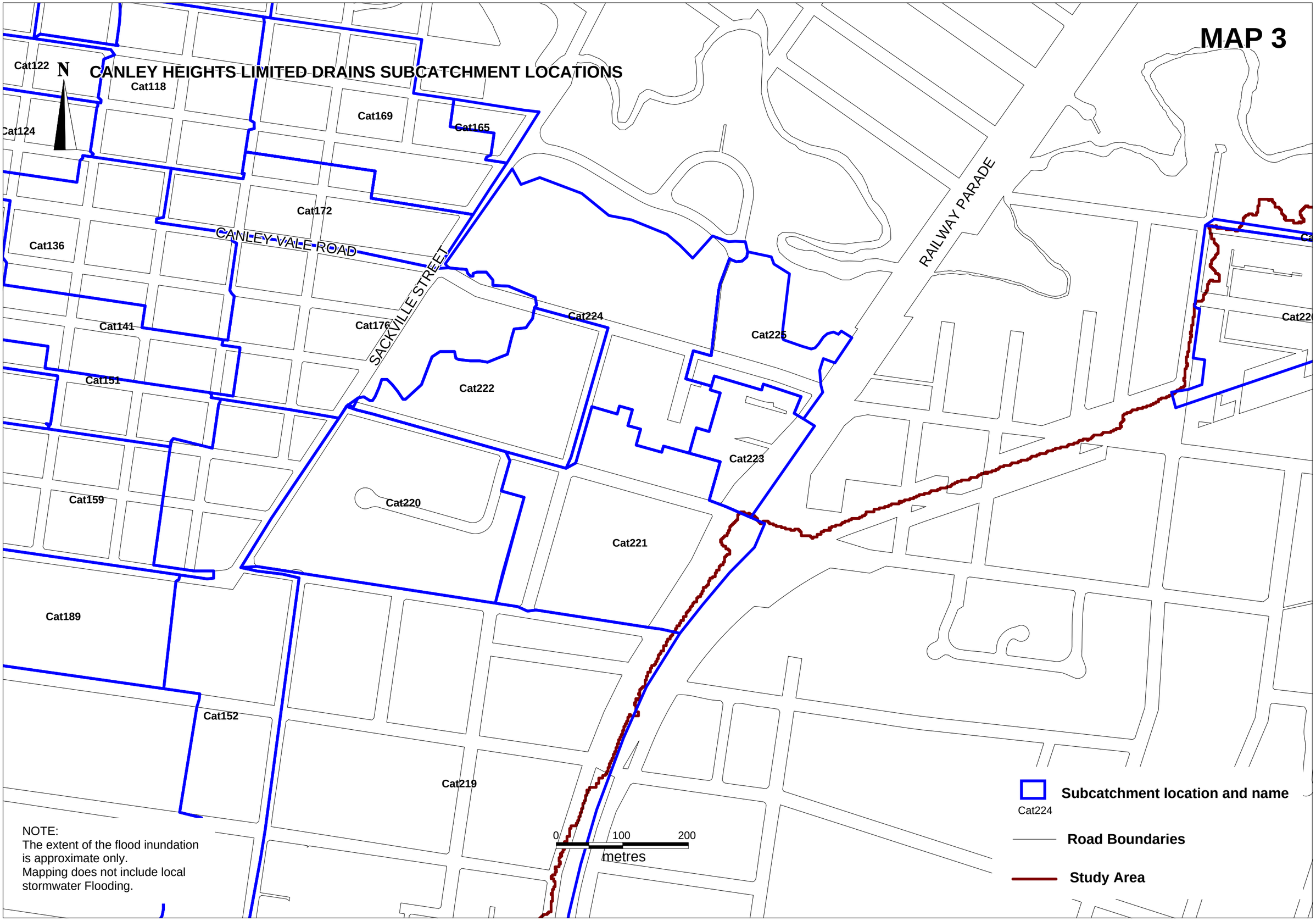
**Peak Overflows from Stormwater Pipe Network for Selected ARI Events and Storm Durations**
**$m^3/s$**

| | 100 Year ARI Event | | | | | | | | | | | PMF Event | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Storm Duration (mins)** | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 | 15 | 30 | 45 | 60 | 90 | 120 | 150 | 180 | 240 | 300 | 360 |
| **Overflow node** | | | | | | | | | | | | | | | | | | | | | | |
| OF802 | 0.42 | 0.50 | 0.47 | 0.49 | 0.37 | 0.48 | 0.50 | 0.47 | 0.19 | 0.14 | 0.02 | 3.73 | 2.98 | 2.57 | 2.24 | 1.68 | 1.45 | 1.21 | 1.06 | 0.84 | 0.70 | 0.57 |
| OF540 | 0.00 | 0.83 | 0.84 | 0.86 | 0.87 | 0.87 | 0.87 | 0.86 | 0.85 | 0.84 | 0.83 | 1.04 | 1.05 | 1.06 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| OF541 | 0.00 | 0.75 | 1.33 | 2.23 | 2.44 | 2.55 | 2.49 | 2.29 | 1.59 | 1.42 | 0.81 | 16.64 | 23.38 | 24.65 | 23.05 | 18.54 | 16.07 | 13.32 | 11.59 | 9.19 | 7.77 | 6.26 |
| OF518 | 1.49 | 2.51 | 2.63 | 2.51 | 2.31 | 2.30 | 2.35 | 2.48 | 1.72 | 1.57 | 1.22 | 12.78 | 10.21 | 8.96 | 7.97 | 6.34 | 5.51 | 4.80 | 4.35 | 3.69 | 3.30 | 2.91 |
| OF524 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF526 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF229 | 2.00 | 2.43 | 2.44 | 2.43 | 2.15 | 2.32 | 2.38 | 2.14 | 1.59 | 1.47 | 1.13 | 12.38 | 10.02 | 8.71 | 7.67 | 6.09 | 5.35 | 4.63 | 4.18 | 3.54 | 2.89 | 2.71 |
| OF225 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF222 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF215 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF218 | 0.59 | 0.82 | 0.83 | 0.81 | 0.69 | 0.77 | 0.79 | 0.80 | 0.45 | 0.39 | 0.23 | 5.32 | 4.18 | 3.68 | 3.24 | 2.48 | 2.15 | 1.84 | 1.63 | 1.33 | 1.15 | 0.97 |
| OF391 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF392 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF398 | 1.78 | 3.87 | 4.22 | 4.00 | 3.83 | 4.07 | 4.03 | 4.05 | 3.16 | 2.77 | 2.09 | 22.82 | 22.19 | 20.35 | 18.24 | 14.28 | 12.20 | 10.42 | 9.31 | 7.78 | 6.89 | 6.06 |
| OF185 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF180 | 1.76 | 2.93 | 3.17 | 2.99 | 2.72 | 2.76 | 2.79 | 2.97 | 1.91 | 1.70 | 1.17 | 17.94 | 14.56 | 12.76 | 11.26 | 8.79 | 7.54 | 6.47 | 5.81 | 4.86 | 4.24 | 3.65 |
| OF153 | 0.28 | 0.30 | 0.29 | 0.26 | 0.24 | 0.26 | 0.28 | 0.27 | 0.13 | 0.11 | 0.07 | 1.63 | 1.17 | 1.00 | 0.89 | 0.70 | 0.60 | 0.50 | 0.44 | 0.36 | 0.30 | 0.26 |
| OF386 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF383 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF358 | 1.13 | 2.19 | 2.40 | 2.23 | 2.07 | 2.09 | 2.16 | 2.26 | 1.55 | 1.35 | 0.95 | 13.80 | 11.63 | 10.55 | 9.40 | 7.30 | 6.27 | 5.35 | 4.78 | 4.00 | 3.51 | 3.05 |
| OF364 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF330 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF306 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF337 | 0.00 | 0.21 | 0.21 | 0.22 | 0.06 | 0.13 | 0.18 | 0.16 | 0.00 | 0.00 | 0.00 | 0.66 | 0.57 | 0.53 | 0.50 | 0.47 | 0.45 | 0.44 | 0.44 | 0.44 | 0.43 | 0.33 |
| OF338 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.52 | 3.36 | 2.73 | 2.25 | 1.53 | 1.16 | 0.82 | 0.61 | 0.29 | 0.08 | 0.00 |
| OF656 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF333 | 0.57 | 0.64 | 0.60 | 0.63 | 0.49 | 0.59 | 0.63 | 0.58 | 0.30 | 0.26 | 0.14 | 3.91 | 3.09 | 2.64 | 2.29 | 1.80 | 1.55 | 1.31 | 1.16 | 0.94 | 0.80 | 0.67 |
| OF334 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF331 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF320 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF318 | 0.60 | 0.64 | 0.59 | 0.57 | 0.50 | 0.55 | 0.59 | 0.55 | 0.26 | 0.22 | 0.13 | 3.69 | 2.67 | 2.24 | 2.02 | 1.57 | 1.35 | 1.13 | 0.99 | 0.79 | 0.67 | 0.57 |
| OF317 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF321 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF322 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF323 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF324 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF325 | 0.73 | 1.59 | 1.73 | 1.61 | 1.49 | 1.54 | 1.57 | 1.62 | 1.14 | 0.98 | 0.67 | 10.40 | 8.99 | 8.15 | 7.28 | 5.63 | 4.81 | 4.09 | 3.64 | 3.04 | 2.66 | 2.31 |
| OF310 | 0.57 | 0.76 | 0.76 | 0.75 | 0.64 | 0.73 | 0.74 | 0.74 | 0.45 | 0.39 | 0.26 | 4.60 | 3.70 | 3.26 | 2.88 | 2.20 | 1.92 | 1.65 | 1.47 | 1.22 | 1.06 | 0.90 |
| OF296 | 0.25 | 2.81 | 3.15 | 2.81 | 2.52 | 2.71 | 2.57 | 2.68 | 1.52 | 1.09 | 0.20 | 26.98 | 23.92 | 21.08 | 18.74 | 14.04 | 11.71 | 9.71 | 8.46 | 6.76 | 5.73 | 4.73 |
| OF300 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| OF388 | 1.50 | 1.20 | 1.20 | 1.21 | 1.21 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 0.83 | 1.20 | 1.20 | 1.20 | 1.21 | 1.20 | 1.20 | 1.21 | 1.21 | 1.21 | 1.20 | 1.20 |
| OF387 | 0.75 | 1.40 | 1.57 | 1.46 | 1.33 | 1.25 | 1.30 | 1.44 | 0.83 | 0.72 | 0.45 | 9.49 | 7.63 | 6.51 | 5.70 | 4.39 | 3.75 | 3.20 | 2.86 | 2.37 | 2.02 | 1.72 |
| OF768 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF329 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF41 | 0.00 | 1.08 | 1.45 | 1.38 | 1.39 | 1.52 | 1.57 | 1.52 | 0.99 | 0.74 | 0.38 | 12.24 | 13.76 | 12.73 | 11.68 | 8.98 | 7.49 | 6.22 | 5.42 | 4.33 | 3.68 | 3.11 |
| OF62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF63 | 0.42 | 0.79 | 0.85 | 0.79 | 0.69 | 0.72 | 0.74 | 0.79 | 0.44 | 0.37 | 0.19 | 5.73 | 4.53 | 4.00 | 3.55 | 2.71 | 2.32 | 1.96 | 1.74 | 1.41 | 1.22 | 1.02 |
| OF672 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF81 | 0.84 | 1.58 | 1.89 | 1.78 | 1.60 | 1.84 | 2.05 | 1.99 | 1.21 | 0.88 | 0.57 | 9.27 | 7.47 | 6.49 | 5.80 | 4.68 | 4.14 | 3.66 | 3.35 | 2.90 | 2.60 | 2.33 |
| OF416 | 1.51 | 2.56 | 2.81 | 2.63 | 2.40 | 2.45 | 2.47 | 2.64 | 1.72 | 1.53 | 1.04 | 15.97 | 13.06 | 11.55 | 10.26 | 7.96 | 6.84 | 5.85 | 5.25 | 4.39 | 3.85 | 3.31 |
| OF414 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF722 | 1.72 | 3.91 | 4.17 | 3.92 | 3.70 | 3.83 | 3.76 | 3.85 | 2.98 | 2.66 | 2.01 | 21.74 | 19.39 | 17.32 | 15.61 | 12.17 | 10.46 | 8.99 | 8.08 | 6.83 | 6.07 | 5.34 |
| OF697 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OF698 | 2.66 | 5.03 | 5.49 | 5.12 | 4.80 | 5.02 | 5.25 | 5.39 | 3.91 | 3.41 | 2.58 | 30.57 | 26.88 | 24.76 | 22.08 | 17.23 | 14.76 | 12.64 | 11.33 | 9.53 | 8.43 | 7.45 |


CANLEY HEIGHTS LIMITED DRAINS SUBCATCHMENT LOCATIONS
MAP 1
MAP 2
MAP 3
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Subcatchment location and name
Cat224
Road Boundaries
Study Area


MAP 1
CANLEY HEIGHTS LIMITED DRAINS SUBCATCHMENT LOCATIONS
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
Cat106
Cat153
Cat151
Cat159
Cat13
Cat27
Cat189
Cat28
Cat24
Cat187
Cat203
Cat37
Cat54
Cat31
Cat59
Cat30
Cat50
Cat84
Cat62
Cat76
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Subcatchment location and name
Cat224
Road Boundaries
Study Area


MAP 2
N
CANLEY HEIGHTS LIMITED DRAINS SUBCATCHMENT LOCATIONS
Subcatchment location and name
Cat224
Road Boundaries
Study Area
Cat218
Cat217
Cat216
Cat116
Cat114
Cat215
Cat122
Cat118
Cat124
Cat169
Cat165
CANLEY VALE ROAD
Cat172
SACKVILLE STREET
Cat136
Cat139
Cat141
Cat176
Cat224
Cat151
Cat222
Cat106
Cat153
Cat159
Cat220
Cat221
Cat189
Cat27
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.


MAP 3
CANLEY HEIGHTS LIMITED DRAINS SUBCATCHMENT LOCATIONS
N
Cat122
Cat118
Cat124
Cat169
Cat165
Cat172
Cat136
CANLEY VALE ROAD
SACKVILLE STREET
RAILWAY PARADE
Cat141
Cat176
Cat224
Cat225
Cat151
Cat222
Cat223
Cat159
Cat220
Cat221
Cat189
Cat152
Cat219
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Subcatchment location and name
Cat224
Road Boundaries
Study Area

**Peak Catchment Runoff for Selected ARI Events and Storm Durations**
**$m^3/s$**

| | 5 Year ARI Event | | | | | | | | | | | 20 Year ARI Event | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Storm Duration (mins)** | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 |
| **Catchment node** | | | | | | | | | | | | | | | | | | | | | | |
| Cat172 | 0.53 | 0.94 | 1.04 | 1.01 | 0.90 | 0.89 | 0.97 | 1.03 | 0.71 | 0.62 | 0.47 | 0.73 | 1.26 | 1.39 | 1.35 | 1.21 | 1.21 | 1.28 | 1.36 | 0.95 | 0.85 | 0.63 |
| Cat223 | 0.54 | 0.62 | 0.62 | 0.61 | 0.52 | 0.57 | 0.62 | 0.58 | 0.36 | 0.32 | 0.24 | 0.71 | 0.81 | 0.80 | 0.79 | 0.68 | 0.76 | 0.82 | 0.77 | 0.48 | 0.43 | 0.32 |
| Cat221 | 1.00 | 1.74 | 1.93 | 1.86 | 1.66 | 1.63 | 1.78 | 1.89 | 1.29 | 1.12 | 0.90 | 1.37 | 2.32 | 2.57 | 2.48 | 2.23 | 2.22 | 2.42 | 2.59 | 1.77 | 1.57 | 1.20 |
| Cat231 | 1.10 | 1.92 | 2.14 | 2.07 | 1.84 | 1.82 | 1.98 | 2.10 | 1.44 | 1.25 | 1.12 | 1.51 | 2.57 | 2.85 | 2.76 | 2.48 | 2.48 | 2.70 | 2.88 | 2.04 | 1.82 | 1.53 |
| Cat219 | 2.30 | 3.92 | 4.23 | 4.09 | 3.64 | 3.43 | 3.67 | 3.94 | 2.59 | 2.27 | 1.77 | 3.05 | 5.11 | 5.48 | 5.30 | 4.73 | 4.48 | 4.81 | 5.18 | 3.46 | 3.06 | 2.34 |
| Cat225 | 0.88 | 0.89 | 0.87 | 0.86 | 0.73 | 0.82 | 0.88 | 0.83 | 0.46 | 0.41 | 0.30 | 1.15 | 1.16 | 1.13 | 1.12 | 0.96 | 1.06 | 1.13 | 1.07 | 0.60 | 0.54 | 0.39 |
| Cat224 | 0.65 | 1.16 | 1.32 | 1.28 | 1.14 | 1.18 | 1.28 | 1.35 | 0.95 | 0.93 | 0.78 | 0.92 | 1.59 | 1.80 | 1.74 | 1.57 | 1.66 | 1.79 | 1.90 | 1.39 | 1.28 | 1.17 |
| Cat222 | 0.54 | 0.93 | 1.02 | 0.98 | 0.88 | 0.84 | 0.92 | 0.98 | 0.66 | 0.57 | 0.48 | 0.73 | 1.23 | 1.34 | 1.30 | 1.16 | 1.12 | 1.23 | 1.32 | 0.91 | 0.80 | 0.64 |
| Cat232 | 0.44 | 0.76 | 0.84 | 0.81 | 0.72 | 0.70 | 0.76 | 0.81 | 0.55 | 0.48 | 0.42 | 0.59 | 1.01 | 1.11 | 1.07 | 0.96 | 0.94 | 1.03 | 1.10 | 0.77 | 0.68 | 0.56 |
| Cat220 | 0.82 | 0.88 | 0.83 | 0.89 | 0.70 | 0.87 | 0.97 | 0.84 | 0.59 | 0.51 | 0.41 | 1.09 | 1.17 | 1.12 | 1.20 | 0.95 | 1.19 | 1.32 | 1.17 | 0.81 | 0.72 | 0.55 |
| Cat229 | 0.03 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.01 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.02 | 0.02 | 0.02 |
| Cat227 | 0.05 | 0.09 | 0.10 | 0.10 | 0.09 | 0.08 | 0.08 | 0.09 | 0.06 | 0.05 | 0.04 | 0.07 | 0.12 | 0.13 | 0.12 | 0.11 | 0.10 | 0.11 | 0.12 | 0.08 | 0.07 | 0.05 |
| Cat226 | 0.70 | 1.22 | 1.35 | 1.30 | 1.16 | 1.12 | 1.22 | 1.30 | 0.88 | 0.77 | 0.65 | 0.96 | 1.62 | 1.78 | 1.72 | 1.54 | 1.51 | 1.65 | 1.77 | 1.23 | 1.08 | 0.86 |
| Cat230 | 0.22 | 0.24 | 0.24 | 0.24 | 0.20 | 0.23 | 0.26 | 0.23 | 0.15 | 0.13 | 0.10 | 0.29 | 0.32 | 0.31 | 0.32 | 0.26 | 0.31 | 0.34 | 0.31 | 0.20 | 0.18 | 0.13 |
| Cat228 | 0.15 | 0.15 | 0.15 | 0.15 | 0.12 | 0.15 | 0.16 | 0.14 | 0.10 | 0.08 | 0.06 | 0.19 | 0.20 | 0.19 | 0.20 | 0.16 | 0.20 | 0.22 | 0.20 | 0.13 | 0.12 | 0.09 |
| Cat218 | 0.07 | 0.07 | 0.07 | 0.07 | 0.06 | 0.07 | 0.08 | 0.07 | 0.04 | 0.04 | 0.03 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.09 | 0.10 | 0.09 | 0.06 | 0.05 | 0.04 |
| Cat217 | 0.40 | 0.48 | 0.47 | 0.48 | 0.40 | 0.46 | 0.50 | 0.46 | 0.30 | 0.27 | 0.20 | 0.54 | 0.64 | 0.62 | 0.65 | 0.53 | 0.63 | 0.66 | 0.63 | 0.40 | 0.36 | 0.26 |
| Cat216 | 0.39 | 0.47 | 0.46 | 0.48 | 0.39 | 0.46 | 0.50 | 0.46 | 0.30 | 0.27 | 0.20 | 0.53 | 0.63 | 0.61 | 0.64 | 0.52 | 0.62 | 0.66 | 0.63 | 0.40 | 0.36 | 0.26 |
| Cat215 | 1.41 | 2.44 | 2.68 | 2.59 | 2.31 | 2.22 | 2.42 | 2.58 | 1.74 | 1.52 | 1.29 | 1.91 | 3.23 | 3.53 | 3.42 | 3.06 | 2.97 | 3.25 | 3.48 | 2.40 | 2.14 | 1.74 |
| Cat203 | 0.95 | 1.99 | 2.33 | 2.86 | 3.08 | 3.17 | 3.15 | 3.02 | 2.60 | 2.53 | 2.09 | 1.31 | 2.67 | 3.12 | 3.82 | 4.08 | 4.21 | 4.20 | 4.04 | 3.51 | 3.43 | 2.93 |
| Cat124 | 0.48 | 0.66 | 0.67 | 0.69 | 0.57 | 0.65 | 0.69 | 0.67 | 0.43 | 0.39 | 0.28 | 0.66 | 0.89 | 0.90 | 0.93 | 0.77 | 0.86 | 0.90 | 0.89 | 0.57 | 0.52 | 0.38 |
| Cat139 | 1.47 | 3.01 | 3.31 | 3.23 | 2.96 | 3.06 | 3.04 | 3.18 | 2.44 | 2.13 | 1.65 | 2.02 | 4.02 | 4.40 | 4.29 | 3.95 | 4.11 | 4.10 | 4.19 | 3.27 | 2.92 | 2.19 |
| Cat106 | 0.71 | 1.52 | 1.78 | 1.82 | 1.79 | 1.92 | 1.97 | 1.88 | 1.51 | 1.40 | 1.15 | 1.00 | 2.07 | 2.41 | 2.45 | 2.43 | 2.59 | 2.67 | 2.58 | 2.12 | 1.92 | 1.53 |
| Cat13 | 1.20 | 2.36 | 2.62 | 2.54 | 2.31 | 2.37 | 2.44 | 2.57 | 1.91 | 1.66 | 1.35 | 1.67 | 3.18 | 3.50 | 3.40 | 3.11 | 3.21 | 3.34 | 3.50 | 2.64 | 2.33 | 1.81 |
| Cat71 | 0.32 | 0.67 | 0.79 | 0.85 | 0.85 | 0.90 | 0.92 | 0.88 | 0.70 | 0.66 | 0.56 | 0.44 | 0.91 | 1.06 | 1.14 | 1.14 | 1.21 | 1.24 | 1.19 | 0.98 | 0.91 | 0.75 |
| Cat24 | 0.78 | 1.49 | 1.66 | 1.61 | 1.45 | 1.47 | 1.53 | 1.61 | 1.17 | 1.02 | 0.81 | 1.08 | 2.00 | 2.20 | 2.14 | 1.95 | 1.98 | 2.08 | 2.17 | 1.60 | 1.42 | 1.08 |
| Cat54 | 1.06 | 1.31 | 1.25 | 1.35 | 1.05 | 1.31 | 1.41 | 1.28 | 0.82 | 0.74 | 0.54 | 1.46 | 1.77 | 1.69 | 1.84 | 1.44 | 1.73 | 1.84 | 1.71 | 1.09 | 0.98 | 0.72 |
| Cat37 | 0.70 | 1.50 | 1.74 | 1.75 | 1.71 | 1.83 | 1.87 | 1.80 | 1.45 | 1.33 | 1.13 | 0.99 | 2.05 | 2.35 | 2.37 | 2.32 | 2.48 | 2.54 | 2.48 | 2.04 | 1.85 | 1.51 |
| Cat153 | 1.17 | 2.22 | 2.46 | 2.39 | 2.16 | 2.18 | 2.29 | 2.41 | 1.75 | 1.53 | 1.20 | 1.62 | 2.98 | 3.29 | 3.19 | 2.90 | 2.95 | 3.12 | 3.24 | 2.38 | 2.12 | 1.60 |
| Cat187 | 0.99 | 2.13 | 2.41 | 2.39 | 2.26 | 2.43 | 2.46 | 2.51 | 1.98 | 1.82 | 1.55 | 1.41 | 2.93 | 3.28 | 3.26 | 3.10 | 3.33 | 3.41 | 3.51 | 2.83 | 2.52 | 2.09 |
| Cat27 | 0.83 | 1.39 | 1.59 | 1.60 | 1.38 | 1.62 | 1.74 | 1.80 | 1.22 | 1.13 | 0.82 | 1.24 | 2.00 | 2.29 | 2.30 | 2.02 | 2.29 | 2.33 | 2.40 | 1.67 | 1.53 | 1.12 |
| Cat31 | 0.84 | 1.60 | 1.79 | 1.73 | 1.56 | 1.58 | 1.69 | 1.78 | 1.29 | 1.12 | 0.87 | 1.18 | 2.16 | 2.40 | 2.33 | 2.12 | 2.16 | 2.27 | 2.37 | 1.74 | 1.56 | 1.17 |
| Cat28 | 2.20 | 3.00 | 3.01 | 3.09 | 2.55 | 2.88 | 3.14 | 3.00 | 2.00 | 1.81 | 1.32 | 3.00 | 4.00 | 4.02 | 4.15 | 3.45 | 3.92 | 4.11 | 4.06 | 2.66 | 2.40 | 1.76 |
| Cat30 | 1.54 | 2.98 | 3.33 | 3.23 | 2.92 | 2.98 | 3.16 | 3.33 | 2.44 | 2.13 | 1.73 | 2.16 | 4.04 | 4.48 | 4.35 | 3.97 | 4.11 | 4.36 | 4.57 | 3.39 | 3.00 | 2.33 |
| Cat56 | 1.08 | 2.19 | 2.42 | 2.35 | 2.15 | 2.23 | 2.23 | 2.34 | 1.78 | 1.55 | 1.21 | 1.49 | 2.93 | 3.22 | 3.13 | 2.88 | 3.00 | 3.02 | 3.09 | 2.40 | 2.14 | 1.61 |
| Cat59 | 0.96 | 1.64 | 1.80 | 1.76 | 1.55 | 1.58 | 1.71 | 1.80 | 1.23 | 1.09 | 0.81 | 1.33 | 2.21 | 2.42 | 2.37 | 2.11 | 2.16 | 2.25 | 2.39 | 1.64 | 1.48 | 1.09 |
| Cat62 | 0.60 | 0.89 | 0.92 | 0.95 | 0.79 | 0.88 | 0.94 | 0.94 | 0.60 | 0.55 | 0.40 | 0.83 | 1.21 | 1.25 | 1.29 | 1.09 | 1.17 | 1.23 | 1.24 | 0.80 | 0.72 | 0.53 |
| Cat76 | 0.39 | 0.64 | 0.68 | 0.67 | 0.58 | 0.59 | 0.65 | 0.67 | 0.46 | 0.40 | 0.30 | 0.53 | 0.85 | 0.90 | 0.89 | 0.78 | 0.80 | 0.85 | 0.89 | 0.60 | 0.55 | 0.40 |
| Cat84 | 0.62 | 1.31 | 1.53 | 1.56 | 1.53 | 1.64 | 1.68 | 1.61 | 1.29 | 1.19 | 1.02 | 0.87 | 1.78 | 2.08 | 2.10 | 2.07 | 2.22 | 2.28 | 2.21 | 1.81 | 1.66 | 1.37 |
| Cat141 | 0.55 | 0.96 | 1.08 | 1.04 | 0.93 | 0.93 | 0.99 | 1.08 | 0.69 | 0.63 | 0.46 | 0.77 | 1.30 | 1.45 | 1.41 | 1.27 | 1.25 | 1.30 | 1.41 | 0.92 | 0.83 | 0.61 |
| Cat114 | 0.38 | 0.52 | 0.53 | 0.54 | 0.45 | 0.50 | 0.55 | 0.52 | 0.35 | 0.32 | 0.23 | 0.52 | 0.70 | 0.70 | 0.72 | 0.60 | 0.68 | 0.71 | 0.71 | 0.47 | 0.42 | 0.31 |
| Cat118 | 0.55 | 1.07 | 1.19 | 1.15 | 1.05 | 1.07 | 1.10 | 1.16 | 0.86 | 0.75 | 0.59 | 0.76 | 1.44 | 1.58 | 1.54 | 1.41 | 1.45 | 1.50 | 1.55 | 1.17 | 1.04 | 0.79 |
| Cat116 | 0.40 | 0.45 | 0.41 | 0.45 | 0.35 | 0.43 | 0.46 | 0.43 | 0.24 | 0.22 | 0.16 | 0.54 | 0.61 | 0.57 | 0.59 | 0.48 | 0.56 | 0.60 | 0.56 | 0.32 | 0.29 | 0.21 |
| Cat122 | 0.40 | 0.48 | 0.46 | 0.49 | 0.38 | 0.47 | 0.51 | 0.46 | 0.29 | 0.26 | 0.19 | 0.55 | 0.64 | 0.61 | 0.66 | 0.52 | 0.62 | 0.66 | 0.62 | 0.38 | 0.35 | 0.25 |
| Cat136 | 0.76 | 1.43 | 1.58 | 1.54 | 1.39 | 1.39 | 1.46 | 1.54 | 1.11 | 0.97 | 0.76 | 1.05 | 1.91 | 2.11 | 2.05 | 1.86 | 1.88 | 1.99 | 2.07 | 1.50 | 1.34 | 1.01 |
| Cat165 | 0.16 | 0.20 | 0.18 | 0.20 | 0.15 | 0.19 | 0.20 | 0.20 | 0.10 | 0.09 | 0.07 | 0.23 | 0.27 | 0.26 | 0.26 | 0.22 | 0.25 | 0.27 | 0.26 | 0.14 | 0.12 | 0.09 |
| Cat176 | 1.10 | 1.86 | 2.02 | 1.98 | 1.74 | 1.77 | 1.92 | 2.02 | 1.35 | 1.22 | 0.89 | 1.52 | 2.50 | 2.71 | 2.66 | 2.35 | 2.41 | 2.51 | 2.66 | 1.80 | 1.63 | 1.19 |
| Cat152 | 1.10 | 2.32 | 2.59 | 2.57 | 2.43 | 2.57 | 2.53 | 2.56 | 2.04 | 1.80 | 1.45 | 1.53 | 3.12 | 3.47 | 3.43 | 3.24 | 3.45 | 3.42 | 3.42 | 2.81 | 2.49 | 1.94 |
| Cat151 | 0.44 | 0.62 | 0.63 | 0.63 | 0.53 | 0.58 | 0.63 | 0.61 | 0.41 | 0.37 | 0.27 | 0.60 | 0.82 | 0.83 | 0.84 | 0.71 | 0.78 | 0.83 | 0.83 | 0.54 | 0.49 | 0.36 |
| Cat159 | 1.01 | 1.36 | 1.36 | 1.40 | 1.15 | 1.31 | 1.42 | 1.36 | 0.89 | 0.80 | 0.58 | 1.38 | 1.82 | 1.82 | 1.89 | 1.56 | 1.78 | 1.86 | 1.81 | 1.18 | 1.06 | 0.78 |
| Cat189 | 0.81 | 1.35 | 1.44 | 1.41 | 1.24 | 1.23 | 1.33 | 1.40 | 0.92 | 0.83 | 0.60 | 1.10 | 1.79 | 1.91 | 1.86 | 1.65 | 1.65 | 1.73 | 1.83 | 1.22 | 1.10 | 0.80 |

**Peak Catchment Runoff for Selected ARI Events and Storm Durations**
**$m^3/s$**

| | 100 Year ARI Event | | | | | | | | | | | PMF Event | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Storm Duration (mins)** | 5 | 15 | 20 | 30 | 45 | 60 | 90 | 120 | 180 | 270 | 360 | 15 | 30 | 45 | 60 | 90 | 120 | 150 | 180 | 240 | 300 | 360 |
| **Catchment node** | | | | | | | | | | | | | | | | | | | | | | |
| Cat172 | 0.99 | 1.63 | 1.78 | 1.66 | 1.55 | 1.54 | 1.57 | 1.68 | 1.17 | 1.05 | 0.78 | 8.38 | 7.65 | 6.78 | 6.08 | 4.76 | 4.11 | 3.54 | 3.19 | 2.70 | 2.39 | 2.09 |
| Cat223 | 0.94 | 1.00 | 0.98 | 0.95 | 0.84 | 0.93 | 1.00 | 0.95 | 0.59 | 0.52 | 0.39 | 4.03 | 3.47 | 3.13 | 2.89 | 2.25 | 2.00 | 1.75 | 1.58 | 1.32 | 1.13 | 1.03 |
| Cat221 | 1.85 | 2.99 | 3.26 | 3.05 | 2.83 | 2.84 | 3.03 | 3.19 | 2.18 | 1.93 | 1.48 | 13.68 | 12.84 | 12.10 | 10.94 | 8.57 | 7.41 | 6.44 | 5.81 | 4.92 | 4.25 | 3.87 |
| Cat231 | 2.05 | 3.32 | 3.63 | 3.39 | 3.15 | 3.19 | 3.42 | 3.69 | 2.62 | 2.26 | 1.90 | 15.24 | 14.38 | 14.08 | 13.62 | 11.01 | 9.48 | 8.07 | 7.17 | 6.10 | 5.28 | 4.81 |
| Cat219 | 4.04 | 6.48 | 6.82 | 6.39 | 5.87 | 5.54 | 5.92 | 6.42 | 4.26 | 3.75 | 2.87 | 28.17 | 25.49 | 22.41 | 20.31 | 16.35 | 14.20 | 12.46 | 11.28 | 9.58 | 8.19 | 7.38 |
| Cat225 | 1.50 | 1.43 | 1.38 | 1.31 | 1.19 | 1.28 | 1.36 | 1.29 | 0.73 | 0.66 | 0.48 | 5.79 | 4.74 | 4.17 | 3.85 | 3.04 | 2.61 | 2.24 | 1.99 | 1.65 | 1.40 | 1.25 |
| Cat224 | 1.27 | 2.08 | 2.33 | 2.17 | 2.03 | 2.17 | 2.31 | 2.48 | 1.82 | 1.61 | 1.46 | 9.88 | 10.26 | 10.62 | 10.08 | 8.39 | 7.37 | 6.27 | 5.57 | 4.64 | 3.97 | 3.61 |
| Cat222 | 0.97 | 1.57 | 1.69 | 1.58 | 1.46 | 1.42 | 1.54 | 1.66 | 1.14 | 0.99 | 0.79 | 7.02 | 6.49 | 6.01 | 5.65 | 4.56 | 3.89 | 3.33 | 3.01 | 2.59 | 2.23 | 2.02 |
| Cat232 | 0.80 | 1.29 | 1.40 | 1.31 | 1.21 | 1.21 | 1.30 | 1.40 | 0.98 | 0.85 | 0.69 | 5.86 | 5.45 | 5.18 | 4.97 | 3.99 | 3.43 | 2.92 | 2.60 | 2.25 | 1.94 | 1.76 |
| Cat220 | 1.45 | 1.48 | 1.39 | 1.46 | 1.20 | 1.51 | 1.61 | 1.49 | 1.00 | 0.90 | 0.68 | 5.82 | 5.83 | 5.54 | 5.09 | 3.98 | 3.40 | 2.93 | 2.67 | 2.26 | 1.97 | 1.79 |
| Cat218 | 0.12 | 0.12 | 0.11 | 0.11 | 0.10 | 0.12 | 0.12 | 0.11 | 0.07 | 0.06 | 0.05 | 0.47 | 0.43 | 0.39 | 0.35 | 0.14 | 0.27 | 0.24 | 0.21 | 0.19 | 0.16 | 0.12 |
| Cat217 | 0.72 | 0.80 | 0.77 | 0.78 | 0.67 | 0.78 | 0.80 | 0.77 | 0.49 | 0.44 | 0.32 | 3.22 | 3.06 | 2.72 | 2.42 | 1.90 | 1.69 | 1.46 | 1.31 | 1.11 | 0.95 | 0.85 |
| Cat216 | 0.71 | 0.79 | 0.76 | 0.78 | 0.66 | 0.77 | 0.80 | 0.76 | 0.49 | 0.44 | 0.32 | 3.19 | 3.06 | 2.73 | 2.42 | 1.90 | 1.68 | 1.46 | 1.31 | 1.11 | 0.95 | 0.85 |
| Cat215 | 2.57 | 4.14 | 4.46 | 4.17 | 3.85 | 3.77 | 4.07 | 4.39 | 3.04 | 2.65 | 2.15 | 20.58 | 18.43 | 16.87 | 16.07 | 12.89 | 11.01 | 9.36 | 8.38 | 7.20 | 6.37 | 5.61 |
| Cat203 | 1.77 | 3.56 | 4.14 | 5.06 | 5.29 | 5.40 | 5.33 | 5.13 | 4.41 | 4.24 | 3.61 | 17.27 | 26.70 | 28.00 | 26.37 | 21.80 | 18.98 | 16.20 | 14.45 | 12.03 | 10.59 | 9.32 |
| Cat124 | 0.89 | 1.14 | 1.13 | 1.15 | 0.99 | 1.05 | 1.10 | 1.08 | 0.70 | 0.63 | 0.47 | 5.35 | 4.87 | 4.19 | 3.68 | 2.92 | 2.54 | 2.20 | 1.97 | 1.66 | 1.44 | 1.25 |
| Cat139 | 2.74 | 5.31 | 5.65 | 5.31 | 5.02 | 5.20 | 5.07 | 5.18 | 4.02 | 3.58 | 2.70 | 26.37 | 26.41 | 23.57 | 21.24 | 16.54 | 14.21 | 12.20 | 10.96 | 9.26 | 8.23 | 7.23 |
| Cat106 | 1.38 | 2.78 | 3.23 | 3.16 | 3.18 | 3.32 | 3.39 | 3.32 | 2.63 | 2.37 | 1.89 | 13.87 | 17.65 | 16.05 | 14.62 | 11.58 | 9.91 | 8.48 | 7.59 | 6.36 | 5.64 | 5.00 |
| Cat13 | 2.27 | 4.19 | 4.50 | 4.22 | 3.98 | 4.09 | 4.25 | 4.36 | 3.27 | 2.88 | 2.24 | 21.48 | 20.82 | 19.28 | 17.28 | 13.54 | 11.68 | 10.04 | 9.02 | 7.62 | 6.76 | 5.98 |
| Cat71 | 0.61 | 1.22 | 1.42 | 1.47 | 1.49 | 1.55 | 1.57 | 1.53 | 1.24 | 1.12 | 0.92 | 6.04 | 8.17 | 7.67 | 7.10 | 5.62 | 4.81 | 4.11 | 3.67 | 3.07 | 2.72 | 2.41 |
| Cat24 | 1.47 | 2.61 | 2.82 | 2.64 | 2.48 | 2.51 | 2.59 | 2.68 | 1.96 | 1.74 | 1.33 | 13.40 | 12.58 | 11.53 | 10.31 | 8.08 | 6.98 | 6.00 | 5.39 | 4.56 | 4.04 | 3.57 |
| Cat54 | 1.97 | 2.24 | 2.13 | 2.26 | 1.85 | 2.12 | 2.24 | 2.09 | 1.34 | 1.21 | 0.89 | 10.06 | 9.30 | 8.02 | 7.02 | 5.58 | 4.87 | 4.20 | 3.78 | 3.16 | 2.75 | 2.40 |
| Cat37 | 1.36 | 2.76 | 3.14 | 3.04 | 3.04 | 3.18 | 3.24 | 3.21 | 2.58 | 2.29 | 1.87 | 13.76 | 16.96 | 15.65 | 14.33 | 11.37 | 9.72 | 8.32 | 7.44 | 6.24 | 5.54 | 4.91 |
| Cat153 | 2.20 | 3.90 | 4.22 | 3.95 | 3.70 | 3.76 | 3.85 | 4.00 | 2.93 | 2.61 | 1.98 | 20.13 | 18.92 | 17.19 | 15.39 | 12.05 | 10.39 | 8.94 | 8.04 | 6.80 | 6.03 | 5.31 |
| Cat187 | 1.96 | 3.97 | 4.35 | 4.14 | 4.09 | 4.32 | 4.37 | 4.44 | 3.61 | 3.14 | 2.59 | 20.12 | 23.07 | 21.62 | 19.90 | 15.77 | 13.43 | 11.49 | 10.28 | 8.63 | 7.66 | 6.79 |
| Cat27 | 1.78 | 2.76 | 3.10 | 2.96 | 2.74 | 2.90 | 2.90 | 2.99 | 2.08 | 1.90 | 1.40 | 15.13 | 14.76 | 12.80 | 11.34 | 8.77 | 7.55 | 6.51 | 5.87 | 5.00 | 4.39 | 3.82 |
| Cat31 | 1.61 | 2.84 | 3.09 | 2.89 | 2.72 | 2.77 | 2.80 | 2.93 | 2.14 | 1.92 | 1.44 | 14.84 | 14.11 | 12.61 | 11.30 | 8.84 | 7.60 | 6.53 | 5.88 | 4.97 | 4.42 | 3.88 |
| Cat28 | 4.05 | 5.09 | 5.06 | 5.08 | 4.39 | 4.90 | 5.01 | 4.96 | 3.27 | 2.95 | 2.17 | 23.69 | 22.10 | 19.30 | 17.03 | 13.29 | 11.68 | 10.10 | 9.06 | 7.64 | 6.70 | 5.83 |
| Cat30 | 2.96 | 5.33 | 5.79 | 5.42 | 5.10 | 5.32 | 5.55 | 5.69 | 4.21 | 3.71 | 2.88 | 27.94 | 27.18 | 25.06 | 22.38 | 17.53 | 15.06 | 12.94 | 11.63 | 9.83 | 8.73 | 7.75 |
| Cat56 | 2.02 | 3.88 | 4.14 | 3.89 | 3.67 | 3.80 | 3.73 | 3.82 | 2.95 | 2.63 | 1.98 | 19.49 | 19.36 | 17.29 | 15.58 | 12.14 | 10.43 | 8.96 | 8.05 | 6.80 | 6.04 | 5.31 |
| Cat59 | 1.81 | 2.86 | 3.11 | 2.93 | 2.70 | 2.74 | 2.77 | 2.94 | 2.02 | 1.83 | 1.34 | 14.61 | 13.36 | 11.86 | 10.56 | 8.26 | 7.13 | 6.15 | 5.55 | 4.68 | 4.15 | 3.61 |
| Cat62 | 1.14 | 1.56 | 1.62 | 1.60 | 1.41 | 1.43 | 1.50 | 1.52 | 0.99 | 0.89 | 0.65 | 7.67 | 6.87 | 5.90 | 5.22 | 4.11 | 3.56 | 3.09 | 2.78 | 2.33 | 2.03 | 1.76 |
| Cat76 | 0.72 | 1.09 | 1.15 | 1.09 | 0.99 | 1.02 | 1.04 | 1.09 | 0.74 | 0.67 | 0.49 | 5.36 | 4.84 | 4.30 | 3.85 | 3.01 | 2.62 | 2.26 | 2.04 | 1.71 | 1.52 | 1.32 |
| Cat84 | 1.19 | 2.40 | 2.77 | 2.70 | 2.71 | 2.84 | 2.89 | 2.84 | 2.31 | 2.06 | 1.70 | 11.96 | 15.07 | 14.05 | 13.00 | 10.30 | 8.81 | 7.54 | 6.74 | 5.65 | 5.00 | 4.43 |
| Cat141 | 1.05 | 1.69 | 1.87 | 1.75 | 1.63 | 1.55 | 1.60 | 1.74 | 1.13 | 1.02 | 0.75 | 8.81 | 7.93 | 6.81 | 6.00 | 4.69 | 4.05 | 3.50 | 3.16 | 2.67 | 2.32 | 2.02 |
| Cat114 | 0.69 | 0.88 | 0.89 | 0.88 | 0.77 | 0.86 | 0.87 | 0.87 | 0.58 | 0.52 | 0.38 | 4.14 | 3.83 | 3.39 | 3.01 | 2.33 | 2.05 | 1.78 | 1.60 | 1.34 | 1.19 | 1.03 |
| Cat118 | 1.03 | 1.89 | 2.03 | 1.91 | 1.79 | 1.84 | 1.87 | 1.92 | 1.44 | 1.28 | 0.97 | 9.65 | 9.29 | 8.45 | 7.58 | 5.93 | 5.11 | 4.39 | 3.94 | 3.33 | 2.96 | 2.61 |
| Cat116 | 0.73 | 0.76 | 0.72 | 0.70 | 0.63 | 0.68 | 0.72 | 0.68 | 0.39 | 0.35 | 0.26 | 3.37 | 2.79 | 2.37 | 2.14 | 1.70 | 1.47 | 1.26 | 1.12 | 0.92 | 0.80 | 0.70 |
| Cat122 | 0.74 | 0.81 | 0.77 | 0.80 | 0.67 | 0.76 | 0.81 | 0.75 | 0.47 | 0.43 | 0.31 | 3.59 | 3.26 | 2.81 | 2.46 | 1.97 | 1.72 | 1.48 | 1.33 | 1.11 | 0.97 | 0.84 |
| Cat136 | 1.43 | 2.49 | 2.70 | 2.53 | 2.36 | 2.38 | 2.46 | 2.56 | 1.85 | 1.65 | 1.25 | 12.80 | 11.93 | 10.85 | 9.70 | 7.60 | 6.57 | 5.65 | 5.08 | 4.30 | 3.81 | 3.35 |
| Cat165 | 0.32 | 0.33 | 0.33 | 0.30 | 0.28 | 0.30 | 0.32 | 0.31 | 0.17 | 0.15 | 0.11 | 1.54 | 1.20 | 1.04 | 0.93 | 0.74 | 0.63 | 0.54 | 0.48 | 0.39 | 0.34 | 0.30 |
| Cat176 | 2.06 | 3.22 | 3.47 | 3.29 | 3.02 | 3.05 | 3.09 | 3.27 | 2.21 | 2.00 | 1.47 | 16.35 | 14.87 | 13.07 | 11.56 | 9.08 | 7.84 | 6.77 | 6.11 | 5.15 | 4.54 | 3.95 |
| Cat152 | 2.07 | 4.17 | 4.52 | 4.30 | 4.13 | 4.37 | 4.33 | 4.35 | 3.46 | 3.06 | 2.39 | 20.41 | 22.48 | 20.65 | 18.54 | 14.58 | 12.50 | 10.71 | 9.61 | 8.08 | 7.19 | 6.36 |
| Cat151 | 0.80 | 1.04 | 1.04 | 1.03 | 0.90 | 0.98 | 1.01 | 1.02 | 0.67 | 0.60 | 0.44 | 4.83 | 4.39 | 3.89 | 3.45 | 2.70 | 2.36 | 2.06 | 1.84 | 1.55 | 1.36 | 1.19 |
| Cat159 | 1.86 | 2.31 | 2.29 | 2.31 | 1.99 | 2.18 | 2.26 | 2.21 | 1.45 | 1.31 | 0.96 | 10.74 | 9.96 | 8.58 | 7.54 | 5.96 | 5.21 | 4.50 | 4.04 | 3.41 | 2.97 | 2.58 |
| Cat189 | 1.48 | 2.28 | 2.41 | 2.28 | 2.08 | 2.07 | 2.11 | 2.25 | 1.49 | 1.34 | 0.99 | 11.18 | 9.99 | 8.72 | 7.74 | 6.11 | 5.28 | 4.56 | 4.12 | 3.46 | 3.04 | 2.64 |

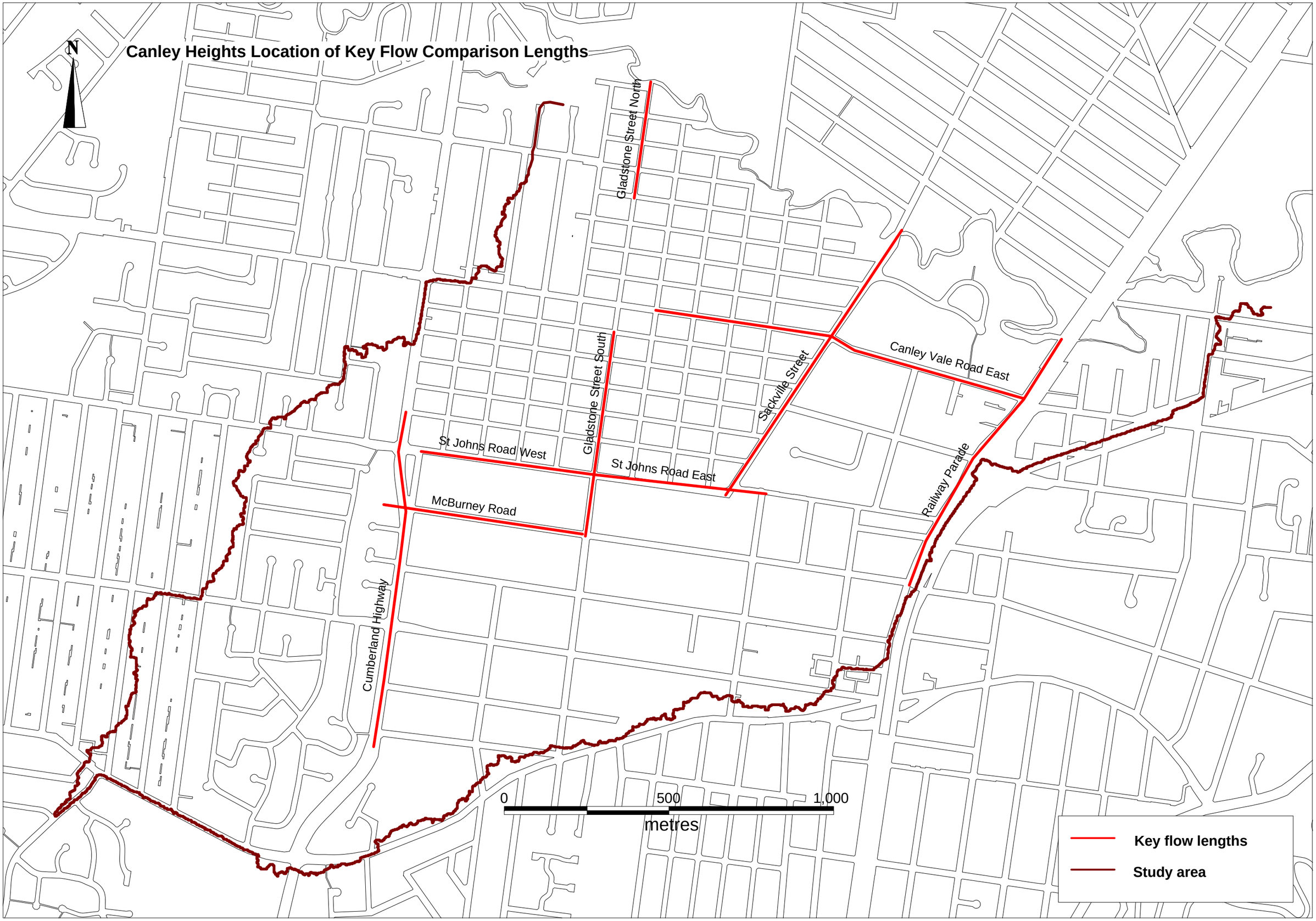
# Appendix C Peak Flows Across Selected Roads

The peak flows at a number of selected roads crossing the Canley Heights catchment were extracted from the TUFLOW model, for the 5, 20 and 100 year ARI events. The values reported in Table C1 are total flows crossing the length of the road.

The location of the key roads is shown in the following figure.

**Table C1 Peak Flows across Selected Roads**

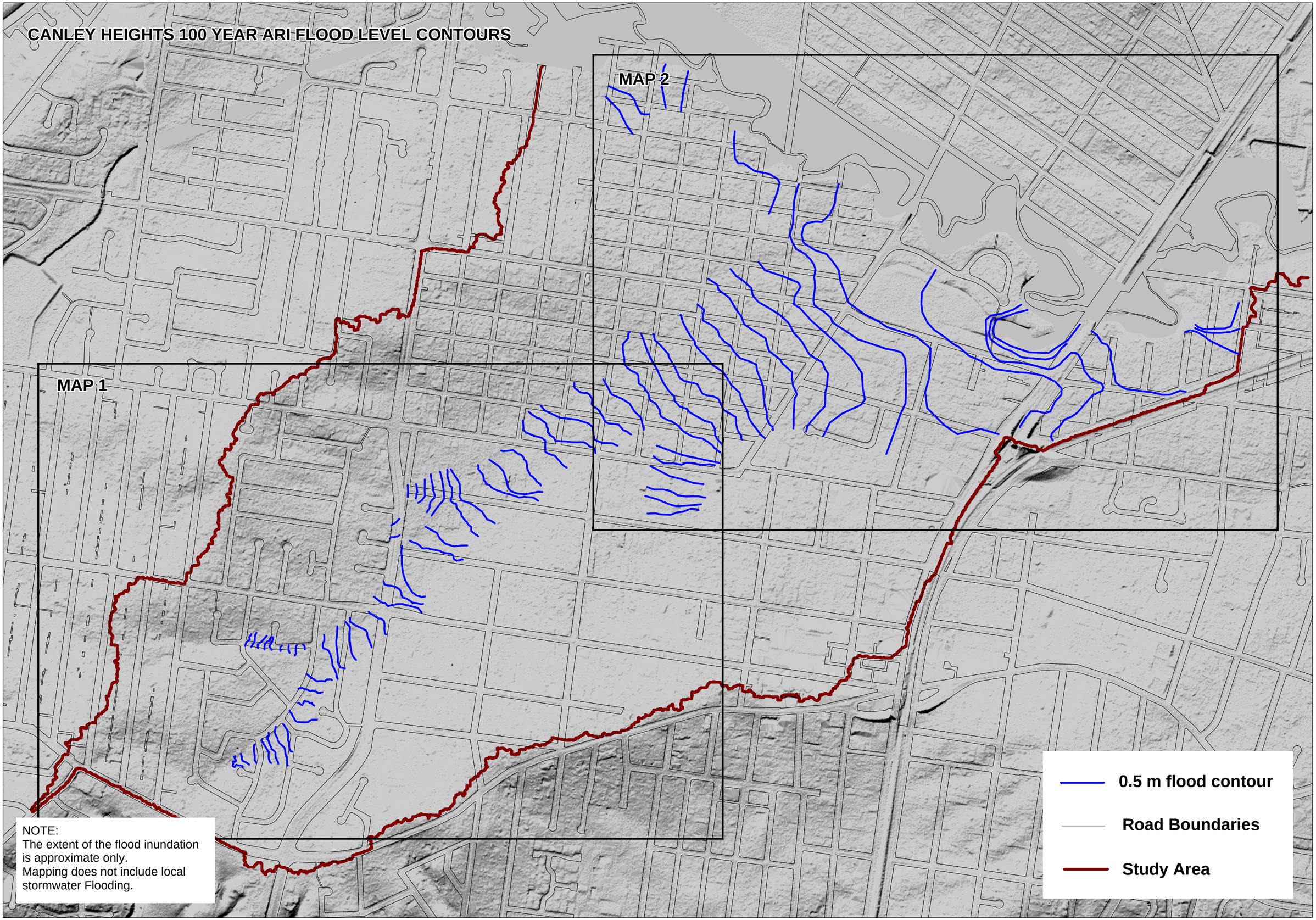
| Key Road | Storm Event | | | | | |
|---|---|---|---|---|---|---|
| | 5 Year ARI | | 20 Year ARI | | 100 Year ARI | |
| | Flow ($m^3/s$) | Crit.Dur (min) | Flow ($m^3/s$) | Crit.Dur (min) | Flow ($m^3/s$) | Crit.Dur (min) |
| Cumberland Highway | 3.6 | 120 | 5.6 | 120 | 8.5 | 90 |
| McBurney Road | 8.7 | 120 | 13 | 120 | 19 | 120 |
| Gladstone Street South | 9.4 | 120 | 15 | 120 | 21 | 120 |
| Sackville Street | 8.6 | 120 | 16 | 120 | 63 | 120 |
| Canley Vale Road East | 3.9 | 120 | 6.8 | 120 | 11 | 120 |
| Canley Vale Road West | 6.5 | 120 | 11 | 120 | 16 | 120 |
| St Johns Road East | 8.7 | 120 | 14 | 120 | 20 | 90 |
| St Johns Road West | 1.4 | 120 | 1.9 | 120 | 3.0 | 120 |
| Railway Parade | 2.1 | 120 | 2.7 | 120 | 3.1 | 90 |
| Gladstone Street North | 0.2 | 120 | 0.4 | 120 | 0.8 | 90 |

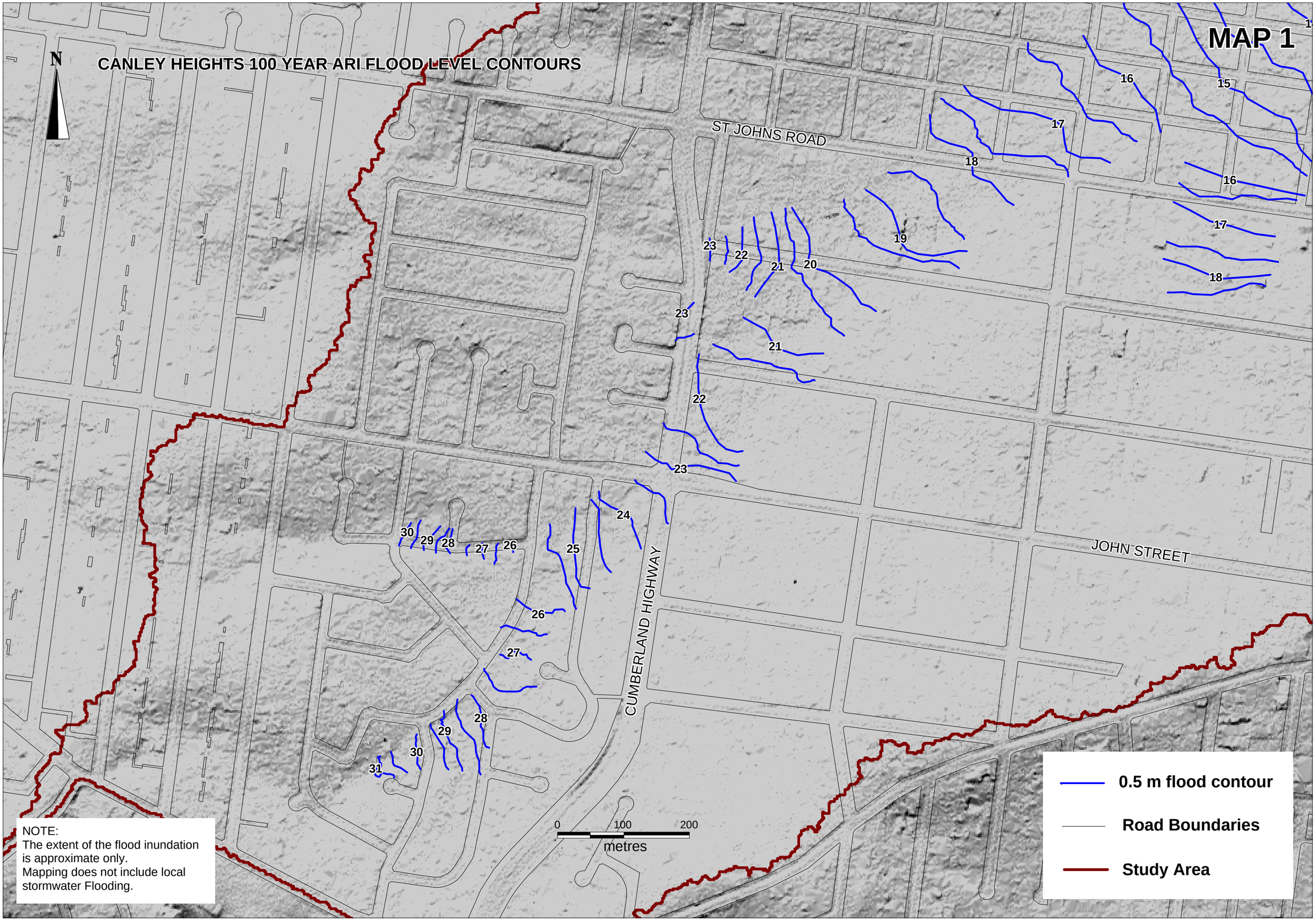

Canley Heights Location of Key Flow Comparison Lengths
N
Gladstone Street North
Gladstone Street South
Sackville Street
Canley Vale Road East
St Johns Road West
St Johns Road East
McBurney Road
Railway Parade
Cumberland Highway
0
500
1,000
metres
Key flow lengths
Study area

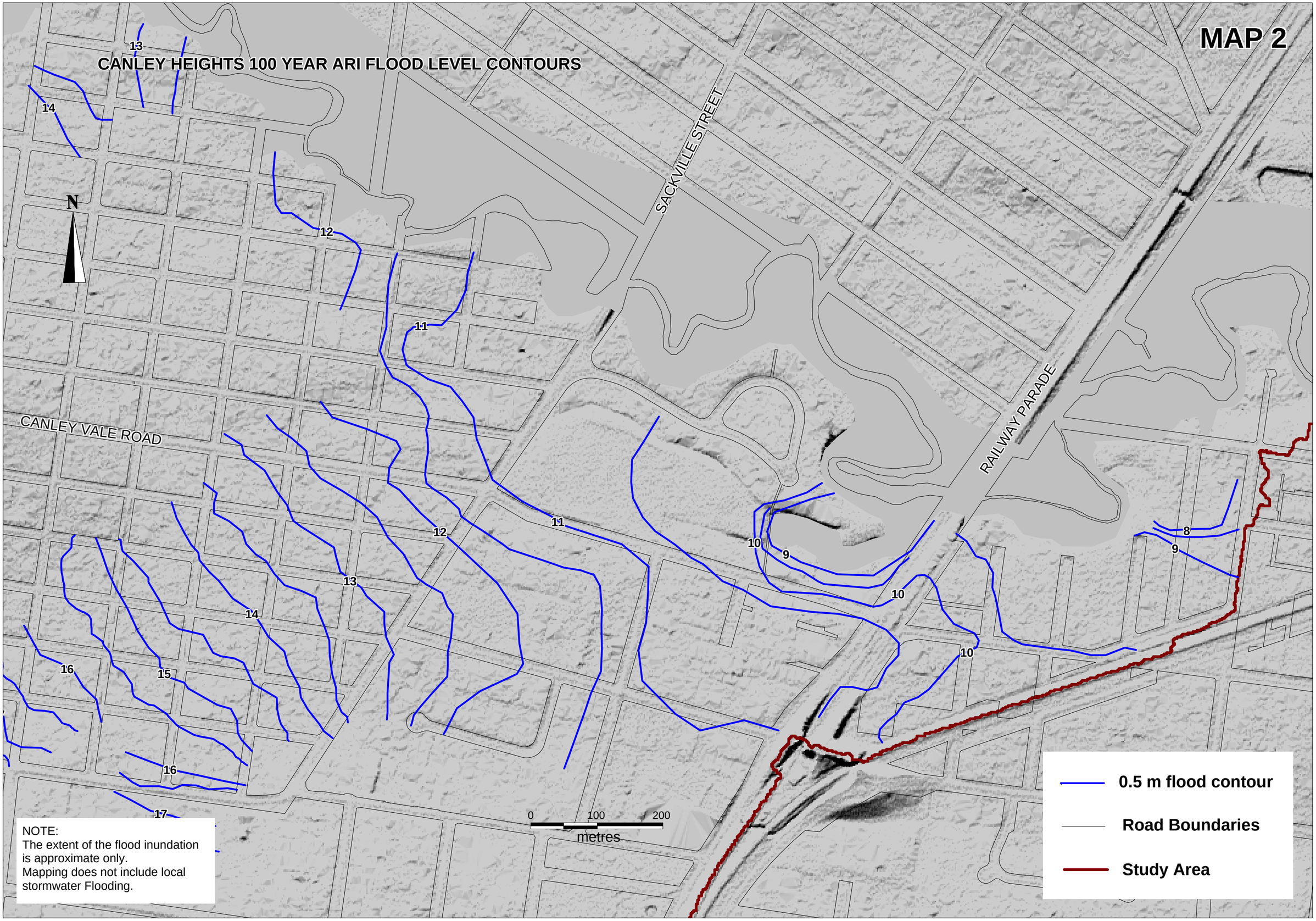
# Appendix D 100 Year ARI Flood Mapping

This appendix includes:

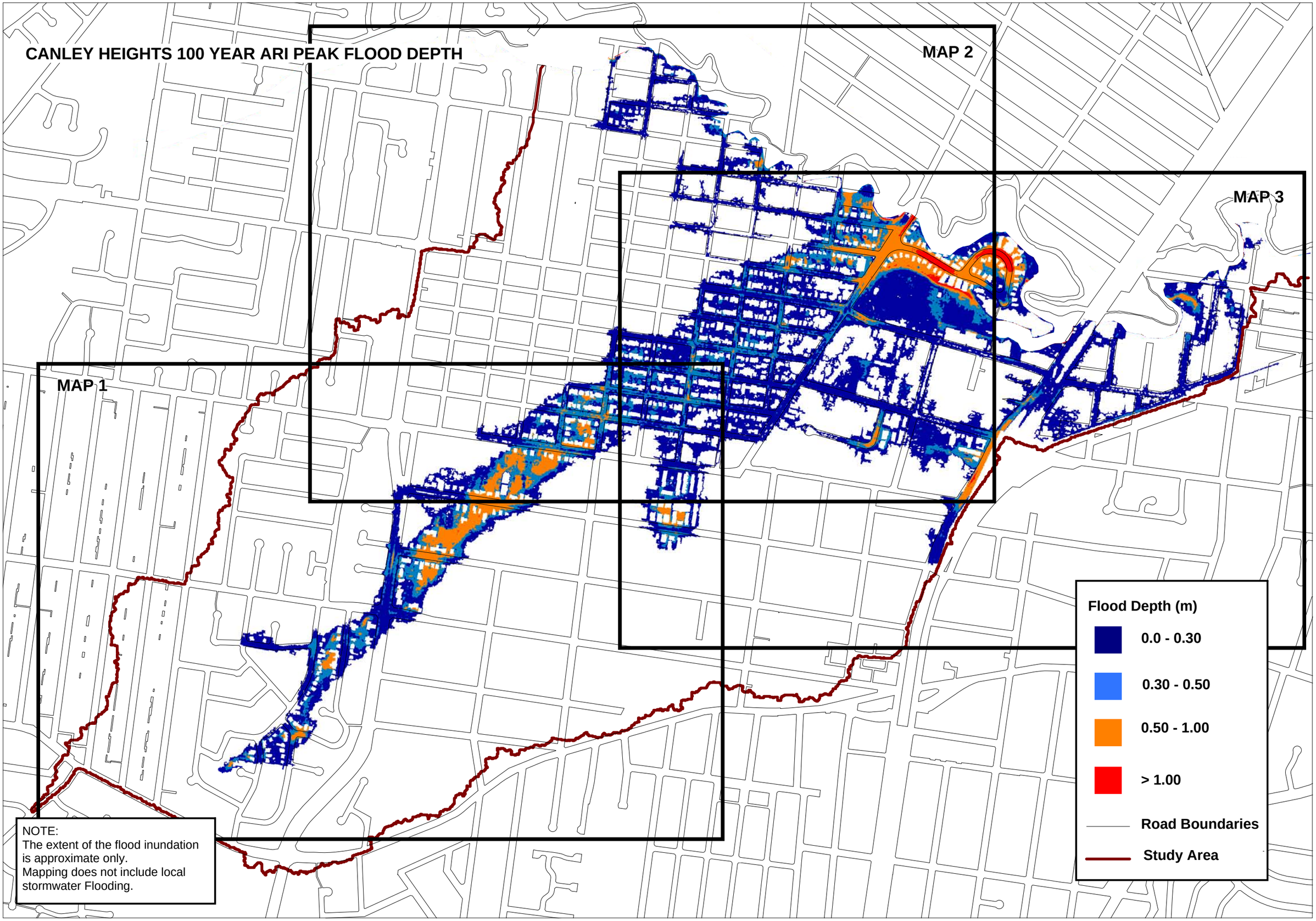
- Peak Water Level Contours
- Peak Depth Contours
- Peak Velocity Contours
- Peak Velocity times Depth Contours


CANLEY HEIGHTS 100 YEAR ARI FLOOD LEVEL CONTOURS
MAP 2
MAP 1
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0.5 m flood contour
Road Boundaries
Study Area

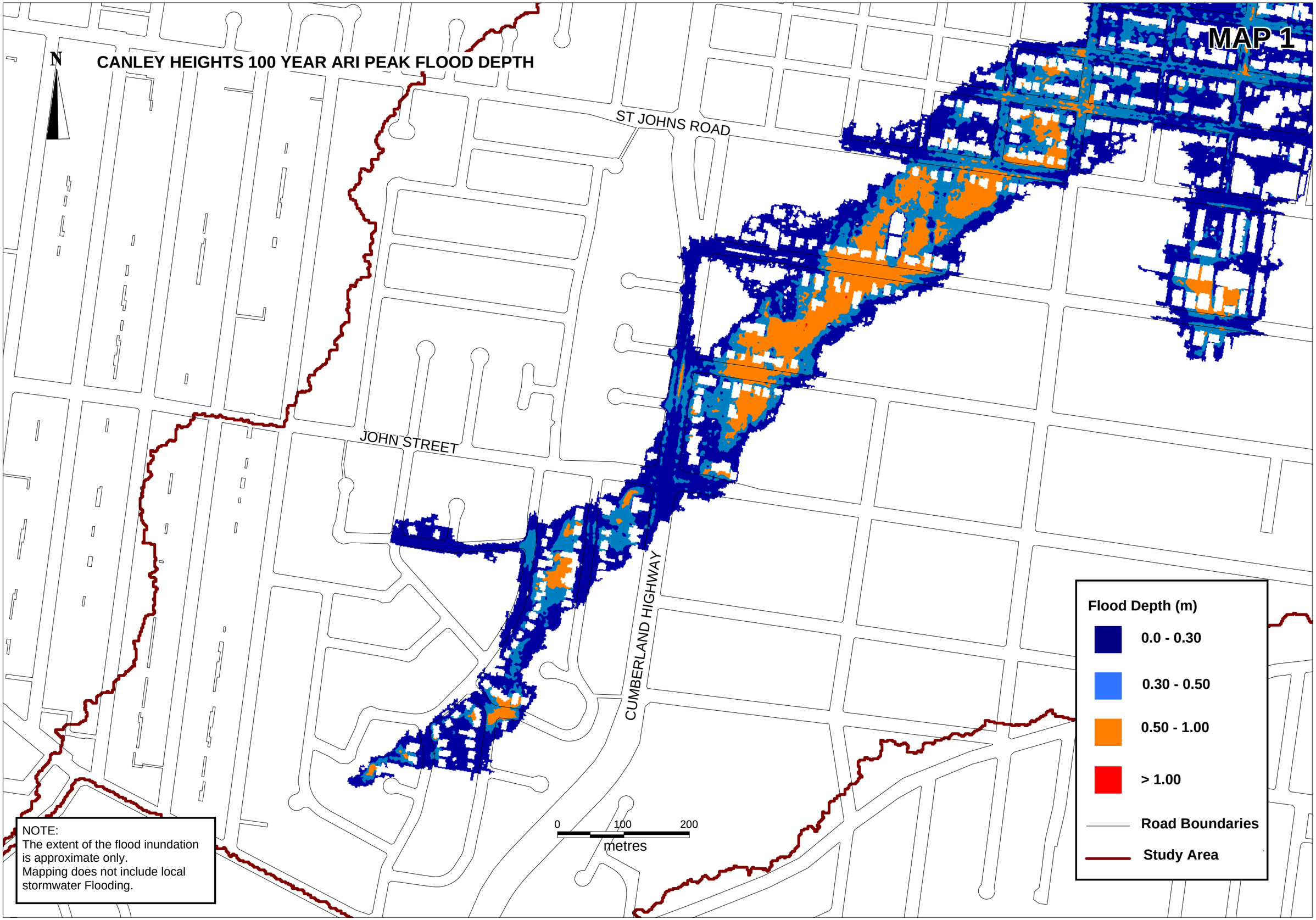

MAP 1
CANLEY HEIGHTS 100 YEAR ARI FLOOD LEVEL CONTOURS
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0.5 m flood contour
Road Boundaries
Study Area

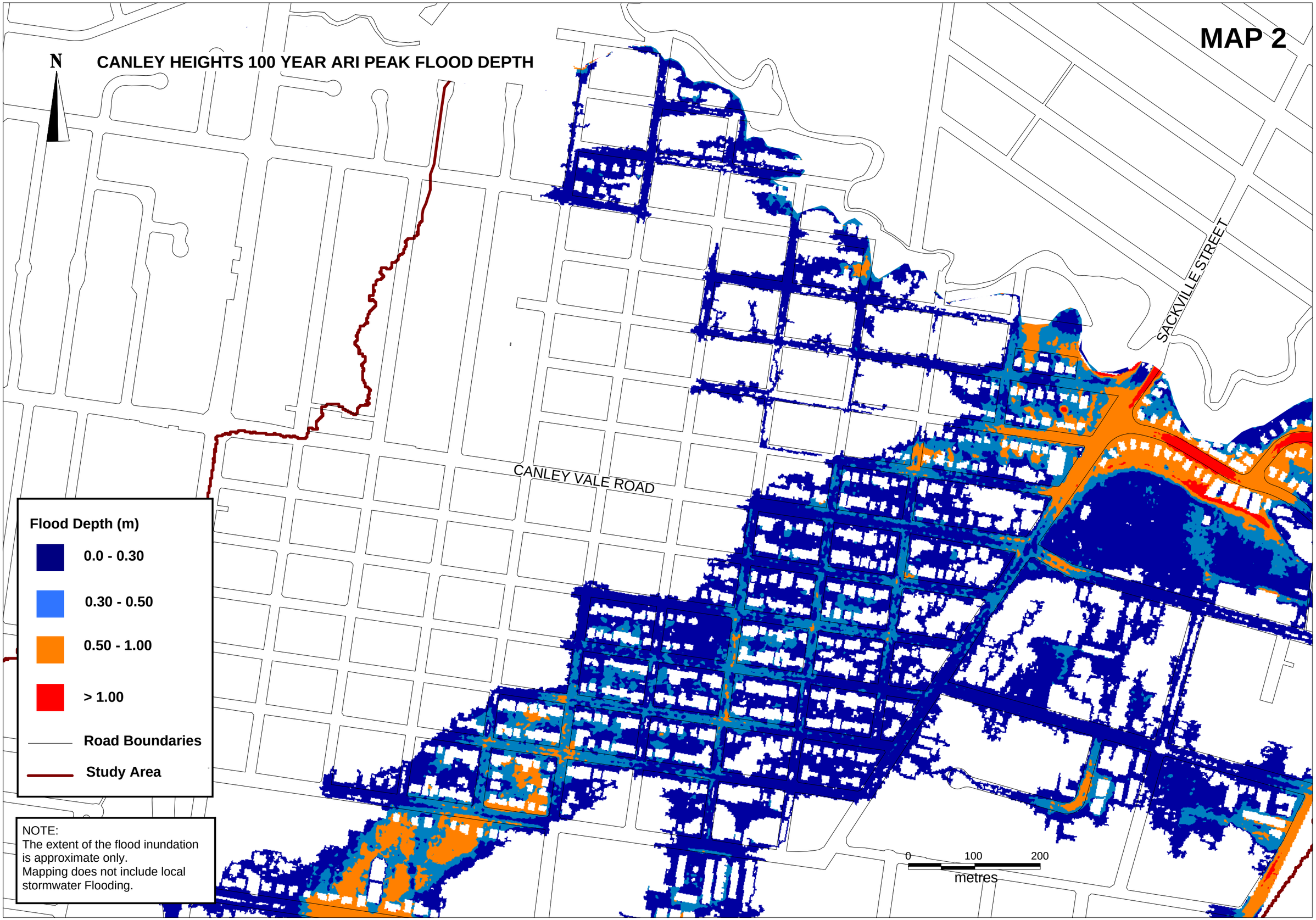

MAP 2
CANLEY HEIGHTS 100 YEAR ARI FLOOD LEVEL CONTOURS
N
SACKVILLE STREET
RAILWAY PARADE
CANLEY VALE ROAD
13
14
12
11
12
11
10
9
8
9
10
10
13
14
16
15
16
17
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0.5 m flood contour
Road Boundaries
Study Area

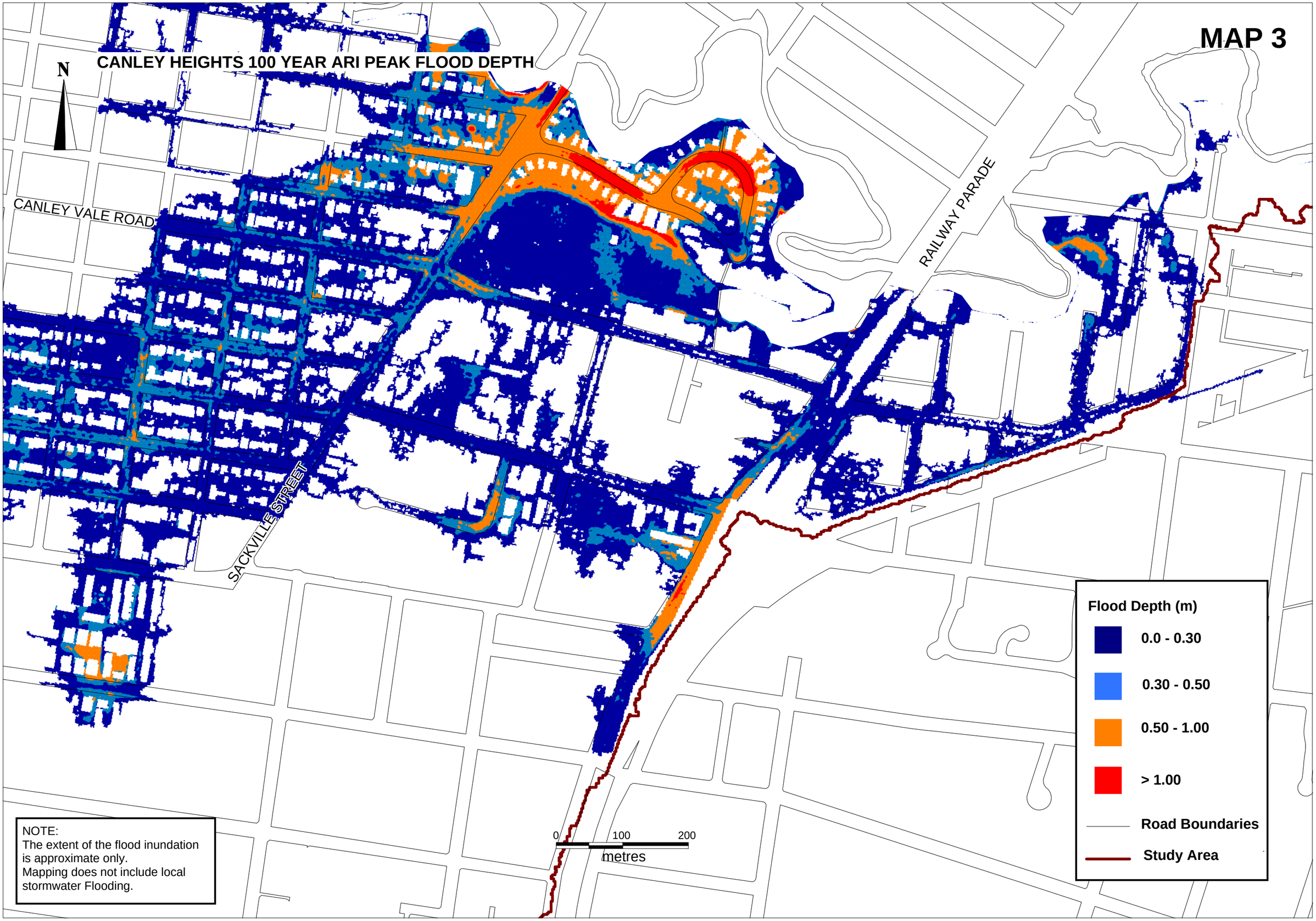
# CANLEY HEIGHTS 100 YEAR ARI PEAK FLOOD DEPTH

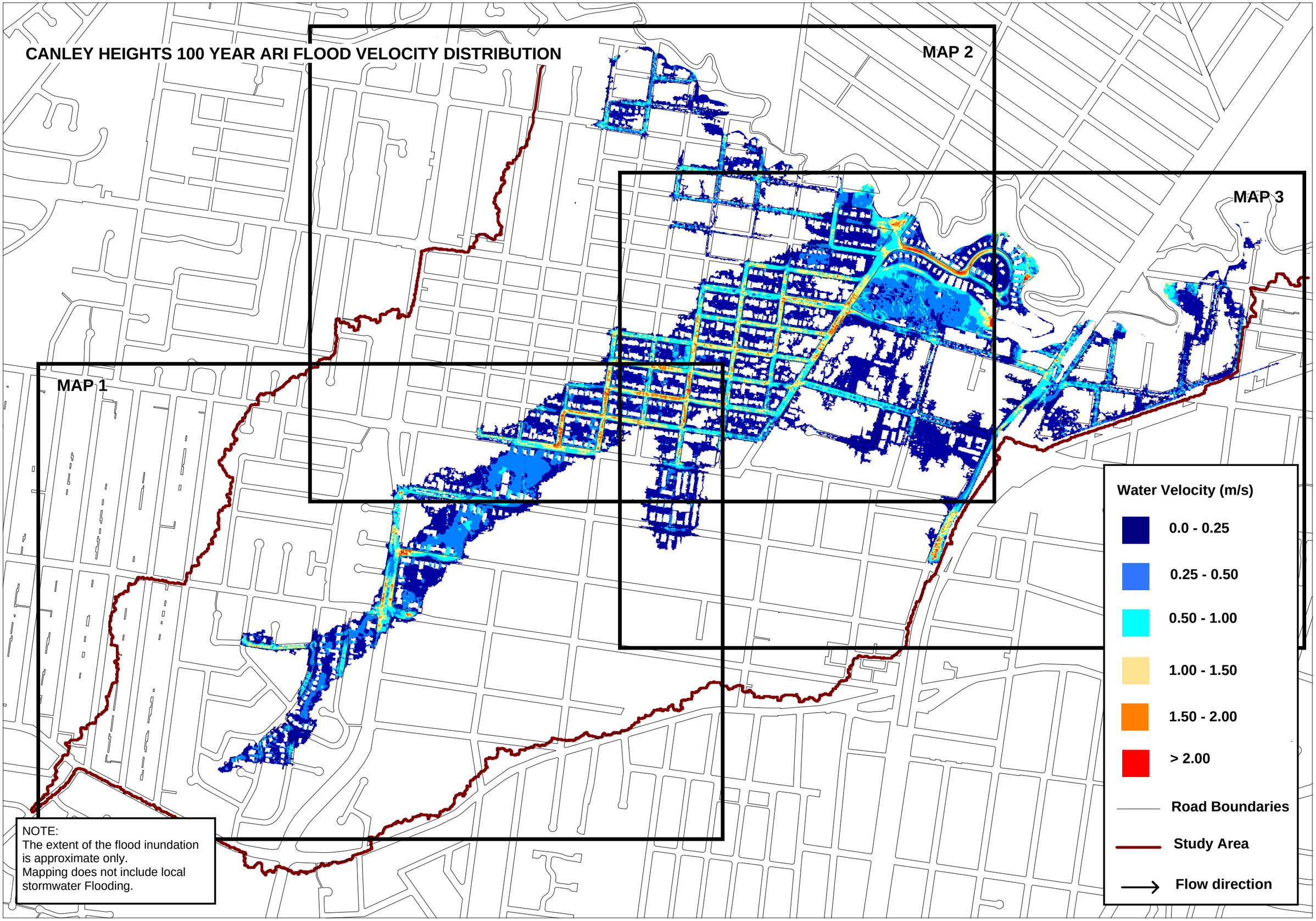


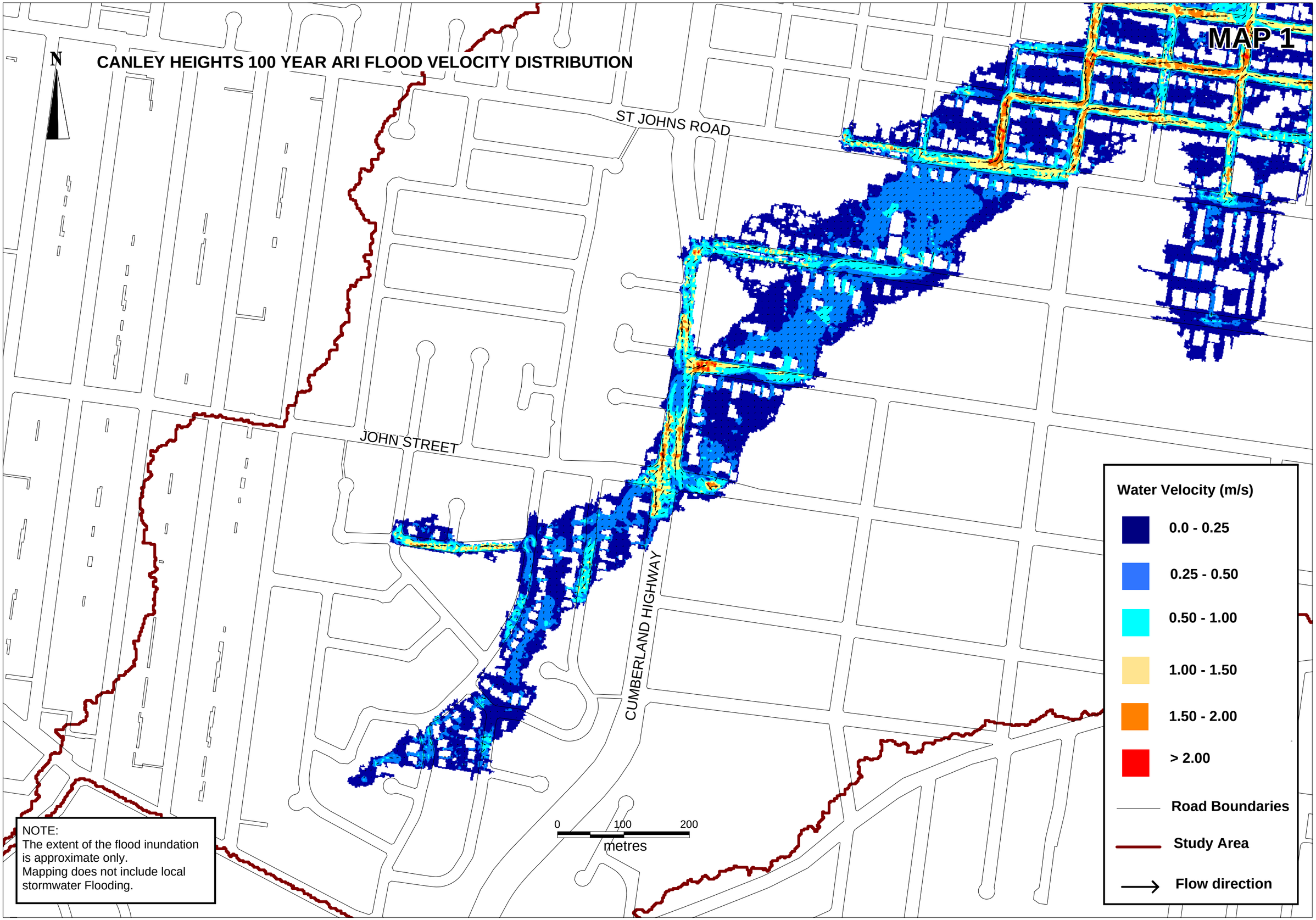

NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

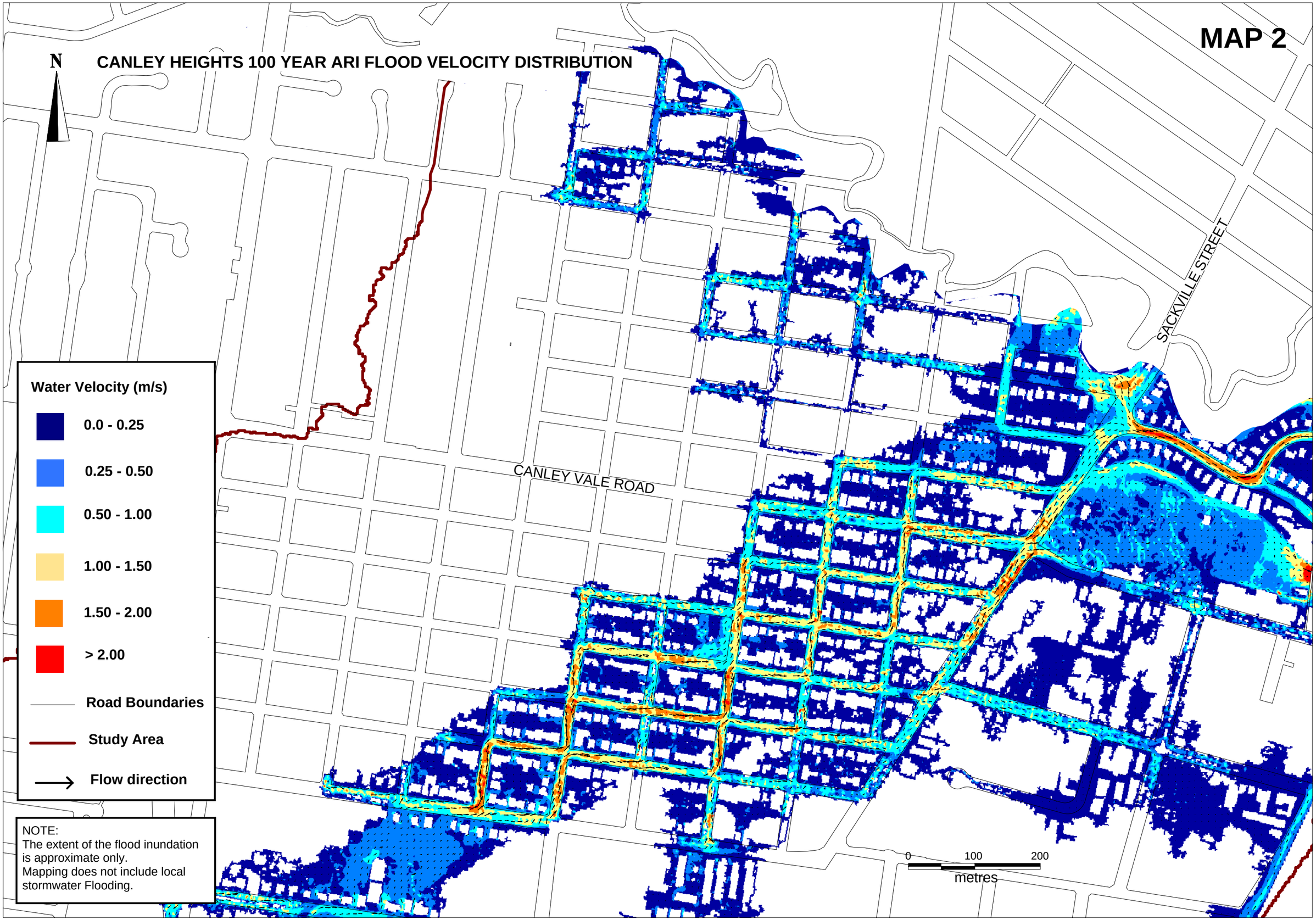

MAP 1
CANLEY HEIGHTS 100 YEAR ARI PEAK FLOOD DEPTH
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
0
100
200
metres
Flood Depth (m)
0.0 - 0.30
0.30 - 0.50
0.50 - 1.00
> 1.00
Road Boundaries
Study Area
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

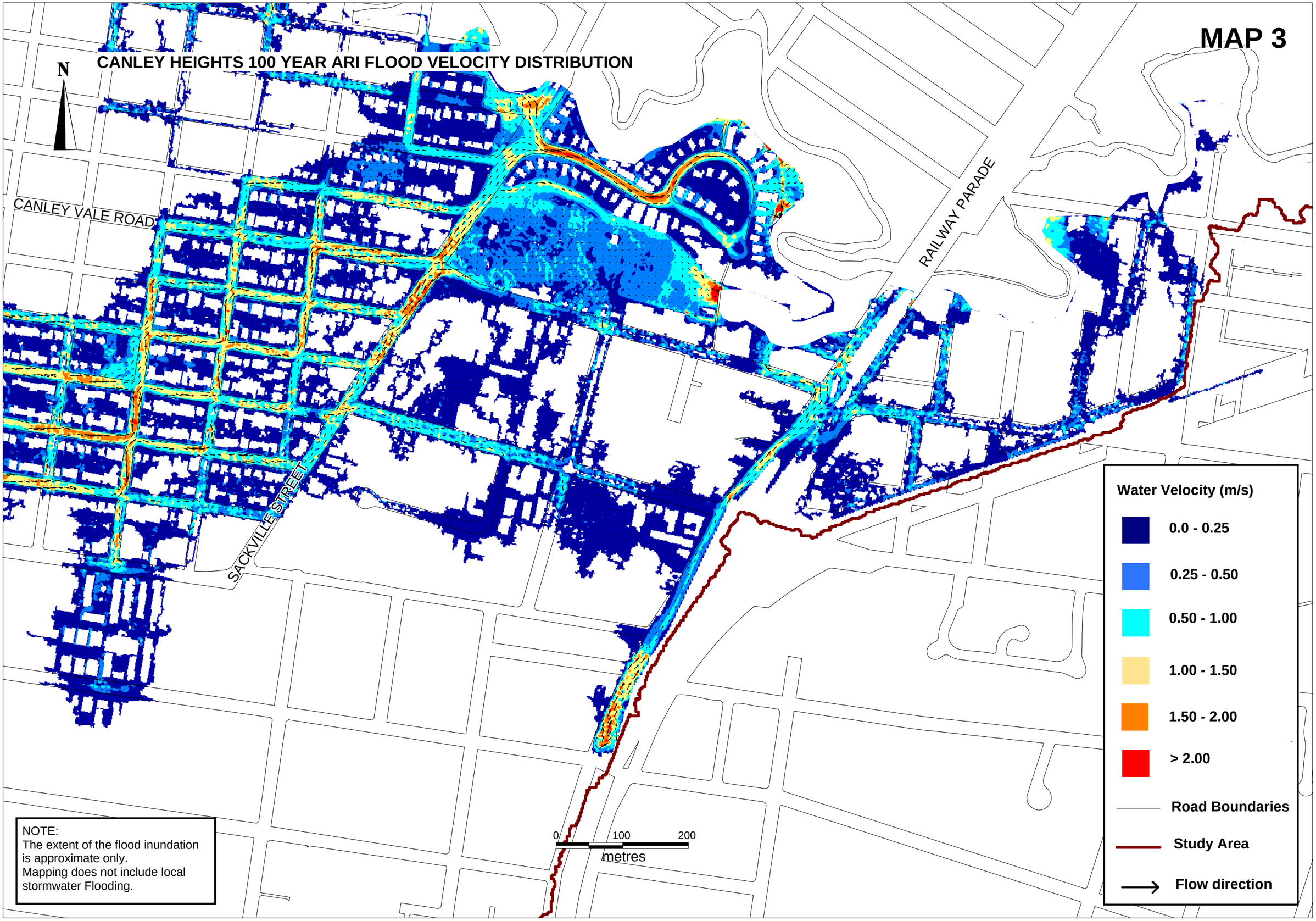

MAP 2
N
CANLEY HEIGHTS 100 YEAR ARI PEAK FLOOD DEPTH
CANLEY VALE ROAD
SACKVILLE STREET
Flood Depth (m)
0.0 - 0.30
0.30 - 0.50
0.50 - 1.00
> 1.00
Road Boundaries
Study Area
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0
100
200
metres


MAP 3
CANLEY HEIGHTS 100 YEAR ARI PEAK FLOOD DEPTH
N
CANLEY VALE ROAD
SACKVILLE STREET
RAILWAY PARADE
Flood Depth (m)
0.0 - 0.30
0.30 - 0.50
0.50 - 1.00
> 1.00
Road Boundaries
Study Area
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

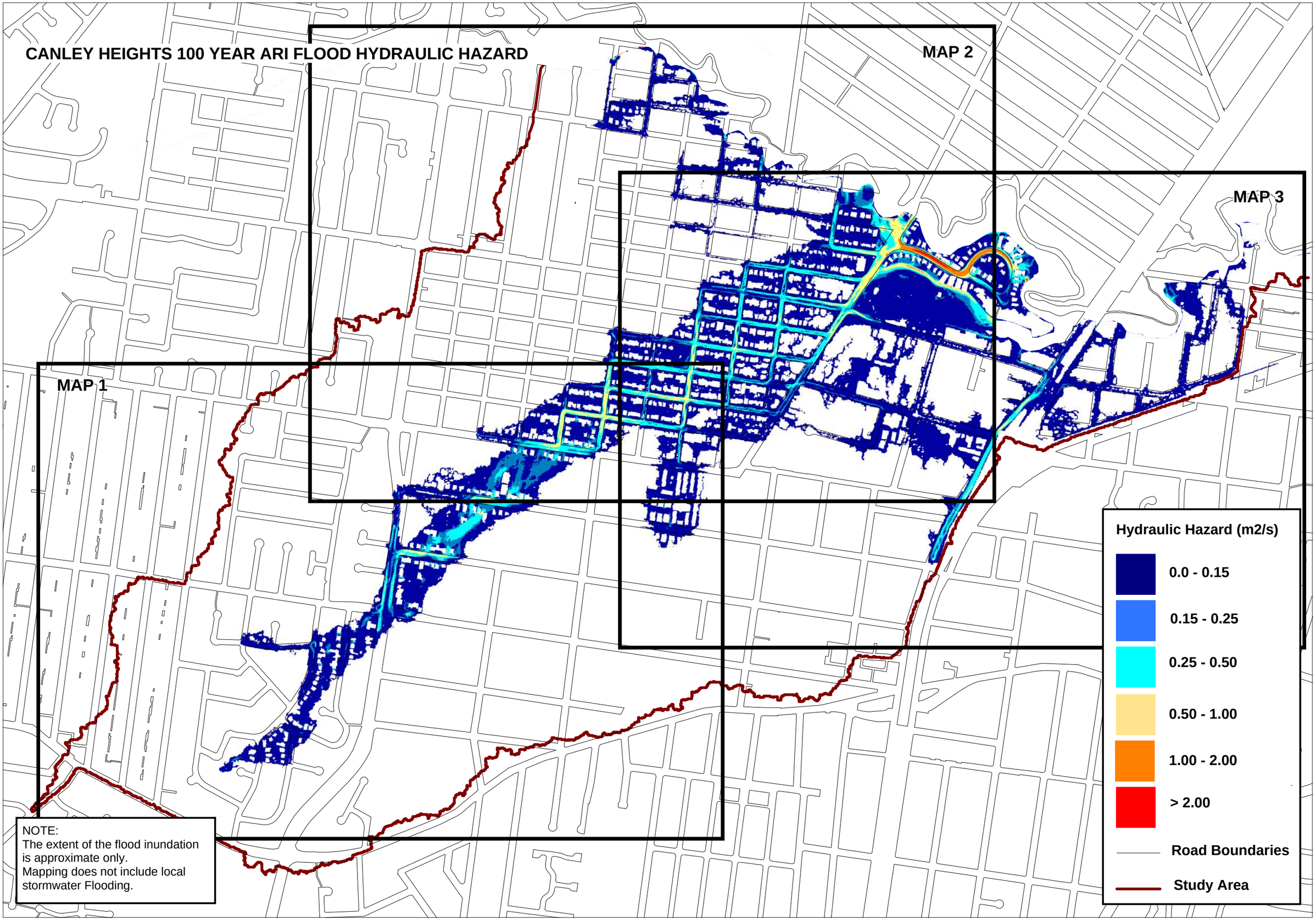

CANLEY HEIGHTS 100 YEAR ARI FLOOD VELOCITY DISTRIBUTION
MAP 1
MAP 2
MAP 3
Water Velocity (m/s)
0.0 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
> 2.00
Road Boundaries
Study Area
Flow direction
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.


MAP 1
CANLEY HEIGHTS 100 YEAR ARI FLOOD VELOCITY DISTRIBUTION
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
0
100
200
metres
Water Velocity (m/s)
0.0 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
> 2.00
Road Boundaries
Study Area
Flow direction
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

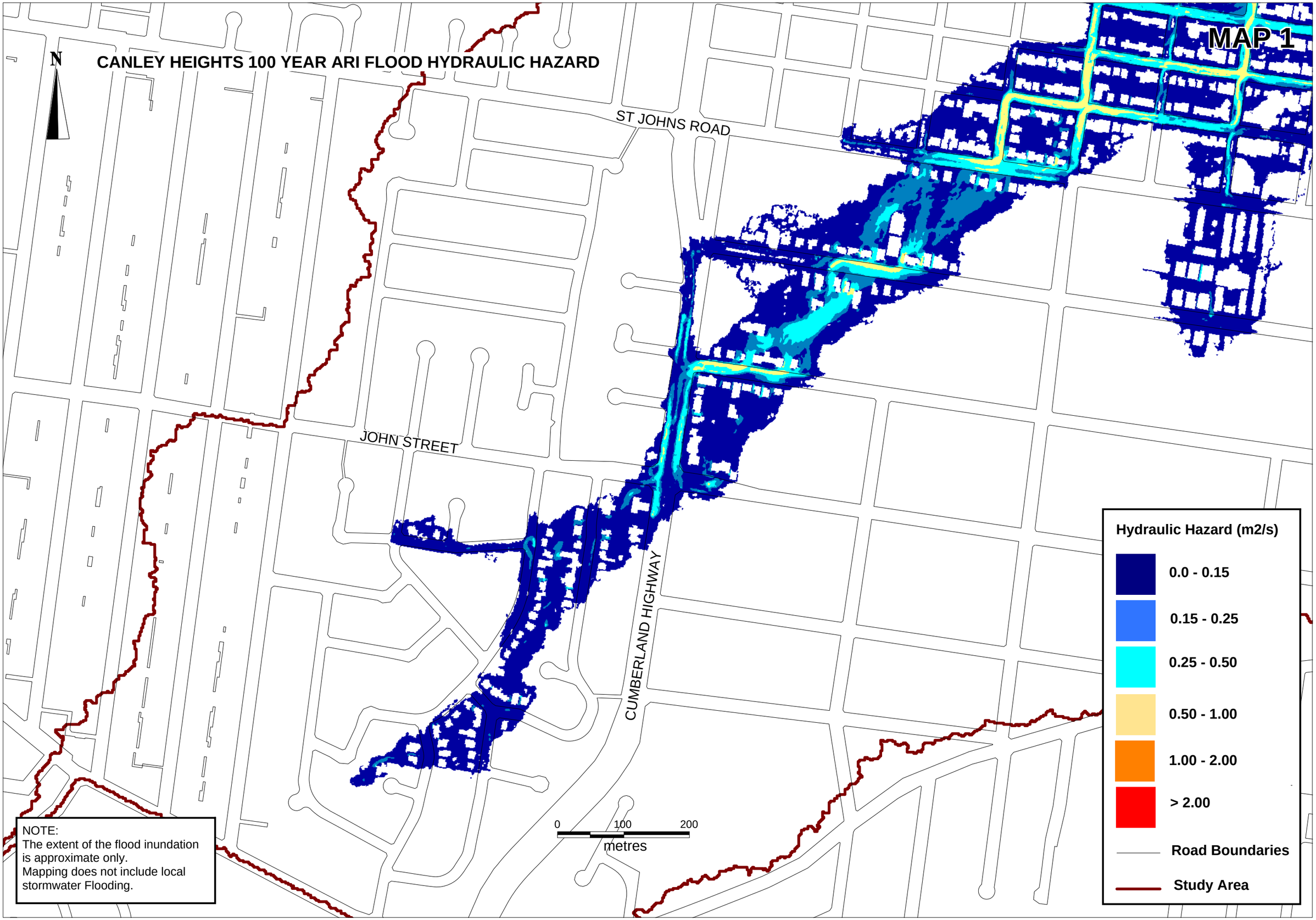

MAP 2
N
CANLEY HEIGHTS 100 YEAR ARI FLOOD VELOCITY DISTRIBUTION
SACKVILLE STREET
CANLEY VALE ROAD
Water Velocity (m/s)
0.0 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
> 2.00
Road Boundaries
Study Area
Flow direction
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0
100
200
metres

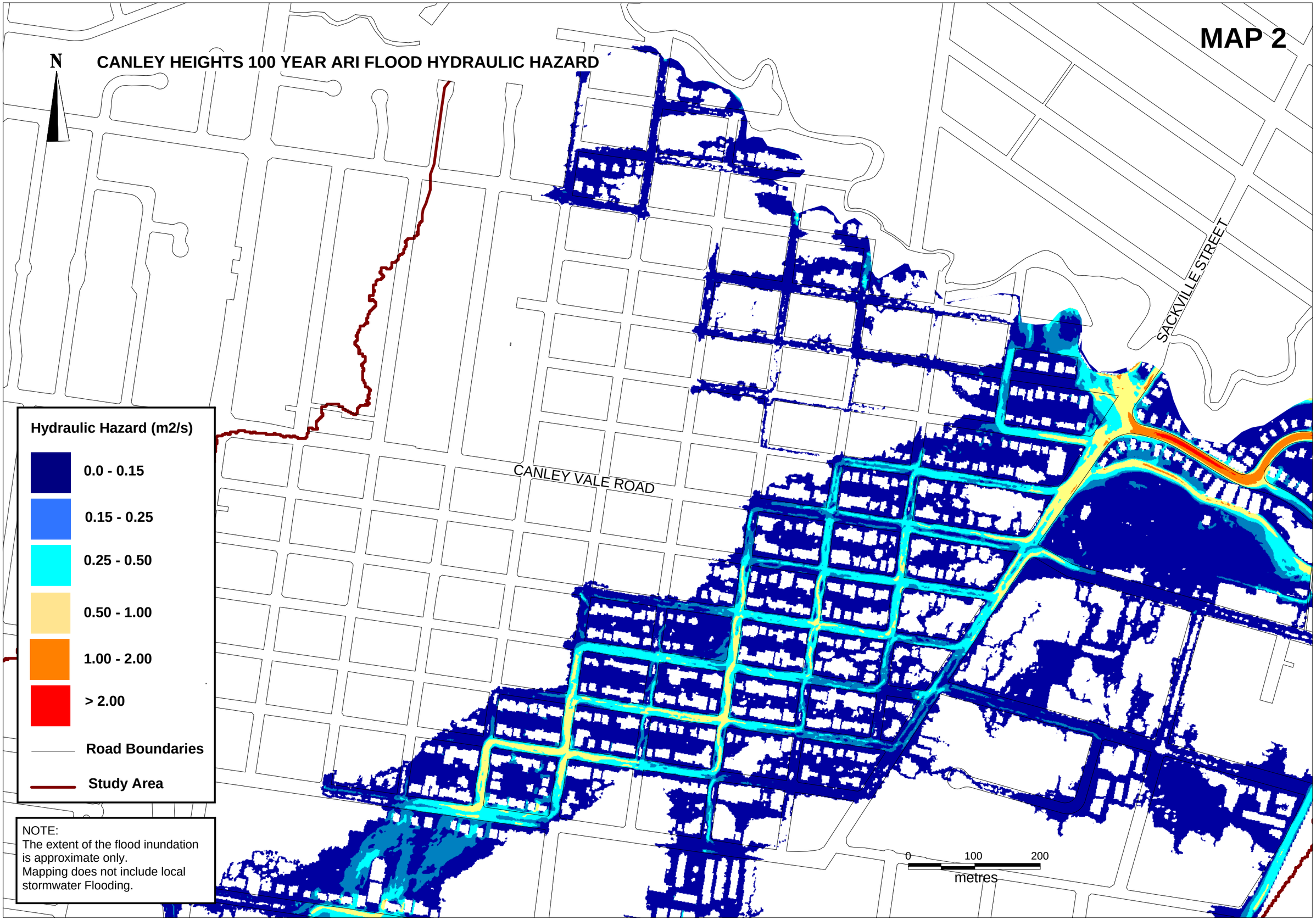

MAP 3
CANLEY HEIGHTS 100 YEAR ARI FLOOD VELOCITY DISTRIBUTION
N
CANLEY VALE ROAD
SACKVILLE STREET
RAILWAY PARADE
Water Velocity (m/s)
0.0 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 1.50
1.50 - 2.00
> 2.00
Road Boundaries
Study Area
Flow direction
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

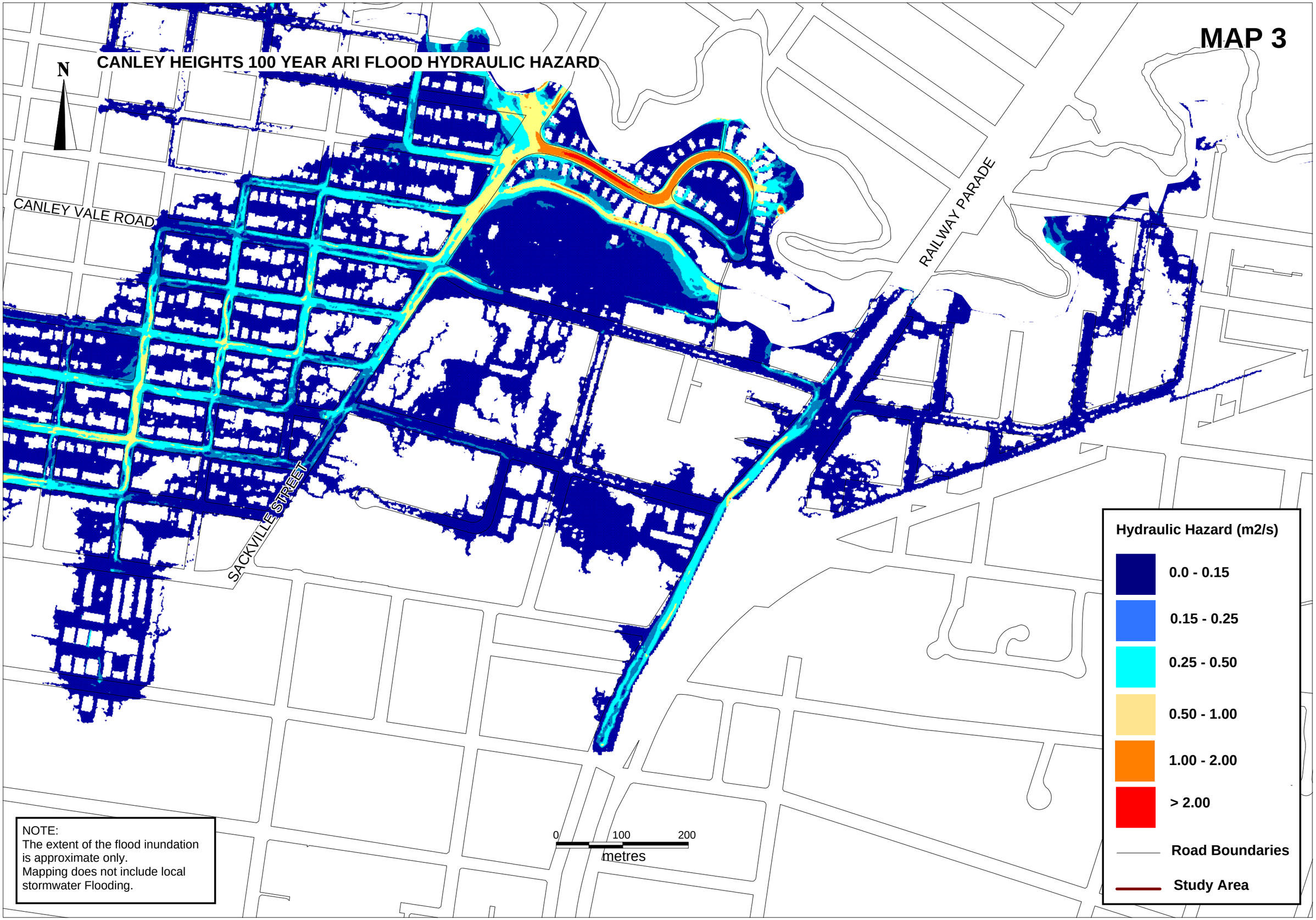
# CANLEY HEIGHTS 100 YEAR ARI FLOOD HYDRAULIC HAZARD




NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.

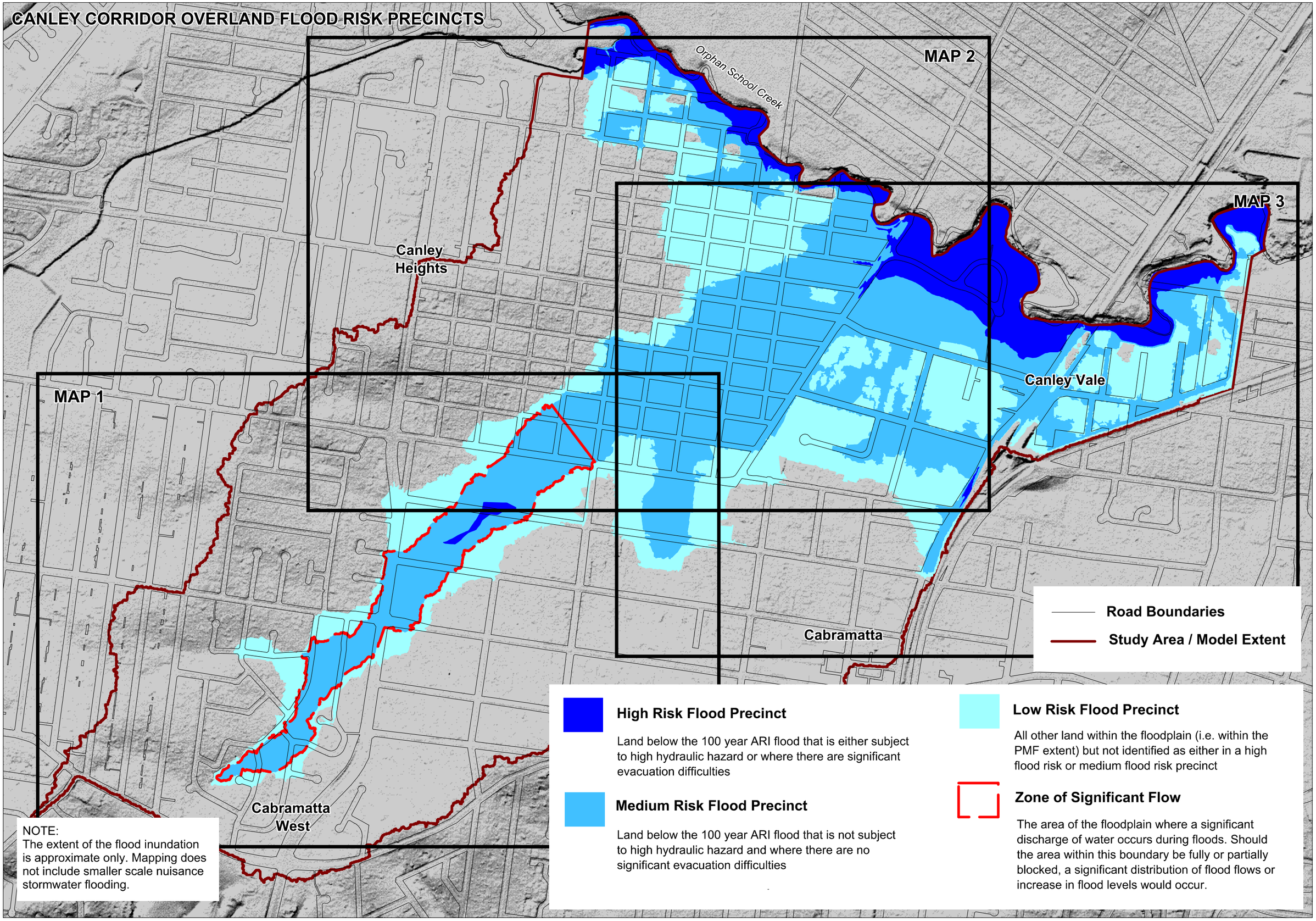

MAP 1
CANLEY HEIGHTS 100 YEAR ARI FLOOD HYDRAULIC HAZARD
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Hydraulic Hazard (m2/s)
0.0 - 0.15
0.15 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00
Road Boundaries
Study Area

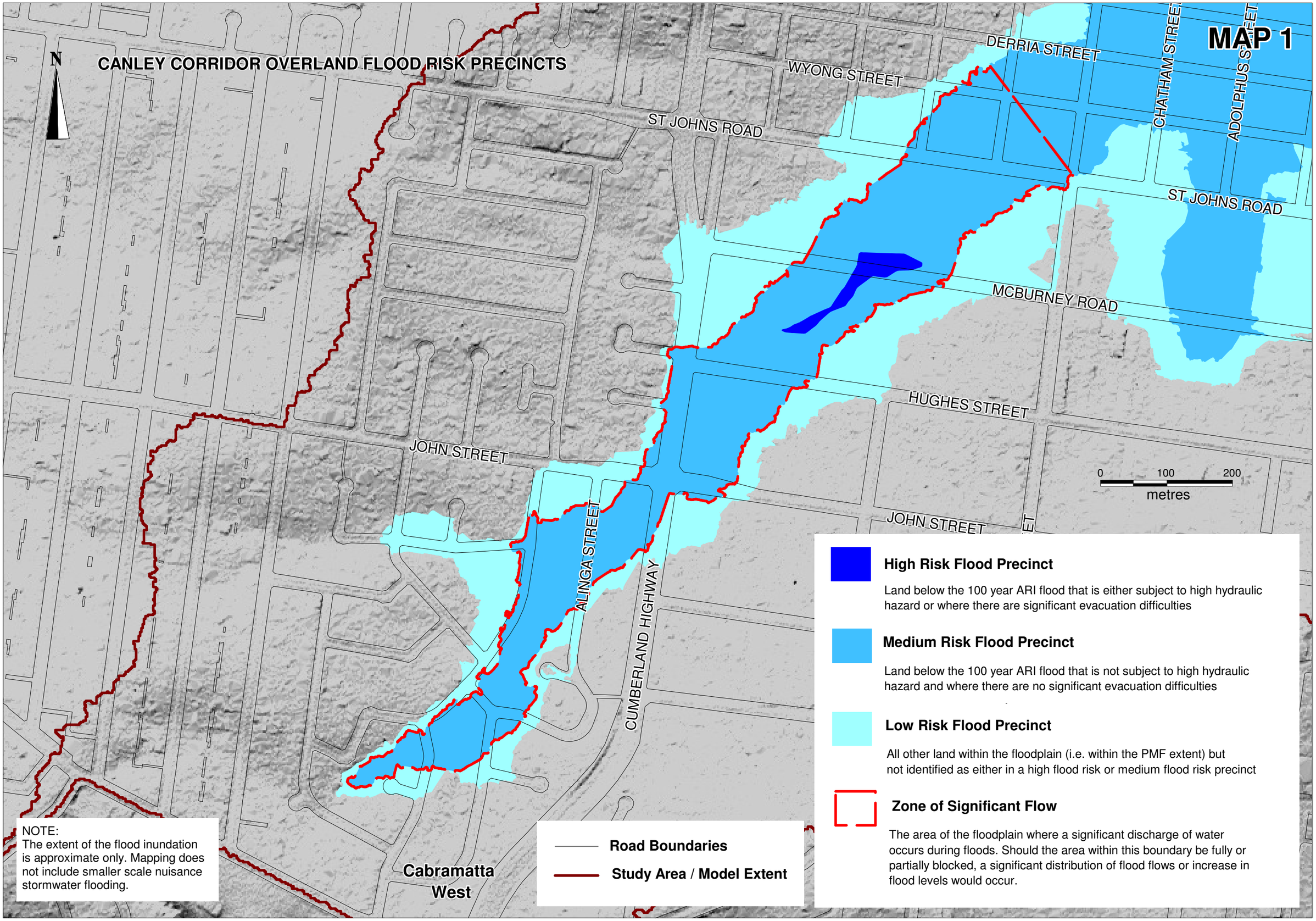

MAP 2
N
CANLEY HEIGHTS 100 YEAR ARI FLOOD HYDRAULIC HAZARD
SACKVILLE STREET
CANLEY VALE ROAD
Hydraulic Hazard (m2/s)
0.0 - 0.15
0.15 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00
Road Boundaries
Study Area
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
0
100
200
metres

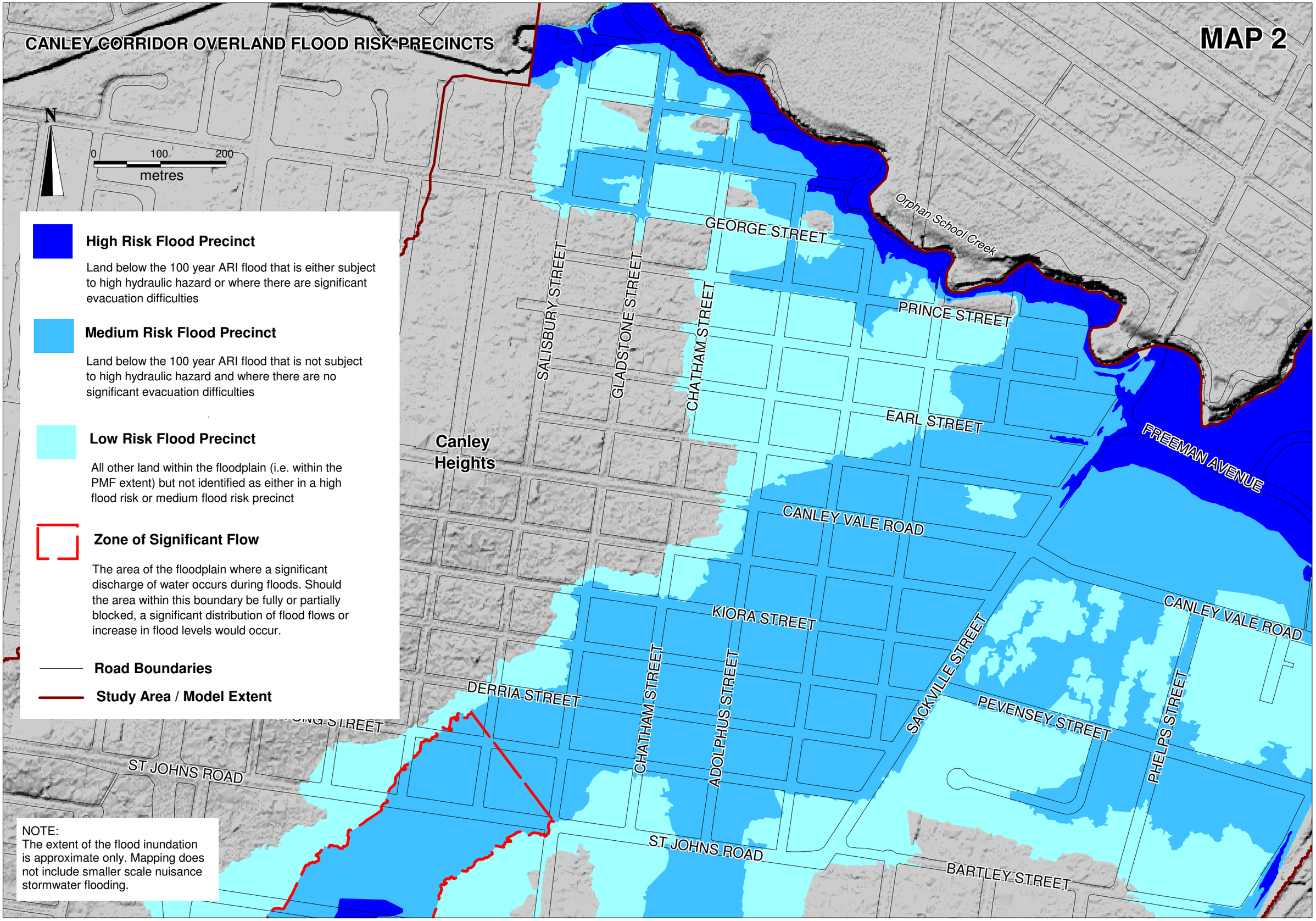

MAP 3
CANLEY HEIGHTS 100 YEAR ARI FLOOD HYDRAULIC HAZARD
N
CANLEY VALE ROAD
SACKVILLE STREET
RAILWAY PARADE
0
100
200
metres
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Hydraulic Hazard (m2/s)
0.0 - 0.15
0.15 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00
Road Boundaries
Study Area

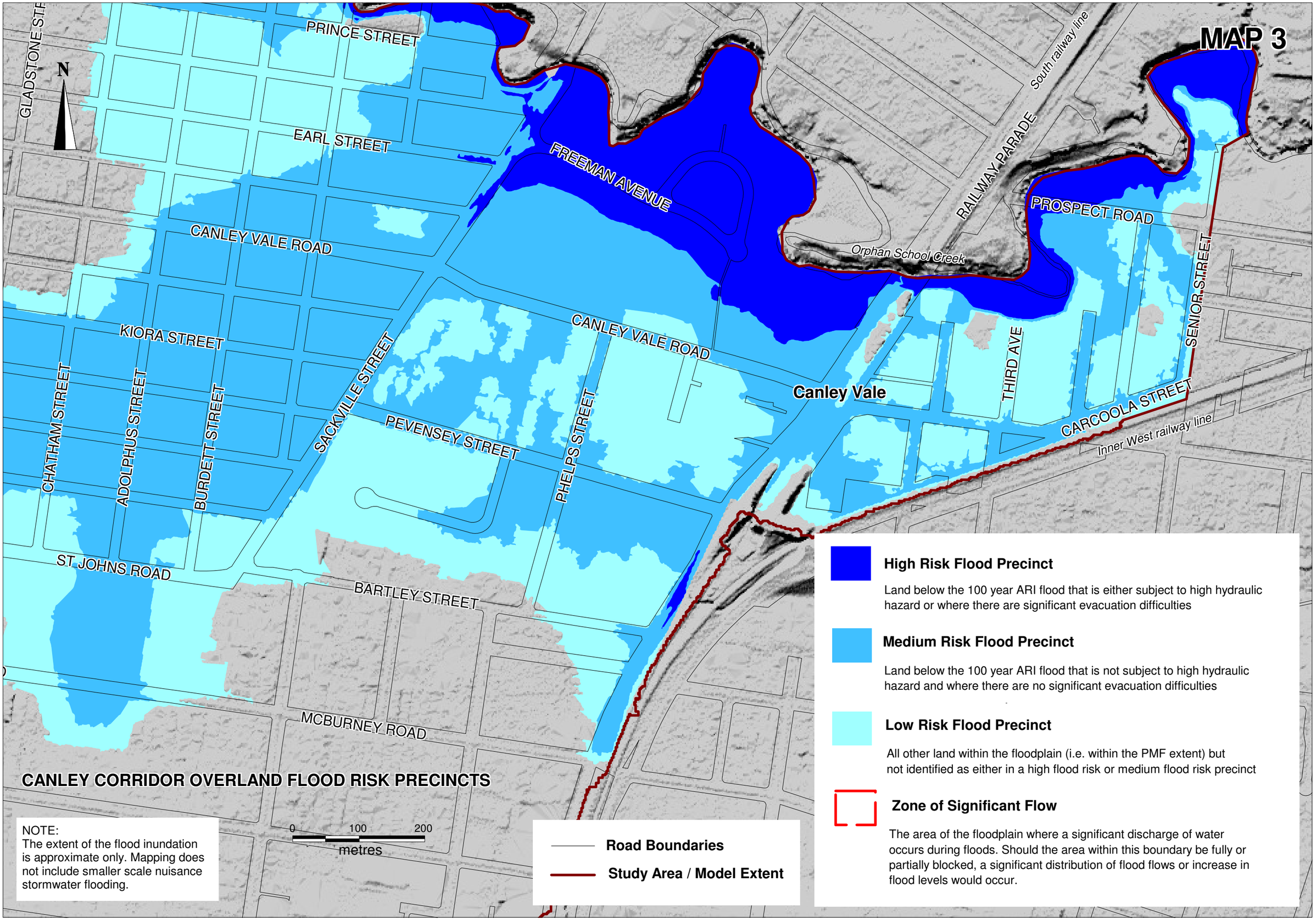
# Appendix E Flood Risk Precinct Mapping

# CANLEY CORRIDOR OVERLAND FLOOD RISK PRECINCTS

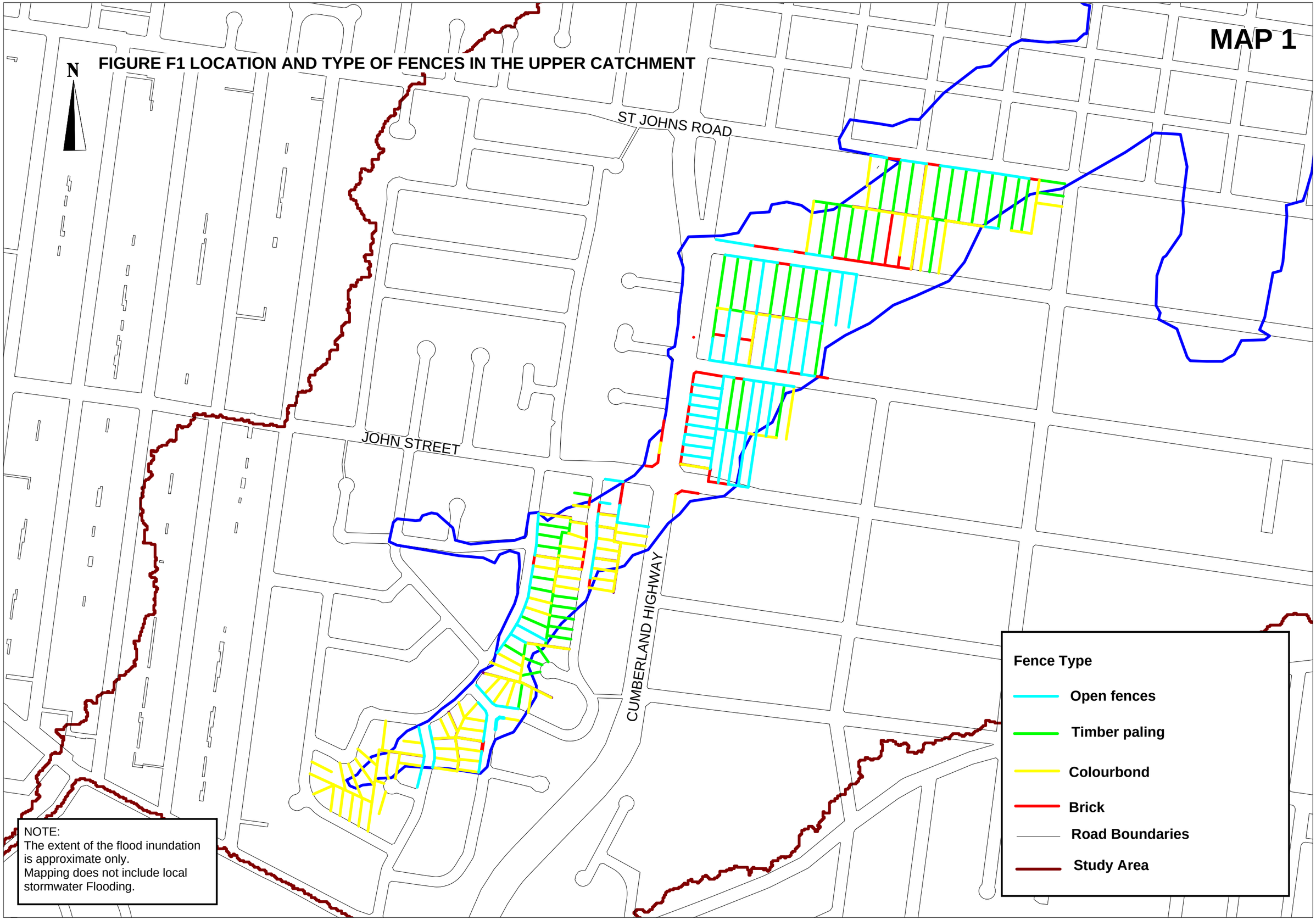


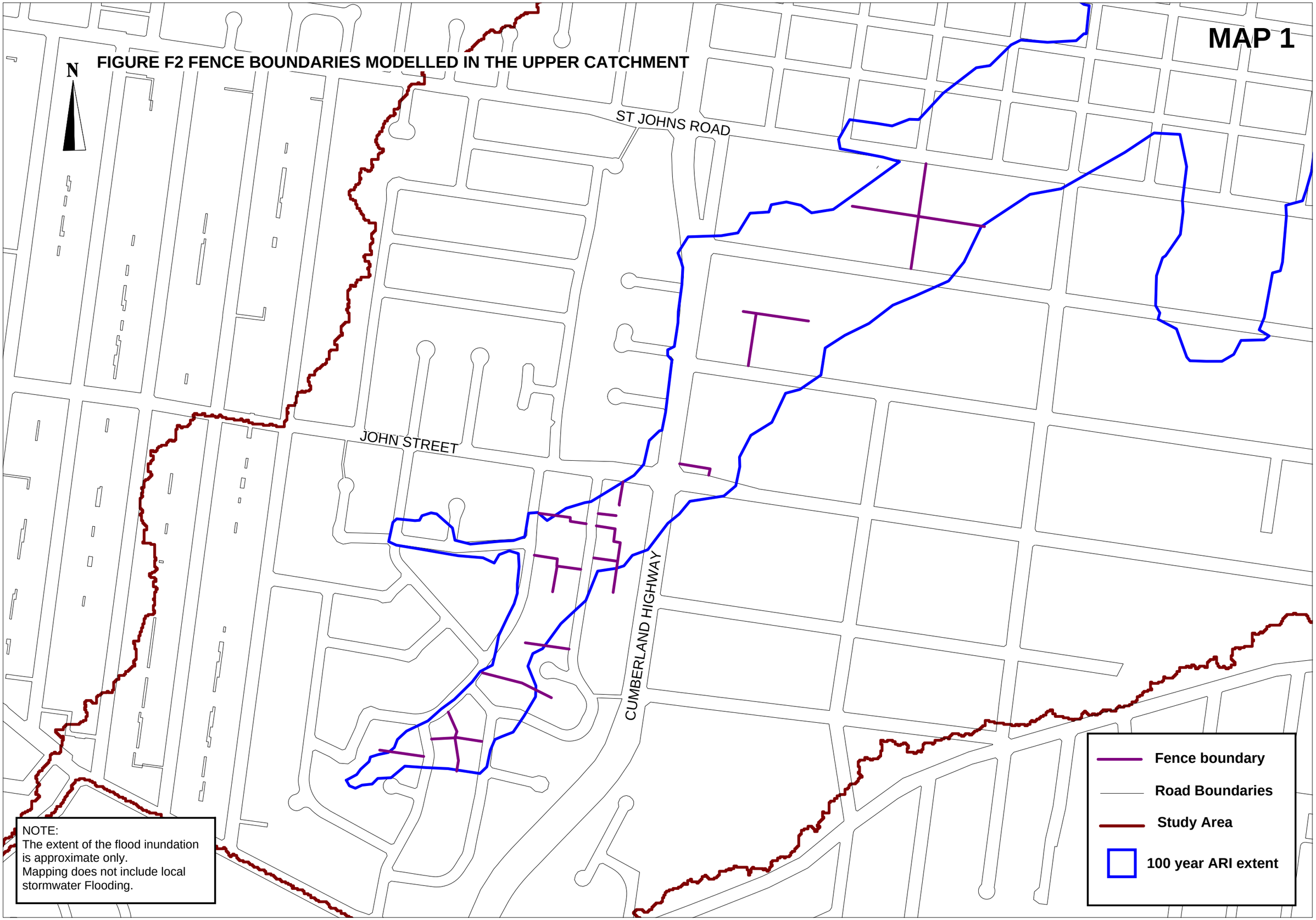

MAP 1
CANLEY CORRIDOR OVERLAND FLOOD RISK PRECINCTS
N
DERRIA STREET
WYONG STREET
ST JOHNS ROAD
CHATHAM STREET
ADOLPHUS STREET
ST JOHNS ROAD
MCBURNEY ROAD
HUGHES STREET
JOHN STREET
JOHN STREET
ALINGA STREET
CUMBERLAND HIGHWAY
0 100 200
metres
Cabramatta West
High Risk Flood Precinct
Land below the 100 year ARI flood that is either subject to high hydraulic hazard or where there are significant evacuation difficulties
Medium Risk Flood Precinct
Land below the 100 year ARI flood that is not subject to high hydraulic hazard and where there are no significant evacuation difficulties
Low Risk Flood Precinct
All other land within the floodplain (i.e. within the PMF extent) but not identified as either in a high flood risk or medium flood risk precinct
Zone of Significant Flow
The area of the floodplain where a significant discharge of water occurs during floods. Should the area within this boundary be fully or partially blocked, a significant distribution of flood flows or increase in flood levels would occur.
Road Boundaries
Study Area / Model Extent
NOTE:
The extent of the flood inundation is approximate only. Mapping does not include smaller scale nuisance stormwater flooding.

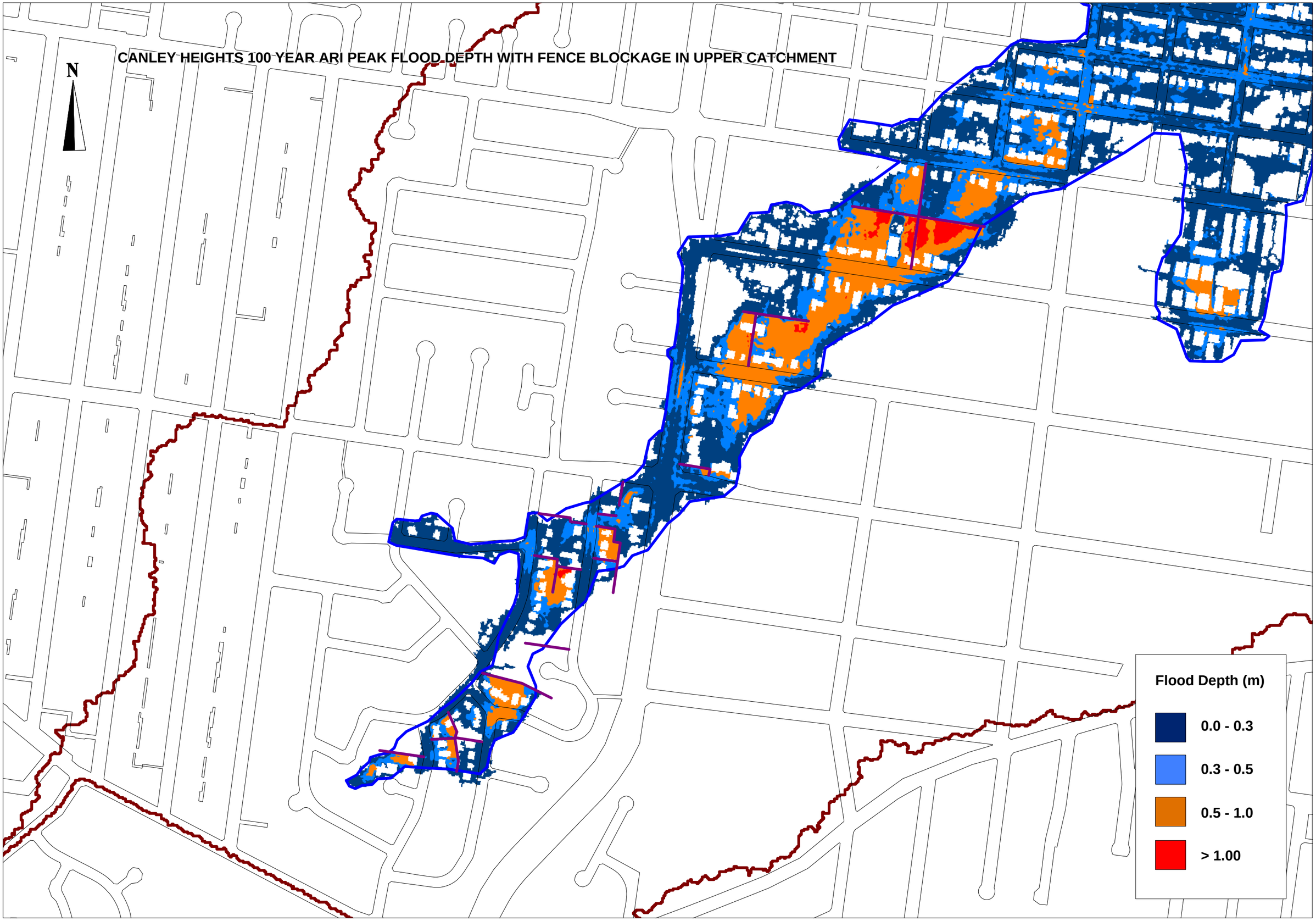

CANLEY CORRIDOR OVERLAND FLOOD RISK PRECINCTS
MAP 2
N
0
100
200
metres
High Risk Flood Precinct
Land below the 100 year ARI flood that is either subject to high hydraulic hazard or where there are significant evacuation difficulties
Medium Risk Flood Precinct
Land below the 100 year ARI flood that is not subject to high hydraulic hazard and where there are no significant evacuation difficulties
Low Risk Flood Precinct
All other land within the floodplain (i.e. within the PMF extent) but not identified as either in a high flood risk or medium flood risk precinct
Zone of Significant Flow
The area of the floodplain where a significant discharge of water occurs during floods. Should the area within this boundary be fully or partially blocked, a significant distribution of flood flows or increase in flood levels would occur.
Road Boundaries
Study Area / Model Extent
NOTE:
The extent of the flood inundation is approximate only. Mapping does not include smaller scale nuisance stormwater flooding.
Canley Heights
GEORGE STREET
PRINCE STREET
EARL STREET
CANLEY VALE ROAD
KIORA STREET
DERRIA STREET
ST JOHNS ROAD
BARTLEY STREET
PEVENSEY STREET
SALISBURY STREET
GLADSTONE STREET
CHATHAM STREET
ADOLPHUS STREET
SACKVILLE STREET
PHELPS STREET
FREEMAN AVENUE
Orphan School Creek

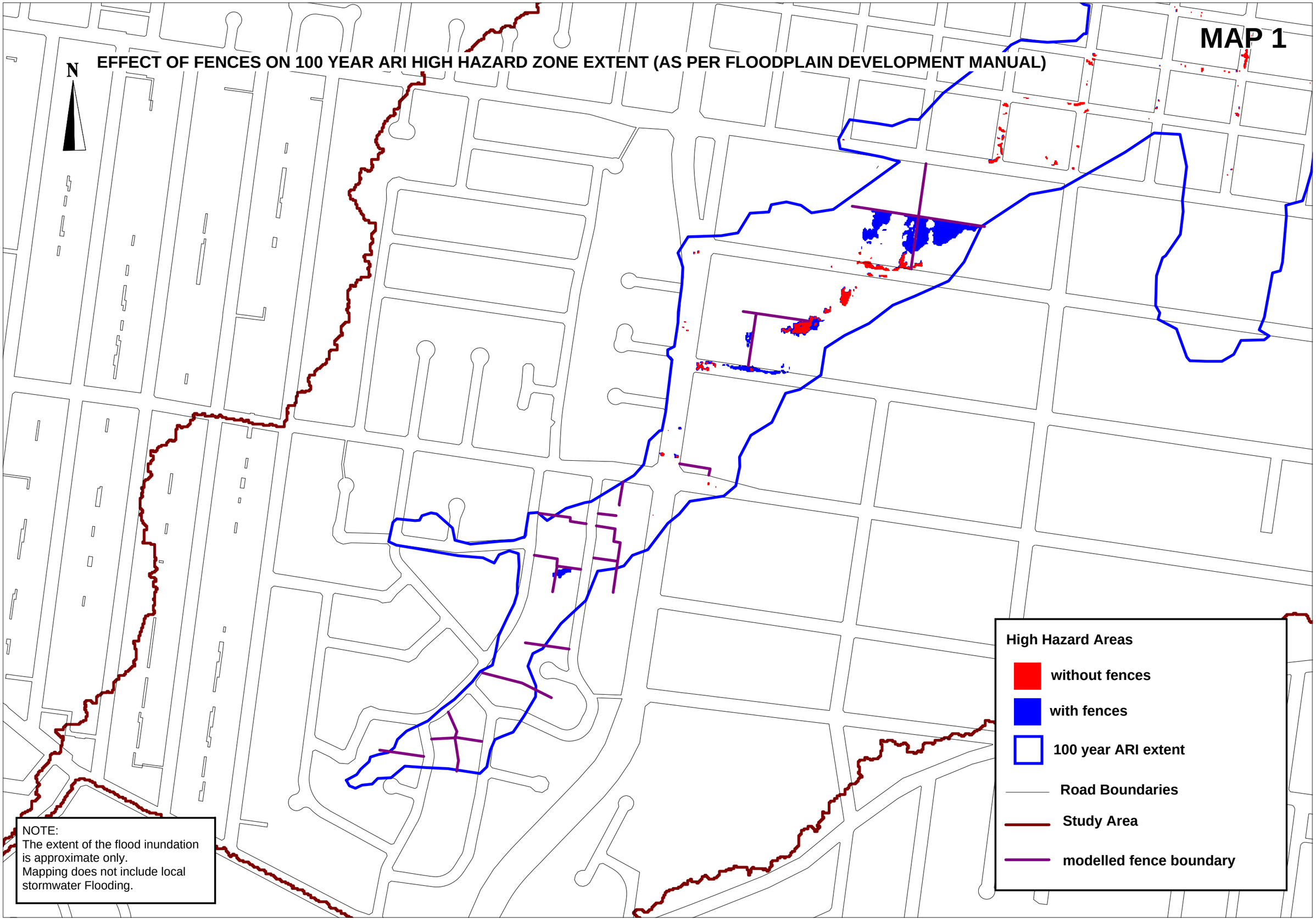

MAP 3
N
GLADSTONE STREET
PRINCE STREET
EARL STREET
FREEMAN AVENUE
CANLEY VALE ROAD
KIORA STREET
CHATHAM STREET
ADOLPHUS STREET
BURDETT STREET
SACKVILLE STREET
PEVENSEY STREET
PHELPS STREET
CANLEY VALE ROAD
Canley Vale
THIRD AVE
RAILWAY PARADE
South railway line
Orphan School Creek
PROSPECT ROAD
SENIOR STREET
CARCOOLA STREET
Inner West railway line
ST JOHNS ROAD
BARTLEY STREET
MCBURNEY ROAD
CANLEY CORRIDOR OVERLAND FLOOD RISK PRECINCTS
NOTE:
The extent of the flood inundation is approximate only. Mapping does not include smaller scale nuisance stormwater flooding.
0
100
200
metres
Road Boundaries
Study Area / Model Extent
High Risk Flood Precinct
Land below the 100 year ARI flood that is either subject to high hydraulic hazard or where there are significant evacuation difficulties
Medium Risk Flood Precinct
Land below the 100 year ARI flood that is not subject to high hydraulic hazard and where there are no significant evacuation difficulties
Low Risk Flood Precinct
All other land within the floodplain (i.e. within the PMF extent) but not identified as either in a high flood risk or medium flood risk precinct
Zone of Significant Flow
The area of the floodplain where a significant discharge of water occurs during floods. Should the area within this boundary be fully or partially blocked, a significant distribution of flood flows or increase in flood levels would occur.

# Appendix F Fence Blockage Modelling


MAP 1
FIGURE F1 LOCATION AND TYPE OF FENCES IN THE UPPER CATCHMENT
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
Fence Type
Open fences
Timber paling
Colourbond
Brick
Road Boundaries
Study Area
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.


MAP 1
FIGURE F2 FENCE BOUNDARIES MODELLED IN THE UPPER CATCHMENT
N
ST JOHNS ROAD
JOHN STREET
CUMBERLAND HIGHWAY
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.
Fence boundary
Road Boundaries
Study Area
100 year ARI extent


CANLEY HEIGHTS 100 YEAR ARI PEAK FLOOD DEPTH WITH FENCE BLOCKAGE IN UPPER CATCHMENT
N
Flood Depth (m)
0.0 - 0.3
0.3 - 0.5
0.5 - 1.0
> 1.00


MAP 1
EFFECT OF FENCES ON 100 YEAR ARI HIGH HAZARD ZONE EXTENT (AS PER FLOODPLAIN DEVELOPMENT MANUAL)
N
High Hazard Areas
without fences
with fences
100 year ARI extent
Road Boundaries
Study Area
modelled fence boundary
NOTE:
The extent of the flood inundation is approximate only.
Mapping does not include local stormwater Flooding.