UraniumSA

Appendix 7

URS
Hydrology Baseline Investigation

Retention Lease Proposal

On

Mineral Claim 4280

for a

Uranium In-situ Recovery Field Trial

Owner/Operator: Gingertom Resources Pty Ltd
(a wholly owned subsidiary of UraniumSA Limited)

Contact Person: Alistair Muir

32 Beulah Road, Norwood, SA 5067

Phone 08 8132 0577, Fax 08 8132 0766

5 August 2011

Report

Hydrology Baseline Investigation
Mullaquana Uranium Project

29 JUNE 2010

Prepared for

UraniumSA Ltd

32 Beulah Road
Norwood SA 5067

42657428

Project Director:

……………………………
Cliff Allen
Senior Principal

URS Australia Pty Ltd

Level 4, 70 Light Square
Adelaide SA 5000
Australia
T: 61 8 8366 1000
F: 61 8 8366 1001

Project Manager:

……………………………
Geoff Watson
Senior Mechanical Engineer

Author:

……………………………
Maria Pham
Civil/Geotechnical Engineer

Reviewer:

……………………………
Jerome Argue
Senior Principal Civil Engineer

Date: **29 June 2010**
Reference: 42657428/R001/0
Status: Final

Document delivery

URS Australia provides this document in either printed format, electronic format or both. URS considers the printed version to be binding. The electronic format is provided for the client's convenience and URS requests that the client ensures the integrity of this electronic information is maintained. Storage of this electronic information should at a minimum comply with the requirements of the Commonwealth Electronic Transactions Act (ETA) 2000.

Where an electronic only version is provided to the client, a signed hard copy of this document is held on file by URS and a copy will be provided if requested.

Table of Contents

Executive Summary 6

1 Introduction 7

2 Site Visit 8

3 Catchment Analysis 10

4 Rainfall 11

5 Streamflow Estimation 12

5.1 Rational Method 12

5.2 Other Methods 12

5.2.1 Eusuff Method 12

5.2.2 Akter and Daniell Method 13

5.2.3 Kemp Method 13

5.3 Results and Comparison of Streamflow Estimation 13

6 Deep Creek Hydraulic Analysis 14

6.1 HEC-RAS 14

6.2 Cross-sectional Information 14

6.3 HEC-RAS Modelling 15

6.4 Interpretation of HEC-RAS Results 15

7 Hydraulic Analysis for A1, A2, A4, A5 and A6 17

8 Discussion and Conclusion 18

8.1 Assessment of Potential Flood Risk 18

8.2 Further Modelling 18

9 References 19

10 Limitations 20

Tables

Table 3-1 Summary of catchment areas 10

Table 5-1 Summary of flow rates for 6 catchment areas 13

Table 7-1 Summary of 10 year ARI flow depths and velocities for A1, A2, A4, A5 and A6 17

Table 7-2 Summary of 100 year ARI flow depths and velocities for A1, A2, A4, A5 and A6 17

Figures

Figure 1-1 Location of proposed Field Leach Trial 7

Plates

Plate 2-1 Typical landscape illustrating upper catchment characteristics 8
Plate 2-2 Sandy soils and sparse vegetation - lower reach 9

Appendices

Appendix A Catchment Definitions
Appendix B Streamflow Estimates
Appendix C Flood Inundation Map and HEC-RAS Output
Appendix D Hydraulic Calculations for A1, A2, A4, A5 and A6

Executive Summary

This report presents the results of the baseline hydrology investigation as part of the approval process for an in-situ recovery trial within the exploration lease 3652. The investigation utilised 1:50,000 scale maps of the area to delineate the catchment boundaries, totalling to an area of approximately 450 km^2. The available maps and on-site observations show that there is a major drainage line running to the south of the tenement, called Deep Creek. The Deep Creek and other catchments are fairly sandy with sparse vegetation characterised by low shrubs and small trees and minimal ground cover. The terrain east of Lincoln Highway is flat with slopes of approximately 0.5%. An escarpment runs in the north-south direction at approximately 50 m above sea level. The area east of this escarpment is flat with no defined channels.

Streamflows for the 10 and 100 year Average Recurrence Interval (ARI) events were determined using various methods. Flows from the Rational Method were used for the hydraulic analysis to determine flow depths, velocities, and hence floodplain limits for the 10 and 100 year ARI events.

The floodplain map shows the flooding limits for Deep Creek based on a detailed hydraulic analysis of the creek. Due to the high flow depths and velocities, the Deep Creek floodplain is considered a high hazard area.

The floodplain map also shows the area prone to shallow flooding east of the escarpment where more detailed modelling could not be performed due to the lack of defined channels. This includes the proposed field leach trial area. Here flows are shallow and slow, thereby posing a low hazard. Flood protection in this area may include constructing a low level bund around sensitive areas or providing building pads for infrastructure. Further detail can be found in the Discussion and Conclusion section and throughout the main body of the report.

The floodplain analysis conducted in this baseline study should be utilised for preliminary information only. If a more refined flood inundation prediction at the area of interest is required, more detailed topographic information should be made available. A more detailed estimation of the flow rates may also be required to refine the floodplain mapping.

1

Introduction

UraniumSA Ltd commissioned URS Australia Pty Ltd (URS) to conduct a hydrology baseline study as part of the approval process for the proposed Field Leach Trial (FLT) and subsequent In-Situ Recovery (ISR) operations to be undertaken as part of the Mullaquana Uranium Project.

The area of interest is located approximately 20 km southwest of Whyalla on the Eyre Peninsula of South Australia and is located within the Exploration Lease (EL) 3652. The extent of the particular area of interest for ISR trial inside the tenement is shown in Figure 1-1.

Based on URS' site visit and the topographical map (1:50,000 scales - 10 m contour) of the area, a major drainage line was identified running to the south of the area of interest, named Deep Creek.

A detailed description of the agreed scopes of work is outlined in URS proposal reference 42657428, dated 29 March 2010. The main objectives include:

- Visit the site to inspect characteristics of the catchment and drainages;
- Delineate the catchment boundaries;
- Prepare baseline hydrology for the 10 and 100 year Average Recurrence Interval (ARI);
- Perform hydraulic analysis of the drainages to determine flood levels and velocities;
- Prepare floodplain maps for the 10 and 100 year ARI event using results from the hydraulic analysis for Deep Creek and other smaller drainages; and,
- Prepare this Hydrology Baseline Investigation Report.

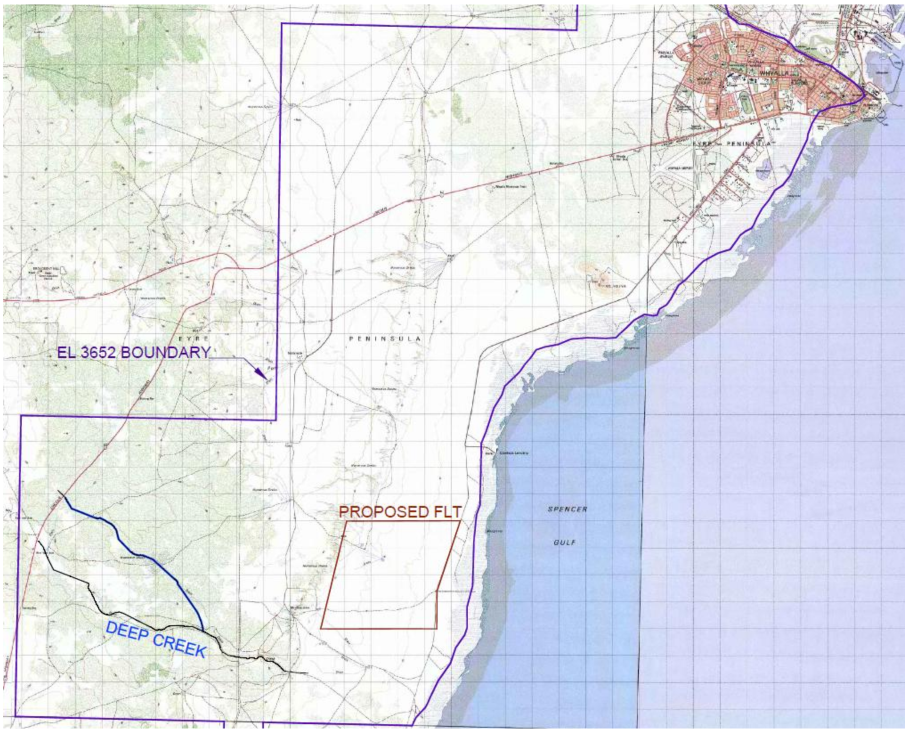


Figure 1-1 Location of proposed Field Leach Trial

2

Site Visit

The purpose of the site visit was to ascertain inputs to the flood modelling and to review the outfall characteristics of the drainages, particularly Deep Creek.

During URS' site visit on 12 April 2010, the observed creeks on the Mullaquana area consisted of dry creek beds. Vegetation in the Deep Creek catchment is mostly sparse and low, with tree growth concentrated along water course routes. The creek bed in the lower reaches of the creek is typically braided, characterised by multiple channels and lined with small rocks and gravelly materials.

Anecdotally, Deep Creek is subject to occasional flood flows where the creek intersects the Lincoln Highway. The creek's catchment slopes vary from typical slopes of about 10% at the Middle Back Range grading to much flatter slope of about 0.5% to the eastern side of Lincoln Highway.

For the lowest reach of Deep Creek, between the escarpment and sea level, the channel formation characteristic was not observed. It is suspected that the flow from the creeks converts to sheet flow from this point onwards. This characteristic is also observed at other areas from Murninnie Beach to the north of the proposed FLT and ISR area.

Numerous man-made drains were also observed on site. These were constructed to direct the sheet flow in flat catchments to collection points.

Plate 2-1 Typical landscape illustrating upper catchment characteristics

Plate 2-2 Sandy soils and sparse vegetation - lower reach

Catchment Analysis

Deep Creek, located approximately 5 km south of the FLT, generally drains a catchment area which extends from the Middle Back Range eastward to Spencer Gulf. Catchment boundaries for Deep Creek and other smaller drainages for the area of interest are shown in Figure A1 of Appendix A. Catchment areas are presented in Table 3-1.

Runoff from catchments A4 and A5 may have an impact on the proposed mine exploration area. This and the other catchments are relatively small compared to the Deep Creek catchment. Streamflow estimates for all the catchments listed in Table 3-1 were determined.

A desktop study of the local topography and site photographs (shown on Plates 2-1 and 2-2) indicate that the catchment is fairly sandy with sparse vegetation characterised by low shrubs and small trees and minimal ground cover. This is typical of well-grazed, semi-arid country. The upper reaches are quite steep with typical slopes of approximately 10% near the Middle Back Range, then reducing to much flatter slopes of approximately 0.5% on the eastern side of the Lincoln Highway. The nature of the terrain would suggest that the catchment is characterised by a low to medium runoff coefficient.

Table 3-1 Summary of catchment areas

Catchment ID	**Catchment Areas (km^2)**
A1	48.5
A2	16.1
A3	252.5
A4	16.8
A5	76.5
A6	38.0

4

Rainfall

Creeks in the Mullaquana area are located in an arid region of South Australia. The area is characterised by wet winter and low summer rainfall, with an average annual rainfall of less than 300 mm. The nearest rainfall recording stations are the Whyalla (Mullaquana), Whyalla (Nonowie), Whyalla (Broad View), Whyalla (Moola) and Iron Knob (Gilles Downs).

Rainfall Intensity-Frequency-Duration (IFD) information for the site, used in calculation of the streamflow estimates, was derived using the methodology described in Australian Rainfall and Runoff (ARR Vol 2, 2007). The results of the IFD analysis are presented in Appendix B.

Streamflow Estimation

It is noted that the purpose of this study is to provide a preliminary estimation of the flow rates for the catchment areas within EL3652, as a baseline hydrology study only. A more sophisticated estimation of the flow rate, using techniques such as runoff routing models based on computer software (e.g. RORB) could be performed if required.

5.1 Rational Method

Australian Rainfall and Runoff (ARR) (Institution of Engineers Australia 1987) Rational Method for the south east region (Zone 6) of South Australia was used to estimate the flow rate in the creeks within the vicinity of the tenement. The method as described by the Engineering and Water Supply Department in South Australia is based on the observed flood data from 20 catchments. The design relations are:

$$t_c = 0.5\ A^{0.65}$$

Where:

t_c = time of concentration (hr)

A = catchment area (km^2)

The runoff coefficients for the 1 in 10 and 1 in 100 year ARI are:

$$C_{10} = 0.23$$

$$C_{100} = 0.28$$

The derivation of the runoff coefficient was based on a streamflow record of 16 years, therefore, the 100 year ARI value involved considerable extrapolation (ARR, 1987).

5.2 Other Methods

To assess the flow rates calculated by the Rational Method, a comparison was made with flows estimated by four different regression equations. On the recommendation of Dr David Kemp (Department of Transport, Energy and Infrastructure – DTEI, email dated 10 May 2010), recognised as a leading authority on hydrology in South Australia, other methods such as Eusuff (1995), Akter & Daniell (1993) and Kemp (2003) were used. These calculation techniques were selected because they are based on observed data available for South Australia. These methods are described below:

5.2.1 Eusuff Method

The Eusuff Method was derived for the Mount Lofty Ranges. The method is categorised for high runoff area and low runoff area.

High Runoff Area:

$$Q_{100} = 3.8\ A^{0.73}$$

Low Runoff Area (at the eastern side of the Mount Lofty Range):

$$Q_{100} = 1.09\ A^{0.87}$$

Where: Q_{100} = flow rate for 100 ARI

A = catchment area (km^2)

5.2.2 Akter and Daniell Method

The Akter and Daniell (1993) method was also derived for the Mount Loft Ranges. The design relations are:

$$Q_{100} = 6.2\ A^{0.58}$$

Where: Q_{100} = flow rate for 100 ARI

A = catchment area (km^2)

5.2.3 Kemp Method

The Kemp method was developed for the Upper Onkaparinga River catchment in 2003. This method was derived for the Onkaparinga Catchment Water Management Board by DTEI. The design relations are:

$$Q_{100} = 3.08\ A^{0.91}$$

Where: Q_{100} = flow rate for 100 ARI

A = catchment area (km^2)

5.3 Results and Comparison of Streamflow Estimation

The peak streamflow estimates for each of the creeks for 100 year ARI event in the proposed tenement development site are summarised in Table 5-1. Table 5-1 also includes the 10 year ARI streamflows for the Rational Method. The calculations are attached in Appendix B.

Table 5-1 Summary of flow rates for 6 catchment areas

Catchment ID	Flow Rate (m³/sec)					
	Rational Method* Q_{10}	Rational Method* Q_{100}	Eusuff High Runoff Q_{100}	Eusuff Low Runoff Q_{100}	Akter & Daniell Q_{100}	Kemp Q_{100}
A1	21.3	49.5	64.6	31.9	58.9	105.3
A2	11.9	27.7	28.9	12.2	31.1	38.6
A3	50.6	116.0	215.5	134.1	153.4	472.7
A4	12.1	28.3	29.8	12.7	31.9	40.1
A5	27.1	62.9	90.1	47.5	76.7	159.5
A6	18.7	43.5	54.1	25.8	51.1	84.4
*Note: The Rational Method was adopted for this report						

In general, the Rational Method, the average of Eusuff Method for high and low runoff catchments and Akter and Daniell Method yielded similar peak flow rates for the 100 year ARI event. Therefore the **Rational Method** flows were used to map the floodplain. The Kemp Method was unsuitable because the formula was empirically derived from the Onkaparinga catchment located in a considerably more humid part of South Australia.

It is acknowledged that these estimates are subject to significant errors and caution should be exercised in their use. Further work is currently being undertaken within the industry to improve these methods.

Deep Creek Hydraulic Analysis

The hydraulic analysis of Deep Creek was performed using HEC-RAS. Results from the analysis were used to prepare a first-order estimation of floodplain extent. HEC-RAS models were not developed for other catchment areas (A1, A2, A4, A5 and A6) because there was no obvious channel details based on the 1:50,000 scale topographical information. Since these areas are flat, flood mapping was estimated based on the Manning's formula and engineering judgement. A discussion of the hydraulic analysis for these other catchments is in Section 7.

6.1 HEC-RAS

The HEC-RAS River Analysis System, developed by the U.S. Army Corps of Engineers, Hydrologic Engineering Center is an industry standard, one-dimensional, backwater curve analysis package. The package uses step-wise solution of the energy equation to predict water surface profiles for a range of open-channel flow situations.

HEC-RAS requires, as input, data defining channel cross-sectional shape, roughness and flow rate, to enable it to predict water surface levels associated with the flow.

HEC-RAS outputs were used to generate inundation maps showing flooding extents. Velocity mapping was not created, but limited velocity information can be obtained from HEC-RAS output tables.

Figure C1 in Appendix C shows the flow paths, and cross-sections (labelled) that were used in the HEC-RAS model. The HEC-RAS output tables are provided for reference in Appendix C. If there is a need to confirm flow depth and velocity at any given point in the floodplain (e.g. for design of scour protection or road crossings), this information may be estimated from the HEC-RAS output for the nearest cross-section of the relevant creek channel, from the data tables provided in the Appendix.

The degree of accuracy of contour information to closely define the flow path channel in the lower reaches of the catchment is relatively coarse. As a consequence predicted water surface levels are sufficient for planning purposes, however, it must be expected that actual events may vary significantly from these levels.

Provided that any construction within predicted floodplains is located outside the main flow path, and is able to withstand expected velocities across the overbank area, floodplain maps derived from such an analysis will provide guidance for infrastructure location.

There is considerable uncertainty with respect to the alignment of the flow path of the lower section of the creek (from Lincoln Highway to the escarpment), which is ill-defined at the 10 metre contour resolution. Several possible alignments were modelled, and the most likely alignment has been selected for the final modelling and floodplain mapping. It is highly likely that the flows discharge overland from the main reach as unconfined, shallow sheet flow. The resultant flood maps for this reach should thus be viewed with considerable caution, and a site inspection is strongly recommended to determine actual conditions, particularly if there is potential for construction of any mine infrastructure in the vicinity of Deep Creek.

6.2 Cross-sectional Information

To undertake the HEC-RAS analysis, collation of cross-sectional information along flow paths of interest is necessary. Civil 3D was used to develop a data set containing geo-referenced, 3D cross-sectional information.

Cross-sections are generally located at points of major flow change, such as significant bends, and at relatively regular intervals along individual creek lines. Spacing of cross-sections varies along the extents of the creek reaches, depending on factors such as steepness and variability of the terrain, with sections spaced at approximately 200 metre intervals due to the coarseness of the available topography information.

The selection of a channel roughness value (Manning's *n* parameter) of 0.05 is based upon review of site photographs.

Once cross-sectional information has been extracted, a visual check is made of the resulting profiles, to determine any irregularities, prior to completion of final hydraulic modelling using HEC-RAS. In addition, pre-processing of HEC-RAS import data includes filtering of data to remove superfluous data points, and the additions of Manning's *n* and *reach length* inputs.

6.3 HEC-RAS Modelling

Following the input of cross-sectional information, flow data were entered to the model, which was then used to simulate 100 year ARI event, using flow rates generated from the Rational Method, as discussed in Section 5.

For the minor tributary at the northern side of Deep Creek, with no adjoining streams contributing to flows, the peak flows that were derived by using the whole contributing subcatchment areas were applied from the upstream end of the watercourse. This is a conservative approach; in actual fact, flows typically increase with distance travelled downstream, as the contributing catchment area increases. For this reason, flow rates, depths and velocities shown for the upper reaches of the catchment will typically be greater than can be expected in reality.

Normal depth was defined as the downstream boundary condition for flow modelling.

A floodplain map, indicating approximate flooding extent for the 10 and 100 year ARI events, has been prepared using AutoCAD to plot HEC-RAS modelling outputs. This map is provided as Figure C1 in Appendix C.

6.4 Interpretation of HEC-RAS Results

Of interest are both the extent of flooding, as shown on the floodplain map, and the velocity of flow occurring during a flood event.

Summary tables from the HEC-RAS model run are included in Appendix C for reference. These tables show the predicted water surface level at each cross-section, the analysed flow rate and the predicted average flow velocity across the cross-section. In addition, data such as the width of flow are indicated for each of the analysed flow profiles at each cross-section. Maximum flow depths may be derived from the differences between the minimum channel elevation and the water surface elevation.

It should be noted, with regard to velocity, that the average velocity represents an average taken over the full cross-section. It can be expected, particularly in the event of overbank flow, that the velocity in the channel proper will be higher than in the overbank flow. Therefore the velocities tabulated in Appendix C would be expected to be in excess of the velocity that would be experienced on the bank of the channel.

Flooding extents and depths between cross-sections have been interpolated by HEC-RAS, and these must therefore be regarded as indicative and approximate only, with accuracy greatest in the vicinity of actual cross section locations, and even at these locations dependent upon the contours data used in this study.

A review of the model results shows maximum flow velocities of 3.5 m/s for the 100 year ARI flooding scenario, with the majority of average velocities being less than 1.5 m/s. At most of the locations in which flow velocity is shown exceeding 1 m/s, the flows occur in steeper upper sections of the reach, and in these cases it is also likely that the flow is largely confined to a narrow width near the invert of the flow path. For the 10 year ARI event, the maximum flow velocity is 2.9 m/s with a majority of average velocities being less than 1 m/s.

Hydraulic Analysis for A1, A2, A4, A5 and A6

Due to the coarseness of the topography information, it was not possible to define the sub-catchments for the creeks within the catchment areas A1, A2, A4, A5 and A6. Since these areas are flat, with no obvious channel formation, the flow was assumed to spread evenly over the width of the catchment near the escarpment (at approximately 50 m above sea level) and flow towards Spencer Gulf. As a consequence the water surface width, level and velocity are sufficient for planning purposes, however, it must be expected that actual events may vary significantly from these estimated values.

The Manning formula was used to estimate the flow depth and velocity for the 100 year ARI event, using flow rates generated from the Rational Method, as discussed in Section 5.

The Manning formula states:

$$V = \frac{1}{n} R_h^{\frac{2}{3}} S^{\frac{1}{2}}$$

Where:

V = cross-sectional average velocity (m/s)

n = Manning roughness coefficient

R_h = hydraulic radius = A/P (m)

S = channel bed slope

A = cross sectional area of flow (m^2)

P = wetted perimeter (m)

The flow depth and velocity estimates from each of the above mentioned catchment areas for the 10 and 100 year ARI events in the proposed tenement development site are summarised in Table 7-1 and Table 7-2, respectively. The calculations are attached in Appendix D.

Table 7-1 Summary of 10 year ARI flow depths and velocities for A1, A2, A4, A5 and A6

Catchment ID	Assumed Flow Width (m)	Flow Depth (mm)	Flow Velocity (m/sec)
A1	2400	49	0.2
A2	2900	31	0.1
A4	4100	25	0.1
A5	5700	34	0.1
A6	4100	33	0.1

Table 7-2 Summary of 100 year ARI flow depths and velocities for A1, A2, A4, A5 and A6

Catchment ID	Assumed Flow Width (m)	Flow Depth (mm)	Flow Velocity (m/sec)
A1	2400	81	0.3
A2	2900	51	0.2
A4	4100	42	0.2
A5	5700	56	0.2
A6	4100	54	0.2

Discussion and Conclusion

8.1 Assessment of Potential Flood Risk

From the flood inundation map for the proposed FLT area as shown in Appendix D, it clearly shows that the Lincoln Highway is intersecting the Deep Creek's flow path, which explains the observed flooding in this section of the highway.

At the upper reaches of Deep Creek (from the eastern side of Lincoln Highway to the junction between Deep Creek and minor tributary creek), higher velocity up to 3.5 m/sec could be expected for the 100 year ARI event. The depth of the water flow for this event could be up to 3 m. At the lower reaches, the flow is slower with flow 100 year ARI velocity of 2.7 m/sec with shallower flow depth and wider flow width. In general, due to these high flow depths and velocities, the 100 year ARI floodplain is considered a high hazard area.

In assessing the impact of predicted flood risk on potential operations within the floodplain, recognition must be made of the likelihood of a flood event occurring. If mining activities are to be located within the Deep Creek floodplain for a short period, a lower flood standard may be appropriate. For example, over a 12 months period, the risk of a 100 year ARI flood is 1%. However, mining infrastructure to remain in one place for a much longer period, for example 15 years, would be exposed to a 14% risk of a 100 year ARI flood.

For other areas, namely A1, A2, A4, A5 and A6, the catchment areas are generally flat with no obvious channel formation as shown on the 1:50,000 scale topographic map. Even though numerous man-made drains and small drainage lines are shown on the map indicating the course of the flow, the sub-catchment areas for these drainage lines could not be identified at such scale. Hence, flow velocity, width and depth for these drainage lines could not be estimated. At the lower side of these catchment areas, the flow from the escarpment (at approximately 50 above sea level) to sea level is assumed to occur as sheet flow. These sheet flows are estimated to be shallow, typically in a range from 50 to 80 mm deep with slow-moving velocity of approximately 0.3 m/sec velocity. Flood protection still needs to be considered in the design of infrastructure within these areas, but due to the shallow depth and low velocity of the flood flow, the hazard posed by a 100 year ARI event and the cost of flood protection are expected to be low. Flood protection from the 100 year ARI event may include constructing a low level bund around sensitive areas or providing building pads for infrastructure. Such bunds or pads probably need not be higher than a half metre.

8.2 Further Modelling

The floodplain analysis within the tenement area as described in this report serves as a baseline study and as such is to be utilised for preliminary information only. It has been noted that there is some uncertainty in the prediction of both flow rates and the accuracy of cross-sectional information along flow paths due to the coarseness of the topographic information. It is acknowledged that these estimates are subject to significant errors and caution should be exercised in their use.

If a more refined flood inundation prediction at the area of interest is required, more detailed topographic information (1 or 2 m contour) for the tenement should be made available. A more sophisticated estimation of the flow rate, using techniques such as runoff routing models based on computer software (e.g. RORB) should also be undertaken.

References

Akter, S. and Daniell, T.M. (1993) "Regional Flood Frequency in the Mount Lofty Ranges" I.E. Aust. Hydrology and Water Resources Symposium, Newcastle, June 1993. pp 281-286.

Australian Rainfall and Runoff ARR, 1987, “A Guide to Flood Estimation” Volume 1, The Institution of Engineers Australia

Australian Rainfall and Runoff ARR, 2007, “A Guide to Flood Estimation” Volume 2, The Institution of Engineers Australia

Eusuff, T.H. (1995) “A Regional Flood Frequency Approach to the Mount Lofty Ranges” Unpublished Thesis, University of Adelaide, June 1995

HEC-RAS River Analysis System, Version 4, March 2008, US Army Corps of Engineers, Hydrologic Engineering Center

Kemp, D (2003) "Hydrological Study of the Upper Onkaparinga River Catchment" Report produced for the Onkaparinga Catchment Water Management Board by Transport SA.

10

Limitations

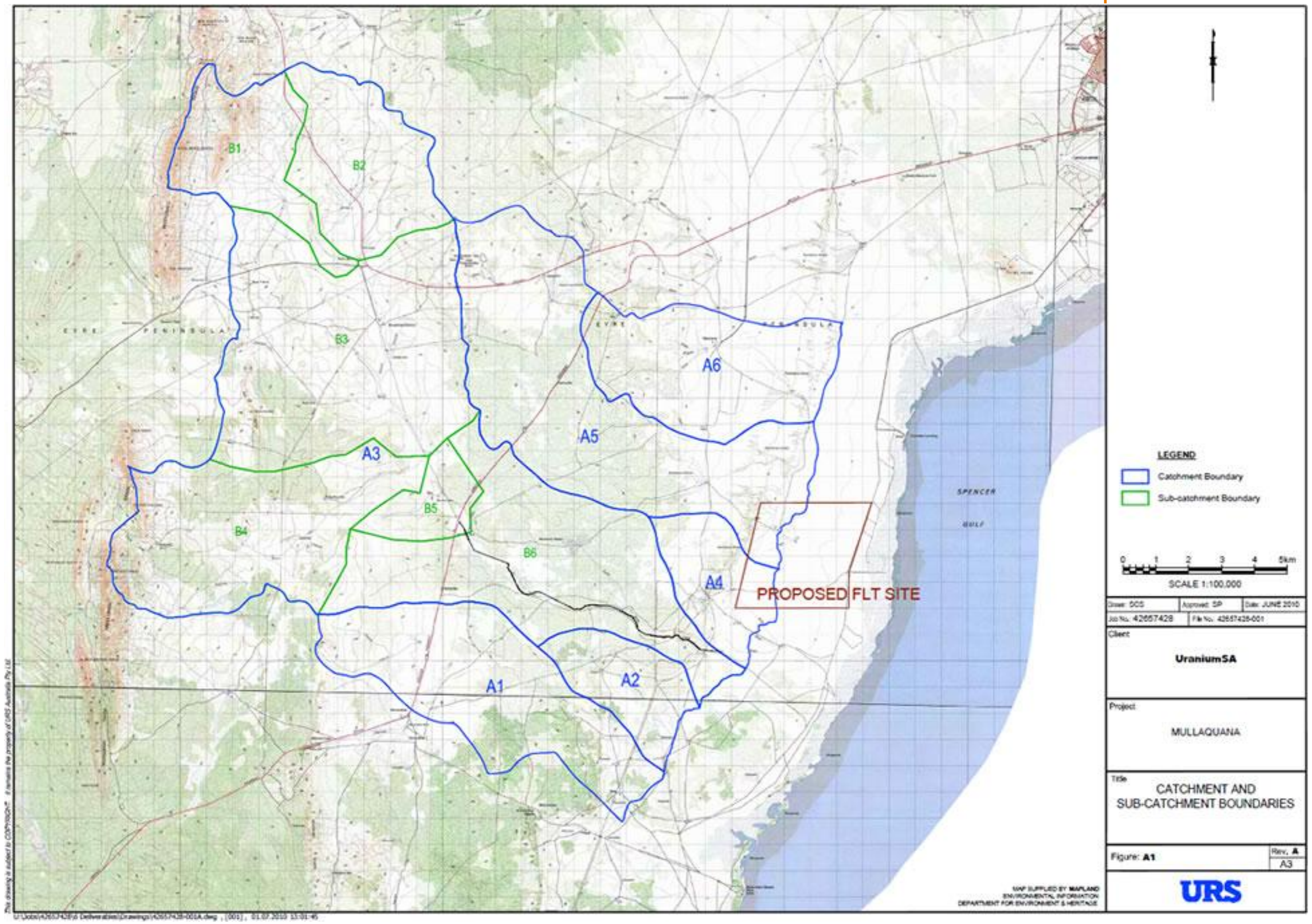
URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of UraniumSA Ltd and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 29 March 2010.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

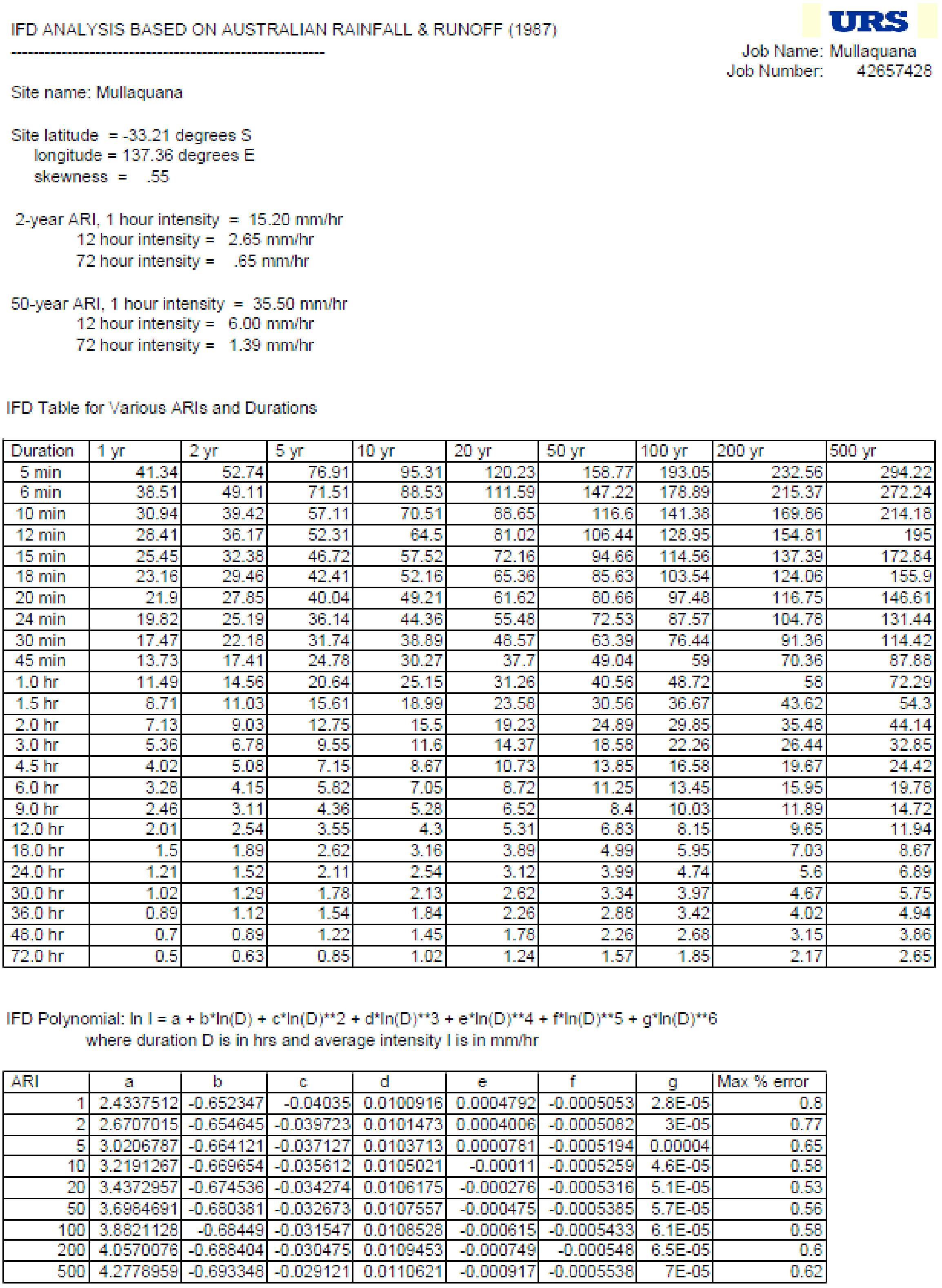
This report was prepared between 28 May and 15 June 2010 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Appendix A Catchment Definitions



Appendix B Streamflow Estimates



IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

URS
Job Name: Mullaquana
Job Number: 42657428

Site name: Mullaquana

Site latitude = -33.21 degrees S
longitude = 137.36 degrees E
skewness = .55

2-year ARI, 1 hour intensity = 15.20 mm/hr
12 hour intensity = 2.65 mm/hr
72 hour intensity = .65 mm/hr

50-year ARI, 1 hour intensity = 35.50 mm/hr
12 hour intensity = 6.00 mm/hr
72 hour intensity = 1.39 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	41.34	52.74	76.91	95.31	120.23	158.77	193.05	232.56	294.22
6 min	38.51	49.11	71.51	88.53	111.59	147.22	178.89	215.37	272.24
10 min	30.94	39.42	57.11	70.51	88.65	116.6	141.38	169.86	214.18
12 min	28.41	36.17	52.31	64.5	81.02	106.44	128.95	154.81	195
15 min	25.45	32.38	46.72	57.52	72.16	94.66	114.56	137.39	172.84
18 min	23.16	29.46	42.41	52.16	65.36	85.63	103.54	124.06	155.9
20 min	21.9	27.85	40.04	49.21	61.62	80.66	97.48	116.75	146.61
24 min	19.82	25.19	36.14	44.36	55.48	72.53	87.57	104.78	131.44
30 min	17.47	22.18	31.74	38.89	48.57	63.39	76.44	91.36	114.42
45 min	13.73	17.41	24.78	30.27	37.7	49.04	59	70.36	87.88
1.0 hr	11.49	14.56	20.64	25.15	31.26	40.56	48.72	58	72.29
1.5 hr	8.71	11.03	15.61	18.99	23.58	30.56	36.67	43.62	54.3
2.0 hr	7.13	9.03	12.75	15.5	19.23	24.89	29.85	35.48	44.14
3.0 hr	5.36	6.78	9.55	11.6	14.37	18.58	22.26	26.44	32.85
4.5 hr	4.02	5.08	7.15	8.67	10.73	13.85	16.58	19.67	24.42
6.0 hr	3.28	4.15	5.82	7.05	8.72	11.25	13.45	15.95	19.78
9.0 hr	2.46	3.11	4.36	5.28	6.52	8.4	10.03	11.89	14.72
12.0 hr	2.01	2.54	3.55	4.3	5.31	6.83	8.15	9.65	11.94
18.0 hr	1.5	1.89	2.62	3.16	3.89	4.99	5.95	7.03	8.67
24.0 hr	1.21	1.52	2.11	2.54	3.12	3.99	4.74	5.6	6.89
30.0 hr	1.02	1.29	1.78	2.13	2.62	3.34	3.97	4.67	5.75
36.0 hr	0.89	1.12	1.54	1.84	2.26	2.88	3.42	4.02	4.94
48.0 hr	0.7	0.89	1.22	1.45	1.78	2.26	2.68	3.15	3.86
72.0 hr	0.5	0.63	0.85	1.02	1.24	1.57	1.85	2.17	2.65

IFD Polynomial: ln I = a + b*ln(D) + c*ln(D)**2 + d*ln(D)**3 + e*ln(D)**4 + f*ln(D)**5 + g*ln(D)**6
where duration D is in hrs and average intensity I is in mm/hr

ARI	a	b	c	d	e	f	g	Max % error
1	2.4337512	-0.652347	-0.04035	0.0100916	0.0004792	-0.0005053	2.8E-05	0.8
2	2.6707015	-0.654645	-0.039723	0.0101473	0.0004006	-0.0005082	3E-05	0.77
5	3.0206787	-0.664121	-0.037127	0.0103713	0.0000781	-0.0005194	0.00004	0.65
10	3.2191267	-0.669654	-0.035612	0.0105021	-0.00011	-0.0005259	4.6E-05	0.58
20	3.4372957	-0.674536	-0.034274	0.0106175	-0.000276	-0.0005316	5.1E-05	0.53
50	3.6984691	-0.680381	-0.032673	0.0107557	-0.000475	-0.0005385	5.7E-05	0.56
100	3.8821128	-0.68449	-0.031547	0.0108528	-0.000615	-0.0005433	6.1E-05	0.58
200	4.0570076	-0.688404	-0.030475	0.0109453	-0.000749	-0.000548	6.5E-05	0.6
500	4.2778959	-0.693348	-0.029121	0.0110621	-0.000917	-0.0005538	7E-05	0.62

Rational Method

URS

Job Name: Mullaquana
Job Number: 42657428

Area	km^2	tc (hr)	C_{10}	C_{100}	I_{10} (mm/hr)	I_{100} (mm/hr)	Q_{10} (m^3/s	Q_{100} (m^3/sec)
A1	48.5	6.2	0.23	0.28	6.9	13.1	21.3	49.5
A2	16.1	3.0	0.23	0.28	11.5	22.1	11.9	27.7
A3	252.5	18.2	0.23	0.28	3.1	5.9	50.6	116.0
A4	16.8	3.1	0.23	0.28	11.3	21.6	12.1	28.3
A5	76.5	8.4	0.23	0.28	5.6	10.6	27.1	62.9
A6	38.0	5.3	0.23	0.28	7.7	14.7	18.7	43.5

Note:	Reference
tc=0.5 A $^{0.65}$ for South East Region (Zone 6) in South Australia	(Section 5.4.6 ARR 1987)
C10 = 0.23	(Section 5.4.6 ARR 1987)
C100 = 0.28	(Section 5.4.6 ARR 1987)
ln I = a + b*ln(D) + c*ln(D)**2 + d*ln(D)**3 + e*ln(D)**4 + f*ln(D)**5 + g*ln(D)**6	IFD to determine Intensity
Q = CiA	

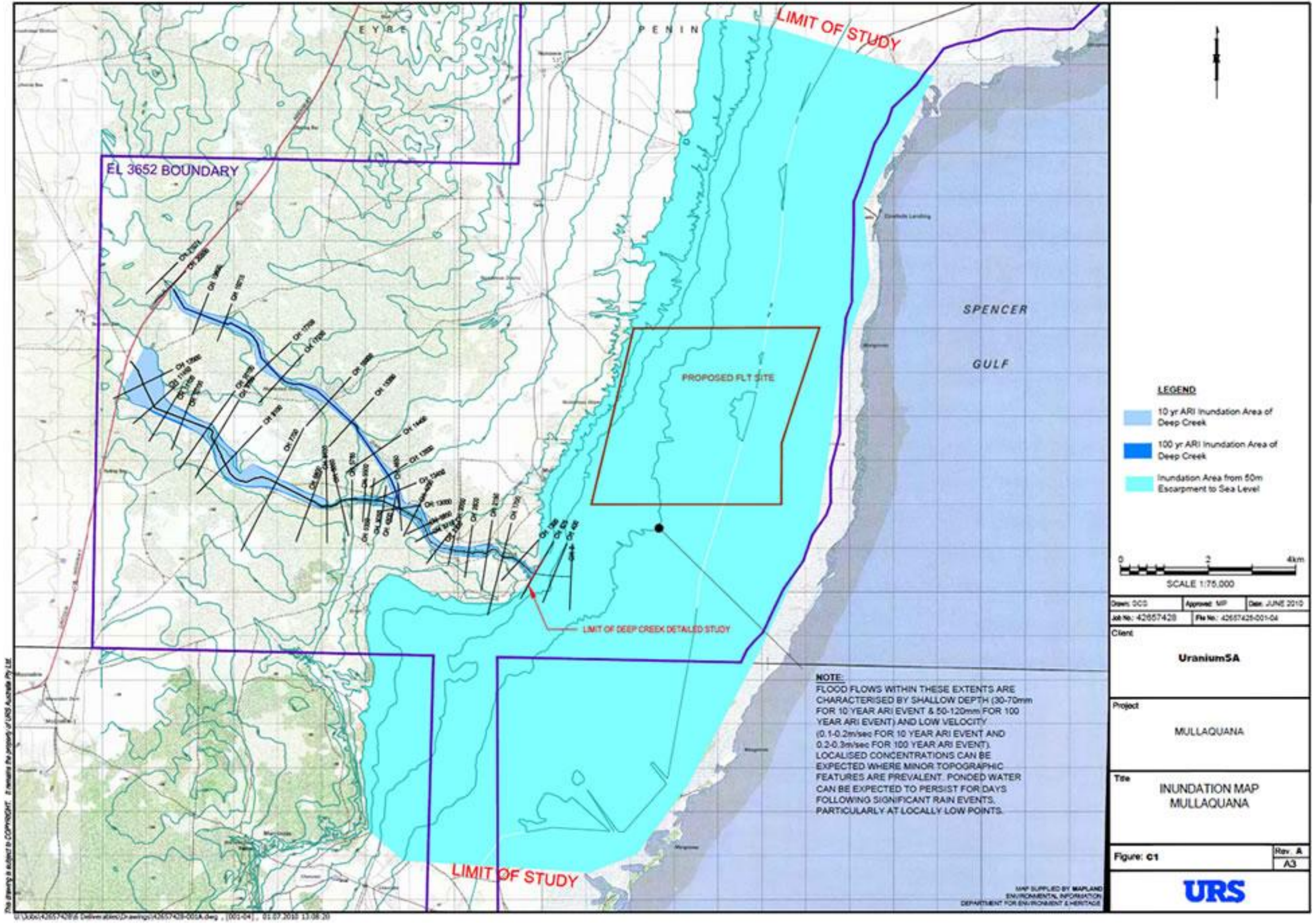
Sub-Areas of A3

Area	From CAD	Area contribute to each reach	tc	C_{10}	C_{100}	I_{10}	I_{100}	Q_{10}	Q_{100}
	(m^2)	(km^2)	(hr)			(mm/hr)	(mm/hr)	(m3/sec)	(m3/sec)
B1	24102496	24.1	4.0	0.23	0.28	9.5	18.3	14.7	34.2
B2	28979577	29.0	4.5	0.23	0.28	8.8	16.7	16.2	37.7
B3	75290091	128.4	11.7	0.23	0.28	4.3	8.2	35.7	82.3
B4	51210930	51.2	6.5	0.23	0.28	6.7	12.8	21.9	51.0
B5	9606717	189.2	15.1	0.23	0.28	3.6	6.8	43.6	100.3
B6	58076847	247.3	18.0	0.23	0.28	3.2	6.0	50.1	114.8

B6a	29795811	219.0	16.6	0.23	0.28	3.4	6.3	47.1	108.0
B6b	21373302	21.3733	3.7	0.23	0.28	10.1	19.3	13.8	32.1
B6c	6907734	6.907734	1.8	0.23	0.28	17.0	32.7	7.5	17.6

CL-01A	218985622	219.0	16.6	0.23	0.28	3.4	6.3	47.1	108.0	At Highway Xing
CL-02	21373302	21.3733	3.7	0.23	0.28	10.1	19.3	13.8	32.1	
CL-02B	247266658	247.3	18.0	0.23	0.28	3.2	6.0	50.1	114.8	At Junction

Appendix C Flood Inundation Map and HEC-RAS Output



NOTE:
FLOOD FLOWS WITHIN THESE EXTENTS ARE CHARACTERISED BY SHALLOW DEPTH (30-70mm FOR 10 YEAR ARI EVENT & 50-120mm FOR 100 YEAR ARI EVENT) AND LOW VELOCITY (0.1-0.2m/sec FOR 10 YEAR ARI EVENT AND 0.2-0.3m/sec FOR 100 YEAR ARI EVENT). LOCALISED CONCENTRATIONS CAN BE EXPECTED WHERE MINOR TOPOGRAPHIC FEATURES ARE PREVALENT. PONDED WATER CAN BE EXPECTED TO PERSIST FOR DAYS FOLLOWING SIGNIFICANT RAIN EVENTS, PARTICULARLY AT LOCALLY LOW POINTS.

MAP SUPPLIED BY MAPLAND
ENVIRONMENTAL INFORMATION
DEPARTMENT FOR ENVIRONMENT & HERITAGE

Drawn: OCS | Approved: MP | Date: JUNE 2010
Job No.: 42657428 | File No.: 42657428-001-04

Client
UraniumSA

Project
MULLAQUANA

Title
INUNDATION MAP
MULLAQUANA

Figure: **C1** | Rev. A | A3

U:\Jobs\42657428\6 Deliverables\Drawings\42657428-001A.dwg , [001-04] , 01.07.2010 13:08:20

HEC-RAS Plan: 7Jun10   Profile: 10 yr ARI

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
CL-02	CL-02	21073.65	10 yr ARI	13.80	110.88	111.40		111.42	0.003835	0.55	24.93	83.44	0.32
CL-02	CL-02	20800	10 yr ARI	13.80	109.98	110.17		110.18	0.005358	0.45	30.36	175.47	0.35
CL-02	CL-02	19800	10 yr ARI	13.80	104.53	104.78		104.79	0.007505	0.54	25.78	150.11	0.41
CL-02	CL-02	19215	10 yr ARI	13.80	100.00	100.29		100.30	0.003484	0.39	35.06	182.14	0.29
CL-02	CL-02	17700	10 yr ARI	13.80	94.40	94.71		94.72	0.009781	0.58	23.77	149.43	0.46
CL-02	CL-02	17250	10 yr ARI	13.80	90.00	90.38		90.40	0.004241	0.56	24.59	86.92	0.34
CL-02	CL-02	16000	10 yr ARI	13.80	84.86	85.20		85.22	0.006287	0.47	29.25	180.26	0.37
CL-02	CL-02	15300	10 yr ARI	13.80	80.05	80.57		80.59	0.005927	0.64	21.66	81.37	0.39
CL-02	CL-02	14400	10 yr ARI	13.80	74.56	75.04		75.07	0.007849	0.78	17.70	60.60	0.46
CL-02	CL-02	13800	10 yr ARI	13.80	69.84	70.07		70.09	0.012759	0.62	22.33	156.13	0.52
CL-02	CL-02	13400	10 yr ARI	13.80	64.77	64.97		65.00	0.015373	0.67	20.52	145.25	0.57
CL-02	CL-02	13000	10 yr ARI	13.80	60.00	61.05		61.05	0.000026	0.08	175.11	256.08	0.03
CL-01	CL-01A	12622.86	10 yr ARI	47.10	99.98	100.38		100.38	0.000145	0.13	368.63	954.73	0.07
CL-01	CL-01A	12000	10 yr ARI	47.10	99.95	100.12		100.13	0.003557	0.33	141.25	955.72	0.28
CL-01	CL-01A	11450	10 yr ARI	47.10	96.99	97.48		97.49	0.004793	0.55	85.49	340.60	0.35
CL-01	CL-01A	11100	10 yr ARI	47.10	95.20	95.77		95.79	0.004896	0.63	75.10	250.29	0.37
CL-01	CL-01A	10700	10 yr ARI	47.10	93.16	93.77		93.79	0.004692	0.64	73.66	230.99	0.36
CL-01	CL-01A	10100	10 yr ARI	47.10	90.12	91.15		91.15	0.000940	0.36	131.84	296.46	0.17
CL-01	CL-01A	9700	10 yr ARI	47.10	90.00	90.85		90.85	0.000538	0.33	143.42	240.63	0.14
CL-01	CL-01A	9100	10 yr ARI	47.10	89.97	90.22		90.23	0.003229	0.42	113.02	508.96	0.28
CL-01	CL-01A	7700	10 yr ARI	47.10	85.00	85.54		85.56	0.004936	0.67	70.27	213.27	0.37
CL-01	CL-01A	6800	10 yr ARI	47.10	80.08	81.20		81.21	0.000931	0.43	108.70	181.68	0.18
CL-01	CL-01A	6400	10 yr ARI	47.10	79.89	80.41	80.33	80.49	0.018452	1.30	36.36	110.40	0.72
CL-01	CL-01A	6050	10 yr ARI	47.10	70.00	72.14		72.24	0.002899	1.35	34.80	24.05	0.36
CL-01	CL-01A	5785	10 yr ARI	47.10	69.99	71.31		71.34	0.001332	0.71	66.11	68.45	0.23
CL-01	CL-01A	5500	10 yr ARI	47.10	69.98	70.86		70.88	0.001134	0.50	93.81	145.67	0.20
CL-01	CL-01A	5350	10 yr ARI	47.10	69.97	70.44		70.50	0.011553	1.10	42.68	116.03	0.58
CL-01	CL-01A	5050	10 yr ARI	47.10	66.45	66.84		66.90	0.014547	1.05	44.79	155.61	0.63
CL-01	CL-01A	4800	10 yr ARI	47.10	61.90	62.31	62.31	62.44	0.039284	1.60	29.53	115.67	1.01
CL-01	CL-01B	4650	10 yr ARI	50.10	59.99	61.03		61.05	0.000983	0.46	108.41	171.38	0.19
CL-01	CL-01B	4290	10 yr ARI	50.10	59.94	60.74		60.75	0.000287	0.25	202.84	326.23	0.10
CL-01	CL-01B	3950	10 yr ARI	50.10	59.86	60.37		60.41	0.007577	0.87	57.38	161.56	0.47
CL-01	CL-01B	3300	10 yr ARI	50.10	54.88	55.40		55.45	0.012540	0.94	53.47	197.63	0.57
CL-01	CL-01B	3000	10 yr ARI	50.10	50.00	51.39		51.41	0.001167	0.54	93.29	133.86	0.21
CL-01	CL-01B	2600	10 yr ARI	50.10	50.00	50.94		50.95	0.000827	0.45	110.47	157.70	0.17
CL-01	CL-01B	2150	10 yr ARI	50.10	49.95	50.24		50.27	0.010959	0.78	64.63	286.86	0.52
CL-01	CL-01B	1700	10 yr ARI	50.10	40.00	42.24		42.31	0.002695	1.12	44.89	40.00	0.34
CL-01	CL-01B	1300	10 yr ARI	50.10	39.99	40.61		40.65	0.004176	0.84	59.46	112.92	0.37
CL-01	CL-01B	825	10 yr ARI	50.10	37.48	38.05		38.15	0.022560	1.38	35.22	108.22	0.79
CL-01	CL-01B	400	10 yr ARI	50.10	29.39	29.71		29.72	0.006389	0.50	105.24	697.05	0.38
CL-01	CL-01B	0	10 yr ARI	50.10	26.64	26.96	26.84	26.97	0.007002	0.62	80.89	359.32	0.42

HEC-RAS Plan: 7Jun10 Profile: 100 yr ARI

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
CL-02	CL-02	21073.65	100 yr ARI	32.10	110.88	111.61		111.64	0.004276	0.69	46.53	121.47	0.36
CL-02	CL-02	20800	100 yr ARI	32.10	109.98	110.29		110.31	0.005323	0.62	51.81	187.26	0.38
CL-02	CL-02	19800	100 yr ARI	32.10	104.53	104.90		104.92	0.007440	0.71	45.51	174.03	0.44
CL-02	CL-02	19215	100 yr ARI	32.10	100.00	100.43		100.44	0.003371	0.49	65.03	234.57	0.30
CL-02	CL-02	17700	100 yr ARI	32.10	94.40	94.83		94.86	0.009356	0.68	46.96	223.54	0.48
CL-02	CL-02	17250	100 yr ARI	32.10	90.00	90.59		90.62	0.004166	0.71	45.38	111.86	0.35
CL-02	CL-02	16000	100 yr ARI	32.10	84.86	85.32		85.34	0.005704	0.59	54.15	220.29	0.38
CL-02	CL-02	15300	100 yr ARI	32.10	80.05	80.76		80.79	0.006229	0.82	39.13	104.47	0.43
CL-02	CL-02	14400	100 yr ARI	32.10	74.56	75.25		75.30	0.008172	0.96	33.28	85.38	0.49
CL-02	CL-02	13800	100 yr ARI	32.10	69.84	70.17		70.20	0.013106	0.80	40.04	193.30	0.56
CL-02	CL-02	13400	100 yr ARI	32.10	64.77	65.08		65.12	0.013419	0.84	38.03	172.96	0.57
CL-02	CL-02	13000	100 yr ARI	32.10	60.00	61.45		61.45	0.000034	0.11	288.01	308.31	0.04
CL-01	CL-01A	12622.86	100 yr ARI	108.00	99.98	100.57		100.58	0.000205	0.20	552.34	979.26	0.08
CL-01	CL-01A	12000	100 yr ARI	108.00	99.95	100.22		100.23	0.003391	0.46	236.73	965.62	0.29
CL-01	CL-01A	11450	100 yr ARI	108.00	96.99	97.67		97.69	0.004525	0.67	160.08	450.83	0.36
CL-01	CL-01A	11100	100 yr ARI	108.00	95.20	95.98		96.01	0.005032	0.78	137.68	334.85	0.39
CL-01	CL-01A	10700	100 yr ARI	108.00	93.16	94.00		94.04	0.004537	0.79	137.56	309.17	0.38
CL-01	CL-01A	10100	100 yr ARI	108.00	90.12	91.50		91.51	0.000780	0.44	245.78	352.26	0.17
CL-01	CL-01A	9700	100 yr ARI	108.00	90.00	91.17		91.18	0.000770	0.47	229.76	294.88	0.17
CL-01	CL-01A	9100	100 yr ARI	108.00	89.97	90.38		90.39	0.003148	0.56	193.67	552.80	0.30
CL-01	CL-01A	7700	100 yr ARI	108.00	85.00	85.77		85.81	0.005014	0.85	127.49	275.59	0.40
CL-01	CL-01A	6800	100 yr ARI	108.00	80.08	81.60		81.62	0.001040	0.56	192.35	236.75	0.20
CL-01	CL-01A	6400	100 yr ARI	108.00	79.89	80.67		80.79	0.015702	1.53	70.51	147.54	0.71
CL-01	CL-01A	6050	100 yr ARI	108.00	70.00	72.94		73.13	0.004068	1.91	56.41	29.78	0.44
CL-01	CL-01A	5785	100 yr ARI	108.00	69.99	71.84		71.90	0.001856	1.01	106.48	83.23	0.29
CL-01	CL-01A	5500	100 yr ARI	108.00	69.98	71.24		71.26	0.001487	0.70	154.36	178.62	0.24
CL-01	CL-01A	5350	100 yr ARI	108.00	69.97	70.70		70.80	0.011542	1.42	75.91	140.87	0.62
CL-01	CL-01A	5050	100 yr ARI	108.00	66.45	67.05		67.14	0.015709	1.32	81.84	214.22	0.68
CL-01	CL-01A	4800	100 yr ARI	108.00	61.90	62.51	62.51	62.70	0.034491	1.91	56.40	152.30	1.00
CL-01	CL-01B	4650	100 yr ARI	114.80	59.99	61.42		61.44	0.001266	0.62	184.65	226.09	0.22
CL-01	CL-01B	4290	100 yr ARI	114.80	59.94	61.09		61.10	0.000377	0.35	326.11	378.18	0.12
CL-01	CL-01B	3950	100 yr ARI	114.80	59.86	60.61		60.68	0.007751	1.13	101.68	198.04	0.50
CL-01	CL-01B	3300	100 yr ARI	114.80	54.88	55.58		55.66	0.013362	1.25	92.09	232.60	0.63
CL-01	CL-01B	3000	100 yr ARI	114.80	50.00	51.86		51.88	0.001331	0.69	165.29	177.90	0.23
CL-01	CL-01B	2600	100 yr ARI	114.80	50.00	51.32		51.34	0.001161	0.65	176.92	190.43	0.21
CL-01	CL-01B	2150	100 yr ARI	114.80	49.95	50.40		50.46	0.009286	1.00	114.53	305.33	0.52
CL-01	CL-01B	1700	100 yr ARI	114.80	40.00	42.92		43.03	0.003503	1.52	75.77	51.97	0.40
CL-01	CL-01B	1300	100 yr ARI	114.80	39.99	40.98		41.04	0.004104	1.10	104.63	131.99	0.39
CL-01	CL-01B	825	100 yr ARI	114.80	37.48	38.28	38.22	38.44	0.022003	1.74	65.15	142.35	0.83
CL-01	CL-01B	400	100 yr ARI	114.80	29.39	29.81		29.83	0.006301	0.66	185.29	794.41	0.41
CL-01	CL-01B	0	100 yr ARI	114.80	26.64	27.11	26.95	27.14	0.007003	0.82	140.19	409.53	0.45

Appendix D Hydraulic Calculations for A1, A2, A4, A5 and A6

Open channel flow

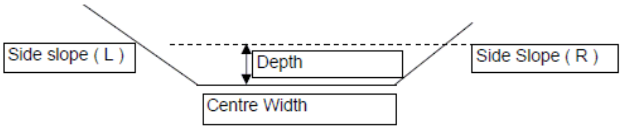
n	0.06 (very high vegetations----CONSERVATIVE SELECTION of n)	Job Name: Mullaquana
S	0.007 m/m	Job Number: 42657428

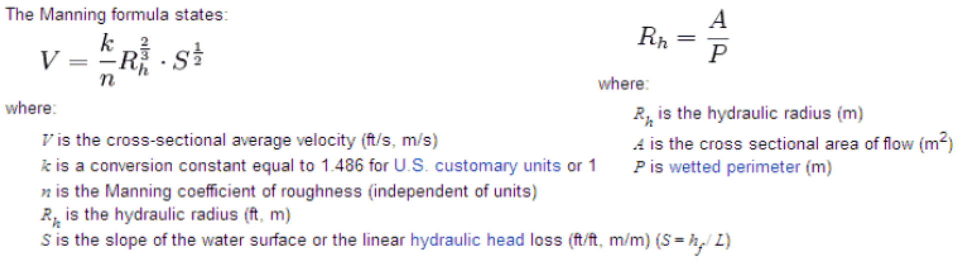
1 in 10 year event

Area	Q (m^3/s)	Depth, d (m)	Flow width (m)	Side Slope (L) 1:X	Centre Width	Side Slope (R) 1:X	Area, A (m2)	Wetted Perimeter, P (m)	Hydraulic Radius, R_h (m)	$V_{Manning's}$ (m/s)	Q (m^3/s)
A1	21.317	0.049	2400	0	2400	0	117	2400	0.049	0.2	21.3
A2	11.851	0.031	2900	0	2900	0	89	2900	0.031	0.1	11.9
A3	50.621	0.073	2300	0	2900	0	212	2900	0.073	0.2	50.6
A4	12.118	0.025	4100	0	4100	0	103	4100	0.025	0.1	12.1
A5	27.142	0.034	5700	0	5700	0	192	5700	0.034	0.1	27.1
A6	18.717	0.033	4100	0	4100	0	134	4100	0.033	0.1	18.7

1 in 100 year event

Area	Q (m3/s)	Depth, d (m)	Flow width (m)	Side slope (L) 1:X	Centre Width	Side Slope (R) 1:X	Area, A (m2)	Wetted Perimeter, P (m)	Hydraulic Radius, Rh (m)	$V_{Manning's}$ (m/s)	Q (m3/s)
A1	49.521	0.081	2400	0	2400	0	194	2400	0.081	0.3	49.5
A2	27.670	0.051	2900	0	2900	0	148	2900	0.051	0.2	27.7
A3	116.001	0.120	2300	0	2900	0	349	2900	0.120	0.3	116.0
A4	28.288	0.042	4100	0	4100	0	172	4100	0.042	0.2	28.3
A5	62.886	0.056	5700	0	5700	0	317	5700	0.056	0.2	62.9
A6	43.532	0.054	4100	0	4100	0	223	4100	0.054	0.2	43.5





The Manning formula states:

$$V = \frac{k}{n} R_h^{\frac{2}{3}} \cdot S^{\frac{1}{2}}$$

where:

V is the cross-sectional average velocity (ft/s, m/s)

k is a conversion constant equal to 1.486 for U.S. customary units or 1

n is the Manning coefficient of roughness (independent of units)

R_h is the hydraulic radius (ft, m)

S is the slope of the water surface or the linear hydraulic head loss (ft/ft, m/m) ($S = h_f / L$)

$$R_h = \frac{A}{P}$$

where:

R_h is the hydraulic radius (m)

A is the cross sectional area of flow (m^2)

P is wetted perimeter (m)

URS Australia Pty Ltd
Level 4, 70 Light Square
Adelaide SA 5000
Australia
T: 61 8 8366 1000
F: 61 8 8366 1001

www.ap.urscorp.com