Whakatane stream catchments study

Hydrological investigations into rain intensities, stream flows, and river levels for use in the design of urban stormwater systems

Bay of Plenty Regional Council
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Bay of Plenty Regional Council
5 Quay Street
PO Box 364
Whakatane 3158
NEW ZEALAND

Prepared by Peter West, Blue Duck Design Limited

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Ken Williams ran the verification simulations on the Maraetōtara Stream Mike11 model.

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Executive summary

Design rainfall intensities, stream flows, and downstream boundary levels have been determined for use in urban stormwater design for the town of Whakatāne and nearby Ōhope and Ōtarawairere in the eastern Bay of Plenty.

Rainfall hyetographs have been generated by nesting the range of intensity-duration couples from NIWA’s HIRDS version 3 software system.

Stream hydrographs have been generated using the USDA’s NRCS (SCS) rainfall-runoff and dimensionless unit hydrograph methods. Catchment parameters have been estimated directly from measured data in two representative gauged catchments within the study area; and extrapolated using literature values and a GIS analysis of soil types and ground covers.

Design river level time-series for use in model downstream boundaries have been generated by combining statistically-derived discharge-duration-probability relationships with river mouth hydraulics, tide data and storm surge in a numerical hydraulic model.

The methodology and tool-sets to carry out these hydrological studies have been assembled in a general way to facilitate further scenario modelling of potential changes in the catchments’ hydrological characteristics – whether these changes are to climate, catchment cover vegetation, or to flood attenuation structures.

Numerical time-series for these boundary conditions have been generated for direct use in computer-based hydraulic modelling for storm-water system design.

Contents

Part 1: Background

1.1 Introduction

Whakatāne township and its beachside suburb Ōhope are subject to extreme rainstorm events and occasional damaging floods. The Whakatāne District Council (WDC) has an extensive network of stormwater drainage and flood protection infrastructure to manage these events and to minimise damage to the community. As part of best-practice public asset management the Whakatāne District Council periodically carries out detailed investigations into the existing system's performance and potential improvements to the system.

The Whakatāne District Council considers that desirable system performance benchmarks would be:

- Primary stormwater networks contain and convey all flows from local rain up to a 10 year ARI standard;
- Secondary networks that include overland flow-paths effectively manage stormwater from local rainfall up to a 100 year ARI without it entering buildings;
- Flows in stream channels and rivers originating outside of the urban area are safely conveyed through or past urban areas without spilling, to an event standard of at least 100 year ARI.

Previous studies and observations by the Whakatāne District Council indicate that several components of the stormwater drainage and flood protection system do not meet these criteria. Starting in mid-2010 the Whakatāne District Council embarked on an extensive detailed study into these systems and potential solutions.

As part of their participation in the study, the Bay of Plenty Regional Council (BOPRC) carried out this part of the investigation to determine the hydrologic boundary conditions required for analysis of the drainage and protection systems.

1.2 Investigation site location

Figure 1 shows the study area. Design river levels are provided for the selected locations shown in the Whakatāne River; design catchment discharge hydrographs are provided for the catchments delineated in red (see Table 1 for catchment names); the design rainfall intensities provided are appropriate for urban Whakatāne, Ōhope and the hill catchments.

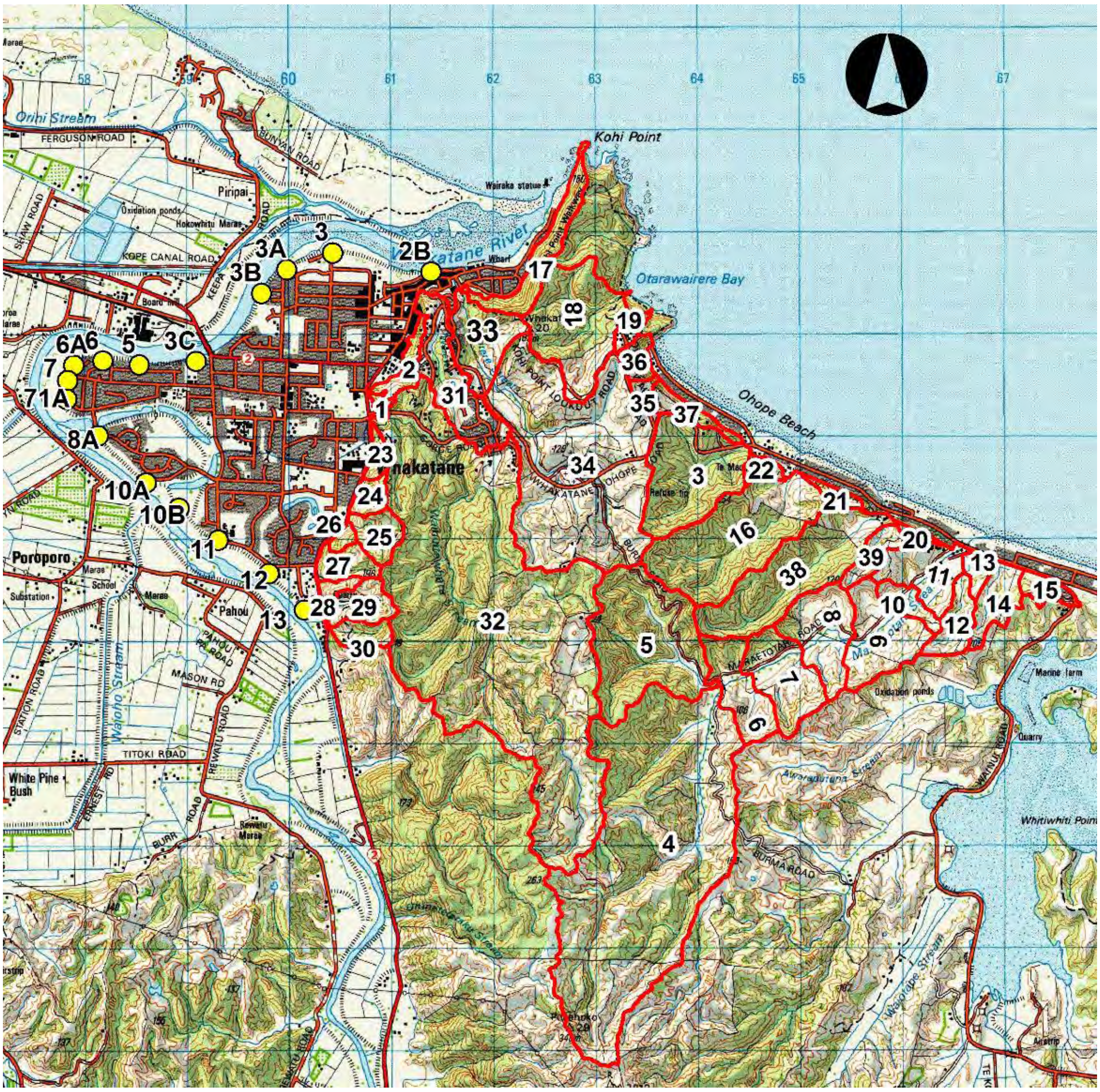

Figure 1 *Study location map*

Table 1 Key for catchment numbers in Figure 1

Catchment Number	Name	Catchment Number	Name
1	Commerce Street 1	21	Pohutukawa Ave 2
2	Commerce Street 2	22	Pohutukawa Ave 3
3	Mahy	23	Valley Road 1
4	Maraetotara 1	24	Valley Road 2
5	Maraetotara 2	25	Valley Road 3
6	Maraetotara 3	26	Valley Road 4
7	Maraetotara 4	27	Valley Road 5
8	Maraetotara 5	28	Valley Road 6
9	Maraetotara 6	29	Valley Road 7
10	Maraetotara 7	30	Valley Road 8
11	Maraetotara 8	31	Waiewe
12	Maraetotara 9	32	Wainuitewhara
13	Maraetotara 11	33	Wairere
14	Maraetotara 12	34	Wairere Gauge
15	Maraetotara 13	35	West End 1
16	Miller	36	West End 2
17	Muriwai	37	West End 3
18	Otarawairere 1	38	Wharekura 1
19	Otarawairere 2	39	Wharekura 2
20	Pohutukawa Ave 1		

1.3 Purpose of this study

The purpose of this study is two-fold:

- To produce reliable boundary conditions (stream flows, rainfall intensities, and downstream water levels) for stormwater system design in urban Whakatāne and Ōhope in the eastern Bay of Plenty.
- To provide a comprehensive foundation for hydrological scenario-modelling in the stream catchments to determine such things as the potential benefits of forest regeneration or floodwater detention basins.

This report is in four parts:

1. Part 1 provides background material.
2. Part 2, covers the selection of design rainfall intensities and durations for this study. The base material is from NIWA's HIRDS version 3 system. This report covers the method of nesting used to apply the NIWA design rainstorm depths in this catchment study.
3. Part 3 outlines the methods used to determine accurate time-varying downstream boundary conditions. These conditions are key to the performance of the stormwater systems in urban Whakatāne and Ōhope.
4. Part 4 covers the investigation into the streams that flow into urban Whakatāne and Ōhope. This includes the application of runoff and routing methods used to determine design discharges; both peak discharge and the volume of floodwater delivered over time.

1.4 General hydrological basis

1.4.1 Event probability

Event probabilities reported here are the probabilities that the event will be exceeded at least once in any calendar year, referred to as the event's Annual Exceedance Probability (AEP). Throughout this report the similar reference method of describing the event's Average Return Interval (ARI) in years is also used. In this report the ARI is taken to mean the same as the inverse of the AEP (1/AEP).

It has been assumed in this study that the probability of occurrence of an extreme flow in any given stream is the same as the probability of the critical duration rainstorm occurring over its catchment to cause the flow.

1.4.2 Climate change and the Inter-decadal Pacific Oscillation

While climate change has been factored into the results of these investigations using the methods recommended by the New Zealand Ministry for the Environment (MfE) (MfE, July 2008) the various statistical analyses of rain, flow, and sea-level data that have been carried out or otherwise used have not included any consideration of time-dependant biases or trends. The Inter-decadal Pacific Oscillation has not been included as a factor in this study.

Where stated, climate change factors have been applied to rainfall intensities at the 2040 and 2090 timeframe levels (non-adjusted current-day values are also produced).

Supplementary sets of design downstream water level boundaries are also provided with sea-level rise incorporated for 2040 and 2090. These downstream boundary files do not include the potential increase in design discharge in the Whakatāne River. Although this last factor would have some effect, it is considered that the impacts to urban stormwater design would not be large.

Part 2: Design rainfall

2.1 Design rainfall intensities

The design rainstorms are based on output from the National Institute of Water and Atomospheric Research (NIWA)'s HIRDS version 3 for the area centroid of the study area. A study carried out for WDC in 2008 (OPUS 2008) compared HIRDS version 1.5b values against statistical analyses of local rain gauges and recommended the use of HIRDS for stormwater design at Whakatāne. NIWA have since released a new version of HIRDS (Version 3). This has since been tested by the BOPRC and is considered to be appropriate for design at Whakatāne. The design rainfall depths shown in Figure 2 and Table 2 below are from HIRDS V3 for the location at the centre of the study area.

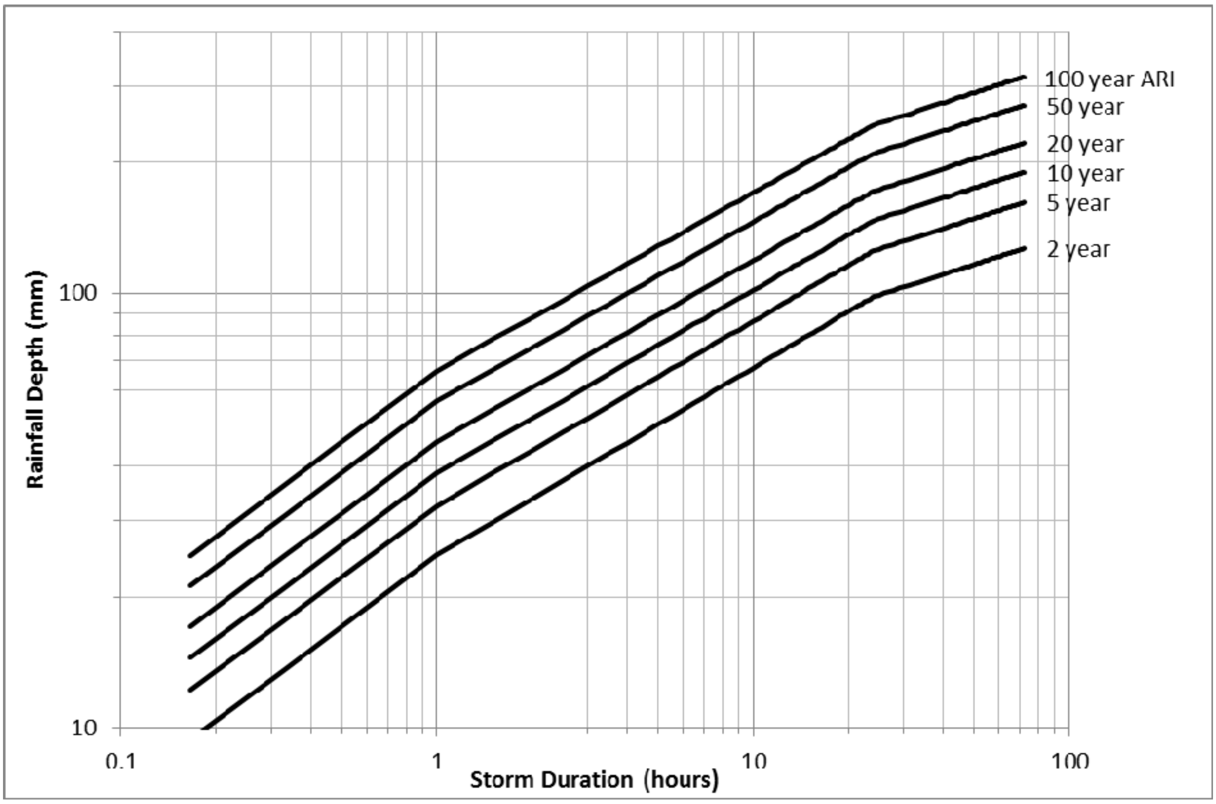

Figure 2 Design rainstorm depths against duration for Whakatāne from HIRDS V3

Table 2 Selected design rainfall depths (mm) with average intensities in brackets (rounded to the nearest mm/hour)

Duration	ARI (years) 2	5	10	20	50	100
10 mins	9 (56)	12 (73)	14 (87)	17 (103)	21 (127)	25 (149)
20 mins	14 (41)	18 (53)	21 (63)	25 (75)	31 (93)	36 (109)
30 mins	17 (34)	22 (44)	26 (53)	31 (62)	39 (77)	45 (91)
1 hr	25 (25)	32 (32)	39 (39)	46 (46)	56 (56)	66 (66)
2 hrs	34 (17)	44 (22)	52 (26)	61 (30)	75 (38)	88 (44)
3 hrs	40 (13)	52 (17)	61 (20)	72 (24)	89 (30)	104 (35)
6 hrs	54 (9)	69 (12)	82 (14)	96 (16)	118 (20)	138 (23)
12 hrs	73 (6)	93 (8)	110 (9)	129 (11)	158 (13)	184 (15)
24 hrs	98 (4)	125 (5)	147 (6)	172 (7)	210 (9)	244 (10)
48 hrs	115 (2)	147 (3)	173 (4)	202 (4)	247 (5)	287 (6)
72 hrs	127 (2)	162 (2)	190 (3)	222 (3)	271 (4)	315 (4)

2.1.1 Nested storms hyetograph

The design rainstorms were constructed to deliver the appropriate rainfall depths for each of the nominal event durations from 10 minutes to three days using a “nested storm” approach. For example a 10 minute (high intensity) rainstorm has been nested within a 20 minute rainstorm, within a 30 minute rainstorm and so on. This is shown in the design hyetograph shown in Figure 3 on page 7 and is tabulated in cumulative format for the full range of design probabilities in Appendix 6.

Although this approach produces conservative design outcomes because it represents the nominated storm probability at all duration indices up to 72 hours in a single simulation, this envelope approach enables a design solution to be thoroughly tested at all durations without a large number of simulations.

The hyetograph has made use of HIRDS V3 eight coefficients to produce a (semi) continuous rainfall/depth relationship (NIWA, May 2011).

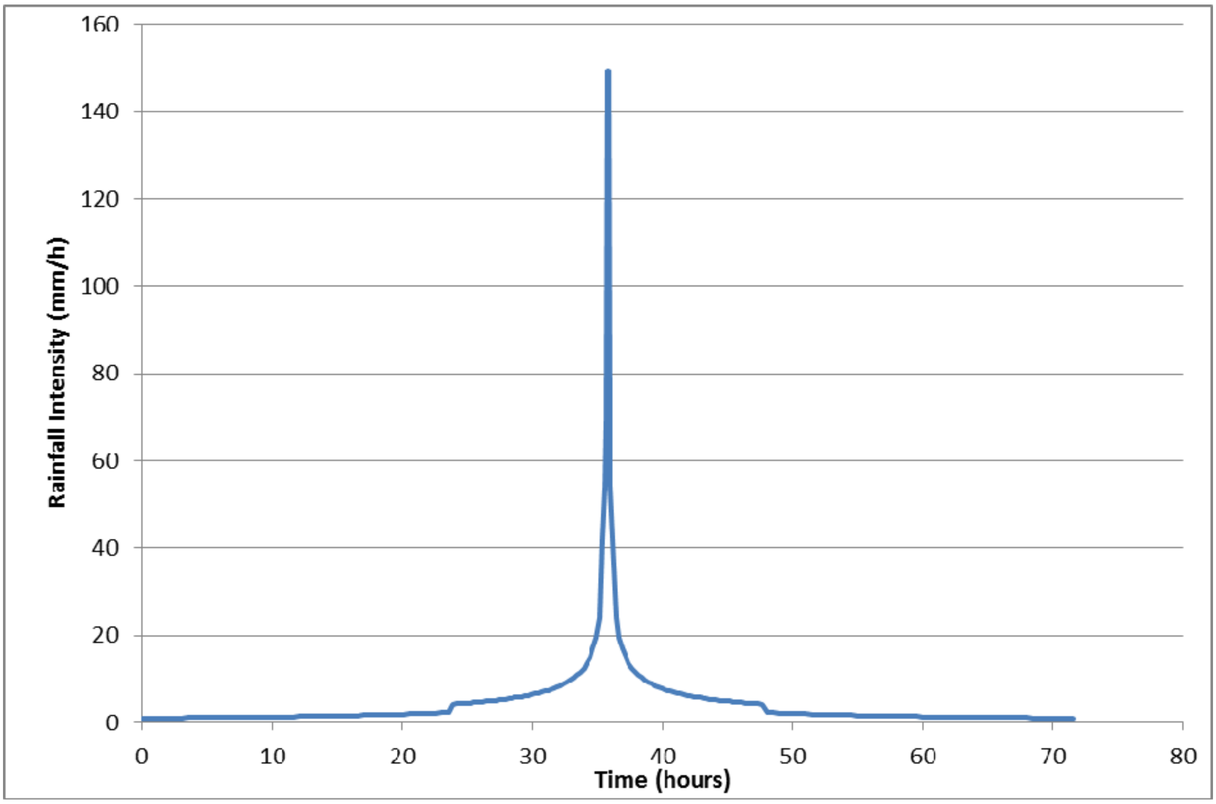

Figure 3 *100 year ARI design storm hyetograph showing the assumed temporal distribution of rainfall intensities*

2.1.2 Observed extreme rainfall events eastern Bay of Plenty

The coastal escarpments in the Eastern Bay of Plenty are thought to be subject to an extreme weather effect that occurs during periods of intense thunderstorm-type events. It is considered that phenomena associated with the steep coastal hills can increase the chance of stalling of frontal convergence zones and this effect is more pronounced when the convergence is near stationary. This leads to extreme rainfall intensities on time-scales of around 1-2 hours. The effect has not been studied in detail, however it was noted to have contributed to the devastating flooding at Matatā in May 2005 (Downs 2005; Blackwood 2005, 2011); and may also have contributed to the severe intensities experienced in Whakatāne in June 2010. Due to the small size of these weather structures relative to rain-gauge spacing it is likely that they are under-represented in the rain record. Blackwood also noted that although the orographic component is small in convective (thunderstorm-like) rainfalls, there is still strong evidence of steep rainfall gradients immediately inland from the coast and thus rainfalls recorded at low altitude gauges are likely to under-estimate mean catchment rainfalls. To account for this effect Blackwood suggested a multiplication factor of 1.3 be applied to HIRDS design rainfall intensities in design analyses for catchments along the Matatā escarpment. Such a factor may also be appropriate for the hill catchments at Whakatāne.

Consideration of this 1.3 factor is recommended when analysing extreme rainfall events in the hills behind Whakatāne. Its use is at the discretion of the designer. The design catchment discharge hydrographs determined for this study have not included the use of this factor.

Part 3: Downstream boundaries – river levels

3.1 Whakatāne River levels – analysis of flow duration

Stormwater system design in urban Whakatāne is governed to a large extent by river levels. All of Whakatāne township drains eventually to the River. While much of the town is drained by pumping stations, these are generally augmented by gravity outlets and some parts of the town rely on gravity drainage alone. Typically the gravity discharge (when conditions allow) is considerably larger than the pumping discharge. Stormwater design is therefore – at least in part – a storage/routing problem and reliable dynamic downstream boundary levels become key to its solution.

In earlier work (West, June 2007) duration-level-probability relationships for the Whakatāne River were determined. That work is summarised in this chapter.

The flow in the Whakatane River has been recorded at Valley Road since 1956. The river duration analysis was carried out on the data collected between the start of 1957 and the end of 2006.

Maxima were extracted from each year of data that were the maximum flows exceeded for precisely the nominal time increment. Standard EV1 and GEV frequency distributions were then fitted to each set of maxima using the method of L-Moments (Hosking 1990). In this way a comprehensive relationship was determined between river flow, duration, and probability. The importance of this analysis is that it provides the designer with a high degree of confidence that, for example, during the critical 20 year flow event the River will not flow at higher than 1032 m^3/s for more than 24 hours.

Similar studies have been carried out in New Zealand that analysed the volume of river discharge within specific time intervals.

The outcomes were used to generate a synthetic river hydrograph to represent the envelope described by these discharge/duration couples. Based on observations of historic flood hydrographs for the Whakatāne River it was assumed that the peak occurred at one-third of the flood duration for each duration increment. These synthetic design hydrographs are shown in Figure 4. It should be noted that this approach will lead to slightly conservative design outcomes because it represents the envelope of all likely design hydrographs – a natural flood hydrograph at the nominal event probability would only touch this envelope curve in two places at most. The benefit of using the envelope hydrograph is that only one simulation is needed to test the range of possible critical flood durations.

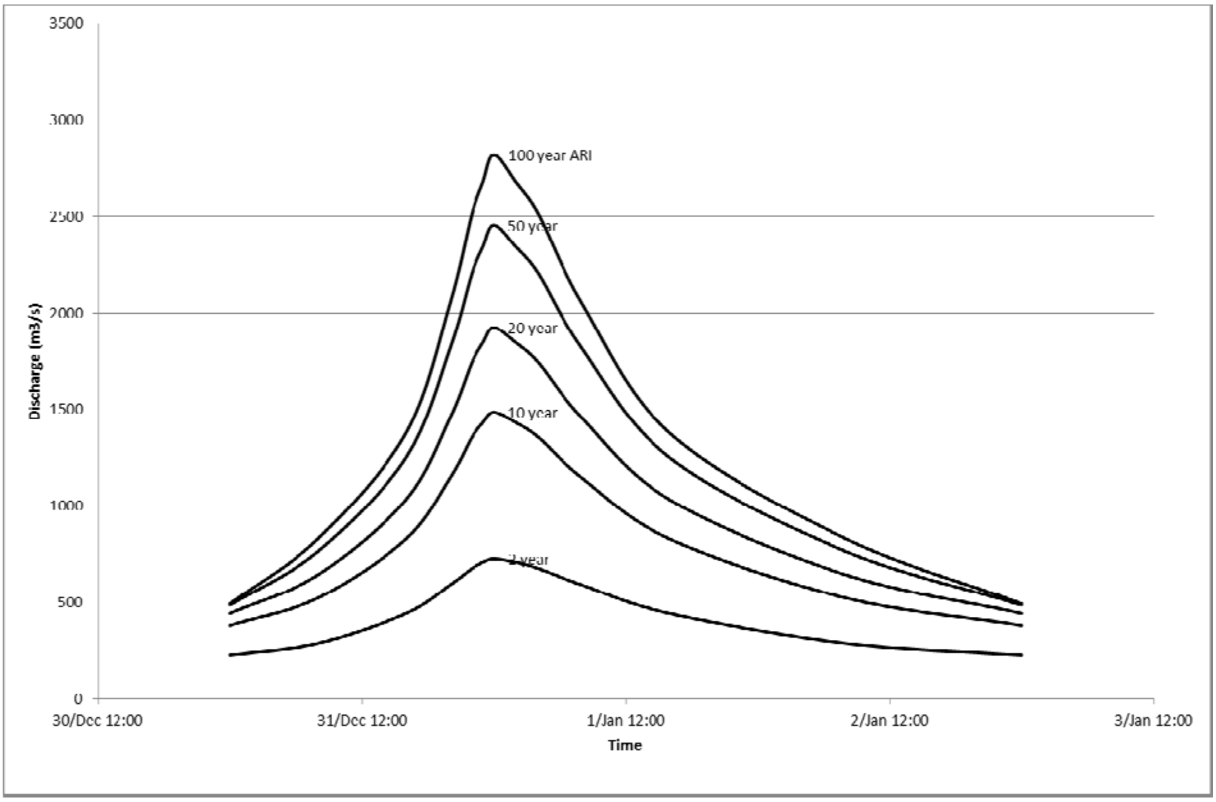

Figure 4 *Whakatane River design hydrographs; flood duration is explicitly included*

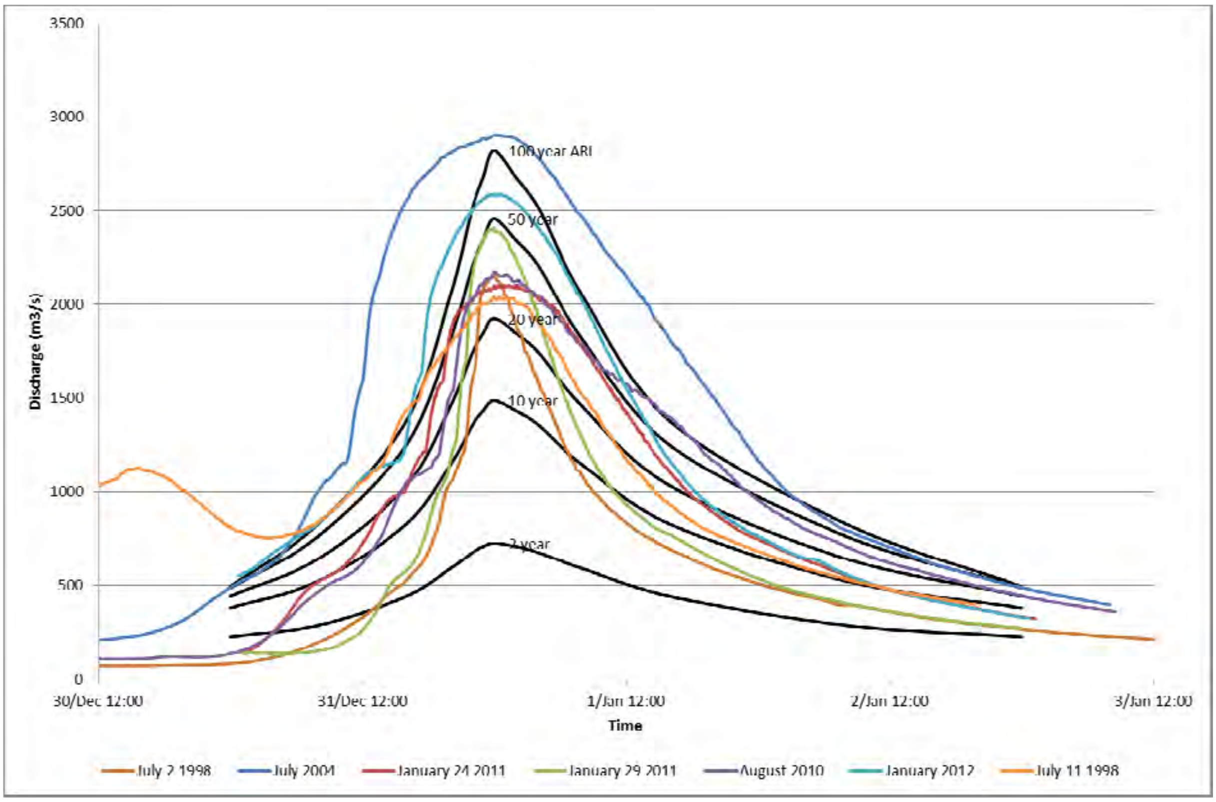

Figure 5 *Whakatāne River design hydrographs against selected recent river flood events*

3.2 Sea level, tides, and storm surge

To determine design water-level time series for Whakatāne River a numerical hydraulic model of the lower river and mouth was run in Mike11 software. The model set-up was adopted from work by Wallace in 2004; Wallace's "pre-breach-SF" configuration at the river mouth was used.

Tides were generated with a sinusoidal approximation of the M2 and S2 celestial tides at Whakatane from the RNZ Navy's Nautical Almanac, elevated to represent design storm surge as per BOPRC's *Hydrological and Hydraulic Guidelines* (Guidelines 2001/04).

The peak water levels from the guideline are from a statistical analysis of recorded sea levels at Moturiki Island, Mount Maunganui (NIWA, 1997). It naturally included celestial tides, and storm surge. To this an increment has been applied for an observed increased storm surge magnitude in the Bay of Plenty east of about Matata (Blackwood, 2000). The guideline design water levels also include an increment of sea level rise as recommended by the Ministry for the Environment (July 2004). Where stated, water-level time series have also been prepared without sea level rise.

In lieu of any comprehensive data on the temporal aspects of storm surge, it has been assumed that the storm surge increment has a triangular onset shape with duration of 48 hours.

At Ōhope, where river dynamics are not a factor, the downstream boundaries generated directly from the tide, storm-surge, and climate change factors already outlined in this section may be used (Available from BOPRC).

3.3 Climate change impacts on downstream boundaries

For the determination of stormwater design downstream boundary values at Whakatāne and Ōhope, climate change impacts were included as follows.

- The effects of climate change on sea level to the year 2090 were included as recommended by the Ministry for the Environment (MfE, July 2004).
- The estimates of design river discharge are based on long-term statistical analysis where trends and biases were not taken into account. These results have not been altered to represent the expected effects of climate change. It is recognised that climate change is expected to impact on river discharge probabilities, and that specific advice is available from MfE relating to increased rain intensities; however a detailed study is yet to be carried out on these effects in the Whakatāne River.
- The stormwater system designer is the person best placed to estimate the impact on design uncertainty from not including climate change effects to the Whakatāne River design discharge. A method suitable for sensitivity analysis is to apply a halving of the river flow design probability i.e. the current 100 year river flow is expected to be up to twice as probable (50 year flood) by the year 2040 or up to four times as probable (25 year flood) by the year 2090 (MfE, July 2008, Table 1 for extreme rainfall).

3.4 Event combination statistics at downstream boundaries

The selection of event combinations for use in design of adjacent waterways has not yet been fully investigated in New Zealand. The development of a model of statistical interdependence between concurrent river levels, sea state, and Whakatāne design rainfalls is yet to be carried out. In the meantime the BOPRC gives a guideline approach (Guidelines 2001/04).

3.5 Downstream boundary values

Resulting design water-level time-series for Whakatāne River at a selected location immediately downstream of the Landing Road Bridge are shown in Figure 6. The various time-series in the figure represent different combinations of design river/sea events. A collection of design water-level time-series for use as downstream boundaries have been prepared from the results of the hydraulic model. These are for the river locations labelled in the study location map: Figure 1, and are included in Appendix 1. For design river levels relating to other climate change scenarios (other than the 2090 mid-range sea level rise scenario), designers can approach the Regional Council directly.

Alternatively stormwater designers may choose to apply a river discharge time-series directly and include an explicit representation of the lower Whakatāne River in their own analysis. For this purpose the design river hydrographs described in this Part are included in Appendix 2.

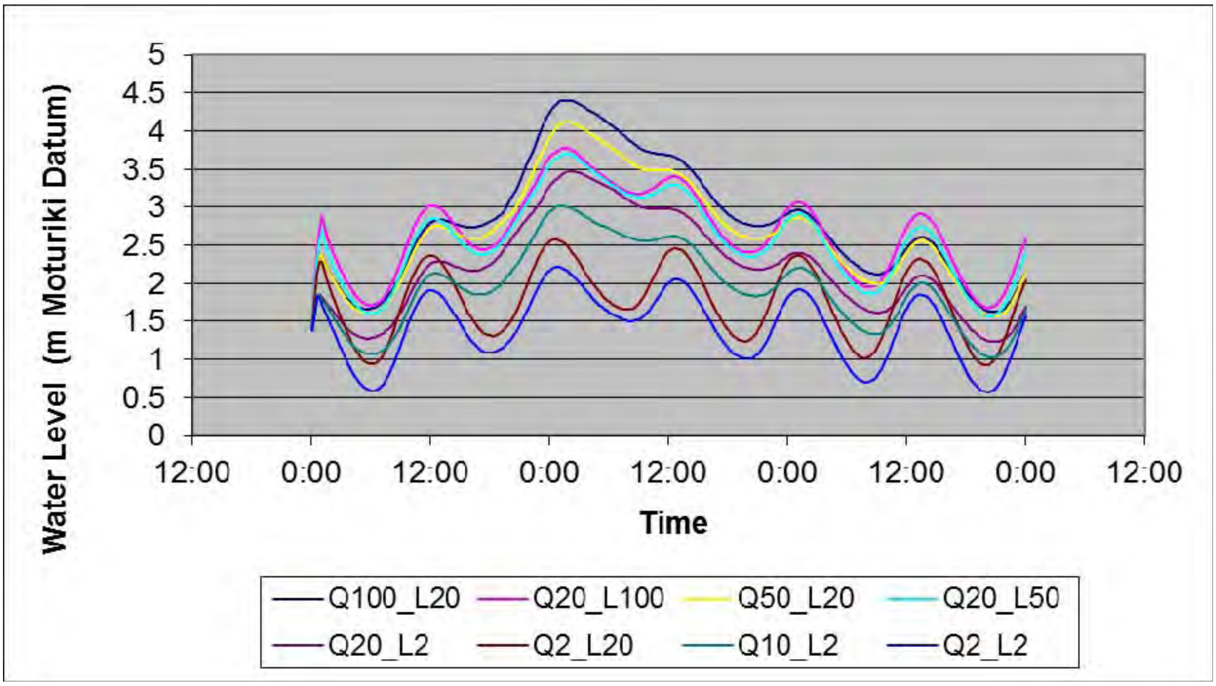

Figure 6 Design water level time series for Whakatane River at Landing Road Bridge

Part 4: Catchment runoff – design stream hydrographs

This study assessed catchment design discharge for each of the stream catchments that potentially contribute to urban flooding in Whakatāne and Ōhope. Runoff from within an urban environment is best assessed within the stormwater design process and is not addressed here (except for the recommended rainfall intensities in Part 2).

4.1 Catchments – study extents

Thirty-five catchments were identified and analysed. They are all predominantly non-urban hill catchments that deliver floodwaters to the urban areas of Whakatāne, Ōhope, or Otarawairere. Some of them do contain urban areas in their upper catchments. These catchments are shown in Figure 1 on page 2. They were delineated automatically within GIS software then manually inspected and altered where appropriate.

Some small catchments along the escarpments have been amalgamated – example *Commerce Street 2* and at *West End Ohope*. In these cases a designer may choose to subdivide the design hydrograph by catchment area and allocate amongst several stormwater system nodes.

In follow-up work sub-catchments at West End have been defined and analysed to a finer resolution. From the three catchments at West End Ōhope, outlined for this study, 28 catchments were identified and analysed. That work is reported on separately, a copy of which is included in Appendix 5.

4.2 Available hydrological data

The availability of hydrological data relevant to this study is summarised below.

4.2.1 Rain gauges

Bay of Plenty Regional Council maintains a network of automatic rain gauges throughout the region. These are maintained and calibrated on a three monthly basis. Data is stored in a TiDeDa database. Nearby gauges are Whakatāne-at-Kopeopeo and Rangitāiki-at-Thornton. The Kopeopeo gauge is the nearest to the Wainui te Whara catchment and was used to analyse flood events from that catchment.

NIWA maintains an automatic rain gauge at Whakatāne Airport. Values from this gauge were appraised when selecting event rainstorm data to apply at Wainui te Whara.

Whakatāne District Council has several rain gauges in Whakatāne and Ōhope. These are not routinely calibrated and gaps are apparent in the data. In several cases, buildings or trees would be interfering with the rain catch. Data is stored in both a SCADA database and an SQL differential database. Data from these gauges has been appraised for some storms but for a range of reliability issues, the data has largely not been included in the analyses.

A Ministry of Works automatic rain gauge was maintained in the Wairere Stream catchment from 1967 until Jan 1994. This coincided with a stream gauge in the same catchment and has been used extensively in this study. Several manual rain gauges were also maintained in the Wairere catchment during this period. These have been used to confirm event rainfall amounts.

An automatic rain gauge and stream gauge were maintained by NIWA in the nearby Wainui Stream catchment for several years. These would likely provide valuable data to evaluate the findings in this study but have not yet been analysed due to time constraints.

Manual rain gauge records are available for Maraetōtara Valley, Ohakana Island in Ōhiwa Harbour and Port Ōhope. This data has been used to gain an understanding of likely geographical spread of key observed storm events at Wainui te Whara and Maraetōtara catchments.

4.2.2 Stream gauges

An automatic stream gauge has been maintained by the Regional Council on the Wainui te Whara Stream in the Mokoroa Gorge since November 2006. The rating curve above about 8 m^3/s is based on only one gauging at 30 m^3/s in June 2010. Due to the difficulties on site at the time, staff associated with this gauging estimate its accuracy of +- 20% (Ellery, 2011).

An automatic stream gauge was maintained in the Wairere Stream catchment between 1967 and 1993. Data from this site was used in this study in conjunction with the rain gauge in the same catchment.

4.2.3 Flood observations

Flood debris levels were recorded at Maraetōtara near the community hall following disastrous flooding in June 2010. A comprehensive survey of flood debris was collected over several kilometres of the Maraetōtara Stream for the 29 January 2011 event.

Although not used in this study, detailed information of flood ponding depths and durations, along with pump ammeter records from recent flooding is available for Whakatāne. This can be used for calibration of numerical stormwater models. This is especially valuable to enable reliable estimation of urban infiltration variables.

4.2.4 Catchment information

Bay of Plenty Regional Council holds detailed soil maps and land cover maps for the region including the study area, in their GIS database. A digital elevation model is also available for the study area based on aerial LiDAR survey, and photogrammetry.

4.3 Hydrological methods

The pumping/storage behaviour of many of Whakatāne's stormwater systems requires a mass-conserving method of analysis. The method should provide accurate estimates of peak discharge as well as reliable estimates of total volume discharged over time. The United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) methods of Runoff Curve Numbers, and Dimensionless Unit Hydrographs was selected for these reasons. This method has been widely used in New Zealand following its introduction in Auckland Regional

Council's TP108 publication (ARC 1999). This publication was produced for the ARC by Beca Carter Hollings and Ferner Ltd (BCHF).

In this study two gauged catchments within the study area – Wairere Stream and Wainui te Whara Stream – were analysed to derive the key parameters (Curve number and Time of Concentration). With the aid of literature values, curve numbers were then related to both catchments' soil types and land cover types, and then extrapolated across the remaining study catchments. Resulting hydrographs in the gauged catchments were compared against the various recorded stream-flow events. Results at Maraetōtara were verified against debris levels from the 1 June 2010, and 29 January 2011 flood events by applying the flows to a Mike11 numerical hydraulic model.

4.3.1 NRCS curve number method

This method is widely known in New Zealand as the Soil Conservation Service (SCS) Curve Number Method. It applies an empirical relationship between rainfall and runoff. A catchment's response to rain is considered to be described via its assigned Curve Number (CN). The method's governing equations (for SI units) are:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad \text{(eq. 1)}$$

$$S = 25.4\left(\frac{1000}{CN} - 10\right) \qquad \text{(eq. 2)}$$

Where:

Q is runoff in mm; P is precipitation (mm); Ia is the initial abstraction assumed to occur before runoff begins. Equation 1 is only valid for P > Ia. S is the potential maximum soil retention not including Ia. CN is the Curve Number.

The first equation is applied cumulatively and is readily applied to a cumulative rainfall curve. It is apparent from equation 1 that the runoff proportion of incremental rainfall increases throughout the storm. Outcomes prove to be very sensitive to the initial abstraction variable Ia.

For this study, event curve numbers were determined for each significant flow event recorded in the two gauged catchments. From each of these two samples a single catchment CN was determined by taking the mean of the log of S for each event (this method is described fully in NEH Part 630 Chapter 5).

From these two catchment Curve Numbers, soil types were classified into the NRCS standard A, B, C, or D soil classes. The area matrix of soil type vs. Land Cover was determined for each catchment using GIS software. Standard CN values from literature were used to sort the main soil groups into the standard soil classes. Soil descriptions were used to guide and validate this process. Detailed comments on this process, with charts and hydrographs, are made in sections 4.6 and 4.7 below.

4.3.2 Dimensionless unit hydrograph method

In the NRCS method, increments of runoff over each time-step are applied in a standard unit hydrograph approach. In early versions of the method and in ARC's TP108 a single dimensionless unit hydrograph was used for all catchments – scaled against time-to-peak, and peak UHG discharge. More recently the NRCS has adopted a Gamma function representation that allows selection of a UHG shape parameter (m). The gamma function is shown below. The original SCS UHG with the peak rate factor PRF=484 (12.5 in S.I. Units) equates to an "m" value of 3.7.

$$\frac{Q}{Q_p} = e^m \left[\left(\frac{t}{t_p} \right)^m \right] \left[e^{\left(-m \left(\frac{t}{t_p} \right) \right)} \right] \qquad \text{(eq. 3)}$$

Peak UHG discharge is calculated from the following equation.

$$q_p = \frac{PRF \times Q_i \times A}{t_p} \qquad \text{(eq.4)}$$

Where: qp is the peak flow rate of the UHG (m^3/s). Qi is the increment of runoff (mm) in the unit time step. A is catchment area (km^2). Tp is the time to peak of the UHG (minutes). PRF is the Peak Rate Factor and is a function of the UHG shape. PRF is a dimensionless number but because consistent units are generally not used, it is dependent on these; the American PRF's relate to units of square miles, inches, cusecs and hours. For this study, where various UHG shapes were trialled, the PRF was determined by integrating the area under the UHG curve and ensuring conservation of mass.

4.3.3 Time of concentration

Five methods for estimating catchment Time-of-Concentration (Tc) were trialled. The SCS 'Watershed Lag" method (NEH Part 630 Chapter 15); BCHF TP108 method; Ramser Kirpich Method; Bransby Williams Method; and a method from the NZ TM61 document labelled "US SCS method". These last three can be found in NZ Ministry of Works TM61 document.

The dimensionless UHG method is very sensitive to the selection of Tc. Similar to the BCHF's TP108, unit hydrograph time-to-peak (Tp) is assumed to be 2/3 of the estimated catchment time-of-concentration (Tc).

For this study Tp was determined for each of the two gauged catchments by the following iterative process: The UHG was run for each recorded rainstorm, with the measured curve number for that event at a range of Tp values and evaluated against how well the results matched the recorded peak discharge. For each of the two catchments a Tp value was selected that resulted in the best fit over the range of events on record.

In parallel with the process for determining Tp in the two gauged catchments, variations in the UHG shape parameter "m" were also trialled. These were evaluated by eye based on the how well the resulting hydrograph fitted the measured stream hydrograph; particular attention was applied to the timing of the peak flow.

The resulting gauged catchment Tp values were compared against (2/3 times) the estimates of Tc by the five methods above. It was found that BCHF's TP108 method gave the closest estimates in both cases. That method was then used to estimate Tc for the other catchments in the study.

A minimum time of concentration, Tc=10 minutes was used in this study.

4.3.4 **Initial rainfall abstraction**

In the curve number method, rainfall is "lost" by two mechanisms: initial abstraction and ongoing abstractions. Ongoing abstractions are controlled by the runoff equations (Eq. 1 and 2 above) via the selection of Curve Number. Initial abstractions are effectively deleted from the start of the rainfall record – both in a design approach and in retrospective analysis.

Results are sensitive to the selection of Ia, especially for lesser magnitude storms. It is less obvious that the choice of catchment Curve Number is also dependant on the selection of Ia. Previous studies in New Zealand appear to have overlooked this effect.

The NRCS recommend taking Ia=0.2S. Although their literature does not discourage other approaches, their tables of recommended CN values are all based on that model. In this study it was found that taking Ia=0.2S led to a very poor approximation of the rising limb of the recorded hydrographs. Better results were obtained with a constant value of Ia=5 mm (as recommended by BCHF in the TP108). We also used Ia=0 mm for events with wet antecedent conditions (high baseflow).

However this change in the initial abstraction model impacts on the selection of CN. The magnitude of the impact is not constant over the storm. Figure 7 below shows the effect on curve number when changing initial abstraction models from Ia=0.2S to Ia=5 mm over a range of CN for selected values of P (the necessary change to CN to produce the same value for runoff). Figure 8 shows the same data over the course of a rainstorm from 100 mm to 350 mm for selected Curve Numbers.

From these findings it is concluded that altering the Initial Abstraction model also profoundly alters the nature of the runoff model in general. Curve Numbers from literature are therefore not directly applicable and perfect conversions from literature values will not be practical.

Notwithstanding the above, literature values from the NRCS were used as a basis for selection of curve number in this study. They were adjusted based on a polynomial relationship fitted to the 200 mm precipitation curve in Figure 7 (the formula is shown on the chart). 200 mm precipitation depth was selected because it coincides approximately with the peak rainfall intensities in the Whakatāne design storms.

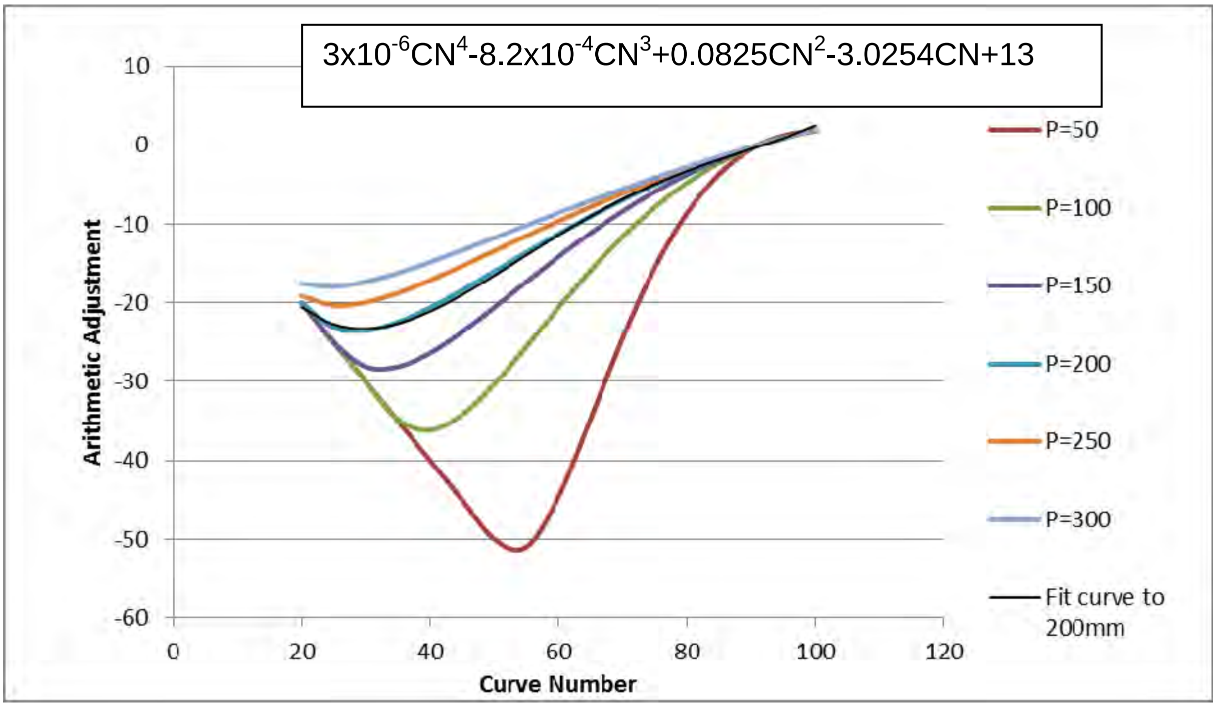

Figure 7 *Arithmetic Adjustment to Curve Number necessary to return the same runoff depth when changing between initial abstraction models (from Ia=0.2S to Ia=0.5 mm); selected precipitation depths shown; the formula shown is for P=200 mm*

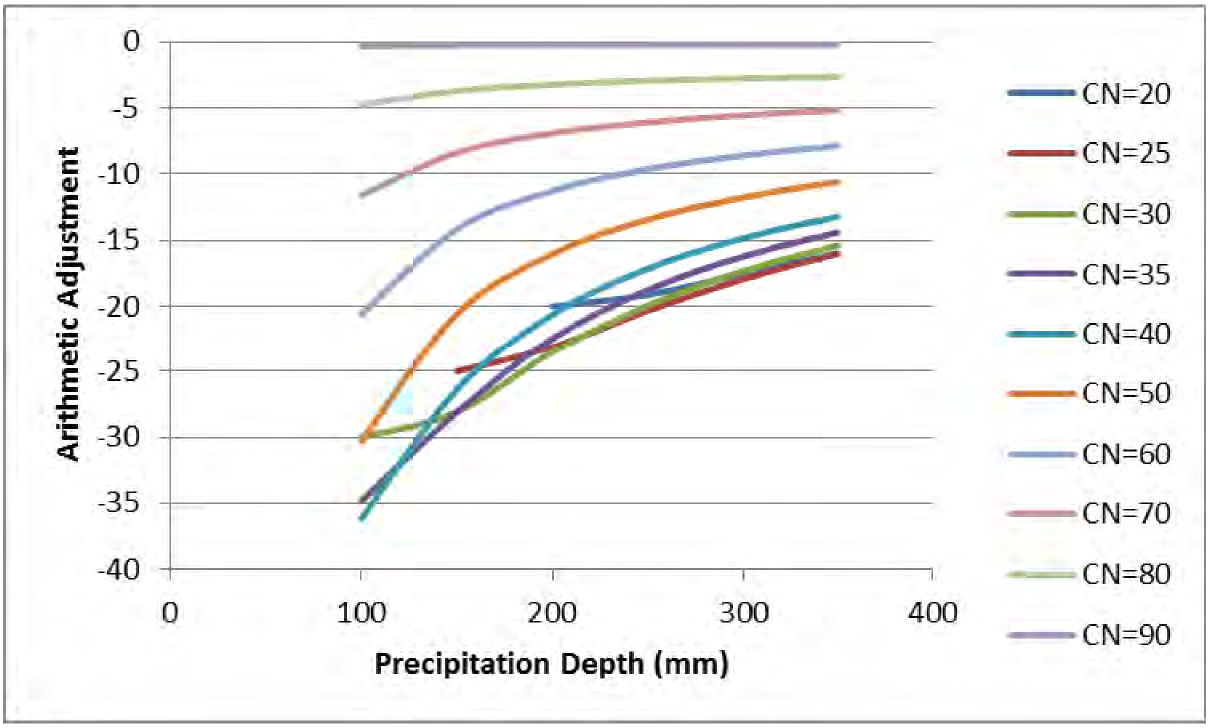

Figure 8 *Arithmetic Adjustment to Curve Number necessary to return the same runoff depth when changing between initial abstraction models (from Ia=0.2S to Ia=0.5 mm); selected Curve Numbers shown*

4.3.5 Base flow

The determination of curve number from event data begins with extraction of total event precipitation amount and effective catchment runoff amount. Storm runoff must be separated from baseflow. In this study baseflow was assumed to be all stream flow in the event hydrograph below the straight line that joins the flow at start-of-rain; and flow at end-of-rain-plus-60-hours. 60 hours was selected arbitrarily based on observation of the recession in these natural hydrographs. Ideally this value would align with the maximum extent that the UHG has impact on the synthetic hydrograph. The tail of the UHG used in this study (m=2) extends effectively 5.5 times Tp from the end of rain (a little over nine hours in both the gauged catchments). However it is hoped that further work on selecting an improved mathematical representation of the UHG would yield a UHG with a tail of about 60 hours. Further comments on the shape of the synthetic hydrograph recession are made in section 4.4 below.

For the design hydrographs the mean base-flow of the events on record was added to the UHG synthetic runoff hydrographs as a constant value. In the ungauged catchments the selected design base flow was the Wairere Stream design base flow applied proportional to catchment area.

4.4 Wairere Stream event data

The eight largest recorded discharge events on the Wairere catchment from between 1967 and 1992 were analysed. Two of these were discounted due to various complications with the data that made the results unreliable – for example the December 1967 event has only three rain data points that, when applied, lead to the resulting hydrograph peak arriving four hours earlier than that measured. Also the recorded hydrograph data recedes from 3.5 m^3/s to 0.3 m^3/s in about 30 minutes – completely out of line with the other data. Attempts were made to unravel such data anomalies but in most cases little could be discovered.

For events that started with a high stream flow, when applying the constant Ia model, the initial abstraction value was not applied i.e. Ia=0 mm.

The remaining six events are summarised in Table 3. The resulting catchment curve number is from the mean of the sample: log of S. 10^{th} and 90^{th} percentiles are also estimated to guide sensitivity analysis.

Table 3 Event rainfall and runoff depths at Wairere Stream gauge; also derived S and CN values

Event	Rain (mm)	Runoff (mm)	Ia (mm)	S (mm)	Log S	Event CN
1992	211	38.7	5	891	2.95	22.2
1984	122	32.1	5	309	2.49	45.1
1979	178	32.5	5	747	2.87	25.4
Nov-67	134	21.6	5	641	2.81	28.4
1968	54	13.6	0	160	2.21	61.3
1970	145	37.9	0	410	2.61	38.3

mean(logS)	2.66
std_dev(logS)	0.279
S_{50}=	453
S_{10}=	1033
S_{90}=	199

CN_{50}	**35.9**
CN_{10}	19.7
CN_{90}	56.1

Figure 9 on page 21 shows the six events on a Rain vs Runoff plot. Also drawn are standard runoff curves for Ia=5 mm (Blue) and Ia=0.2S (Black). A visual appraisal of Figure 9 suggests that a better fit between rainfall and runoff for this catchment could be found – in both cases the data suggests that the standard SCS curves are too steep – although the Ia=5 mm model gives the best visual approximation. Any further alteration/improvement of the rainfall/runoff relationship would involve departing from the NRCS runoff formula altogether; which was considered beyond the scope of this investigation.

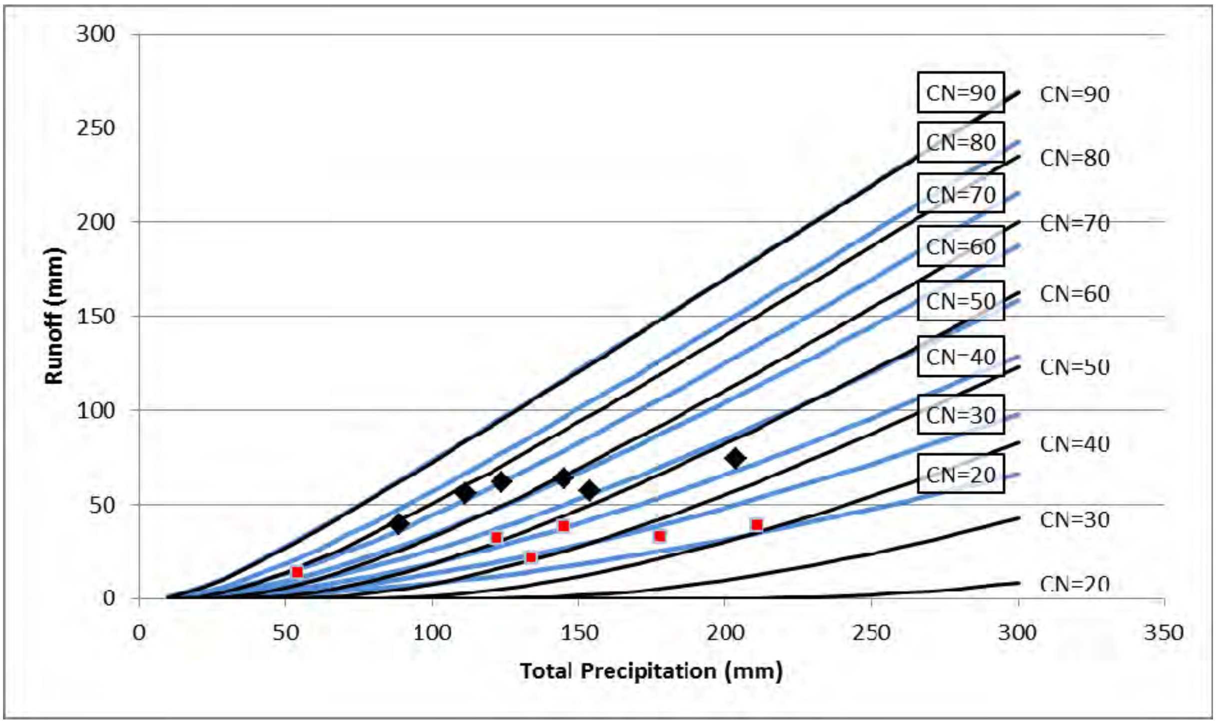

Figure 9 *Standard Runoff Curves for both Ia=0.2S (Black) and Ia=5 mm (Blue with boxed labels); also showing values from six largest flows on record in Wairere Stream between 1967 and 1993 (red squares) and in Wainui te Whara Stream between 2006 and 2011(black diamonds).*

The best fitting of synthetic hydrographs over these six events was found by eye using Tp=100 minutes and m=2. Quality of fit was not assessed numerically. An example is included in Figure 10 on page 22 for the June 1979 event. The two synthetic hydrographs are shown against the recorded hydrograph (red): one is produced with the curve number derived for that particular event (CN=25.4 in black); the other is produced with the median curve number (CN=35.9 in blue). Both of these hydrographs have Tp=100 minutes and m=2.

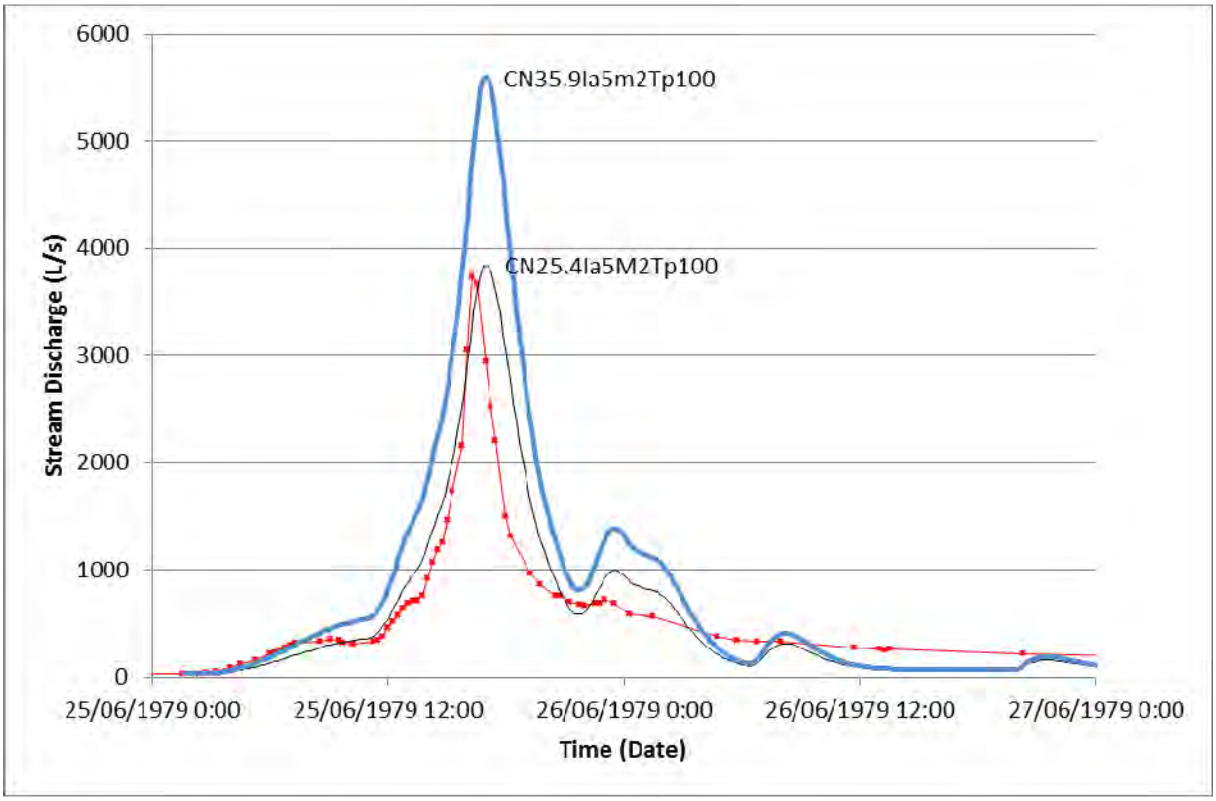

Figure 10 Generated hydrographs against measured for Wairere Stream in June 1979; CN=25.4 (black); CN=35.9 (Blue); Measured (Red)

Similar plots for the eight events analysed are included in Appendix 3.

It was noted that for most of the events tested, the tail of the measured hydrograph is not well reproduced in the synthetic hydrograph. As is apparent in Figure 10, the method applies more runoff to the upper part of the receding limb than is desirable and underrepresents the long tail of the flood. Experiments with various values of m, the UHG shape factor, failed to adequately rectify this. This will be an area for further work; however the current results are fit-for-purpose in that they adequately predict peak flows and deliver a mass-conserved time-dependant quantity of floodwater to the hydraulic model zone.

4.5 Wainui te Whara Stream event data

Eleven of the largest flow events on record were analysed from this dataset. Of these only six were selected for use in determining the catchment Curve Number. The five outliers clearly showed that rain was inadequately represented in the record (the nearest rain gauge is at Kopeopeo, about 3 km from the catchment area centroid).

As at Wairere Stream, for events that started with a high stream flow, when applying the constant Ia model, the initial abstraction value was not applied i.e. Ia=0 mm.

For the six storms analysed in detail, data from the other rain gauges in the vicinity were inspected to assess the degree of variation across the Wainui te Whara catchment. In all of these cases it was decided to apply the Kopeopeo rainfall data directly. Table 4 on page 23 and Figure 9 on page 21 show the event rainfall-runoff data in the curve number context. A catchment Curve Number of 60.5 is indicated by the event data when applying Ia=5 mm.

Table 4 Event rainfall and runoff depths at Wainui te Whara Stream gauge; also derived S and CN values

Event	Rain (mm)	Runoff (mm)	Ia (mm)	S (mm)	Log S	Event CN
Jun-10	124	61.7	0	125	2.10	67.0
Jan-11	111.5	55.8	0	111	2.05	69.5
May-10	144.8	64.1	5	165	2.22	60.6
Jun-09	203.6	74.2	5	333	2.52	43.3
Jul-08	88.8	39.2	0	112	2.05	69.4
Jan-11	154	57.0	5	241	2.38	51.3

Mean(logS)	2.22
std_dev(logS)	0.196
S_{50}=	165.7
S_{10}=	295.2
S_{90}=	93.0

CN_{50}	60.5
CN_{10}	46.3
CN_{90}	73.2

Figure 11 shows the June 2010 event hydrograph alongside two synthetic reproductions. The measured hydrograph is in red, the synthetic hydrograph produced using the event curve number is in black, and the synthetic hydrograph produced using the statistically derived catchment average (median) curve number is in blue. Similar plots for the other events on record are included in Appendix 3.

Interestingly the parameters that gave the best hydrograph fitting across the six events were found to be the same as for Wairere Stream: Tp=100 minutes, m=2.

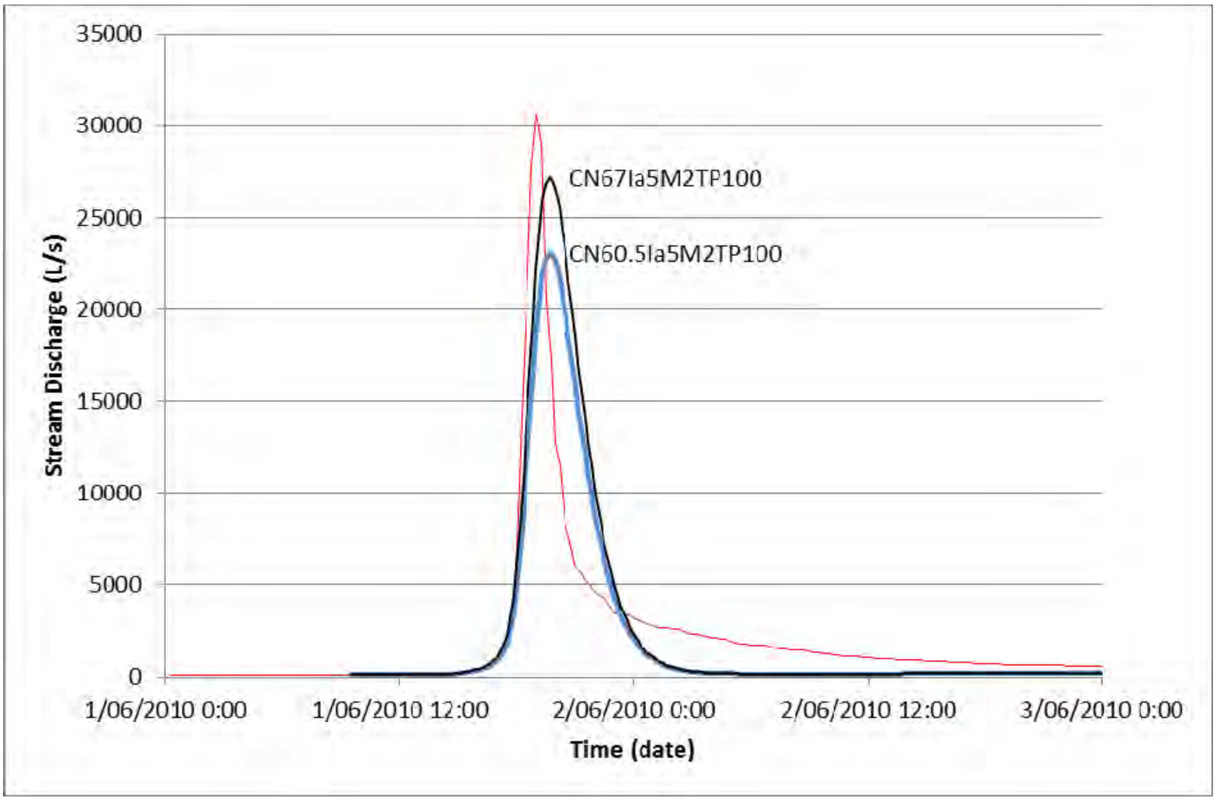

Figure 11 Generated hydrographs against measured for Wainui te Whara Stream in June 2010; CN=67 (black); CN=60.5 (Blue); Measured (Red)

4.6 Applying soils classification

The process that was used to apply soil and land cover information to the outcomes of the events analysis of sections 4.3.1 through 4.5, is described here in two stages for simplicity. However by necessity, both of these processes occurred simultaneously in the same GIS analysis.

The NRCS groups soils into 4 classes: A, B, C, or D on their ability to absorb rainfall (A being most permeable). Published tables of soil class recommend Curve Number values depending also on their vegetation cover (see Table 5 on page 28).

The information about distribution and nature of the soils in the study area was taken from the report: *Soils of Whakatane County* (Rijkse, W.C. 1993). BOPRC have the information digitised in GIS format. Figure 12 on page 26 shows the data overlaid onto a topographical map of the study area. The six main soils in the study area were grouped according to Rijkse's descriptions as follows:

- Whakatāne Hill Soil (WxH) and Whakatāne Loamy Sand (Wx) were grouped as the most highly permeable. They are described by Rijkse as wholly based on volcanic tephra. It was noted that these soils occupy locations with higher elevations, with more gentle slopes, that have less history of deep valley-forming erosion.

  It was found that these soils aligned best with a NRCS soil class of AB; midway between classes A and B.

- Tawhia Steepland Soils (TyS), and Ngatiawa Steepland (NS) Soils were grouped as less permeable. They are described as tephra overlying sandstone and greywacke. By comparison with the grouping above, these soils occupy locations on the valley sides. It was perceived that these soils are therefore shallow by nature with weathered greywacke clays and marine stone layers not far beneath the surface. To this grouping was added the valley-bottom soils at Maraetōtara (Ou).

  This group of soils was assigned a NRCS class of C.

- The soils on the face of the escarpments were grouped together as more highly impermeable. They are described by Rijkse as colluvium on greywacke (Maa, Re).

  The escarpment slope soils were assigned Class D.

The soil groups were classified such that the resulting area-weighted average catchment curve numbers (based on literature tables; see Table 5) closely matched the measured values from gauge data. This involved taking catchment ground cover into account.

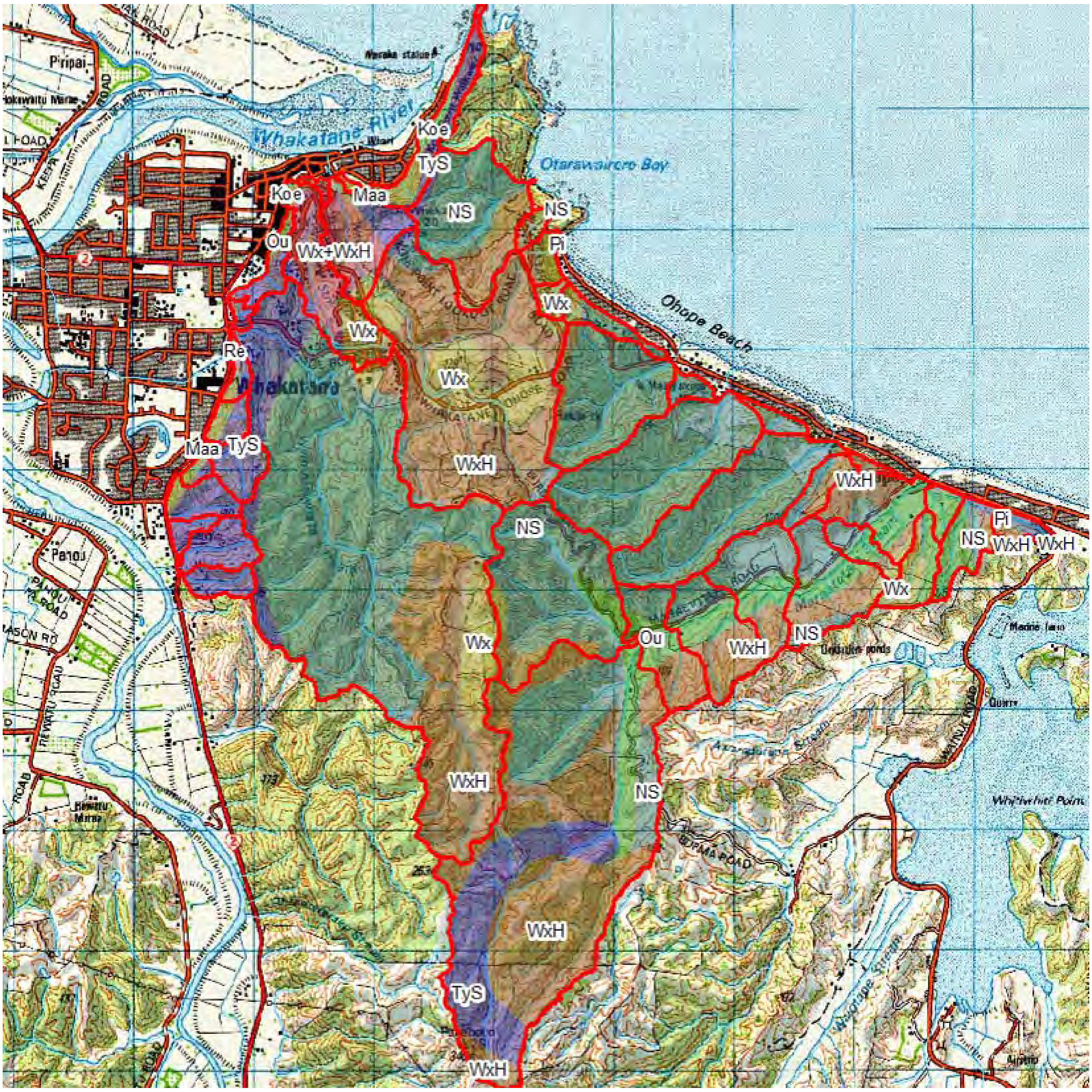

Figure 12 Soil map for the study area, labelled values are "Soil Code"; the red polygons are the study sub-catchments

4.7 Applying land cover information

The Ministry for the Environment Land Cover Database *LCDB2* (2001) was applied in a GIS analysis to determine the proportional areas of each study sub-catchment under various land covers. The map in Figure 13 shows the LCDB2 data for the study area.

The Ministry of Works Representative Catchment Index (1970) lists Wairere at Wainui Road catchment as having 90% pasture cover. LCDB2 gives this value at 76.5% (2001). In this study the 2001 values were used throughout.

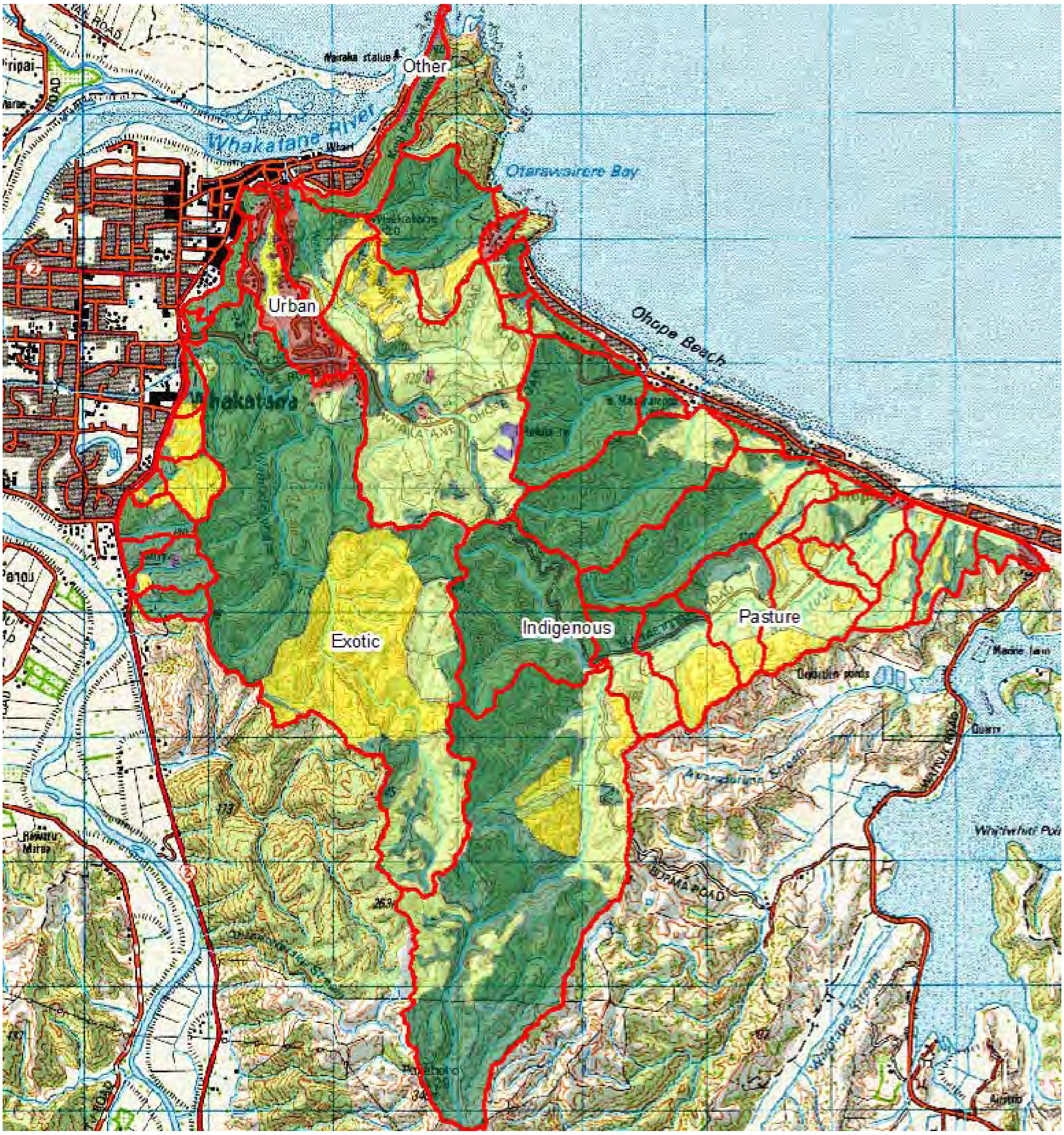

Figure 13 Land Cover from MfE's LCDB2 2001; the red polygons are study catchments

Three GIS polygon feature-class layers: Sub-catchments, Soils, and LCDB2, were "intersected" to determine the area of each sub-catchment, for each soil type, covered by each land cover class. Land cover classes were grouped into Pasture, Indigenous, Exotic, Urban, and Other. In this study area, "other" mainly refers to quarries. These groups were matched to NRCS land cover classes as shown in Table 5 below:

Table 5 Curve Numbers by Land Cover and Soil Class from NRCS TR55 (values in brackets have been modified as described in section 4.3.4)

		Soil Class				
LCDB2 Group	NRCS Classification	A	AB	B	C	D
Pasture	Pasture, good condition	39 (18)	50 (33)	61 (50)	74 (69)	80 (77)
Indigenous	Woods, good condition	30 (7)	43 (22)	55 (41)	70 (63)	80 (77)
Exotic	Woods, poor condition	45 (26)	56 (42)	66 (57)	77 (73)	83 (81)
Urban	Urban, Commercial	89 (88)	91 (90)	92 (92)	94 (95)	95 (96)
Other	As for Urban Commercial	89 (88)	91 (90)	92 (92)	94 (95)	95 (96)

4.8 Resulting sub-catchment design parameters; peak design discharge

The outcomes of the process described in sections 4.6 and 4.7 are shown in Table 6 on page 29. The resulting Curve Number for Wairere at Gauge was 35.6 compared to a measured value of 35.9. At Wainui te Whara, the Curve Number obtained using the values in Table 5 was 56.2 compared to the measured value of 60.5.

The main subjective judgements involved in arriving at these values are listed here in order of their importance.

- Allocation of soil types to NRCS classes e.g. Whakatāne Hill Soil type as Class AB – midway between standard NRCS classes A and B.
- Allocation of New Zealand Land Cover Database 2 classes to the corresponding classes from NRCS TR55 (as shown in Table 5).
- Selection of Initial Abstraction model: Ia=5 mm.
- Selection of 200 mm as storm magnitude index for modification of literature Curve Number values between Initial Abstraction models.
- Decisions relating to outlier storms in the event record.

Table 7 on page 30 shows peak catchment discharge for selected event probabilities. Full design hydrographs are available in electronic format from Bay of Plenty Regional Council.

Table 6 Study catchments with measured and estimated key parameters

	Area	Direct length	Stream length	Channel Slope	Height difference	Curve Number	Time of Conc.
	A	L_d	L	S_a	H	CN	Tc
	km^2	km	km	m/m	m		min
Commerce Street 1	0.039	0.22	0.22	0.52	86	68.7	5
Commerce Street 2	0.133	0.21	0.21	0.46	110	61.1	6
Mahy	0.849	1.25	1.37	0.05	142	59.4	40
Maraetotara 1	4.200	3.85	4.44	0.04	311	45.3	114
Maraetotara 2	1.244	1.58	1.86	0.03	163	57.5	59
Maraetotara 3	0.406	0.68	0.70	0.07	117	52.6	26
Maraetotara 4	0.497	0.83	0.93	0.08	142	54.0	30
Maraetotara 5	0.504	0.61	0.87	0.07	124	61.2	26
Maraetotara 6	0.530	0.59	0.70	0.03	73	58.0	30
Maraetotara 7	0.144	0.48	0.52	0.08	80	62.0	18
Maraetotara 8	0.401	0.61	0.82	0.01	57	51.2	47
Maraetotara 9	0.217	0.88	1.02	0.07	94	47.5	35
Maraetotara 11	0.088	0.41	0.43	0.10	55	67.7	14
Maraetotara 12	0.243	0.78	0.85	0.07	83	58.4	27
Maraetotara 13	0.109	0.56	0.58	0.01	17	45.4	55
Miller	1.196	1.66	1.99	0.03	165	64.1	55
Muriwai	0.345	0.22	0.22	0.53	137	67.6	5
Otarawairere 1	0.859	1.09	1.25	0.11	179	52.8	33
Otarawairere 2	0.068	0.55	0.56	0.34	152	74.3	11
Pohutukawa Ave 1	0.037	0.15	0.15	0.22	30	29.6	10
Pohutukawa Ave 2	0.075	0.21	0.22	0.51	103	66.1	6
Pohutukawa Ave 3	0.073	0.29	0.30	0.32	101	64.2	8
Valley Road 1	0.073	0.17	0.17	0.53	89	74.7	4
Valley Road 2	0.107	0.29	0.29	0.36	105	77.2	6
Valley Road 3	0.191	0.51	0.66	0.25	173	72.3	13
Valley Road 4	0.046	0.16	0.16	0.66	97	75.0	4
Valley Road 5	0.173	0.62	0.64	0.21	178	67.1	15
Valley Road 6	0.070	0.45	0.46	0.25	148	65.0	11
Valley Road 7	0.208	0.70	0.77	0.13	176	65.0	19
Valley Road 8	0.131	0.58	0.65	0.22	171	63.4	15
Waiewe	0.563	1.36	1.75	0.03	66	78.0	46
Wainuitewhara	5.753	4.78	6.54	0.02	199	56.2	151
Wairere	3.034	3.05	3.62	0.02	90	38.9	137
Wairere Gauge	2.720	2.26	2.66	0.02	70	35.6	124
West End 1	0.062	0.33	0.33	0.53	151	30.6	13
West End 2	0.110	0.24	0.24	0.71	127	33.7	9
West End 3	0.136	0.25	0.25	0.60	137	52.7	7
Wharekura 1	0.997	1.97	2.38	0.03	152	64.0	62
Wharekura 2	0.158	0.69	0.71	0.12	95	47.4	24

Table 7 *Peak catchment discharge for selected event probabilities; includes no climate change impacts; does not include the 30% factor outlined in section 2.1.2*

	Q2	Q5	Q10	Q20	Q50	Q100
	L/s	L/s	L/s	L/s	L/s	L/s
Commerce Street 1	270	399	511	642	853	1046
Commerce Street 2	765	1158	1507	1923	2604	3241
Mahy	2569	3910	5105	6536	8893	11104
Maraetotara 1	4862	7629	10180	13326	18687	23888
Maraetotara 2	2953	4513	5908	7587	10368	12990
Maraetotara 3	1253	1943	2571	3335	4616	5838
Maraetotara 4	1503	2321	3062	3962	5466	6897
Maraetotara 5	1963	2974	3871	4941	6696	8336
Maraetotara 6	1767	2700	3536	4542	6205	7771
Maraetotara 7	680	1028	1335	1701	2300	2858
Maraetotara 8	893	1388	1840	2391	3318	4206
Maraetotara 9	500	785	1047	1369	1917	2446
Maraetotara 11	532	790	1013	1276	1699	2089
Maraetotara 12	867	1325	1734	2225	3036	3799
Maraetotara 13	190	299	399	524	737	943
Miller	3498	5248	6784	8605	11566	14315
Muriwai	2341	3473	4455	5609	7472	9189
Otarawairere 1	2394	3709	4903	6357	8792	11113
Otarawairere 2	545	788	995	1234	1614	1960
Pohutukawa Ave 1	78	126	173	232	338	444
Pohutukawa Ave 2	492	733	944	1192	1594	1966
Pohutukawa Ave 3	457	685	885	1123	1509	1867
Valley Road 1	587	848	1070	1326	1733	2103
Valley Road 2	912	1304	1634	2014	2614	3158
Valley Road 3	1334	1946	2470	3079	4051	4939
Valley Road 4	373	538	678	840	1097	1331
Valley Road 5	1021	1517	1950	2459	3281	4040
Valley Road 6	433	649	837	1061	1423	1758
Valley Road 7	1026	1536	1983	2511	3370	4165
Valley Road 8	693	1043	1350	1716	2311	2865
Waiewe	2539	3620	4528	5570	7214	8703
Wainuitewhara	7748	11837	15497	19902	27189	34055
Wairere	2568	4076	5486	7250	10301	13299
Wairere Gauge	2065	3301	4467	5932	8484	11011
West End 1	127	206	282	378	549	720
West End 2	274	441	601	803	1157	1511
West End 3	624	967	1278	1657	2291	2896
Wharekura 1	2717	4075	5266	6678	8973	11104
Wharekura 2	436	685	914	1196	1676	2139

4.9 Attempted hydrologic verification against Maraetōtara Stream debris levels

Flood debris levels were surveyed in the urban area adjacent to Maraetōtara Stream following the 1 June 2010 event; and over several kilometres of stream channel following the 29 January 2011 event. The event in January 2011 was more appropriate for use in verifying the hydrological model because, along with the greater amount of level data, less spilling occurred from the channel.

No stream gauge exists at Maraetōtara but a single daily rain gauge is maintained by R Brosnahan at about 1 km upstream from Pohutukawa Avenue. He recorded 120 mm for the January event compared with 111.5 mm recorded at Kopeopeo. An automatic rain gauge does exist at Maraetōtara Reserve; however data-files obtained from Whakatāne District Council for this gauge showed zero rainfall for this period.

Rainfall from the Kopeopeo rain gauge was applied directly to the 12 sub-catchments of Maraetōtara Stream upstream of Pohutukawa Avenue. Curve numbers were applied as per Table 6 on page 29. Time to peak for each sub-catchment was as calculated by the BCHF TP108 method (also shown in Table 6). UHG shape factor m=2 was applied.

The resulting hydrographs were applied to the (then) draft Maraetotara hydraulic model. Downstream boundary levels were taken directly from the water level recorder at Port Ōhope. For this hydrological verification no attempt was made to refine the hydraulic model calibration; a general channel roughness value of n=0.055 was used throughout.

Resulting peak water levels over the several kilometres of channel were generally within 400 mm. The modelled flows were lower than those observed. A better match was obtained when the rain inputs for the upper four sub-catchments were scaled up based on event data in the Wainui te Whara catchment. For these catchments the rain was scaled up proportionally from a total of 111.5 mm to 128 mm. 128 mm was the amount calculated to bring the Wainui te Whara 28 January 2011 event Curve Number in line with that catchment's average. Figure 14 on page 32 is a long-section plot showing peak modelled water level for 128 mm rain, and the recorded debris levels for the 29 January 2011 event.

While an exacting verification is not possible at Maraetōtara due to the lack of stream and rain gauging, the hydraulic model results indicate that the hydrologic model is producing results within the range of what was experienced.

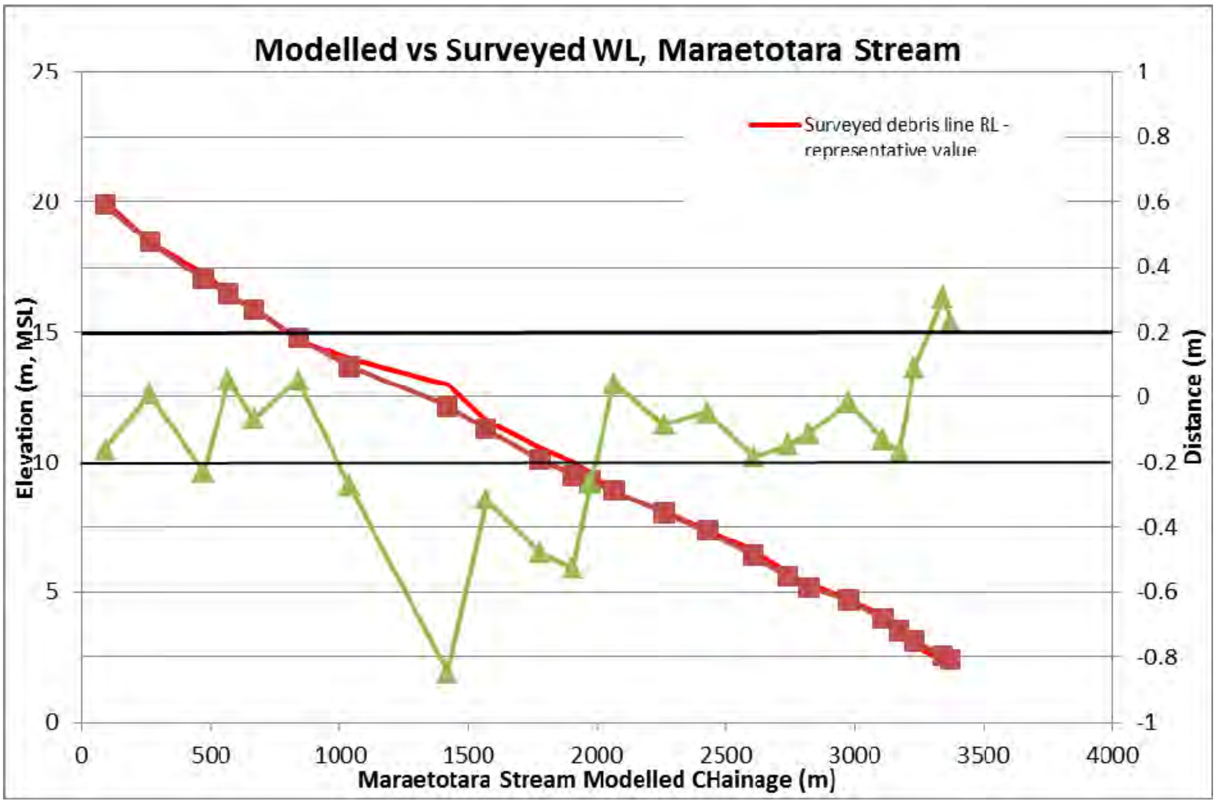

Figure 14 Verification plot for Maraetotara Stream 28 January 2011

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Appendices

Appendix 1 – Whakatāne River water level time series for downstream boundary design

Table A1- 1 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q100L20; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.48	1.50	1.59	1.74	1.99	1.88	1.81	1.92
0.50	2.22	2.13	2.13	2.23	2.27	2.25	2.20	2.22	2.20	2.14	2.13	2.13	2.12	2.11	2.09	2.12
0.75	2.91	2.83	2.73	2.68	2.62	2.54	2.51	2.49	2.48	2.45	2.41	2.36	2.28	2.25	2.23	2.17
1.00	3.09	2.99	2.85	2.80	2.71	2.62	2.56	2.53	2.49	2.45	2.43	2.39	2.34	2.32	2.26	2.20
1.25	3.16	3.04	2.86	2.79	2.68	2.56	2.51	2.46	2.40	2.35	2.32	2.29	2.23	2.22	2.18	2.14
1.50	3.18	3.05	2.85	2.76	2.63	2.50	2.44	2.39	2.33	2.28	2.25	2.21	2.16	2.15	2.10	2.07
1.75	3.19	3.06	2.84	2.75	2.60	2.47	2.40	2.35	2.28	2.23	2.19	2.16	2.10	2.08	2.04	2.00
2.00	3.20	3.06	2.83	2.74	2.59	2.44	2.36	2.31	2.23	2.18	2.14	2.10	2.04	2.02	1.97	1.92
2.25	3.22	3.07	2.83	2.73	2.57	2.41	2.33	2.27	2.19	2.13	2.09	2.05	1.98	1.96	1.90	1.86
2.50	3.23	3.08	2.83	2.72	2.55	2.38	2.30	2.23	2.15	2.08	2.04	2.00	1.92	1.90	1.84	1.79
2.75	3.24	3.09	2.82	2.71	2.54	2.36	2.27	2.20	2.11	2.04	2.00	1.95	1.87	1.84	1.78	1.73
3.00	3.26	3.10	2.83	2.71	2.53	2.34	2.24	2.17	2.07	2.00	1.96	1.90	1.82	1.79	1.73	1.67
3.25	3.27	3.11	2.83	2.71	2.52	2.32	2.22	2.14	2.04	1.97	1.92	1.86	1.77	1.74	1.68	1.62
3.50	3.29	3.12	2.83	2.71	2.52	2.31	2.20	2.12	2.01	1.93	1.89	1.82	1.73	1.70	1.63	1.57
3.75	3.30	3.13	2.84	2.71	2.51	2.30	2.18	2.10	1.98	1.90	1.86	1.79	1.69	1.66	1.59	1.52
4.00	3.32	3.15	2.85	2.72	2.51	2.29	2.17	2.08	1.96	1.88	1.83	1.76	1.65	1.62	1.55	1.48
4.25	3.34	3.16	2.86	2.72	2.52	2.28	2.16	2.07	1.94	1.86	1.81	1.74	1.62	1.59	1.51	1.44
4.50	3.36	3.18	2.87	2.73	2.52	2.28	2.15	2.06	1.93	1.84	1.79	1.72	1.60	1.57	1.49	1.41
4.75	3.38	3.20	2.88	2.75	2.53	2.28	2.15	2.05	1.92	1.83	1.78	1.70	1.58	1.55	1.46	1.39
5.00	3.40	3.22	2.90	2.76	2.54	2.29	2.15	2.05	1.91	1.82	1.77	1.69	1.57	1.53	1.45	1.37
5.25	3.43	3.24	2.92	2.78	2.55	2.30	2.16	2.05	1.91	1.82	1.76	1.69	1.56	1.52	1.44	1.36
5.50	3.45	3.26	2.94	2.80	2.56	2.31	2.16	2.06	1.92	1.82	1.76	1.68	1.56	1.52	1.43	1.36
5.75	3.48	3.29	2.96	2.81	2.58	2.32	2.17	2.07	1.92	1.83	1.77	1.69	1.56	1.52	1.43	1.36
6.00	3.50	3.31	2.98	2.84	2.60	2.33	2.19	2.08	1.93	1.84	1.78	1.69	1.56	1.53	1.44	1.36
6.25	3.53	3.34	3.00	2.86	2.62	2.35	2.20	2.10	1.95	1.85	1.79	1.71	1.58	1.54	1.45	1.37
6.50	3.55	3.36	3.02	2.88	2.64	2.37	2.22	2.11	1.97	1.87	1.81	1.72	1.59	1.55	1.47	1.39
6.75	3.58	3.39	3.05	2.91	2.66	2.39	2.24	2.14	1.99	1.89	1.83	1.74	1.61	1.58	1.49	1.42
7.00	3.61	3.42	3.07	2.94	2.69	2.42	2.27	2.16	2.01	1.91	1.85	1.77	1.64	1.60	1.52	1.45
7.25	3.64	3.45	3.10	2.96	2.71	2.44	2.29	2.19	2.04	1.94	1.88	1.80	1.67	1.64	1.55	1.49
7.50	3.67	3.48	3.13	2.99	2.74	2.47	2.32	2.22	2.07	1.97	1.91	1.83	1.71	1.67	1.59	1.53
7.75	3.69	3.51	3.16	3.02	2.77	2.50	2.36	2.25	2.11	2.01	1.95	1.87	1.75	1.72	1.64	1.58
8.00	3.72	3.53	3.19	3.05	2.80	2.53	2.39	2.29	2.15	2.05	1.99	1.91	1.80	1.77	1.70	1.64
8.25	3.75	3.56	3.22	3.09	2.83	2.57	2.43	2.33	2.20	2.10	2.04	1.96	1.85	1.83	1.76	1.70
8.50	3.78	3.59	3.25	3.12	2.86	2.60	2.47	2.37	2.24	2.15	2.09	2.02	1.91	1.89	1.82	1.77
8.75	3.81	3.63	3.28	3.16	2.90	2.65	2.52	2.42	2.30	2.20	2.15	2.08	1.98	1.95	1.89	1.84
9.00	3.85	3.66	3.32	3.20	2.94	2.69	2.56	2.47	2.35	2.26	2.21	2.14	2.05	2.02	1.96	1.92
9.25	3.88	3.70	3.36	3.24	2.98	2.74	2.62	2.53	2.42	2.33	2.27	2.21	2.12	2.10	2.04	2.00
9.50	3.92	3.75	3.41	3.29	3.03	2.80	2.68	2.59	2.48	2.39	2.34	2.28	2.19	2.17	2.11	2.08
9.75	3.96	3.79	3.46	3.34	3.08	2.85	2.74	2.65	2.55	2.46	2.41	2.35	2.27	2.25	2.19	2.15
10.00	4.01	3.84	3.51	3.39	3.13	2.91	2.80	2.72	2.62	2.53	2.48	2.42	2.34	2.32	2.27	2.23
10.25	4.05	3.88	3.56	3.44	3.19	2.97	2.86	2.79	2.69	2.60	2.55	2.49	2.41	2.39	2.34	2.30
10.50	4.09	3.93	3.62	3.50	3.24	3.03	2.92	2.85	2.75	2.66	2.61	2.55	2.48	2.46	2.40	2.36
10.75	4.14	3.97	3.67	3.55	3.29	3.09	2.98	2.91	2.81	2.73	2.67	2.61	2.54	2.52	2.46	2.42
11.00	4.18	4.02	3.72	3.60	3.34	3.14	3.03	2.96	2.87	2.78	2.72	2.67	2.59	2.57	2.51	2.47
11.25	4.22	4.06	3.77	3.65	3.39	3.19	3.08	3.02	2.92	2.83	2.77	2.72	2.64	2.62	2.56	2.51
11.50	4.27	4.10	3.82	3.69	3.44	3.23	3.13	3.06	2.96	2.87	2.81	2.76	2.67	2.65	2.59	2.55
11.75	4.31	4.14	3.86	3.74	3.48	3.27	3.17	3.10	3.00	2.91	2.85	2.79	2.70	2.68	2.62	2.57
12.00	4.35	4.18	3.90	3.78	3.51	3.31	3.20	3.14	3.04	2.94	2.88	2.81	2.72	2.70	2.63	2.58
12.25	4.38	4.22	3.94	3.82	3.55	3.34	3.23	3.16	3.06	2.96	2.90	2.83	2.74	2.72	2.65	2.59
12.50	4.42	4.25	3.98	3.85	3.58	3.37	3.26	3.19	3.08	2.98	2.91	2.84	2.75	2.72	2.65	2.59
12.75	4.45	4.29	4.01	3.88	3.61	3.39	3.28	3.21	3.10	2.99	2.92	2.85	2.75	2.72	2.64	2.58
13.00	4.49	4.32	4.04	3.91	3.63	3.41	3.30	3.22	3.11	3.00	2.92	2.85	2.74	2.72	2.63	2.56
13.25	4.52	4.35	4.07	3.94	3.65	3.43	3.31	3.23	3.12	3.00	2.92	2.85	2.73	2.70	2.61	2.54
13.50	4.55	4.37	4.10	3.96	3.67	3.44	3.32	3.24	3.12	3.00	2.92	2.84	2.72	2.69	2.59	2.52
13.75	4.58	4.40	4.12	3.98	3.69	3.46	3.33	3.25	3.12	3.00	2.91	2.83	2.71	2.67	2.57	2.49
14.00	4.60	4.43	4.15	4.01	3.71	3.47	3.34	3.25	3.13	3.00	2.91	2.82	2.69	2.65	2.55	2.46
14.25	4.63	4.45	4.17	4.03	3.72	3.48	3.34	3.25	3.12	2.99	2.90	2.81	2.67	2.63	2.52	2.43
14.50	4.66	4.47	4.20	4.05	3.74	3.49	3.35	3.26	3.12	2.99	2.89	2.80	2.65	2.62	2.50	2.40
14.75	4.68	4.50	4.22	4.07	3.76	3.50	3.35	3.26	3.13	2.98	2.88	2.79	2.64	2.60	2.48	2.38
15.00	4.71	4.52	4.24	4.09	3.77	3.51	3.36	3.27	3.13	2.98	2.88	2.78	2.62	2.58	2.46	2.35
15.25	4.73	4.54	4.26	4.11	3.79	3.52	3.37	3.28	3.13	2.98	2.88	2.77	2.61	2.57	2.44	2.33
15.50	4.76	4.56	4.29	4.13	3.81	3.53	3.38	3.28	3.14	2.98	2.88	2.77	2.60	2.56	2.42	2.31
15.75	4.78	4.59	4.31	4.15	3.83	3.55	3.39	3.29	3.14	2.98	2.88	2.76	2.59	2.55	2.41	2.29
16.00	4.81	4.61	4.33	4.18	3.85	3.56	3.40	3.30	3.15	2.99	2.88	2.76	2.59	2.54	2.40	2.28
16.25	4.83	4.63	4.36	4.20	3.86	3.57	3.42	3.32	3.16	3.00	2.88	2.76	2.59	2.54	2.39	2.27
16.50	4.85	4.66	4.38	4.22	3.88	3.59	3.43	3.33	3.17	3.00	2.89	2.77	2.59	2.54	2.39	2.26

	Location														
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
16.75	4.88	4.68	4.41	4.25	3.91	3.61	3.45	3.34	3.19	3.01	2.90	2.77	2.59	2.54	2.39	2.26
17.00	4.91	4.71	4.44	4.27	3.93	3.63	3.47	3.36	3.20	3.03	2.91	2.78	2.60	2.55	2.39	2.26
17.25	4.94	4.74	4.47	4.30	3.96	3.65	3.49	3.38	3.22	3.05	2.92	2.80	2.61	2.55	2.40	2.27
17.50	4.97	4.76	4.49	4.33	3.98	3.68	3.51	3.41	3.24	3.06	2.94	2.81	2.62	2.57	2.41	2.27
17.75	4.99	4.79	4.52	4.35	4.01	3.70	3.53	3.43	3.26	3.08	2.96	2.83	2.63	2.58	2.42	2.29
18.00	5.02	4.81	4.55	4.38	4.03	3.72	3.56	3.45	3.29	3.10	2.98	2.85	2.65	2.60	2.43	2.30
18.25	5.04	4.83	4.57	4.40	4.05	3.74	3.58	3.47	3.31	3.13	2.99	2.87	2.67	2.62	2.45	2.32
18.50	5.06	4.85	4.59	4.43	4.08	3.77	3.60	3.50	3.33	3.15	3.02	2.89	2.69	2.63	2.47	2.33
18.75	5.08	4.88	4.62	4.45	4.10	3.79	3.62	3.52	3.35	3.17	3.03	2.90	2.71	2.65	2.49	2.35
19.00	5.15	4.93	4.67	4.49	4.14	3.82	3.65	3.55	3.38	3.19	3.06	2.93	2.73	2.68	2.51	2.38
19.25	5.23	5.00	4.74	4.56	4.20	3.87	3.70	3.60	3.43	3.24	3.10	2.97	2.76	2.71	2.54	2.40
19.50	5.30	5.08	4.82	4.64	4.28	3.94	3.77	3.66	3.49	3.30	3.15	3.02	2.81	2.76	2.59	2.45
19.75	5.36	5.13	4.88	4.71	4.34	4.01	3.84	3.73	3.56	3.36	3.21	3.08	2.87	2.82	2.64	2.50
20.00	5.41	5.18	4.94	4.76	4.40	4.07	3.90	3.79	3.62	3.42	3.27	3.13	2.93	2.88	2.70	2.56
20.25	5.45	5.23	4.99	4.81	4.45	4.12	3.95	3.85	3.68	3.48	3.33	3.19	2.99	2.94	2.76	2.62
20.50	5.50	5.27	5.03	4.86	4.50	4.17	4.00	3.90	3.74	3.53	3.38	3.24	3.04	2.99	2.82	2.68
20.75	5.61	5.38	5.14	4.96	4.59	4.25	4.07	3.97	3.81	3.60	3.44	3.30	3.10	3.05	2.87	2.74
21.00	5.70	5.46	5.23	5.05	4.68	4.34	4.17	4.07	3.90	3.69	3.53	3.38	3.18	3.13	2.95	2.81
21.25	5.77	5.54	5.31	5.13	4.76	4.42	4.25	4.16	3.99	3.77	3.61	3.47	3.26	3.21	3.03	2.89
21.50	5.83	5.60	5.38	5.21	4.84	4.50	4.33	4.24	4.07	3.85	3.69	3.55	3.34	3.29	3.11	2.98
21.75	5.89	5.66	5.45	5.27	4.90	4.57	4.41	4.31	4.15	3.93	3.76	3.62	3.42	3.37	3.19	3.05
22.00	5.95	5.71	5.51	5.33	4.96	4.63	4.47	4.38	4.22	4.00	3.83	3.69	3.49	3.45	3.26	3.13
22.25	6.04	5.80	5.59	5.41	5.04	4.70	4.54	4.45	4.29	4.07	3.90	3.76	3.56	3.51	3.33	3.20
22.50	6.15	5.90	5.70	5.52	5.14	4.80	4.64	4.55	4.39	4.16	3.98	3.84	3.64	3.59	3.40	3.27
22.75	6.24	6.00	5.80	5.62	5.24	4.90	4.75	4.65	4.49	4.26	4.08	3.93	3.73	3.68	3.49	3.35
23.00	6.32	6.08	5.89	5.71	5.33	4.99	4.84	4.75	4.59	4.35	4.16	4.02	3.82	3.77	3.57	3.43
23.25	6.39	6.15	5.97	5.79	5.41	5.08	4.92	4.84	4.68	4.43	4.24	4.10	3.90	3.85	3.65	3.51
23.50	6.45	6.22	6.04	5.86	5.48	5.15	5.00	4.91	4.75	4.51	4.31	4.17	3.96	3.92	3.71	3.57
23.75	6.51	6.28	6.10	5.92	5.55	5.22	5.07	4.98	4.82	4.57	4.37	4.23	4.02	3.98	3.76	3.62
24.00	6.57	6.33	6.16	5.98	5.60	5.27	5.13	5.04	4.88	4.63	4.43	4.28	4.07	4.03	3.81	3.66
24.25	6.62	6.39	6.22	6.04	5.66	5.33	5.18	5.10	4.94	4.68	4.47	4.32	4.12	4.07	3.84	3.69
24.50	6.67	6.43	6.27	6.09	5.71	5.38	5.23	5.15	4.98	4.73	4.52	4.36	4.15	4.10	3.87	3.72
24.75	6.70	6.46	6.30	6.12	5.74	5.41	5.27	5.18	5.02	4.76	4.55	4.39	4.18	4.13	3.90	3.74
25.00	6.72	6.49	6.33	6.15	5.77	5.44	5.29	5.21	5.05	4.79	4.57	4.42	4.20	4.15	3.92	3.75
25.25	6.73	6.50	6.34	6.16	5.78	5.46	5.31	5.23	5.07	4.80	4.58	4.43	4.21	4.16	3.92	3.76
25.50	6.73	6.50	6.34	6.17	5.79	5.46	5.32	5.23	5.07	4.81	4.59	4.43	4.21	4.17	3.92	3.76
25.75	6.73	6.50	6.34	6.17	5.79	5.46	5.32	5.23	5.07	4.81	4.59	4.43	4.21	4.16	3.92	3.75
26.00	6.72	6.49	6.34	6.16	5.78	5.46	5.31	5.23	5.07	4.80	4.58	4.42	4.21	4.16	3.91	3.74
26.25	6.71	6.48	6.33	6.15	5.77	5.45	5.30	5.22	5.06	4.79	4.57	4.42	4.20	4.15	3.90	3.73
26.50	6.70	6.47	6.31	6.14	5.76	5.44	5.29	5.21	5.05	4.78	4.56	4.40	4.18	4.13	3.89	3.71
26.75	6.68	6.46	6.30	6.12	5.75	5.42	5.28	5.19	5.03	4.77	4.55	4.39	4.17	4.12	3.87	3.70
27.00	6.67	6.44	6.28	6.10	5.73	5.41	5.26	5.18	5.01	4.75	4.53	4.37	4.15	4.10	3.85	3.68
27.25	6.65	6.42	6.26	6.09	5.71	5.39	5.24	5.16	4.99	4.73	4.51	4.36	4.13	4.08	3.84	3.66
27.50	6.63	6.40	6.24	6.07	5.69	5.37	5.22	5.14	4.97	4.71	4.50	4.34	4.12	4.06	3.82	3.64
27.75	6.61	6.38	6.22	6.05	5.67	5.35	5.20	5.12	4.95	4.69	4.48	4.32	4.10	4.04	3.80	3.62
28.00	6.59	6.36	6.20	6.02	5.65	5.33	5.18	5.10	4.93	4.67	4.46	4.30	4.08	4.02	3.78	3.60
28.25	6.57	6.34	6.18	6.00	5.63	5.31	5.16	5.07	4.91	4.65	4.44	4.28	4.06	4.00	3.76	3.58
28.50	6.55	6.32	6.16	5.98	5.61	5.28	5.14	5.05	4.89	4.63	4.42	4.26	4.04	3.98	3.74	3.57
28.75	6.52	6.30	6.13	5.96	5.59	5.26	5.11	5.03	4.87	4.61	4.40	4.24	4.02	3.96	3.72	3.55
29.00	6.50	6.27	6.11	5.93	5.56	5.24	5.09	5.00	4.84	4.58	4.37	4.22	4.00	3.94	3.70	3.53
29.25	6.47	6.25	6.08	5.90	5.54	5.21	5.06	4.98	4.82	4.56	4.35	4.20	3.97	3.92	3.68	3.51
29.50	6.44	6.22	6.05	5.87	5.51	5.19	5.04	4.95	4.79	4.53	4.33	4.17	3.95	3.90	3.66	3.49
29.75	6.41	6.19	6.02	5.85	5.48	5.16	5.01	4.92	4.76	4.51	4.30	4.15	3.93	3.87	3.64	3.46
30.00	6.38	6.16	5.99	5.81	5.45	5.13	4.98	4.89	4.73	4.48	4.28	4.12	3.90	3.85	3.61	3.44
30.25	6.35	6.13	5.96	5.78	5.42	5.10	4.95	4.86	4.70	4.45	4.25	4.10	3.88	3.83	3.59	3.42
30.50	6.32	6.10	5.92	5.75	5.39	5.07	4.92	4.83	4.67	4.42	4.23	4.07	3.85	3.80	3.57	3.40
30.75	6.29	6.07	5.89	5.72	5.36	5.04	4.89	4.80	4.64	4.40	4.20	4.05	3.83	3.77	3.54	3.37
31.00	6.25	6.03	5.86	5.69	5.33	5.01	4.86	4.77	4.61	4.37	4.17	4.02	3.80	3.75	3.52	3.35
31.25	6.22	6.00	5.82	5.65	5.29	4.98	4.83	4.74	4.58	4.34	4.14	3.99	3.78	3.72	3.50	3.33
31.50	6.19	5.97	5.79	5.62	5.26	4.94	4.79	4.71	4.55	4.31	4.12	3.96	3.75	3.70	3.47	3.31
31.75	6.15	5.94	5.75	5.58	5.23	4.91	4.76	4.67	4.51	4.28	4.09	3.94	3.72	3.67	3.45	3.28
32.00	6.12	5.90	5.72	5.55	5.20	4.88	4.73	4.64	4.48	4.25	4.06	3.91	3.70	3.65	3.43	3.26
32.25	6.09	5.87	5.69	5.52	5.16	4.85	4.70	4.61	4.45	4.22	4.03	3.89	3.67	3.62	3.40	3.24
32.50	6.05	5.84	5.65	5.48	5.13	4.81	4.67	4.58	4.42	4.19	4.01	3.86	3.65	3.60	3.38	3.23
32.75	6.02	5.80	5.62	5.45	5.10	4.78	4.63	4.55	4.39	4.16	3.98	3.84	3.63	3.58	3.37	3.21
33.00	5.99	5.77	5.59	5.42	5.07	4.75	4.60	4.52	4.36	4.13	3.96	3.81	3.61	3.56	3.35	3.20
33.25	5.96	5.74	5.55	5.39	5.04	4.73	4.58	4.49	4.33	4.11	3.93	3.79	3.59	3.54	3.34	3.18
33.50	5.93	5.72	5.52	5.36	5.01	4.70	4.55	4.46	4.31	4.09	3.91	3.77	3.57	3.52	3.32	3.18
33.75	5.90	5.69	5.50	5.33	4.98	4.67	4.53	4.44	4.28	4.07	3.90	3.76	3.56	3.52	3.32	3.18
34.00	5.87	5.66	5.47	5.30	4.96	4.65	4.50	4.42	4.26	4.05	3.88	3.75	3.56	3.51	3.32	3.18
34.25	5.85	5.64	5.44	5.28	4.93	4.63	4.48	4.40	4.25	4.03	3.87	3.74	3.55	3.51	3.32	3.19
34.50	5.82	5.61	5.42	5.25	4.91	4.61	4.46	4.38	4.23	4.02	3.86	3.73	3.55	3.50	3.32	3.20
34.75	5.80	5.59	5.39	5.23	4.89	4.59	4.45	4.36	4.21	4.01	3.86	3.73	3.55	3.50	3.33	3.21
35.00	5.77	5.56	5.37	5.20	4.87	4.57	4.43	4.35	4.20	4.00	3.85	3.72	3.55	3.51	3.34	3.22
35.25	5.75	5.54	5.34	5.18	4.85	4.56	4.42	4.33	4.19	3.99	3.84	3.72	3.55	3.51	3.34	3.22
35.50	5.72	5.52	5.32	5.16	4.83	4.54	4.40	4.32	4.18	3.98	3.84	3.72	3.55	3.51	3.34	3.23
35.75	5.70	5.49	5.30	5.14	4.81	4.52	4.38	4.30	4.16	3.97	3.83	3.71	3.55	3.51	3.35	3.24
36.00	5.67	5.47	5.27	5.11	4.79	4.51	4.37	4.29	4.15	3.96	3.82	3.70	3.54	3.50	3.35	3.24
36.25	5.65	5.45	5.25	5.09	4.77	4.49	4.35	4.27	4.13	3.95	3.81	3.69	3.53	3.50	3.34	3.23
36.50	5.62	5.42	5.23	5.07	4.75	4.47	4.33	4.25	4.12	3.93	3.80	3.68	3.52	3.49	3.33	3.23

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
36.75	5.60	5.40	5.20	5.05	4.73	4.45	4.31	4.23	4.10	3.92	3.78	3.67	3.51	3.47	3.32	3.21
37.00	5.58	5.38	5.18	5.02	4.71	4.43	4.29	4.21	4.08	3.90	3.76	3.65	3.49	3.45	3.30	3.20
37.25	5.55	5.35	5.15	5.00	4.68	4.41	4.27	4.19	4.05	3.88	3.74	3.63	3.47	3.43	3.28	3.17
37.50	5.53	5.33	5.13	4.97	4.66	4.38	4.25	4.17	4.03	3.85	3.72	3.61	3.45	3.41	3.26	3.15
37.75	5.50	5.30	5.10	4.94	4.63	4.35	4.22	4.14	4.00	3.82	3.69	3.58	3.42	3.38	3.23	3.11
38.00	5.46	5.27	5.06	4.91	4.60	4.32	4.19	4.10	3.97	3.79	3.66	3.55	3.38	3.34	3.19	3.08
38.25	5.43	5.23	5.03	4.87	4.56	4.29	4.15	4.07	3.93	3.75	3.62	3.51	3.35	3.31	3.15	3.04
38.50	5.39	5.20	4.99	4.84	4.53	4.25	4.11	4.03	3.89	3.72	3.58	3.47	3.31	3.27	3.11	2.99
38.75	5.36	5.17	4.96	4.80	4.49	4.21	4.08	3.99	3.85	3.68	3.55	3.43	3.26	3.22	3.07	2.95
39.00	5.33	5.13	4.92	4.77	4.45	4.18	4.04	3.95	3.81	3.63	3.50	3.39	3.22	3.18	3.02	2.90
39.25	5.29	5.10	4.89	4.73	4.42	4.14	4.00	3.91	3.77	3.59	3.46	3.35	3.17	3.13	2.97	2.85
39.50	5.26	5.07	4.85	4.69	4.38	4.10	3.96	3.87	3.73	3.55	3.42	3.30	3.13	3.09	2.93	2.80
39.75	5.22	5.03	4.81	4.65	4.34	4.06	3.91	3.83	3.68	3.51	3.38	3.26	3.08	3.04	2.88	2.75
40.00	5.19	5.00	4.77	4.62	4.30	4.02	3.87	3.78	3.64	3.46	3.33	3.22	3.04	2.99	2.83	2.71
40.25	5.15	4.96	4.73	4.58	4.26	3.98	3.83	3.74	3.60	3.42	3.29	3.17	2.99	2.95	2.79	2.66
40.50	5.12	4.93	4.70	4.54	4.22	3.94	3.79	3.70	3.55	3.38	3.25	3.13	2.95	2.90	2.74	2.61
40.75	5.09	4.90	4.66	4.51	4.19	3.90	3.76	3.66	3.51	3.34	3.21	3.09	2.91	2.86	2.70	2.57
41.00	5.06	4.87	4.63	4.48	4.15	3.87	3.72	3.63	3.48	3.30	3.17	3.05	2.87	2.82	2.66	2.53
41.25	5.04	4.85	4.60	4.45	4.12	3.84	3.69	3.59	3.44	3.27	3.14	3.02	2.83	2.79	2.63	2.49
41.50	5.02	4.82	4.58	4.42	4.10	3.81	3.66	3.56	3.41	3.23	3.11	2.99	2.80	2.75	2.59	2.46
41.75	4.99	4.80	4.55	4.40	4.07	3.78	3.63	3.53	3.38	3.20	3.08	2.96	2.77	2.72	2.56	2.43
42.00	4.97	4.78	4.53	4.37	4.05	3.76	3.60	3.51	3.35	3.18	3.05	2.93	2.74	2.69	2.53	2.40
42.25	4.95	4.76	4.51	4.35	4.02	3.73	3.58	3.48	3.33	3.15	3.03	2.91	2.72	2.67	2.51	2.38
42.50	4.94	4.75	4.49	4.33	4.00	3.71	3.56	3.46	3.30	3.13	3.01	2.88	2.70	2.65	2.49	2.35
42.75	4.92	4.73	4.47	4.31	3.98	3.69	3.54	3.44	3.28	3.11	2.99	2.86	2.68	2.63	2.47	2.34
43.00	4.90	4.71	4.45	4.29	3.96	3.68	3.52	3.42	3.26	3.09	2.97	2.85	2.66	2.61	2.45	2.32
43.25	4.89	4.70	4.43	4.28	3.95	3.66	3.50	3.40	3.24	3.07	2.95	2.83	2.65	2.60	2.44	2.31
43.50	4.87	4.68	4.42	4.26	3.93	3.64	3.48	3.38	3.23	3.06	2.94	2.82	2.63	2.59	2.43	2.30
43.75	4.85	4.66	4.40	4.24	3.91	3.63	3.47	3.37	3.21	3.04	2.93	2.81	2.62	2.58	2.42	2.30
44.00	4.84	4.65	4.38	4.23	3.90	3.61	3.46	3.36	3.20	3.03	2.92	2.80	2.62	2.57	2.42	2.29
44.25	4.82	4.63	4.37	4.21	3.88	3.60	3.44	3.34	3.19	3.02	2.91	2.79	2.61	2.56	2.42	2.29
44.50	4.81	4.62	4.35	4.19	3.87	3.58	3.43	3.33	3.18	3.01	2.90	2.78	2.61	2.56	2.42	2.30
44.75	4.79	4.60	4.33	4.18	3.85	3.57	3.42	3.32	3.17	3.01	2.89	2.78	2.61	2.56	2.42	2.31
45.00	4.78	4.59	4.32	4.16	3.84	3.56	3.41	3.31	3.16	3.00	2.89	2.78	2.61	2.57	2.43	2.32
45.25	4.76	4.58	4.31	4.15	3.83	3.55	3.40	3.30	3.15	3.00	2.89	2.78	2.61	2.57	2.44	2.33
45.50	4.75	4.56	4.29	4.14	3.82	3.54	3.39	3.30	3.15	3.00	2.89	2.78	2.62	2.58	2.45	2.35
45.75	4.73	4.55	4.28	4.13	3.81	3.54	3.39	3.29	3.15	3.00	2.89	2.79	2.63	2.59	2.47	2.37
46.00	4.72	4.54	4.27	4.12	3.80	3.53	3.39	3.29	3.15	3.00	2.90	2.80	2.65	2.61	2.49	2.39
46.25	4.71	4.53	4.26	4.11	3.79	3.53	3.38	3.29	3.15	3.01	2.91	2.81	2.66	2.63	2.51	2.42
46.50	4.69	4.51	4.24	4.10	3.79	3.52	3.38	3.29	3.16	3.02	2.92	2.82	2.68	2.65	2.54	2.45
46.75	4.68	4.50	4.23	4.09	3.78	3.52	3.39	3.30	3.17	3.03	2.93	2.84	2.71	2.67	2.57	2.49
47.00	4.67	4.49	4.23	4.08	3.78	3.53	3.39	3.30	3.18	3.04	2.95	2.86	2.73	2.70	2.60	2.52
47.25	4.66	4.48	4.22	4.07	3.77	3.53	3.40	3.31	3.19	3.06	2.97	2.88	2.76	2.73	2.63	2.56
47.50	4.65	4.47	4.21	4.07	3.77	3.53	3.40	3.32	3.20	3.07	2.98	2.90	2.78	2.75	2.66	2.59
47.75	4.64	4.47	4.20	4.06	3.77	3.53	3.41	3.33	3.21	3.09	3.00	2.92	2.81	2.78	2.69	2.62
48.00	4.63	4.46	4.20	4.06	3.77	3.54	3.42	3.34	3.22	3.10	3.02	2.94	2.83	2.80	2.71	2.65
48.25	4.62	4.45	4.19	4.05	3.77	3.54	3.42	3.35	3.23	3.11	3.03	2.96	2.85	2.82	2.74	2.67
48.50	4.61	4.44	4.18	4.05	3.77	3.55	3.43	3.35	3.24	3.12	3.04	2.97	2.86	2.84	2.75	2.69
48.75	4.60	4.43	4.18	4.04	3.77	3.55	3.43	3.36	3.25	3.13	3.05	2.98	2.87	2.85	2.76	2.70
49.00	4.59	4.42	4.17	4.04	3.76	3.54	3.43	3.35	3.25	3.13	3.05	2.98	2.87	2.85	2.76	2.70
49.25	4.58	4.41	4.16	4.03	3.75	3.54	3.42	3.35	3.24	3.13	3.05	2.97	2.87	2.84	2.76	2.69
49.50	4.56	4.40	4.15	4.02	3.74	3.53	3.41	3.34	3.23	3.12	3.04	2.96	2.86	2.83	2.74	2.68
49.75	4.55	4.39	4.13	4.00	3.73	3.52	3.40	3.33	3.22	3.10	3.02	2.95	2.84	2.81	2.72	2.66
50.00	4.54	4.37	4.12	3.99	3.72	3.50	3.38	3.31	3.20	3.08	3.00	2.93	2.82	2.79	2.70	2.63
50.25	4.52	4.36	4.10	3.97	3.70	3.48	3.36	3.29	3.18	3.06	2.98	2.90	2.79	2.76	2.67	2.60
50.50	4.50	4.34	4.08	3.95	3.68	3.46	3.34	3.27	3.15	3.03	2.95	2.87	2.76	2.73	2.63	2.56
50.75	4.48	4.32	4.06	3.93	3.65	3.43	3.31	3.24	3.12	3.00	2.92	2.84	2.72	2.69	2.59	2.51
51.00	4.46	4.30	4.04	3.91	3.63	3.41	3.29	3.21	3.09	2.97	2.89	2.80	2.68	2.65	2.55	2.47
51.25	4.44	4.28	4.01	3.88	3.60	3.38	3.26	3.18	3.05	2.93	2.85	2.77	2.64	2.61	2.51	2.42
51.50	4.42	4.26	3.99	3.86	3.58	3.35	3.22	3.14	3.02	2.90	2.81	2.73	2.60	2.56	2.46	2.37
51.75	4.40	4.24	3.96	3.83	3.55	3.32	3.19	3.11	2.98	2.86	2.77	2.69	2.55	2.52	2.41	2.32
52.00	4.38	4.22	3.94	3.80	3.52	3.29	3.16	3.07	2.95	2.82	2.73	2.64	2.51	2.47	2.36	2.27
52.25	4.36	4.20	3.91	3.78	3.49	3.26	3.13	3.04	2.91	2.78	2.69	2.60	2.47	2.43	2.32	2.22
52.50	4.34	4.17	3.89	3.75	3.47	3.23	3.09	3.00	2.87	2.74	2.66	2.56	2.42	2.39	2.27	2.18
52.75	4.32	4.15	3.86	3.72	3.44	3.20	3.06	2.97	2.83	2.71	2.62	2.53	2.38	2.34	2.23	2.13
53.00	4.29	4.13	3.83	3.70	3.41	3.17	3.03	2.94	2.80	2.67	2.58	2.49	2.34	2.30	2.19	2.09
53.25	4.27	4.11	3.81	3.67	3.38	3.14	3.00	2.90	2.77	2.63	2.55	2.45	2.30	2.26	2.15	2.04
53.50	4.25	4.09	3.78	3.65	3.36	3.11	2.97	2.87	2.73	2.60	2.51	2.42	2.27	2.23	2.11	2.01
53.75	4.23	4.06	3.75	3.62	3.33	3.08	2.94	2.84	2.70	2.57	2.48	2.39	2.23	2.19	2.07	1.97
54.00	4.21	4.04	3.73	3.60	3.31	3.05	2.91	2.81	2.67	2.54	2.45	2.36	2.20	2.16	2.04	1.93
54.25	4.18	4.02	3.70	3.57	3.28	3.03	2.89	2.79	2.64	2.51	2.42	2.33	2.17	2.13	2.01	1.90
54.50	4.16	4.00	3.68	3.55	3.26	3.00	2.86	2.76	2.61	2.48	2.40	2.30	2.14	2.10	1.98	1.88
54.75	4.14	3.97	3.65	3.52	3.24	2.98	2.84	2.73	2.59	2.46	2.37	2.27	2.12	2.07	1.96	1.85
55.00	4.12	3.95	3.63	3.50	3.21	2.95	2.81	2.71	2.56	2.43	2.35	2.25	2.10	2.05	1.93	1.83
55.25	4.10	3.93	3.61	3.48	3.19	2.93	2.79	2.69	2.54	2.41	2.33	2.23	2.07	2.03	1.91	1.81
55.50	4.08	3.91	3.58	3.45	3.17	2.91	2.77	2.66	2.52	2.39	2.31	2.21	2.06	2.01	1.90	1.80
55.75	4.06	3.89	3.56	3.43	3.15	2.89	2.75	2.64	2.50	2.37	2.29	2.19	2.04	2.00	1.88	1.79
56.00	4.03	3.87	3.54	3.41	3.13	2.87	2.73	2.62	2.48	2.35	2.27	2.18	2.03	1.99	1.87	1.78
56.25	4.02	3.85	3.51	3.39	3.11	2.85	2.71	2.61	2.46	2.34	2.26	2.16	2.02	1.98	1.87	1.78
56.50	4.00	3.83	3.49	3.37	3.09	2.84	2.69	2.59	2.45	2.33	2.25	2.16	2.01	1.97	1.87	1.78

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
56.75	3.98	3.81	3.47	3.35	3.08	2.82	2.68	2.58	2.43	2.32	2.24	2.15	2.01	1.97	1.87	1.78
57.00	3.96	3.79	3.46	3.33	3.06	2.81	2.67	2.57	2.43	2.31	2.23	2.15	2.01	1.97	1.87	1.79
57.25	3.94	3.78	3.44	3.32	3.05	2.80	2.66	2.56	2.42	2.31	2.23	2.15	2.02	1.98	1.89	1.81
57.50	3.93	3.76	3.43	3.30	3.04	2.79	2.65	2.55	2.42	2.31	2.24	2.15	2.03	1.99	1.90	1.83
57.75	3.92	3.75	3.41	3.29	3.03	2.78	2.65	2.55	2.42	2.31	2.24	2.16	2.04	2.01	1.93	1.86
58.00	3.90	3.73	3.40	3.28	3.02	2.78	2.65	2.56	2.43	2.32	2.26	2.18	2.07	2.04	1.96	1.90
58.25	3.89	3.72	3.40	3.28	3.02	2.78	2.65	2.56	2.44	2.34	2.28	2.20	2.10	2.07	2.00	1.94
58.50	3.88	3.71	3.39	3.27	3.02	2.79	2.66	2.57	2.46	2.36	2.30	2.23	2.13	2.11	2.04	1.99
58.75	3.87	3.70	3.38	3.27	3.02	2.79	2.68	2.59	2.48	2.39	2.33	2.27	2.18	2.15	2.09	2.04
59.00	3.86	3.69	3.38	3.27	3.02	2.81	2.69	2.61	2.51	2.42	2.37	2.31	2.22	2.20	2.14	2.10
59.25	3.85	3.69	3.38	3.27	3.03	2.82	2.71	2.64	2.54	2.45	2.40	2.35	2.27	2.25	2.20	2.16
59.50	3.85	3.69	3.38	3.27	3.04	2.84	2.74	2.67	2.57	2.49	2.44	2.39	2.32	2.30	2.25	2.21
59.75	3.84	3.68	3.39	3.28	3.06	2.86	2.76	2.70	2.61	2.53	2.49	2.44	2.37	2.35	2.30	2.27
60.00	3.84	3.68	3.39	3.29	3.07	2.89	2.79	2.73	2.64	2.57	2.53	2.48	2.41	2.40	2.35	2.32
60.25	3.84	3.68	3.40	3.30	3.09	2.91	2.82	2.76	2.68	2.61	2.56	2.52	2.46	2.44	2.40	2.37
60.50	3.84	3.69	3.41	3.31	3.10	2.93	2.84	2.79	2.71	2.64	2.60	2.55	2.49	2.48	2.43	2.40
60.75	3.84	3.69	3.41	3.32	3.12	2.95	2.86	2.81	2.73	2.66	2.62	2.58	2.52	2.50	2.46	2.43
61.00	3.84	3.69	3.42	3.33	3.13	2.96	2.88	2.83	2.75	2.68	2.64	2.60	2.54	2.52	2.48	2.45
61.25	3.83	3.69	3.42	3.33	3.13	2.97	2.89	2.84	2.76	2.70	2.66	2.61	2.55	2.54	2.49	2.46
61.50	3.83	3.68	3.42	3.33	3.14	2.98	2.90	2.84	2.77	2.70	2.66	2.61	2.55	2.54	2.49	2.45
61.75	3.82	3.68	3.42	3.33	3.13	2.97	2.89	2.84	2.76	2.70	2.65	2.61	2.55	2.53	2.48	2.44
62.00	3.81	3.67	3.41	3.32	3.13	2.97	2.89	2.83	2.75	2.68	2.64	2.59	2.53	2.51	2.46	2.42
62.25	3.80	3.66	3.40	3.31	3.11	2.95	2.87	2.81	2.74	2.67	2.62	2.58	2.51	2.49	2.44	2.40
62.50	3.79	3.64	3.38	3.29	3.10	2.94	2.85	2.79	2.71	2.64	2.60	2.55	2.48	2.46	2.40	2.36
62.75	3.77	3.63	3.37	3.27	3.08	2.91	2.83	2.77	2.68	2.61	2.56	2.51	2.44	2.42	2.36	2.32
63.00	3.76	3.61	3.35	3.25	3.05	2.88	2.80	2.73	2.65	2.57	2.53	2.47	2.40	2.38	2.32	2.27
63.25	3.74	3.59	3.32	3.23	3.03	2.85	2.76	2.70	2.61	2.53	2.48	2.43	2.35	2.33	2.27	2.21
63.50	3.71	3.56	3.29	3.20	3.00	2.82	2.73	2.66	2.57	2.49	2.44	2.38	2.30	2.28	2.21	2.16
63.75	3.69	3.54	3.27	3.17	2.96	2.78	2.69	2.62	2.52	2.44	2.39	2.33	2.25	2.22	2.16	2.10
64.00	3.67	3.51	3.24	3.14	2.93	2.75	2.65	2.58	2.48	2.40	2.34	2.28	2.19	2.17	2.10	2.03
64.25	3.64	3.49	3.21	3.11	2.90	2.71	2.61	2.53	2.43	2.35	2.29	2.23	2.14	2.11	2.04	1.97
64.50	3.62	3.46	3.18	3.07	2.87	2.67	2.56	2.49	2.38	2.30	2.24	2.18	2.08	2.05	1.98	1.91
64.75	3.60	3.44	3.15	3.04	2.83	2.63	2.52	2.44	2.34	2.25	2.19	2.13	2.03	2.00	1.92	1.85
65.00	3.57	3.41	3.12	3.01	2.80	2.59	2.48	2.40	2.29	2.20	2.15	2.08	1.97	1.94	1.87	1.79
65.25	3.55	3.38	3.09	2.98	2.77	2.55	2.44	2.36	2.24	2.16	2.10	2.03	1.92	1.89	1.81	1.74
65.50	3.52	3.35	3.06	2.95	2.73	2.52	2.40	2.32	2.20	2.11	2.06	1.98	1.87	1.84	1.76	1.69
65.75	3.50	3.33	3.03	2.92	2.70	2.48	2.36	2.28	2.16	2.07	2.01	1.94	1.83	1.79	1.71	1.64
66.00	3.47	3.30	3.01	2.89	2.67	2.45	2.33	2.24	2.12	2.03	1.97	1.90	1.78	1.75	1.67	1.59
66.25	3.45	3.28	2.98	2.86	2.64	2.42	2.29	2.20	2.08	1.99	1.93	1.86	1.74	1.71	1.62	1.55
66.50	3.42	3.25	2.95	2.83	2.61	2.39	2.26	2.17	2.04	1.95	1.90	1.82	1.70	1.67	1.58	1.51
66.75	3.40	3.23	2.93	2.80	2.59	2.36	2.23	2.14	2.01	1.92	1.86	1.79	1.67	1.63	1.55	1.47
67.00	3.38	3.21	2.91	2.78	2.56	2.33	2.20	2.11	1.98	1.89	1.83	1.76	1.64	1.60	1.52	1.44
67.25	3.36	3.18	2.88	2.75	2.54	2.30	2.18	2.08	1.95	1.86	1.81	1.73	1.61	1.58	1.49	1.42
67.50	3.34	3.16	2.86	2.73	2.52	2.28	2.15	2.05	1.92	1.84	1.78	1.71	1.59	1.55	1.47	1.39
67.75	3.32	3.14	2.84	2.71	2.49	2.26	2.13	2.03	1.90	1.81	1.76	1.69	1.57	1.53	1.45	1.38
68.00	3.30	3.12	2.82	2.68	2.47	2.24	2.11	2.01	1.88	1.79	1.74	1.67	1.55	1.52	1.44	1.37
68.25	3.28	3.10	2.80	2.66	2.45	2.22	2.09	1.99	1.86	1.78	1.73	1.65	1.54	1.51	1.43	1.36
68.50	3.25	3.08	2.78	2.64	2.44	2.20	2.07	1.98	1.85	1.77	1.72	1.65	1.54	1.50	1.43	1.36
68.75	3.24	3.06	2.76	2.62	2.42	2.19	2.06	1.96	1.84	1.76	1.71	1.64	1.53	1.50	1.43	1.37
69.00	3.22	3.04	2.75	2.61	2.40	2.17	2.05	1.96	1.83	1.76	1.71	1.64	1.54	1.51	1.44	1.39
69.25	3.20	3.03	2.73	2.59	2.39	2.17	2.04	1.95	1.83	1.76	1.71	1.65	1.55	1.52	1.46	1.41
69.50	3.18	3.01	2.72	2.58	2.38	2.16	2.04	1.95	1.84	1.76	1.72	1.66	1.57	1.55	1.49	1.44
69.75	3.17	3.00	2.71	2.57	2.38	2.16	2.04	1.96	1.85	1.78	1.74	1.68	1.60	1.58	1.52	1.49
70.00	3.15	2.98	2.70	2.56	2.37	2.16	2.05	1.97	1.87	1.80	1.76	1.71	1.63	1.62	1.57	1.53
70.25	3.14	2.97	2.69	2.56	2.38	2.17	2.06	1.99	1.89	1.83	1.80	1.75	1.68	1.66	1.62	1.59
70.50	3.13	2.97	2.69	2.56	2.38	2.19	2.09	2.01	1.92	1.87	1.84	1.79	1.73	1.72	1.68	1.66
70.75	3.12	2.96	2.69	2.57	2.40	2.21	2.11	2.05	1.97	1.92	1.89	1.85	1.79	1.78	1.75	1.73
71.00	3.11	2.96	2.70	2.58	2.41	2.24	2.15	2.09	2.02	1.97	1.94	1.91	1.86	1.85	1.82	1.81
71.25	3.11	2.96	2.71	2.59	2.44	2.27	2.19	2.14	2.07	2.03	2.00	1.97	1.93	1.92	1.90	1.88
71.50	3.11	2.97	2.72	2.61	2.46	2.31	2.24	2.19	2.13	2.09	2.06	2.04	2.00	1.99	1.97	1.96
71.75	3.12	2.97	2.74	2.64	2.49	2.35	2.29	2.24	2.19	2.15	2.13	2.10	2.07	2.06	2.04	2.03
72.00	3.12	2.99	2.76	2.66	2.53	2.39	2.33	2.29	2.24	2.21	2.19	2.16	2.13	2.12	2.11	2.09

Table A1- 2 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q50L20; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.48	1.50	1.59	1.74	1.99	1.88	1.81	1.92
0.50	2.21	2.12	2.13	2.23	2.27	2.25	2.20	2.22	2.20	2.14	2.13	2.13	2.12	2.11	2.09	2.12
0.75	2.90	2.82	2.72	2.68	2.62	2.54	2.50	2.48	2.47	2.45	2.41	2.36	2.28	2.25	2.23	2.17
1.00	3.07	2.98	2.84	2.79	2.70	2.61	2.56	2.52	2.48	2.45	2.42	2.39	2.34	2.31	2.26	2.20
1.25	3.13	3.02	2.85	2.78	2.67	2.56	2.50	2.45	2.39	2.35	2.32	2.28	2.23	2.21	2.18	2.14
1.50	3.15	3.03	2.83	2.74	2.62	2.49	2.43	2.38	2.32	2.27	2.24	2.21	2.16	2.14	2.10	2.06
1.75	3.16	3.03	2.81	2.72	2.58	2.45	2.38	2.33	2.27	2.22	2.19	2.15	2.09	2.07	2.03	1.99
2.00	3.16	3.03	2.80	2.71	2.56	2.42	2.34	2.29	2.22	2.16	2.13	2.09	2.03	2.01	1.96	1.92
2.25	3.17	3.03	2.79	2.69	2.54	2.39	2.31	2.25	2.17	2.11	2.08	2.03	1.97	1.95	1.89	1.85
2.50	3.18	3.03	2.79	2.68	2.52	2.36	2.27	2.21	2.13	2.06	2.03	1.98	1.91	1.88	1.83	1.78
2.75	3.19	3.03	2.78	2.67	2.50	2.33	2.24	2.17	2.08	2.02	1.98	1.93	1.85	1.83	1.77	1.72
3.00	3.19	3.04	2.78	2.66	2.49	2.30	2.21	2.14	2.04	1.98	1.93	1.88	1.80	1.77	1.71	1.66
3.25	3.20	3.04	2.77	2.65	2.47	2.28	2.18	2.11	2.01	1.94	1.89	1.84	1.75	1.72	1.66	1.60
3.50	3.21	3.05	2.77	2.65	2.46	2.26	2.16	2.08	1.97	1.90	1.86	1.80	1.70	1.67	1.61	1.55
3.75	3.23	3.06	2.77	2.65	2.46	2.25	2.14	2.05	1.94	1.87	1.82	1.76	1.66	1.63	1.56	1.50
4.00	3.24	3.07	2.78	2.65	2.45	2.23	2.12	2.03	1.91	1.84	1.79	1.73	1.62	1.59	1.52	1.45
4.25	3.25	3.08	2.78	2.65	2.45	2.22	2.10	2.01	1.89	1.81	1.76	1.70	1.59	1.56	1.48	1.41
4.50	3.27	3.09	2.79	2.65	2.45	2.22	2.09	2.00	1.87	1.79	1.74	1.67	1.56	1.53	1.45	1.38
4.75	3.28	3.11	2.80	2.66	2.45	2.21	2.08	1.99	1.86	1.78	1.73	1.65	1.54	1.51	1.43	1.36
5.00	3.30	3.12	2.81	2.67	2.46	2.21	2.08	1.98	1.85	1.77	1.71	1.64	1.52	1.49	1.41	1.34
5.25	3.32	3.14	2.82	2.68	2.46	2.22	2.08	1.98	1.85	1.76	1.71	1.63	1.51	1.48	1.39	1.32
5.50	3.34	3.16	2.84	2.69	2.47	2.22	2.08	1.98	1.84	1.76	1.70	1.63	1.50	1.47	1.39	1.31
5.75	3.36	3.18	2.85	2.71	2.48	2.23	2.09	1.99	1.85	1.76	1.70	1.63	1.50	1.47	1.38	1.31
6.00	3.38	3.20	2.87	2.72	2.50	2.24	2.10	1.99	1.85	1.76	1.71	1.63	1.51	1.47	1.39	1.31
6.25	3.40	3.22	2.89	2.74	2.51	2.25	2.11	2.01	1.86	1.77	1.72	1.64	1.51	1.48	1.39	1.32
6.50	3.43	3.24	2.91	2.76	2.53	2.27	2.13	2.02	1.88	1.79	1.73	1.65	1.53	1.49	1.41	1.34
6.75	3.45	3.26	2.93	2.79	2.55	2.29	2.14	2.04	1.90	1.80	1.75	1.67	1.55	1.51	1.43	1.36
7.00	3.47	3.28	2.95	2.81	2.57	2.31	2.17	2.06	1.92	1.83	1.77	1.69	1.57	1.54	1.46	1.39
7.25	3.50	3.31	2.97	2.83	2.60	2.33	2.19	2.09	1.94	1.85	1.80	1.72	1.60	1.57	1.49	1.43
7.50	3.52	3.33	3.00	2.86	2.62	2.36	2.22	2.11	1.97	1.88	1.83	1.75	1.64	1.61	1.53	1.47
7.75	3.55	3.36	3.02	2.89	2.65	2.39	2.25	2.14	2.01	1.92	1.86	1.79	1.68	1.65	1.58	1.53
8.00	3.57	3.39	3.05	2.91	2.67	2.42	2.28	2.18	2.05	1.96	1.91	1.83	1.73	1.70	1.63	1.58
8.25	3.60	3.41	3.08	2.94	2.70	2.45	2.32	2.22	2.09	2.01	1.95	1.88	1.78	1.76	1.70	1.65
8.50	3.63	3.44	3.11	2.98	2.74	2.49	2.36	2.26	2.14	2.06	2.01	1.94	1.85	1.82	1.76	1.72
8.75	3.66	3.48	3.14	3.01	2.77	2.53	2.40	2.31	2.20	2.11	2.06	2.00	1.91	1.89	1.83	1.80
9.00	3.70	3.51	3.18	3.06	2.81	2.58	2.45	2.37	2.26	2.18	2.13	2.07	1.98	1.96	1.91	1.87
9.25	3.73	3.55	3.22	3.10	2.86	2.63	2.51	2.43	2.32	2.24	2.19	2.14	2.06	2.04	1.99	1.95
9.50	3.77	3.59	3.27	3.15	2.91	2.68	2.57	2.49	2.39	2.31	2.26	2.21	2.13	2.12	2.07	2.04
9.75	3.81	3.63	3.31	3.20	2.96	2.74	2.63	2.56	2.46	2.38	2.34	2.28	2.21	2.19	2.15	2.12
10.00	3.85	3.68	3.36	3.25	3.01	2.80	2.69	2.62	2.53	2.45	2.41	2.36	2.29	2.27	2.22	2.19
10.25	3.89	3.73	3.41	3.30	3.06	2.86	2.76	2.69	2.60	2.52	2.47	2.43	2.36	2.34	2.29	2.26
10.50	3.94	3.77	3.46	3.35	3.12	2.92	2.82	2.75	2.66	2.59	2.54	2.49	2.42	2.40	2.36	2.33
10.75	3.98	3.82	3.51	3.40	3.17	2.97	2.88	2.81	2.72	2.65	2.60	2.55	2.48	2.47	2.42	2.38
11.00	4.02	3.86	3.56	3.46	3.22	3.03	2.93	2.87	2.78	2.70	2.65	2.60	2.53	2.52	2.47	2.43
11.25	4.06	3.90	3.61	3.50	3.27	3.08	2.98	2.92	2.83	2.75	2.70	2.65	2.58	2.56	2.51	2.47
11.50	4.10	3.94	3.66	3.55	3.31	3.12	3.03	2.96	2.87	2.79	2.74	2.69	2.62	2.60	2.55	2.51
11.75	4.14	3.98	3.70	3.59	3.35	3.16	3.06	3.00	2.91	2.83	2.77	2.72	2.65	2.63	2.57	2.53
12.00	4.18	4.02	3.74	3.63	3.38	3.19	3.09	3.03	2.94	2.85	2.80	2.74	2.66	2.64	2.58	2.54
12.25	4.21	4.06	3.78	3.66	3.41	3.22	3.12	3.05	2.96	2.87	2.82	2.76	2.68	2.65	2.59	2.54
12.50	4.25	4.09	3.81	3.69	3.44	3.25	3.14	3.07	2.98	2.89	2.83	2.76	2.68	2.66	2.59	2.54
12.75	4.28	4.12	3.84	3.72	3.46	3.26	3.16	3.09	2.99	2.89	2.83	2.77	2.68	2.65	2.58	2.52
13.00	4.31	4.15	3.87	3.75	3.48	3.28	3.17	3.10	3.00	2.90	2.83	2.76	2.67	2.64	2.56	2.50
13.25	4.34	4.17	3.89	3.77	3.50	3.29	3.18	3.10	3.00	2.89	2.82	2.75	2.65	2.62	2.54	2.48
13.50	4.36	4.20	3.92	3.79	3.52	3.30	3.18	3.11	3.00	2.89	2.81	2.74	2.63	2.60	2.52	2.45
13.75	4.39	4.22	3.94	3.81	3.53	3.31	3.19	3.11	2.99	2.88	2.80	2.73	2.61	2.58	2.49	2.42
14.00	4.41	4.24	3.96	3.83	3.54	3.31	3.19	3.11	2.99	2.87	2.79	2.71	2.59	2.56	2.46	2.38
14.25	4.44	4.27	3.98	3.84	3.55	3.32	3.19	3.11	2.98	2.86	2.78	2.69	2.57	2.53	2.43	2.35
14.50	4.46	4.29	4.00	3.86	3.56	3.32	3.19	3.10	2.98	2.85	2.76	2.68	2.54	2.51	2.40	2.31
14.75	4.48	4.31	4.02	3.88	3.57	3.33	3.19	3.10	2.97	2.84	2.75	2.66	2.52	2.48	2.37	2.28
15.00	4.51	4.33	4.04	3.90	3.59	3.34	3.20	3.10	2.97	2.83	2.74	2.65	2.50	2.46	2.35	2.25
15.25	4.53	4.35	4.06	3.91	3.60	3.34	3.20	3.11	2.97	2.83	2.73	2.63	2.49	2.44	2.33	2.23
15.50	4.55	4.37	4.08	3.93	3.61	3.35	3.21	3.11	2.97	2.82	2.73	2.62	2.47	2.43	2.30	2.20
15.75	4.58	4.39	4.10	3.95	3.63	3.36	3.21	3.11	2.97	2.82	2.72	2.62	2.46	2.41	2.29	2.18
16.00	4.60	4.42	4.12	3.97	3.64	3.37	3.22	3.12	2.97	2.82	2.72	2.61	2.45	2.40	2.27	2.16
16.25	4.62	4.44	4.14	3.99	3.66	3.38	3.23	3.13	2.98	2.82	2.72	2.61	2.44	2.39	2.26	2.15
16.50	4.65	4.46	4.17	4.01	3.68	3.40	3.24	3.14	2.98	2.83	2.72	2.61	2.44	2.39	2.25	2.13
16.75	4.68	4.49	4.19	4.04	3.70	3.42	3.26	3.15	3.00	2.84	2.73	2.61	2.44	2.39	2.25	2.13
17.00	4.72	4.52	4.23	4.07	3.73	3.44	3.28	3.17	3.01	2.85	2.74	2.62	2.44	2.39	2.25	2.13
17.25	4.76	4.56	4.27	4.11	3.76	3.47	3.30	3.20	3.03	2.87	2.76	2.64	2.45	2.40	2.25	2.13
17.50	4.80	4.60	4.31	4.15	3.80	3.50	3.33	3.23	3.06	2.89	2.78	2.66	2.47	2.42	2.27	2.14
17.75	4.85	4.64	4.36	4.19	3.84	3.54	3.37	3.26	3.09	2.92	2.80	2.68	2.49	2.44	2.28	2.16
18.00	4.88	4.68	4.40	4.23	3.88	3.57	3.40	3.29	3.13	2.95	2.83	2.71	2.51	2.46	2.31	2.18
18.25	4.92	4.71	4.43	4.27	3.92	3.61	3.44	3.33	3.16	2.99	2.86	2.74	2.54	2.49	2.33	2.20

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.50	4.95	4.74	4.47	4.30	3.95	3.64	3.47	3.36	3.20	3.02	2.89	2.77	2.57	2.52	2.36	2.23
18.75	4.97	4.77	4.50	4.33	3.98	3.67	3.50	3.39	3.23	3.05	2.92	2.79	2.60	2.55	2.39	2.26
19.00	5.00	4.79	4.52	4.36	4.01	3.70	3.53	3.42	3.26	3.08	2.95	2.82	2.63	2.58	2.42	2.29
19.25	5.02	4.82	4.55	4.38	4.03	3.72	3.56	3.45	3.29	3.11	2.98	2.85	2.66	2.60	2.45	2.32
19.50	5.04	4.84	4.57	4.41	4.06	3.75	3.58	3.48	3.31	3.13	3.00	2.88	2.68	2.63	2.48	2.35
19.75	5.07	4.86	4.60	4.43	4.08	3.77	3.61	3.50	3.34	3.16	3.03	2.90	2.71	2.66	2.51	2.38
20.00	5.10	4.89	4.63	4.46	4.11	3.80	3.63	3.53	3.37	3.19	3.06	2.93	2.74	2.69	2.54	2.41
20.25	5.16	4.95	4.68	4.51	4.16	3.84	3.67	3.57	3.41	3.23	3.09	2.97	2.78	2.73	2.57	2.45
20.50	5.24	5.02	4.76	4.59	4.23	3.90	3.73	3.63	3.47	3.28	3.15	3.02	2.82	2.78	2.62	2.49
20.75	5.31	5.09	4.84	4.66	4.30	3.97	3.81	3.70	3.54	3.35	3.21	3.08	2.89	2.84	2.68	2.55
21.00	5.36	5.14	4.90	4.72	4.36	4.04	3.87	3.77	3.61	3.41	3.27	3.14	2.95	2.91	2.75	2.62
21.25	5.41	5.19	4.95	4.78	4.42	4.10	3.93	3.83	3.67	3.48	3.34	3.21	3.02	2.97	2.81	2.69
21.50	5.46	5.24	5.00	4.83	4.48	4.15	3.99	3.90	3.74	3.54	3.40	3.27	3.09	3.04	2.88	2.76
21.75	5.52	5.29	5.05	4.88	4.52	4.21	4.05	3.95	3.80	3.60	3.46	3.33	3.15	3.11	2.95	2.83
22.00	5.63	5.39	5.16	4.99	4.62	4.29	4.13	4.03	3.88	3.68	3.53	3.40	3.21	3.17	3.01	2.89
22.25	5.71	5.48	5.26	5.08	4.71	4.39	4.22	4.13	3.97	3.77	3.62	3.48	3.30	3.25	3.09	2.97
22.50	5.78	5.55	5.33	5.16	4.79	4.47	4.31	4.22	4.06	3.85	3.70	3.57	3.38	3.34	3.17	3.06
22.75	5.83	5.61	5.40	5.22	4.86	4.54	4.38	4.29	4.14	3.93	3.78	3.65	3.46	3.42	3.25	3.13
23.00	5.88	5.66	5.45	5.28	4.92	4.60	4.45	4.36	4.21	4.00	3.84	3.71	3.53	3.49	3.32	3.20
23.25	5.93	5.70	5.50	5.33	4.97	4.66	4.51	4.42	4.27	4.06	3.90	3.77	3.59	3.55	3.38	3.26
23.50	5.99	5.76	5.55	5.38	5.03	4.71	4.56	4.47	4.32	4.11	3.95	3.82	3.64	3.60	3.43	3.31
23.75	6.07	5.84	5.64	5.47	5.10	4.78	4.63	4.55	4.39	4.18	4.01	3.88	3.70	3.65	3.48	3.35
24.00	6.14	5.91	5.72	5.54	5.18	4.86	4.71	4.62	4.47	4.25	4.08	3.94	3.76	3.71	3.53	3.40
24.25	6.20	5.97	5.78	5.61	5.24	4.92	4.78	4.69	4.54	4.31	4.14	4.00	3.81	3.77	3.58	3.45
24.50	6.25	6.02	5.84	5.66	5.30	4.98	4.83	4.75	4.59	4.37	4.19	4.05	3.86	3.81	3.62	3.49
24.75	6.29	6.06	5.88	5.71	5.34	5.03	4.88	4.79	4.64	4.41	4.23	4.09	3.90	3.85	3.65	3.51
25.00	6.31	6.09	5.91	5.74	5.38	5.06	4.91	4.83	4.68	4.44	4.26	4.12	3.92	3.88	3.67	3.53
25.25	6.33	6.11	5.93	5.76	5.40	5.08	4.94	4.85	4.70	4.46	4.28	4.14	3.94	3.89	3.69	3.54
25.50	6.34	6.12	5.94	5.77	5.41	5.09	4.95	4.87	4.71	4.47	4.29	4.14	3.95	3.90	3.69	3.54
25.75	6.34	6.12	5.94	5.77	5.41	5.10	4.95	4.87	4.72	4.48	4.29	4.15	3.94	3.90	3.69	3.54
26.00	6.34	6.12	5.94	5.77	5.41	5.10	4.95	4.87	4.71	4.47	4.28	4.14	3.94	3.89	3.67	3.52
26.25	6.33	6.11	5.94	5.77	5.41	5.09	4.95	4.86	4.71	4.47	4.28	4.13	3.92	3.88	3.66	3.50
26.50	6.32	6.10	5.93	5.76	5.40	5.08	4.93	4.85	4.69	4.45	4.26	4.12	3.91	3.86	3.64	3.49
26.75	6.31	6.09	5.91	5.74	5.38	5.07	4.92	4.84	4.68	4.44	4.25	4.10	3.89	3.84	3.62	3.47
27.00	6.30	6.07	5.90	5.73	5.37	5.05	4.91	4.82	4.66	4.42	4.23	4.08	3.87	3.82	3.60	3.44
27.25	6.28	6.06	5.88	5.71	5.35	5.04	4.89	4.80	4.64	4.40	4.21	4.06	3.85	3.80	3.58	3.42
27.50	6.26	6.04	5.86	5.69	5.33	5.02	4.87	4.78	4.62	4.38	4.19	4.04	3.83	3.78	3.56	3.40
27.75	6.24	6.02	5.85	5.67	5.32	5.00	4.85	4.76	4.60	4.36	4.17	4.02	3.81	3.76	3.54	3.37
28.00	6.23	6.01	5.83	5.66	5.30	4.98	4.83	4.74	4.58	4.34	4.15	4.00	3.79	3.74	3.51	3.35
28.25	6.21	5.99	5.81	5.63	5.28	4.96	4.81	4.72	4.56	4.32	4.13	3.98	3.77	3.72	3.49	3.33
28.50	6.19	5.97	5.78	5.61	5.25	4.94	4.79	4.70	4.54	4.30	4.11	3.96	3.74	3.69	3.47	3.30
28.75	6.16	5.94	5.76	5.59	5.23	4.91	4.76	4.67	4.51	4.28	4.09	3.94	3.72	3.67	3.45	3.28
29.00	6.14	5.92	5.74	5.57	5.21	4.89	4.74	4.65	4.49	4.25	4.07	3.92	3.70	3.65	3.43	3.26
29.25	6.12	5.90	5.71	5.54	5.19	4.87	4.71	4.63	4.47	4.23	4.04	3.89	3.68	3.63	3.40	3.24
29.50	6.09	5.87	5.69	5.52	5.16	4.84	4.69	4.60	4.44	4.20	4.02	3.87	3.65	3.60	3.38	3.22
29.75	6.06	5.84	5.66	5.49	5.13	4.81	4.66	4.57	4.41	4.18	4.00	3.85	3.63	3.58	3.36	3.19
30.00	6.04	5.82	5.63	5.46	5.11	4.79	4.64	4.55	4.39	4.15	3.97	3.82	3.61	3.56	3.34	3.17
30.25	6.01	5.79	5.60	5.43	5.08	4.76	4.61	4.52	4.36	4.13	3.95	3.80	3.58	3.53	3.31	3.15
30.50	5.98	5.76	5.57	5.40	5.05	4.73	4.58	4.49	4.33	4.10	3.92	3.77	3.56	3.51	3.29	3.13
30.75	5.95	5.73	5.54	5.37	5.02	4.70	4.55	4.46	4.30	4.07	3.90	3.75	3.54	3.48	3.27	3.11
31.00	5.92	5.71	5.51	5.34	4.99	4.68	4.52	4.43	4.27	4.05	3.87	3.73	3.51	3.46	3.25	3.09
31.25	5.89	5.68	5.48	5.31	4.96	4.65	4.50	4.40	4.24	4.02	3.85	3.70	3.49	3.44	3.23	3.07
31.50	5.86	5.65	5.45	5.28	4.93	4.62	4.47	4.38	4.22	3.99	3.82	3.68	3.47	3.41	3.21	3.05
31.75	5.83	5.62	5.42	5.25	4.90	4.59	4.44	4.35	4.19	3.97	3.80	3.65	3.44	3.39	3.19	3.03
32.00	5.80	5.59	5.39	5.22	4.87	4.56	4.41	4.32	4.16	3.94	3.77	3.63	3.42	3.37	3.17	3.01
32.25	5.77	5.56	5.36	5.19	4.84	4.53	4.38	4.29	4.13	3.91	3.75	3.61	3.40	3.35	3.15	3.00
32.50	5.74	5.53	5.32	5.16	4.82	4.50	4.35	4.26	4.10	3.89	3.73	3.59	3.38	3.33	3.13	2.98
32.75	5.71	5.50	5.29	5.13	4.79	4.48	4.32	4.23	4.08	3.87	3.70	3.57	3.36	3.31	3.12	2.97
33.00	5.68	5.47	5.27	5.10	4.76	4.45	4.30	4.21	4.05	3.84	3.68	3.55	3.35	3.30	3.11	2.97
33.25	5.65	5.45	5.24	5.07	4.73	4.43	4.28	4.18	4.03	3.82	3.67	3.53	3.34	3.29	3.11	2.97
33.50	5.63	5.42	5.21	5.05	4.71	4.40	4.25	4.16	4.01	3.81	3.65	3.52	3.33	3.28	3.10	2.97
33.75	5.60	5.40	5.19	5.02	4.69	4.38	4.24	4.15	3.99	3.79	3.64	3.51	3.33	3.28	3.11	2.98
34.00	5.58	5.38	5.17	5.00	4.67	4.37	4.22	4.13	3.98	3.78	3.64	3.51	3.33	3.28	3.11	2.99
34.25	5.56	5.35	5.14	4.98	4.65	4.35	4.20	4.12	3.97	3.77	3.63	3.51	3.33	3.28	3.12	3.00
34.50	5.54	5.33	5.12	4.96	4.63	4.34	4.19	4.10	3.96	3.77	3.63	3.51	3.33	3.29	3.13	3.01
34.75	5.52	5.31	5.10	4.94	4.62	4.32	4.18	4.09	3.95	3.76	3.63	3.51	3.34	3.30	3.14	3.03
35.00	5.50	5.30	5.09	4.93	4.60	4.31	4.17	4.09	3.94	3.76	3.62	3.51	3.34	3.30	3.15	3.04
35.25	5.48	5.28	5.07	4.91	4.59	4.30	4.16	4.08	3.94	3.76	3.62	3.51	3.35	3.31	3.16	3.06
35.50	5.45	5.25	5.04	4.89	4.57	4.29	4.15	4.07	3.93	3.75	3.62	3.51	3.36	3.32	3.17	3.07
35.75	5.43	5.23	5.02	4.87	4.55	4.27	4.14	4.06	3.92	3.75	3.62	3.51	3.36	3.32	3.18	3.08
36.00	5.40	5.21	5.00	4.84	4.53	4.26	4.12	4.04	3.91	3.74	3.61	3.51	3.36	3.32	3.18	3.08
36.25	5.38	5.19	4.98	4.82	4.51	4.24	4.11	4.03	3.89	3.73	3.60	3.50	3.35	3.32	3.18	3.08
36.50	5.36	5.17	4.95	4.80	4.49	4.22	4.09	4.01	3.88	3.71	3.59	3.49	3.34	3.31	3.17	3.08
36.75	5.34	5.14	4.93	4.78	4.47	4.20	4.07	3.99	3.86	3.70	3.58	3.48	3.33	3.30	3.16	3.07
37.00	5.31	5.12	4.91	4.75	4.45	4.18	4.05	3.97	3.84	3.68	3.56	3.46	3.32	3.28	3.15	3.05
37.25	5.28	5.09	4.88	4.73	4.43	4.16	4.03	3.95	3.82	3.66	3.54	3.44	3.30	3.26	3.13	3.03
37.50	5.26	5.07	4.85	4.70	4.40	4.14	4.01	3.93	3.80	3.64	3.52	3.42	3.27	3.23	3.10	3.00
37.75	5.23	5.04	4.83	4.68	4.37	4.11	3.98	3.90	3.77	3.61	3.49	3.39	3.24	3.20	3.07	2.97
38.00	5.20	5.02	4.80	4.65	4.34	4.08	3.95	3.87	3.74	3.58	3.46	3.36	3.21	3.17	3.03	2.93
38.25	5.18	4.99	4.77	4.62	4.31	4.05	3.92	3.84	3.70	3.54	3.43	3.32	3.17	3.13	2.99	2.89

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.50	5.15	4.96	4.74	4.59	4.28	4.02	3.88	3.80	3.67	3.51	3.39	3.28	3.13	3.09	2.95	2.85
38.75	5.12	4.93	4.71	4.56	4.25	3.99	3.85	3.77	3.63	3.47	3.35	3.25	3.09	3.05	2.91	2.80
39.00	5.09	4.90	4.68	4.53	4.22	3.95	3.82	3.73	3.59	3.43	3.31	3.21	3.05	3.01	2.87	2.75
39.25	5.06	4.88	4.64	4.49	4.19	3.92	3.78	3.69	3.55	3.39	3.27	3.17	3.01	2.96	2.82	2.71
39.50	5.03	4.85	4.61	4.46	4.15	3.88	3.74	3.65	3.51	3.35	3.23	3.12	2.96	2.92	2.77	2.66
39.75	5.00	4.82	4.58	4.43	4.12	3.85	3.70	3.62	3.47	3.31	3.19	3.08	2.92	2.87	2.73	2.61
40.00	4.97	4.79	4.54	4.39	4.08	3.81	3.67	3.58	3.43	3.27	3.15	3.04	2.87	2.83	2.68	2.56
40.25	4.94	4.75	4.51	4.36	4.05	3.77	3.63	3.54	3.39	3.23	3.11	3.00	2.83	2.79	2.64	2.52
40.50	4.91	4.72	4.48	4.32	4.01	3.74	3.59	3.50	3.35	3.19	3.07	2.96	2.79	2.74	2.59	2.47
40.75	4.88	4.69	4.44	4.29	3.98	3.70	3.55	3.46	3.31	3.15	3.03	2.92	2.75	2.70	2.55	2.43
41.00	4.85	4.67	4.41	4.26	3.94	3.67	3.52	3.43	3.28	3.11	3.00	2.88	2.71	2.66	2.51	2.39
41.25	4.83	4.64	4.38	4.23	3.91	3.64	3.49	3.39	3.24	3.08	2.96	2.85	2.67	2.62	2.47	2.35
41.50	4.80	4.62	4.36	4.20	3.88	3.61	3.46	3.36	3.21	3.04	2.93	2.81	2.64	2.59	2.44	2.31
41.75	4.78	4.60	4.33	4.18	3.86	3.58	3.43	3.33	3.18	3.01	2.90	2.78	2.61	2.56	2.41	2.28
42.00	4.76	4.58	4.31	4.16	3.83	3.56	3.40	3.30	3.15	2.99	2.87	2.76	2.58	2.53	2.38	2.25
42.25	4.74	4.56	4.29	4.13	3.81	3.53	3.38	3.28	3.12	2.96	2.85	2.73	2.55	2.50	2.35	2.23
42.50	4.72	4.54	4.27	4.11	3.79	3.51	3.36	3.26	3.10	2.94	2.83	2.71	2.53	2.48	2.33	2.21
42.75	4.71	4.52	4.25	4.09	3.77	3.49	3.34	3.23	3.08	2.92	2.81	2.69	2.51	2.46	2.31	2.19
43.00	4.69	4.51	4.23	4.07	3.75	3.47	3.32	3.22	3.06	2.90	2.79	2.67	2.49	2.44	2.30	2.17
43.25	4.67	4.49	4.21	4.06	3.73	3.45	3.30	3.20	3.04	2.88	2.77	2.66	2.48	2.43	2.28	2.16
43.50	4.66	4.48	4.19	4.04	3.72	3.44	3.28	3.18	3.03	2.87	2.76	2.64	2.47	2.42	2.27	2.15
43.75	4.64	4.46	4.18	4.02	3.70	3.42	3.27	3.17	3.01	2.85	2.74	2.63	2.46	2.41	2.27	2.15
44.00	4.63	4.45	4.16	4.01	3.68	3.41	3.25	3.15	3.00	2.84	2.73	2.62	2.45	2.40	2.26	2.15
44.25	4.61	4.43	4.15	3.99	3.67	3.40	3.24	3.14	2.99	2.83	2.73	2.61	2.44	2.40	2.26	2.15
44.50	4.60	4.42	4.13	3.98	3.66	3.38	3.23	3.13	2.98	2.82	2.72	2.61	2.44	2.40	2.26	2.15
44.75	4.58	4.41	4.12	3.97	3.64	3.37	3.22	3.12	2.97	2.82	2.72	2.61	2.44	2.40	2.27	2.16
45.00	4.57	4.39	4.10	3.95	3.63	3.36	3.21	3.11	2.96	2.82	2.71	2.61	2.45	2.41	2.28	2.18
45.25	4.56	4.38	4.09	3.94	3.62	3.36	3.21	3.11	2.96	2.82	2.72	2.61	2.46	2.41	2.29	2.19
45.50	4.54	4.37	4.08	3.93	3.61	3.35	3.20	3.11	2.96	2.82	2.72	2.62	2.47	2.43	2.31	2.22
45.75	4.53	4.35	4.07	3.92	3.60	3.34	3.20	3.10	2.96	2.82	2.73	2.63	2.48	2.44	2.33	2.24
46.00	4.52	4.34	4.06	3.91	3.60	3.34	3.20	3.10	2.97	2.83	2.74	2.64	2.50	2.46	2.35	2.27
46.25	4.51	4.33	4.05	3.90	3.59	3.34	3.20	3.11	2.97	2.84	2.75	2.66	2.52	2.49	2.38	2.30
46.50	4.50	4.32	4.04	3.89	3.59	3.34	3.20	3.11	2.98	2.85	2.76	2.68	2.55	2.51	2.41	2.34
46.75	4.49	4.31	4.03	3.89	3.59	3.34	3.21	3.12	2.99	2.87	2.78	2.70	2.58	2.54	2.45	2.38
47.00	4.47	4.30	4.02	3.88	3.58	3.35	3.22	3.13	3.01	2.89	2.81	2.72	2.61	2.58	2.49	2.42
47.25	4.47	4.30	4.02	3.88	3.59	3.35	3.23	3.15	3.03	2.91	2.83	2.75	2.64	2.61	2.53	2.46
47.50	4.46	4.29	4.01	3.88	3.59	3.36	3.24	3.16	3.04	2.93	2.85	2.78	2.67	2.64	2.56	2.50
47.75	4.45	4.28	4.01	3.88	3.59	3.37	3.25	3.17	3.06	2.95	2.88	2.80	2.70	2.68	2.60	2.54
48.00	4.44	4.28	4.00	3.87	3.59	3.38	3.26	3.19	3.08	2.97	2.90	2.83	2.73	2.70	2.63	2.57
48.25	4.43	4.27	4.00	3.87	3.60	3.39	3.27	3.20	3.09	2.99	2.92	2.85	2.75	2.73	2.65	2.60
48.50	4.42	4.26	4.00	3.87	3.60	3.39	3.28	3.21	3.11	3.00	2.93	2.86	2.77	2.75	2.67	2.62
48.75	4.41	4.26	3.99	3.87	3.60	3.40	3.29	3.22	3.11	3.01	2.94	2.88	2.78	2.76	2.68	2.63
49.00	4.41	4.25	3.99	3.86	3.60	3.40	3.29	3.22	3.12	3.01	2.94	2.88	2.78	2.76	2.68	2.63
49.25	4.40	4.24	3.98	3.86	3.59	3.39	3.28	3.22	3.11	3.01	2.94	2.88	2.78	2.76	2.68	2.62
49.50	4.38	4.23	3.97	3.85	3.58	3.38	3.28	3.21	3.10	3.00	2.93	2.87	2.77	2.74	2.67	2.61
49.75	4.37	4.22	3.96	3.83	3.57	3.37	3.26	3.19	3.09	2.99	2.92	2.85	2.75	2.73	2.65	2.59
50.00	4.36	4.20	3.94	3.82	3.56	3.36	3.25	3.18	3.07	2.97	2.90	2.83	2.73	2.70	2.62	2.56
50.25	4.34	4.19	3.93	3.80	3.54	3.34	3.23	3.16	3.05	2.94	2.87	2.80	2.70	2.67	2.59	2.52
50.50	4.33	4.17	3.91	3.78	3.52	3.32	3.20	3.13	3.02	2.92	2.84	2.77	2.67	2.64	2.55	2.48
50.75	4.31	4.16	3.89	3.76	3.50	3.29	3.18	3.10	2.99	2.88	2.81	2.74	2.63	2.60	2.51	2.44
51.00	4.29	4.14	3.86	3.74	3.48	3.26	3.15	3.07	2.96	2.85	2.77	2.70	2.59	2.55	2.46	2.39
51.25	4.27	4.12	3.84	3.71	3.45	3.23	3.12	3.04	2.92	2.81	2.73	2.66	2.54	2.51	2.42	2.34
51.50	4.25	4.10	3.81	3.69	3.42	3.20	3.08	3.00	2.88	2.77	2.69	2.62	2.50	2.46	2.37	2.29
51.75	4.23	4.07	3.79	3.66	3.39	3.17	3.05	2.97	2.85	2.73	2.65	2.57	2.45	2.42	2.32	2.23
52.00	4.21	4.05	3.76	3.63	3.37	3.14	3.02	2.93	2.81	2.69	2.61	2.53	2.40	2.37	2.27	2.18
52.25	4.19	4.03	3.73	3.61	3.34	3.11	2.98	2.89	2.77	2.65	2.57	2.49	2.36	2.32	2.22	2.13
52.50	4.16	4.00	3.70	3.58	3.31	3.08	2.95	2.86	2.73	2.61	2.53	2.44	2.31	2.27	2.17	2.08
52.75	4.14	3.98	3.68	3.55	3.28	3.04	2.91	2.82	2.69	2.57	2.49	2.40	2.27	2.23	2.12	2.03
53.00	4.12	3.96	3.65	3.52	3.25	3.01	2.88	2.79	2.65	2.53	2.45	2.36	2.22	2.19	2.08	1.98
53.25	4.10	3.93	3.62	3.50	3.22	2.98	2.85	2.75	2.62	2.49	2.41	2.32	2.18	2.14	2.03	1.94
53.50	4.07	3.91	3.59	3.47	3.20	2.95	2.82	2.72	2.58	2.46	2.38	2.29	2.15	2.10	1.99	1.90
53.75	4.05	3.89	3.57	3.44	3.17	2.92	2.79	2.69	2.55	2.43	2.35	2.25	2.11	2.07	1.95	1.86
54.00	4.03	3.87	3.54	3.42	3.15	2.89	2.76	2.66	2.52	2.39	2.31	2.22	2.07	2.03	1.92	1.82
54.25	4.01	3.84	3.52	3.39	3.12	2.87	2.73	2.63	2.49	2.36	2.28	2.19	2.04	2.00	1.89	1.79
54.50	3.99	3.82	3.49	3.37	3.10	2.84	2.70	2.60	2.46	2.33	2.25	2.16	2.01	1.97	1.86	1.76
54.75	3.97	3.80	3.47	3.34	3.07	2.82	2.68	2.57	2.43	2.31	2.23	2.13	1.99	1.94	1.83	1.73
55.00	3.95	3.78	3.44	3.32	3.05	2.79	2.65	2.55	2.40	2.28	2.20	2.11	1.96	1.92	1.81	1.71
55.25	3.93	3.76	3.42	3.30	3.03	2.77	2.63	2.53	2.38	2.26	2.18	2.09	1.94	1.90	1.79	1.69
55.50	3.91	3.73	3.40	3.28	3.01	2.75	2.61	2.50	2.36	2.24	2.16	2.07	1.92	1.88	1.77	1.68
55.75	3.89	3.71	3.38	3.26	2.99	2.73	2.59	2.48	2.34	2.22	2.15	2.05	1.91	1.87	1.76	1.67
56.00	3.86	3.69	3.36	3.23	2.97	2.71	2.57	2.47	2.32	2.20	2.13	2.04	1.90	1.86	1.75	1.66
56.25	3.84	3.67	3.34	3.21	2.95	2.69	2.55	2.45	2.31	2.19	2.12	2.03	1.89	1.85	1.75	1.66
56.50	3.82	3.65	3.32	3.19	2.93	2.68	2.54	2.43	2.29	2.18	2.11	2.02	1.88	1.85	1.75	1.66
56.75	3.81	3.63	3.30	3.18	2.92	2.66	2.53	2.42	2.28	2.17	2.10	2.02	1.88	1.85	1.75	1.67
57.00	3.79	3.61	3.28	3.16	2.90	2.65	2.51	2.41	2.27	2.17	2.10	2.02	1.89	1.85	1.76	1.69
57.25	3.77	3.60	3.27	3.15	2.89	2.64	2.51	2.41	2.27	2.17	2.10	2.02	1.90	1.86	1.78	1.71
57.50	3.76	3.58	3.26	3.13	2.88	2.63	2.50	2.40	2.27	2.17	2.11	2.03	1.91	1.88	1.80	1.73
57.75	3.75	3.57	3.24	3.12	2.88	2.63	2.50	2.40	2.28	2.18	2.12	2.04	1.93	1.90	1.83	1.77
58.00	3.73	3.56	3.24	3.12	2.87	2.63	2.50	2.41	2.29	2.19	2.14	2.07	1.96	1.93	1.86	1.81
58.25	3.72	3.55	3.23	3.11	2.87	2.64	2.51	2.42	2.31	2.22	2.16	2.09	2.00	1.97	1.91	1.86

	Location														
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.50	3.72	3.54	3.23	3.11	2.87	2.65	2.53	2.44	2.33	2.24	2.19	2.13	2.04	2.02	1.96	1.92
58.75	3.71	3.54	3.23	3.11	2.88	2.66	2.55	2.47	2.36	2.28	2.23	2.17	2.09	2.07	2.02	1.98
59.00	3.70	3.53	3.23	3.12	2.89	2.68	2.57	2.50	2.40	2.32	2.27	2.22	2.14	2.13	2.08	2.04
59.25	3.70	3.53	3.23	3.12	2.90	2.70	2.60	2.53	2.44	2.36	2.32	2.27	2.20	2.18	2.14	2.11
59.50	3.70	3.53	3.24	3.13	2.92	2.73	2.63	2.56	2.48	2.41	2.37	2.32	2.26	2.24	2.20	2.17
59.75	3.70	3.54	3.25	3.15	2.94	2.76	2.66	2.60	2.52	2.46	2.42	2.37	2.31	2.30	2.26	2.23
60.00	3.70	3.54	3.26	3.16	2.96	2.79	2.70	2.64	2.56	2.50	2.46	2.42	2.36	2.35	2.31	2.29
60.25	3.70	3.55	3.27	3.18	2.98	2.81	2.73	2.68	2.60	2.54	2.51	2.47	2.41	2.40	2.36	2.33
60.50	3.70	3.55	3.29	3.19	3.00	2.84	2.76	2.71	2.64	2.58	2.54	2.50	2.45	2.43	2.40	2.37
60.75	3.71	3.56	3.30	3.21	3.02	2.86	2.79	2.73	2.67	2.61	2.57	2.53	2.48	2.47	2.43	2.40
61.00	3.71	3.56	3.31	3.22	3.03	2.88	2.81	2.75	2.69	2.63	2.59	2.55	2.50	2.49	2.45	2.42
61.25	3.71	3.56	3.31	3.23	3.04	2.89	2.82	2.77	2.70	2.64	2.61	2.57	2.52	2.50	2.46	2.43
61.50	3.71	3.56	3.32	3.23	3.05	2.90	2.83	2.78	2.71	2.65	2.61	2.57	2.51	2.50	2.46	2.43
61.75	3.70	3.56	3.31	3.23	3.05	2.90	2.82	2.77	2.70	2.64	2.61	2.57	2.51	2.49	2.45	2.42
62.00	3.70	3.56	3.31	3.22	3.04	2.89	2.82	2.76	2.69	2.63	2.59	2.55	2.49	2.48	2.43	2.40
62.25	3.69	3.55	3.30	3.21	3.03	2.88	2.80	2.75	2.68	2.61	2.57	2.53	2.47	2.45	2.41	2.37
62.50	3.68	3.53	3.28	3.20	3.02	2.86	2.78	2.73	2.65	2.59	2.55	2.50	2.44	2.42	2.37	2.33
62.75	3.66	3.52	3.27	3.18	2.99	2.84	2.76	2.70	2.62	2.56	2.51	2.47	2.40	2.38	2.33	2.29
63.00	3.64	3.50	3.25	3.16	2.97	2.81	2.73	2.67	2.59	2.52	2.47	2.43	2.35	2.33	2.28	2.23
63.25	3.63	3.48	3.22	3.13	2.94	2.78	2.69	2.63	2.55	2.48	2.43	2.38	2.31	2.29	2.23	2.18
63.50	3.61	3.46	3.20	3.10	2.91	2.74	2.65	2.59	2.50	2.43	2.38	2.33	2.25	2.23	2.17	2.12
63.75	3.58	3.43	3.17	3.07	2.88	2.70	2.61	2.55	2.46	2.38	2.34	2.28	2.20	2.18	2.11	2.06
64.00	3.56	3.41	3.14	3.04	2.85	2.67	2.57	2.50	2.41	2.33	2.28	2.23	2.14	2.12	2.05	1.99
64.25	3.54	3.38	3.11	3.01	2.81	2.63	2.53	2.46	2.36	2.28	2.23	2.17	2.08	2.06	1.99	1.93
64.50	3.51	3.35	3.08	2.98	2.78	2.59	2.49	2.41	2.31	2.23	2.18	2.12	2.03	2.00	1.93	1.87
64.75	3.49	3.33	3.05	2.94	2.74	2.55	2.44	2.37	2.26	2.18	2.13	2.07	1.97	1.94	1.87	1.80
65.00	3.46	3.30	3.02	2.91	2.71	2.51	2.40	2.32	2.21	2.13	2.08	2.02	1.91	1.89	1.81	1.74
65.25	3.44	3.27	2.99	2.88	2.68	2.47	2.36	2.28	2.17	2.08	2.03	1.96	1.86	1.83	1.75	1.69
65.50	3.41	3.25	2.96	2.85	2.64	2.43	2.32	2.23	2.12	2.04	1.98	1.92	1.81	1.78	1.70	1.63
65.75	3.39	3.22	2.93	2.81	2.61	2.40	2.28	2.19	2.08	1.99	1.94	1.87	1.76	1.73	1.65	1.58
66.00	3.37	3.20	2.91	2.79	2.58	2.36	2.24	2.16	2.04	1.95	1.90	1.83	1.72	1.69	1.60	1.53
66.25	3.34	3.18	2.88	2.76	2.55	2.33	2.21	2.12	2.00	1.91	1.86	1.79	1.68	1.64	1.56	1.49
66.50	3.32	3.15	2.86	2.73	2.53	2.30	2.18	2.09	1.96	1.88	1.82	1.75	1.64	1.60	1.52	1.45
66.75	3.30	3.13	2.84	2.70	2.50	2.27	2.15	2.05	1.93	1.84	1.79	1.72	1.60	1.57	1.49	1.41
67.00	3.28	3.11	2.81	2.68	2.48	2.24	2.12	2.03	1.90	1.81	1.76	1.69	1.57	1.54	1.46	1.38
67.25	3.26	3.09	2.79	2.65	2.45	2.22	2.09	2.00	1.87	1.79	1.73	1.66	1.55	1.51	1.43	1.36
67.50	3.24	3.07	2.77	2.63	2.43	2.20	2.07	1.97	1.84	1.76	1.71	1.64	1.52	1.49	1.41	1.34
67.75	3.22	3.05	2.75	2.61	2.41	2.17	2.04	1.95	1.82	1.74	1.69	1.62	1.50	1.47	1.39	1.32
68.00	3.20	3.03	2.73	2.59	2.39	2.15	2.02	1.93	1.80	1.72	1.67	1.60	1.49	1.46	1.38	1.31
68.25	3.18	3.01	2.71	2.57	2.37	2.14	2.01	1.91	1.79	1.71	1.66	1.59	1.48	1.45	1.37	1.31
68.50	3.16	2.99	2.70	2.55	2.35	2.12	1.99	1.90	1.77	1.70	1.65	1.58	1.47	1.44	1.37	1.31
68.75	3.15	2.98	2.68	2.54	2.34	2.11	1.98	1.89	1.77	1.69	1.64	1.58	1.47	1.44	1.38	1.32
69.00	3.13	2.96	2.67	2.52	2.33	2.10	1.97	1.88	1.76	1.69	1.64	1.58	1.48	1.45	1.39	1.34
69.25	3.12	2.95	2.66	2.51	2.32	2.10	1.97	1.88	1.76	1.69	1.65	1.59	1.50	1.47	1.41	1.36
69.50	3.10	2.93	2.65	2.50	2.31	2.09	1.97	1.89	1.77	1.70	1.66	1.61	1.52	1.50	1.44	1.40
69.75	3.09	2.92	2.64	2.49	2.31	2.09	1.98	1.90	1.79	1.72	1.69	1.63	1.55	1.53	1.48	1.45
70.00	3.08	2.91	2.63	2.49	2.31	2.10	1.99	1.91	1.81	1.75	1.72	1.67	1.59	1.58	1.53	1.50
70.25	3.07	2.91	2.63	2.49	2.32	2.12	2.01	1.94	1.84	1.79	1.75	1.71	1.64	1.63	1.59	1.56
70.50	3.06	2.90	2.63	2.50	2.33	2.14	2.04	1.97	1.88	1.83	1.80	1.76	1.70	1.69	1.66	1.64
70.75	3.06	2.90	2.64	2.51	2.34	2.16	2.07	2.01	1.93	1.88	1.85	1.82	1.77	1.76	1.73	1.71
71.00	3.06	2.90	2.65	2.53	2.37	2.20	2.11	2.06	1.98	1.94	1.92	1.88	1.84	1.83	1.81	1.79
71.25	3.06	2.91	2.66	2.55	2.40	2.24	2.16	2.11	2.04	2.00	1.98	1.95	1.91	1.91	1.88	1.87
71.50	3.07	2.92	2.68	2.57	2.43	2.28	2.21	2.16	2.11	2.07	2.05	2.02	1.99	1.98	1.96	1.95
71.75	3.07	2.93	2.70	2.60	2.47	2.33	2.26	2.22	2.17	2.13	2.11	2.09	2.06	2.05	2.03	2.02
72.00	3.08	2.95	2.73	2.63	2.50	2.37	2.32	2.28	2.23	2.19	2.17	2.15	2.12	2.12	2.10	2.09

Table A1- 3 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q20L100; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.49	1.55	1.73	1.94	2.18	2.06	2.02	2.17
0.50	2.19	2.17	2.35	2.44	2.40	2.39	2.40	2.42	2.44	2.40	2.39	2.39	2.42	2.42	2.41	2.48
0.75	3.09	3.06	3.00	2.96	2.93	2.89	2.86	2.83	2.81	2.80	2.76	2.71	2.65	2.63	2.62	2.60
1.00	3.32	3.26	3.19	3.15	3.10	3.05	3.02	2.99	2.97	2.94	2.91	2.89	2.85	2.83	2.78	2.68
1.25	3.37	3.30	3.18	3.14	3.07	3.00	2.95	2.92	2.87	2.83	2.80	2.76	2.71	2.69	2.65	2.60
1.50	3.34	3.25	3.10	3.05	2.94	2.85	2.81	2.77	2.72	2.68	2.65	2.63	2.58	2.57	2.54	2.52
1.75	3.28	3.18	3.02	2.96	2.85	2.76	2.71	2.67	2.63	2.59	2.56	2.53	2.49	2.48	2.45	2.42
2.00	3.24	3.14	2.97	2.90	2.79	2.69	2.64	2.60	2.55	2.51	2.48	2.45	2.41	2.39	2.36	2.33
2.25	3.22	3.10	2.92	2.85	2.73	2.63	2.57	2.53	2.48	2.43	2.41	2.38	2.33	2.31	2.28	2.24
2.50	3.19	3.08	2.89	2.81	2.69	2.57	2.51	2.47	2.41	2.37	2.34	2.30	2.25	2.24	2.20	2.16
2.75	3.18	3.05	2.85	2.77	2.64	2.52	2.46	2.41	2.35	2.30	2.27	2.23	2.18	2.16	2.12	2.08
3.00	3.16	3.03	2.82	2.74	2.60	2.47	2.40	2.35	2.29	2.23	2.20	2.16	2.11	2.09	2.04	2.00
3.25	3.15	3.01	2.80	2.70	2.56	2.42	2.35	2.30	2.23	2.17	2.14	2.10	2.04	2.02	1.97	1.93
3.50	3.14	3.00	2.77	2.67	2.53	2.38	2.30	2.24	2.17	2.11	2.08	2.04	1.97	1.95	1.90	1.86
3.75	3.13	2.99	2.75	2.65	2.50	2.34	2.26	2.20	2.12	2.06	2.02	1.98	1.91	1.89	1.84	1.79
4.00	3.12	2.98	2.73	2.62	2.47	2.30	2.22	2.15	2.07	2.01	1.97	1.93	1.86	1.83	1.78	1.74
4.25	3.12	2.97	2.72	2.61	2.45	2.27	2.18	2.12	2.03	1.97	1.93	1.88	1.81	1.78	1.73	1.68
4.50	3.12	2.96	2.71	2.59	2.43	2.25	2.15	2.08	1.99	1.93	1.89	1.84	1.76	1.74	1.69	1.64
4.75	3.12	2.96	2.70	2.58	2.41	2.22	2.13	2.06	1.96	1.90	1.86	1.81	1.73	1.70	1.65	1.60
5.00	3.12	2.96	2.70	2.57	2.40	2.21	2.11	2.03	1.94	1.87	1.83	1.78	1.70	1.67	1.62	1.57
5.25	3.13	2.97	2.70	2.57	2.39	2.20	2.09	2.02	1.92	1.85	1.81	1.76	1.67	1.65	1.59	1.54
5.50	3.14	2.97	2.70	2.57	2.39	2.19	2.08	2.00	1.90	1.84	1.80	1.74	1.66	1.63	1.58	1.53
5.75	3.15	2.98	2.70	2.57	2.39	2.18	2.07	2.00	1.89	1.83	1.79	1.73	1.65	1.62	1.57	1.52
6.00	3.16	2.99	2.71	2.57	2.39	2.18	2.07	2.00	1.89	1.82	1.78	1.73	1.65	1.62	1.57	1.52
6.25	3.17	3.01	2.72	2.58	2.40	2.19	2.08	2.00	1.89	1.83	1.79	1.73	1.65	1.63	1.58	1.54
6.50	3.19	3.02	2.73	2.60	2.41	2.20	2.09	2.01	1.91	1.84	1.80	1.75	1.67	1.65	1.60	1.56
6.75	3.21	3.04	2.75	2.61	2.42	2.21	2.10	2.03	1.92	1.86	1.82	1.77	1.69	1.67	1.62	1.59
7.00	3.23	3.06	2.76	2.63	2.44	2.23	2.13	2.05	1.95	1.88	1.85	1.80	1.72	1.70	1.66	1.62
7.25	3.25	3.08	2.78	2.66	2.47	2.26	2.15	2.08	1.98	1.92	1.88	1.83	1.76	1.75	1.70	1.67
7.50	3.27	3.10	2.81	2.68	2.49	2.29	2.19	2.11	2.02	1.96	1.92	1.88	1.81	1.80	1.76	1.73
7.75	3.29	3.12	2.83	2.71	2.52	2.32	2.22	2.16	2.07	2.01	1.98	1.93	1.87	1.86	1.82	1.80
8.00	3.32	3.15	2.86	2.74	2.56	2.37	2.27	2.20	2.12	2.07	2.03	1.99	1.94	1.93	1.90	1.87
8.25	3.35	3.18	2.90	2.78	2.60	2.41	2.32	2.26	2.18	2.13	2.10	2.06	2.01	2.00	1.97	1.96
8.50	3.38	3.21	2.93	2.82	2.64	2.47	2.38	2.32	2.25	2.20	2.17	2.14	2.10	2.09	2.06	2.04
8.75	3.41	3.25	2.98	2.87	2.69	2.53	2.45	2.39	2.33	2.28	2.25	2.22	2.18	2.17	2.15	2.14
9.00	3.45	3.29	3.03	2.93	2.75	2.59	2.52	2.47	2.41	2.37	2.34	2.31	2.28	2.27	2.25	2.23
9.25	3.50	3.34	3.08	2.99	2.82	2.67	2.60	2.55	2.50	2.46	2.43	2.41	2.37	2.36	2.34	2.33
9.50	3.55	3.39	3.14	3.05	2.89	2.75	2.68	2.64	2.59	2.55	2.52	2.50	2.46	2.46	2.44	2.42
9.75	3.60	3.45	3.20	3.12	2.96	2.82	2.76	2.72	2.67	2.63	2.61	2.58	2.55	2.54	2.52	2.51
10.00	3.65	3.51	3.27	3.19	3.03	2.90	2.84	2.80	2.75	2.71	2.69	2.66	2.63	2.62	2.60	2.59
10.25	3.70	3.56	3.33	3.25	3.09	2.97	2.91	2.88	2.83	2.79	2.76	2.74	2.71	2.70	2.68	2.66
10.50	3.75	3.62	3.39	3.31	3.15	3.04	2.98	2.94	2.90	2.85	2.83	2.80	2.77	2.76	2.74	2.73
10.75	3.80	3.67	3.44	3.37	3.21	3.10	3.04	3.01	2.96	2.92	2.89	2.87	2.83	2.82	2.80	2.78
11.00	3.85	3.72	3.50	3.43	3.27	3.15	3.10	3.06	3.01	2.97	2.94	2.92	2.88	2.87	2.85	2.83
11.25	3.89	3.77	3.55	3.47	3.31	3.20	3.14	3.11	3.06	3.02	2.99	2.96	2.92	2.92	2.89	2.87
11.50	3.93	3.81	3.59	3.52	3.36	3.24	3.18	3.15	3.10	3.05	3.02	2.99	2.95	2.94	2.91	2.89
11.75	3.97	3.84	3.63	3.55	3.39	3.27	3.21	3.18	3.13	3.08	3.04	3.01	2.97	2.96	2.93	2.91
12.00	4.00	3.88	3.66	3.58	3.42	3.30	3.24	3.20	3.14	3.09	3.06	3.02	2.98	2.97	2.94	2.91
12.25	4.03	3.90	3.69	3.61	3.43	3.31	3.25	3.21	3.15	3.10	3.06	3.03	2.98	2.97	2.93	2.90
12.50	4.05	3.93	3.71	3.63	3.45	3.32	3.26	3.21	3.16	3.10	3.06	3.02	2.97	2.96	2.92	2.89
12.75	4.08	3.95	3.73	3.64	3.46	3.32	3.26	3.21	3.15	3.09	3.05	3.01	2.95	2.94	2.90	2.86
13.00	4.10	3.97	3.74	3.65	3.46	3.32	3.25	3.20	3.14	3.07	3.03	2.98	2.92	2.91	2.86	2.82
13.25	4.12	3.98	3.75	3.66	3.46	3.31	3.24	3.19	3.12	3.05	3.00	2.96	2.89	2.88	2.82	2.78
13.50	4.13	4.00	3.76	3.66	3.45	3.30	3.22	3.17	3.09	3.02	2.97	2.92	2.85	2.83	2.78	2.73
13.75	4.14	4.01	3.76	3.66	3.45	3.29	3.20	3.15	3.07	2.99	2.93	2.88	2.81	2.79	2.73	2.68
14.00	4.16	4.01	3.76	3.66	3.44	3.27	3.18	3.12	3.03	2.95	2.90	2.84	2.76	2.74	2.67	2.62
14.25	4.17	4.02	3.76	3.66	3.43	3.25	3.16	3.09	3.00	2.91	2.86	2.80	2.71	2.69	2.62	2.56
14.50	4.18	4.03	3.76	3.65	3.42	3.23	3.13	3.07	2.97	2.88	2.82	2.75	2.66	2.64	2.56	2.51
14.75	4.19	4.04	3.77	3.65	3.41	3.21	3.11	3.04	2.94	2.84	2.78	2.71	2.62	2.59	2.51	2.45
15.00	4.20	4.05	3.77	3.65	3.40	3.20	3.09	3.02	2.91	2.81	2.74	2.67	2.57	2.54	2.46	2.39
15.25	4.21	4.06	3.77	3.65	3.39	3.18	3.07	2.99	2.88	2.78	2.70	2.63	2.52	2.49	2.41	2.33
15.50	4.23	4.07	3.78	3.65	3.39	3.17	3.05	2.97	2.85	2.75	2.67	2.60	2.48	2.45	2.36	2.28
15.75	4.24	4.08	3.78	3.65	3.38	3.16	3.04	2.95	2.83	2.72	2.64	2.56	2.44	2.41	2.32	2.24
16.00	4.25	4.09	3.79	3.66	3.38	3.15	3.02	2.94	2.81	2.70	2.62	2.54	2.41	2.38	2.28	2.20
16.25	4.27	4.10	3.80	3.67	3.38	3.15	3.01	2.93	2.80	2.68	2.60	2.51	2.38	2.35	2.24	2.16
16.50	4.29	4.12	3.81	3.67	3.39	3.14	3.01	2.92	2.79	2.66	2.58	2.49	2.36	2.32	2.22	2.13
16.75	4.31	4.14	3.83	3.69	3.39	3.15	3.01	2.91	2.78	2.65	2.57	2.48	2.34	2.30	2.19	2.10
17.00	4.34	4.16	3.85	3.71	3.41	3.15	3.01	2.92	2.78	2.65	2.56	2.47	2.33	2.29	2.18	2.08
17.25	4.37	4.19	3.88	3.73	3.43	3.17	3.02	2.92	2.78	2.65	2.56	2.46	2.32	2.28	2.17	2.07
17.50	4.40	4.22	3.91	3.76	3.45	3.18	3.04	2.94	2.79	2.66	2.57	2.47	2.32	2.28	2.16	2.07
17.75	4.44	4.26	3.95	3.80	3.48	3.21	3.06	2.96	2.81	2.67	2.58	2.48	2.32	2.28	2.17	2.07
18.00	4.48	4.30	3.99	3.84	3.51	3.24	3.08	2.98	2.83	2.69	2.59	2.49	2.34	2.29	2.18	2.08
18.25	4.53	4.34	4.03	3.88	3.55	3.27	3.11	3.01	2.86	2.71	2.62	2.51	2.35	2.31	2.19	2.09
18.50	4.57	4.38	4.07	3.92	3.58	3.30	3.15	3.04	2.89	2.74	2.65	2.54	2.38	2.34	2.21	2.12

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.75	4.62	4.42	4.12	3.96	3.62	3.34	3.19	3.08	2.93	2.78	2.68	2.57	2.41	2.37	2.24	2.14
19.00	4.66	4.47	4.16	4.01	3.67	3.38	3.23	3.12	2.97	2.82	2.71	2.61	2.44	2.40	2.28	2.18
19.25	4.71	4.51	4.21	4.05	3.71	3.43	3.27	3.16	3.01	2.86	2.75	2.65	2.48	2.44	2.32	2.22
19.50	4.75	4.55	4.26	4.10	3.76	3.47	3.31	3.21	3.06	2.90	2.80	2.69	2.53	2.48	2.36	2.26
19.75	4.79	4.59	4.31	4.15	3.81	3.52	3.36	3.26	3.11	2.95	2.84	2.73	2.57	2.53	2.41	2.31
20.00	4.84	4.64	4.35	4.19	3.85	3.56	3.41	3.31	3.16	3.00	2.89	2.78	2.62	2.58	2.46	2.37
20.25	4.87	4.67	4.40	4.24	3.90	3.61	3.45	3.36	3.21	3.05	2.94	2.83	2.68	2.64	2.52	2.42
20.50	4.91	4.71	4.44	4.28	3.94	3.65	3.50	3.40	3.26	3.10	2.99	2.89	2.73	2.70	2.58	2.49
20.75	4.94	4.74	4.47	4.31	3.98	3.70	3.55	3.45	3.31	3.15	3.04	2.94	2.79	2.75	2.64	2.55
21.00	4.97	4.77	4.51	4.35	4.02	3.74	3.59	3.50	3.36	3.20	3.10	3.00	2.85	2.82	2.70	2.62
21.25	5.00	4.80	4.54	4.38	4.06	3.78	3.64	3.55	3.41	3.26	3.15	3.05	2.91	2.88	2.77	2.68
21.50	5.03	4.83	4.58	4.42	4.10	3.82	3.68	3.59	3.46	3.31	3.20	3.11	2.97	2.94	2.83	2.75
21.75	5.05	4.86	4.61	4.45	4.14	3.86	3.73	3.64	3.51	3.36	3.26	3.17	3.03	3.00	2.90	2.82
22.00	5.08	4.88	4.64	4.49	4.17	3.90	3.77	3.69	3.56	3.41	3.31	3.22	3.09	3.06	2.96	2.89
22.25	5.11	4.91	4.67	4.52	4.21	3.95	3.81	3.73	3.61	3.47	3.37	3.28	3.15	3.12	3.02	2.95
22.50	5.15	4.95	4.71	4.56	4.25	3.99	3.86	3.78	3.66	3.52	3.42	3.33	3.21	3.18	3.08	3.01
22.75	5.22	5.01	4.78	4.62	4.31	4.05	3.92	3.84	3.72	3.58	3.48	3.39	3.27	3.24	3.14	3.07
23.00	5.30	5.09	4.86	4.70	4.39	4.12	3.99	3.92	3.79	3.65	3.54	3.45	3.33	3.31	3.20	3.13
23.25	5.36	5.16	4.93	4.78	4.46	4.20	4.07	3.99	3.87	3.72	3.62	3.53	3.40	3.37	3.27	3.20
23.50	5.41	5.21	4.99	4.84	4.53	4.26	4.13	4.06	3.94	3.79	3.68	3.59	3.46	3.43	3.32	3.25
23.75	5.45	5.25	5.04	4.88	4.58	4.31	4.19	4.11	3.99	3.84	3.73	3.64	3.51	3.48	3.37	3.30
24.00	5.48	5.28	5.08	4.92	4.62	4.36	4.23	4.16	4.04	3.88	3.77	3.68	3.55	3.52	3.41	3.33
24.25	5.51	5.31	5.11	4.96	4.65	4.39	4.27	4.19	4.07	3.92	3.80	3.71	3.58	3.55	3.43	3.35
24.50	5.55	5.35	5.14	4.99	4.68	4.42	4.29	4.22	4.10	3.94	3.82	3.73	3.60	3.57	3.45	3.36
24.75	5.61	5.41	5.20	5.05	4.73	4.46	4.34	4.26	4.14	3.97	3.85	3.75	3.61	3.58	3.46	3.37
25.00	5.65	5.45	5.25	5.09	4.78	4.51	4.38	4.30	4.17	4.00	3.88	3.77	3.63	3.60	3.47	3.38
25.25	5.68	5.47	5.28	5.12	4.81	4.53	4.40	4.33	4.20	4.03	3.90	3.79	3.65	3.61	3.48	3.38
25.50	5.69	5.49	5.29	5.14	4.82	4.55	4.42	4.34	4.21	4.04	3.90	3.80	3.65	3.62	3.47	3.37
25.75	5.70	5.50	5.30	5.15	4.83	4.56	4.42	4.35	4.22	4.04	3.90	3.79	3.64	3.61	3.46	3.36
26.00	5.70	5.50	5.30	5.15	4.83	4.55	4.42	4.34	4.21	4.03	3.89	3.78	3.63	3.59	3.44	3.33
26.25	5.70	5.50	5.30	5.15	4.83	4.55	4.41	4.34	4.20	4.02	3.88	3.77	3.61	3.57	3.41	3.30
26.50	5.69	5.49	5.30	5.14	4.82	4.54	4.40	4.32	4.19	4.00	3.86	3.74	3.58	3.54	3.38	3.27
26.75	5.69	5.48	5.29	5.13	4.81	4.52	4.39	4.31	4.17	3.98	3.84	3.72	3.55	3.51	3.35	3.23
27.00	5.68	5.47	5.28	5.12	4.79	4.51	4.37	4.29	4.15	3.96	3.81	3.69	3.52	3.48	3.32	3.20
27.25	5.66	5.46	5.26	5.10	4.78	4.49	4.35	4.27	4.12	3.93	3.79	3.67	3.49	3.45	3.28	3.16
27.50	5.65	5.45	5.25	5.09	4.76	4.47	4.33	4.24	4.10	3.90	3.76	3.64	3.46	3.42	3.24	3.12
27.75	5.64	5.43	5.23	5.07	4.74	4.45	4.30	4.22	4.07	3.88	3.73	3.61	3.43	3.38	3.21	3.08
28.00	5.62	5.42	5.21	5.05	4.72	4.42	4.28	4.19	4.05	3.85	3.70	3.58	3.39	3.35	3.17	3.04
28.25	5.61	5.40	5.19	5.03	4.70	4.40	4.26	4.17	4.02	3.82	3.67	3.55	3.36	3.31	3.14	3.00
28.50	5.59	5.38	5.17	5.01	4.68	4.38	4.23	4.14	3.99	3.80	3.65	3.52	3.33	3.28	3.11	2.97
28.75	5.57	5.36	5.15	4.99	4.66	4.36	4.21	4.12	3.97	3.77	3.62	3.49	3.30	3.25	3.07	2.94
29.00	5.55	5.34	5.13	4.97	4.64	4.34	4.19	4.10	3.94	3.75	3.60	3.47	3.27	3.23	3.05	2.91
29.25	5.53	5.32	5.11	4.95	4.61	4.31	4.16	4.07	3.92	3.72	3.57	3.44	3.25	3.20	3.02	2.88
29.50	5.51	5.30	5.09	4.93	4.59	4.29	4.14	4.05	3.89	3.70	3.55	3.42	3.22	3.17	2.99	2.85
29.75	5.49	5.28	5.07	4.90	4.57	4.27	4.12	4.02	3.87	3.67	3.52	3.39	3.20	3.15	2.97	2.83
30.00	5.47	5.26	5.04	4.88	4.55	4.24	4.09	4.00	3.85	3.65	3.50	3.37	3.18	3.13	2.95	2.81
30.25	5.44	5.24	5.02	4.86	4.52	4.22	4.07	3.98	3.82	3.63	3.48	3.35	3.16	3.11	2.93	2.79
30.50	5.41	5.21	4.99	4.83	4.50	4.20	4.04	3.95	3.80	3.60	3.46	3.33	3.14	3.09	2.91	2.77
30.75	5.38	5.18	4.96	4.80	4.47	4.17	4.02	3.93	3.77	3.58	3.44	3.31	3.12	3.07	2.89	2.76
31.00	5.36	5.16	4.93	4.77	4.44	4.14	3.99	3.90	3.75	3.55	3.41	3.29	3.10	3.05	2.88	2.74
31.25	5.33	5.13	4.91	4.75	4.42	4.12	3.97	3.87	3.72	3.53	3.39	3.27	3.08	3.03	2.86	2.73
31.50	5.30	5.11	4.88	4.72	4.39	4.10	3.94	3.85	3.70	3.51	3.38	3.25	3.07	3.02	2.85	2.72
31.75	5.28	5.08	4.86	4.70	4.37	4.07	3.92	3.83	3.68	3.49	3.36	3.24	3.05	3.01	2.85	2.72
32.00	5.26	5.06	4.83	4.67	4.34	4.05	3.90	3.81	3.66	3.48	3.34	3.22	3.05	3.00	2.84	2.72
32.25	5.23	5.03	4.80	4.64	4.32	4.03	3.88	3.79	3.64	3.46	3.33	3.21	3.04	3.00	2.84	2.72
32.50	5.20	5.01	4.78	4.62	4.30	4.01	3.86	3.77	3.63	3.45	3.32	3.21	3.04	2.99	2.84	2.73
32.75	5.18	4.98	4.75	4.60	4.27	3.99	3.84	3.76	3.61	3.44	3.31	3.20	3.04	2.99	2.85	2.74
33.00	5.16	4.96	4.73	4.58	4.26	3.97	3.83	3.74	3.60	3.43	3.31	3.20	3.04	3.00	2.86	2.76
33.25	5.14	4.94	4.71	4.56	4.24	3.96	3.82	3.73	3.59	3.43	3.31	3.20	3.05	3.01	2.88	2.78
33.50	5.12	4.93	4.69	4.54	4.22	3.95	3.81	3.73	3.59	3.43	3.31	3.21	3.06	3.02	2.90	2.80
33.75	5.10	4.91	4.68	4.52	4.21	3.94	3.81	3.72	3.59	3.43	3.32	3.22	3.08	3.04	2.92	2.84
34.00	5.08	4.89	4.66	4.51	4.20	3.94	3.80	3.72	3.59	3.44	3.33	3.24	3.10	3.07	2.95	2.87
34.25	5.07	4.88	4.65	4.50	4.20	3.94	3.81	3.73	3.60	3.45	3.35	3.25	3.13	3.09	2.98	2.91
34.50	5.05	4.87	4.64	4.49	4.19	3.94	3.81	3.73	3.61	3.47	3.36	3.28	3.15	3.12	3.02	2.95
34.75	5.04	4.85	4.63	4.48	4.19	3.94	3.81	3.74	3.62	3.48	3.39	3.30	3.18	3.16	3.06	2.99
35.00	5.02	4.84	4.62	4.47	4.18	3.94	3.82	3.75	3.63	3.50	3.41	3.32	3.21	3.19	3.09	3.03
35.25	5.01	4.83	4.61	4.47	4.18	3.95	3.83	3.76	3.65	3.52	3.43	3.35	3.24	3.22	3.13	3.06
35.50	5.00	4.82	4.60	4.46	4.18	3.95	3.84	3.77	3.66	3.54	3.45	3.37	3.27	3.25	3.16	3.10
35.75	4.98	4.81	4.59	4.45	4.18	3.96	3.85	3.78	3.67	3.55	3.47	3.39	3.29	3.27	3.18	3.12
36.00	4.97	4.80	4.58	4.45	4.18	3.96	3.85	3.79	3.68	3.56	3.48	3.41	3.31	3.29	3.20	3.14
36.25	4.96	4.79	4.57	4.44	4.17	3.96	3.85	3.79	3.69	3.57	3.49	3.42	3.32	3.30	3.21	3.16
36.50	4.94	4.77	4.56	4.43	4.17	3.95	3.85	3.79	3.69	3.57	3.49	3.42	3.32	3.30	3.22	3.16
36.75	4.93	4.76	4.55	4.42	4.16	3.95	3.84	3.78	3.68	3.57	3.49	3.42	3.32	3.30	3.21	3.15
37.00	4.91	4.74	4.53	4.40	4.14	3.93	3.83	3.77	3.67	3.55	3.47	3.40	3.31	3.29	3.20	3.14
37.25	4.89	4.72	4.51	4.38	4.12	3.92	3.81	3.75	3.65	3.54	3.46	3.39	3.29	3.27	3.18	3.12
37.50	4.87	4.70	4.49	4.36	4.10	3.90	3.79	3.73	3.63	3.51	3.43	3.36	3.26	3.24	3.15	3.09
37.75	4.84	4.68	4.47	4.34	4.08	3.87	3.77	3.70	3.60	3.48	3.40	3.33	3.23	3.21	3.12	3.05
38.00	4.82	4.66	4.44	4.31	4.05	3.84	3.74	3.67	3.57	3.45	3.37	3.29	3.19	3.17	3.07	3.01
38.25	4.79	4.63	4.41	4.28	4.02	3.81	3.70	3.63	3.53	3.41	3.33	3.25	3.15	3.12	3.03	2.96
38.50	4.77	4.60	4.38	4.25	3.99	3.77	3.66	3.60	3.49	3.37	3.29	3.21	3.10	3.07	2.98	2.90

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.75	4.74	4.58	4.35	4.22	3.95	3.74	3.63	3.56	3.45	3.33	3.24	3.16	3.05	3.02	2.92	2.85
39.00	4.71	4.55	4.31	4.18	3.92	3.70	3.58	3.51	3.40	3.28	3.19	3.11	3.00	2.97	2.87	2.79
39.25	4.68	4.52	4.28	4.15	3.88	3.66	3.54	3.47	3.35	3.23	3.14	3.06	2.94	2.91	2.81	2.73
39.50	4.65	4.49	4.24	4.11	3.84	3.62	3.50	3.42	3.31	3.18	3.09	3.01	2.88	2.85	2.75	2.66
39.75	4.62	4.46	4.21	4.07	3.80	3.57	3.45	3.37	3.26	3.13	3.04	2.95	2.83	2.79	2.69	2.60
40.00	4.59	4.42	4.17	4.04	3.76	3.53	3.41	3.33	3.21	3.08	2.99	2.90	2.77	2.74	2.63	2.54
40.25	4.56	4.39	4.13	4.00	3.72	3.49	3.36	3.28	3.16	3.03	2.94	2.85	2.72	2.68	2.57	2.48
40.50	4.52	4.36	4.10	3.96	3.68	3.45	3.32	3.24	3.11	2.98	2.89	2.80	2.66	2.63	2.52	2.42
40.75	4.49	4.33	4.06	3.93	3.64	3.41	3.28	3.19	3.06	2.93	2.84	2.75	2.61	2.58	2.46	2.37
41.00	4.47	4.30	4.03	3.89	3.60	3.37	3.24	3.15	3.02	2.89	2.80	2.71	2.57	2.53	2.41	2.32
41.25	4.44	4.28	4.00	3.86	3.57	3.33	3.20	3.11	2.98	2.85	2.76	2.66	2.52	2.48	2.37	2.27
41.50	4.42	4.25	3.97	3.84	3.54	3.30	3.17	3.08	2.94	2.81	2.72	2.63	2.48	2.44	2.33	2.23
41.75	4.40	4.23	3.95	3.81	3.51	3.27	3.13	3.04	2.91	2.77	2.68	2.59	2.45	2.41	2.29	2.19
42.00	4.38	4.21	3.92	3.78	3.49	3.24	3.11	3.01	2.88	2.74	2.65	2.56	2.41	2.37	2.26	2.16
42.25	4.36	4.19	3.90	3.76	3.47	3.22	3.08	2.99	2.85	2.71	2.63	2.53	2.38	2.34	2.23	2.13
42.50	4.34	4.17	3.88	3.74	3.44	3.19	3.06	2.96	2.82	2.69	2.60	2.51	2.36	2.32	2.20	2.11
42.75	4.33	4.16	3.86	3.72	3.42	3.17	3.03	2.94	2.80	2.67	2.58	2.48	2.34	2.30	2.18	2.09
43.00	4.31	4.14	3.84	3.70	3.41	3.15	3.02	2.92	2.78	2.65	2.56	2.47	2.32	2.28	2.17	2.07
43.25	4.29	4.13	3.82	3.68	3.39	3.14	3.00	2.90	2.76	2.63	2.55	2.45	2.31	2.27	2.16	2.07
43.50	4.28	4.11	3.80	3.67	3.37	3.12	2.98	2.89	2.75	2.62	2.53	2.44	2.30	2.26	2.15	2.06
43.75	4.26	4.10	3.79	3.65	3.36	3.11	2.97	2.87	2.74	2.61	2.52	2.43	2.29	2.26	2.15	2.06
44.00	4.25	4.08	3.77	3.64	3.35	3.10	2.96	2.86	2.73	2.60	2.52	2.43	2.29	2.26	2.15	2.07
44.25	4.24	4.07	3.76	3.63	3.34	3.09	2.95	2.86	2.72	2.60	2.52	2.43	2.30	2.26	2.16	2.08
44.50	4.22	4.06	3.75	3.61	3.33	3.08	2.95	2.85	2.72	2.60	2.52	2.43	2.31	2.27	2.18	2.10
44.75	4.21	4.04	3.74	3.60	3.32	3.08	2.94	2.85	2.72	2.60	2.53	2.44	2.32	2.29	2.20	2.13
45.00	4.20	4.03	3.73	3.60	3.31	3.07	2.94	2.85	2.73	2.61	2.54	2.46	2.34	2.31	2.23	2.16
45.25	4.19	4.02	3.72	3.59	3.31	3.08	2.95	2.86	2.74	2.63	2.56	2.48	2.37	2.34	2.26	2.20
45.50	4.18	4.01	3.71	3.58	3.31	3.08	2.96	2.87	2.76	2.65	2.58	2.51	2.41	2.38	2.31	2.25
45.75	4.17	4.01	3.71	3.58	3.31	3.09	2.97	2.89	2.78	2.68	2.61	2.54	2.45	2.43	2.36	2.31
46.00	4.16	4.00	3.70	3.58	3.32	3.10	2.99	2.91	2.81	2.71	2.65	2.59	2.50	2.48	2.41	2.37
46.25	4.15	4.00	3.70	3.59	3.33	3.12	3.01	2.94	2.84	2.75	2.69	2.63	2.55	2.53	2.48	2.44
46.50	4.15	3.99	3.71	3.59	3.34	3.14	3.04	2.97	2.88	2.79	2.74	2.69	2.61	2.60	2.54	2.51
46.75	4.15	3.99	3.71	3.60	3.36	3.17	3.07	3.01	2.92	2.84	2.79	2.74	2.67	2.66	2.61	2.58
47.00	4.15	4.00	3.72	3.61	3.38	3.20	3.11	3.05	2.97	2.89	2.84	2.80	2.73	2.72	2.67	2.65
47.25	4.15	4.00	3.74	3.63	3.40	3.23	3.15	3.09	3.01	2.94	2.90	2.85	2.79	2.78	2.74	2.71
47.50	4.15	4.00	3.75	3.65	3.43	3.27	3.18	3.13	3.06	2.99	2.95	2.90	2.85	2.84	2.80	2.77
47.75	4.15	4.01	3.76	3.66	3.45	3.30	3.22	3.17	3.10	3.04	2.99	2.95	2.90	2.89	2.85	2.82
48.00	4.15	4.02	3.78	3.68	3.47	3.33	3.25	3.21	3.14	3.07	3.03	2.99	2.94	2.93	2.89	2.86
48.25	4.16	4.02	3.79	3.69	3.49	3.35	3.28	3.23	3.17	3.10	3.06	3.03	2.97	2.96	2.92	2.89
48.50	4.16	4.03	3.80	3.71	3.51	3.37	3.30	3.25	3.19	3.13	3.09	3.05	3.00	2.98	2.94	2.92
48.75	4.16	4.03	3.81	3.71	3.52	3.38	3.31	3.27	3.21	3.14	3.10	3.07	3.01	3.00	2.96	2.93
49.00	4.16	4.03	3.81	3.72	3.53	3.39	3.32	3.28	3.21	3.15	3.11	3.07	3.02	3.01	2.96	2.93
49.25	4.15	4.03	3.81	3.72	3.53	3.39	3.32	3.28	3.21	3.15	3.11	3.07	3.02	3.00	2.96	2.93
49.50	4.15	4.02	3.80	3.71	3.52	3.39	3.32	3.27	3.21	3.14	3.10	3.06	3.00	2.99	2.94	2.91
49.75	4.14	4.01	3.79	3.70	3.51	3.37	3.30	3.26	3.19	3.12	3.08	3.04	2.98	2.97	2.92	2.88
50.00	4.12	4.00	3.78	3.69	3.49	3.35	3.28	3.23	3.17	3.10	3.05	3.01	2.95	2.93	2.88	2.85
50.25	4.11	3.98	3.76	3.66	3.47	3.33	3.25	3.20	3.13	3.06	3.02	2.97	2.91	2.89	2.84	2.80
50.50	4.09	3.96	3.73	3.64	3.44	3.30	3.22	3.17	3.10	3.02	2.98	2.93	2.86	2.85	2.79	2.75
50.75	4.07	3.94	3.71	3.61	3.41	3.26	3.18	3.13	3.05	2.98	2.93	2.88	2.81	2.79	2.74	2.69
51.00	4.04	3.91	3.67	3.58	3.38	3.22	3.14	3.09	3.01	2.93	2.88	2.83	2.75	2.74	2.67	2.63
51.25	4.02	3.88	3.64	3.55	3.34	3.18	3.10	3.04	2.96	2.88	2.82	2.77	2.70	2.67	2.61	2.56
51.50	3.99	3.86	3.61	3.51	3.30	3.14	3.05	2.99	2.90	2.82	2.77	2.71	2.63	2.61	2.54	2.49
51.75	3.97	3.83	3.57	3.47	3.26	3.09	3.00	2.94	2.85	2.77	2.71	2.65	2.57	2.55	2.48	2.42
52.00	3.94	3.80	3.53	3.44	3.22	3.04	2.95	2.89	2.79	2.71	2.65	2.59	2.50	2.48	2.41	2.35
52.25	3.91	3.77	3.49	3.40	3.18	3.00	2.90	2.83	2.74	2.65	2.59	2.53	2.44	2.41	2.34	2.28
52.50	3.89	3.74	3.46	3.36	3.14	2.95	2.85	2.78	2.68	2.59	2.53	2.47	2.38	2.35	2.27	2.21
52.75	3.86	3.71	3.42	3.32	3.10	2.91	2.80	2.73	2.63	2.54	2.48	2.41	2.31	2.29	2.21	2.14
53.00	3.83	3.68	3.39	3.29	3.06	2.86	2.76	2.68	2.58	2.48	2.42	2.36	2.26	2.23	2.15	2.08
53.25	3.80	3.64	3.35	3.25	3.02	2.82	2.71	2.64	2.53	2.43	2.37	2.31	2.20	2.17	2.09	2.02
53.50	3.77	3.61	3.32	3.21	2.99	2.78	2.67	2.59	2.48	2.39	2.32	2.26	2.15	2.12	2.04	1.97
53.75	3.75	3.59	3.29	3.18	2.95	2.74	2.63	2.55	2.43	2.34	2.28	2.21	2.10	2.07	1.99	1.92
54.00	3.72	3.56	3.26	3.15	2.92	2.71	2.59	2.51	2.39	2.30	2.24	2.17	2.06	2.03	1.94	1.87
54.25	3.69	3.53	3.23	3.12	2.89	2.67	2.56	2.47	2.35	2.26	2.20	2.13	2.02	1.98	1.90	1.83
54.50	3.67	3.50	3.20	3.09	2.86	2.64	2.52	2.44	2.32	2.22	2.16	2.09	1.98	1.95	1.87	1.79
54.75	3.65	3.48	3.17	3.06	2.83	2.61	2.49	2.40	2.28	2.19	2.13	2.06	1.95	1.91	1.83	1.76
55.00	3.62	3.46	3.15	3.03	2.81	2.58	2.46	2.37	2.25	2.16	2.10	2.03	1.92	1.89	1.81	1.74
55.25	3.60	3.43	3.13	3.01	2.78	2.56	2.44	2.35	2.23	2.14	2.08	2.01	1.90	1.87	1.79	1.72
55.50	3.58	3.41	3.10	2.99	2.76	2.53	2.41	2.33	2.21	2.12	2.06	1.99	1.88	1.85	1.78	1.71
55.75	3.56	3.39	3.08	2.96	2.74	2.51	2.40	2.31	2.19	2.10	2.04	1.98	1.87	1.84	1.77	1.71
56.00	3.54	3.37	3.06	2.94	2.72	2.50	2.38	2.29	2.17	2.09	2.03	1.97	1.87	1.84	1.77	1.71
56.25	3.52	3.35	3.04	2.92	2.71	2.48	2.37	2.28	2.17	2.08	2.03	1.97	1.87	1.84	1.78	1.72
56.50	3.50	3.33	3.03	2.91	2.69	2.47	2.36	2.27	2.16	2.08	2.03	1.97	1.88	1.85	1.79	1.75
56.75	3.48	3.31	3.01	2.90	2.68	2.47	2.36	2.27	2.17	2.09	2.04	1.98	1.90	1.87	1.82	1.78
57.00	3.47	3.30	3.01	2.89	2.68	2.47	2.36	2.28	2.18	2.10	2.06	2.01	1.93	1.91	1.85	1.82
57.25	3.46	3.29	3.00	2.88	2.68	2.47	2.37	2.29	2.20	2.13	2.09	2.04	1.96	1.95	1.90	1.87
57.50	3.45	3.28	3.00	2.89	2.69	2.49	2.39	2.32	2.23	2.16	2.12	2.08	2.01	2.00	1.96	1.93
57.75	3.45	3.28	3.00	2.89	2.70	2.51	2.41	2.35	2.26	2.20	2.17	2.13	2.07	2.05	2.02	2.00
58.00	3.45	3.28	3.01	2.90	2.72	2.54	2.45	2.39	2.31	2.26	2.22	2.19	2.14	2.12	2.09	2.07
58.25	3.45	3.29	3.02	2.92	2.74	2.57	2.49	2.44	2.37	2.32	2.29	2.25	2.21	2.20	2.17	2.16
58.50	3.46	3.30	3.04	2.95	2.77	2.62	2.54	2.49	2.43	2.38	2.35	2.32	2.29	2.28	2.25	2.24

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.75	3.47	3.32	3.07	2.98	2.81	2.67	2.60	2.55	2.50	2.45	2.43	2.40	2.37	2.36	2.34	2.32
59.00	3.48	3.34	3.10	3.01	2.85	2.72	2.66	2.62	2.57	2.53	2.50	2.48	2.45	2.44	2.42	2.41
59.25	3.50	3.36	3.13	3.05	2.90	2.78	2.72	2.68	2.64	2.60	2.58	2.56	2.53	2.52	2.50	2.49
59.50	3.52	3.38	3.17	3.09	2.95	2.84	2.78	2.75	2.71	2.67	2.65	2.63	2.60	2.60	2.58	2.57
59.75	3.54	3.41	3.20	3.14	3.00	2.89	2.84	2.81	2.77	2.74	2.72	2.70	2.67	2.67	2.65	2.64
60.00	3.56	3.44	3.24	3.18	3.04	2.94	2.90	2.87	2.83	2.79	2.77	2.75	2.73	2.72	2.70	2.69
60.25	3.58	3.46	3.27	3.21	3.08	2.99	2.94	2.91	2.88	2.84	2.82	2.81	2.78	2.77	2.76	2.74
60.50	3.60	3.49	3.30	3.24	3.12	3.03	2.98	2.96	2.92	2.89	2.87	2.85	2.82	2.82	2.80	2.79
60.75	3.62	3.51	3.33	3.27	3.15	3.06	3.02	2.99	2.96	2.92	2.90	2.89	2.86	2.85	2.83	2.82
61.00	3.63	3.52	3.35	3.29	3.17	3.09	3.04	3.02	2.98	2.95	2.92	2.90	2.88	2.87	2.85	2.83
61.25	3.64	3.53	3.36	3.30	3.18	3.10	3.06	3.03	2.99	2.96	2.94	2.92	2.89	2.88	2.86	2.84
61.50	3.65	3.54	3.37	3.31	3.19	3.10	3.06	3.03	3.00	2.96	2.94	2.91	2.88	2.88	2.85	2.84
61.75	3.65	3.54	3.37	3.31	3.19	3.10	3.06	3.03	2.99	2.95	2.93	2.91	2.88	2.87	2.84	2.82
62.00	3.64	3.53	3.36	3.30	3.18	3.09	3.05	3.02	2.97	2.94	2.91	2.89	2.85	2.84	2.82	2.79
62.25	3.63	3.52	3.35	3.29	3.16	3.07	3.02	2.99	2.95	2.91	2.88	2.86	2.82	2.81	2.78	2.76
62.50	3.62	3.51	3.33	3.27	3.14	3.04	2.99	2.96	2.92	2.87	2.84	2.82	2.78	2.77	2.74	2.71
62.75	3.60	3.49	3.30	3.24	3.11	3.01	2.96	2.92	2.87	2.83	2.80	2.77	2.73	2.72	2.69	2.66
63.00	3.57	3.46	3.27	3.21	3.07	2.97	2.92	2.88	2.83	2.78	2.75	2.72	2.68	2.67	2.63	2.60
63.25	3.55	3.43	3.24	3.17	3.04	2.93	2.87	2.83	2.78	2.73	2.70	2.67	2.62	2.61	2.57	2.54
63.50	3.52	3.40	3.20	3.13	2.99	2.88	2.82	2.78	2.72	2.67	2.64	2.60	2.55	2.54	2.50	2.46
63.75	3.49	3.37	3.16	3.09	2.95	2.83	2.76	2.72	2.66	2.61	2.57	2.54	2.48	2.47	2.43	2.39
64.00	3.46	3.33	3.12	3.05	2.90	2.77	2.71	2.66	2.60	2.54	2.51	2.47	2.41	2.40	2.35	2.31
64.25	3.42	3.29	3.08	3.00	2.85	2.72	2.65	2.60	2.53	2.48	2.44	2.40	2.34	2.32	2.28	2.24
64.50	3.39	3.26	3.04	2.95	2.80	2.66	2.59	2.54	2.47	2.41	2.37	2.33	2.27	2.25	2.20	2.16
64.75	3.36	3.22	3.00	2.91	2.75	2.61	2.53	2.48	2.40	2.34	2.31	2.26	2.20	2.18	2.12	2.08
65.00	3.32	3.18	2.95	2.86	2.71	2.55	2.48	2.42	2.34	2.28	2.24	2.20	2.13	2.11	2.05	2.01
65.25	3.29	3.15	2.91	2.82	2.66	2.50	2.42	2.36	2.28	2.22	2.18	2.13	2.06	2.04	1.98	1.93
65.50	3.26	3.12	2.88	2.78	2.61	2.45	2.37	2.30	2.22	2.16	2.12	2.07	1.99	1.97	1.92	1.87
65.75	3.23	3.08	2.84	2.73	2.57	2.40	2.31	2.25	2.16	2.10	2.06	2.01	1.93	1.91	1.85	1.80
66.00	3.20	3.05	2.80	2.70	2.53	2.36	2.27	2.20	2.11	2.05	2.01	1.95	1.88	1.85	1.79	1.74
66.25	3.17	3.02	2.77	2.66	2.49	2.31	2.22	2.15	2.06	2.00	1.95	1.90	1.82	1.80	1.74	1.69
66.50	3.14	2.99	2.74	2.62	2.46	2.27	2.18	2.11	2.01	1.95	1.91	1.86	1.78	1.75	1.69	1.64
66.75	3.12	2.97	2.71	2.59	2.42	2.24	2.14	2.07	1.97	1.91	1.87	1.82	1.73	1.71	1.65	1.60
67.00	3.09	2.94	2.68	2.56	2.39	2.21	2.11	2.03	1.94	1.87	1.83	1.78	1.70	1.67	1.62	1.57
67.25	3.07	2.92	2.66	2.53	2.36	2.18	2.08	2.00	1.90	1.84	1.80	1.75	1.67	1.64	1.59	1.54
67.50	3.05	2.90	2.64	2.51	2.34	2.15	2.05	1.98	1.88	1.82	1.78	1.73	1.65	1.62	1.57	1.52
67.75	3.03	2.88	2.62	2.48	2.32	2.13	2.03	1.95	1.86	1.80	1.76	1.71	1.63	1.61	1.56	1.51
68.00	3.01	2.86	2.60	2.47	2.30	2.11	2.01	1.94	1.84	1.78	1.75	1.70	1.62	1.60	1.55	1.51
68.25	3.00	2.84	2.58	2.45	2.29	2.10	2.00	1.93	1.83	1.78	1.74	1.69	1.62	1.60	1.56	1.52
68.50	2.98	2.83	2.57	2.44	2.28	2.09	1.99	1.92	1.83	1.78	1.74	1.70	1.63	1.61	1.57	1.54
68.75	2.97	2.82	2.56	2.43	2.27	2.09	1.99	1.93	1.84	1.79	1.75	1.71	1.65	1.63	1.59	1.57
69.00	2.96	2.81	2.56	2.42	2.27	2.09	2.00	1.94	1.85	1.80	1.78	1.74	1.68	1.67	1.63	1.61
69.25	2.96	2.81	2.56	2.43	2.27	2.10	2.02	1.96	1.88	1.83	1.81	1.77	1.72	1.71	1.68	1.66
69.50	2.95	2.80	2.56	2.43	2.29	2.12	2.04	1.99	1.92	1.87	1.85	1.82	1.77	1.76	1.74	1.72
69.75	2.95	2.81	2.57	2.45	2.31	2.15	2.08	2.03	1.96	1.92	1.90	1.87	1.83	1.82	1.80	1.79
70.00	2.95	2.81	2.58	2.47	2.33	2.19	2.12	2.07	2.01	1.98	1.96	1.94	1.90	1.90	1.88	1.87
70.25	2.96	2.83	2.60	2.50	2.37	2.23	2.17	2.13	2.08	2.05	2.03	2.01	1.98	1.97	1.96	1.95
70.50	2.97	2.84	2.63	2.53	2.41	2.28	2.23	2.19	2.15	2.12	2.11	2.09	2.07	2.06	2.05	2.04
70.75	2.99	2.86	2.66	2.57	2.46	2.35	2.30	2.27	2.23	2.20	2.19	2.17	2.16	2.15	2.14	2.14
71.00	3.01	2.89	2.70	2.62	2.51	2.41	2.37	2.34	2.31	2.29	2.28	2.26	2.24	2.24	2.23	2.23
71.25	3.04	2.93	2.75	2.68	2.57	2.48	2.45	2.42	2.39	2.37	2.36	2.35	2.33	2.33	2.32	2.32
71.50	3.07	2.97	2.79	2.73	2.64	2.56	2.52	2.50	2.47	2.45	2.44	2.43	2.42	2.42	2.41	2.40
71.75	3.11	3.01	2.84	2.79	2.70	2.63	2.60	2.58	2.55	2.53	2.52	2.51	2.50	2.50	2.49	2.49
72.00	3.14	3.05	2.90	2.85	2.76	2.70	2.67	2.65	2.62	2.61	2.60	2.59	2.57	2.57	2.56	2.56

Table A1- 4 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q20L50; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.49	1.53	1.67	1.87	2.11	1.99	1.93	2.07
0.50	2.18	2.13	2.25	2.36	2.35	2.34	2.32	2.34	2.35	2.30	2.29	2.29	2.30	2.30	2.28	2.34
0.75	2.99	2.95	2.88	2.84	2.80	2.75	2.72	2.69	2.68	2.67	2.63	2.57	2.50	2.48	2.46	2.43
1.00	3.19	3.12	3.03	2.99	2.93	2.87	2.82	2.80	2.78	2.74	2.71	2.69	2.65	2.62	2.57	2.48
1.25	3.23	3.15	3.02	2.97	2.88	2.80	2.75	2.71	2.66	2.62	2.59	2.56	2.50	2.49	2.45	2.41
1.50	3.21	3.11	2.95	2.89	2.78	2.68	2.63	2.59	2.54	2.50	2.47	2.44	2.40	2.39	2.35	2.33
1.75	3.17	3.07	2.89	2.82	2.71	2.60	2.55	2.51	2.46	2.42	2.39	2.36	2.31	2.30	2.27	2.24
2.00	3.15	3.04	2.85	2.78	2.66	2.54	2.49	2.45	2.39	2.35	2.32	2.29	2.24	2.22	2.18	2.15
2.25	3.13	3.01	2.82	2.74	2.61	2.49	2.43	2.39	2.33	2.28	2.25	2.22	2.16	2.15	2.11	2.07
2.50	3.12	2.99	2.79	2.70	2.57	2.44	2.38	2.33	2.27	2.22	2.18	2.15	2.09	2.07	2.03	1.99
2.75	3.11	2.98	2.76	2.67	2.53	2.40	2.33	2.27	2.21	2.15	2.12	2.08	2.02	2.00	1.96	1.92
3.00	3.09	2.96	2.74	2.64	2.50	2.35	2.28	2.22	2.15	2.09	2.06	2.02	1.96	1.94	1.89	1.84
3.25	3.09	2.95	2.72	2.61	2.47	2.31	2.23	2.17	2.10	2.04	2.00	1.96	1.89	1.87	1.82	1.77
3.50	3.08	2.94	2.70	2.59	2.44	2.27	2.19	2.13	2.04	1.99	1.95	1.90	1.83	1.81	1.76	1.71
3.75	3.08	2.93	2.68	2.57	2.41	2.24	2.15	2.08	2.00	1.94	1.90	1.85	1.77	1.75	1.69	1.65
4.00	3.07	2.92	2.67	2.55	2.39	2.21	2.11	2.05	1.95	1.89	1.85	1.80	1.72	1.70	1.64	1.59
4.25	3.07	2.92	2.66	2.53	2.37	2.18	2.08	2.01	1.92	1.85	1.81	1.76	1.67	1.65	1.59	1.54
4.50	3.08	2.92	2.65	2.52	2.35	2.16	2.06	1.98	1.88	1.82	1.78	1.72	1.64	1.61	1.55	1.50
4.75	3.08	2.92	2.65	2.52	2.34	2.14	2.03	1.96	1.85	1.79	1.75	1.69	1.60	1.58	1.51	1.46
5.00	3.09	2.92	2.65	2.51	2.33	2.13	2.02	1.94	1.83	1.76	1.72	1.66	1.57	1.55	1.49	1.43
5.25	3.10	2.93	2.65	2.51	2.33	2.12	2.00	1.92	1.81	1.75	1.70	1.64	1.55	1.52	1.46	1.41
5.50	3.11	2.94	2.65	2.51	2.33	2.11	2.00	1.91	1.80	1.73	1.69	1.63	1.54	1.51	1.45	1.39
5.75	3.12	2.95	2.66	2.52	2.33	2.11	1.99	1.91	1.79	1.73	1.68	1.62	1.53	1.50	1.44	1.39
6.00	3.13	2.96	2.67	2.52	2.34	2.12	1.99	1.91	1.79	1.72	1.68	1.62	1.53	1.50	1.44	1.39
6.25	3.15	2.97	2.68	2.53	2.34	2.12	2.00	1.91	1.80	1.73	1.69	1.62	1.53	1.51	1.45	1.40
6.50	3.16	2.99	2.69	2.55	2.36	2.13	2.01	1.92	1.81	1.74	1.70	1.64	1.54	1.52	1.46	1.41
6.75	3.18	3.01	2.71	2.56	2.37	2.15	2.02	1.94	1.82	1.76	1.71	1.65	1.56	1.54	1.48	1.44
7.00	3.20	3.03	2.73	2.58	2.39	2.16	2.04	1.96	1.85	1.78	1.74	1.68	1.59	1.57	1.52	1.48
7.25	3.22	3.05	2.74	2.60	2.41	2.19	2.07	1.98	1.87	1.81	1.77	1.71	1.63	1.61	1.56	1.52
7.50	3.24	3.07	2.77	2.63	2.43	2.21	2.10	2.02	1.91	1.84	1.81	1.75	1.68	1.66	1.61	1.58
7.75	3.27	3.09	2.79	2.66	2.46	2.24	2.13	2.05	1.95	1.89	1.85	1.80	1.73	1.71	1.67	1.64
8.00	3.29	3.12	2.82	2.69	2.49	2.28	2.17	2.10	2.00	1.94	1.90	1.86	1.79	1.78	1.74	1.71
8.25	3.32	3.14	2.85	2.72	2.53	2.32	2.22	2.15	2.06	2.00	1.97	1.92	1.86	1.85	1.81	1.79
8.50	3.35	3.17	2.88	2.76	2.57	2.37	2.28	2.21	2.12	2.07	2.04	2.00	1.94	1.93	1.90	1.88
8.75	3.38	3.21	2.92	2.80	2.62	2.43	2.34	2.27	2.20	2.14	2.11	2.07	2.02	2.01	1.98	1.97
9.00	3.42	3.25	2.96	2.85	2.67	2.49	2.40	2.34	2.27	2.22	2.19	2.16	2.11	2.10	2.07	2.06
9.25	3.46	3.29	3.01	2.91	2.73	2.55	2.47	2.42	2.35	2.30	2.27	2.24	2.20	2.19	2.16	2.15
9.50	3.50	3.34	3.07	2.97	2.79	2.62	2.55	2.50	2.43	2.38	2.36	2.33	2.29	2.28	2.25	2.24
9.75	3.55	3.39	3.12	3.03	2.85	2.70	2.62	2.57	2.52	2.47	2.44	2.41	2.37	2.36	2.34	2.32
10.00	3.60	3.44	3.18	3.09	2.92	2.77	2.70	2.65	2.59	2.55	2.52	2.49	2.45	2.44	2.42	2.40
10.25	3.65	3.50	3.24	3.15	2.98	2.84	2.77	2.72	2.67	2.62	2.59	2.57	2.53	2.52	2.49	2.47
10.50	3.70	3.55	3.30	3.21	3.04	2.90	2.84	2.79	2.74	2.69	2.66	2.63	2.59	2.58	2.56	2.54
10.75	3.74	3.60	3.35	3.27	3.10	2.96	2.90	2.85	2.80	2.75	2.72	2.69	2.65	2.64	2.62	2.60
11.00	3.79	3.65	3.40	3.32	3.15	3.02	2.95	2.91	2.85	2.81	2.77	2.74	2.70	2.69	2.67	2.65
11.25	3.83	3.69	3.45	3.37	3.20	3.06	3.00	2.96	2.90	2.85	2.82	2.79	2.75	2.74	2.71	2.68
11.50	3.87	3.74	3.49	3.41	3.24	3.11	3.04	3.00	2.94	2.89	2.85	2.82	2.78	2.77	2.73	2.71
11.75	3.91	3.77	3.53	3.45	3.27	3.14	3.07	3.03	2.97	2.92	2.88	2.85	2.80	2.79	2.75	2.73
12.00	3.94	3.81	3.57	3.48	3.30	3.17	3.10	3.05	2.99	2.93	2.90	2.86	2.81	2.80	2.76	2.73
12.25	3.97	3.84	3.60	3.51	3.32	3.18	3.11	3.07	3.00	2.94	2.90	2.87	2.81	2.80	2.76	2.73
12.50	4.00	3.86	3.62	3.53	3.34	3.20	3.12	3.08	3.01	2.94	2.90	2.86	2.80	2.79	2.75	2.71
12.75	4.02	3.88	3.64	3.55	3.35	3.20	3.13	3.08	3.01	2.94	2.90	2.85	2.79	2.77	2.73	2.69
13.00	4.04	3.90	3.66	3.56	3.36	3.21	3.13	3.07	3.00	2.93	2.88	2.83	2.77	2.75	2.70	2.65
13.25	4.06	3.92	3.67	3.57	3.36	3.20	3.12	3.06	2.98	2.91	2.86	2.81	2.74	2.72	2.66	2.62
13.50	4.08	3.94	3.68	3.58	3.36	3.19	3.11	3.05	2.96	2.88	2.83	2.78	2.70	2.68	2.62	2.57
13.75	4.10	3.95	3.69	3.58	3.36	3.18	3.09	3.03	2.94	2.86	2.80	2.74	2.66	2.64	2.57	2.52
14.00	4.11	3.96	3.69	3.59	3.36	3.17	3.07	3.01	2.92	2.83	2.77	2.71	2.62	2.60	2.53	2.47
14.25	4.13	3.98	3.70	3.59	3.35	3.16	3.06	2.99	2.89	2.80	2.73	2.67	2.58	2.55	2.48	2.41
14.50	4.14	3.99	3.71	3.59	3.35	3.15	3.04	2.97	2.86	2.76	2.70	2.63	2.53	2.51	2.43	2.36
14.75	4.16	4.00	3.71	3.59	3.34	3.13	3.02	2.95	2.84	2.74	2.67	2.60	2.49	2.46	2.38	2.31
15.00	4.17	4.01	3.72	3.60	3.34	3.12	3.01	2.93	2.81	2.71	2.64	2.56	2.45	2.42	2.33	2.26
15.25	4.19	4.02	3.73	3.60	3.34	3.11	2.99	2.91	2.79	2.68	2.61	2.53	2.41	2.38	2.29	2.21
15.50	4.20	4.04	3.73	3.61	3.33	3.11	2.98	2.89	2.77	2.66	2.58	2.50	2.38	2.34	2.25	2.17
15.75	4.22	4.05	3.74	3.61	3.34	3.10	2.97	2.88	2.75	2.64	2.56	2.47	2.35	2.31	2.21	2.13
16.00	4.23	4.06	3.75	3.62	3.34	3.10	2.96	2.87	2.74	2.62	2.54	2.45	2.32	2.28	2.18	2.09
16.25	4.25	4.08	3.77	3.63	3.34	3.10	2.96	2.87	2.73	2.61	2.52	2.43	2.29	2.26	2.15	2.06
16.50	4.27	4.10	3.78	3.64	3.35	3.10	2.96	2.86	2.72	2.59	2.51	2.42	2.28	2.24	2.13	2.03
16.75	4.29	4.12	3.80	3.66	3.36	3.10	2.96	2.86	2.72	2.59	2.50	2.41	2.26	2.22	2.11	2.01
17.00	4.32	4.15	3.83	3.68	3.38	3.11	2.97	2.87	2.72	2.59	2.50	2.40	2.25	2.21	2.09	2.00
17.25	4.36	4.18	3.85	3.71	3.40	3.13	2.98	2.88	2.73	2.59	2.50	2.40	2.25	2.20	2.09	1.99
17.50	4.39	4.21	3.89	3.74	3.43	3.15	3.00	2.89	2.74	2.60	2.51	2.41	2.25	2.21	2.09	1.98
17.75	4.43	4.25	3.93	3.78	3.46	3.18	3.02	2.92	2.76	2.62	2.52	2.42	2.26	2.21	2.09	1.99
18.00	4.48	4.29	3.97	3.82	3.49	3.21	3.05	2.94	2.79	2.64	2.54	2.44	2.27	2.23	2.10	2.00
18.25	4.52	4.33	4.01	3.86	3.53	3.24	3.08	2.97	2.82	2.67	2.57	2.46	2.29	2.25	2.12	2.02
18.50	4.56	4.37	4.06	3.90	3.56	3.28	3.12	3.01	2.85	2.70	2.60	2.49	2.32	2.27	2.15	2.04

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.75	4.61	4.41	4.10	3.95	3.60	3.32	3.15	3.05	2.89	2.73	2.63	2.52	2.35	2.30	2.17	2.07
19.00	4.65	4.46	4.15	3.99	3.65	3.36	3.20	3.09	2.93	2.77	2.67	2.56	2.38	2.34	2.21	2.10
19.25	4.70	4.50	4.20	4.04	3.69	3.40	3.24	3.13	2.97	2.81	2.71	2.59	2.42	2.38	2.25	2.14
19.50	4.74	4.55	4.25	4.09	3.74	3.45	3.28	3.18	3.02	2.86	2.75	2.64	2.47	2.42	2.29	2.19
19.75	4.79	4.59	4.29	4.13	3.79	3.49	3.33	3.22	3.07	2.91	2.80	2.68	2.51	2.47	2.34	2.23
20.00	4.83	4.63	4.34	4.18	3.84	3.54	3.38	3.27	3.12	2.96	2.84	2.73	2.56	2.52	2.39	2.29
20.25	4.87	4.67	4.38	4.22	3.88	3.58	3.42	3.32	3.17	3.00	2.89	2.78	2.61	2.57	2.44	2.34
20.50	4.90	4.70	4.42	4.26	3.92	3.63	3.47	3.37	3.22	3.05	2.94	2.83	2.67	2.63	2.50	2.40
20.75	4.93	4.73	4.46	4.30	3.96	3.67	3.51	3.41	3.26	3.10	2.99	2.88	2.72	2.68	2.56	2.46
21.00	4.96	4.76	4.50	4.33	4.00	3.71	3.55	3.46	3.31	3.15	3.04	2.93	2.78	2.74	2.61	2.52
21.25	4.99	4.79	4.53	4.37	4.04	3.75	3.60	3.50	3.36	3.20	3.09	2.99	2.83	2.80	2.67	2.59
21.50	5.02	4.82	4.56	4.40	4.07	3.79	3.64	3.55	3.41	3.25	3.14	3.04	2.89	2.85	2.74	2.65
21.75	5.04	4.84	4.59	4.43	4.11	3.83	3.68	3.59	3.45	3.30	3.19	3.09	2.95	2.91	2.80	2.71
22.00	5.07	4.87	4.62	4.46	4.14	3.86	3.72	3.64	3.50	3.35	3.24	3.14	3.00	2.97	2.85	2.77
22.25	5.10	4.90	4.65	4.49	4.18	3.90	3.76	3.68	3.55	3.39	3.29	3.19	3.06	3.02	2.91	2.83
22.50	5.14	4.93	4.69	4.53	4.21	3.94	3.80	3.72	3.59	3.44	3.34	3.24	3.11	3.08	2.97	2.89
22.75	5.20	5.00	4.75	4.59	4.27	4.00	3.86	3.78	3.65	3.50	3.39	3.30	3.17	3.13	3.02	2.95
23.00	5.28	5.07	4.83	4.67	4.35	4.07	3.93	3.85	3.72	3.57	3.46	3.36	3.23	3.19	3.08	3.01
23.25	5.34	5.14	4.91	4.75	4.42	4.14	4.01	3.93	3.80	3.64	3.53	3.43	3.29	3.26	3.15	3.07
23.50	5.39	5.19	4.96	4.80	4.48	4.21	4.07	3.99	3.86	3.70	3.59	3.49	3.36	3.32	3.21	3.12
23.75	5.43	5.23	5.01	4.85	4.53	4.26	4.12	4.05	3.92	3.76	3.64	3.54	3.41	3.37	3.25	3.17
24.00	5.46	5.26	5.05	4.89	4.57	4.30	4.17	4.09	3.96	3.80	3.68	3.58	3.45	3.41	3.29	3.21
24.25	5.49	5.29	5.08	4.92	4.61	4.34	4.20	4.13	4.00	3.84	3.72	3.62	3.48	3.45	3.32	3.23
24.50	5.53	5.32	5.11	4.95	4.64	4.36	4.23	4.16	4.03	3.86	3.74	3.64	3.50	3.47	3.34	3.25
24.75	5.59	5.38	5.17	5.02	4.69	4.41	4.28	4.20	4.07	3.89	3.77	3.66	3.52	3.48	3.35	3.25
25.00	5.64	5.43	5.22	5.06	4.74	4.45	4.32	4.24	4.11	3.93	3.80	3.69	3.54	3.50	3.36	3.26
25.25	5.66	5.45	5.25	5.09	4.77	4.48	4.35	4.27	4.13	3.95	3.82	3.71	3.56	3.52	3.38	3.27
25.50	5.68	5.47	5.27	5.11	4.79	4.50	4.37	4.29	4.15	3.97	3.83	3.72	3.56	3.53	3.38	3.27
25.75	5.68	5.48	5.28	5.12	4.80	4.51	4.38	4.30	4.16	3.97	3.83	3.72	3.56	3.52	3.37	3.26
26.00	5.69	5.48	5.28	5.12	4.80	4.51	4.38	4.30	4.16	3.97	3.83	3.71	3.55	3.51	3.35	3.24
26.25	5.68	5.48	5.28	5.12	4.80	4.51	4.37	4.29	4.15	3.96	3.82	3.70	3.53	3.49	3.33	3.21
26.50	5.68	5.48	5.28	5.12	4.79	4.50	4.36	4.28	4.14	3.95	3.80	3.68	3.51	3.47	3.30	3.18
26.75	5.67	5.47	5.27	5.11	4.78	4.49	4.35	4.26	4.12	3.93	3.78	3.66	3.49	3.44	3.28	3.15
27.00	5.66	5.46	5.26	5.10	4.77	4.47	4.33	4.25	4.10	3.91	3.76	3.64	3.46	3.42	3.25	3.12
27.25	5.65	5.45	5.24	5.08	4.75	4.46	4.31	4.23	4.08	3.89	3.74	3.61	3.43	3.39	3.21	3.08
27.50	5.64	5.43	5.23	5.07	4.74	4.44	4.29	4.21	4.06	3.86	3.71	3.59	3.40	3.36	3.18	3.05
27.75	5.63	5.42	5.21	5.05	4.72	4.42	4.27	4.19	4.04	3.84	3.69	3.56	3.37	3.33	3.15	3.01
28.00	5.61	5.41	5.20	5.03	4.70	4.40	4.25	4.16	4.01	3.81	3.66	3.53	3.34	3.29	3.11	2.97
28.25	5.60	5.39	5.18	5.02	4.68	4.38	4.23	4.14	3.99	3.79	3.64	3.51	3.31	3.27	3.08	2.94
28.50	5.58	5.37	5.16	5.00	4.66	4.36	4.21	4.12	3.97	3.76	3.61	3.48	3.29	3.24	3.05	2.91
28.75	5.56	5.36	5.14	4.98	4.64	4.34	4.19	4.10	3.94	3.74	3.59	3.46	3.26	3.21	3.03	2.88
29.00	5.54	5.34	5.12	4.96	4.62	4.32	4.16	4.07	3.92	3.72	3.57	3.43	3.23	3.18	3.00	2.85
29.25	5.52	5.32	5.10	4.94	4.60	4.29	4.14	4.05	3.89	3.69	3.54	3.41	3.21	3.16	2.97	2.83
29.50	5.50	5.30	5.08	4.92	4.58	4.27	4.12	4.03	3.87	3.67	3.52	3.38	3.19	3.14	2.95	2.80
29.75	5.48	5.28	5.06	4.89	4.56	4.25	4.10	4.00	3.85	3.65	3.50	3.36	3.16	3.11	2.93	2.78
30.00	5.46	5.25	5.04	4.87	4.53	4.23	4.07	3.98	3.82	3.62	3.48	3.34	3.14	3.09	2.91	2.76
30.25	5.44	5.23	5.01	4.85	4.51	4.21	4.05	3.96	3.80	3.60	3.45	3.32	3.12	3.07	2.89	2.74
30.50	5.41	5.21	4.98	4.82	4.48	4.18	4.03	3.93	3.78	3.58	3.43	3.30	3.10	3.05	2.87	2.73
30.75	5.38	5.18	4.95	4.79	4.46	4.15	4.00	3.91	3.75	3.56	3.41	3.28	3.08	3.03	2.85	2.71
31.00	5.35	5.15	4.93	4.76	4.43	4.13	3.97	3.88	3.72	3.53	3.39	3.26	3.06	3.01	2.84	2.70
31.25	5.32	5.12	4.90	4.74	4.41	4.10	3.95	3.86	3.70	3.51	3.37	3.24	3.05	3.00	2.82	2.68
31.50	5.30	5.10	4.87	4.71	4.38	4.08	3.93	3.83	3.68	3.49	3.35	3.22	3.03	2.98	2.81	2.67
31.75	5.27	5.08	4.85	4.69	4.36	4.06	3.90	3.81	3.66	3.47	3.33	3.20	3.02	2.97	2.80	2.67
32.00	5.25	5.05	4.82	4.66	4.33	4.03	3.88	3.79	3.63	3.45	3.31	3.19	3.01	2.96	2.79	2.67
32.25	5.23	5.03	4.79	4.63	4.31	4.01	3.86	3.77	3.62	3.43	3.30	3.18	3.00	2.95	2.79	2.67
32.50	5.20	5.00	4.77	4.61	4.28	3.99	3.84	3.75	3.60	3.42	3.29	3.17	2.99	2.95	2.79	2.67
32.75	5.17	4.98	4.74	4.58	4.26	3.97	3.82	3.73	3.58	3.41	3.28	3.16	2.99	2.94	2.79	2.68
33.00	5.15	4.96	4.72	4.56	4.24	3.95	3.81	3.71	3.57	3.40	3.27	3.16	2.99	2.94	2.80	2.69
33.25	5.13	4.94	4.70	4.54	4.22	3.94	3.79	3.70	3.56	3.39	3.27	3.15	2.99	2.95	2.81	2.70
33.50	5.11	4.92	4.68	4.53	4.21	3.93	3.78	3.69	3.55	3.39	3.27	3.16	3.00	2.96	2.82	2.72
33.75	5.09	4.90	4.66	4.51	4.19	3.92	3.77	3.69	3.55	3.39	3.27	3.16	3.01	2.97	2.84	2.75
34.00	5.07	4.88	4.65	4.49	4.18	3.91	3.77	3.68	3.55	3.39	3.28	3.17	3.03	2.99	2.87	2.78
34.25	5.06	4.87	4.63	4.48	4.17	3.90	3.77	3.68	3.55	3.39	3.29	3.19	3.05	3.01	2.89	2.81
34.50	5.04	4.85	4.62	4.47	4.16	3.90	3.76	3.68	3.55	3.40	3.30	3.20	3.07	3.03	2.92	2.84
34.75	5.02	4.84	4.60	4.46	4.15	3.90	3.76	3.69	3.56	3.41	3.31	3.22	3.09	3.06	2.95	2.87
35.00	5.01	4.83	4.59	4.45	4.15	3.90	3.77	3.69	3.57	3.43	3.33	3.24	3.11	3.09	2.98	2.91
35.25	4.99	4.81	4.58	4.44	4.14	3.90	3.77	3.70	3.58	3.44	3.34	3.26	3.14	3.11	3.01	2.94
35.50	4.98	4.80	4.57	4.43	4.14	3.90	3.77	3.70	3.59	3.45	3.36	3.28	3.16	3.13	3.04	2.97
35.75	4.96	4.79	4.56	4.42	4.13	3.90	3.78	3.71	3.59	3.46	3.37	3.29	3.18	3.15	3.06	2.99
36.00	4.95	4.77	4.55	4.41	4.13	3.90	3.78	3.71	3.60	3.47	3.38	3.30	3.19	3.17	3.07	3.01
36.25	4.93	4.76	4.54	4.40	4.12	3.89	3.78	3.71	3.60	3.47	3.39	3.31	3.20	3.18	3.08	3.02
36.50	4.92	4.75	4.52	4.39	4.11	3.89	3.77	3.71	3.60	3.47	3.39	3.31	3.20	3.18	3.09	3.02
36.75	4.90	4.73	4.51	4.37	4.10	3.88	3.76	3.70	3.59	3.47	3.38	3.31	3.20	3.17	3.08	3.02
37.00	4.88	4.71	4.49	4.35	4.08	3.86	3.75	3.68	3.58	3.46	3.37	3.29	3.19	3.16	3.07	3.00
37.25	4.86	4.69	4.47	4.34	4.07	3.85	3.74	3.67	3.56	3.44	3.35	3.28	3.17	3.14	3.05	2.98
37.50	4.84	4.67	4.45	4.31	4.05	3.83	3.71	3.65	3.54	3.42	3.33	3.25	3.14	3.12	3.02	2.95
37.75	4.82	4.65	4.42	4.29	4.02	3.80	3.69	3.62	3.51	3.39	3.30	3.22	3.11	3.09	2.99	2.92
38.00	4.79	4.63	4.40	4.26	3.99	3.77	3.66	3.59	3.48	3.36	3.27	3.19	3.08	3.05	2.95	2.88
38.25	4.77	4.60	4.37	4.24	3.97	3.74	3.63	3.56	3.45	3.32	3.23	3.15	3.04	3.01	2.91	2.83
38.50	4.74	4.58	4.34	4.21	3.93	3.71	3.59	3.52	3.41	3.28	3.19	3.11	2.99	2.96	2.86	2.78

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.75	4.71	4.55	4.31	4.18	3.90	3.68	3.56	3.48	3.37	3.24	3.15	3.07	2.95	2.91	2.81	2.73
39.00	4.69	4.52	4.28	4.14	3.87	3.64	3.52	3.44	3.32	3.20	3.11	3.02	2.90	2.86	2.76	2.67
39.25	4.66	4.49	4.25	4.11	3.83	3.60	3.48	3.40	3.28	3.15	3.06	2.97	2.85	2.81	2.70	2.61
39.50	4.63	4.46	4.21	4.08	3.79	3.56	3.44	3.36	3.24	3.10	3.01	2.92	2.79	2.76	2.65	2.56
39.75	4.60	4.43	4.18	4.04	3.76	3.52	3.40	3.31	3.19	3.06	2.97	2.88	2.74	2.71	2.59	2.50
40.00	4.57	4.40	4.14	4.00	3.72	3.48	3.35	3.27	3.14	3.01	2.92	2.83	2.69	2.65	2.54	2.44
40.25	4.54	4.37	4.11	3.97	3.68	3.44	3.31	3.23	3.10	2.96	2.87	2.78	2.64	2.60	2.48	2.39
40.50	4.51	4.34	4.07	3.94	3.64	3.40	3.27	3.19	3.05	2.92	2.83	2.73	2.59	2.55	2.43	2.34
40.75	4.48	4.31	4.04	3.90	3.61	3.37	3.23	3.14	3.01	2.88	2.78	2.69	2.54	2.50	2.38	2.28
41.00	4.45	4.29	4.01	3.87	3.57	3.33	3.20	3.11	2.97	2.83	2.74	2.65	2.50	2.46	2.34	2.24
41.25	4.43	4.26	3.98	3.84	3.54	3.30	3.16	3.07	2.93	2.80	2.70	2.61	2.46	2.42	2.30	2.19
41.50	4.41	4.24	3.95	3.81	3.52	3.27	3.13	3.04	2.90	2.76	2.67	2.57	2.42	2.38	2.26	2.15
41.75	4.39	4.22	3.93	3.79	3.49	3.24	3.10	3.00	2.86	2.73	2.63	2.54	2.38	2.34	2.22	2.12
42.00	4.37	4.20	3.90	3.76	3.47	3.21	3.07	2.98	2.83	2.70	2.60	2.51	2.35	2.31	2.19	2.09
42.25	4.35	4.18	3.88	3.74	3.44	3.19	3.05	2.95	2.81	2.67	2.58	2.48	2.33	2.28	2.16	2.06
42.50	4.33	4.16	3.86	3.72	3.42	3.17	3.02	2.93	2.78	2.65	2.55	2.45	2.30	2.26	2.14	2.04
42.75	4.32	4.15	3.84	3.70	3.40	3.15	3.00	2.90	2.76	2.62	2.53	2.43	2.28	2.24	2.12	2.02
43.00	4.30	4.13	3.82	3.68	3.39	3.13	2.98	2.88	2.74	2.60	2.51	2.42	2.26	2.22	2.10	2.00
43.25	4.29	4.12	3.81	3.67	3.37	3.11	2.97	2.87	2.72	2.59	2.50	2.40	2.25	2.21	2.09	1.99
43.50	4.27	4.10	3.79	3.65	3.35	3.10	2.95	2.85	2.71	2.57	2.49	2.39	2.24	2.20	2.08	1.99
43.75	4.26	4.09	3.77	3.64	3.34	3.08	2.94	2.84	2.70	2.56	2.48	2.38	2.23	2.19	2.08	1.99
44.00	4.24	4.07	3.76	3.62	3.33	3.07	2.93	2.83	2.69	2.56	2.47	2.37	2.23	2.19	2.08	1.99
44.25	4.23	4.06	3.74	3.61	3.32	3.06	2.92	2.82	2.68	2.55	2.47	2.37	2.23	2.19	2.09	2.00
44.50	4.22	4.05	3.73	3.60	3.31	3.05	2.91	2.81	2.67	2.55	2.47	2.37	2.24	2.20	2.10	2.01
44.75	4.20	4.03	3.72	3.59	3.30	3.04	2.91	2.81	2.67	2.55	2.47	2.38	2.25	2.21	2.11	2.03
45.00	4.19	4.02	3.71	3.58	3.29	3.04	2.90	2.81	2.67	2.55	2.48	2.39	2.26	2.23	2.14	2.06
45.25	4.18	4.01	3.70	3.57	3.28	3.04	2.90	2.81	2.68	2.56	2.49	2.41	2.29	2.25	2.16	2.10
45.50	4.17	4.00	3.69	3.56	3.28	3.04	2.91	2.82	2.69	2.58	2.51	2.43	2.31	2.28	2.20	2.14
45.75	4.16	3.99	3.68	3.56	3.28	3.04	2.92	2.83	2.71	2.60	2.53	2.45	2.35	2.32	2.24	2.18
46.00	4.15	3.98	3.68	3.55	3.28	3.05	2.93	2.84	2.73	2.62	2.56	2.49	2.39	2.36	2.29	2.24
46.25	4.14	3.98	3.67	3.55	3.28	3.06	2.94	2.86	2.75	2.65	2.59	2.53	2.43	2.41	2.34	2.30
46.50	4.13	3.97	3.67	3.55	3.29	3.08	2.97	2.89	2.78	2.69	2.63	2.57	2.48	2.46	2.40	2.36
46.75	4.13	3.97	3.67	3.56	3.30	3.10	2.99	2.92	2.82	2.73	2.67	2.62	2.54	2.52	2.46	2.42
47.00	4.12	3.97	3.68	3.56	3.32	3.12	3.02	2.95	2.86	2.77	2.72	2.66	2.59	2.57	2.52	2.48
47.25	4.12	3.97	3.68	3.57	3.33	3.14	3.05	2.98	2.90	2.82	2.76	2.71	2.65	2.63	2.58	2.54
47.50	4.12	3.97	3.69	3.59	3.35	3.17	3.08	3.02	2.94	2.86	2.81	2.76	2.70	2.68	2.63	2.60
47.75	4.12	3.97	3.70	3.60	3.37	3.20	3.11	3.05	2.97	2.90	2.85	2.81	2.74	2.73	2.68	2.65
48.00	4.12	3.97	3.71	3.61	3.39	3.22	3.14	3.08	3.01	2.94	2.89	2.84	2.78	2.77	2.73	2.70
48.25	4.12	3.97	3.72	3.62	3.41	3.24	3.16	3.11	3.04	2.97	2.92	2.88	2.82	2.81	2.76	2.73
48.50	4.12	3.98	3.73	3.63	3.42	3.26	3.18	3.13	3.06	2.99	2.94	2.90	2.84	2.83	2.78	2.75
48.75	4.11	3.98	3.73	3.64	3.43	3.27	3.19	3.14	3.07	3.00	2.96	2.91	2.86	2.84	2.79	2.76
49.00	4.11	3.97	3.73	3.64	3.43	3.28	3.20	3.15	3.08	3.01	2.96	2.92	2.86	2.84	2.80	2.76
49.25	4.10	3.97	3.73	3.63	3.43	3.28	3.20	3.15	3.08	3.01	2.96	2.92	2.86	2.84	2.79	2.76
49.50	4.10	3.96	3.72	3.63	3.42	3.27	3.19	3.14	3.07	3.00	2.95	2.91	2.84	2.83	2.78	2.74
49.75	4.09	3.95	3.71	3.62	3.41	3.26	3.18	3.13	3.06	2.98	2.94	2.89	2.83	2.81	2.76	2.71
50.00	4.07	3.94	3.70	3.60	3.40	3.24	3.16	3.11	3.03	2.96	2.91	2.86	2.79	2.78	2.72	2.68
50.25	4.06	3.92	3.68	3.58	3.38	3.22	3.14	3.08	3.00	2.93	2.88	2.83	2.76	2.74	2.68	2.64
50.50	4.04	3.90	3.66	3.56	3.35	3.19	3.11	3.05	2.97	2.89	2.84	2.79	2.71	2.70	2.64	2.59
50.75	4.02	3.88	3.63	3.54	3.32	3.16	3.07	3.01	2.93	2.85	2.80	2.74	2.67	2.65	2.58	2.53
51.00	4.00	3.86	3.60	3.51	3.29	3.12	3.03	2.97	2.89	2.80	2.75	2.69	2.61	2.59	2.53	2.47
51.25	3.98	3.84	3.57	3.48	3.26	3.09	2.99	2.93	2.84	2.76	2.70	2.64	2.56	2.53	2.47	2.41
51.50	3.95	3.81	3.54	3.44	3.22	3.05	2.95	2.88	2.79	2.70	2.65	2.59	2.50	2.48	2.40	2.35
51.75	3.93	3.78	3.51	3.41	3.19	3.00	2.91	2.84	2.74	2.65	2.59	2.53	2.44	2.41	2.34	2.28
52.00	3.91	3.76	3.47	3.37	3.15	2.96	2.86	2.79	2.69	2.60	2.54	2.48	2.38	2.35	2.28	2.21
52.25	3.88	3.73	3.44	3.34	3.12	2.92	2.82	2.74	2.64	2.55	2.49	2.42	2.32	2.29	2.21	2.15
52.50	3.85	3.70	3.41	3.31	3.08	2.88	2.77	2.70	2.59	2.49	2.43	2.37	2.26	2.23	2.15	2.08
52.75	3.83	3.67	3.38	3.27	3.04	2.84	2.73	2.65	2.54	2.44	2.38	2.31	2.21	2.18	2.09	2.02
53.00	3.80	3.64	3.35	3.24	3.01	2.80	2.69	2.60	2.49	2.39	2.33	2.26	2.15	2.12	2.04	1.96
53.25	3.78	3.61	3.31	3.21	2.97	2.76	2.65	2.56	2.45	2.35	2.29	2.21	2.10	2.07	1.98	1.91
53.50	3.75	3.59	3.28	3.17	2.94	2.72	2.61	2.52	2.40	2.30	2.24	2.17	2.05	2.02	1.93	1.86
53.75	3.72	3.56	3.26	3.14	2.91	2.69	2.57	2.48	2.36	2.26	2.20	2.12	2.01	1.97	1.88	1.81
54.00	3.70	3.53	3.23	3.11	2.88	2.65	2.53	2.44	2.32	2.22	2.16	2.08	1.96	1.93	1.84	1.76
54.25	3.68	3.51	3.20	3.08	2.85	2.62	2.50	2.41	2.28	2.18	2.12	2.05	1.93	1.89	1.80	1.73
54.50	3.65	3.48	3.17	3.05	2.82	2.59	2.47	2.37	2.25	2.15	2.09	2.01	1.89	1.86	1.77	1.69
54.75	3.63	3.46	3.15	3.03	2.80	2.56	2.44	2.34	2.22	2.12	2.06	1.98	1.86	1.83	1.74	1.66
55.00	3.61	3.43	3.12	3.00	2.77	2.54	2.41	2.32	2.19	2.09	2.03	1.95	1.83	1.80	1.71	1.64
55.25	3.58	3.41	3.10	2.98	2.75	2.51	2.39	2.29	2.16	2.07	2.01	1.93	1.81	1.78	1.69	1.62
55.50	3.56	3.39	3.08	2.95	2.73	2.49	2.36	2.27	2.14	2.05	1.99	1.91	1.79	1.76	1.68	1.61
55.75	3.54	3.37	3.06	2.93	2.71	2.47	2.34	2.25	2.12	2.03	1.97	1.90	1.78	1.75	1.67	1.60
56.00	3.52	3.35	3.04	2.91	2.69	2.45	2.33	2.23	2.11	2.01	1.96	1.89	1.77	1.74	1.66	1.60
56.25	3.50	3.33	3.02	2.89	2.67	2.44	2.31	2.22	2.09	2.01	1.95	1.88	1.77	1.74	1.67	1.61
56.50	3.48	3.31	3.00	2.88	2.66	2.42	2.30	2.21	2.09	2.00	1.95	1.88	1.78	1.75	1.68	1.62
56.75	3.47	3.29	2.99	2.86	2.64	2.42	2.29	2.21	2.09	2.00	1.95	1.89	1.79	1.76	1.70	1.65
57.00	3.45	3.28	2.98	2.85	2.64	2.41	2.29	2.21	2.09	2.01	1.97	1.90	1.81	1.79	1.73	1.68
57.25	3.44	3.27	2.97	2.84	2.63	2.41	2.30	2.22	2.11	2.03	1.98	1.93	1.84	1.82	1.77	1.73
57.50	3.43	3.26	2.96	2.84	2.63	2.42	2.31	2.23	2.13	2.06	2.01	1.96	1.88	1.86	1.81	1.78
57.75	3.43	3.25	2.96	2.84	2.64	2.43	2.33	2.25	2.16	2.09	2.05	2.00	1.93	1.91	1.87	1.84
58.00	3.42	3.25	2.96	2.85	2.65	2.45	2.35	2.28	2.19	2.13	2.09	2.05	1.99	1.97	1.93	1.91
58.25	3.42	3.25	2.97	2.86	2.67	2.48	2.39	2.32	2.24	2.18	2.15	2.11	2.05	2.04	2.01	1.99
58.50	3.42	3.26	2.98	2.88	2.69	2.51	2.43	2.37	2.29	2.24	2.21	2.17	2.13	2.11	2.09	2.07

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.75	3.43	3.27	3.00	2.90	2.72	2.56	2.48	2.42	2.36	2.31	2.28	2.24	2.20	2.19	2.17	2.15
59.00	3.44	3.28	3.02	2.93	2.76	2.60	2.53	2.48	2.42	2.37	2.35	2.32	2.28	2.27	2.24	2.23
59.25	3.45	3.30	3.05	2.96	2.80	2.65	2.59	2.54	2.48	2.44	2.42	2.39	2.35	2.34	2.32	2.31
59.50	3.46	3.32	3.08	3.00	2.84	2.70	2.64	2.60	2.55	2.51	2.48	2.46	2.42	2.42	2.39	2.38
59.75	3.48	3.34	3.11	3.03	2.88	2.75	2.70	2.66	2.61	2.57	2.55	2.52	2.49	2.48	2.46	2.45
60.00	3.50	3.36	3.14	3.07	2.92	2.80	2.75	2.71	2.67	2.63	2.60	2.58	2.55	2.54	2.52	2.51
60.25	3.51	3.38	3.17	3.10	2.96	2.85	2.79	2.76	2.72	2.68	2.66	2.64	2.61	2.60	2.58	2.56
60.50	3.53	3.40	3.20	3.13	2.99	2.89	2.84	2.80	2.76	2.72	2.70	2.68	2.64	2.64	2.62	2.60
60.75	3.54	3.42	3.22	3.15	3.02	2.92	2.87	2.83	2.79	2.75	2.73	2.71	2.68	2.67	2.65	2.63
61.00	3.55	3.43	3.24	3.17	3.04	2.94	2.89	2.86	2.81	2.78	2.75	2.73	2.69	2.69	2.66	2.65
61.25	3.56	3.44	3.25	3.19	3.05	2.95	2.90	2.87	2.83	2.79	2.76	2.74	2.71	2.70	2.67	2.65
61.50	3.56	3.45	3.25	3.19	3.06	2.96	2.91	2.88	2.83	2.79	2.77	2.74	2.71	2.70	2.67	2.65
61.75	3.56	3.45	3.25	3.19	3.06	2.96	2.91	2.87	2.83	2.79	2.76	2.74	2.70	2.69	2.66	2.64
62.00	3.56	3.44	3.25	3.19	3.05	2.95	2.90	2.86	2.81	2.77	2.74	2.72	2.68	2.67	2.64	2.61
62.25	3.55	3.43	3.24	3.17	3.04	2.93	2.88	2.84	2.79	2.75	2.72	2.69	2.65	2.64	2.60	2.58
62.50	3.54	3.42	3.22	3.15	3.02	2.90	2.85	2.81	2.76	2.71	2.68	2.65	2.61	2.60	2.56	2.53
62.75	3.52	3.40	3.20	3.13	2.99	2.87	2.82	2.78	2.72	2.67	2.64	2.61	2.56	2.55	2.51	2.48
63.00	3.50	3.37	3.17	3.10	2.96	2.84	2.78	2.74	2.68	2.63	2.59	2.56	2.51	2.50	2.46	2.43
63.25	3.48	3.35	3.14	3.07	2.92	2.80	2.73	2.69	2.63	2.58	2.54	2.51	2.46	2.44	2.40	2.36
63.50	3.45	3.32	3.11	3.03	2.88	2.75	2.69	2.64	2.58	2.52	2.49	2.45	2.39	2.38	2.33	2.29
63.75	3.42	3.29	3.07	2.99	2.84	2.71	2.64	2.59	2.52	2.46	2.43	2.39	2.33	2.31	2.26	2.22
64.00	3.39	3.26	3.04	2.95	2.80	2.66	2.58	2.53	2.46	2.40	2.37	2.32	2.26	2.24	2.19	2.15
64.25	3.36	3.22	3.00	2.91	2.75	2.61	2.53	2.48	2.40	2.34	2.30	2.26	2.19	2.17	2.12	2.08
64.50	3.33	3.19	2.96	2.87	2.71	2.56	2.48	2.42	2.34	2.28	2.24	2.19	2.12	2.10	2.05	2.00
64.75	3.30	3.16	2.92	2.83	2.67	2.51	2.42	2.36	2.28	2.22	2.18	2.13	2.06	2.03	1.98	1.93
65.00	3.27	3.13	2.89	2.79	2.62	2.46	2.37	2.31	2.22	2.16	2.12	2.07	1.99	1.97	1.91	1.86
65.25	3.24	3.10	2.85	2.75	2.58	2.41	2.32	2.25	2.16	2.10	2.06	2.00	1.92	1.90	1.84	1.79
65.50	3.22	3.07	2.81	2.71	2.54	2.36	2.27	2.20	2.11	2.04	2.00	1.95	1.86	1.84	1.78	1.72
65.75	3.19	3.04	2.78	2.67	2.50	2.32	2.22	2.15	2.05	1.99	1.95	1.89	1.81	1.78	1.72	1.66
66.00	3.16	3.01	2.75	2.63	2.46	2.27	2.18	2.10	2.00	1.94	1.89	1.84	1.75	1.73	1.66	1.61
66.25	3.13	2.98	2.72	2.60	2.43	2.24	2.13	2.06	1.96	1.89	1.85	1.79	1.70	1.68	1.61	1.56
66.50	3.11	2.95	2.69	2.57	2.39	2.20	2.09	2.02	1.91	1.85	1.80	1.75	1.66	1.63	1.57	1.51
66.75	3.08	2.93	2.66	2.53	2.36	2.16	2.06	1.98	1.88	1.81	1.77	1.71	1.62	1.59	1.53	1.47
67.00	3.06	2.90	2.64	2.50	2.33	2.13	2.02	1.95	1.84	1.77	1.73	1.67	1.58	1.56	1.49	1.44
67.25	3.04	2.88	2.61	2.48	2.31	2.11	1.99	1.92	1.81	1.74	1.70	1.64	1.55	1.53	1.46	1.41
67.50	3.02	2.86	2.59	2.45	2.28	2.08	1.97	1.89	1.78	1.72	1.68	1.62	1.53	1.50	1.44	1.39
67.75	3.00	2.84	2.57	2.43	2.26	2.06	1.95	1.87	1.76	1.70	1.66	1.60	1.51	1.49	1.43	1.38
68.00	2.99	2.83	2.56	2.41	2.24	2.04	1.93	1.85	1.74	1.68	1.64	1.59	1.50	1.48	1.42	1.38
68.25	2.97	2.81	2.54	2.40	2.23	2.03	1.91	1.84	1.73	1.67	1.63	1.58	1.50	1.47	1.42	1.38
68.50	2.96	2.80	2.53	2.38	2.22	2.02	1.90	1.83	1.73	1.67	1.63	1.58	1.50	1.48	1.43	1.40
68.75	2.94	2.79	2.52	2.37	2.21	2.01	1.90	1.83	1.73	1.67	1.64	1.59	1.52	1.50	1.45	1.42
69.00	2.93	2.78	2.51	2.37	2.21	2.01	1.91	1.84	1.74	1.69	1.66	1.61	1.54	1.53	1.49	1.46
69.25	2.92	2.77	2.51	2.37	2.21	2.02	1.92	1.85	1.76	1.71	1.68	1.64	1.58	1.56	1.53	1.50
69.50	2.92	2.76	2.51	2.37	2.21	2.03	1.94	1.87	1.79	1.74	1.71	1.68	1.62	1.61	1.58	1.56
69.75	2.91	2.76	2.51	2.38	2.23	2.05	1.96	1.90	1.83	1.78	1.76	1.72	1.67	1.66	1.64	1.62
70.00	2.91	2.77	2.52	2.39	2.24	2.08	2.00	1.94	1.87	1.83	1.81	1.78	1.74	1.73	1.71	1.70
70.25	2.92	2.77	2.53	2.41	2.27	2.12	2.04	1.99	1.93	1.90	1.87	1.85	1.81	1.81	1.79	1.78
70.50	2.92	2.78	2.55	2.44	2.31	2.16	2.10	2.05	2.00	1.96	1.94	1.92	1.89	1.89	1.87	1.86
70.75	2.93	2.80	2.58	2.47	2.35	2.22	2.15	2.11	2.07	2.04	2.02	2.00	1.97	1.97	1.95	1.95
71.00	2.95	2.82	2.61	2.51	2.39	2.27	2.22	2.18	2.14	2.11	2.10	2.08	2.06	2.05	2.04	2.04
71.25	2.97	2.84	2.64	2.56	2.44	2.33	2.29	2.25	2.22	2.19	2.18	2.16	2.14	2.14	2.13	2.12
71.50	2.99	2.87	2.68	2.60	2.50	2.40	2.36	2.33	2.29	2.27	2.26	2.25	2.23	2.22	2.22	2.21
71.75	3.02	2.91	2.73	2.66	2.55	2.46	2.43	2.40	2.37	2.35	2.34	2.33	2.31	2.31	2.30	2.29
72.00	3.05	2.94	2.77	2.71	2.61	2.53	2.49	2.47	2.44	2.42	2.41	2.40	2.38	2.38	2.37	2.36

Table A1- 5 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q20L2; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.47	1.47	1.49	1.55	1.70	1.66	1.60	1.65
0.50	2.16	2.05	1.93	1.92	1.97	1.99	1.95	1.91	1.87	1.85	1.84	1.83	1.79	1.77	1.76	1.73
0.75	2.58	2.49	2.35	2.28	2.20	2.11	2.05	2.02	1.99	1.94	1.91	1.87	1.81	1.80	1.77	1.69
1.00	2.72	2.60	2.42	2.32	2.22	2.10	2.03	1.99	1.92	1.88	1.85	1.82	1.77	1.76	1.73	1.69
1.25	2.77	2.64	2.43	2.32	2.20	2.07	2.00	1.95	1.89	1.84	1.82	1.78	1.73	1.71	1.68	1.64
1.50	2.80	2.67	2.45	2.33	2.20	2.06	1.98	1.93	1.86	1.81	1.78	1.74	1.69	1.67	1.63	1.59
1.75	2.83	2.69	2.46	2.34	2.20	2.05	1.96	1.90	1.83	1.78	1.75	1.71	1.64	1.62	1.57	1.53
2.00	2.85	2.70	2.47	2.34	2.20	2.03	1.94	1.88	1.79	1.74	1.71	1.67	1.59	1.57	1.52	1.48
2.25	2.86	2.72	2.47	2.33	2.19	2.01	1.92	1.85	1.76	1.71	1.67	1.62	1.55	1.52	1.47	1.42
2.50	2.88	2.72	2.47	2.33	2.18	2.00	1.89	1.82	1.73	1.67	1.64	1.58	1.50	1.48	1.42	1.36
2.75	2.89	2.73	2.47	2.33	2.17	1.98	1.87	1.80	1.70	1.64	1.60	1.54	1.46	1.43	1.37	1.31
3.00	2.90	2.74	2.47	2.32	2.16	1.96	1.85	1.77	1.66	1.60	1.56	1.50	1.41	1.38	1.32	1.26
3.25	2.91	2.75	2.48	2.32	2.15	1.95	1.83	1.75	1.63	1.57	1.53	1.47	1.37	1.34	1.27	1.21
3.50	2.92	2.75	2.48	2.32	2.15	1.94	1.81	1.73	1.61	1.54	1.50	1.43	1.33	1.30	1.23	1.16
3.75	2.93	2.76	2.48	2.32	2.14	1.93	1.80	1.71	1.58	1.51	1.47	1.40	1.30	1.26	1.19	1.12
4.00	2.94	2.77	2.49	2.32	2.14	1.92	1.78	1.69	1.56	1.49	1.45	1.38	1.26	1.23	1.15	1.08
4.25	2.95	2.78	2.49	2.32	2.14	1.91	1.77	1.68	1.54	1.47	1.43	1.35	1.24	1.20	1.12	1.05
4.50	2.97	2.79	2.50	2.33	2.14	1.91	1.76	1.67	1.53	1.45	1.41	1.33	1.21	1.18	1.10	1.02
4.75	2.98	2.81	2.51	2.33	2.14	1.91	1.76	1.66	1.52	1.44	1.39	1.32	1.20	1.16	1.08	1.00
5.00	3.00	2.82	2.52	2.34	2.15	1.91	1.76	1.66	1.51	1.43	1.38	1.31	1.18	1.14	1.06	0.98
5.25	3.01	2.84	2.53	2.35	2.16	1.91	1.76	1.65	1.50	1.43	1.38	1.30	1.17	1.13	1.05	0.97
5.50	3.03	2.85	2.54	2.37	2.17	1.92	1.76	1.66	1.50	1.43	1.38	1.30	1.17	1.13	1.04	0.96
5.75	3.05	2.87	2.56	2.38	2.18	1.92	1.77	1.66	1.51	1.43	1.38	1.30	1.16	1.13	1.04	0.96
6.00	3.07	2.88	2.57	2.39	2.19	1.93	1.78	1.67	1.51	1.43	1.38	1.30	1.17	1.13	1.04	0.96
6.25	3.08	2.90	2.59	2.41	2.20	1.95	1.79	1.68	1.52	1.44	1.39	1.31	1.17	1.13	1.05	0.97
6.50	3.10	2.92	2.60	2.43	2.22	1.96	1.80	1.69	1.53	1.45	1.40	1.32	1.19	1.15	1.06	0.98
6.75	3.12	2.94	2.62	2.45	2.24	1.97	1.81	1.70	1.55	1.47	1.41	1.33	1.20	1.16	1.08	1.00
7.00	3.14	2.96	2.64	2.47	2.25	1.99	1.83	1.72	1.57	1.48	1.43	1.35	1.22	1.18	1.10	1.02
7.25	3.16	2.98	2.65	2.49	2.27	2.01	1.85	1.74	1.59	1.50	1.45	1.37	1.24	1.20	1.12	1.05
7.50	3.18	3.00	2.67	2.51	2.29	2.03	1.87	1.76	1.61	1.53	1.48	1.40	1.27	1.23	1.15	1.09
7.75	3.20	3.02	2.69	2.53	2.31	2.05	1.89	1.79	1.64	1.55	1.50	1.43	1.30	1.27	1.19	1.13
8.00	3.23	3.04	2.71	2.55	2.33	2.07	1.92	1.81	1.67	1.59	1.54	1.46	1.34	1.31	1.23	1.18
8.25	3.25	3.06	2.73	2.58	2.36	2.10	1.95	1.85	1.70	1.62	1.57	1.50	1.38	1.35	1.28	1.23
8.50	3.27	3.09	2.76	2.60	2.38	2.13	1.98	1.88	1.74	1.66	1.61	1.54	1.43	1.40	1.34	1.29
8.75	3.30	3.11	2.78	2.63	2.41	2.16	2.02	1.92	1.78	1.71	1.66	1.59	1.49	1.46	1.40	1.35
9.00	3.33	3.14	2.81	2.67	2.45	2.19	2.06	1.96	1.83	1.76	1.71	1.64	1.55	1.52	1.46	1.42
9.25	3.36	3.18	2.85	2.70	2.48	2.24	2.10	2.01	1.89	1.81	1.77	1.70	1.61	1.59	1.53	1.49
9.50	3.40	3.21	2.89	2.75	2.53	2.28	2.15	2.06	1.94	1.87	1.82	1.77	1.68	1.66	1.61	1.57
9.75	3.44	3.25	2.93	2.79	2.57	2.33	2.21	2.12	2.01	1.93	1.89	1.83	1.75	1.73	1.68	1.64
10.00	3.48	3.29	2.97	2.84	2.62	2.38	2.26	2.18	2.07	2.00	1.95	1.90	1.82	1.80	1.75	1.71
10.25	3.51	3.33	3.01	2.88	2.66	2.43	2.32	2.24	2.13	2.06	2.02	1.96	1.89	1.87	1.82	1.78
10.50	3.55	3.37	3.05	2.93	2.71	2.49	2.37	2.29	2.19	2.12	2.08	2.02	1.95	1.93	1.88	1.85
10.75	3.59	3.41	3.10	2.98	2.76	2.54	2.43	2.35	2.25	2.18	2.14	2.08	2.01	1.99	1.94	1.91
11.00	3.64	3.46	3.14	3.03	2.80	2.59	2.48	2.40	2.31	2.23	2.19	2.14	2.06	2.04	1.99	1.95
11.25	3.68	3.50	3.19	3.07	2.85	2.63	2.53	2.45	2.35	2.28	2.23	2.18	2.10	2.08	2.03	1.99
11.50	3.71	3.54	3.23	3.11	2.89	2.68	2.57	2.50	2.40	2.32	2.27	2.22	2.14	2.12	2.07	2.02
11.75	3.75	3.58	3.26	3.15	2.92	2.71	2.61	2.53	2.43	2.35	2.31	2.25	2.17	2.15	2.09	2.05
12.00	3.78	3.61	3.30	3.19	2.96	2.75	2.64	2.56	2.46	2.38	2.33	2.27	2.19	2.17	2.11	2.06
12.25	3.82	3.64	3.33	3.22	2.99	2.78	2.67	2.59	2.49	2.40	2.35	2.29	2.20	2.18	2.12	2.07
12.50	3.85	3.68	3.36	3.25	3.01	2.80	2.69	2.61	2.51	2.42	2.36	2.30	2.21	2.18	2.12	2.06
12.75	3.87	3.71	3.39	3.28	3.04	2.82	2.71	2.63	2.52	2.43	2.37	2.31	2.21	2.18	2.11	2.06
13.00	3.90	3.73	3.42	3.30	3.06	2.84	2.72	2.64	2.53	2.43	2.37	2.31	2.20	2.18	2.10	2.04
13.25	3.93	3.76	3.44	3.32	3.07	2.85	2.73	2.65	2.53	2.43	2.37	2.30	2.19	2.16	2.09	2.02
13.50	3.95	3.79	3.46	3.34	3.09	2.86	2.74	2.65	2.53	2.43	2.36	2.29	2.18	2.15	2.06	1.99
13.75	3.98	3.81	3.48	3.36	3.10	2.87	2.74	2.65	2.53	2.43	2.36	2.28	2.16	2.13	2.04	1.97
14.00	4.00	3.84	3.50	3.38	3.12	2.88	2.75	2.66	2.53	2.42	2.35	2.27	2.15	2.11	2.02	1.94
14.25	4.02	3.86	3.52	3.40	3.13	2.88	2.75	2.66	2.53	2.41	2.34	2.26	2.13	2.09	2.00	1.91
14.50	4.05	3.88	3.54	3.42	3.14	2.89	2.76	2.66	2.52	2.41	2.33	2.24	2.11	2.07	1.97	1.88
14.75	4.07	3.90	3.56	3.44	3.16	2.90	2.76	2.66	2.52	2.40	2.32	2.23	2.09	2.05	1.95	1.86
15.00	4.09	3.92	3.58	3.45	3.17	2.91	2.76	2.66	2.52	2.40	2.32	2.22	2.08	2.03	1.93	1.83
15.25	4.11	3.94	3.60	3.47	3.18	2.91	2.77	2.66	2.52	2.39	2.31	2.21	2.06	2.02	1.91	1.80
15.50	4.14	3.96	3.62	3.49	3.19	2.92	2.77	2.67	2.52	2.39	2.30	2.21	2.05	2.00	1.89	1.78
15.75	4.16	3.98	3.64	3.51	3.21	2.93	2.78	2.67	2.52	2.39	2.30	2.20	2.04	1.99	1.87	1.77
16.00	4.18	4.00	3.66	3.53	3.22	2.94	2.79	2.68	2.52	2.39	2.30	2.20	2.03	1.98	1.86	1.75
16.25	4.20	4.02	3.68	3.54	3.24	2.96	2.80	2.69	2.53	2.39	2.30	2.20	2.03	1.98	1.85	1.74
16.50	4.23	4.05	3.71	3.56	3.25	2.97	2.81	2.70	2.54	2.40	2.31	2.20	2.03	1.98	1.85	1.73
16.75	4.26	4.07	3.73	3.59	3.27	2.99	2.83	2.71	2.55	2.41	2.31	2.20	2.03	1.98	1.84	1.73
17.00	4.29	4.10	3.76	3.62	3.30	3.01	2.84	2.73	2.56	2.42	2.32	2.21	2.03	1.98	1.84	1.73
17.25	4.33	4.14	3.80	3.65	3.32	3.03	2.87	2.75	2.58	2.43	2.34	2.22	2.04	1.99	1.85	1.73
17.50	4.37	4.18	3.84	3.68	3.36	3.06	2.89	2.77	2.60	2.45	2.35	2.24	2.05	2.00	1.86	1.74
17.75	4.41	4.22	3.88	3.73	3.39	3.09	2.92	2.80	2.63	2.48	2.38	2.26	2.07	2.02	1.87	1.75
18.00	4.45	4.26	3.93	3.77	3.43	3.13	2.96	2.84	2.66	2.51	2.40	2.28	2.09	2.04	1.89	1.77
18.25	4.50	4.30	3.97	3.81	3.47	3.17	2.99	2.87	2.70	2.54	2.43	2.31	2.12	2.06	1.92	1.79
18.50	4.54	4.35	4.02	3.86	3.51	3.21	3.03	2.91	2.74	2.58	2.47	2.34	2.15	2.09	1.95	1.82

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.75	4.59	4.39	4.07	3.91	3.56	3.25	3.07	2.96	2.78	2.61	2.50	2.38	2.18	2.13	1.98	1.85
19.00	4.64	4.44	4.12	3.96	3.60	3.29	3.12	3.00	2.82	2.66	2.54	2.42	2.22	2.17	2.01	1.89
19.25	4.68	4.48	4.17	4.00	3.65	3.34	3.16	3.04	2.87	2.70	2.58	2.46	2.26	2.21	2.05	1.92
19.50	4.73	4.53	4.22	4.05	3.69	3.38	3.21	3.09	2.92	2.74	2.63	2.50	2.30	2.25	2.09	1.96
19.75	4.77	4.57	4.27	4.10	3.74	3.43	3.25	3.14	2.97	2.79	2.67	2.54	2.35	2.29	2.14	2.01
20.00	4.81	4.61	4.31	4.14	3.79	3.47	3.30	3.19	3.01	2.84	2.72	2.59	2.39	2.34	2.18	2.05
20.25	4.85	4.64	4.35	4.19	3.83	3.52	3.34	3.23	3.06	2.88	2.76	2.63	2.44	2.39	2.23	2.10
20.50	4.88	4.68	4.39	4.22	3.87	3.56	3.39	3.27	3.11	2.93	2.81	2.68	2.48	2.43	2.28	2.15
20.75	4.92	4.71	4.43	4.26	3.91	3.60	3.43	3.32	3.15	2.97	2.85	2.72	2.53	2.48	2.33	2.20
21.00	4.94	4.74	4.46	4.29	3.94	3.63	3.46	3.36	3.19	3.01	2.89	2.77	2.58	2.53	2.37	2.25
21.25	4.97	4.77	4.49	4.33	3.98	3.67	3.50	3.39	3.23	3.05	2.93	2.81	2.62	2.57	2.42	2.30
21.50	5.00	4.79	4.52	4.36	4.01	3.70	3.54	3.43	3.27	3.09	2.97	2.85	2.66	2.62	2.47	2.35
21.75	5.02	4.82	4.55	4.38	4.04	3.73	3.57	3.47	3.31	3.13	3.01	2.89	2.71	2.66	2.51	2.40
22.00	5.04	4.84	4.58	4.41	4.07	3.76	3.60	3.50	3.34	3.17	3.05	2.93	2.75	2.70	2.56	2.44
22.25	5.07	4.86	4.60	4.44	4.10	3.79	3.63	3.53	3.38	3.21	3.08	2.96	2.79	2.74	2.60	2.49
22.50	5.11	4.90	4.63	4.47	4.13	3.82	3.67	3.57	3.42	3.24	3.12	3.00	2.83	2.78	2.64	2.53
22.75	5.17	4.95	4.69	4.52	4.18	3.87	3.71	3.61	3.46	3.29	3.16	3.04	2.87	2.83	2.68	2.57
23.00	5.24	5.03	4.77	4.60	4.25	3.94	3.78	3.68	3.52	3.34	3.22	3.09	2.92	2.88	2.73	2.62
23.25	5.31	5.09	4.84	4.67	4.32	4.00	3.84	3.75	3.59	3.41	3.28	3.16	2.98	2.94	2.79	2.67
23.50	5.35	5.14	4.89	4.72	4.38	4.06	3.91	3.81	3.66	3.47	3.34	3.21	3.04	2.99	2.84	2.73
23.75	5.39	5.17	4.94	4.77	4.42	4.11	3.96	3.86	3.71	3.52	3.39	3.27	3.09	3.05	2.89	2.78
24.00	5.42	5.21	4.97	4.81	4.46	4.16	4.00	3.91	3.76	3.57	3.43	3.31	3.13	3.09	2.93	2.82
24.25	5.45	5.23	5.01	4.84	4.50	4.19	4.04	3.95	3.79	3.61	3.47	3.35	3.17	3.12	2.97	2.85
24.50	5.48	5.26	5.03	4.87	4.52	4.22	4.07	3.98	3.83	3.64	3.50	3.37	3.20	3.15	2.99	2.87
24.75	5.54	5.32	5.10	4.93	4.58	4.26	4.11	4.02	3.86	3.67	3.53	3.40	3.22	3.17	3.01	2.89
25.00	5.59	5.37	5.15	4.98	4.63	4.31	4.16	4.06	3.91	3.71	3.57	3.44	3.25	3.20	3.03	2.91
25.25	5.62	5.40	5.18	5.01	4.66	4.35	4.19	4.10	3.95	3.75	3.60	3.47	3.28	3.23	3.06	2.93
25.50	5.63	5.42	5.20	5.03	4.69	4.37	4.22	4.13	3.97	3.77	3.62	3.49	3.30	3.25	3.07	2.94
25.75	5.64	5.43	5.21	5.05	4.70	4.39	4.24	4.14	3.99	3.79	3.63	3.50	3.31	3.26	3.08	2.94
26.00	5.65	5.43	5.22	5.05	4.71	4.40	4.24	4.15	4.00	3.79	3.64	3.50	3.31	3.26	3.08	2.94
26.25	5.65	5.43	5.22	5.05	4.71	4.40	4.25	4.15	4.00	3.79	3.64	3.50	3.31	3.26	3.07	2.93
26.50	5.64	5.43	5.22	5.05	4.71	4.40	4.24	4.15	3.99	3.79	3.63	3.50	3.30	3.25	3.06	2.91
26.75	5.64	5.43	5.21	5.05	4.70	4.39	4.24	4.14	3.99	3.78	3.62	3.49	3.28	3.23	3.04	2.90
27.00	5.63	5.42	5.21	5.04	4.70	4.38	4.23	4.14	3.98	3.77	3.61	3.47	3.27	3.22	3.03	2.88
27.25	5.62	5.41	5.20	5.03	4.69	4.37	4.22	4.12	3.97	3.76	3.60	3.46	3.26	3.20	3.01	2.86
27.50	5.61	5.40	5.19	5.02	4.67	4.36	4.21	4.11	3.95	3.74	3.59	3.45	3.24	3.19	2.99	2.84
27.75	5.60	5.39	5.17	5.01	4.66	4.35	4.19	4.10	3.94	3.73	3.57	3.43	3.22	3.17	2.98	2.82
28.00	5.59	5.38	5.16	4.99	4.65	4.33	4.18	4.08	3.92	3.71	3.56	3.42	3.21	3.16	2.96	2.80
28.25	5.57	5.36	5.15	4.98	4.63	4.32	4.16	4.07	3.91	3.70	3.54	3.40	3.19	3.14	2.94	2.79
28.50	5.56	5.35	5.13	4.96	4.62	4.30	4.15	4.05	3.89	3.68	3.53	3.38	3.18	3.12	2.93	2.77
28.75	5.54	5.33	5.12	4.95	4.60	4.29	4.13	4.04	3.87	3.67	3.51	3.37	3.16	3.11	2.91	2.75
29.00	5.53	5.32	5.10	4.93	4.59	4.27	4.11	4.02	3.86	3.65	3.49	3.35	3.14	3.09	2.89	2.74
29.25	5.51	5.30	5.08	4.91	4.57	4.25	4.10	4.00	3.84	3.63	3.48	3.34	3.13	3.07	2.88	2.72
29.50	5.49	5.28	5.06	4.89	4.55	4.24	4.08	3.98	3.82	3.61	3.46	3.32	3.11	3.06	2.86	2.70
29.75	5.47	5.26	5.04	4.87	4.53	4.22	4.06	3.96	3.80	3.59	3.44	3.30	3.09	3.04	2.85	2.69
30.00	5.45	5.24	5.02	4.85	4.51	4.20	4.04	3.94	3.78	3.58	3.42	3.28	3.07	3.02	2.83	2.67
30.25	5.42	5.22	4.99	4.83	4.49	4.18	4.02	3.92	3.76	3.56	3.40	3.27	3.06	3.00	2.81	2.66
30.50	5.40	5.19	4.97	4.80	4.46	4.15	3.99	3.90	3.74	3.53	3.38	3.25	3.04	2.98	2.79	2.64
30.75	5.37	5.16	4.94	4.77	4.43	4.13	3.97	3.87	3.71	3.51	3.36	3.22	3.02	2.96	2.78	2.62
31.00	5.34	5.14	4.91	4.75	4.41	4.10	3.94	3.85	3.68	3.49	3.34	3.20	3.00	2.94	2.76	2.60
31.25	5.31	5.11	4.89	4.72	4.38	4.08	3.92	3.82	3.66	3.46	3.32	3.18	2.98	2.92	2.74	2.59
31.50	5.29	5.09	4.86	4.70	4.36	4.05	3.89	3.79	3.63	3.44	3.29	3.16	2.96	2.90	2.72	2.57
31.75	5.26	5.07	4.83	4.67	4.33	4.03	3.87	3.77	3.61	3.41	3.27	3.14	2.94	2.88	2.70	2.55
32.00	5.24	5.04	4.81	4.64	4.31	4.00	3.84	3.74	3.58	3.39	3.25	3.12	2.92	2.86	2.68	2.54
32.25	5.22	5.02	4.78	4.61	4.28	3.98	3.82	3.72	3.56	3.37	3.23	3.10	2.90	2.85	2.67	2.52
32.50	5.19	4.99	4.75	4.59	4.25	3.95	3.79	3.70	3.54	3.35	3.21	3.08	2.88	2.83	2.65	2.51
32.75	5.16	4.96	4.72	4.56	4.23	3.93	3.77	3.67	3.51	3.33	3.19	3.06	2.86	2.81	2.64	2.50
33.00	5.14	4.94	4.70	4.54	4.20	3.90	3.75	3.65	3.49	3.31	3.17	3.04	2.85	2.80	2.63	2.49
33.25	5.11	4.92	4.67	4.51	4.18	3.88	3.73	3.63	3.47	3.29	3.16	3.03	2.84	2.79	2.63	2.49
33.50	5.09	4.90	4.65	4.49	4.16	3.86	3.71	3.61	3.46	3.27	3.15	3.02	2.83	2.79	2.62	2.50
33.75	5.07	4.88	4.63	4.47	4.14	3.85	3.69	3.60	3.44	3.26	3.14	3.01	2.83	2.78	2.63	2.50
34.00	5.05	4.86	4.61	4.45	4.12	3.83	3.68	3.58	3.43	3.25	3.13	3.01	2.83	2.78	2.63	2.51
34.25	5.03	4.84	4.59	4.43	4.11	3.82	3.66	3.57	3.42	3.25	3.12	3.01	2.83	2.78	2.64	2.52
34.50	5.01	4.82	4.57	4.41	4.09	3.80	3.65	3.56	3.41	3.24	3.12	3.00	2.83	2.79	2.64	2.53
34.75	4.99	4.80	4.56	4.40	4.07	3.79	3.64	3.55	3.40	3.23	3.12	3.00	2.84	2.79	2.65	2.54
35.00	4.98	4.79	4.54	4.38	4.06	3.78	3.63	3.54	3.39	3.23	3.11	3.00	2.84	2.80	2.66	2.55
35.25	4.96	4.77	4.52	4.36	4.05	3.77	3.62	3.53	3.39	3.23	3.11	3.00	2.84	2.80	2.67	2.57
35.50	4.94	4.75	4.50	4.35	4.03	3.76	3.61	3.52	3.38	3.22	3.11	3.00	2.85	2.81	2.68	2.58
35.75	4.92	4.73	4.49	4.33	4.02	3.75	3.60	3.51	3.37	3.22	3.11	3.00	2.85	2.81	2.68	2.59
36.00	4.90	4.72	4.47	4.31	4.00	3.73	3.59	3.51	3.37	3.21	3.11	3.00	2.85	2.81	2.69	2.59
36.25	4.88	4.70	4.45	4.30	3.99	3.72	3.58	3.49	3.36	3.21	3.10	3.00	2.85	2.81	2.69	2.59
36.50	4.86	4.68	4.43	4.28	3.97	3.71	3.57	3.48	3.35	3.20	3.09	2.99	2.84	2.81	2.68	2.59
36.75	4.84	4.66	4.41	4.26	3.95	3.69	3.56	3.47	3.33	3.19	3.08	2.98	2.84	2.80	2.68	2.58
37.00	4.82	4.64	4.39	4.24	3.93	3.68	3.54	3.45	3.32	3.17	3.07	2.97	2.82	2.78	2.66	2.57
37.25	4.80	4.62	4.37	4.22	3.91	3.66	3.52	3.43	3.30	3.15	3.05	2.95	2.81	2.77	2.65	2.55
37.50	4.78	4.60	4.34	4.20	3.89	3.64	3.50	3.41	3.28	3.13	3.03	2.93	2.79	2.75	2.62	2.53
37.75	4.75	4.58	4.32	4.17	3.87	3.61	3.48	3.39	3.25	3.11	3.01	2.91	2.76	2.72	2.60	2.50
38.00	4.73	4.55	4.29	4.15	3.85	3.59	3.45	3.36	3.23	3.08	2.98	2.88	2.73	2.69	2.57	2.47
38.25	4.70	4.53	4.27	4.12	3.82	3.56	3.43	3.34	3.20	3.05	2.95	2.85	2.70	2.66	2.54	2.43
38.50	4.68	4.51	4.24	4.10	3.79	3.54	3.40	3.31	3.17	3.02	2.92	2.82	2.67	2.63	2.50	2.39

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.75	4.66	4.48	4.21	4.07	3.76	3.51	3.37	3.28	3.14	2.99	2.89	2.79	2.63	2.59	2.46	2.36
39.00	4.63	4.46	4.19	4.04	3.73	3.48	3.34	3.25	3.10	2.96	2.86	2.75	2.60	2.55	2.42	2.31
39.25	4.60	4.43	4.16	4.01	3.70	3.45	3.31	3.21	3.07	2.92	2.82	2.72	2.56	2.52	2.38	2.27
39.50	4.58	4.40	4.13	3.98	3.67	3.42	3.27	3.18	3.04	2.89	2.79	2.68	2.52	2.48	2.34	2.23
39.75	4.55	4.38	4.10	3.95	3.64	3.39	3.24	3.15	3.00	2.85	2.75	2.65	2.48	2.44	2.30	2.19
40.00	4.52	4.35	4.07	3.92	3.61	3.35	3.21	3.11	2.96	2.82	2.72	2.61	2.44	2.40	2.26	2.14
40.25	4.49	4.32	4.04	3.89	3.58	3.32	3.18	3.08	2.93	2.78	2.68	2.57	2.41	2.36	2.22	2.10
40.50	4.47	4.30	4.01	3.86	3.55	3.29	3.14	3.04	2.89	2.75	2.64	2.54	2.37	2.32	2.18	2.06
40.75	4.44	4.27	3.98	3.83	3.52	3.26	3.11	3.01	2.86	2.71	2.61	2.50	2.33	2.28	2.14	2.02
41.00	4.42	4.25	3.95	3.81	3.50	3.23	3.08	2.98	2.83	2.68	2.58	2.47	2.30	2.25	2.11	1.99
41.25	4.40	4.22	3.92	3.78	3.47	3.20	3.05	2.95	2.79	2.65	2.55	2.44	2.26	2.21	2.07	1.95
41.50	4.38	4.20	3.90	3.76	3.45	3.18	3.03	2.92	2.76	2.62	2.52	2.41	2.23	2.18	2.04	1.92
41.75	4.36	4.19	3.88	3.73	3.42	3.15	3.00	2.89	2.74	2.59	2.49	2.38	2.20	2.15	2.02	1.89
42.00	4.34	4.17	3.86	3.71	3.40	3.13	2.98	2.87	2.71	2.57	2.47	2.36	2.18	2.13	1.99	1.87
42.25	4.33	4.15	3.84	3.69	3.38	3.11	2.96	2.85	2.69	2.54	2.44	2.33	2.16	2.11	1.97	1.84
42.50	4.31	4.14	3.82	3.68	3.37	3.09	2.94	2.83	2.67	2.52	2.42	2.31	2.14	2.09	1.95	1.82
42.75	4.29	4.12	3.80	3.66	3.35	3.07	2.92	2.81	2.65	2.50	2.41	2.30	2.12	2.07	1.93	1.81
43.00	4.28	4.11	3.78	3.64	3.33	3.06	2.90	2.79	2.63	2.49	2.39	2.28	2.10	2.05	1.91	1.79
43.25	4.26	4.09	3.77	3.63	3.32	3.04	2.89	2.78	2.62	2.47	2.37	2.26	2.09	2.04	1.90	1.78
43.50	4.25	4.08	3.75	3.61	3.30	3.03	2.87	2.76	2.60	2.46	2.36	2.25	2.08	2.03	1.89	1.77
43.75	4.24	4.06	3.74	3.60	3.29	3.01	2.86	2.75	2.59	2.44	2.35	2.24	2.07	2.02	1.88	1.76
44.00	4.22	4.05	3.72	3.58	3.28	3.00	2.85	2.73	2.57	2.43	2.34	2.23	2.06	2.01	1.88	1.76
44.25	4.21	4.03	3.71	3.57	3.26	2.99	2.83	2.72	2.56	2.42	2.33	2.22	2.05	2.00	1.87	1.76
44.50	4.19	4.02	3.69	3.55	3.25	2.98	2.82	2.71	2.55	2.41	2.32	2.22	2.05	2.00	1.87	1.76
44.75	4.18	4.01	3.68	3.54	3.24	2.97	2.81	2.70	2.55	2.41	2.32	2.21	2.05	2.00	1.88	1.77
45.00	4.17	3.99	3.66	3.53	3.23	2.96	2.80	2.69	2.54	2.40	2.31	2.21	2.05	2.00	1.88	1.78
45.25	4.15	3.98	3.65	3.52	3.22	2.95	2.80	2.69	2.53	2.40	2.31	2.21	2.05	2.01	1.89	1.79
45.50	4.14	3.97	3.64	3.50	3.21	2.94	2.79	2.68	2.53	2.40	2.31	2.21	2.06	2.02	1.90	1.81
45.75	4.13	3.96	3.63	3.49	3.20	2.93	2.78	2.68	2.53	2.40	2.32	2.22	2.07	2.03	1.92	1.83
46.00	4.12	3.95	3.62	3.48	3.19	2.93	2.78	2.68	2.53	2.40	2.32	2.23	2.08	2.04	1.94	1.85
46.25	4.10	3.93	3.60	3.47	3.19	2.92	2.78	2.68	2.53	2.41	2.33	2.24	2.10	2.06	1.96	1.88
46.50	4.09	3.92	3.59	3.47	3.18	2.92	2.78	2.68	2.54	2.42	2.34	2.25	2.12	2.08	1.99	1.91
46.75	4.08	3.91	3.59	3.46	3.18	2.92	2.78	2.68	2.55	2.43	2.36	2.27	2.14	2.11	2.02	1.94
47.00	4.07	3.90	3.58	3.45	3.17	2.92	2.79	2.69	2.56	2.44	2.37	2.29	2.17	2.13	2.05	1.98
47.25	4.06	3.89	3.57	3.44	3.17	2.92	2.79	2.70	2.57	2.46	2.39	2.31	2.19	2.16	2.08	2.01
47.50	4.05	3.88	3.56	3.44	3.17	2.93	2.80	2.71	2.58	2.48	2.41	2.33	2.22	2.19	2.11	2.05
47.75	4.04	3.88	3.56	3.44	3.17	2.93	2.81	2.72	2.60	2.49	2.43	2.35	2.25	2.22	2.14	2.08
48.00	4.03	3.87	3.55	3.43	3.17	2.94	2.82	2.73	2.61	2.51	2.44	2.37	2.27	2.24	2.16	2.11
48.25	4.02	3.86	3.55	3.43	3.17	2.94	2.82	2.74	2.62	2.52	2.46	2.39	2.29	2.26	2.19	2.13
48.50	4.01	3.85	3.54	3.42	3.17	2.95	2.83	2.75	2.63	2.54	2.47	2.40	2.30	2.28	2.20	2.15
48.75	4.00	3.84	3.53	3.42	3.17	2.95	2.83	2.75	2.64	2.54	2.48	2.41	2.32	2.29	2.22	2.16
49.00	3.99	3.84	3.53	3.41	3.16	2.95	2.83	2.75	2.64	2.55	2.49	2.42	2.32	2.29	2.22	2.16
49.25	3.98	3.83	3.52	3.41	3.16	2.94	2.83	2.75	2.64	2.55	2.48	2.42	2.32	2.29	2.22	2.16
49.50	3.97	3.82	3.51	3.40	3.15	2.94	2.83	2.75	2.64	2.54	2.48	2.41	2.31	2.28	2.21	2.15
49.75	3.96	3.80	3.50	3.39	3.14	2.93	2.81	2.74	2.63	2.53	2.47	2.40	2.30	2.27	2.19	2.13
50.00	3.95	3.79	3.48	3.37	3.13	2.92	2.80	2.72	2.61	2.51	2.45	2.38	2.28	2.25	2.17	2.10
50.25	3.94	3.78	3.47	3.36	3.12	2.90	2.78	2.70	2.59	2.49	2.43	2.36	2.25	2.22	2.14	2.07
50.50	3.92	3.76	3.45	3.34	3.10	2.88	2.76	2.68	2.57	2.47	2.40	2.33	2.22	2.19	2.11	2.04
50.75	3.91	3.75	3.44	3.32	3.08	2.86	2.74	2.66	2.54	2.44	2.38	2.30	2.19	2.16	2.07	2.00
51.00	3.89	3.73	3.42	3.30	3.06	2.84	2.72	2.63	2.51	2.41	2.34	2.27	2.15	2.12	2.03	1.96
51.25	3.87	3.71	3.40	3.28	3.04	2.81	2.69	2.60	2.48	2.38	2.31	2.23	2.12	2.08	1.99	1.91
51.50	3.85	3.69	3.37	3.26	3.01	2.79	2.66	2.57	2.45	2.34	2.28	2.20	2.07	2.04	1.95	1.86
51.75	3.83	3.67	3.35	3.24	2.99	2.76	2.63	2.54	2.41	2.31	2.24	2.16	2.03	2.00	1.90	1.82
52.00	3.81	3.64	3.33	3.21	2.96	2.73	2.60	2.51	2.38	2.27	2.20	2.12	1.99	1.95	1.85	1.77
52.25	3.79	3.62	3.30	3.19	2.94	2.70	2.57	2.47	2.34	2.23	2.16	2.08	1.95	1.91	1.81	1.72
52.50	3.77	3.60	3.28	3.16	2.91	2.67	2.54	2.44	2.31	2.20	2.13	2.04	1.91	1.87	1.77	1.67
52.75	3.75	3.58	3.26	3.14	2.89	2.64	2.51	2.41	2.27	2.16	2.09	2.01	1.87	1.83	1.72	1.63
53.00	3.73	3.56	3.23	3.11	2.86	2.61	2.48	2.38	2.24	2.13	2.06	1.97	1.83	1.79	1.68	1.59
53.25	3.71	3.53	3.21	3.09	2.84	2.59	2.45	2.35	2.20	2.09	2.03	1.94	1.79	1.75	1.64	1.55
53.50	3.69	3.51	3.19	3.06	2.81	2.56	2.42	2.32	2.17	2.06	1.99	1.90	1.76	1.72	1.61	1.51
53.75	3.67	3.49	3.16	3.04	2.79	2.53	2.39	2.29	2.14	2.03	1.96	1.87	1.73	1.68	1.57	1.47
54.00	3.65	3.47	3.14	3.01	2.77	2.51	2.37	2.26	2.11	2.00	1.93	1.84	1.69	1.65	1.54	1.44
54.25	3.62	3.45	3.12	2.99	2.74	2.48	2.34	2.23	2.08	1.97	1.91	1.81	1.67	1.62	1.51	1.41
54.50	3.60	3.42	3.10	2.97	2.72	2.46	2.32	2.21	2.06	1.95	1.88	1.79	1.64	1.59	1.49	1.39
54.75	3.58	3.40	3.07	2.94	2.70	2.44	2.29	2.18	2.03	1.92	1.86	1.76	1.61	1.57	1.46	1.36
55.00	3.56	3.38	3.05	2.92	2.68	2.42	2.27	2.16	2.01	1.90	1.83	1.74	1.59	1.55	1.44	1.34
55.25	3.54	3.36	3.03	2.90	2.66	2.40	2.25	2.14	1.99	1.88	1.81	1.72	1.57	1.53	1.42	1.32
55.50	3.52	3.34	3.02	2.88	2.64	2.38	2.23	2.12	1.97	1.86	1.79	1.70	1.55	1.51	1.40	1.31
55.75	3.50	3.32	3.00	2.86	2.62	2.36	2.21	2.10	1.95	1.84	1.78	1.69	1.54	1.49	1.39	1.30
56.00	3.49	3.30	2.98	2.84	2.60	2.34	2.19	2.08	1.93	1.83	1.76	1.67	1.53	1.48	1.38	1.29
56.25	3.47	3.28	2.96	2.82	2.59	2.32	2.18	2.07	1.91	1.81	1.75	1.66	1.52	1.47	1.37	1.28
56.50	3.45	3.26	2.94	2.80	2.57	2.31	2.16	2.05	1.90	1.80	1.74	1.65	1.51	1.47	1.37	1.28
56.75	3.43	3.25	2.92	2.78	2.55	2.29	2.15	2.04	1.89	1.79	1.73	1.64	1.50	1.46	1.37	1.29
57.00	3.41	3.23	2.91	2.77	2.54	2.28	2.13	2.03	1.88	1.78	1.72	1.64	1.50	1.47	1.37	1.30
57.25	3.40	3.22	2.90	2.76	2.53	2.27	2.12	2.02	1.87	1.78	1.72	1.64	1.51	1.47	1.38	1.31
57.50	3.39	3.20	2.89	2.74	2.52	2.26	2.12	2.01	1.87	1.78	1.72	1.64	1.52	1.48	1.40	1.33
57.75	3.38	3.19	2.88	2.73	2.51	2.26	2.12	2.01	1.87	1.78	1.73	1.65	1.53	1.50	1.42	1.36
58.00	3.37	3.18	2.87	2.73	2.51	2.25	2.12	2.02	1.88	1.79	1.74	1.67	1.55	1.52	1.45	1.39
58.25	3.36	3.18	2.86	2.72	2.50	2.26	2.12	2.02	1.89	1.81	1.76	1.69	1.58	1.55	1.48	1.43
58.50	3.35	3.17	2.86	2.72	2.50	2.26	2.13	2.04	1.91	1.83	1.78	1.72	1.62	1.59	1.53	1.48

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.75	3.34	3.17	2.86	2.72	2.51	2.27	2.15	2.05	1.93	1.86	1.81	1.75	1.66	1.63	1.57	1.53
59.00	3.34	3.16	2.86	2.72	2.51	2.28	2.16	2.08	1.96	1.89	1.85	1.79	1.70	1.68	1.63	1.59
59.25	3.34	3.16	2.86	2.73	2.52	2.30	2.19	2.10	2.00	1.93	1.89	1.83	1.75	1.73	1.68	1.65
59.50	3.33	3.16	2.86	2.74	2.54	2.32	2.21	2.13	2.03	1.97	1.93	1.88	1.80	1.78	1.74	1.71
59.75	3.33	3.16	2.87	2.75	2.55	2.35	2.24	2.17	2.07	2.01	1.97	1.92	1.85	1.84	1.79	1.76
60.00	3.33	3.16	2.88	2.76	2.57	2.37	2.27	2.20	2.11	2.05	2.01	1.97	1.90	1.88	1.84	1.81
60.25	3.33	3.17	2.89	2.77	2.58	2.39	2.30	2.23	2.15	2.09	2.05	2.01	1.94	1.93	1.89	1.86
60.50	3.33	3.17	2.90	2.78	2.60	2.42	2.32	2.26	2.18	2.12	2.08	2.04	1.98	1.96	1.93	1.90
60.75	3.34	3.18	2.91	2.80	2.62	2.44	2.35	2.29	2.21	2.15	2.11	2.07	2.01	2.00	1.96	1.93
61.00	3.34	3.18	2.91	2.81	2.63	2.46	2.37	2.31	2.23	2.17	2.14	2.09	2.03	2.02	1.98	1.95
61.25	3.34	3.18	2.92	2.81	2.64	2.47	2.38	2.32	2.24	2.19	2.15	2.11	2.05	2.03	1.99	1.96
61.50	3.34	3.18	2.92	2.82	2.64	2.47	2.39	2.33	2.25	2.19	2.16	2.11	2.05	2.04	1.99	1.96
61.75	3.33	3.18	2.92	2.82	2.65	2.48	2.39	2.33	2.25	2.19	2.16	2.11	2.05	2.03	1.99	1.95
62.00	3.33	3.17	2.92	2.82	2.64	2.47	2.39	2.33	2.25	2.19	2.15	2.10	2.04	2.02	1.97	1.93
62.25	3.32	3.17	2.91	2.81	2.63	2.46	2.38	2.31	2.23	2.17	2.13	2.09	2.02	2.00	1.95	1.91
62.50	3.31	3.16	2.90	2.80	2.62	2.45	2.36	2.30	2.21	2.15	2.11	2.06	1.99	1.97	1.92	1.87
62.75	3.30	3.15	2.89	2.78	2.61	2.43	2.34	2.27	2.19	2.12	2.08	2.03	1.96	1.94	1.88	1.83
63.00	3.28	3.13	2.87	2.76	2.59	2.41	2.31	2.25	2.16	2.09	2.05	2.00	1.92	1.90	1.84	1.79
63.25	3.27	3.11	2.85	2.74	2.56	2.38	2.29	2.22	2.12	2.06	2.01	1.96	1.88	1.85	1.79	1.74
63.50	3.25	3.10	2.83	2.72	2.54	2.35	2.25	2.18	2.09	2.02	1.97	1.92	1.83	1.81	1.74	1.69
63.75	3.24	3.08	2.81	2.69	2.51	2.32	2.22	2.15	2.05	1.98	1.93	1.87	1.78	1.76	1.69	1.63
64.00	3.22	3.06	2.79	2.67	2.49	2.29	2.19	2.11	2.00	1.93	1.89	1.83	1.73	1.71	1.64	1.58
64.25	3.20	3.04	2.76	2.64	2.46	2.26	2.15	2.07	1.96	1.89	1.84	1.78	1.68	1.65	1.58	1.52
64.50	3.18	3.02	2.74	2.61	2.43	2.22	2.11	2.03	1.92	1.84	1.80	1.73	1.63	1.60	1.53	1.46
64.75	3.16	2.99	2.72	2.58	2.40	2.19	2.08	1.99	1.88	1.80	1.75	1.69	1.58	1.55	1.48	1.41
65.00	3.13	2.97	2.69	2.56	2.37	2.16	2.04	1.95	1.83	1.76	1.71	1.64	1.54	1.50	1.42	1.35
65.25	3.11	2.95	2.67	2.53	2.34	2.12	2.00	1.91	1.79	1.72	1.67	1.60	1.49	1.45	1.37	1.30
65.50	3.09	2.93	2.64	2.50	2.31	2.09	1.97	1.88	1.75	1.67	1.63	1.56	1.44	1.41	1.33	1.25
65.75	3.07	2.91	2.62	2.47	2.28	2.06	1.93	1.84	1.71	1.64	1.59	1.52	1.40	1.36	1.28	1.21
66.00	3.05	2.89	2.60	2.45	2.26	2.03	1.90	1.81	1.68	1.60	1.55	1.48	1.36	1.32	1.24	1.16
66.25	3.03	2.87	2.58	2.42	2.23	2.01	1.87	1.78	1.64	1.57	1.52	1.44	1.32	1.29	1.20	1.12
66.50	3.01	2.85	2.56	2.40	2.21	1.98	1.84	1.75	1.61	1.53	1.49	1.41	1.29	1.25	1.17	1.09
66.75	3.00	2.83	2.54	2.38	2.19	1.96	1.82	1.72	1.58	1.50	1.46	1.38	1.26	1.22	1.14	1.06
67.00	2.98	2.81	2.52	2.35	2.17	1.93	1.79	1.69	1.55	1.48	1.43	1.35	1.23	1.19	1.11	1.03
67.25	2.96	2.79	2.50	2.33	2.15	1.91	1.77	1.67	1.53	1.45	1.40	1.33	1.20	1.17	1.08	1.00
67.50	2.95	2.78	2.48	2.31	2.13	1.89	1.75	1.65	1.50	1.43	1.38	1.31	1.18	1.14	1.06	0.98
67.75	2.93	2.76	2.47	2.30	2.11	1.87	1.73	1.63	1.48	1.41	1.36	1.29	1.16	1.13	1.04	0.97
68.00	2.92	2.75	2.45	2.28	2.09	1.86	1.71	1.61	1.47	1.40	1.35	1.27	1.15	1.11	1.03	0.96
68.25	2.90	2.73	2.44	2.26	2.08	1.84	1.70	1.60	1.45	1.38	1.34	1.26	1.14	1.10	1.02	0.95
68.50	2.89	2.72	2.42	2.25	2.06	1.83	1.68	1.58	1.44	1.37	1.33	1.25	1.13	1.10	1.02	0.95
68.75	2.87	2.70	2.41	2.23	2.05	1.82	1.67	1.57	1.43	1.37	1.32	1.25	1.13	1.10	1.02	0.96
69.00	2.86	2.69	2.40	2.22	2.04	1.81	1.67	1.57	1.43	1.36	1.32	1.25	1.14	1.10	1.03	0.97
69.25	2.85	2.68	2.39	2.21	2.03	1.80	1.66	1.56	1.43	1.36	1.32	1.25	1.14	1.11	1.05	0.99
69.50	2.84	2.67	2.38	2.20	2.03	1.80	1.66	1.56	1.43	1.37	1.33	1.26	1.16	1.13	1.07	1.02
69.75	2.82	2.66	2.37	2.20	2.02	1.80	1.66	1.57	1.44	1.38	1.34	1.28	1.18	1.16	1.10	1.05
70.00	2.82	2.65	2.37	2.19	2.02	1.80	1.67	1.58	1.46	1.40	1.36	1.30	1.21	1.19	1.13	1.09
70.25	2.81	2.64	2.36	2.19	2.02	1.81	1.68	1.60	1.48	1.42	1.39	1.33	1.25	1.23	1.18	1.14
70.50	2.80	2.64	2.36	2.19	2.03	1.82	1.70	1.62	1.51	1.45	1.42	1.37	1.30	1.28	1.23	1.20
70.75	2.80	2.63	2.36	2.20	2.04	1.84	1.72	1.65	1.54	1.49	1.46	1.42	1.35	1.33	1.29	1.27
71.00	2.79	2.63	2.37	2.21	2.05	1.86	1.75	1.68	1.58	1.54	1.51	1.47	1.41	1.39	1.36	1.34
71.25	2.79	2.64	2.38	2.22	2.07	1.89	1.78	1.72	1.63	1.59	1.56	1.52	1.47	1.46	1.43	1.41
71.50	2.79	2.64	2.39	2.24	2.10	1.92	1.82	1.76	1.68	1.64	1.62	1.58	1.54	1.52	1.50	1.48
71.75	2.80	2.65	2.40	2.26	2.12	1.96	1.87	1.81	1.74	1.70	1.68	1.65	1.60	1.59	1.57	1.55
72.00	2.80	2.66	2.42	2.29	2.15	2.00	1.91	1.86	1.80	1.76	1.74	1.71	1.67	1.66	1.64	1.62

Table A1- 6 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q10L2; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.93	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.47	1.47	1.49	1.55	1.70	1.66	1.60	1.65
0.50	2.10	2.00	1.90	1.90	1.95	1.98	1.95	1.90	1.87	1.85	1.84	1.83	1.79	1.77	1.76	1.73
0.75	2.49	2.40	2.29	2.22	2.16	2.08	2.02	2.00	1.97	1.93	1.89	1.86	1.80	1.79	1.76	1.68
1.00	2.59	2.48	2.33	2.24	2.15	2.04	1.99	1.94	1.88	1.85	1.83	1.80	1.76	1.74	1.71	1.68
1.25	2.61	2.49	2.31	2.21	2.11	1.99	1.93	1.89	1.84	1.80	1.78	1.75	1.70	1.69	1.65	1.63
1.50	2.62	2.50	2.31	2.20	2.09	1.97	1.90	1.85	1.79	1.75	1.73	1.70	1.65	1.63	1.59	1.56
1.75	2.62	2.50	2.30	2.18	2.07	1.94	1.86	1.81	1.75	1.71	1.68	1.65	1.59	1.57	1.53	1.50
2.00	2.63	2.50	2.29	2.17	2.05	1.91	1.83	1.78	1.70	1.66	1.63	1.60	1.54	1.52	1.47	1.43
2.25	2.63	2.49	2.28	2.15	2.03	1.88	1.79	1.74	1.66	1.61	1.59	1.54	1.48	1.46	1.41	1.37
2.50	2.63	2.49	2.27	2.13	2.00	1.85	1.76	1.70	1.61	1.57	1.54	1.49	1.42	1.40	1.35	1.30
2.75	2.63	2.49	2.26	2.11	1.98	1.82	1.72	1.66	1.57	1.52	1.49	1.44	1.37	1.34	1.29	1.24
3.00	2.63	2.48	2.25	2.10	1.96	1.79	1.69	1.62	1.52	1.47	1.44	1.39	1.31	1.29	1.23	1.18
3.25	2.63	2.48	2.24	2.08	1.94	1.76	1.65	1.58	1.48	1.43	1.40	1.35	1.26	1.23	1.18	1.12
3.50	2.63	2.48	2.23	2.07	1.92	1.74	1.62	1.55	1.44	1.39	1.36	1.30	1.21	1.18	1.12	1.07
3.75	2.63	2.48	2.22	2.05	1.90	1.72	1.60	1.52	1.41	1.35	1.32	1.26	1.17	1.14	1.07	1.02
4.00	2.63	2.48	2.22	2.04	1.89	1.70	1.57	1.49	1.37	1.32	1.28	1.22	1.13	1.10	1.03	0.97
4.25	2.64	2.48	2.22	2.04	1.88	1.68	1.55	1.46	1.34	1.29	1.25	1.19	1.09	1.06	0.99	0.93
4.50	2.65	2.48	2.22	2.03	1.87	1.67	1.53	1.44	1.32	1.26	1.22	1.16	1.06	1.02	0.95	0.89
4.75	2.65	2.49	2.22	2.03	1.87	1.66	1.52	1.42	1.30	1.24	1.20	1.13	1.03	0.99	0.92	0.86
5.00	2.66	2.50	2.22	2.03	1.86	1.65	1.51	1.41	1.28	1.22	1.18	1.12	1.01	0.97	0.90	0.83
5.25	2.67	2.50	2.22	2.03	1.86	1.65	1.50	1.40	1.27	1.21	1.17	1.10	0.99	0.95	0.88	0.82
5.50	2.68	2.51	2.23	2.04	1.87	1.65	1.50	1.40	1.26	1.20	1.16	1.09	0.98	0.94	0.87	0.80
5.75	2.69	2.52	2.24	2.04	1.87	1.65	1.50	1.40	1.26	1.20	1.16	1.09	0.97	0.94	0.86	0.80
6.00	2.71	2.54	2.25	2.05	1.88	1.65	1.50	1.40	1.26	1.20	1.16	1.09	0.97	0.94	0.86	0.80
6.25	2.72	2.55	2.26	2.06	1.89	1.66	1.51	1.40	1.27	1.21	1.16	1.09	0.98	0.94	0.87	0.80
6.50	2.74	2.56	2.27	2.08	1.90	1.67	1.52	1.41	1.28	1.21	1.17	1.10	0.98	0.95	0.88	0.82
6.75	2.75	2.58	2.29	2.09	1.91	1.68	1.53	1.43	1.29	1.23	1.18	1.11	1.00	0.97	0.90	0.84
7.00	2.77	2.59	2.30	2.11	1.93	1.70	1.54	1.44	1.30	1.24	1.20	1.13	1.02	0.99	0.92	0.86
7.25	2.78	2.61	2.32	2.12	1.94	1.71	1.56	1.46	1.33	1.26	1.22	1.15	1.04	1.01	0.95	0.89
7.50	2.80	2.63	2.33	2.14	1.96	1.73	1.58	1.48	1.35	1.29	1.25	1.18	1.07	1.05	0.98	0.93
7.75	2.82	2.65	2.35	2.16	1.98	1.76	1.61	1.51	1.38	1.32	1.28	1.21	1.11	1.08	1.02	0.98
8.00	2.84	2.67	2.37	2.19	2.01	1.78	1.64	1.54	1.41	1.35	1.31	1.25	1.16	1.13	1.08	1.03
8.25	2.86	2.69	2.39	2.21	2.03	1.81	1.67	1.58	1.45	1.39	1.36	1.30	1.21	1.18	1.13	1.09
8.50	2.88	2.71	2.42	2.24	2.06	1.84	1.71	1.62	1.50	1.44	1.40	1.35	1.26	1.24	1.20	1.16
8.75	2.91	2.74	2.45	2.28	2.10	1.88	1.75	1.66	1.55	1.49	1.46	1.41	1.33	1.31	1.27	1.24
9.00	2.94	2.77	2.48	2.31	2.14	1.92	1.80	1.71	1.61	1.55	1.52	1.47	1.40	1.38	1.34	1.32
9.25	2.98	2.81	2.52	2.36	2.18	1.97	1.85	1.77	1.67	1.62	1.59	1.54	1.47	1.46	1.42	1.40
9.50	3.02	2.85	2.56	2.40	2.23	2.02	1.91	1.83	1.74	1.69	1.66	1.61	1.55	1.54	1.50	1.48
9.75	3.06	2.89	2.60	2.45	2.28	2.08	1.97	1.90	1.81	1.76	1.73	1.69	1.63	1.61	1.58	1.56
10.00	3.10	2.93	2.64	2.50	2.33	2.13	2.03	1.96	1.88	1.83	1.80	1.76	1.70	1.69	1.66	1.64
10.25	3.14	2.97	2.69	2.56	2.38	2.19	2.09	2.03	1.95	1.90	1.87	1.83	1.77	1.76	1.73	1.71
10.50	3.18	3.02	2.74	2.61	2.44	2.25	2.16	2.09	2.01	1.96	1.93	1.89	1.84	1.83	1.80	1.77
10.75	3.23	3.06	2.78	2.66	2.49	2.30	2.21	2.15	2.07	2.02	1.99	1.96	1.90	1.89	1.86	1.83
11.00	3.27	3.10	2.83	2.71	2.53	2.36	2.27	2.21	2.13	2.08	2.05	2.01	1.95	1.94	1.90	1.88
11.25	3.31	3.14	2.87	2.76	2.58	2.40	2.31	2.25	2.18	2.12	2.09	2.05	2.00	1.98	1.95	1.92
11.50	3.34	3.18	2.91	2.80	2.62	2.44	2.35	2.29	2.22	2.16	2.13	2.09	2.03	2.01	1.97	1.95
11.75	3.38	3.22	2.94	2.83	2.65	2.48	2.39	2.33	2.25	2.19	2.16	2.11	2.05	2.04	2.00	1.96
12.00	3.41	3.25	2.97	2.87	2.68	2.51	2.42	2.35	2.27	2.21	2.18	2.13	2.07	2.05	2.01	1.97
12.25	3.44	3.28	3.00	2.90	2.71	2.53	2.44	2.37	2.29	2.23	2.19	2.15	2.08	2.06	2.01	1.98
12.50	3.47	3.31	3.03	2.92	2.73	2.55	2.46	2.39	2.30	2.24	2.20	2.15	2.08	2.06	2.01	1.97
12.75	3.50	3.33	3.05	2.94	2.75	2.56	2.47	2.40	2.31	2.24	2.20	2.15	2.07	2.05	2.00	1.95
13.00	3.52	3.36	3.07	2.96	2.76	2.57	2.47	2.40	2.31	2.24	2.19	2.14	2.06	2.03	1.98	1.93
13.25	3.55	3.38	3.09	2.98	2.77	2.57	2.47	2.40	2.30	2.23	2.18	2.12	2.04	2.01	1.95	1.90
13.50	3.57	3.40	3.10	2.99	2.78	2.58	2.47	2.39	2.29	2.21	2.16	2.10	2.01	1.99	1.92	1.86
13.75	3.59	3.42	3.12	3.00	2.79	2.58	2.47	2.39	2.28	2.20	2.14	2.08	1.99	1.96	1.89	1.83
14.00	3.61	3.44	3.13	3.01	2.79	2.57	2.46	2.38	2.27	2.18	2.13	2.06	1.96	1.93	1.85	1.79
14.25	3.63	3.45	3.14	3.02	2.80	2.57	2.45	2.37	2.25	2.16	2.11	2.04	1.93	1.90	1.82	1.75
14.50	3.65	3.47	3.15	3.03	2.80	2.57	2.45	2.36	2.24	2.14	2.08	2.01	1.90	1.87	1.78	1.71
14.75	3.66	3.49	3.16	3.04	2.81	2.57	2.44	2.35	2.22	2.13	2.06	1.99	1.87	1.83	1.75	1.67
15.00	3.68	3.50	3.18	3.05	2.81	2.57	2.44	2.34	2.21	2.11	2.05	1.97	1.84	1.80	1.71	1.63
15.25	3.70	3.52	3.19	3.06	2.82	2.57	2.43	2.33	2.20	2.09	2.03	1.95	1.82	1.78	1.68	1.60
15.50	3.72	3.54	3.20	3.07	2.82	2.57	2.43	2.33	2.19	2.08	2.01	1.93	1.79	1.75	1.65	1.56
15.75	3.74	3.55	3.21	3.09	2.83	2.57	2.43	2.32	2.18	2.07	2.00	1.91	1.77	1.73	1.63	1.54
16.00	3.75	3.57	3.23	3.10	2.84	2.57	2.43	2.32	2.17	2.06	1.99	1.90	1.75	1.71	1.61	1.51
16.25	3.77	3.59	3.24	3.11	2.85	2.58	2.43	2.32	2.17	2.05	1.98	1.89	1.74	1.70	1.59	1.49
16.50	3.79	3.61	3.26	3.13	2.86	2.58	2.43	2.32	2.17	2.05	1.98	1.88	1.73	1.68	1.57	1.47
16.75	3.82	3.63	3.28	3.14	2.87	2.59	2.44	2.32	2.17	2.05	1.97	1.88	1.72	1.67	1.56	1.46
17.00	3.84	3.65	3.30	3.16	2.89	2.60	2.45	2.33	2.17	2.05	1.98	1.88	1.72	1.67	1.55	1.45
17.25	3.87	3.69	3.33	3.19	2.91	2.62	2.46	2.35	2.18	2.06	1.98	1.88	1.72	1.67	1.55	1.45
17.50	3.91	3.72	3.36	3.22	2.93	2.64	2.48	2.36	2.20	2.07	1.99	1.89	1.72	1.67	1.55	1.45
17.75	3.94	3.76	3.39	3.25	2.96	2.67	2.50	2.38	2.22	2.09	2.01	1.90	1.73	1.68	1.56	1.45
18.00	3.98	3.79	3.42	3.29	2.99	2.69	2.53	2.41	2.24	2.11	2.02	1.92	1.74	1.69	1.57	1.46
18.25	4.02	3.84	3.46	3.32	3.02	2.72	2.56	2.43	2.26	2.13	2.05	1.94	1.76	1.71	1.59	1.48

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.50	4.06	3.88	3.50	3.36	3.06	2.76	2.59	2.46	2.29	2.16	2.07	1.96	1.78	1.73	1.61	1.50
18.75	4.10	3.91	3.55	3.40	3.09	2.79	2.62	2.50	2.33	2.19	2.10	1.99	1.81	1.76	1.63	1.52
19.00	4.14	3.95	3.59	3.44	3.13	2.83	2.66	2.53	2.36	2.22	2.13	2.02	1.84	1.79	1.66	1.55
19.25	4.18	3.99	3.63	3.49	3.17	2.86	2.70	2.57	2.40	2.26	2.16	2.05	1.87	1.82	1.69	1.58
19.50	4.22	4.03	3.68	3.53	3.21	2.90	2.73	2.61	2.44	2.29	2.20	2.09	1.91	1.86	1.73	1.62
19.75	4.26	4.07	3.72	3.57	3.25	2.94	2.77	2.65	2.48	2.33	2.24	2.13	1.95	1.90	1.77	1.66
20.00	4.30	4.11	3.76	3.61	3.28	2.98	2.81	2.69	2.52	2.37	2.28	2.17	1.99	1.94	1.81	1.70
20.25	4.34	4.15	3.81	3.65	3.32	3.02	2.85	2.74	2.57	2.42	2.32	2.21	2.03	1.98	1.86	1.75
20.50	4.38	4.19	3.85	3.70	3.36	3.06	2.90	2.78	2.61	2.46	2.36	2.25	2.08	2.03	1.90	1.80
20.75	4.43	4.23	3.90	3.74	3.41	3.11	2.94	2.82	2.66	2.51	2.41	2.30	2.13	2.08	1.95	1.85
21.00	4.47	4.28	3.95	3.79	3.45	3.15	2.99	2.87	2.71	2.56	2.46	2.35	2.18	2.13	2.01	1.91
21.25	4.52	4.32	4.00	3.84	3.50	3.20	3.04	2.92	2.76	2.61	2.51	2.40	2.23	2.19	2.06	1.97
21.50	4.56	4.37	4.05	3.89	3.55	3.25	3.09	2.98	2.82	2.66	2.56	2.45	2.29	2.25	2.12	2.03
21.75	4.61	4.41	4.10	3.94	3.60	3.30	3.14	3.03	2.87	2.72	2.62	2.51	2.35	2.31	2.18	2.09
22.00	4.66	4.46	4.15	3.99	3.65	3.36	3.20	3.09	2.93	2.78	2.68	2.57	2.41	2.37	2.25	2.15
22.25	4.71	4.51	4.21	4.04	3.70	3.41	3.25	3.15	2.99	2.84	2.74	2.63	2.47	2.43	2.31	2.21
22.50	4.75	4.55	4.26	4.10	3.76	3.46	3.31	3.20	3.05	2.90	2.79	2.69	2.53	2.49	2.37	2.28
22.75	4.80	4.60	4.31	4.15	3.81	3.52	3.36	3.26	3.11	2.96	2.85	2.74	2.59	2.55	2.43	2.34
23.00	4.83	4.63	4.35	4.19	3.86	3.57	3.41	3.31	3.17	3.01	2.91	2.80	2.64	2.61	2.48	2.39
23.25	4.87	4.67	4.39	4.23	3.90	3.61	3.46	3.36	3.22	3.06	2.96	2.85	2.70	2.66	2.54	2.44
23.50	4.90	4.70	4.43	4.27	3.94	3.65	3.50	3.41	3.26	3.11	3.00	2.90	2.74	2.70	2.58	2.49
23.75	4.92	4.73	4.46	4.30	3.97	3.69	3.54	3.45	3.30	3.15	3.04	2.94	2.78	2.74	2.62	2.53
24.00	4.94	4.75	4.49	4.33	4.00	3.72	3.57	3.48	3.34	3.18	3.07	2.97	2.82	2.78	2.65	2.56
24.25	4.96	4.77	4.51	4.35	4.03	3.75	3.60	3.51	3.37	3.21	3.10	3.00	2.84	2.80	2.68	2.58
24.50	4.98	4.78	4.53	4.37	4.05	3.77	3.62	3.53	3.39	3.23	3.12	3.01	2.86	2.82	2.69	2.59
24.75	4.98	4.79	4.54	4.38	4.06	3.78	3.64	3.55	3.40	3.25	3.13	3.03	2.87	2.83	2.70	2.60
25.00	4.99	4.80	4.55	4.39	4.07	3.79	3.65	3.56	3.41	3.26	3.14	3.04	2.88	2.84	2.71	2.60
25.25	4.99	4.80	4.55	4.39	4.07	3.80	3.65	3.56	3.42	3.26	3.15	3.04	2.88	2.84	2.70	2.60
25.50	4.99	4.80	4.55	4.39	4.07	3.80	3.65	3.56	3.42	3.26	3.14	3.03	2.87	2.83	2.69	2.58
25.75	4.99	4.80	4.55	4.39	4.07	3.79	3.65	3.56	3.41	3.25	3.14	3.03	2.86	2.82	2.68	2.57
26.00	4.99	4.80	4.55	4.39	4.07	3.79	3.64	3.55	3.41	3.24	3.13	3.01	2.85	2.80	2.66	2.55
26.25	4.99	4.79	4.54	4.39	4.06	3.78	3.64	3.54	3.40	3.23	3.11	3.00	2.83	2.79	2.64	2.52
26.50	4.98	4.79	4.54	4.38	4.06	3.78	3.63	3.53	3.38	3.22	3.10	2.98	2.81	2.77	2.62	2.50
26.75	4.98	4.78	4.53	4.37	4.05	3.77	3.62	3.52	3.37	3.20	3.08	2.97	2.79	2.75	2.60	2.47
27.00	4.97	4.78	4.52	4.37	4.04	3.76	3.60	3.51	3.36	3.19	3.07	2.95	2.77	2.72	2.57	2.45
27.25	4.96	4.77	4.51	4.36	4.03	3.74	3.59	3.49	3.34	3.17	3.05	2.93	2.75	2.70	2.55	2.42
27.50	4.95	4.76	4.51	4.35	4.02	3.73	3.58	3.48	3.33	3.15	3.03	2.91	2.73	2.68	2.52	2.39
27.75	4.95	4.75	4.50	4.34	4.01	3.72	3.56	3.46	3.31	3.14	3.01	2.89	2.71	2.66	2.50	2.36
28.00	4.94	4.74	4.48	4.32	4.00	3.70	3.55	3.45	3.29	3.12	2.99	2.87	2.68	2.63	2.47	2.34
28.25	4.93	4.73	4.47	4.31	3.98	3.69	3.53	3.43	3.28	3.10	2.98	2.85	2.66	2.61	2.45	2.31
28.50	4.92	4.73	4.46	4.30	3.97	3.68	3.52	3.42	3.26	3.08	2.96	2.84	2.64	2.59	2.43	2.29
28.75	4.91	4.72	4.45	4.29	3.96	3.67	3.51	3.40	3.24	3.07	2.94	2.82	2.63	2.57	2.41	2.27
29.00	4.90	4.70	4.44	4.28	3.95	3.65	3.49	3.39	3.23	3.05	2.93	2.80	2.61	2.56	2.39	2.25
29.25	4.88	4.69	4.43	4.27	3.93	3.64	3.48	3.37	3.21	3.04	2.91	2.79	2.59	2.54	2.38	2.24
29.50	4.87	4.68	4.41	4.25	3.92	3.62	3.46	3.36	3.20	3.02	2.90	2.77	2.58	2.53	2.36	2.22
29.75	4.85	4.66	4.40	4.24	3.90	3.61	3.45	3.34	3.18	3.01	2.88	2.76	2.56	2.51	2.35	2.21
30.00	4.84	4.65	4.38	4.22	3.89	3.59	3.43	3.33	3.17	2.99	2.87	2.74	2.55	2.50	2.33	2.19
30.25	4.82	4.63	4.36	4.20	3.87	3.58	3.42	3.31	3.15	2.98	2.85	2.73	2.53	2.48	2.32	2.18
30.50	4.80	4.61	4.34	4.18	3.85	3.56	3.40	3.29	3.13	2.96	2.84	2.71	2.52	2.47	2.30	2.16
30.75	4.78	4.59	4.32	4.16	3.83	3.54	3.38	3.28	3.11	2.94	2.82	2.70	2.50	2.45	2.29	2.15
31.00	4.76	4.58	4.30	4.14	3.81	3.52	3.36	3.26	3.10	2.93	2.81	2.68	2.49	2.44	2.28	2.14
31.25	4.74	4.56	4.28	4.12	3.79	3.50	3.34	3.24	3.08	2.91	2.79	2.67	2.48	2.42	2.26	2.13
31.50	4.72	4.54	4.26	4.10	3.77	3.49	3.33	3.22	3.06	2.89	2.78	2.65	2.46	2.41	2.25	2.12
31.75	4.70	4.52	4.24	4.08	3.75	3.47	3.31	3.20	3.04	2.88	2.76	2.64	2.45	2.40	2.24	2.11
32.00	4.68	4.50	4.21	4.06	3.73	3.45	3.29	3.18	3.02	2.86	2.75	2.63	2.44	2.39	2.24	2.11
32.25	4.66	4.48	4.19	4.04	3.71	3.43	3.27	3.17	3.01	2.84	2.73	2.61	2.43	2.38	2.23	2.11
32.50	4.64	4.46	4.17	4.02	3.69	3.41	3.25	3.15	2.99	2.83	2.72	2.60	2.42	2.37	2.23	2.10
32.75	4.62	4.44	4.15	4.00	3.67	3.39	3.24	3.13	2.98	2.82	2.71	2.59	2.42	2.37	2.23	2.11
33.00	4.60	4.42	4.13	3.98	3.65	3.38	3.22	3.12	2.96	2.81	2.70	2.59	2.41	2.37	2.23	2.11
33.25	4.58	4.40	4.11	3.96	3.63	3.36	3.21	3.11	2.95	2.80	2.69	2.58	2.41	2.37	2.23	2.12
33.50	4.56	4.38	4.09	3.94	3.62	3.35	3.20	3.09	2.94	2.79	2.69	2.58	2.41	2.37	2.24	2.13
33.75	4.54	4.36	4.07	3.92	3.60	3.33	3.18	3.08	2.93	2.78	2.68	2.58	2.42	2.37	2.25	2.14
34.00	4.52	4.34	4.05	3.91	3.59	3.32	3.17	3.08	2.93	2.78	2.68	2.58	2.42	2.38	2.26	2.16
34.25	4.50	4.33	4.04	3.89	3.57	3.31	3.17	3.07	2.92	2.78	2.69	2.58	2.43	2.39	2.27	2.18
34.50	4.49	4.31	4.02	3.88	3.56	3.30	3.16	3.06	2.92	2.78	2.69	2.59	2.44	2.40	2.29	2.20
34.75	4.47	4.30	4.01	3.86	3.55	3.30	3.15	3.06	2.92	2.78	2.69	2.60	2.45	2.42	2.31	2.22
35.00	4.45	4.28	3.99	3.85	3.54	3.29	3.15	3.06	2.92	2.79	2.70	2.61	2.47	2.43	2.33	2.24
35.25	4.44	4.27	3.98	3.84	3.53	3.28	3.15	3.06	2.92	2.79	2.70	2.61	2.48	2.45	2.34	2.26
35.50	4.42	4.25	3.96	3.82	3.52	3.28	3.14	3.05	2.92	2.80	2.71	2.62	2.49	2.46	2.36	2.28
35.75	4.40	4.24	3.95	3.81	3.52	3.27	3.14	3.05	2.92	2.80	2.72	2.63	2.51	2.47	2.38	2.30
36.00	4.39	4.22	3.93	3.80	3.51	3.27	3.14	3.05	2.93	2.80	2.72	2.64	2.51	2.48	2.39	2.31
36.25	4.37	4.21	3.92	3.79	3.50	3.26	3.13	3.05	2.92	2.80	2.72	2.64	2.52	2.49	2.39	2.32
36.50	4.36	4.19	3.91	3.77	3.49	3.26	3.13	3.04	2.92	2.80	2.72	2.64	2.52	2.49	2.40	2.32
36.75	4.34	4.18	3.89	3.76	3.48	3.25	3.12	3.04	2.91	2.80	2.72	2.64	2.52	2.49	2.39	2.32
37.00	4.32	4.16	3.88	3.74	3.46	3.23	3.11	3.03	2.90	2.79	2.71	2.63	2.51	2.48	2.38	2.31
37.25	4.31	4.15	3.86	3.73	3.45	3.22	3.10	3.01	2.89	2.77	2.70	2.61	2.49	2.46	2.37	2.29
37.50	4.29	4.13	3.84	3.71	3.43	3.20	3.08	3.00	2.87	2.76	2.68	2.60	2.48	2.44	2.35	2.27
37.75	4.27	4.11	3.82	3.69	3.41	3.19	3.06	2.98	2.85	2.74	2.66	2.58	2.45	2.42	2.32	2.24
38.00	4.25	4.09	3.80	3.67	3.39	3.16	3.04	2.95	2.83	2.71	2.63	2.55	2.42	2.39	2.29	2.21
38.25	4.23	4.07	3.77	3.65	3.37	3.14	3.01	2.93	2.80	2.68	2.61	2.52	2.39	2.36	2.26	2.17

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.50	4.21	4.05	3.75	3.62	3.35	3.12	2.99	2.90	2.77	2.65	2.57	2.49	2.36	2.32	2.22	2.13
38.75	4.18	4.02	3.72	3.60	3.32	3.09	2.96	2.87	2.74	2.62	2.54	2.46	2.32	2.29	2.18	2.09
39.00	4.16	4.00	3.70	3.57	3.30	3.06	2.93	2.84	2.71	2.59	2.51	2.42	2.28	2.25	2.14	2.05
39.25	4.13	3.97	3.67	3.54	3.27	3.03	2.90	2.81	2.67	2.55	2.47	2.38	2.24	2.21	2.10	2.00
39.50	4.11	3.95	3.64	3.51	3.24	3.00	2.87	2.77	2.64	2.51	2.43	2.34	2.20	2.16	2.05	1.96
39.75	4.08	3.92	3.61	3.48	3.21	2.97	2.83	2.74	2.60	2.48	2.40	2.30	2.16	2.12	2.01	1.91
40.00	4.06	3.90	3.58	3.45	3.18	2.93	2.80	2.70	2.56	2.44	2.36	2.27	2.12	2.08	1.96	1.86
40.25	4.03	3.87	3.55	3.42	3.15	2.90	2.77	2.67	2.52	2.40	2.32	2.23	2.08	2.04	1.92	1.82
40.50	4.01	3.84	3.52	3.39	3.12	2.87	2.73	2.63	2.49	2.36	2.28	2.19	2.04	1.99	1.88	1.77
40.75	3.98	3.82	3.49	3.36	3.09	2.84	2.70	2.60	2.45	2.33	2.25	2.15	2.00	1.95	1.84	1.73
41.00	3.96	3.79	3.46	3.34	3.07	2.81	2.67	2.56	2.42	2.29	2.21	2.12	1.96	1.92	1.80	1.69
41.25	3.94	3.77	3.44	3.31	3.04	2.78	2.64	2.53	2.38	2.26	2.18	2.08	1.93	1.88	1.76	1.66
41.50	3.92	3.75	3.41	3.29	3.02	2.76	2.61	2.50	2.35	2.23	2.15	2.05	1.89	1.85	1.73	1.62
41.75	3.90	3.73	3.39	3.27	3.00	2.73	2.59	2.48	2.33	2.20	2.12	2.02	1.87	1.82	1.70	1.59
42.00	3.88	3.71	3.37	3.25	2.98	2.71	2.56	2.45	2.30	2.18	2.10	2.00	1.84	1.79	1.67	1.56
42.25	3.87	3.69	3.35	3.23	2.96	2.69	2.54	2.43	2.28	2.15	2.07	1.97	1.81	1.77	1.65	1.54
42.50	3.85	3.67	3.34	3.21	2.94	2.67	2.52	2.41	2.25	2.13	2.05	1.95	1.79	1.74	1.63	1.52
42.75	3.84	3.66	3.32	3.19	2.92	2.65	2.50	2.39	2.23	2.11	2.03	1.93	1.77	1.73	1.61	1.50
43.00	3.82	3.64	3.30	3.17	2.90	2.63	2.48	2.37	2.21	2.09	2.02	1.92	1.76	1.71	1.59	1.48
43.25	3.81	3.63	3.29	3.16	2.89	2.62	2.47	2.35	2.20	2.08	2.00	1.90	1.74	1.69	1.58	1.47
43.50	3.79	3.61	3.27	3.14	2.88	2.60	2.45	2.34	2.18	2.06	1.99	1.89	1.73	1.68	1.57	1.46
43.75	3.78	3.60	3.26	3.13	2.86	2.59	2.44	2.32	2.17	2.05	1.97	1.88	1.72	1.67	1.56	1.46
44.00	3.77	3.58	3.24	3.11	2.85	2.58	2.43	2.31	2.16	2.04	1.96	1.87	1.71	1.67	1.56	1.46
44.25	3.75	3.57	3.23	3.10	2.84	2.56	2.41	2.30	2.15	2.03	1.96	1.86	1.71	1.66	1.55	1.46
44.50	3.74	3.56	3.22	3.09	2.83	2.55	2.41	2.29	2.14	2.02	1.95	1.86	1.71	1.66	1.56	1.46
44.75	3.73	3.55	3.21	3.07	2.82	2.54	2.40	2.29	2.13	2.02	1.95	1.86	1.71	1.67	1.56	1.47
45.00	3.71	3.53	3.19	3.06	2.81	2.54	2.39	2.28	2.13	2.02	1.95	1.86	1.71	1.67	1.57	1.49
45.25	3.70	3.52	3.18	3.05	2.80	2.53	2.38	2.28	2.13	2.02	1.95	1.86	1.72	1.68	1.59	1.51
45.50	3.69	3.51	3.17	3.04	2.79	2.52	2.38	2.27	2.13	2.02	1.96	1.87	1.74	1.70	1.61	1.53
45.75	3.68	3.50	3.16	3.03	2.78	2.52	2.38	2.28	2.13	2.03	1.97	1.88	1.76	1.72	1.63	1.56
46.00	3.67	3.49	3.15	3.03	2.78	2.52	2.38	2.28	2.14	2.04	1.98	1.90	1.78	1.75	1.66	1.60
46.25	3.66	3.48	3.15	3.02	2.77	2.52	2.39	2.29	2.15	2.06	2.00	1.92	1.81	1.78	1.70	1.64
46.50	3.65	3.47	3.14	3.01	2.77	2.52	2.39	2.30	2.17	2.08	2.02	1.95	1.84	1.81	1.74	1.68
46.75	3.64	3.46	3.14	3.01	2.77	2.53	2.40	2.31	2.19	2.10	2.04	1.98	1.88	1.85	1.78	1.73
47.00	3.63	3.45	3.13	3.01	2.78	2.54	2.42	2.33	2.21	2.13	2.07	2.01	1.91	1.89	1.83	1.78
47.25	3.62	3.45	3.13	3.01	2.78	2.55	2.44	2.35	2.24	2.16	2.11	2.04	1.95	1.93	1.87	1.83
47.50	3.61	3.44	3.13	3.01	2.79	2.57	2.45	2.37	2.27	2.19	2.14	2.08	1.99	1.97	1.92	1.88
47.75	3.61	3.44	3.13	3.02	2.80	2.58	2.47	2.39	2.29	2.22	2.17	2.11	2.03	2.01	1.96	1.92
48.00	3.61	3.44	3.13	3.02	2.81	2.60	2.49	2.42	2.32	2.24	2.20	2.14	2.07	2.05	2.00	1.96
48.25	3.60	3.43	3.14	3.03	2.82	2.61	2.51	2.44	2.34	2.27	2.22	2.17	2.10	2.08	2.03	1.99
48.50	3.60	3.43	3.14	3.03	2.82	2.63	2.53	2.45	2.36	2.29	2.24	2.19	2.12	2.10	2.05	2.01
48.75	3.59	3.43	3.14	3.03	2.83	2.63	2.54	2.47	2.38	2.30	2.26	2.21	2.14	2.12	2.06	2.02
49.00	3.59	3.42	3.14	3.03	2.83	2.64	2.54	2.48	2.38	2.31	2.27	2.22	2.14	2.12	2.07	2.03
49.25	3.58	3.42	3.14	3.03	2.83	2.64	2.55	2.48	2.39	2.32	2.27	2.22	2.15	2.12	2.07	2.03
49.50	3.57	3.41	3.13	3.03	2.83	2.64	2.54	2.47	2.38	2.31	2.27	2.21	2.14	2.12	2.06	2.02
49.75	3.56	3.40	3.12	3.02	2.82	2.63	2.54	2.47	2.37	2.30	2.25	2.20	2.12	2.10	2.04	2.00
50.00	3.55	3.39	3.11	3.01	2.81	2.62	2.52	2.45	2.36	2.28	2.24	2.18	2.10	2.08	2.02	1.97
50.25	3.54	3.38	3.10	2.99	2.79	2.60	2.50	2.43	2.34	2.26	2.21	2.16	2.07	2.05	1.99	1.93
50.50	3.52	3.36	3.08	2.97	2.78	2.58	2.48	2.41	2.31	2.23	2.18	2.13	2.04	2.01	1.95	1.89
50.75	3.50	3.34	3.06	2.95	2.75	2.56	2.45	2.38	2.28	2.20	2.15	2.09	2.00	1.97	1.91	1.85
51.00	3.49	3.32	3.04	2.93	2.73	2.53	2.43	2.35	2.24	2.16	2.11	2.05	1.96	1.93	1.86	1.80
51.25	3.47	3.30	3.02	2.91	2.70	2.50	2.39	2.31	2.21	2.13	2.08	2.01	1.91	1.89	1.81	1.75
51.50	3.44	3.28	2.99	2.88	2.68	2.47	2.36	2.28	2.17	2.09	2.03	1.97	1.87	1.84	1.76	1.69
51.75	3.42	3.26	2.97	2.85	2.65	2.44	2.32	2.24	2.13	2.04	1.99	1.92	1.82	1.79	1.71	1.64
52.00	3.40	3.23	2.94	2.82	2.62	2.40	2.29	2.20	2.08	2.00	1.95	1.88	1.77	1.73	1.65	1.58
52.25	3.38	3.21	2.92	2.80	2.59	2.37	2.25	2.16	2.04	1.96	1.90	1.83	1.72	1.69	1.60	1.53
52.50	3.36	3.19	2.89	2.77	2.56	2.34	2.22	2.13	2.00	1.91	1.86	1.79	1.67	1.64	1.55	1.47
52.75	3.33	3.16	2.87	2.74	2.53	2.31	2.18	2.09	1.96	1.87	1.82	1.75	1.63	1.59	1.50	1.42
53.00	3.31	3.14	2.84	2.71	2.50	2.27	2.15	2.05	1.92	1.83	1.78	1.70	1.58	1.55	1.46	1.37
53.25	3.29	3.12	2.82	2.68	2.48	2.24	2.11	2.02	1.88	1.80	1.74	1.66	1.54	1.50	1.41	1.33
53.50	3.27	3.09	2.79	2.66	2.45	2.21	2.08	1.98	1.85	1.76	1.70	1.63	1.50	1.46	1.37	1.29
53.75	3.24	3.07	2.77	2.63	2.42	2.18	2.05	1.95	1.81	1.72	1.67	1.59	1.46	1.42	1.33	1.25
54.00	3.22	3.05	2.75	2.60	2.39	2.15	2.02	1.92	1.78	1.69	1.64	1.56	1.43	1.39	1.30	1.21
54.25	3.20	3.02	2.72	2.57	2.37	2.13	1.99	1.89	1.75	1.66	1.61	1.53	1.40	1.36	1.26	1.18
54.50	3.18	3.00	2.70	2.55	2.34	2.10	1.96	1.86	1.72	1.63	1.58	1.50	1.37	1.33	1.23	1.15
54.75	3.15	2.98	2.68	2.53	2.32	2.08	1.93	1.83	1.69	1.60	1.55	1.47	1.34	1.30	1.20	1.12
55.00	3.13	2.96	2.66	2.50	2.30	2.06	1.91	1.81	1.66	1.58	1.53	1.45	1.31	1.27	1.18	1.10
55.25	3.11	2.94	2.64	2.48	2.28	2.03	1.89	1.78	1.64	1.56	1.50	1.42	1.29	1.25	1.16	1.08
55.50	3.09	2.92	2.62	2.46	2.26	2.01	1.87	1.76	1.62	1.53	1.48	1.40	1.27	1.23	1.14	1.06
55.75	3.07	2.90	2.60	2.44	2.24	2.00	1.85	1.74	1.60	1.52	1.47	1.39	1.26	1.22	1.13	1.05
56.00	3.05	2.88	2.58	2.42	2.22	1.98	1.83	1.73	1.58	1.50	1.45	1.37	1.24	1.21	1.12	1.04
56.25	3.04	2.86	2.56	2.40	2.20	1.96	1.81	1.71	1.57	1.49	1.44	1.36	1.24	1.20	1.11	1.04
56.50	3.02	2.85	2.55	2.38	2.19	1.95	1.80	1.70	1.55	1.48	1.43	1.35	1.23	1.20	1.12	1.05
56.75	3.00	2.83	2.53	2.36	2.17	1.93	1.79	1.69	1.55	1.47	1.42	1.35	1.23	1.20	1.12	1.06
57.00	2.99	2.82	2.52	2.35	2.16	1.92	1.78	1.68	1.54	1.47	1.42	1.35	1.24	1.21	1.13	1.07
57.25	2.98	2.80	2.51	2.34	2.15	1.92	1.78	1.68	1.54	1.47	1.43	1.36	1.25	1.22	1.15	1.10
57.50	2.97	2.80	2.50	2.33	2.15	1.92	1.78	1.68	1.55	1.48	1.44	1.37	1.27	1.24	1.18	1.13
57.75	2.96	2.79	2.50	2.33	2.15	1.92	1.78	1.69	1.56	1.50	1.46	1.40	1.30	1.27	1.21	1.17
58.00	2.95	2.78	2.50	2.33	2.15	1.93	1.79	1.71	1.58	1.52	1.48	1.42	1.34	1.31	1.26	1.22
58.25	2.95	2.78	2.50	2.33	2.16	1.94	1.81	1.73	1.61	1.55	1.52	1.46	1.38	1.36	1.31	1.28

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.50	2.95	2.78	2.50	2.34	2.17	1.96	1.83	1.75	1.65	1.59	1.56	1.51	1.43	1.41	1.37	1.34
58.75	2.94	2.78	2.50	2.35	2.18	1.98	1.86	1.79	1.69	1.63	1.60	1.56	1.49	1.47	1.44	1.41
59.00	2.95	2.79	2.51	2.36	2.20	2.00	1.89	1.82	1.73	1.68	1.65	1.61	1.55	1.54	1.50	1.48
59.25	2.95	2.79	2.53	2.38	2.22	2.03	1.93	1.87	1.78	1.74	1.71	1.67	1.62	1.61	1.58	1.55
59.50	2.95	2.80	2.54	2.40	2.25	2.07	1.98	1.92	1.84	1.79	1.77	1.73	1.68	1.67	1.64	1.62
59.75	2.96	2.81	2.56	2.43	2.28	2.11	2.02	1.96	1.89	1.85	1.82	1.79	1.74	1.73	1.71	1.69
60.00	2.97	2.82	2.58	2.45	2.31	2.15	2.06	2.01	1.94	1.90	1.87	1.84	1.80	1.79	1.76	1.74
60.25	2.98	2.84	2.59	2.48	2.33	2.18	2.10	2.05	1.99	1.94	1.92	1.89	1.85	1.84	1.81	1.79
60.50	2.99	2.85	2.61	2.50	2.36	2.21	2.14	2.09	2.03	1.98	1.96	1.93	1.89	1.88	1.85	1.83
60.75	3.00	2.86	2.63	2.52	2.38	2.24	2.17	2.12	2.06	2.02	2.00	1.97	1.93	1.91	1.89	1.87
61.00	3.01	2.87	2.64	2.54	2.40	2.26	2.19	2.15	2.09	2.05	2.02	1.99	1.95	1.94	1.91	1.89
61.25	3.01	2.88	2.65	2.55	2.42	2.28	2.21	2.16	2.10	2.06	2.04	2.01	1.96	1.95	1.92	1.90
61.50	3.02	2.88	2.66	2.56	2.43	2.29	2.22	2.17	2.11	2.07	2.04	2.01	1.96	1.95	1.92	1.90
61.75	3.02	2.88	2.66	2.56	2.43	2.29	2.22	2.17	2.11	2.07	2.04	2.01	1.96	1.95	1.92	1.89
62.00	3.01	2.88	2.66	2.56	2.43	2.29	2.22	2.17	2.10	2.06	2.03	2.00	1.95	1.93	1.90	1.87
62.25	3.01	2.87	2.65	2.55	2.42	2.27	2.20	2.15	2.09	2.04	2.01	1.98	1.92	1.91	1.87	1.84
62.50	3.00	2.86	2.64	2.54	2.40	2.26	2.18	2.13	2.06	2.02	1.99	1.95	1.89	1.88	1.84	1.80
62.75	2.98	2.85	2.63	2.52	2.38	2.23	2.16	2.10	2.03	1.98	1.95	1.91	1.86	1.84	1.80	1.76
63.00	2.97	2.83	2.61	2.50	2.36	2.21	2.13	2.07	2.00	1.95	1.92	1.88	1.81	1.79	1.75	1.71
63.25	2.95	2.81	2.59	2.47	2.33	2.18	2.10	2.04	1.96	1.91	1.88	1.83	1.77	1.75	1.70	1.66
63.50	2.93	2.79	2.56	2.45	2.30	2.15	2.06	2.00	1.92	1.86	1.83	1.79	1.72	1.69	1.64	1.60
63.75	2.91	2.77	2.54	2.42	2.27	2.11	2.02	1.96	1.87	1.82	1.78	1.74	1.66	1.64	1.59	1.54
64.00	2.89	2.75	2.51	2.38	2.24	2.07	1.98	1.91	1.82	1.77	1.73	1.68	1.61	1.58	1.53	1.47
64.25	2.87	2.72	2.48	2.35	2.20	2.03	1.93	1.87	1.77	1.72	1.68	1.63	1.55	1.52	1.46	1.41
64.50	2.85	2.70	2.46	2.32	2.17	1.99	1.89	1.82	1.72	1.66	1.63	1.58	1.49	1.46	1.40	1.35
64.75	2.82	2.67	2.43	2.29	2.13	1.95	1.84	1.77	1.67	1.61	1.58	1.52	1.43	1.41	1.34	1.28
65.00	2.80	2.65	2.40	2.25	2.10	1.91	1.80	1.73	1.62	1.56	1.53	1.47	1.38	1.35	1.28	1.22
65.25	2.78	2.63	2.37	2.22	2.07	1.88	1.76	1.68	1.57	1.51	1.48	1.42	1.32	1.29	1.23	1.17
65.50	2.76	2.60	2.35	2.19	2.03	1.84	1.72	1.64	1.53	1.47	1.43	1.37	1.27	1.24	1.17	1.11
65.75	2.74	2.58	2.32	2.16	2.00	1.81	1.68	1.60	1.48	1.42	1.39	1.32	1.22	1.19	1.12	1.06
66.00	2.71	2.56	2.30	2.13	1.97	1.77	1.65	1.56	1.44	1.38	1.34	1.28	1.18	1.15	1.08	1.01
66.25	2.70	2.54	2.27	2.10	1.94	1.74	1.61	1.52	1.40	1.34	1.30	1.24	1.13	1.10	1.03	0.97
66.50	2.68	2.52	2.25	2.08	1.91	1.71	1.58	1.49	1.37	1.31	1.27	1.20	1.10	1.06	0.99	0.93
66.75	2.66	2.50	2.23	2.05	1.89	1.68	1.55	1.46	1.33	1.28	1.23	1.17	1.06	1.03	0.96	0.89
67.00	2.64	2.48	2.21	2.03	1.87	1.66	1.52	1.43	1.30	1.25	1.20	1.14	1.03	1.00	0.92	0.86
67.25	2.63	2.46	2.19	2.01	1.85	1.64	1.50	1.40	1.28	1.22	1.18	1.11	1.00	0.97	0.90	0.83
67.50	2.61	2.45	2.18	1.99	1.83	1.62	1.48	1.38	1.25	1.20	1.16	1.09	0.98	0.95	0.88	0.81
67.75	2.60	2.43	2.16	1.97	1.81	1.60	1.46	1.36	1.23	1.18	1.14	1.07	0.96	0.93	0.86	0.80
68.00	2.58	2.42	2.15	1.96	1.79	1.58	1.44	1.34	1.22	1.16	1.12	1.06	0.95	0.92	0.85	0.79
68.25	2.57	2.41	2.14	1.94	1.78	1.57	1.43	1.33	1.21	1.15	1.11	1.05	0.94	0.91	0.84	0.79
68.50	2.56	2.39	2.12	1.93	1.77	1.56	1.42	1.32	1.20	1.15	1.11	1.04	0.94	0.91	0.85	0.79
68.75	2.55	2.38	2.11	1.92	1.76	1.55	1.41	1.32	1.20	1.14	1.11	1.04	0.95	0.92	0.86	0.81
69.00	2.54	2.37	2.11	1.91	1.75	1.55	1.41	1.32	1.20	1.15	1.11	1.05	0.96	0.93	0.87	0.83
69.25	2.53	2.37	2.10	1.91	1.75	1.55	1.42	1.32	1.21	1.16	1.12	1.07	0.98	0.95	0.90	0.86
69.50	2.52	2.36	2.10	1.91	1.75	1.55	1.42	1.33	1.22	1.17	1.14	1.09	1.00	0.98	0.93	0.89
69.75	2.51	2.35	2.09	1.91	1.75	1.56	1.43	1.35	1.24	1.20	1.17	1.11	1.04	1.01	0.97	0.94
70.00	2.51	2.35	2.09	1.91	1.76	1.57	1.45	1.37	1.27	1.23	1.20	1.15	1.08	1.06	1.02	0.99
70.25	2.51	2.35	2.10	1.92	1.77	1.59	1.48	1.40	1.31	1.26	1.24	1.19	1.13	1.12	1.08	1.06
70.50	2.51	2.35	2.10	1.93	1.79	1.62	1.51	1.44	1.35	1.31	1.29	1.25	1.19	1.18	1.15	1.13
70.75	2.51	2.36	2.11	1.95	1.81	1.65	1.54	1.48	1.40	1.36	1.34	1.30	1.26	1.24	1.22	1.20
71.00	2.51	2.37	2.13	1.97	1.84	1.68	1.59	1.53	1.45	1.42	1.40	1.37	1.33	1.32	1.29	1.28
71.25	2.52	2.38	2.15	2.00	1.87	1.72	1.64	1.58	1.51	1.48	1.47	1.44	1.40	1.39	1.37	1.36
71.50	2.53	2.39	2.17	2.03	1.91	1.77	1.69	1.64	1.58	1.55	1.53	1.51	1.48	1.47	1.45	1.44
71.75	2.54	2.41	2.20	2.06	1.95	1.82	1.74	1.70	1.64	1.62	1.60	1.58	1.55	1.55	1.53	1.52
72.00	2.56	2.43	2.22	2.10	1.99	1.87	1.80	1.76	1.71	1.68	1.67	1.65	1.62	1.61	1.60	1.59

Table A1- 7 Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q2L20; Sea Level change to 2090

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.92	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.48	1.50	1.59	1.74	1.99	1.88	1.81	1.92
0.50	1.96	1.93	2.01	2.15	2.20	2.21	2.17	2.20	2.19	2.13	2.12	2.13	2.12	2.11	2.09	2.12
0.75	2.57	2.55	2.52	2.50	2.46	2.42	2.38	2.37	2.37	2.35	2.32	2.28	2.24	2.22	2.21	2.16
1.00	2.66	2.62	2.57	2.54	2.50	2.45	2.41	2.39	2.36	2.34	2.32	2.30	2.26	2.23	2.18	2.13
1.25	2.60	2.55	2.47	2.43	2.38	2.32	2.29	2.27	2.23	2.20	2.19	2.17	2.13	2.12	2.10	2.08
1.50	2.50	2.44	2.35	2.30	2.25	2.19	2.16	2.14	2.11	2.09	2.07	2.05	2.03	2.02	2.00	1.98
1.75	2.42	2.35	2.26	2.20	2.15	2.09	2.06	2.04	2.01	1.99	1.97	1.96	1.93	1.92	1.90	1.88
2.00	2.35	2.28	2.18	2.12	2.07	2.01	1.97	1.95	1.92	1.90	1.88	1.87	1.84	1.83	1.81	1.78
2.25	2.29	2.22	2.11	2.05	1.99	1.93	1.89	1.87	1.83	1.81	1.80	1.78	1.75	1.74	1.71	1.69
2.50	2.24	2.16	2.05	1.98	1.92	1.85	1.81	1.78	1.75	1.73	1.71	1.69	1.66	1.65	1.63	1.60
2.75	2.19	2.11	1.99	1.91	1.85	1.78	1.73	1.71	1.67	1.64	1.63	1.61	1.58	1.56	1.54	1.51
3.00	2.14	2.06	1.93	1.85	1.78	1.71	1.66	1.63	1.59	1.57	1.55	1.53	1.49	1.48	1.46	1.43
3.25	2.10	2.01	1.88	1.79	1.72	1.64	1.59	1.56	1.51	1.49	1.47	1.45	1.41	1.40	1.38	1.35
3.50	2.06	1.97	1.83	1.73	1.66	1.57	1.52	1.49	1.44	1.42	1.40	1.38	1.34	1.33	1.30	1.27
3.75	2.03	1.93	1.78	1.67	1.60	1.51	1.45	1.42	1.37	1.35	1.33	1.30	1.26	1.25	1.22	1.19
4.00	2.00	1.89	1.74	1.62	1.55	1.45	1.39	1.35	1.30	1.28	1.26	1.24	1.19	1.18	1.15	1.12
4.25	1.97	1.86	1.70	1.58	1.50	1.40	1.33	1.29	1.24	1.21	1.20	1.17	1.13	1.11	1.08	1.06
4.50	1.94	1.83	1.66	1.54	1.45	1.35	1.28	1.24	1.18	1.16	1.14	1.11	1.07	1.06	1.03	1.00
4.75	1.92	1.81	1.63	1.50	1.41	1.31	1.24	1.19	1.13	1.11	1.09	1.06	1.02	1.01	0.98	0.95
5.00	1.91	1.79	1.61	1.47	1.38	1.27	1.20	1.15	1.09	1.07	1.05	1.02	0.98	0.96	0.94	0.91
5.25	1.90	1.77	1.59	1.45	1.35	1.24	1.17	1.12	1.06	1.04	1.02	0.99	0.94	0.93	0.90	0.88
5.50	1.89	1.76	1.58	1.43	1.33	1.22	1.14	1.09	1.03	1.01	0.99	0.96	0.92	0.91	0.88	0.86
5.75	1.88	1.75	1.57	1.42	1.32	1.21	1.13	1.08	1.02	1.00	0.98	0.95	0.91	0.89	0.87	0.85
6.00	1.88	1.75	1.56	1.41	1.31	1.20	1.12	1.07	1.01	0.99	0.97	0.95	0.91	0.89	0.87	0.85
6.25	1.88	1.75	1.56	1.41	1.31	1.20	1.12	1.07	1.02	0.99	0.98	0.95	0.91	0.90	0.88	0.86
6.50	1.89	1.76	1.57	1.42	1.32	1.21	1.13	1.09	1.03	1.01	0.99	0.97	0.93	0.92	0.91	0.89
6.75	1.90	1.77	1.58	1.43	1.34	1.23	1.16	1.11	1.05	1.04	1.02	1.00	0.96	0.96	0.94	0.93
7.00	1.91	1.79	1.60	1.45	1.36	1.25	1.18	1.14	1.09	1.07	1.06	1.04	1.01	1.00	0.99	0.98
7.25	1.93	1.81	1.62	1.48	1.39	1.29	1.22	1.18	1.13	1.12	1.11	1.09	1.06	1.05	1.04	1.04
7.50	1.95	1.83	1.65	1.52	1.43	1.33	1.27	1.23	1.19	1.18	1.16	1.15	1.13	1.12	1.11	1.11
7.75	1.98	1.86	1.69	1.56	1.48	1.39	1.33	1.30	1.26	1.24	1.23	1.22	1.20	1.20	1.19	1.19
8.00	2.01	1.90	1.73	1.61	1.54	1.45	1.40	1.37	1.33	1.32	1.32	1.30	1.29	1.29	1.28	1.28
8.25	2.05	1.94	1.78	1.67	1.60	1.52	1.48	1.45	1.42	1.41	1.41	1.40	1.38	1.38	1.38	1.38
8.50	2.10	1.99	1.84	1.74	1.68	1.60	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.48	1.48	1.48
8.75	2.15	2.05	1.91	1.82	1.76	1.69	1.65	1.63	1.61	1.60	1.60	1.59	1.58	1.58	1.58	1.58
9.00	2.21	2.12	1.98	1.90	1.84	1.78	1.75	1.73	1.71	1.70	1.70	1.69	1.68	1.68	1.68	1.68
9.25	2.28	2.19	2.06	1.99	1.93	1.87	1.84	1.83	1.81	1.80	1.80	1.79	1.78	1.78	1.78	1.78
9.50	2.34	2.26	2.14	2.07	2.02	1.96	1.93	1.92	1.90	1.89	1.89	1.88	1.88	1.88	1.87	1.87
9.75	2.41	2.33	2.21	2.15	2.10	2.05	2.02	2.01	1.99	1.99	1.98	1.98	1.97	1.97	1.96	1.96
10.00	2.48	2.40	2.29	2.23	2.18	2.13	2.11	2.09	2.08	2.07	2.06	2.05	2.04	2.04	2.04	2.04
10.25	2.54	2.47	2.35	2.30	2.25	2.20	2.18	2.16	2.15	2.14	2.13	2.13	2.12	2.12	2.11	2.11
10.50	2.60	2.53	2.42	2.37	2.31	2.26	2.24	2.23	2.21	2.20	2.20	2.19	2.18	2.18	2.17	2.17
10.75	2.65	2.58	2.47	2.42	2.37	2.32	2.30	2.29	2.27	2.26	2.25	2.25	2.24	2.24	2.23	2.22
11.00	2.70	2.63	2.52	2.48	2.42	2.37	2.35	2.34	2.32	2.31	2.30	2.29	2.28	2.28	2.27	2.27
11.25	2.74	2.67	2.56	2.52	2.46	2.41	2.39	2.38	2.36	2.35	2.34	2.33	2.32	2.32	2.31	2.30
11.50	2.78	2.71	2.60	2.56	2.50	2.45	2.43	2.41	2.39	2.37	2.36	2.35	2.34	2.34	2.33	2.32
11.75	2.81	2.74	2.63	2.58	2.52	2.47	2.44	2.43	2.41	2.39	2.38	2.37	2.36	2.35	2.34	2.33
12.00	2.84	2.76	2.65	2.60	2.54	2.48	2.46	2.44	2.41	2.40	2.38	2.37	2.35	2.35	2.34	2.33
12.25	2.86	2.78	2.66	2.61	2.54	2.48	2.46	2.44	2.41	2.39	2.38	2.37	2.35	2.34	2.33	2.31
12.50	2.87	2.79	2.66	2.61	2.54	2.48	2.45	2.43	2.40	2.38	2.36	2.35	2.33	2.32	2.30	2.29
12.75	2.87	2.79	2.66	2.61	2.53	2.46	2.43	2.41	2.38	2.35	2.34	2.32	2.30	2.29	2.27	2.26
13.00	2.87	2.78	2.65	2.59	2.52	2.44	2.41	2.38	2.35	2.32	2.30	2.29	2.26	2.25	2.23	2.21
13.25	2.86	2.77	2.63	2.57	2.49	2.41	2.37	2.35	2.31	2.28	2.26	2.24	2.21	2.20	2.18	2.16
13.50	2.85	2.76	2.61	2.55	2.46	2.38	2.33	2.30	2.26	2.23	2.21	2.19	2.16	2.15	2.12	2.10
13.75	2.84	2.74	2.59	2.52	2.43	2.34	2.29	2.26	2.21	2.18	2.16	2.14	2.10	2.09	2.06	2.03
14.00	2.83	2.73	2.56	2.49	2.39	2.29	2.24	2.21	2.16	2.12	2.10	2.07	2.03	2.02	1.99	1.96
14.25	2.81	2.71	2.54	2.45	2.35	2.24	2.19	2.15	2.10	2.06	2.04	2.01	1.97	1.95	1.92	1.89
14.50	2.80	2.68	2.51	2.42	2.31	2.20	2.14	2.10	2.04	2.00	1.98	1.95	1.90	1.88	1.85	1.81
14.75	2.78	2.66	2.48	2.38	2.27	2.15	2.09	2.04	1.98	1.94	1.91	1.88	1.83	1.81	1.77	1.74
15.00	2.77	2.64	2.45	2.35	2.23	2.10	2.04	1.99	1.92	1.88	1.85	1.82	1.76	1.74	1.70	1.66
15.25	2.75	2.63	2.42	2.31	2.19	2.06	1.98	1.93	1.86	1.82	1.79	1.75	1.69	1.67	1.63	1.59
15.50	2.74	2.61	2.40	2.28	2.16	2.01	1.94	1.88	1.81	1.76	1.73	1.69	1.63	1.61	1.56	1.52
15.75	2.73	2.60	2.38	2.25	2.12	1.97	1.89	1.83	1.75	1.70	1.67	1.63	1.56	1.54	1.49	1.45
16.00	2.72	2.58	2.36	2.23	2.09	1.94	1.84	1.78	1.70	1.65	1.62	1.57	1.50	1.48	1.43	1.38
16.25	2.72	2.57	2.34	2.20	2.07	1.90	1.81	1.74	1.65	1.60	1.57	1.52	1.45	1.42	1.37	1.32
16.50	2.72	2.57	2.33	2.18	2.04	1.87	1.77	1.70	1.61	1.56	1.52	1.47	1.40	1.37	1.32	1.27
16.75	2.72	2.57	2.32	2.17	2.03	1.85	1.74	1.67	1.57	1.52	1.48	1.43	1.35	1.33	1.27	1.22
17.00	2.73	2.57	2.32	2.16	2.01	1.83	1.72	1.64	1.54	1.49	1.45	1.40	1.31	1.29	1.23	1.18
17.25	2.74	2.58	2.33	2.16	2.01	1.82	1.70	1.62	1.52	1.46	1.43	1.37	1.28	1.26	1.20	1.15
17.50	2.76	2.60	2.33	2.17	2.01	1.81	1.69	1.61	1.50	1.44	1.41	1.35	1.26	1.23	1.17	1.12
17.75	2.78	2.62	2.35	2.18	2.01	1.81	1.69	1.60	1.49	1.43	1.39	1.33	1.24	1.21	1.15	1.10
18.00	2.80	2.64	2.36	2.19	2.02	1.81	1.69	1.60	1.48	1.42	1.39	1.33	1.23	1.21	1.14	1.09
18.25	2.83	2.66	2.38	2.21	2.04	1.82	1.69	1.60	1.48	1.42	1.39	1.33	1.23	1.20	1.14	1.09

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.50	2.85	2.69	2.40	2.23	2.05	1.84	1.70	1.61	1.49	1.43	1.39	1.33	1.24	1.21	1.15	1.10
18.75	2.88	2.71	2.42	2.25	2.07	1.85	1.72	1.63	1.51	1.45	1.41	1.35	1.25	1.22	1.16	1.12
19.00	2.91	2.74	2.45	2.28	2.10	1.88	1.74	1.65	1.53	1.46	1.43	1.37	1.27	1.25	1.19	1.14
19.25	2.94	2.77	2.48	2.31	2.12	1.90	1.77	1.68	1.55	1.49	1.45	1.39	1.30	1.27	1.22	1.18
19.50	2.97	2.80	2.51	2.34	2.15	1.93	1.79	1.71	1.58	1.52	1.48	1.42	1.34	1.31	1.26	1.22
19.75	3.01	2.83	2.54	2.37	2.19	1.96	1.83	1.74	1.62	1.56	1.52	1.46	1.38	1.36	1.31	1.27
20.00	3.04	2.87	2.57	2.41	2.22	2.00	1.86	1.78	1.67	1.60	1.57	1.51	1.43	1.41	1.36	1.33
20.25	3.08	2.90	2.60	2.44	2.26	2.03	1.91	1.83	1.72	1.66	1.62	1.57	1.49	1.47	1.43	1.40
20.50	3.11	2.94	2.64	2.48	2.30	2.08	1.96	1.88	1.77	1.71	1.68	1.63	1.56	1.54	1.50	1.47
20.75	3.15	2.97	2.67	2.53	2.34	2.13	2.01	1.93	1.83	1.78	1.74	1.70	1.63	1.61	1.58	1.55
21.00	3.19	3.01	2.72	2.58	2.39	2.18	2.07	2.00	1.90	1.85	1.81	1.77	1.71	1.70	1.66	1.64
21.25	3.23	3.06	2.76	2.63	2.44	2.24	2.14	2.07	1.98	1.92	1.89	1.85	1.80	1.78	1.75	1.73
21.50	3.27	3.10	2.81	2.68	2.50	2.30	2.20	2.14	2.06	2.00	1.97	1.94	1.88	1.87	1.84	1.83
21.75	3.32	3.15	2.86	2.74	2.55	2.37	2.28	2.21	2.14	2.09	2.06	2.02	1.97	1.96	1.93	1.91
22.00	3.36	3.19	2.91	2.80	2.61	2.43	2.35	2.29	2.22	2.17	2.14	2.10	2.06	2.05	2.02	2.00
22.25	3.41	3.24	2.96	2.86	2.68	2.50	2.42	2.36	2.30	2.25	2.22	2.18	2.14	2.13	2.10	2.08
22.50	3.45	3.29	3.02	2.91	2.74	2.57	2.49	2.44	2.37	2.32	2.29	2.26	2.22	2.21	2.18	2.16
22.75	3.50	3.34	3.07	2.97	2.79	2.63	2.56	2.51	2.44	2.39	2.36	2.33	2.29	2.28	2.25	2.23
23.00	3.54	3.38	3.12	3.03	2.85	2.69	2.62	2.57	2.51	2.46	2.43	2.39	2.35	2.34	2.31	2.29
23.25	3.58	3.43	3.17	3.08	2.90	2.75	2.68	2.63	2.57	2.52	2.49	2.45	2.41	2.40	2.37	2.34
23.50	3.62	3.47	3.21	3.12	2.95	2.80	2.73	2.68	2.61	2.56	2.53	2.50	2.45	2.44	2.41	2.38
23.75	3.65	3.50	3.25	3.16	2.98	2.84	2.77	2.72	2.65	2.60	2.57	2.53	2.49	2.47	2.44	2.41
24.00	3.68	3.53	3.28	3.20	3.02	2.87	2.80	2.75	2.69	2.63	2.60	2.56	2.51	2.50	2.46	2.44
24.25	3.71	3.56	3.31	3.22	3.04	2.89	2.82	2.77	2.71	2.65	2.62	2.58	2.53	2.52	2.48	2.45
24.50	3.73	3.58	3.33	3.24	3.06	2.91	2.84	2.79	2.72	2.66	2.62	2.59	2.53	2.52	2.48	2.44
24.75	3.74	3.60	3.35	3.26	3.07	2.92	2.85	2.80	2.73	2.66	2.63	2.59	2.53	2.51	2.47	2.43
25.00	3.75	3.61	3.35	3.27	3.08	2.93	2.85	2.79	2.72	2.66	2.62	2.57	2.51	2.50	2.45	2.41
25.25	3.76	3.61	3.35	3.27	3.08	2.92	2.84	2.78	2.71	2.64	2.60	2.56	2.49	2.48	2.43	2.39
25.50	3.75	3.61	3.35	3.26	3.07	2.91	2.83	2.77	2.69	2.62	2.58	2.53	2.46	2.44	2.39	2.35
25.75	3.75	3.60	3.34	3.25	3.05	2.89	2.80	2.75	2.66	2.59	2.55	2.50	2.43	2.41	2.35	2.30
26.00	3.74	3.59	3.33	3.23	3.04	2.87	2.78	2.72	2.63	2.56	2.51	2.46	2.38	2.36	2.30	2.25
26.25	3.73	3.58	3.31	3.22	3.01	2.84	2.75	2.68	2.60	2.52	2.47	2.42	2.33	2.31	2.25	2.20
26.50	3.72	3.56	3.29	3.19	2.99	2.81	2.72	2.65	2.56	2.48	2.43	2.37	2.28	2.26	2.19	2.14
26.75	3.70	3.55	3.27	3.17	2.96	2.78	2.68	2.61	2.51	2.43	2.38	2.32	2.23	2.21	2.14	2.08
27.00	3.69	3.53	3.25	3.15	2.94	2.74	2.64	2.57	2.47	2.39	2.33	2.27	2.18	2.15	2.08	2.02
27.25	3.67	3.51	3.22	3.12	2.91	2.71	2.61	2.53	2.43	2.34	2.29	2.22	2.12	2.10	2.02	1.96
27.50	3.65	3.49	3.20	3.09	2.88	2.68	2.57	2.49	2.38	2.29	2.24	2.17	2.07	2.04	1.96	1.89
27.75	3.63	3.47	3.17	3.06	2.85	2.64	2.53	2.45	2.34	2.25	2.19	2.12	2.02	1.99	1.91	1.83
28.00	3.61	3.44	3.15	3.04	2.82	2.61	2.49	2.41	2.29	2.20	2.14	2.07	1.96	1.93	1.85	1.78
28.25	3.59	3.42	3.12	3.01	2.79	2.57	2.45	2.37	2.25	2.16	2.10	2.03	1.91	1.88	1.80	1.72
28.50	3.57	3.40	3.10	2.98	2.76	2.54	2.42	2.33	2.21	2.12	2.06	1.98	1.87	1.83	1.75	1.67
28.75	3.55	3.38	3.07	2.96	2.73	2.51	2.38	2.29	2.17	2.08	2.02	1.94	1.82	1.79	1.70	1.62
29.00	3.53	3.35	3.05	2.93	2.71	2.48	2.35	2.26	2.13	2.04	1.98	1.90	1.78	1.75	1.66	1.58
29.25	3.51	3.33	3.03	2.90	2.68	2.45	2.32	2.23	2.10	2.00	1.94	1.87	1.74	1.71	1.62	1.54
29.50	3.49	3.31	3.00	2.88	2.65	2.42	2.29	2.19	2.06	1.97	1.91	1.83	1.71	1.67	1.58	1.50
29.75	3.46	3.29	2.98	2.85	2.63	2.39	2.26	2.17	2.03	1.94	1.88	1.80	1.68	1.64	1.55	1.47
30.00	3.44	3.27	2.96	2.83	2.61	2.37	2.24	2.14	2.00	1.91	1.85	1.77	1.65	1.61	1.52	1.44
30.25	3.42	3.25	2.94	2.81	2.59	2.35	2.21	2.11	1.98	1.89	1.83	1.75	1.62	1.59	1.50	1.42
30.50	3.40	3.23	2.92	2.79	2.57	2.32	2.19	2.09	1.95	1.86	1.80	1.73	1.60	1.57	1.48	1.40
30.75	3.38	3.21	2.90	2.77	2.55	2.30	2.17	2.07	1.93	1.84	1.79	1.71	1.58	1.55	1.46	1.39
31.00	3.37	3.19	2.88	2.75	2.53	2.28	2.15	2.05	1.91	1.83	1.77	1.69	1.57	1.54	1.45	1.38
31.25	3.35	3.17	2.86	2.73	2.51	2.27	2.13	2.03	1.90	1.81	1.76	1.68	1.56	1.53	1.45	1.38
31.50	3.33	3.15	2.85	2.71	2.49	2.25	2.12	2.02	1.89	1.80	1.75	1.68	1.56	1.53	1.45	1.38
31.75	3.31	3.14	2.83	2.69	2.48	2.24	2.11	2.01	1.88	1.80	1.74	1.67	1.56	1.53	1.45	1.39
32.00	3.29	3.12	2.81	2.68	2.47	2.23	2.10	2.00	1.88	1.79	1.75	1.68	1.57	1.54	1.47	1.41
32.25	3.28	3.10	2.80	2.66	2.45	2.22	2.09	2.00	1.88	1.80	1.75	1.68	1.58	1.56	1.49	1.44
32.50	3.26	3.09	2.79	2.65	2.45	2.22	2.09	2.00	1.88	1.81	1.76	1.70	1.61	1.58	1.52	1.48
32.75	3.25	3.08	2.78	2.64	2.44	2.22	2.10	2.01	1.90	1.83	1.78	1.72	1.64	1.62	1.56	1.52
33.00	3.24	3.07	2.77	2.64	2.44	2.22	2.11	2.03	1.92	1.85	1.81	1.76	1.68	1.66	1.61	1.58
33.25	3.23	3.06	2.77	2.64	2.45	2.24	2.13	2.05	1.95	1.89	1.85	1.80	1.73	1.71	1.67	1.64
33.50	3.22	3.05	2.77	2.64	2.46	2.26	2.15	2.08	1.99	1.93	1.90	1.85	1.79	1.78	1.74	1.72
33.75	3.21	3.05	2.77	2.65	2.47	2.28	2.19	2.12	2.04	1.98	1.95	1.91	1.86	1.84	1.81	1.79
34.00	3.21	3.05	2.78	2.67	2.49	2.31	2.23	2.16	2.09	2.04	2.01	1.97	1.92	1.91	1.89	1.87
34.25	3.21	3.06	2.80	2.68	2.52	2.35	2.27	2.21	2.14	2.10	2.07	2.04	2.00	1.99	1.96	1.95
34.50	3.22	3.07	2.81	2.71	2.55	2.39	2.32	2.27	2.20	2.16	2.14	2.11	2.07	2.06	2.04	2.03
34.75	3.22	3.08	2.83	2.73	2.58	2.44	2.37	2.32	2.27	2.23	2.20	2.18	2.14	2.13	2.11	2.10
35.00	3.23	3.09	2.86	2.76	2.62	2.48	2.42	2.38	2.33	2.29	2.27	2.24	2.21	2.20	2.18	2.17
35.25	3.24	3.11	2.88	2.80	2.66	2.53	2.47	2.43	2.38	2.35	2.33	2.30	2.27	2.26	2.24	2.23
35.50	3.25	3.12	2.91	2.83	2.69	2.57	2.52	2.48	2.43	2.40	2.38	2.35	2.32	2.32	2.30	2.28
35.75	3.27	3.14	2.93	2.85	2.72	2.61	2.56	2.52	2.48	2.44	2.42	2.40	2.37	2.36	2.34	2.32
36.00	3.28	3.15	2.95	2.88	2.75	2.64	2.59	2.55	2.51	2.47	2.45	2.43	2.40	2.39	2.37	2.35
36.25	3.28	3.16	2.96	2.89	2.77	2.66	2.61	2.58	2.53	2.50	2.48	2.45	2.42	2.41	2.39	2.37
36.50	3.29	3.16	2.97	2.90	2.78	2.68	2.63	2.59	2.55	2.51	2.49	2.46	2.43	2.42	2.40	2.38
36.75	3.29	3.17	2.98	2.91	2.78	2.68	2.63	2.60	2.55	2.51	2.49	2.47	2.43	2.42	2.40	2.38
37.00	3.28	3.16	2.97	2.91	2.78	2.68	2.63	2.59	2.55	2.51	2.48	2.46	2.42	2.41	2.39	2.36
37.25	3.27	3.15	2.96	2.90	2.77	2.67	2.61	2.58	2.53	2.49	2.47	2.44	2.40	2.39	2.36	2.34
37.50	3.26	3.14	2.95	2.88	2.76	2.65	2.60	2.56	2.51	2.47	2.44	2.41	2.37	2.36	2.33	2.31
37.75	3.24	3.12	2.93	2.86	2.73	2.62	2.57	2.53	2.48	2.43	2.41	2.38	2.34	2.32	2.29	2.26
38.00	3.22	3.10	2.91	2.83	2.71	2.59	2.53	2.49	2.44	2.39	2.37	2.33	2.29	2.28	2.24	2.21
38.25	3.19	3.07	2.88	2.80	2.67	2.55	2.49	2.45	2.39	2.35	2.32	2.29	2.24	2.22	2.19	2.15

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.50	3.16	3.04	2.84	2.76	2.63	2.51	2.45	2.40	2.34	2.30	2.27	2.23	2.18	2.16	2.12	2.09
38.75	3.13	3.01	2.81	2.72	2.59	2.46	2.40	2.35	2.29	2.24	2.21	2.17	2.12	2.10	2.06	2.02
39.00	3.10	2.97	2.77	2.68	2.55	2.41	2.35	2.30	2.23	2.18	2.15	2.11	2.05	2.03	1.99	1.95
39.25	3.06	2.94	2.73	2.63	2.50	2.36	2.29	2.24	2.17	2.12	2.08	2.05	1.98	1.97	1.92	1.88
39.50	3.03	2.90	2.68	2.59	2.45	2.31	2.23	2.18	2.11	2.05	2.02	1.98	1.91	1.89	1.85	1.80
39.75	2.99	2.86	2.64	2.54	2.40	2.25	2.17	2.12	2.04	1.99	1.95	1.91	1.84	1.82	1.77	1.73
40.00	2.95	2.82	2.60	2.49	2.35	2.20	2.12	2.06	1.98	1.92	1.89	1.84	1.77	1.75	1.70	1.65
40.25	2.91	2.78	2.55	2.44	2.30	2.14	2.06	2.00	1.91	1.86	1.82	1.78	1.70	1.68	1.63	1.58
40.50	2.88	2.74	2.51	2.39	2.25	2.09	2.00	1.94	1.85	1.79	1.76	1.71	1.64	1.61	1.56	1.50
40.75	2.84	2.70	2.47	2.34	2.20	2.04	1.94	1.88	1.79	1.73	1.70	1.65	1.57	1.55	1.49	1.44
41.00	2.81	2.67	2.43	2.30	2.16	1.99	1.89	1.82	1.73	1.67	1.64	1.59	1.51	1.48	1.43	1.37
41.25	2.78	2.64	2.40	2.26	2.11	1.94	1.84	1.77	1.67	1.62	1.58	1.53	1.45	1.42	1.37	1.31
41.50	2.75	2.61	2.36	2.22	2.07	1.90	1.79	1.72	1.62	1.57	1.53	1.48	1.40	1.37	1.31	1.26
41.75	2.72	2.58	2.33	2.18	2.04	1.86	1.75	1.68	1.58	1.52	1.49	1.43	1.35	1.32	1.26	1.21
42.00	2.70	2.55	2.31	2.15	2.00	1.82	1.71	1.64	1.53	1.48	1.44	1.39	1.30	1.28	1.22	1.17
42.25	2.68	2.53	2.28	2.12	1.97	1.79	1.68	1.60	1.49	1.44	1.41	1.35	1.27	1.24	1.18	1.13
42.50	2.66	2.50	2.26	2.09	1.94	1.76	1.64	1.57	1.46	1.41	1.37	1.32	1.23	1.21	1.15	1.10
42.75	2.64	2.48	2.23	2.07	1.92	1.73	1.62	1.54	1.43	1.38	1.35	1.29	1.21	1.18	1.13	1.08
43.00	2.62	2.47	2.21	2.05	1.90	1.71	1.59	1.52	1.41	1.36	1.33	1.27	1.19	1.17	1.11	1.07
43.25	2.60	2.45	2.20	2.03	1.88	1.69	1.58	1.50	1.39	1.34	1.31	1.26	1.18	1.15	1.10	1.06
43.50	2.59	2.43	2.18	2.01	1.87	1.68	1.56	1.49	1.38	1.34	1.30	1.25	1.17	1.15	1.10	1.06
43.75	2.57	2.42	2.17	2.00	1.85	1.67	1.56	1.48	1.38	1.33	1.30	1.25	1.18	1.16	1.11	1.08
44.00	2.56	2.41	2.16	1.99	1.85	1.67	1.55	1.48	1.38	1.34	1.31	1.26	1.19	1.17	1.13	1.10
44.25	2.55	2.40	2.16	1.99	1.85	1.67	1.56	1.49	1.39	1.35	1.32	1.28	1.22	1.20	1.16	1.14
44.50	2.55	2.40	2.15	1.99	1.85	1.68	1.57	1.50	1.41	1.38	1.35	1.31	1.25	1.24	1.21	1.18
44.75	2.54	2.39	2.15	1.99	1.86	1.69	1.59	1.53	1.45	1.41	1.39	1.35	1.30	1.29	1.26	1.24
45.00	2.54	2.39	2.16	2.00	1.87	1.72	1.62	1.56	1.49	1.45	1.43	1.40	1.36	1.35	1.32	1.31
45.25	2.54	2.40	2.17	2.02	1.90	1.75	1.66	1.61	1.54	1.51	1.49	1.46	1.42	1.42	1.40	1.39
45.50	2.55	2.41	2.19	2.05	1.93	1.79	1.71	1.66	1.60	1.57	1.56	1.53	1.50	1.49	1.48	1.47
45.75	2.56	2.42	2.21	2.08	1.97	1.84	1.76	1.72	1.67	1.64	1.63	1.61	1.58	1.58	1.56	1.56
46.00	2.57	2.44	2.24	2.12	2.01	1.89	1.83	1.79	1.74	1.72	1.71	1.69	1.67	1.66	1.65	1.65
46.25	2.59	2.47	2.27	2.16	2.06	1.95	1.90	1.86	1.82	1.80	1.79	1.78	1.76	1.76	1.75	1.74
46.50	2.61	2.50	2.31	2.21	2.12	2.02	1.97	1.94	1.91	1.89	1.88	1.87	1.85	1.85	1.84	1.84
46.75	2.64	2.53	2.36	2.27	2.18	2.09	2.05	2.02	2.00	1.98	1.97	1.96	1.95	1.94	1.94	1.93
47.00	2.68	2.57	2.41	2.33	2.25	2.17	2.13	2.10	2.08	2.06	2.05	2.04	2.03	2.02	2.02	2.01
47.25	2.71	2.61	2.46	2.39	2.31	2.23	2.20	2.18	2.15	2.14	2.13	2.12	2.10	2.10	2.09	2.09
47.50	2.75	2.65	2.51	2.44	2.37	2.29	2.26	2.24	2.22	2.20	2.19	2.18	2.16	2.16	2.15	2.15
47.75	2.78	2.69	2.55	2.48	2.41	2.34	2.31	2.29	2.27	2.26	2.25	2.24	2.22	2.22	2.21	2.20
48.00	2.80	2.72	2.58	2.53	2.45	2.39	2.36	2.34	2.32	2.30	2.29	2.28	2.27	2.27	2.26	2.25
48.25	2.83	2.74	2.61	2.56	2.49	2.43	2.40	2.38	2.36	2.35	2.34	2.33	2.31	2.31	2.30	2.29
48.50	2.85	2.77	2.64	2.59	2.52	2.46	2.43	2.42	2.39	2.37	2.36	2.35	2.34	2.33	2.32	2.31
48.75	2.87	2.78	2.66	2.61	2.54	2.48	2.45	2.43	2.41	2.39	2.38	2.37	2.36	2.35	2.34	2.33
49.00	2.87	2.79	2.67	2.62	2.56	2.49	2.46	2.44	2.42	2.40	2.39	2.37	2.35	2.35	2.33	2.32
49.25	2.88	2.80	2.67	2.62	2.55	2.49	2.46	2.44	2.41	2.39	2.38	2.37	2.35	2.34	2.32	2.31
49.50	2.87	2.79	2.67	2.62	2.54	2.48	2.45	2.43	2.40	2.38	2.36	2.35	2.32	2.32	2.30	2.29
49.75	2.86	2.78	2.65	2.60	2.53	2.46	2.43	2.40	2.38	2.35	2.34	2.32	2.30	2.29	2.27	2.26
50.00	2.84	2.76	2.63	2.58	2.50	2.43	2.40	2.38	2.34	2.32	2.30	2.29	2.26	2.25	2.23	2.22
50.25	2.82	2.74	2.61	2.55	2.47	2.40	2.36	2.34	2.30	2.28	2.26	2.24	2.22	2.21	2.18	2.16
50.50	2.79	2.71	2.57	2.51	2.43	2.36	2.32	2.29	2.26	2.23	2.21	2.19	2.16	2.15	2.13	2.11
50.75	2.76	2.67	2.53	2.47	2.39	2.31	2.27	2.24	2.20	2.17	2.15	2.13	2.10	2.09	2.06	2.04
51.00	2.72	2.63	2.49	2.42	2.34	2.26	2.21	2.18	2.14	2.11	2.09	2.07	2.03	2.02	1.99	1.97
51.25	2.69	2.59	2.45	2.37	2.29	2.20	2.15	2.12	2.08	2.04	2.02	2.00	1.96	1.95	1.92	1.89
51.50	2.64	2.55	2.40	2.32	2.23	2.14	2.09	2.06	2.01	1.98	1.95	1.93	1.89	1.88	1.84	1.82
51.75	2.60	2.50	2.35	2.26	2.17	2.08	2.02	1.99	1.94	1.90	1.88	1.86	1.81	1.80	1.77	1.73
52.00	2.56	2.46	2.30	2.20	2.11	2.01	1.96	1.92	1.87	1.83	1.81	1.78	1.73	1.72	1.69	1.65
52.25	2.51	2.41	2.24	2.15	2.05	1.95	1.89	1.85	1.79	1.76	1.73	1.70	1.66	1.64	1.61	1.57
52.50	2.47	2.36	2.19	2.09	1.99	1.88	1.82	1.78	1.72	1.68	1.66	1.63	1.58	1.56	1.53	1.49
52.75	2.43	2.32	2.14	2.03	1.93	1.82	1.75	1.71	1.65	1.61	1.59	1.55	1.50	1.49	1.45	1.41
53.00	2.39	2.27	2.09	1.97	1.88	1.76	1.69	1.64	1.57	1.54	1.52	1.48	1.43	1.41	1.37	1.34
53.25	2.35	2.23	2.04	1.92	1.82	1.70	1.62	1.58	1.51	1.47	1.45	1.42	1.36	1.34	1.30	1.27
53.50	2.31	2.19	2.00	1.87	1.77	1.64	1.56	1.51	1.44	1.41	1.39	1.35	1.29	1.28	1.24	1.20
53.75	2.27	2.15	1.96	1.82	1.72	1.59	1.51	1.45	1.38	1.35	1.33	1.29	1.23	1.21	1.17	1.14
54.00	2.24	2.11	1.92	1.77	1.67	1.54	1.45	1.40	1.33	1.29	1.27	1.23	1.17	1.16	1.11	1.08
54.25	2.20	2.08	1.88	1.73	1.62	1.49	1.40	1.35	1.27	1.24	1.22	1.18	1.12	1.10	1.06	1.03
54.50	2.17	2.04	1.84	1.69	1.58	1.45	1.36	1.30	1.23	1.19	1.17	1.13	1.07	1.06	1.02	0.98
54.75	2.14	2.01	1.81	1.65	1.54	1.41	1.32	1.26	1.19	1.15	1.13	1.09	1.04	1.02	0.98	0.95
55.00	2.12	1.99	1.78	1.62	1.51	1.38	1.29	1.23	1.15	1.12	1.10	1.06	1.01	0.99	0.96	0.92
55.25	2.09	1.96	1.76	1.60	1.49	1.35	1.26	1.20	1.13	1.10	1.08	1.04	0.99	0.97	0.94	0.91
55.50	2.07	1.94	1.73	1.57	1.46	1.33	1.24	1.18	1.11	1.08	1.06	1.03	0.98	0.96	0.93	0.90
55.75	2.06	1.92	1.72	1.56	1.45	1.32	1.23	1.17	1.10	1.07	1.05	1.02	0.97	0.96	0.93	0.91
56.00	2.04	1.91	1.70	1.55	1.44	1.31	1.22	1.17	1.10	1.08	1.06	1.03	0.99	0.97	0.95	0.93
56.25	2.03	1.90	1.70	1.54	1.44	1.31	1.23	1.18	1.12	1.09	1.08	1.05	1.01	1.00	0.98	0.96
56.50	2.02	1.89	1.69	1.54	1.44	1.32	1.25	1.20	1.14	1.12	1.10	1.08	1.04	1.04	1.02	1.01
56.75	2.02	1.89	1.70	1.55	1.46	1.35	1.27	1.23	1.18	1.16	1.14	1.12	1.09	1.08	1.07	1.06
57.00	2.02	1.90	1.71	1.57	1.48	1.38	1.31	1.27	1.22	1.20	1.19	1.17	1.15	1.14	1.13	1.13
57.25	2.03	1.91	1.73	1.60	1.52	1.42	1.36	1.32	1.28	1.26	1.25	1.24	1.22	1.21	1.21	1.20
57.50	2.05	1.93	1.76	1.64	1.56	1.47	1.42	1.38	1.35	1.34	1.33	1.31	1.30	1.30	1.29	1.29
57.75	2.07	1.96	1.80	1.69	1.62	1.53	1.48	1.46	1.43	1.41	1.41	1.40	1.38	1.38	1.38	1.38
58.00	2.10	2.00	1.85	1.75	1.68	1.60	1.56	1.54	1.51	1.50	1.50	1.49	1.48	1.48	1.48	1.48
58.25	2.13	2.04	1.90	1.81	1.75	1.68	1.65	1.63	1.61	1.60	1.59	1.59	1.58	1.58	1.58	1.58

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.50	2.18	2.09	1.96	1.88	1.83	1.77	1.74	1.72	1.70	1.70	1.69	1.69	1.68	1.68	1.68	1.68
58.75	2.23	2.15	2.03	1.96	1.91	1.85	1.83	1.81	1.80	1.79	1.79	1.78	1.78	1.78	1.78	1.77
59.00	2.28	2.21	2.10	2.04	1.99	1.94	1.92	1.90	1.89	1.88	1.88	1.87	1.87	1.86	1.86	1.86
59.25	2.34	2.26	2.16	2.11	2.06	2.02	2.00	1.98	1.97	1.96	1.96	1.96	1.95	1.95	1.95	1.95
59.50	2.39	2.32	2.22	2.17	2.13	2.09	2.07	2.06	2.05	2.04	2.04	2.03	2.03	2.03	2.02	2.02
59.75	2.43	2.37	2.28	2.24	2.20	2.16	2.14	2.13	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.09
60.00	2.48	2.42	2.34	2.30	2.26	2.22	2.20	2.19	2.18	2.18	2.17	2.17	2.16	2.16	2.16	2.15
60.25	2.53	2.47	2.39	2.35	2.31	2.27	2.26	2.25	2.24	2.23	2.23	2.23	2.22	2.22	2.21	2.21
60.50	2.57	2.51	2.43	2.40	2.36	2.32	2.31	2.30	2.28	2.27	2.27	2.26	2.25	2.25	2.25	2.24
60.75	2.60	2.54	2.46	2.43	2.39	2.35	2.34	2.33	2.31	2.31	2.30	2.30	2.29	2.28	2.28	2.27
61.00	2.62	2.56	2.49	2.45	2.41	2.38	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.30	2.29	2.29
61.25	2.63	2.58	2.50	2.47	2.43	2.39	2.37	2.36	2.35	2.34	2.33	2.33	2.32	2.31	2.30	2.29
61.50	2.64	2.59	2.51	2.48	2.44	2.40	2.38	2.37	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.29
61.75	2.64	2.59	2.51	2.47	2.43	2.39	2.37	2.35	2.34	2.32	2.32	2.31	2.29	2.29	2.28	2.27
62.00	2.63	2.58	2.49	2.46	2.41	2.37	2.35	2.33	2.32	2.30	2.29	2.28	2.27	2.26	2.25	2.24
62.25	2.62	2.56	2.47	2.43	2.39	2.34	2.32	2.31	2.29	2.27	2.26	2.25	2.23	2.23	2.22	2.20
62.50	2.59	2.54	2.45	2.41	2.36	2.31	2.29	2.27	2.25	2.23	2.22	2.21	2.19	2.18	2.17	2.15
62.75	2.57	2.51	2.41	2.37	2.32	2.27	2.24	2.22	2.20	2.18	2.17	2.16	2.14	2.13	2.11	2.10
63.00	2.53	2.47	2.37	2.32	2.27	2.22	2.19	2.17	2.14	2.12	2.11	2.10	2.07	2.07	2.05	2.03
63.25	2.49	2.43	2.33	2.27	2.22	2.16	2.13	2.11	2.08	2.06	2.05	2.03	2.01	2.00	1.98	1.96
63.50	2.45	2.38	2.27	2.22	2.16	2.10	2.07	2.04	2.01	1.99	1.98	1.96	1.93	1.93	1.91	1.89
63.75	2.40	2.33	2.22	2.16	2.10	2.03	2.00	1.98	1.94	1.92	1.91	1.89	1.86	1.85	1.83	1.81
64.00	2.36	2.28	2.17	2.10	2.04	1.97	1.93	1.91	1.87	1.85	1.83	1.81	1.78	1.77	1.74	1.72
64.25	2.31	2.23	2.11	2.03	1.97	1.90	1.86	1.83	1.79	1.77	1.75	1.73	1.70	1.69	1.66	1.64
64.50	2.26	2.17	2.05	1.97	1.90	1.83	1.78	1.75	1.71	1.69	1.67	1.65	1.62	1.61	1.58	1.55
64.75	2.21	2.12	1.99	1.90	1.84	1.76	1.71	1.68	1.64	1.61	1.60	1.57	1.54	1.52	1.50	1.47
65.00	2.16	2.07	1.93	1.84	1.77	1.69	1.64	1.61	1.56	1.53	1.52	1.50	1.46	1.44	1.42	1.39
65.25	2.12	2.02	1.88	1.78	1.71	1.62	1.57	1.53	1.48	1.46	1.44	1.42	1.38	1.37	1.34	1.31
65.50	2.07	1.97	1.83	1.72	1.65	1.55	1.50	1.46	1.41	1.39	1.37	1.35	1.30	1.29	1.26	1.23
65.75	2.03	1.93	1.78	1.66	1.59	1.49	1.43	1.39	1.34	1.32	1.30	1.27	1.23	1.22	1.19	1.16
66.00	1.99	1.88	1.73	1.61	1.53	1.43	1.37	1.33	1.27	1.25	1.23	1.21	1.16	1.15	1.12	1.09
66.25	1.95	1.85	1.68	1.56	1.48	1.38	1.31	1.27	1.21	1.19	1.17	1.15	1.10	1.09	1.06	1.03
66.50	1.92	1.81	1.64	1.51	1.43	1.33	1.26	1.21	1.16	1.13	1.12	1.09	1.05	1.03	1.00	0.98
66.75	1.89	1.78	1.61	1.47	1.38	1.28	1.21	1.16	1.11	1.09	1.07	1.04	1.00	0.98	0.96	0.93
67.00	1.86	1.75	1.57	1.43	1.35	1.24	1.17	1.12	1.07	1.04	1.03	1.00	0.96	0.95	0.92	0.89
67.25	1.84	1.72	1.55	1.40	1.32	1.21	1.14	1.09	1.03	1.01	1.00	0.97	0.93	0.91	0.89	0.87
67.50	1.82	1.70	1.52	1.38	1.29	1.18	1.11	1.06	1.01	0.99	0.97	0.95	0.91	0.89	0.87	0.85
67.75	1.80	1.68	1.50	1.36	1.27	1.17	1.09	1.05	0.99	0.97	0.96	0.93	0.89	0.88	0.86	0.85
68.00	1.79	1.67	1.49	1.35	1.26	1.15	1.08	1.04	0.99	0.97	0.95	0.93	0.90	0.89	0.87	0.85
68.25	1.78	1.66	1.49	1.34	1.26	1.16	1.09	1.04	1.00	0.98	0.96	0.94	0.91	0.90	0.89	0.87
68.50	1.78	1.66	1.48	1.35	1.26	1.16	1.10	1.06	1.01	1.00	0.98	0.97	0.94	0.93	0.91	0.91
68.75	1.78	1.66	1.49	1.36	1.28	1.18	1.12	1.08	1.04	1.03	1.01	1.00	0.97	0.97	0.95	0.95
69.00	1.78	1.67	1.50	1.37	1.30	1.21	1.15	1.12	1.08	1.07	1.06	1.04	1.02	1.02	1.01	1.00
69.25	1.79	1.68	1.52	1.40	1.33	1.25	1.20	1.17	1.13	1.12	1.11	1.10	1.08	1.08	1.07	1.07
69.50	1.81	1.70	1.55	1.44	1.37	1.30	1.25	1.22	1.20	1.19	1.18	1.17	1.16	1.16	1.15	1.15
69.75	1.83	1.73	1.59	1.49	1.43	1.36	1.32	1.30	1.27	1.26	1.26	1.25	1.24	1.24	1.24	1.24
70.00	1.86	1.77	1.64	1.55	1.49	1.43	1.40	1.38	1.36	1.35	1.34	1.34	1.33	1.33	1.33	1.33
70.25	1.90	1.81	1.69	1.61	1.56	1.51	1.48	1.46	1.44	1.44	1.43	1.43	1.42	1.42	1.42	1.42
70.50	1.94	1.86	1.75	1.68	1.63	1.59	1.56	1.55	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.53
70.75	1.99	1.92	1.82	1.76	1.72	1.68	1.66	1.65	1.64	1.63	1.63	1.63	1.63	1.63	1.62	1.63
71.00	2.05	1.99	1.90	1.84	1.81	1.77	1.75	1.74	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.72
71.25	2.11	2.05	1.97	1.92	1.89	1.86	1.84	1.83	1.82	1.82	1.82	1.82	1.81	1.81	1.81	1.81
71.50	2.18	2.12	2.04	2.00	1.97	1.94	1.92	1.92	1.91	1.90	1.90	1.90	1.89	1.89	1.89	1.89
71.75	2.23	2.18	2.11	2.07	2.04	2.01	2.00	1.99	1.98	1.98	1.98	1.97	1.97	1.97	1.97	1.97
72.00	2.29	2.24	2.17	2.14	2.11	2.08	2.07	2.06	2.05	2.05	2.05	2.04	2.04	2.04	2.04	2.04

Table A1- 8 *Design Water Levels in Whakatāne River at selected locations (see location diagram Figure 1); Scenario Q2L2; Sea Level change to 2090*

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
0.00	1.85	1.78	1.68	1.62	1.57	1.52	1.49	1.46	1.44	1.42	1.41	1.39	1.37	1.37	1.35	1.34
0.25	1.92	1.86	1.76	1.70	1.64	1.59	1.54	1.51	1.47	1.47	1.49	1.55	1.70	1.66	1.60	1.65
0.50	1.95	1.88	1.82	1.84	1.91	1.95	1.93	1.89	1.86	1.85	1.84	1.82	1.79	1.77	1.76	1.73
0.75	2.23	2.19	2.12	2.08	2.04	1.99	1.94	1.93	1.91	1.88	1.85	1.82	1.77	1.77	1.75	1.68
1.00	2.25	2.18	2.08	2.02	1.97	1.90	1.86	1.83	1.79	1.76	1.75	1.74	1.70	1.70	1.67	1.64
1.25	2.18	2.11	1.99	1.92	1.87	1.80	1.77	1.74	1.71	1.69	1.67	1.66	1.62	1.62	1.59	1.57
1.50	2.13	2.05	1.94	1.86	1.80	1.73	1.69	1.67	1.63	1.61	1.60	1.58	1.55	1.54	1.51	1.49
1.75	2.09	2.01	1.88	1.80	1.74	1.67	1.62	1.60	1.56	1.54	1.52	1.50	1.47	1.46	1.43	1.41
2.00	2.05	1.96	1.84	1.75	1.68	1.61	1.56	1.53	1.49	1.46	1.45	1.43	1.39	1.38	1.36	1.33
2.25	2.02	1.92	1.79	1.69	1.62	1.54	1.49	1.46	1.41	1.39	1.38	1.35	1.32	1.30	1.28	1.25
2.50	1.98	1.88	1.74	1.64	1.57	1.48	1.42	1.39	1.34	1.32	1.30	1.28	1.24	1.23	1.20	1.17
2.75	1.95	1.85	1.70	1.59	1.51	1.42	1.36	1.32	1.27	1.25	1.23	1.20	1.16	1.15	1.12	1.08
3.00	1.92	1.81	1.66	1.54	1.45	1.36	1.29	1.25	1.20	1.17	1.16	1.13	1.08	1.07	1.04	1.00
3.25	1.89	1.78	1.62	1.49	1.40	1.30	1.23	1.18	1.13	1.10	1.08	1.05	1.01	0.99	0.96	0.92
3.50	1.87	1.75	1.58	1.44	1.35	1.24	1.17	1.12	1.06	1.04	1.02	0.98	0.93	0.92	0.88	0.85
3.75	1.85	1.72	1.54	1.40	1.30	1.19	1.11	1.06	1.00	0.97	0.95	0.92	0.86	0.85	0.81	0.77
4.00	1.83	1.70	1.51	1.36	1.26	1.14	1.06	1.00	0.94	0.91	0.89	0.86	0.80	0.78	0.74	0.71
4.25	1.81	1.68	1.49	1.33	1.22	1.10	1.01	0.95	0.89	0.86	0.84	0.80	0.74	0.72	0.69	0.65
4.50	1.80	1.66	1.47	1.30	1.19	1.06	0.97	0.91	0.84	0.81	0.79	0.75	0.69	0.67	0.63	0.60
4.75	1.79	1.65	1.45	1.27	1.16	1.03	0.94	0.87	0.80	0.77	0.75	0.71	0.65	0.63	0.59	0.55
5.00	1.78	1.64	1.43	1.25	1.14	1.00	0.91	0.84	0.77	0.74	0.71	0.67	0.61	0.59	0.55	0.51
5.25	1.78	1.64	1.42	1.24	1.12	0.98	0.88	0.81	0.74	0.71	0.68	0.64	0.58	0.56	0.52	0.48
5.50	1.78	1.63	1.42	1.23	1.11	0.97	0.86	0.79	0.72	0.69	0.66	0.62	0.56	0.54	0.50	0.46
5.75	1.78	1.63	1.41	1.22	1.10	0.96	0.85	0.78	0.70	0.67	0.65	0.61	0.55	0.52	0.49	0.45
6.00	1.78	1.63	1.41	1.22	1.10	0.95	0.84	0.77	0.70	0.67	0.64	0.60	0.54	0.52	0.48	0.45
6.25	1.78	1.64	1.41	1.22	1.10	0.95	0.84	0.77	0.70	0.67	0.64	0.60	0.54	0.52	0.49	0.46
6.50	1.79	1.64	1.42	1.22	1.10	0.96	0.85	0.78	0.70	0.68	0.65	0.61	0.56	0.54	0.51	0.48
6.75	1.80	1.65	1.43	1.23	1.11	0.97	0.86	0.80	0.72	0.69	0.67	0.63	0.58	0.56	0.53	0.51
7.00	1.81	1.66	1.44	1.25	1.13	0.98	0.88	0.82	0.74	0.72	0.69	0.66	0.61	0.60	0.57	0.55
7.25	1.82	1.67	1.45	1.27	1.15	1.01	0.91	0.85	0.78	0.75	0.73	0.70	0.65	0.64	0.62	0.60
7.50	1.84	1.69	1.47	1.29	1.18	1.04	0.95	0.89	0.82	0.80	0.78	0.75	0.71	0.69	0.67	0.66
7.75	1.85	1.71	1.50	1.32	1.21	1.08	0.99	0.93	0.87	0.85	0.83	0.81	0.77	0.76	0.74	0.73
8.00	1.88	1.73	1.53	1.36	1.25	1.13	1.04	0.99	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.82
8.25	1.90	1.76	1.56	1.40	1.30	1.18	1.11	1.06	1.01	0.99	0.98	0.96	0.93	0.92	0.91	0.90
8.50	1.93	1.80	1.60	1.45	1.36	1.25	1.18	1.14	1.09	1.07	1.06	1.04	1.01	1.01	1.00	1.00
8.75	1.97	1.84	1.65	1.51	1.42	1.32	1.25	1.21	1.17	1.15	1.14	1.13	1.11	1.10	1.09	1.09
9.00	2.01	1.89	1.71	1.57	1.49	1.39	1.33	1.30	1.26	1.24	1.23	1.22	1.20	1.20	1.19	1.19
9.25	2.06	1.94	1.77	1.64	1.56	1.47	1.41	1.38	1.35	1.33	1.33	1.31	1.30	1.29	1.29	1.28
9.50	2.11	2.00	1.83	1.72	1.64	1.55	1.50	1.47	1.44	1.42	1.42	1.40	1.39	1.39	1.38	1.38
9.75	2.17	2.06	1.90	1.79	1.71	1.63	1.58	1.56	1.52	1.51	1.50	1.49	1.48	1.48	1.47	1.46
10.00	2.22	2.12	1.96	1.86	1.79	1.71	1.66	1.64	1.61	1.59	1.58	1.57	1.56	1.55	1.55	1.54
10.25	2.28	2.18	2.02	1.93	1.86	1.78	1.73	1.71	1.68	1.67	1.66	1.65	1.63	1.63	1.62	1.62
10.50	2.33	2.23	2.08	1.99	1.92	1.84	1.80	1.78	1.75	1.74	1.73	1.72	1.70	1.70	1.69	1.69
10.75	2.38	2.28	2.14	2.05	1.98	1.90	1.86	1.84	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74
11.00	2.43	2.33	2.19	2.11	2.04	1.96	1.92	1.90	1.87	1.85	1.84	1.83	1.81	1.80	1.79	1.78
11.25	2.47	2.38	2.23	2.15	2.08	2.00	1.96	1.93	1.90	1.89	1.88	1.86	1.84	1.84	1.83	1.81
11.50	2.51	2.41	2.26	2.18	2.11	2.03	1.99	1.97	1.93	1.91	1.90	1.89	1.87	1.86	1.85	1.84
11.75	2.54	2.44	2.29	2.21	2.14	2.05	2.01	1.99	1.95	1.93	1.92	1.91	1.88	1.88	1.86	1.85
12.00	2.56	2.47	2.32	2.23	2.16	2.07	2.03	2.00	1.97	1.94	1.93	1.91	1.89	1.88	1.86	1.85
12.25	2.59	2.49	2.33	2.25	2.17	2.08	2.04	2.01	1.97	1.95	1.93	1.91	1.88	1.88	1.86	1.84
12.50	2.60	2.50	2.34	2.26	2.17	2.08	2.04	2.00	1.96	1.94	1.92	1.90	1.87	1.86	1.84	1.82
12.75	2.62	2.51	2.35	2.26	2.17	2.07	2.02	1.99	1.95	1.92	1.90	1.88	1.85	1.84	1.81	1.79
13.00	2.63	2.52	2.35	2.26	2.16	2.06	2.01	1.97	1.93	1.90	1.88	1.85	1.81	1.80	1.78	1.75
13.25	2.63	2.52	2.34	2.25	2.15	2.04	1.99	1.95	1.90	1.86	1.84	1.82	1.78	1.76	1.73	1.70
13.50	2.63	2.52	2.34	2.23	2.13	2.02	1.96	1.92	1.86	1.83	1.80	1.77	1.73	1.71	1.68	1.65
13.75	2.63	2.51	2.32	2.22	2.11	1.99	1.92	1.88	1.82	1.78	1.76	1.73	1.68	1.66	1.63	1.59
14.00	2.63	2.51	2.31	2.20	2.09	1.96	1.89	1.84	1.78	1.74	1.71	1.68	1.62	1.61	1.57	1.53
14.25	2.63	2.50	2.30	2.18	2.06	1.93	1.85	1.80	1.73	1.69	1.66	1.63	1.57	1.55	1.51	1.47
14.50	2.62	2.49	2.28	2.16	2.04	1.89	1.81	1.76	1.68	1.64	1.61	1.57	1.51	1.49	1.45	1.40
14.75	2.62	2.48	2.27	2.13	2.01	1.86	1.77	1.72	1.64	1.59	1.56	1.52	1.45	1.43	1.38	1.34
15.00	2.62	2.48	2.25	2.11	1.99	1.83	1.74	1.67	1.59	1.54	1.51	1.47	1.39	1.37	1.32	1.27
15.25	2.61	2.47	2.24	2.09	1.96	1.80	1.70	1.63	1.54	1.49	1.46	1.41	1.34	1.31	1.26	1.21
15.50	2.61	2.47	2.23	2.08	1.94	1.77	1.66	1.59	1.50	1.45	1.41	1.36	1.28	1.26	1.20	1.15
15.75	2.62	2.47	2.22	2.06	1.92	1.74	1.63	1.56	1.45	1.40	1.37	1.32	1.23	1.20	1.15	1.09
16.00	2.62	2.46	2.21	2.05	1.90	1.72	1.60	1.52	1.42	1.36	1.33	1.27	1.18	1.16	1.09	1.04
16.25	2.62	2.46	2.21	2.04	1.89	1.70	1.57	1.49	1.38	1.33	1.29	1.23	1.14	1.11	1.05	0.99
16.50	2.63	2.47	2.21	2.03	1.87	1.68	1.55	1.47	1.35	1.30	1.26	1.20	1.10	1.07	1.00	0.94
16.75	2.64	2.48	2.21	2.03	1.87	1.67	1.53	1.44	1.32	1.27	1.23	1.17	1.06	1.03	0.97	0.90
17.00	2.66	2.49	2.22	2.03	1.87	1.66	1.52	1.43	1.30	1.25	1.21	1.14	1.04	1.00	0.93	0.87
17.25	2.68	2.51	2.23	2.04	1.87	1.66	1.51	1.42	1.29	1.23	1.19	1.12	1.01	0.98	0.91	0.84
17.50	2.70	2.53	2.25	2.05	1.88	1.66	1.51	1.41	1.28	1.22	1.18	1.11	1.00	0.96	0.89	0.82
17.75	2.72	2.55	2.26	2.07	1.89	1.67	1.52	1.42	1.28	1.22	1.18	1.10	0.99	0.95	0.88	0.81
18.00	2.75	2.58	2.28	2.09	1.91	1.68	1.53	1.42	1.28	1.22	1.18	1.10	0.99	0.95	0.88	0.81
18.25	2.78	2.60	2.31	2.11	1.93	1.70	1.54	1.43	1.29	1.23	1.18	1.11	0.99	0.95	0.88	0.81

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
18.50	2.81	2.63	2.33	2.14	1.95	1.71	1.56	1.45	1.31	1.24	1.19	1.12	1.00	0.96	0.89	0.82
18.75	2.84	2.66	2.36	2.16	1.98	1.74	1.58	1.47	1.32	1.26	1.21	1.14	1.02	0.98	0.90	0.84
19.00	2.87	2.69	2.39	2.19	2.00	1.76	1.60	1.49	1.35	1.28	1.23	1.16	1.04	1.00	0.92	0.86
19.25	2.90	2.72	2.41	2.22	2.03	1.78	1.63	1.52	1.37	1.30	1.26	1.18	1.06	1.03	0.95	0.89
19.50	2.93	2.75	2.44	2.25	2.06	1.81	1.65	1.55	1.40	1.33	1.28	1.21	1.09	1.06	0.98	0.92
19.75	2.97	2.79	2.47	2.29	2.09	1.84	1.68	1.58	1.43	1.36	1.31	1.24	1.12	1.09	1.02	0.96
20.00	3.00	2.82	2.50	2.32	2.12	1.87	1.72	1.61	1.47	1.40	1.35	1.28	1.16	1.13	1.06	1.01
20.25	3.04	2.85	2.54	2.36	2.16	1.91	1.75	1.65	1.51	1.44	1.39	1.32	1.21	1.18	1.11	1.06
20.50	3.07	2.89	2.57	2.40	2.19	1.94	1.79	1.69	1.55	1.48	1.44	1.37	1.26	1.23	1.17	1.12
20.75	3.11	2.92	2.60	2.43	2.23	1.98	1.83	1.73	1.60	1.53	1.48	1.42	1.32	1.29	1.23	1.19
21.00	3.14	2.96	2.64	2.48	2.27	2.02	1.88	1.78	1.65	1.58	1.54	1.48	1.38	1.36	1.30	1.26
21.25	3.18	2.99	2.68	2.52	2.31	2.07	1.93	1.83	1.71	1.64	1.60	1.54	1.45	1.43	1.38	1.34
21.50	3.22	3.03	2.71	2.56	2.35	2.11	1.98	1.89	1.77	1.71	1.66	1.61	1.52	1.50	1.45	1.42
21.75	3.26	3.07	2.75	2.61	2.40	2.16	2.04	1.95	1.84	1.77	1.73	1.68	1.60	1.58	1.53	1.50
22.00	3.30	3.11	2.80	2.66	2.45	2.22	2.10	2.01	1.90	1.84	1.80	1.75	1.67	1.65	1.61	1.58
22.25	3.34	3.15	2.84	2.70	2.50	2.27	2.16	2.08	1.97	1.91	1.87	1.82	1.75	1.73	1.69	1.66
22.50	3.38	3.20	2.89	2.75	2.55	2.33	2.22	2.14	2.04	1.97	1.94	1.89	1.82	1.80	1.76	1.73
22.75	3.41	3.23	2.93	2.80	2.60	2.38	2.27	2.20	2.10	2.04	2.00	1.95	1.89	1.87	1.83	1.80
23.00	3.45	3.27	2.97	2.85	2.64	2.43	2.33	2.26	2.16	2.10	2.06	2.01	1.95	1.93	1.89	1.86
23.25	3.49	3.31	3.01	2.89	2.69	2.48	2.38	2.31	2.22	2.16	2.12	2.07	2.00	1.99	1.94	1.91
23.50	3.52	3.35	3.05	2.93	2.73	2.53	2.43	2.36	2.27	2.20	2.16	2.12	2.05	2.03	1.98	1.95
23.75	3.55	3.38	3.08	2.97	2.77	2.57	2.47	2.40	2.31	2.24	2.20	2.15	2.09	2.07	2.02	1.98
24.00	3.58	3.41	3.12	3.01	2.80	2.60	2.51	2.44	2.35	2.28	2.23	2.18	2.11	2.09	2.05	2.01
24.25	3.61	3.44	3.14	3.03	2.83	2.63	2.53	2.46	2.37	2.30	2.26	2.21	2.14	2.12	2.07	2.02
24.50	3.63	3.46	3.17	3.06	2.85	2.65	2.56	2.49	2.39	2.32	2.27	2.22	2.15	2.12	2.07	2.03
24.75	3.64	3.48	3.18	3.08	2.87	2.67	2.57	2.50	2.40	2.33	2.28	2.23	2.15	2.13	2.07	2.02
25.00	3.65	3.49	3.19	3.09	2.87	2.68	2.58	2.50	2.41	2.33	2.28	2.23	2.14	2.12	2.06	2.01
25.25	3.66	3.49	3.20	3.09	2.88	2.68	2.58	2.50	2.40	2.33	2.28	2.22	2.13	2.11	2.05	1.99
25.50	3.66	3.49	3.20	3.09	2.88	2.68	2.57	2.50	2.40	2.31	2.26	2.20	2.11	2.09	2.02	1.97
25.75	3.66	3.49	3.20	3.09	2.87	2.67	2.56	2.48	2.38	2.30	2.24	2.18	2.09	2.06	1.99	1.93
26.00	3.65	3.49	3.19	3.08	2.86	2.65	2.55	2.47	2.36	2.27	2.22	2.15	2.06	2.03	1.96	1.89
26.25	3.65	3.48	3.18	3.07	2.85	2.64	2.53	2.44	2.33	2.25	2.19	2.12	2.02	1.99	1.92	1.85
26.50	3.64	3.47	3.17	3.06	2.84	2.62	2.51	2.42	2.31	2.22	2.16	2.09	1.98	1.95	1.87	1.81
26.75	3.63	3.46	3.16	3.04	2.82	2.60	2.48	2.39	2.28	2.19	2.13	2.06	1.95	1.91	1.83	1.76
27.00	3.62	3.45	3.14	3.03	2.80	2.57	2.46	2.37	2.25	2.15	2.09	2.02	1.91	1.87	1.79	1.71
27.25	3.60	3.43	3.12	3.01	2.78	2.55	2.43	2.34	2.21	2.12	2.06	1.98	1.86	1.83	1.74	1.66
27.50	3.59	3.42	3.11	2.99	2.76	2.53	2.40	2.31	2.18	2.08	2.02	1.95	1.82	1.79	1.69	1.61
27.75	3.57	3.40	3.09	2.97	2.74	2.50	2.37	2.28	2.15	2.05	1.99	1.91	1.78	1.74	1.65	1.57
28.00	3.56	3.38	3.07	2.94	2.71	2.47	2.34	2.25	2.11	2.01	1.95	1.87	1.74	1.70	1.61	1.52
28.25	3.54	3.36	3.05	2.92	2.69	2.45	2.32	2.22	2.08	1.98	1.92	1.84	1.70	1.66	1.57	1.48
28.50	3.52	3.34	3.03	2.90	2.67	2.43	2.29	2.19	2.05	1.95	1.89	1.80	1.67	1.63	1.53	1.44
28.75	3.51	3.33	3.01	2.88	2.65	2.40	2.26	2.16	2.02	1.92	1.86	1.77	1.63	1.59	1.49	1.40
29.00	3.49	3.31	2.99	2.86	2.63	2.38	2.24	2.13	1.99	1.89	1.83	1.74	1.60	1.56	1.46	1.37
29.25	3.47	3.29	2.97	2.84	2.61	2.36	2.21	2.11	1.96	1.86	1.80	1.71	1.57	1.53	1.43	1.33
29.50	3.45	3.27	2.95	2.82	2.59	2.33	2.19	2.08	1.94	1.84	1.77	1.69	1.54	1.50	1.40	1.31
29.75	3.43	3.25	2.93	2.80	2.57	2.31	2.17	2.06	1.91	1.81	1.75	1.66	1.52	1.48	1.37	1.28
30.00	3.42	3.23	2.92	2.78	2.55	2.29	2.15	2.04	1.89	1.79	1.73	1.64	1.49	1.45	1.35	1.26
30.25	3.40	3.21	2.90	2.76	2.53	2.27	2.12	2.02	1.86	1.77	1.70	1.62	1.47	1.43	1.33	1.24
30.50	3.38	3.20	2.88	2.74	2.51	2.25	2.10	1.99	1.84	1.75	1.68	1.60	1.45	1.41	1.31	1.22
30.75	3.36	3.18	2.86	2.72	2.49	2.23	2.08	1.97	1.82	1.73	1.67	1.58	1.44	1.39	1.29	1.21
31.00	3.34	3.16	2.84	2.70	2.47	2.21	2.06	1.96	1.81	1.71	1.65	1.56	1.42	1.38	1.28	1.19
31.25	3.32	3.14	2.82	2.68	2.45	2.20	2.05	1.94	1.79	1.70	1.64	1.55	1.41	1.37	1.27	1.19
31.50	3.30	3.12	2.81	2.66	2.44	2.18	2.03	1.92	1.78	1.68	1.63	1.54	1.40	1.36	1.27	1.18
31.75	3.29	3.11	2.79	2.64	2.42	2.16	2.02	1.91	1.76	1.67	1.62	1.53	1.40	1.36	1.27	1.19
32.00	3.27	3.09	2.77	2.62	2.41	2.15	2.00	1.90	1.75	1.66	1.61	1.53	1.40	1.36	1.27	1.19
32.25	3.25	3.07	2.76	2.61	2.39	2.14	1.99	1.89	1.75	1.66	1.61	1.52	1.40	1.36	1.28	1.20
32.50	3.23	3.05	2.74	2.59	2.38	2.13	1.99	1.88	1.74	1.66	1.60	1.53	1.40	1.37	1.29	1.22
32.75	3.22	3.04	2.73	2.58	2.37	2.12	1.98	1.88	1.74	1.66	1.61	1.53	1.42	1.38	1.31	1.25
33.00	3.20	3.03	2.72	2.57	2.36	2.12	1.98	1.88	1.75	1.67	1.62	1.55	1.43	1.40	1.33	1.28
33.25	3.19	3.01	2.71	2.56	2.35	2.11	1.98	1.88	1.75	1.68	1.63	1.56	1.46	1.43	1.37	1.32
33.50	3.18	3.00	2.70	2.55	2.35	2.12	1.99	1.89	1.77	1.70	1.65	1.59	1.49	1.47	1.41	1.37
33.75	3.16	2.99	2.69	2.55	2.35	2.12	2.00	1.91	1.79	1.72	1.68	1.62	1.53	1.51	1.46	1.42
34.00	3.15	2.98	2.69	2.55	2.35	2.13	2.01	1.93	1.82	1.76	1.72	1.66	1.58	1.56	1.51	1.48
34.25	3.15	2.98	2.69	2.55	2.36	2.15	2.04	1.96	1.85	1.79	1.76	1.71	1.64	1.62	1.57	1.54
34.50	3.14	2.97	2.69	2.56	2.37	2.17	2.06	1.99	1.89	1.84	1.80	1.76	1.69	1.67	1.63	1.61
34.75	3.14	2.97	2.70	2.57	2.39	2.19	2.09	2.02	1.93	1.88	1.85	1.81	1.75	1.73	1.69	1.67
35.00	3.13	2.97	2.70	2.58	2.41	2.22	2.13	2.06	1.98	1.93	1.89	1.85	1.80	1.79	1.75	1.73
35.25	3.13	2.98	2.71	2.59	2.43	2.25	2.16	2.10	2.02	1.97	1.94	1.91	1.85	1.84	1.81	1.78
35.50	3.13	2.98	2.72	2.61	2.45	2.28	2.19	2.13	2.06	2.01	1.98	1.95	1.90	1.89	1.86	1.83
35.75	3.13	2.98	2.73	2.62	2.47	2.30	2.22	2.17	2.10	2.05	2.02	1.99	1.94	1.93	1.90	1.87
36.00	3.13	2.99	2.74	2.64	2.48	2.33	2.25	2.20	2.13	2.08	2.05	2.02	1.97	1.96	1.93	1.90
36.25	3.13	2.99	2.75	2.65	2.50	2.34	2.27	2.22	2.15	2.10	2.08	2.04	2.00	1.98	1.95	1.92
36.50	3.13	2.99	2.75	2.65	2.50	2.36	2.28	2.23	2.16	2.12	2.09	2.06	2.01	1.99	1.96	1.93
36.75	3.13	2.99	2.75	2.65	2.51	2.36	2.29	2.24	2.17	2.12	2.10	2.06	2.01	2.00	1.96	1.93
37.00	3.12	2.98	2.75	2.65	2.51	2.36	2.29	2.24	2.17	2.12	2.09	2.06	2.00	1.99	1.95	1.92
37.25	3.11	2.97	2.74	2.64	2.50	2.35	2.28	2.23	2.16	2.11	2.08	2.04	1.99	1.98	1.94	1.90
37.50	3.10	2.96	2.73	2.63	2.49	2.34	2.26	2.21	2.14	2.09	2.06	2.02	1.97	1.95	1.91	1.88
37.75	3.08	2.94	2.72	2.61	2.47	2.32	2.24	2.19	2.12	2.07	2.04	2.00	1.94	1.92	1.88	1.84
38.00	3.06	2.92	2.70	2.59	2.45	2.30	2.22	2.16	2.09	2.03	2.00	1.96	1.90	1.88	1.83	1.80
38.25	3.04	2.90	2.67	2.57	2.42	2.26	2.18	2.13	2.05	2.00	1.96	1.92	1.85	1.83	1.79	1.74

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
38.50	3.02	2.88	2.65	2.54	2.39	2.23	2.15	2.09	2.01	1.95	1.92	1.87	1.80	1.78	1.73	1.69
38.75	2.99	2.85	2.62	2.50	2.36	2.19	2.11	2.05	1.96	1.90	1.87	1.82	1.75	1.73	1.68	1.63
39.00	2.96	2.82	2.59	2.47	2.32	2.15	2.06	2.00	1.91	1.86	1.82	1.77	1.70	1.67	1.62	1.57
39.25	2.93	2.79	2.55	2.43	2.28	2.11	2.02	1.95	1.86	1.80	1.77	1.72	1.64	1.61	1.56	1.50
39.50	2.90	2.76	2.52	2.39	2.24	2.07	1.97	1.90	1.81	1.75	1.71	1.66	1.58	1.55	1.49	1.44
39.75	2.87	2.73	2.48	2.35	2.20	2.02	1.92	1.85	1.75	1.69	1.66	1.60	1.52	1.49	1.43	1.37
40.00	2.84	2.69	2.45	2.31	2.16	1.98	1.87	1.80	1.70	1.64	1.60	1.55	1.46	1.43	1.37	1.31
40.25	2.81	2.66	2.41	2.27	2.12	1.93	1.82	1.75	1.64	1.58	1.55	1.49	1.40	1.37	1.30	1.24
40.50	2.78	2.63	2.38	2.23	2.08	1.89	1.78	1.70	1.59	1.53	1.49	1.43	1.34	1.31	1.24	1.18
40.75	2.75	2.60	2.35	2.19	2.04	1.85	1.73	1.65	1.54	1.48	1.44	1.38	1.28	1.25	1.18	1.12
41.00	2.72	2.57	2.32	2.16	2.00	1.81	1.69	1.60	1.49	1.43	1.39	1.33	1.23	1.20	1.13	1.06
41.25	2.70	2.55	2.29	2.12	1.96	1.77	1.64	1.56	1.44	1.38	1.34	1.28	1.18	1.15	1.08	1.01
41.50	2.68	2.52	2.26	2.09	1.93	1.73	1.60	1.52	1.40	1.34	1.30	1.24	1.13	1.10	1.03	0.96
41.75	2.66	2.50	2.24	2.06	1.90	1.70	1.57	1.48	1.36	1.30	1.26	1.20	1.09	1.06	0.99	0.92
42.00	2.64	2.48	2.21	2.03	1.87	1.67	1.54	1.44	1.32	1.26	1.22	1.16	1.05	1.02	0.95	0.88
42.25	2.62	2.46	2.19	2.01	1.85	1.64	1.51	1.41	1.29	1.23	1.19	1.13	1.02	0.99	0.91	0.85
42.50	2.60	2.44	2.17	1.98	1.82	1.62	1.48	1.38	1.26	1.20	1.16	1.10	0.99	0.96	0.89	0.82
42.75	2.58	2.42	2.15	1.96	1.80	1.60	1.45	1.36	1.23	1.18	1.14	1.07	0.96	0.93	0.86	0.80
43.00	2.56	2.40	2.13	1.94	1.78	1.58	1.43	1.34	1.21	1.16	1.12	1.05	0.95	0.91	0.84	0.78
43.25	2.55	2.39	2.12	1.93	1.77	1.56	1.42	1.32	1.20	1.14	1.10	1.04	0.93	0.90	0.83	0.77
43.50	2.54	2.37	2.11	1.91	1.75	1.54	1.40	1.31	1.18	1.13	1.09	1.03	0.92	0.89	0.83	0.77
43.75	2.52	2.36	2.09	1.90	1.74	1.53	1.39	1.30	1.17	1.12	1.08	1.02	0.92	0.89	0.83	0.77
44.00	2.51	2.35	2.08	1.89	1.73	1.53	1.39	1.29	1.17	1.12	1.08	1.02	0.93	0.90	0.84	0.79
44.25	2.50	2.34	2.07	1.88	1.72	1.52	1.38	1.29	1.17	1.12	1.09	1.03	0.94	0.91	0.85	0.81
44.50	2.49	2.33	2.07	1.87	1.72	1.52	1.39	1.30	1.18	1.13	1.10	1.04	0.96	0.93	0.88	0.84
44.75	2.48	2.32	2.06	1.87	1.72	1.52	1.39	1.31	1.20	1.15	1.12	1.06	0.98	0.96	0.91	0.88
45.00	2.47	2.32	2.06	1.87	1.72	1.53	1.41	1.32	1.22	1.17	1.14	1.09	1.02	1.00	0.96	0.92
45.25	2.47	2.31	2.06	1.87	1.73	1.55	1.42	1.35	1.25	1.21	1.18	1.13	1.06	1.04	1.01	0.98
45.50	2.47	2.31	2.06	1.88	1.74	1.56	1.45	1.37	1.28	1.24	1.22	1.18	1.12	1.10	1.07	1.05
45.75	2.47	2.31	2.07	1.90	1.76	1.59	1.48	1.41	1.33	1.29	1.27	1.23	1.18	1.17	1.14	1.12
46.00	2.47	2.32	2.08	1.91	1.78	1.62	1.52	1.46	1.38	1.35	1.33	1.30	1.25	1.24	1.22	1.20
46.25	2.47	2.33	2.10	1.94	1.81	1.66	1.57	1.51	1.44	1.41	1.39	1.37	1.33	1.32	1.30	1.29
46.50	2.48	2.34	2.12	1.97	1.85	1.71	1.62	1.57	1.51	1.48	1.46	1.44	1.40	1.40	1.38	1.37
46.75	2.49	2.36	2.14	2.00	1.89	1.75	1.68	1.63	1.58	1.55	1.54	1.51	1.48	1.48	1.46	1.45
47.00	2.51	2.37	2.17	2.04	1.93	1.81	1.74	1.70	1.65	1.62	1.61	1.59	1.56	1.55	1.54	1.53
47.25	2.52	2.40	2.20	2.08	1.98	1.86	1.80	1.76	1.71	1.69	1.68	1.66	1.64	1.63	1.62	1.61
47.50	2.54	2.42	2.23	2.12	2.02	1.91	1.85	1.82	1.78	1.75	1.74	1.72	1.70	1.69	1.68	1.67
47.75	2.56	2.44	2.26	2.16	2.06	1.96	1.91	1.87	1.83	1.81	1.80	1.78	1.76	1.76	1.74	1.73
48.00	2.58	2.47	2.29	2.19	2.10	2.00	1.95	1.92	1.88	1.86	1.85	1.83	1.80	1.80	1.79	1.78
48.25	2.60	2.49	2.32	2.22	2.13	2.04	1.99	1.96	1.92	1.90	1.89	1.87	1.84	1.84	1.82	1.81
48.50	2.61	2.50	2.34	2.25	2.16	2.06	2.02	1.99	1.95	1.93	1.91	1.89	1.87	1.86	1.85	1.84
48.75	2.62	2.51	2.35	2.26	2.18	2.08	2.04	2.01	1.97	1.95	1.93	1.92	1.89	1.88	1.87	1.85
49.00	2.62	2.52	2.36	2.27	2.19	2.10	2.05	2.02	1.98	1.96	1.94	1.92	1.89	1.89	1.87	1.86
49.25	2.63	2.52	2.36	2.28	2.19	2.10	2.05	2.02	1.98	1.96	1.94	1.92	1.89	1.89	1.87	1.85
49.50	2.62	2.52	2.36	2.28	2.19	2.10	2.05	2.02	1.98	1.95	1.93	1.91	1.88	1.87	1.85	1.83
49.75	2.62	2.51	2.35	2.27	2.18	2.08	2.03	2.00	1.96	1.93	1.91	1.89	1.86	1.85	1.83	1.80
50.00	2.60	2.50	2.34	2.25	2.16	2.06	2.01	1.98	1.93	1.90	1.88	1.86	1.82	1.81	1.79	1.77
50.25	2.59	2.48	2.32	2.23	2.14	2.03	1.98	1.95	1.90	1.87	1.85	1.82	1.79	1.77	1.75	1.72
50.50	2.56	2.46	2.29	2.20	2.10	2.00	1.95	1.91	1.86	1.82	1.80	1.78	1.74	1.72	1.69	1.67
50.75	2.54	2.43	2.26	2.16	2.07	1.96	1.90	1.86	1.81	1.78	1.76	1.73	1.68	1.67	1.64	1.61
51.00	2.51	2.40	2.23	2.12	2.03	1.92	1.85	1.81	1.76	1.72	1.70	1.67	1.62	1.61	1.57	1.54
51.25	2.48	2.37	2.19	2.08	1.98	1.87	1.80	1.76	1.70	1.66	1.64	1.61	1.56	1.55	1.51	1.47
51.50	2.45	2.33	2.15	2.04	1.94	1.82	1.75	1.70	1.64	1.60	1.58	1.55	1.49	1.48	1.44	1.40
51.75	2.42	2.30	2.11	1.99	1.89	1.77	1.69	1.64	1.58	1.54	1.52	1.48	1.42	1.41	1.36	1.32
52.00	2.38	2.26	2.07	1.94	1.84	1.71	1.63	1.58	1.51	1.47	1.45	1.41	1.35	1.33	1.29	1.25
52.25	2.35	2.22	2.03	1.89	1.79	1.66	1.57	1.52	1.45	1.41	1.38	1.34	1.28	1.26	1.22	1.18
52.50	2.31	2.19	1.99	1.85	1.74	1.60	1.51	1.46	1.38	1.34	1.32	1.28	1.21	1.19	1.15	1.10
52.75	2.28	2.15	1.95	1.80	1.69	1.55	1.46	1.39	1.32	1.28	1.25	1.21	1.14	1.12	1.08	1.03
53.00	2.25	2.11	1.91	1.75	1.64	1.49	1.40	1.34	1.25	1.22	1.19	1.15	1.08	1.06	1.01	0.96
53.25	2.21	2.08	1.87	1.71	1.59	1.44	1.34	1.28	1.19	1.16	1.13	1.08	1.01	0.99	0.94	0.89
53.50	2.18	2.05	1.83	1.66	1.54	1.39	1.29	1.22	1.13	1.10	1.07	1.02	0.95	0.93	0.88	0.83
53.75	2.15	2.01	1.79	1.62	1.50	1.35	1.24	1.17	1.08	1.04	1.01	0.97	0.89	0.87	0.82	0.77
54.00	2.12	1.98	1.76	1.58	1.46	1.30	1.19	1.12	1.03	0.99	0.96	0.92	0.84	0.82	0.76	0.72
54.25	2.10	1.95	1.73	1.55	1.42	1.26	1.15	1.08	0.98	0.95	0.92	0.87	0.79	0.77	0.72	0.67
54.50	2.07	1.93	1.70	1.52	1.39	1.23	1.11	1.04	0.95	0.91	0.88	0.83	0.75	0.73	0.68	0.63
54.75	2.05	1.90	1.67	1.49	1.36	1.20	1.08	1.00	0.91	0.87	0.84	0.79	0.72	0.69	0.64	0.60
55.00	2.03	1.88	1.65	1.46	1.33	1.17	1.05	0.97	0.88	0.84	0.81	0.77	0.69	0.66	0.62	0.57
55.25	2.01	1.86	1.63	1.44	1.31	1.14	1.03	0.95	0.86	0.82	0.79	0.74	0.67	0.64	0.60	0.55
55.50	1.99	1.84	1.61	1.41	1.29	1.12	1.01	0.93	0.84	0.80	0.77	0.73	0.65	0.63	0.58	0.54
55.75	1.97	1.82	1.59	1.40	1.27	1.11	0.99	0.92	0.83	0.79	0.76	0.72	0.65	0.62	0.58	0.54
56.00	1.96	1.81	1.58	1.38	1.26	1.10	0.98	0.91	0.82	0.79	0.76	0.72	0.65	0.63	0.59	0.55
56.25	1.94	1.79	1.57	1.37	1.25	1.09	0.98	0.91	0.82	0.79	0.76	0.72	0.66	0.64	0.60	0.57
56.50	1.93	1.78	1.56	1.37	1.24	1.09	0.98	0.91	0.83	0.80	0.78	0.74	0.68	0.66	0.63	0.60
56.75	1.92	1.78	1.55	1.36	1.24	1.10	0.99	0.93	0.85	0.82	0.80	0.76	0.71	0.69	0.67	0.65
57.00	1.92	1.77	1.55	1.37	1.25	1.11	1.01	0.95	0.88	0.85	0.83	0.80	0.75	0.74	0.72	0.70
57.25	1.92	1.78	1.56	1.38	1.27	1.14	1.04	0.99	0.92	0.90	0.88	0.85	0.81	0.80	0.78	0.76
57.50	1.92	1.78	1.57	1.40	1.30	1.17	1.09	1.03	0.97	0.95	0.93	0.91	0.87	0.86	0.85	0.84
57.75	1.93	1.80	1.59	1.43	1.33	1.21	1.14	1.09	1.03	1.01	1.00	0.98	0.94	0.94	0.92	0.92
58.00	1.94	1.81	1.62	1.47	1.37	1.26	1.19	1.15	1.10	1.08	1.07	1.05	1.03	1.02	1.01	1.01
58.25	1.96	1.84	1.65	1.51	1.42	1.32	1.26	1.22	1.18	1.16	1.15	1.13	1.11	1.11	1.10	1.10

	Location															
Time (hrs)	13	12	11	10B	10A	8A	71A	7	6A	6	5	3C	3B	3A	3	2B
58.50	1.98	1.86	1.69	1.56	1.48	1.39	1.33	1.29	1.26	1.24	1.23	1.22	1.20	1.20	1.19	1.19
58.75	2.01	1.90	1.73	1.61	1.54	1.45	1.40	1.37	1.34	1.32	1.32	1.31	1.29	1.29	1.28	1.28
59.00	2.04	1.93	1.78	1.67	1.60	1.52	1.48	1.45	1.42	1.41	1.40	1.39	1.38	1.38	1.37	1.37
59.25	2.08	1.97	1.83	1.73	1.67	1.59	1.55	1.53	1.50	1.49	1.49	1.48	1.47	1.47	1.46	1.46
59.50	2.11	2.02	1.88	1.79	1.73	1.67	1.63	1.61	1.58	1.57	1.57	1.56	1.55	1.54	1.54	1.54
59.75	2.15	2.06	1.93	1.85	1.79	1.73	1.70	1.68	1.66	1.65	1.64	1.63	1.62	1.62	1.61	1.61
60.00	2.19	2.10	1.98	1.91	1.85	1.79	1.76	1.74	1.72	1.71	1.70	1.69	1.68	1.67	1.67	1.66
60.25	2.22	2.14	2.02	1.95	1.90	1.84	1.81	1.79	1.77	1.76	1.75	1.74	1.73	1.73	1.72	1.71
60.50	2.25	2.17	2.06	1.99	1.94	1.88	1.85	1.83	1.81	1.80	1.79	1.78	1.77	1.77	1.76	1.76
60.75	2.28	2.20	2.09	2.02	1.97	1.91	1.89	1.87	1.85	1.84	1.83	1.82	1.81	1.81	1.80	1.79
61.00	2.30	2.22	2.12	2.05	2.00	1.94	1.92	1.90	1.88	1.86	1.85	1.84	1.83	1.82	1.81	1.80
61.25	2.32	2.24	2.13	2.07	2.01	1.96	1.93	1.91	1.89	1.87	1.86	1.85	1.84	1.83	1.82	1.81
61.50	2.32	2.25	2.14	2.07	2.02	1.96	1.93	1.91	1.89	1.87	1.86	1.85	1.83	1.83	1.82	1.81
61.75	2.32	2.25	2.14	2.07	2.02	1.96	1.93	1.91	1.88	1.87	1.86	1.85	1.83	1.82	1.81	1.79
62.00	2.32	2.24	2.13	2.07	2.01	1.95	1.92	1.90	1.87	1.85	1.84	1.82	1.80	1.79	1.78	1.77
62.25	2.31	2.23	2.12	2.05	1.99	1.92	1.89	1.87	1.84	1.82	1.81	1.79	1.77	1.76	1.75	1.73
62.50	2.29	2.21	2.09	2.02	1.96	1.90	1.86	1.83	1.80	1.78	1.77	1.75	1.73	1.72	1.70	1.68
62.75	2.27	2.19	2.06	1.99	1.93	1.86	1.82	1.79	1.76	1.74	1.73	1.71	1.68	1.67	1.65	1.63
63.00	2.24	2.16	2.03	1.95	1.89	1.82	1.77	1.75	1.71	1.69	1.67	1.66	1.63	1.62	1.59	1.57
63.25	2.21	2.12	2.00	1.91	1.85	1.77	1.72	1.70	1.66	1.63	1.62	1.60	1.57	1.56	1.53	1.51
63.50	2.18	2.09	1.96	1.87	1.80	1.72	1.67	1.64	1.60	1.57	1.56	1.54	1.50	1.49	1.46	1.44
63.75	2.15	2.05	1.91	1.82	1.75	1.66	1.61	1.58	1.53	1.51	1.49	1.47	1.43	1.42	1.39	1.36
64.00	2.11	2.01	1.87	1.77	1.69	1.60	1.55	1.51	1.46	1.44	1.42	1.40	1.36	1.35	1.32	1.29
64.25	2.07	1.97	1.82	1.71	1.64	1.54	1.48	1.45	1.40	1.37	1.35	1.33	1.28	1.27	1.24	1.21
64.50	2.04	1.93	1.77	1.66	1.58	1.48	1.42	1.38	1.32	1.30	1.28	1.25	1.21	1.19	1.16	1.13
64.75	2.00	1.89	1.73	1.61	1.52	1.42	1.35	1.31	1.25	1.23	1.21	1.18	1.13	1.12	1.08	1.05
65.00	1.96	1.85	1.68	1.55	1.46	1.36	1.29	1.24	1.18	1.16	1.14	1.11	1.06	1.04	1.00	0.97
65.25	1.93	1.81	1.64	1.50	1.41	1.30	1.22	1.17	1.11	1.09	1.07	1.03	0.98	0.96	0.93	0.89
65.50	1.89	1.77	1.59	1.45	1.35	1.24	1.16	1.11	1.04	1.02	1.00	0.96	0.91	0.89	0.85	0.82
65.75	1.86	1.74	1.55	1.40	1.30	1.19	1.10	1.05	0.98	0.95	0.93	0.90	0.84	0.82	0.78	0.75
66.00	1.83	1.71	1.51	1.36	1.26	1.13	1.05	0.99	0.92	0.89	0.87	0.84	0.78	0.76	0.72	0.68
66.25	1.81	1.68	1.48	1.32	1.21	1.09	1.00	0.94	0.87	0.84	0.82	0.78	0.72	0.70	0.66	0.63
66.50	1.78	1.65	1.45	1.28	1.17	1.05	0.95	0.89	0.82	0.79	0.77	0.73	0.67	0.65	0.62	0.58
66.75	1.76	1.62	1.42	1.25	1.14	1.01	0.92	0.85	0.78	0.75	0.73	0.69	0.63	0.61	0.57	0.54
67.00	1.74	1.60	1.40	1.22	1.11	0.98	0.88	0.82	0.75	0.72	0.69	0.66	0.60	0.57	0.54	0.50
67.25	1.72	1.58	1.38	1.20	1.09	0.95	0.85	0.79	0.72	0.69	0.66	0.62	0.57	0.54	0.51	0.47
67.50	1.71	1.57	1.36	1.18	1.06	0.93	0.83	0.76	0.69	0.66	0.64	0.60	0.54	0.52	0.49	0.46
67.75	1.69	1.55	1.34	1.16	1.05	0.91	0.81	0.75	0.67	0.65	0.62	0.59	0.53	0.51	0.48	0.45
68.00	1.68	1.54	1.33	1.15	1.03	0.90	0.80	0.74	0.66	0.64	0.62	0.58	0.53	0.51	0.48	0.45
68.25	1.67	1.53	1.32	1.14	1.03	0.89	0.79	0.73	0.66	0.64	0.61	0.58	0.53	0.51	0.48	0.46
68.50	1.67	1.53	1.32	1.13	1.02	0.89	0.80	0.73	0.67	0.65	0.62	0.59	0.55	0.53	0.50	0.48
68.75	1.66	1.52	1.32	1.14	1.03	0.90	0.81	0.75	0.69	0.66	0.64	0.61	0.57	0.56	0.54	0.52
69.00	1.66	1.52	1.32	1.14	1.04	0.91	0.83	0.77	0.71	0.69	0.67	0.65	0.61	0.60	0.58	0.57
69.25	1.66	1.52	1.33	1.16	1.05	0.94	0.85	0.80	0.75	0.73	0.71	0.69	0.66	0.65	0.63	0.62
69.50	1.66	1.53	1.34	1.18	1.08	0.97	0.89	0.85	0.80	0.78	0.76	0.74	0.72	0.71	0.69	0.69
69.75	1.67	1.54	1.36	1.20	1.11	1.01	0.94	0.90	0.85	0.84	0.83	0.81	0.78	0.78	0.77	0.76
70.00	1.68	1.56	1.38	1.24	1.15	1.06	1.00	0.96	0.92	0.91	0.90	0.88	0.87	0.86	0.85	0.85
70.25	1.70	1.58	1.42	1.28	1.21	1.12	1.07	1.04	1.00	0.99	0.98	0.97	0.95	0.95	0.94	0.94
70.50	1.73	1.61	1.46	1.34	1.27	1.19	1.14	1.11	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03
70.75	1.76	1.65	1.50	1.39	1.33	1.26	1.22	1.19	1.17	1.16	1.15	1.14	1.13	1.13	1.13	1.13
71.00	1.79	1.69	1.55	1.46	1.40	1.33	1.30	1.27	1.25	1.24	1.24	1.23	1.22	1.22	1.22	1.22
71.25	1.83	1.74	1.61	1.52	1.47	1.41	1.38	1.36	1.34	1.33	1.33	1.32	1.31	1.31	1.31	1.31
71.50	1.87	1.78	1.67	1.59	1.54	1.49	1.46	1.44	1.42	1.42	1.41	1.41	1.40	1.40	1.40	1.40
71.75	1.91	1.84	1.73	1.66	1.61	1.56	1.54	1.52	1.51	1.50	1.50	1.49	1.49	1.49	1.48	1.48
72.00	1.96	1.89	1.79	1.72	1.68	1.64	1.61	1.60	1.58	1.58	1.57	1.57	1.56	1.56	1.55	1.55

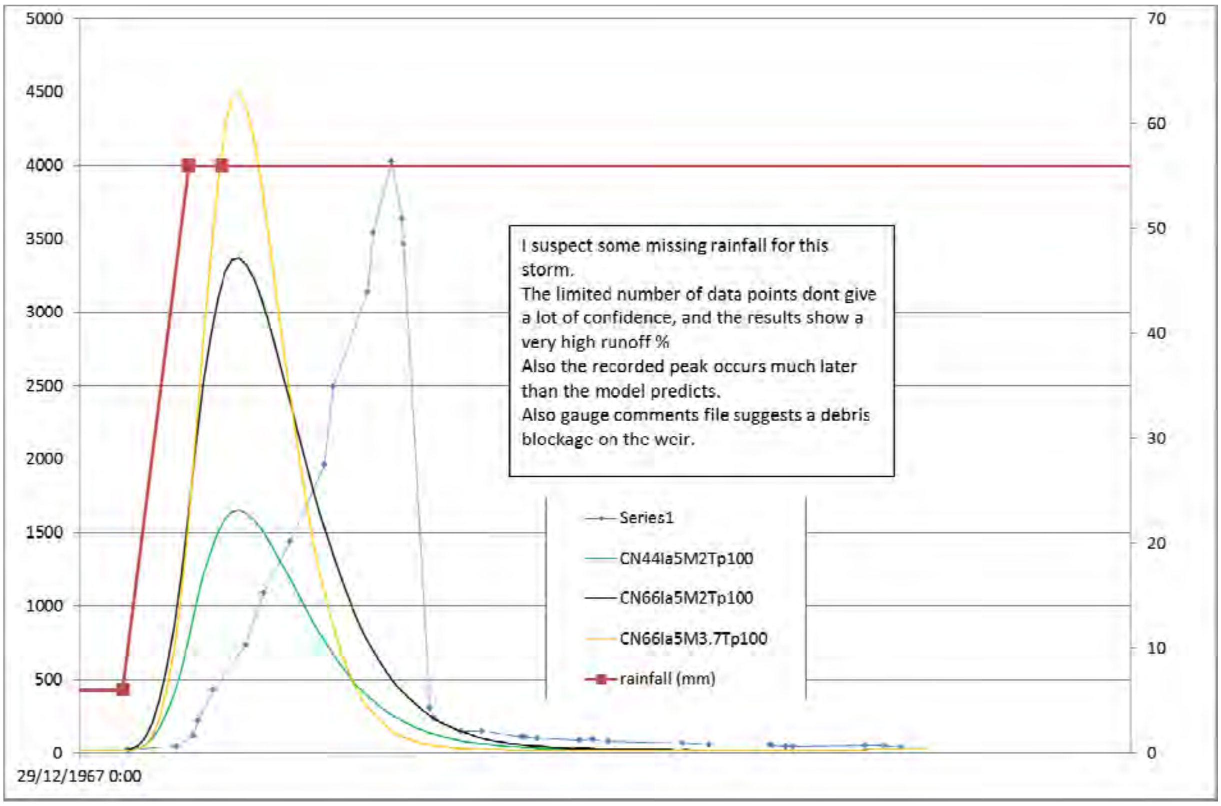
Appendix 2 – Whakatāne River design discharge time series at Valley Road gauge

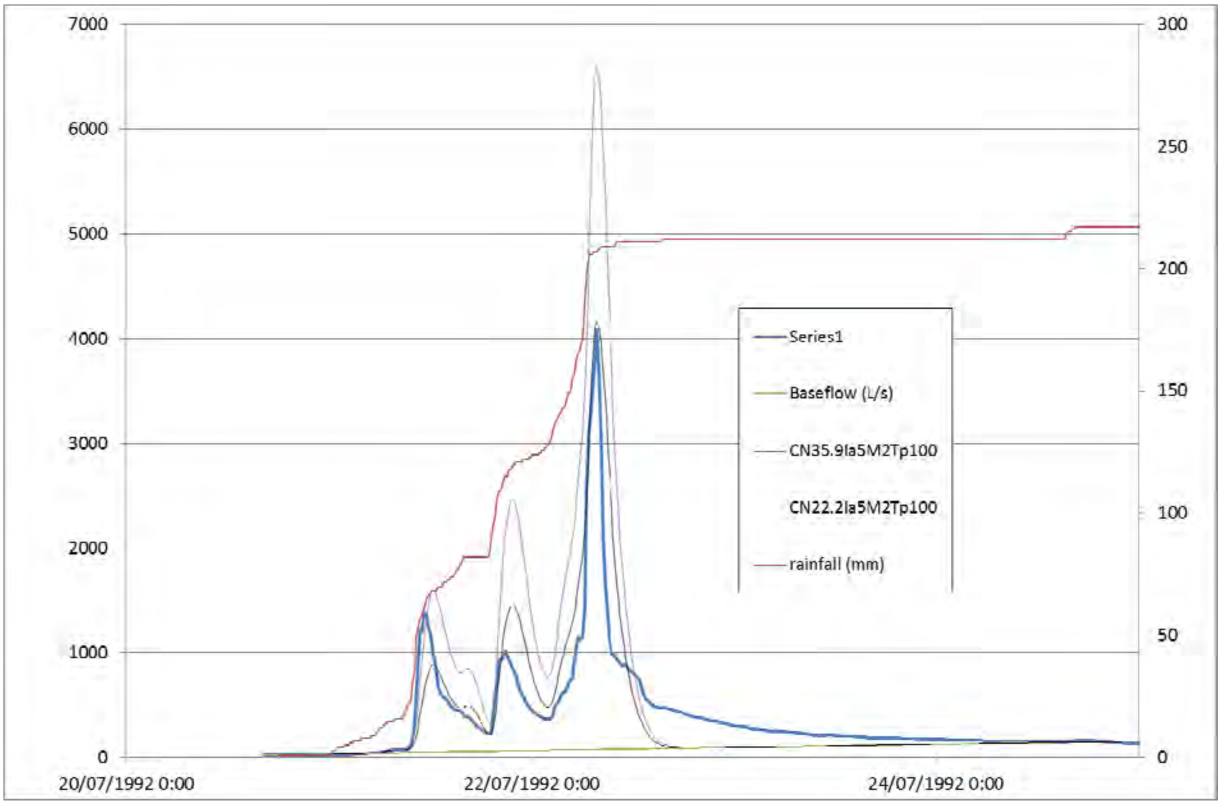
Table A2- 1 River Design Discharge Hydrographs for Whakatāne River at Valley Road; include statistical consideration of discharge/duration relationship (see Part 3)

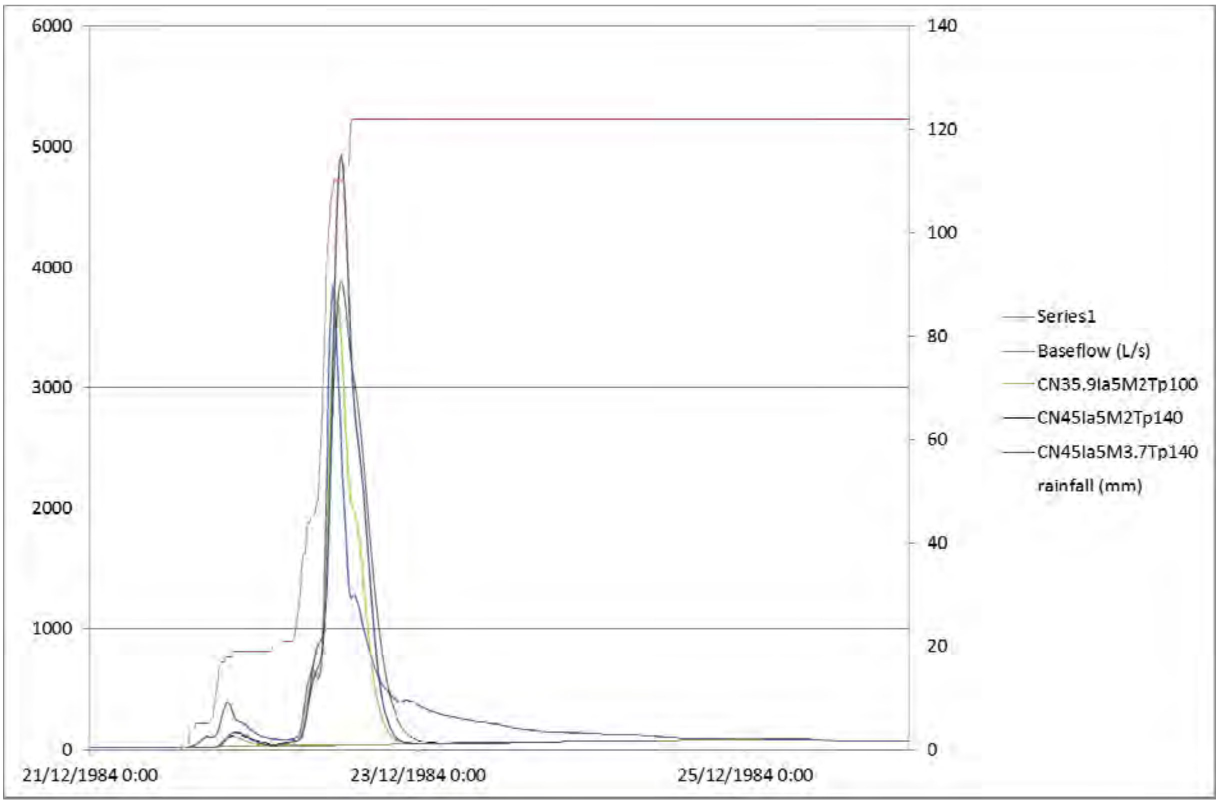
	Discharge (m^3/s)				
Time (hours)	100 year ARI	50 year	20 year	10 year	2 year
0	494	486	443	381	229
8	830	764	643	523	288
16	1377	1250	1032	828	443
20	2051	1817	1457	1146	591
22	2516	2207	1745	1357	676
23	2677	2342	1846	1432	709
24	2821	2457	1925	1486	726
26	2677	2342	1846	1432	709
28	2516	2207	1745	1357	676
32	2051	1817	1457	1146	591
40	1377	1250	1032	828	443
56	830	764	643	523	288
72	494	486	443	381	229

Appendix 3 – Event data from Wairere Stream and Wainui te Whara Stream catchments

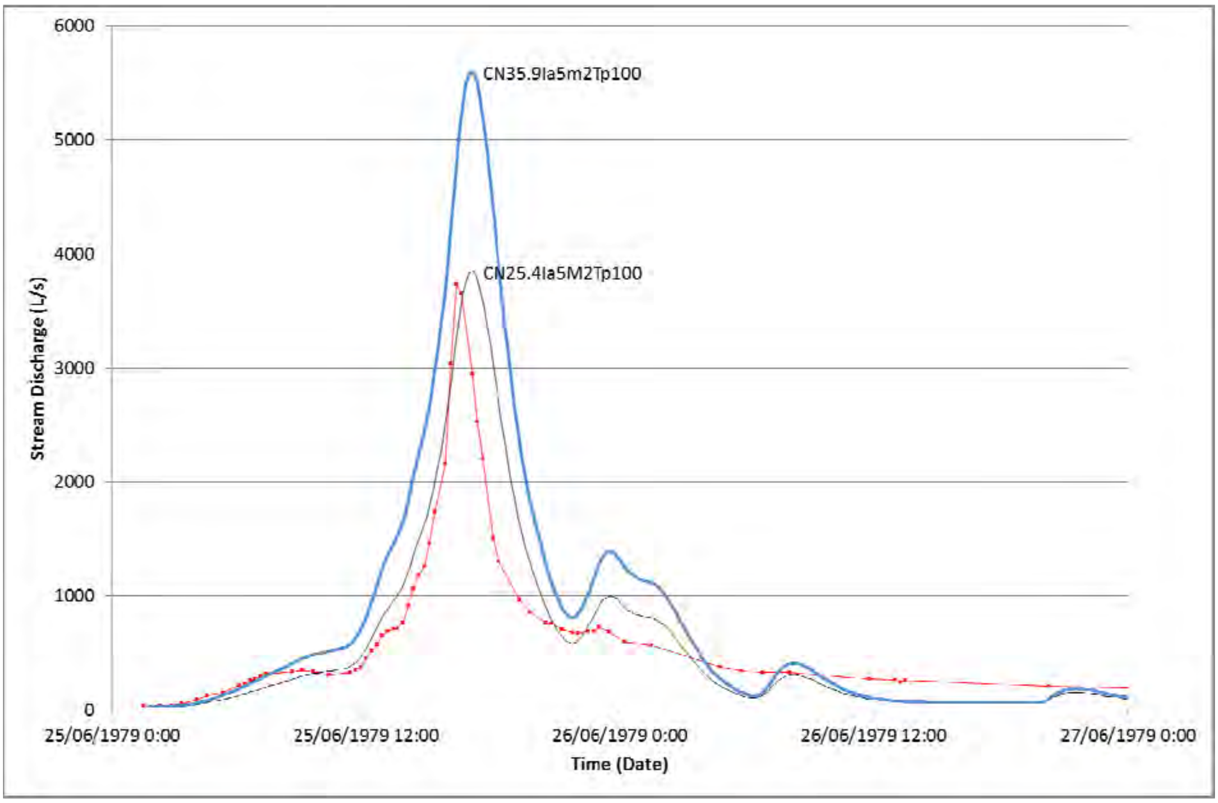
Wairere Stream data







6000
5000
4000
3000
2000
1000
0
140
120
100
80
60
40
20
0
21/12/1984 0:00
23/12/1984 0:00
25/12/1984 0:00
Series1
Baseflow (L/s)
CN35.9Ia5M2Tp100
CN45Ia5M2Tp140
CN45Ia5M3.7Tp140
rainfall (mm)



6000
5000
4000
3000
2000
1000
0
Stream Discharge (L/s)
CN35.9Ia5m2Tp100
CN25.4Ia5M2Tp100
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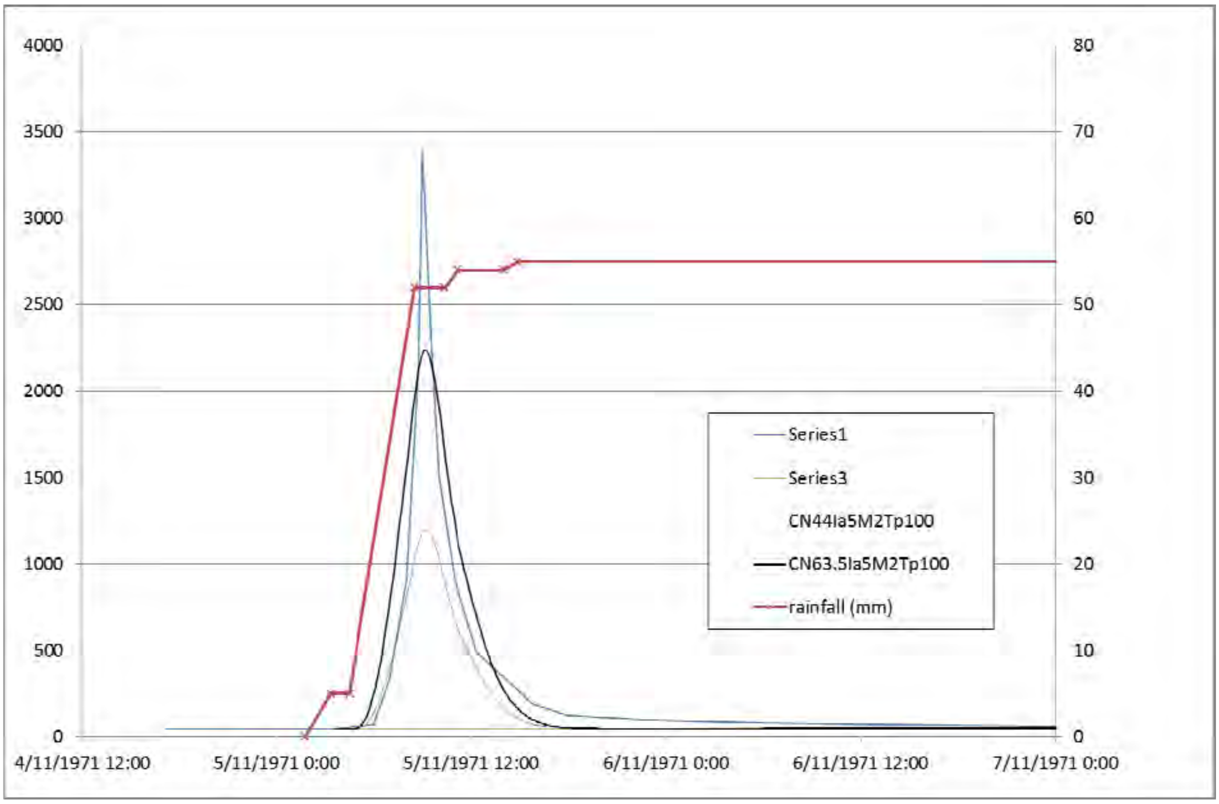
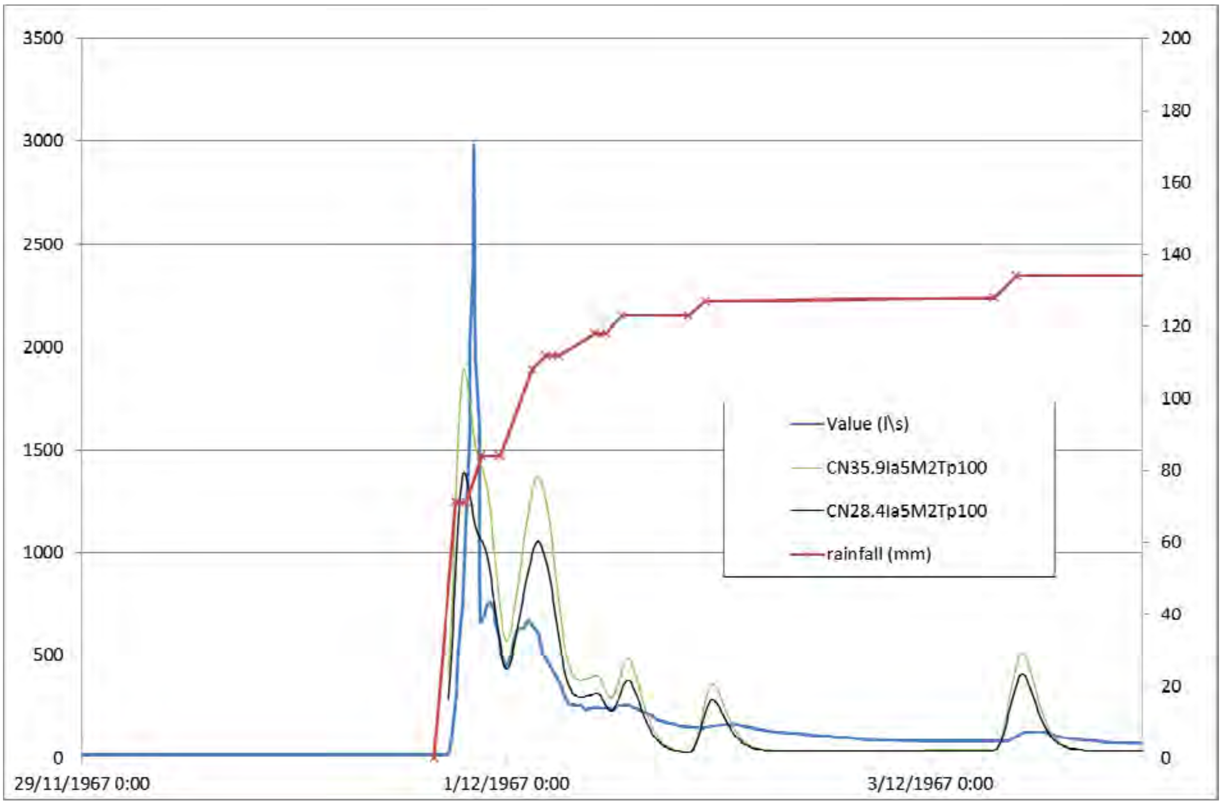
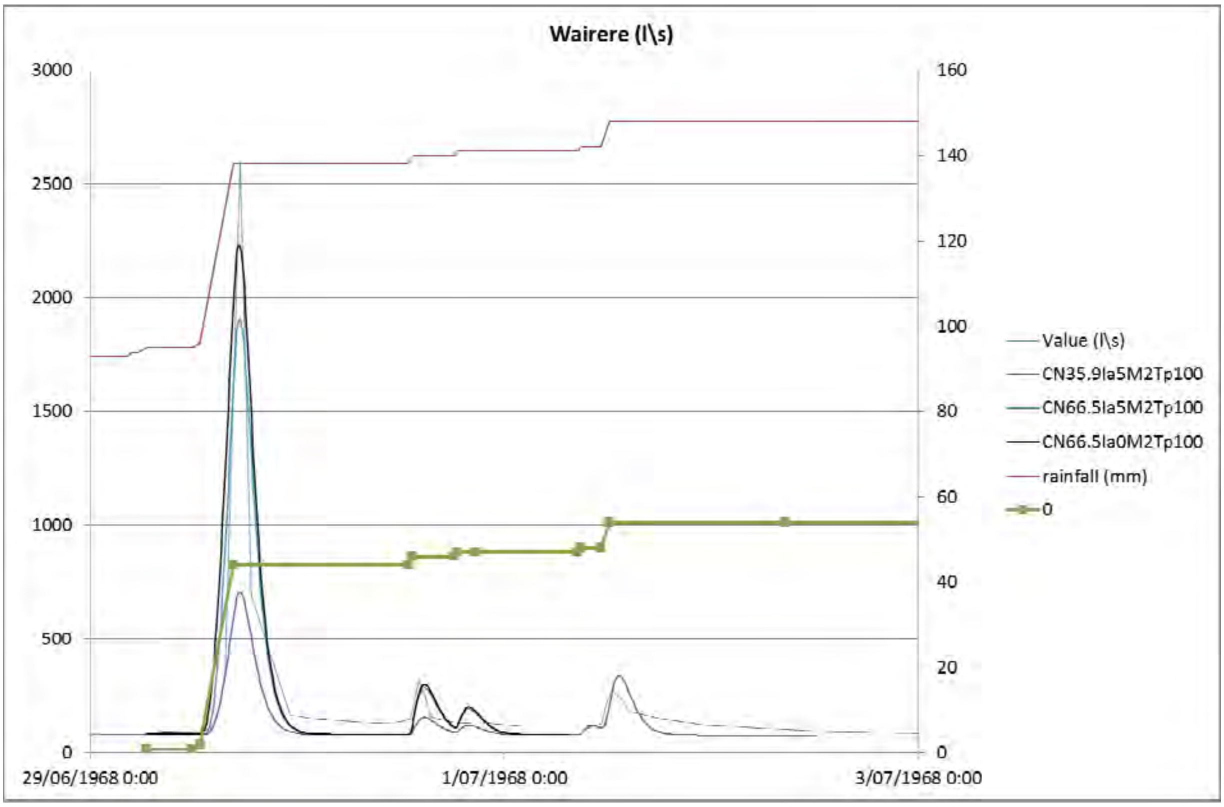
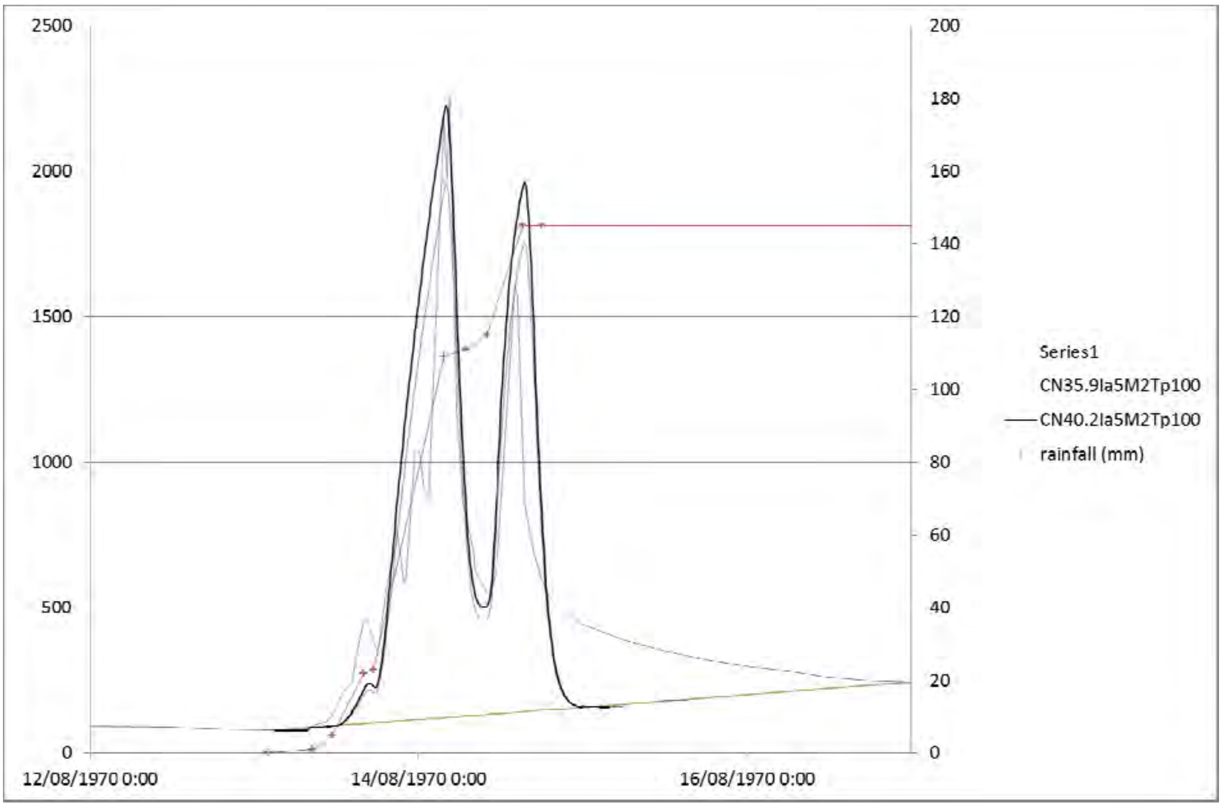
25/06/1979 12:00
26/06/1979 0:00
26/06/1979 12:00
27/06/1979 0:00
Time (Date)

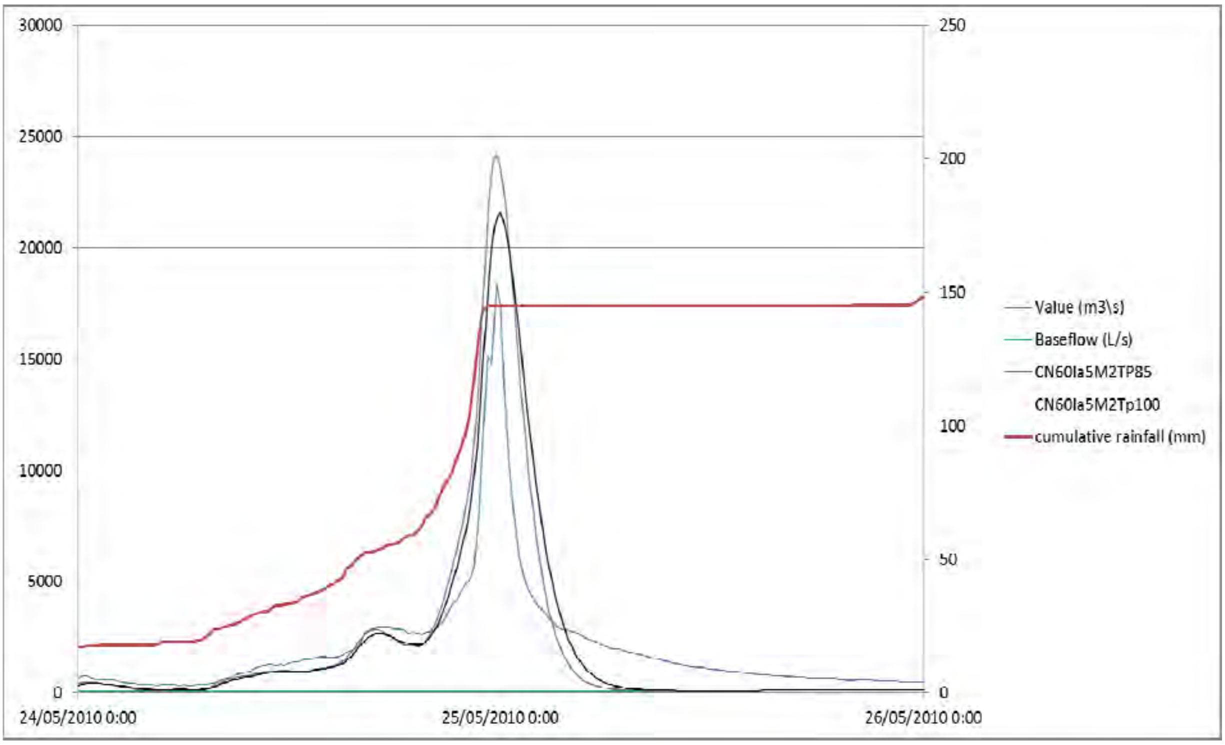

4000
3500
3000
2500
2000
1500
1000
500
0
80
70
60
50
40
30
20
10
0
Series1
Series3
CN44Ia5M2Tp100
CN63.5Ia5M2Tp100
rainfall (mm)
4/11/1971 12:00
5/11/1971 0:00
5/11/1971 12:00
6/11/1971 0:00
6/11/1971 12:00
7/11/1971 0:00

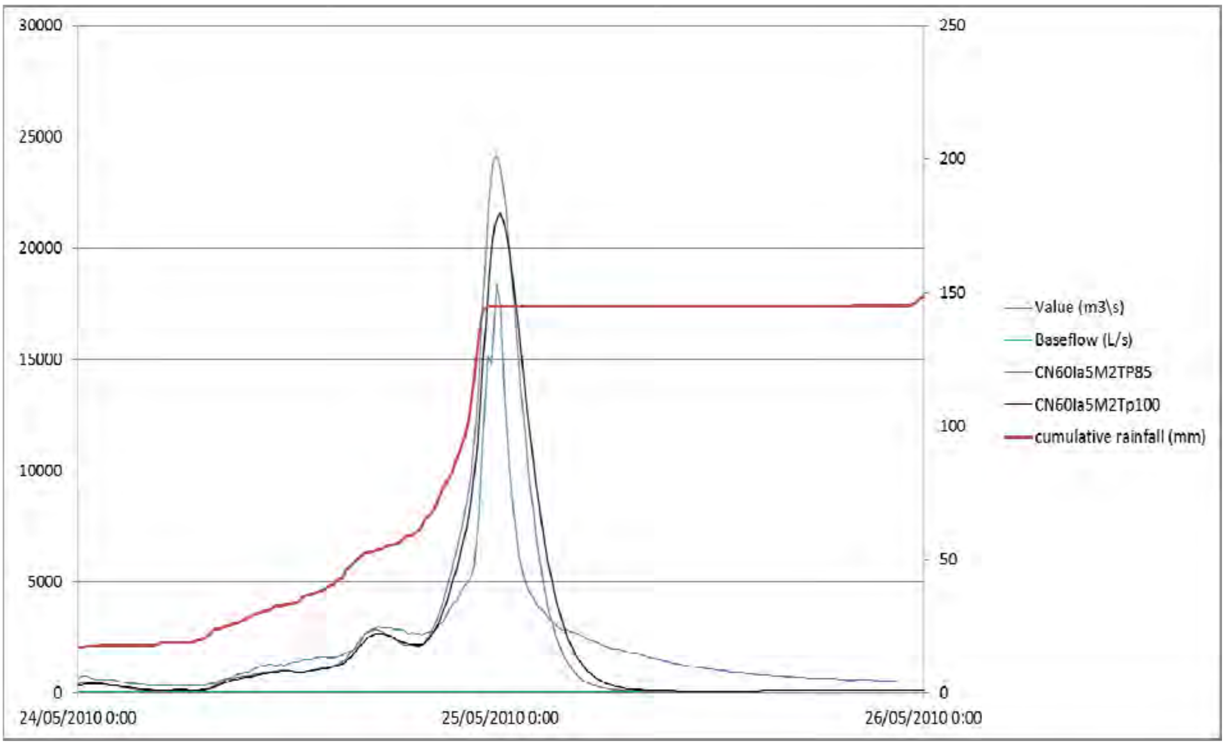

3500
3000
2500
2000
1500
1000
500
0
200
180
160
140
120
100
80
60
40
20
0
Value (l\s)
CN35.9Ia5M2Tp100
CN28.4Ia5M2Tp100
rainfall (mm)
29/11/1967 0:00
1/12/1967 0:00
3/12/1967 0:00

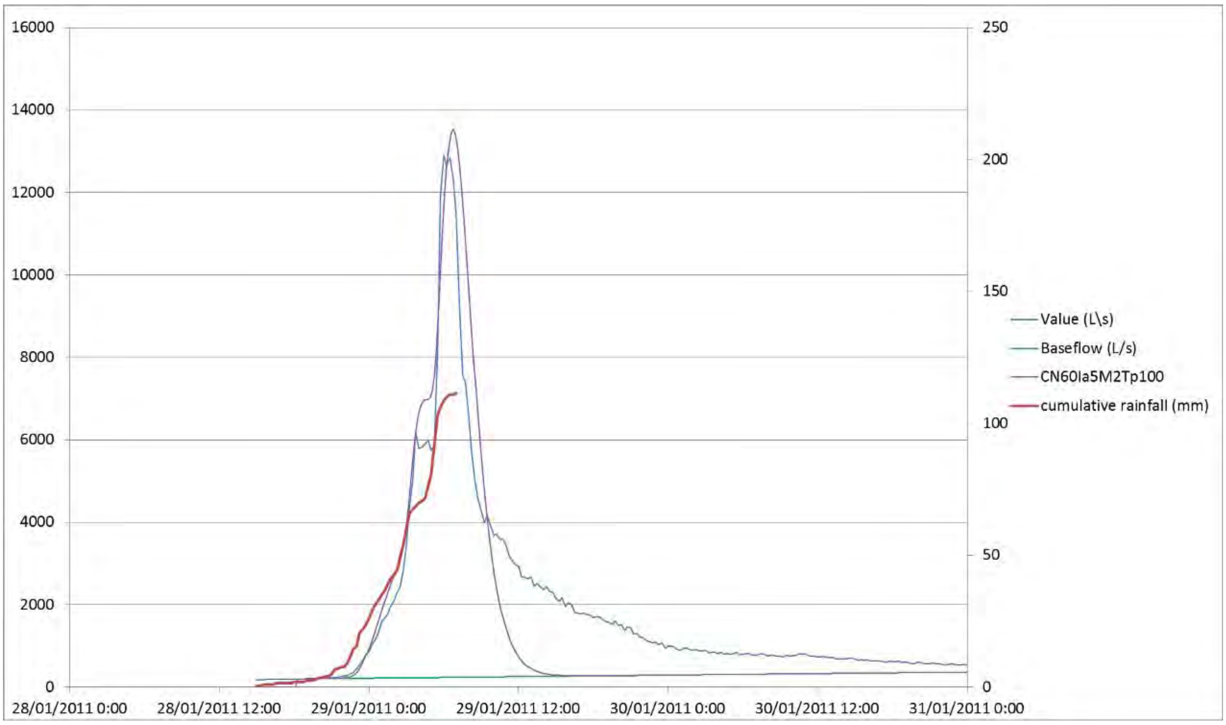

Wairere (l\s)
3000
2500
2000
1500
1000
500
0
160
140
120
100
80
60
40
20
0
Value (l\s)
CN35.9Ia5M2Tp100
CN66.5Ia5M2Tp100
CN66.5Ia0M2Tp100
rainfall (mm)
0
29/06/1968 0:00
1/07/1968 0:00
3/07/1968 0:00

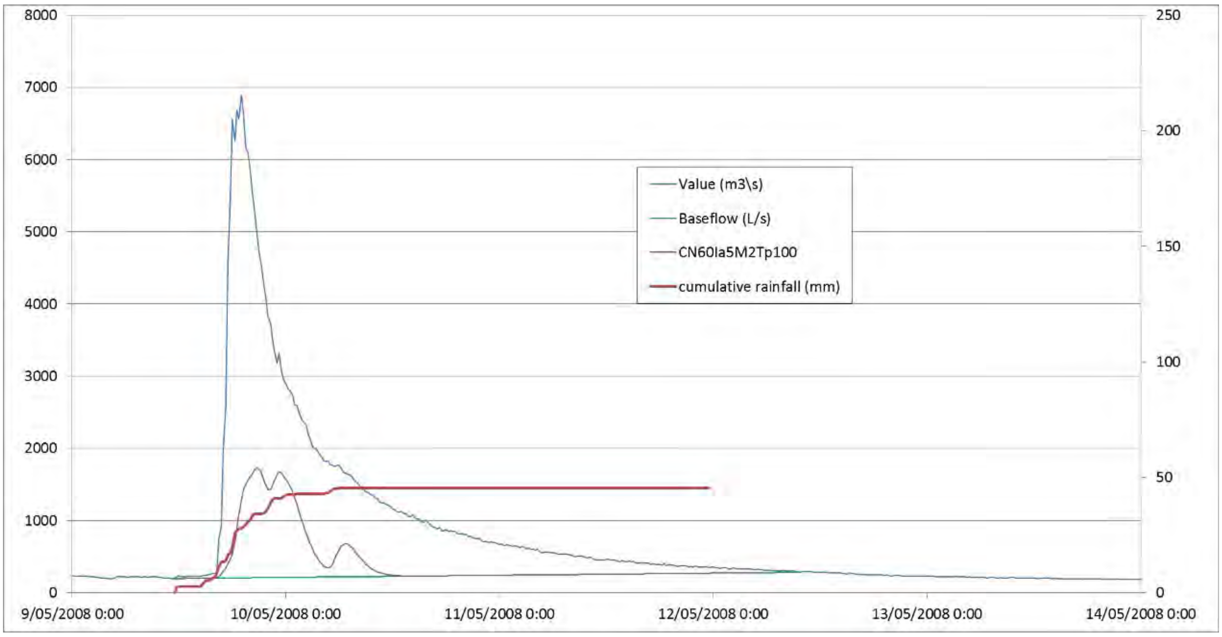

2500
2000
1500
1000
500
0
200
180
160
140
120
100
80
60
40
20
0
Series1
CN35.9Ia5M2Tp100
CN40.2Ia5M2Tp100
rainfall (mm)
12/08/1970 0:00
14/08/1970 0:00
16/08/1970 0:00

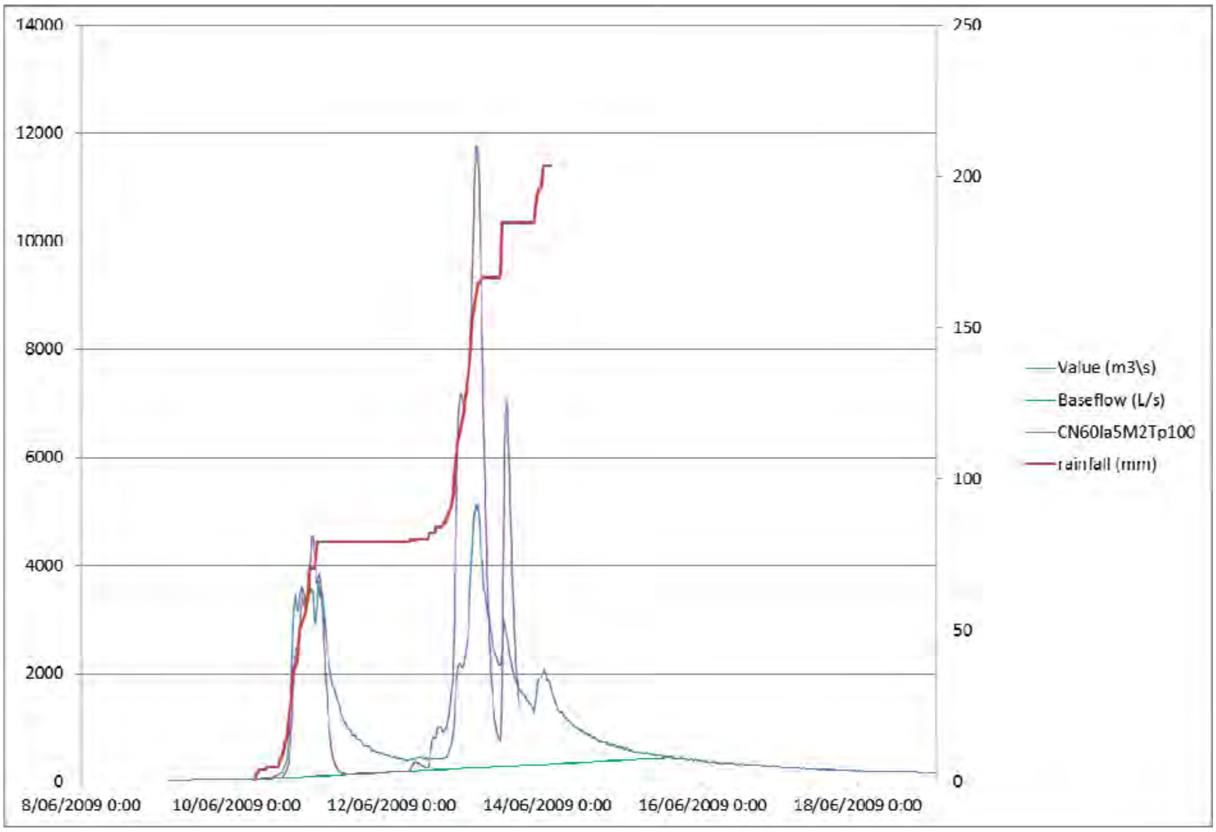
Wainui te Whara Stream data

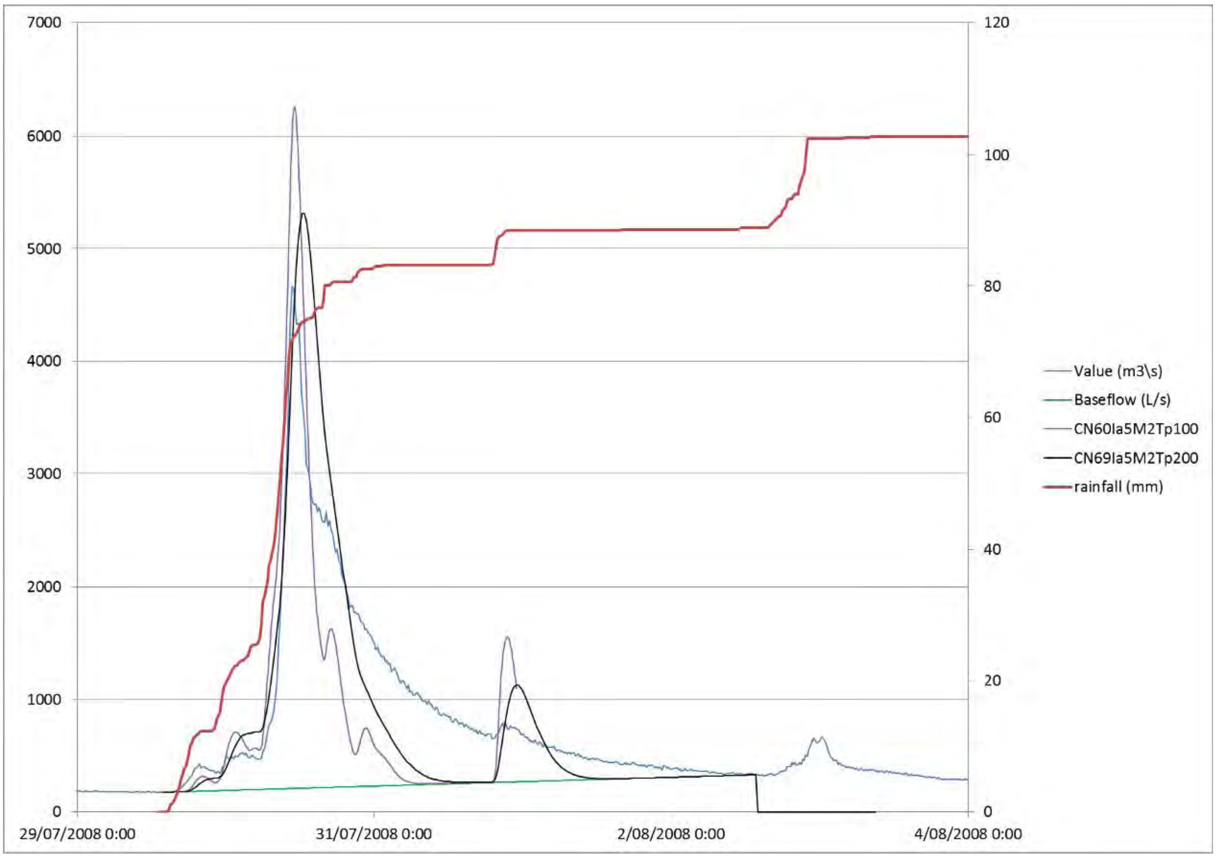


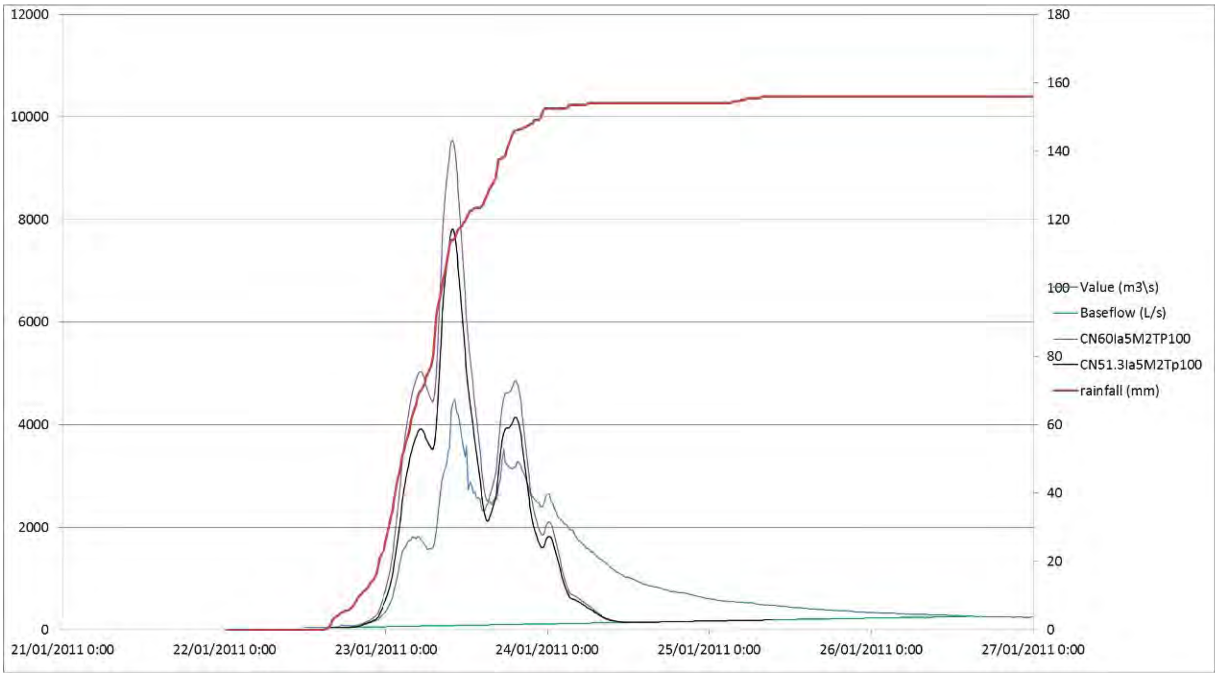



16000
14000
12000
10000
8000
6000
4000
2000
0
250
200
150
100
50
0
Value (L\s)
Baseflow (L/s)
CN60Ia5M2Tp100
cumulative rainfall (mm)
28/01/2011 0:00
28/01/2011 12:00
29/01/2011 0:00
29/01/2011 12:00
30/01/2011 0:00
30/01/2011 12:00
31/01/2011 0:00

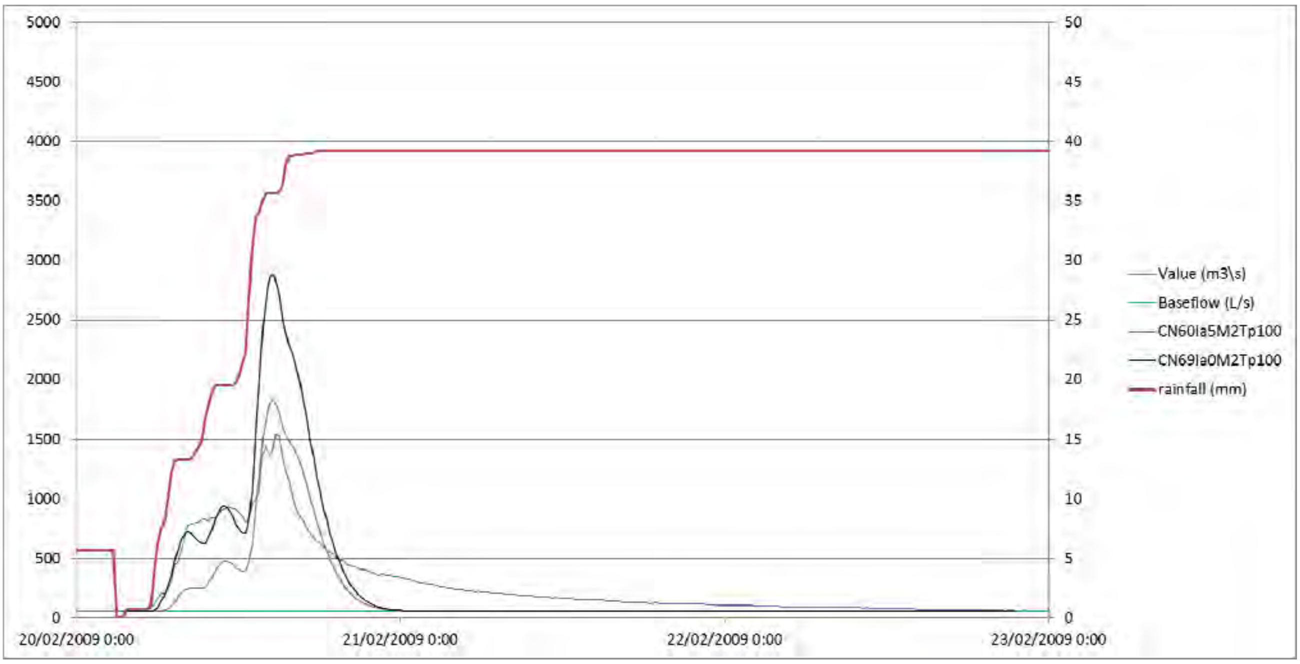

8000
7000
6000
5000
4000
3000
2000
1000
0
250
200
150
100
50
0
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
cumulative rainfall (mm)
9/05/2008 0:00
10/05/2008 0:00
11/05/2008 0:00
12/05/2008 0:00
13/05/2008 0:00
14/05/2008 0:00


14000
12000
10000
8000
6000
4000
2000
0
250
200
150
100
50
0
8/06/2009 0:00
10/06/2009 0:00
12/06/2009 0:00
14/06/2009 0:00
16/06/2009 0:00
18/06/2009 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
rainfall (mm)

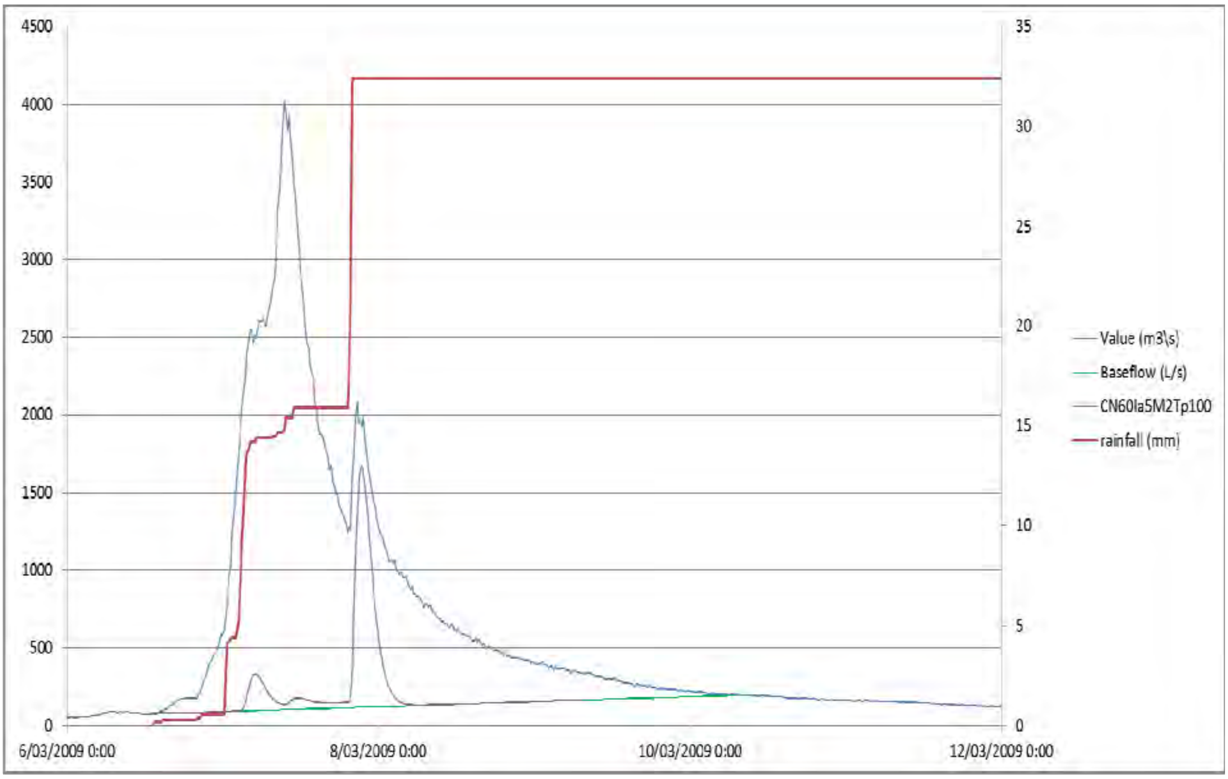

7000
6000
5000
4000
3000
2000
1000
0
120
100
80
60
40
20
0
29/07/2008 0:00
31/07/2008 0:00
2/08/2008 0:00
4/08/2008 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
CN69Ia5M2Tp200
rainfall (mm)

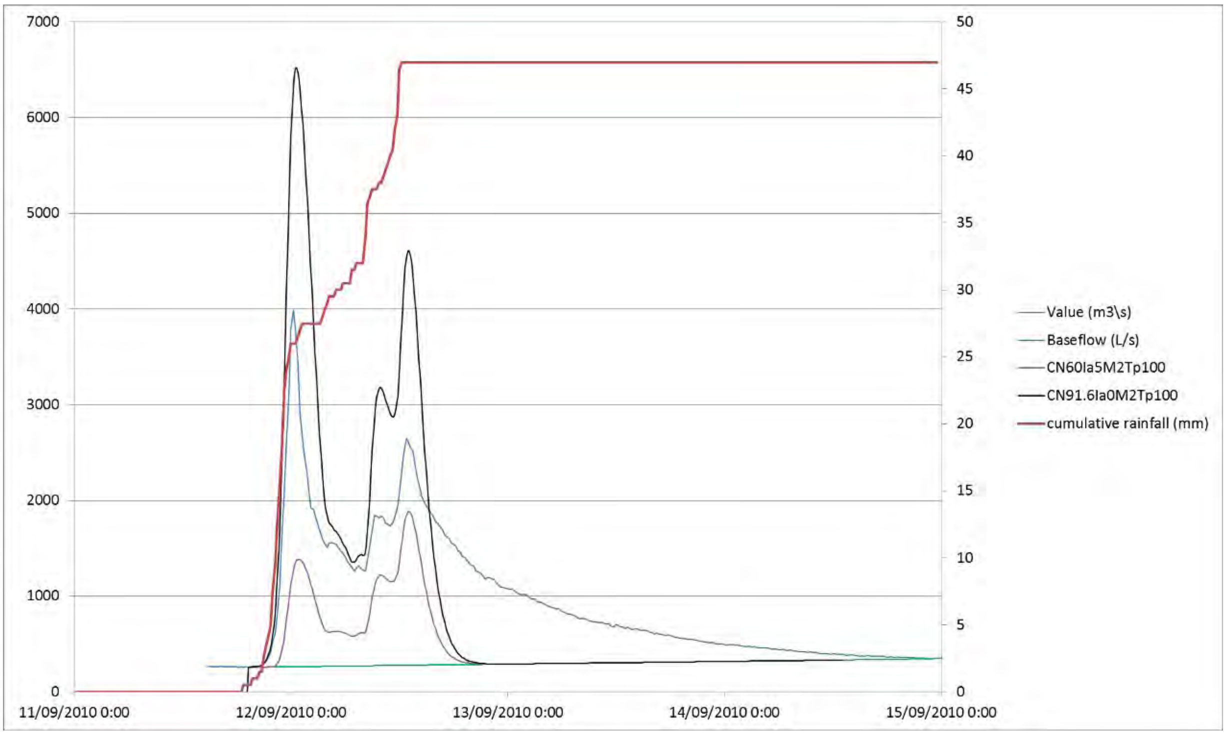


12000
10000
8000
6000
4000
2000
0
180
160
140
120
100
80
60
40
20
0
21/01/2011 0:00
22/01/2011 0:00
23/01/2011 0:00
24/01/2011 0:00
25/01/2011 0:00
26/01/2011 0:00
27/01/2011 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2TP100
CN51.3Ia5M2Tp100
rainfall (mm)



5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
50
45
40
35
30
25
20
15
10
5
0
20/02/2009 0:00
21/02/2009 0:00
22/02/2009 0:00
23/02/2009 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
CN69Ia0M2Tp100
rainfall (mm)


4500
4000
3500
3000
2500
2000
1500
1000
500
0
35
30
25
20
15
10
5
0
6/03/2009 0:00
8/03/2009 0:00
10/03/2009 0:00
12/03/2009 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
rainfall (mm)


7000
6000
5000
4000
3000
2000
1000
0
50
45
40
35
30
25
20
15
10
5
0
11/09/2010 0:00
12/09/2010 0:00
13/09/2010 0:00
14/09/2010 0:00
15/09/2010 0:00
Value (m3\s)
Baseflow (L/s)
CN60Ia5M2Tp100
CN91.6Ia0M2Tp100
cumulative rainfall (mm)

Appendix 5 – Detailed catchment delineation and analysis at West End, Ohope

Your Ref:
Our Ref: **fA208588**

13 July 2011

The Chief Executive
Whakatane District Council
Private Bag 1002
Whakatāne 3158

Attention Debbie Fransen
Project Engineer

Debbie

Stormwater catchment delineation and analysis at West End, Ohope

As follow up work to the Whakatāne Streams Catchment Study recently undertaken by the Regional Council, the hydrological catchments at West End, Ōhope were analysed in finer detail.

The broader catchment study had initially distributed only three hydrological catchments along the West End escarpment, amalgamating many of the smaller catchments together. This letter describes the work done to delineate 28 catchments along the escarpment and the analysis carried out to determine design peak discharges for 26 of these.

Flow-line and catchment delineation

This work was carried out in a GIS environment using ESRI's ARCMap 10.0 software. A "rain-drop" tool was used in conjunction with a 2m resolution digital elevation model (DEM) grid to determine flow paths from a large number of points placed in the upper catchments above the escarpment. The DEM is based on aerial LiDAR survey flown in 2003. From these flow-lines and using a detailed ground contour plot, catchment boundaries were delineated. Initially an automated method was used to delineate each catchment; then this was checked and adjusted manually. A map is attached that gives a graphical representation of this work.

Several catchments on the eastern end of the escarpment were extensively modified in 2007 when Whakatāne District Council implemented a scheme to collect and reticulate stormwater. These catchments were delineated as above but also by reviewing stormwater plans and visiting the site. The 2007 scheme created two new reticulated catchments (labelled R and W on the attached drawing) which we have not analysed further.

Determining catchment parameters

The 26 catchments were then divided by soil class and land cover to determine the appropriate runoff curve number in the same way as described in the Whakatāne Streams Catchment Study report.

The Average Channel Slope, Stream Length and Direct Length were measured for the longest streamline in each catchment. This was used to estimate the time of concentration by the BCHF method (ARC's TP108).

The table below shows the catchment parameters for each of the catchments.

<u>Estimating catchment discharge</u>

The catchment parameters (shown in table below) were applied using the dimensionless unit hydrograph approach (US NRCS method). Rainfall intensities used were from NIWA's HIRDS system. A nested storm approach was used as described in the Whakatāne Streams Catchment Study report. The minimum time of concentration used in the analysis was 10 minutes. Peak discharge estimates are shown in the table on the next page.

Table 8 Catchment parameters at West End, Ohope

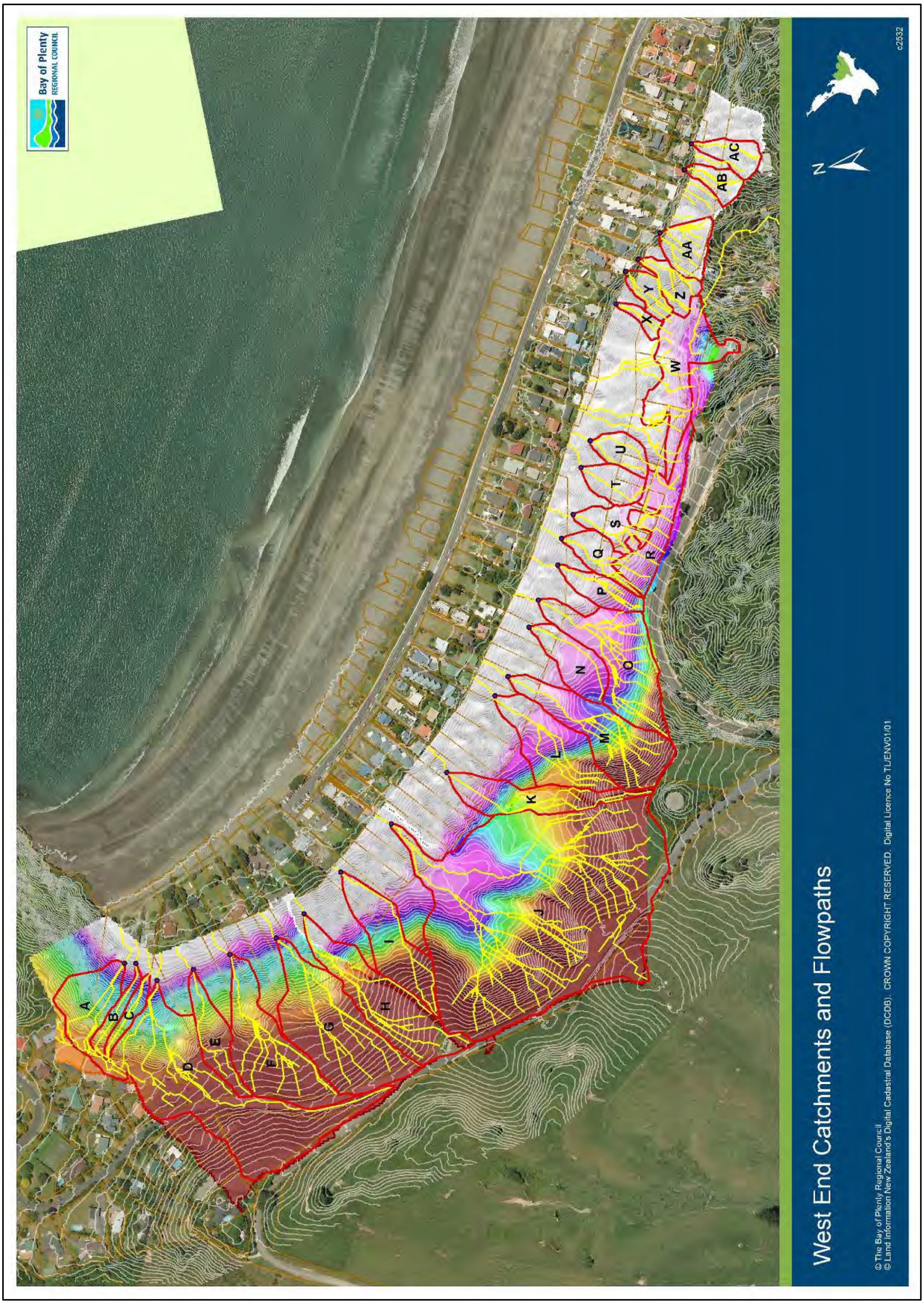
	Area	Direct length	Stream length	Channel Slope	Height difference	Curve Number	Time of Conc.
	A	L_d	L	S_a	H	CN	Tc
catchment	m^2	km	km	m/m	m		mins
westend_A	5548	0.13	0.17	0.73	93	61	4.6
westend_B	1401	0.11	0.12	0.67	92	65	3.6
westend_C	1426	0.11	0.11	0.87	90	67	3.0
westend_D	22388	0.30	0.39	0.42	117	49	10.9
westend_E	3743	0.16	0.19	0.67	102	35	7.3
westend_F	10397	0.20	0.22	0.67	107	36	8.0
westend_G	13822	0.22	0.23	0.64	112	32	9.0
westend_H	10133	0.24	0.28	0.61	122	34	10.0
westend_I	6817	0.20	0.21	0.73	121	36	7.8
westend_J	58059	0.35	0.47	0.40	148	34	16.2
westend_K	6066	0.24	0.26	0.57	113	39	9.0
westend_L	7608	0.17	0.19	0.70	111	38	6.9
westend_M	9453	0.21	0.25	0.55	118	36	9.4
westend_N	4077	0.12	0.13	0.73	69	57	4.0
westend_O	10206	0.22	0.24	0.51	112	55	6.8
westend_P	2618	0.11	0.11	0.74	70	65	3.2
westend_Q	2458	0.11	0.12	0.66	73	67	3.4
westend_S	2789	0.09	0.10	0.70	52	66	3.0
westend_T	2519	0.07	0.09	0.76	56	68	2.7
westend_U	2161	0.07	0.08	0.86	57	70	2.3
westend_W	8196	0.06	0.06	0.96	54	63	1.9
westend_Y	1687	0.07	0.07	0.81	62	68	2.3
westend_Z	2171	0.08	0.09	0.76	66	65	2.8
westend_AA	3051	0.07	0.08	0.64	53	70	2.5
westend_AB	1707	0.07	0.07	0.67	54	69	2.4
westend_AC	2072	0.08	0.09	0.67	62	66	2.8

Table 9 Design peak discharge (L/s) for 26 catchments at West End, Ohope

	Q2	Q5	Q10	Q20	Q50	Q100
Catchment Name	L/s	L/s	L/s	L/s	L/s	L/s
Westend_A	33.3	49.8	64.3	81.6	109.9	136.4
Westend_B	9.2	13.7	17.5	22.1	29.4	36.3
Westend_C	10.1	14.8	18.8	23.6	31.2	38.3
Westend_D	95.5	146.8	193.7	251.2	348.1	441.3
Westend_E	10.5	16.5	22.3	29.5	42.0	54.5
Westend_F	30.3	47.8	64.2	84.8	120.7	156.3
Westend_G	34.6	54.9	74.2	98.6	141.5	184.4
Westend_H	27.1	42.9	57.9	76.7	109.7	142.6
Westend_I	19.4	30.6	41.2	54.5	77.6	100.6
Westend_J	131.0	207.3	279.5	370.5	529.7	688.3
Westend_K	19.4	30.4	40.7	53.6	75.9	97.8
Westend_L	23.9	37.5	50.3	66.3	93.9	121.1
Westend_M	27.1	42.8	57.5	76.1	108.3	140.3
Westend_N	22.4	33.8	43.9	56.1	76.2	95.2
Westend_O	53.0	80.3	104.8	134.4	183.6	230.1
Westend_P	17.7	26.0	33.3	41.8	55.7	68.6
Westend_Q	17.4	25.4	32.4	40.6	53.8	66.0
Westend_S	19.2	28.2	36.0	45.2	60.1	73.8
Westend_T	18.3	26.6	33.8	42.3	55.9	68.5
Westend_U	16.4	23.7	30.1	37.4	49.3	60.1
Westend_X	6.5	9.5	12.0	14.9	19.6	24.0
Westend_Y	12.2	17.8	22.6	28.3	37.4	45.8
Westend_Z	14.5	21.3	27.3	34.4	45.9	56.6
Westend_AA	22.7	33.0	41.9	52.3	68.9	84.1
Westend_AB	12.6	18.4	23.3	29.1	38.4	46.9
Westend_AC	14.2	20.9	26.6	33.5	44.5	54.7

Yours sincerely

Peter West
Contract Engineer



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West End Catchments and Flowpaths
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Appendix 6 – Tabulated design rainfall hyetographs for Whakatāne, Ōhope and their hill catchments

Table A6- 1 Design Rainstorm Cumulative Rainfall Depths (mm) for Selected Event Probabilities

	ARI (years)					
Time (hours)	2	5	10	20	50	100
0.00	0.0	0.0	0.0	0.0	0.0	0.0
0.50	0.2	0.3	0.3	0.4	0.4	0.5
1.00	0.4	0.5	0.6	0.7	0.9	1.0
1.50	0.6	0.8	0.9	1.1	1.3	1.6
2.00	0.8	1.1	1.3	1.5	1.8	2.1
2.50	1.1	1.3	1.6	1.8	2.3	2.6
3.00	1.3	1.6	1.9	2.2	2.7	3.2
3.50	1.5	1.9	2.2	2.6	3.2	3.7
4.00	1.7	2.2	2.6	3.0	3.7	4.3
4.50	1.9	2.5	2.9	3.4	4.2	4.8
5.00	2.2	2.8	3.3	3.8	4.6	5.4
5.50	2.4	3.1	3.6	4.2	5.1	6.0
6.00	2.6	3.4	4.0	4.6	5.6	6.6
6.50	2.9	3.7	4.3	5.0	6.2	7.1
7.00	3.1	4.0	4.7	5.5	6.7	7.7
7.50	3.4	4.3	5.0	5.9	7.2	8.3
8.00	3.6	4.6	5.4	6.3	7.7	9.0
8.50	3.9	4.9	5.8	6.8	8.3	9.6
9.00	4.1	5.3	6.2	7.2	8.8	10.2
9.50	4.4	5.6	6.6	7.7	9.3	10.9
10.00	4.6	5.9	7.0	8.1	9.9	11.5
10.50	4.9	6.3	7.4	8.6	10.5	12.2
11.00	5.2	6.6	7.8	9.1	11.1	12.8
11.50	5.5	7.0	8.2	9.5	11.6	13.5
12.00	5.7	7.3	8.6	10.0	12.2	14.2
12.50	6.0	7.7	9.0	10.5	12.8	14.9
13.00	6.3	8.0	9.4	11.0	13.4	15.6
13.50	6.6	8.4	9.9	11.5	14.1	16.3
14.00	6.9	8.8	10.3	12.0	14.7	17.1
14.50	7.2	9.2	10.8	12.6	15.4	17.8
15.00	7.5	9.6	11.2	13.1	16.0	18.6
15.50	7.8	10.0	11.7	13.7	16.7	19.4
16.00	8.1	10.4	12.2	14.2	17.4	20.2
16.50	8.5	10.8	12.7	14.8	18.1	21.0
17.00	8.8	11.2	13.2	15.4	18.8	21.8
17.50	9.1	11.6	13.7	16.0	19.5	22.6
18.00	9.5	12.1	14.2	16.6	20.2	23.5
18.50	9.8	12.5	14.7	17.2	21.0	24.4
19.00	10.2	13.0	15.3	17.8	21.8	25.3
19.50	10.6	13.5	15.8	18.5	22.6	26.2
20.00	10.9	14.0	16.4	19.1	23.4	27.1
20.50	11.3	14.5	17.0	19.8	24.2	28.1
21.00	11.7	15.0	17.6	20.5	25.0	29.1
21.50	12.1	15.5	18.2	21.2	25.9	30.1
22.00	12.6	16.0	18.8	21.9	26.8	31.1
22.50	13.0	16.6	19.5	22.7	27.7	32.2
23.00	13.4	17.1	20.1	23.5	28.7	33.3
23.50	13.9	17.7	20.8	24.3	29.6	34.4
24.00	14.4	18.3	21.5	25.1	30.6	35.6
24.25	14.8	18.9	22.2	25.8	31.5	36.6
24.50	15.2	19.4	22.8	26.6	32.5	37.7
24.75	15.7	20.0	23.5	27.4	33.4	38.8
25.00	16.2	20.6	24.2	28.2	34.3	39.9

	ARI (years)					
Time (hours)	2	5	10	20	50	100
25.25	16.6	21.2	24.8	28.9	35.3	41.0
25.50	17.1	21.8	25.5	29.8	36.3	42.1
25.75	17.6	22.4	26.2	30.6	37.3	43.2
26.00	18.1	23.0	26.9	31.4	38.3	44.4
26.25	18.6	23.6	27.7	32.2	39.3	45.5
26.50	19.1	24.2	28.4	33.1	40.3	46.7
26.75	19.6	24.9	29.1	33.9	41.3	47.9
27.00	20.1	25.5	29.9	34.8	42.4	49.1
27.25	20.6	26.2	30.7	35.7	43.5	50.4
27.50	21.1	26.8	31.5	36.6	44.6	51.6
27.75	21.7	27.5	32.2	37.5	45.7	52.9
28.00	22.2	28.2	33.1	38.5	46.8	54.2
28.25	22.8	28.9	33.9	39.4	48.0	55.6
28.50	23.4	29.6	34.7	40.4	49.2	56.9
28.75	23.9	30.4	35.6	41.4	50.4	58.3
29.00	24.5	31.1	36.5	42.4	51.6	59.7
29.25	25.1	31.9	37.3	43.4	52.8	61.2
29.50	25.7	32.7	38.3	44.5	54.1	62.7
29.75	26.4	33.5	39.2	45.6	55.4	64.2
30.00	27.0	34.3	40.1	46.7	56.8	65.7
30.25	27.7	35.1	41.1	47.8	58.1	67.3
30.50	28.4	36.0	42.1	49.0	59.5	68.9
30.75	29.1	36.9	43.1	50.2	61.0	70.6
31.00	29.8	37.8	44.2	51.4	62.5	72.3
31.25	30.5	38.7	45.3	52.7	64.0	74.1
31.50	31.3	39.7	46.4	54.0	65.6	75.9
31.75	32.1	40.6	47.6	55.3	67.2	77.8
32.00	32.9	41.7	48.8	56.7	68.9	79.8
32.25	33.7	42.7	50.0	58.1	70.7	81.8
32.50	34.6	43.8	51.3	59.6	72.5	83.9
32.75	35.5	45.0	52.6	61.2	74.4	86.1
33.00	36.4	46.2	54.1	62.8	76.4	88.4
33.25	37.4	47.5	55.5	64.6	78.5	90.8
33.50	38.5	48.8	57.1	66.4	80.7	93.4
33.75	39.6	50.2	58.7	68.3	83.0	96.1
34.00	40.8	51.7	60.5	70.3	85.5	99.0
34.25	42.0	53.3	62.4	72.6	88.2	102.1
34.50	43.4	55.1	64.4	74.9	91.1	105.5
34.75	44.9	57.0	66.7	77.6	94.3	109.2
35.00	46.6	59.1	69.3	80.6	98.0	113.4
35.25	48.6	61.7	72.2	84.0	102.2	118.3
35.50	51.0	64.7	75.8	88.2	107.3	124.3
35.75	54.9	69.8	81.9	95.4	116.2	134.8
35.83	56.6	72.0	84.5	98.5	120.1	139.3
35.92	58.7	74.8	87.8	102.4	125.0	145.1
36.00	63.4	80.9	95.1	111.0	135.6	157.5
36.08	68.1	87.0	102.3	119.5	146.2	169.9
36.17	70.3	89.8	105.7	123.5	151.0	175.7
36.25	72.0	92.0	108.3	126.6	154.9	180.2
36.50	75.9	97.1	114.4	133.7	163.8	190.7
36.75	78.3	100.2	118.0	137.9	168.9	196.7
37.00	80.3	102.7	120.9	141.4	173.2	201.6
37.25	82.0	104.9	123.4	144.4	176.8	205.8
37.50	83.5	106.8	125.7	147.0	180.0	209.5
37.75	84.9	108.5	127.8	149.4	182.9	212.9
38.00	86.1	110.2	129.7	151.6	185.6	216.0
38.25	87.3	111.7	131.4	153.7	188.1	218.9
38.50	88.4	113.1	133.1	155.6	190.5	221.6
38.75	89.5	114.4	134.6	157.4	192.7	224.2
39.00	90.4	115.7	136.1	159.1	194.7	226.6
39.25	91.4	116.9	137.5	160.7	196.7	228.9

	ARI (years)					
Time (hours)	2	5	10	20	50	100
39.50	92.3	118.0	138.9	162.3	198.6	231.1
39.75	93.2	119.1	140.1	163.8	200.5	233.2
40.00	94.0	120.2	141.4	165.3	202.2	235.2
40.25	94.8	121.2	142.6	166.6	203.9	237.2
40.50	95.6	122.2	143.7	168.0	205.5	239.1
40.75	96.4	123.2	144.9	169.3	207.1	240.9
41.00	97.1	124.1	146.0	170.6	208.6	242.7
41.25	97.8	125.0	147.0	171.8	210.1	244.4
41.50	98.5	125.9	148.0	173.0	211.6	246.1
41.75	99.2	126.7	149.0	174.1	213.0	247.7
42.00	99.8	127.6	150.0	175.3	214.4	249.3
42.25	100.5	128.4	151.0	176.4	215.7	250.8
42.50	101.1	129.2	151.9	177.5	217.0	252.3
42.75	101.7	130.0	152.8	178.5	218.3	253.8
43.00	102.3	130.7	153.7	179.5	219.5	255.3
43.25	102.9	131.5	154.6	180.6	220.8	256.7
43.50	103.5	132.2	155.4	181.5	222.0	258.1
43.75	104.1	132.9	156.3	182.5	223.2	259.4
44.00	104.7	133.6	157.1	183.5	224.3	260.8
44.25	105.2	134.3	157.9	184.4	225.4	262.1
44.50	105.7	135.0	158.7	185.3	226.6	263.4
44.75	106.3	135.7	159.5	186.2	227.7	264.6
45.00	106.8	136.3	160.3	187.1	228.7	265.9
45.25	107.3	137.0	161.0	188.0	229.8	267.1
45.50	107.8	137.6	161.8	188.9	230.8	268.3
45.75	108.3	138.2	162.5	189.7	231.9	269.5
46.00	108.8	138.9	163.2	190.6	232.9	270.6
46.25	109.3	139.5	163.9	191.4	233.9	271.8
46.50	109.8	140.1	164.6	192.2	234.9	272.9
46.75	110.2	140.7	165.3	193.0	235.8	274.0
47.00	110.7	141.3	166.0	193.8	236.8	275.1
47.25	111.2	141.8	166.7	194.6	237.7	276.2
47.50	111.6	142.4	167.3	195.3	238.7	277.3
47.75	112.1	143.0	168.0	196.1	239.6	278.4
48.00	112.5	143.5	168.7	196.9	240.5	279.4
48.50	113.0	144.1	169.4	197.7	241.5	280.6
49.00	113.4	144.7	170.0	198.5	242.5	281.7
49.50	113.9	145.3	170.7	199.3	243.4	282.8
50.00	114.3	145.8	171.3	200.0	244.3	283.9
50.50	114.7	146.4	172.0	200.7	245.2	284.9
51.00	115.1	146.9	172.6	201.4	246.1	285.9
51.50	115.5	147.4	173.2	202.1	246.9	286.9
52.00	115.9	147.9	173.8	202.8	247.8	287.9
52.50	116.3	148.4	174.3	203.5	248.6	288.8
53.00	116.7	148.8	174.9	204.1	249.4	289.7
53.50	117.0	149.3	175.4	204.8	250.1	290.6
54.00	117.4	149.8	176.0	205.4	250.9	291.5
54.50	117.7	150.2	176.5	206.0	251.6	292.4
55.00	118.1	150.6	177.0	206.6	252.4	293.2
55.50	118.4	151.1	177.5	207.2	253.1	294.0
56.00	118.7	151.5	178.0	207.7	253.8	294.8
56.50	119.1	151.9	178.4	208.3	254.4	295.6
57.00	119.4	152.3	178.9	208.8	255.1	296.4
57.50	119.7	152.7	179.4	209.4	255.8	297.2
58.00	120.0	153.1	179.8	209.9	256.4	297.9
58.50	120.3	153.4	180.3	210.4	257.1	298.7
59.00	120.6	153.8	180.7	210.9	257.7	299.4
59.50	120.9	154.2	181.1	211.4	258.3	300.1
60.00	121.1	154.5	181.6	211.9	258.9	300.8
60.50	121.4	154.9	182.0	212.4	259.5	301.5
61.00	121.7	155.2	182.4	212.9	260.1	302.2

	ARI (years)					
Time (hours)	2	5	10	20	50	100
61.50	122.0	155.6	182.8	213.4	260.7	302.8
62.00	122.2	155.9	183.2	213.8	261.2	303.5
62.50	122.5	156.3	183.6	214.3	261.8	304.1
63.00	122.8	156.6	184.0	214.7	262.3	304.8
63.50	123.0	156.9	184.4	215.2	262.9	305.4
64.00	123.3	157.2	184.7	215.6	263.4	306.0
64.50	123.5	157.6	185.1	216.1	263.9	306.7
65.00	123.7	157.9	185.5	216.5	264.5	307.3
65.50	124.0	158.2	185.8	216.9	265.0	307.9
66.00	124.2	158.5	186.2	217.3	265.5	308.4
66.50	124.5	158.8	186.5	217.7	266.0	309.0
67.00	124.7	159.1	186.9	218.1	266.5	309.6
67.50	124.9	159.4	187.2	218.5	267.0	310.2
68.00	125.2	159.7	187.6	218.9	267.5	310.7
68.50	125.4	159.9	187.9	219.3	267.9	311.3
69.00	125.6	160.2	188.2	219.7	268.4	311.8
69.50	125.8	160.5	188.6	220.1	268.9	312.4
70.00	126.0	160.8	188.9	220.5	269.3	312.9
70.50	126.2	161.0	189.2	220.9	269.8	313.4
71.00	126.5	161.3	189.5	221.2	270.2	314.0
71.50	126.7	161.6	189.8	221.6	270.7	314.5
72.00	126.9	161.8	190.2	222.0	271.1	315.0