ELITE GEOSCIENCES

PROPOSED RESIDENTIAL DEVELOPMENT
GEOTECHNICAL INVESTIGATION REPORT
24 Epacris Avenue, Forestville

22 July 2025

Prepared by:
Elite Geosciences Pty Ltd

Project Number:
2025152

Document History

Version	Effective Date	Description of Revision	Prepared by	Approved by
0	16/06/2025	Final	TH	TH
1	22/07/2025	Final	AS	TH

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Prepared and Approved by:

Signature

Terence Huang

Printed Name

Director | Principal Geotechnical Engineer

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NSW PDP0001079, DEP0003150, PRE0001948

Qualifications

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1 Introduction

As requested, a principal geotechnical engineer from Elite Geosciences (EG) attended site on 11th June 2025. The purpose of this investigation was to assess the site's surface and subsurface conditions in order to provide recommendations from a geotechnical viewpoint for the design and construction of the proposed residential redevelopment on the existing property. The results of the investigation are detailed below.

1.1 Proposed Development

At the time of preparing this report, we understand that the proposed redevelopment includes:

- Demolition of the existing house and construction of a new double storey duplex with a swimming pool at the rear. No basement is proposed. Pool will incur excavation of up to 1.8m depth bgl.

2 Findings of Investigation

2.1 Geological Condition

Reference to the Geological Map of Sydney (1:100,000) indicates that the site is underlain by Hawkesbury Sandstone, which comprises medium to coarse grained quartz sandstone, very minor shale and laminite lenses.

2.2 Fieldwork

Fieldwork for the geotechnical investigation was carried out on 11th June 2025 and comprised the following:

- A detailed walkover inspection of the site and surrounds.
- Drilling of a total of four (4) boreholes (BH1 and BH4) within the footprint of the proposed development, using manual hand auger equipment taken to refusal depths of up to 1m.
- In-situ testing using a Dynamic Cone Penetrometer (DCP) was conducted next to each borehole. DCP tests were undertaken to refusal depths of up to 2.4m depth in order to determine the underlain soil density and depths of weathered sandstone bedrock.
- Permeability tests at selected boreholes (BH3 and BH4) to assess the soil absorption rate.

The approximate borehole and DCP test locations are shown on the enclosed Borehole and DCP Test Location Plan referenced Figure 1 in Appendix A.

2.3 Site Description

The following site observation were made:

- The site is rectangular in shape and is currently occupied by a two storey house at the southern half of the site.
- The site is bounded by Epacris Ave to the south, and residential properties to the other sides.
- Site dips down north-west at about 8-12 degrees.

2.4 Surface Condition

Based on the observations from the geotechnical investigation, the sub surface profile within the footprint of the proposed development can be generalised as follows:

- Topsoil and Fill Silty Clay, low to medium plasticity, dark brown to brown, with gravel and sand, up to 0.2m thick, overlying,
- Residual Sandy Clay, medium plasticity, brown and pale grey, with gravel, overlying weathered sandstone at about 2.4m depth bgl at the backyard.

The encountered subsurface materials and their relative strengths have been recorded and logged as Engineering Log of Boreholes and on a Penetration Resistance of Soil Test Sheet. These have been enclosed in Appendix B.

Groundwater table or seepage was not encountered in any of the boreholes during drilling to shallow depths of not more than about 1m below existing ground surface levels. It should be noted however, that variations in ground water seepage flows may occur due to variations in rainfall duration and intensity. It is anticipated the proposed pool excavation and earthwork may not intersect with the groundwater table. However, it is possible that minor localised seepage/inflow may occur within interface of soils and rocks and fractures/defects of rock if it encounters an intense and prolonged rainfall during any excavation.

2.5 Soil Absorption

After the completion of the auguring in BH3 and BH4, permeability tests were carried out to estimate the rate of permeability in the underlain soil. The table below provides the test results in each borehole.

Table 1 – Permeability Test Results

BH ID	Permeability Rate (m/day)	Degree of Permeability	Absorption Capacity ($L/m^2/s$)
BH3	3.2	Low to Medium	0.0090
BH4	2.4	Low to Medium	0.0089

The subject residual materials comprising Silty Clay have a related low to medium rate of permeability rate of between 2.4-3.2 m/day which is considered suitable for an infiltration system at the proposed backyard location. With reference to the Water NSW spec, the site can be classified as Heavy Clay of Massive. The infiltration system and area (where required) should be designed by a qualified civil engineer.

3 Comments and Recommendations

3.1 General

It is understood that the proposed development comprises construction of a new double storey duplex with a swimming pool at the rear. No basement is proposed. Pool will incur excavation of up to 1.8m depth bgl.

3.2 Excavation Condition

We expect overburden soils comprising topsoil, natural residual and highly weathered sandstone (up to 3m depth) to be readily excavated by conventional earthworks equipment such as excavators. Ripping or hammering will not be required. Therefore, the induced vibration and noise impact to the adjoining properties will be minimal.

3.3 Site Classification and Subgrade Preparation

Based on the results of this investigation, we consider that the subsurface conditions comprise topsoil overlying medium plasticity residual clay materials. A site classification of "Class M – Moderately reactive clay or silt site, which may experience moderate ground movement from moisture change" can be adopted (if applicable) for footings constructed in accordance with AS2870-2011.

The following site preparation measures are recommended:

- Remove all topsoil fill, foundations/ slabs and deleterious materials (including roots/vegetation);
- Proof roll and compact the exposed subgrade to at least 98% MMDD at +/- 2% OMC. Where the proof roll reveals soft-spots these should be excavated and replaced with approved engineering fill;

3.4 Temporary Batter Slopes

Temporary batter slopes may be appropriate for the proposed excavation provided the batters do not encroach into the zone of influence of the existing adjacent structures. Temporary batter slopes, where applicable, may be adopted during excavation of the soils. Permanent batter slopes are not recommended. For unsupported cuts in topsoil, fill and overburden soils, the recommended temporary batter slopes are presented in the following Table 1.

TABLE 1
RECOMMENDED TEMPORARY BATTER SLOPES FOR UNSUPPORTED CUTS
(Not exceeding 3.0m in height)

Material	Temporary (Horizontal : Vertical)	
	Exposed	Protected
Topsoil, fill and overburden soils	1.25 :1	1 :1
Weathered Sandstone	Vertical	Vertical

Temporary surface protection against erosion may be provided by covering the batters with plastic sheeting. It should be noted however, that the plastic sheeting should extend at least 1.5m behind the crest of the cut face.

3.5 Structural Footings

Pier footings are recommended to socket min. 0.3m into the underlain weathered sandstone which could be designed for a serviceability end bearing capacity of 700kPa. Based on the DCP test results, weathered sandstone was found at about 2.4m depths bgl.

It is recommended that all footings for the proposed development be founded on uniform bearing materials to minimise the potential for differential settlements.

We recommend that footing inspections be carried out by a Geotechnical Engineer / consultant during footing excavation to confirm appropriate founding materials, that the recommended serviceability bearing pressures could be met and to ensure that all soft and wet materials have been removed from the foundation footprint prior to concrete placement.

4 Limitation

Assessment of the sub-surface profile at the site and the recommendations presented in this report are based on information from four (4) boreholes, drilled at locations considered representative across the site, and DCP testing at four (4) locations. Based on the results of the investigation and subsurface variability, there is a possibility that actual geotechnical conditions across the site could differ from the inferred geotechnical model presented in this report.

This report contains geotechnical parameters to be used as input for the structural design of footings and retaining walls. On-going geotechnical input is required to ensure recommendations provided in this report are followed and that actual ground conditions reflect those indicated in this report.

Appendix A Site Plans

⊗ DCP TEST LOCATION

ELITE GEOSCIENCES	TITLE: **Site Plan** **24 Epacris Avenue, Forestville – Geotechnical Investigation**		
	PROJECT NO: **2025152**	TEST DATE: **16/06/2025**	PREPARED BY: **TH**

Appendix B Borehole Logs

PENETRATION RESISTANCE OF SOIL TEST FIELD SHEET

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Project:	Project No.	Testing Type	
Proposed Redevelopment	2025152	Dynamic Cone Penetrometer (DCP)	x
Client:	**Test By:**	Dynamic Perth Sand Penetrometer (PSP)	
Aform	AS		
Location:	**Date:**	**Location:**	**Sheet:**
24 Epacris Avenue, Forestville	16/06/2025 25	Refer to Site Plan	1

DCP No.	DCP1	DCP2	DCP3	DCP4												
Penetration (mm)	Number of Blows per 100 mm Penetration					Penetration (mm)	Number of Blows per 100 mm Penetration											
100	1	1	1	1		2500												
200	2	1	2	2		2600												
300	2	2	2	3		2700												
400	2	3	3	3		2800												
500	2	3	3	3		2900												
600	8	3	3	4		3000												
700	7	3	4	4		3100												
800	4	3	5	5		3200												
900	4	5	5	6		3300												
1000	7	5	6	6		3400												
1100	6	6	6	7		3500												
1200	6	6	7	6		3600												
1300	5	7	7	7		3700												
1400	6	7	8	7		3800												
1500	6	8	8	6		3900												
1600	6	9	8	7		4000												
1700	7	9	9	8		4100												
1800	7	9	10	8		4200												
1900	8	9	11	9		4300												
2000	9	11	12	10		4400												
2100	11	12	13	11		4500												
2200	12	12	13	12		4600												
2300	13	12	14	13		4700												
2400	R	R	R	R		4800												

Test Procedure: AS 1289.6.3.2

Comments: R - Refusal H - High Resistance \ Unable to Penetrate

EXCAVATION - GEOLOGICAL LOG

PIT NO : BH1
FILE / JOB NO : 2025152
SHEET : 1 OF 1

PROJECT : Proposed House
LOCATION : 24 Epacris Avenue, Forestville

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Hand Auger	METHOD : Hand Auger
DATE EXCAVATED : 11/06/2025	LOGGED BY : TH CHECKED BY : TH
EXCAVATION DIMENSIONS :	

DRILLING | MATERIAL

VE / E / F / H PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	HAND PENETROMETER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
	STABLE	Dry		0.0			(FILL) Silty CLAY: low to medium plasticity, brown to dark brown, with gravel and sand, minor roots				FILL
				0.20m			Sandy CLAY: medium plasticity, brown and pale grey, with gravel				RESIDUAL SOIL
				0.5		CI		D	St to VSt		
				1.00m			EXCAVATION BH1 TERMINATED AT 1.00 m Target Depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☐ YES ☒ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : BH2
FILE / JOB NO : 2025152
SHEET : 1 OF 1

PROJECT : Proposed House
LOCATION : 24 Epacris Avenue, Forestville

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Hand Auger	METHOD : Hand Auger
DATE EXCAVATED : 11/06/2025	LOGGED BY : TH CHECKED BY : TH
EXCAVATION DIMENSIONS :	

DRILLING | MATERIAL

VE / E / F / H PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETROMETER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
	STABLE	Dry		0.0			(FILL) Silty CLAY: low to medium plasticity, brown to dark brown, with gravel and sand, minor roots				FILL
				0.20m			Sandy CLAY: medium plasticity, brown and pale grey, with gravel				RESIDUAL SOIL
				0.5		CI		D	St to VSt		
				1.00m			EXCAVATION BH2 TERMINATED AT 1.00 m Target Depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☐ YES ☒ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
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D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : BH3
FILE / JOB NO : 2025152
SHEET : 1 OF 1

PROJECT : Proposed House
LOCATION : 24 Epacris Avenue, Forestville

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Hand Auger	METHOD : Hand Auger
DATE EXCAVATED : 11/06/2025	LOGGED BY : TH — CHECKED BY : TH
EXCAVATION DIMENSIONS :	

DRILLING | MATERIAL

PENETRATION (VE / E / F / H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETROMETER kPa (100 / 200 / 300 / 400)	STRUCTURE & Other Observations
	STABLE	Dry		0.0			(FILL) Silty CLAY: low to medium plasticity, brown to dark brown, with gravel and sand, minor roots				FILL
				0.20m			Sandy CLAY: medium plasticity, brown and pale grey, with gravel				RESIDUAL SOIL
				0.5		CI		D	St to VSt		
				1.00m			EXCAVATION BH3 TERMINATED AT 1.00 m Target Depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☐ YES ☒ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
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See Explanatory Notes for details of abbreviations & basis of descriptions.

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EXCAVATION - GEOLOGICAL LOG

PIT NO : BH4
FILE / JOB NO : 2025152
SHEET : 1 OF 1

PROJECT : Proposed House
LOCATION : 24 Epacris Avenue, Forestville

POSITION :	SURFACE ELEVATION :
EQUIPMENT TYPE : Hand Auger	METHOD : Hand Auger
DATE EXCAVATED : 11/06/2025	LOGGED BY : TH CHECKED BY : TH
EXCAVATION DIMENSIONS :	

DRILLING | MATERIAL

PENETRATION (VE, E, F, H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETROMETER (kPa)	STRUCTURE & Other Observations
	STABLE	Dry		0.0			(FILL) Silty CLAY: low to medium plasticity, brown to dark brown, with gravel and sand, minor roots				FILL
				0.20m			Sandy CLAY: medium plasticity, brown and pale grey, with gravel				RESIDUAL SOIL
				0.5		CI		D	St to VSt		
				1.00m			EXCAVATION BH4 TERMINATED AT 1.00 m Target Depth				
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS NOTES ☐ YES ☒ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
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Job No. : 2025152
Project : Proposed Duplex
Borehole : BH3
Test No. 1
Date: 21/7/2025

Spreadsheet Prepared by: TH

Depth of Borehole 1 m

Field Falling Head Permeability Calculation

As per AS1547-1994

Falling Head

Enter the following test result values

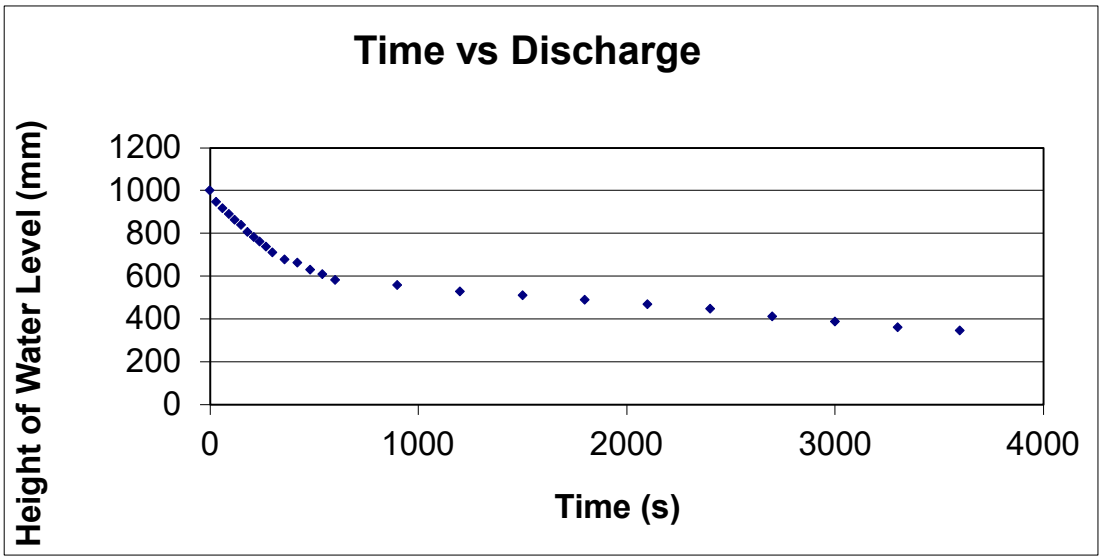
Test hole radius	R(m)=	0.068
Test starting depth (top of hole)	H_1(m)=	1.000
Test finishing depth	H_2(m)=	0.345
Starting time	T_1(sec)=	0.00
Finishing time	T_2(sec)=	3600.00
	T_{total}(sec)=	3600.00

P = 3.7E-05 m/sec

P= 3.2E+00 m/day

Test hole Diamater (m)	0.1360
Test hole Perimeter (m)	0.4273
Test Hole Cross Sectional Area (m^2)	0.0145
Water Level Drop during test (m)	0.6550
Wetted Area (m2)	0.2944
Volume of Water (m^3)	0.0095
Test Duration (s)	3600
Absorption Capacity ($m^3/m^2/s$)	8.98E-06
Absorption Capacity ($L/m^2/s$)	**0.0090**
Absorption Capacity ($L/m^2/d$)	775.7329463

Time Elapsed (s)	Height of water from top of Hole (mm)	Height of Water from Base of Bole (mm)
0	0	1000
30	52	948
60	83	917
90	111	889
120	138	862
150	162	838
180	193	807
210	218	782
240	238	762
270	263	737
300	290	710
360	321	679
420	338	662
480	369	631
540	392	608
600	418	582
900	442	558
1200	472	528
1500	491	509
1800	510	490
2100	532	468
2400	552	448
2700	589	411
3000	612	388
3300	638	362
3600	655	345



Job No. : 2025152
Project : Proposed Duplex
Borehole : BH4
Test No. 1
Date: 21/7/2025

Spreadsheet Prepared by: TH

Depth of Borehole 1 m

Field Falling Head Permeability Calculation

As per AS1547-1994

Falling Head

Enter the following test result values

Test hole radius	R(m)=	0.068
Test starting depth (top of hole)	H_1(m)=	1.000
Test finishing depth	H_2(m)=	0.418
Starting time	T_1(sec)=	0.00
Finishing time	T_2(sec)=	3600.00
	T_{total}(sec)=	3600.00

P = 2.7E-05 m/sec

P= 2.4E+00 m/day

Test hole Diamater (m)	0.1360
Test hole Perimeter (m)	0.4273
Test Hole Cross Sectional Area (m^2)	0.0145
Water Level Drop during test (m)	0.5820
Wetted Area (m2)	0.2632
Volume of Water (m^3)	0.0085
Test Duration (s)	3600
Absorption Capacity ($m^3/m^2/s$)	8.92E-06
Absorption Capacity ($L/m^2/s$)	**0.0089**
Absorption Capacity ($L/m^2/d$)	770.961039

Time Elapsed (s)	Height of water from top of Hole (mm)	Height of Water from Base of Bole (mm)
0	0	1000
30	41	959
60	73	927
90	100	900
120	122	878
150	152	848
180	171	829
210	200	800
240	218	782
270	245	755
300	270	730
360	292	708
420	310	690
480	330	670
540	351	649
600	372	628
900	412	588
1200	451	549
1500	470	530
1800	491	509
2100	510	490
2400	523	477
2700	543	457
3000	556	444
3300	570	430
3600	582	418