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May 2020

NOISE MIGITATION STUDY
SOUTH ARM SKATE PARK

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OVER 30 YEARS OF INDEPENDENT TAILOR-MADE ADVICE

1 INTRODUCTION

Clarence City Council has installed a skate park at the south-east of the South Arm Oval. Once the skate park was in use, an environmental noise assessment was conducted of skate park noise emissions by Pearu Terts and involved the measurement of skate park noise levels under various times and conditions.

The environmental assessment conducted concluded that the skate park noise emission met the applicable conditions in Planning Condition 4 which relates to noise emissions.

To investigate potential noise mitigation options available to further reduce the noise emissions at residential receivers, JTA Health, Safety & Noise Specialists was engaged to perform a desktop noise modelling study of the skate park. The desktop noise modelling study was commissioned by Clarence City Council.

Illustrations of three noise mitigation options were also provided by Clarence City Council to determine the effectiveness of each design.

The desktop noise modelling study included the following:

1) From the information provided in the acoustic report and skate park design drawings, prepare a 3D noise model of the skate park and surrounding local area. Noise modelling will be conducted utilising SoundPLAN software.

2) Implement noise mitigation design options into the noise model and predict the noise impact at residential receivers with each recommended treatment option.

3) Prepare a report detailing the findings of the review and noise modelling outcomes.

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2 SITE DESCRIPTION

South Arm is a town located on the South Arm Peninsula on the outskirts of the greater Hobart area in Tasmania, Australia. The skate park is situated adjacent to the South Arm Oval and is bounded by the following:

- A Tennis court and Harmony Lane to the north
- A community centre and Calverton Hall to the west and South Arm Road and dwellings
- Dwellings and Calverton Place to the south

Several dwellings are located in close proximity to the skate park on both Harmony Lane and Calverton Place with the closest dwellings being to the north and south.

Figure 2.1 details the nearest noise sensitive receivers to the skate park.



Figure 2.1 – Noise Sensitive Receivers and Local Environment

2.1 Skate Park

The skate park is located south east of the South Arm Oval and its foundation is slightly elevated by approximately 1 metre to the surrounding area, while platform levels are elevated approximately 2 metres. Figures 2.2 and 2.3 illustrates the location of the skate park in relation to the surrounding environment and the skate park design respectively. Also presented in Appendix III are the engineering drawings and construction of the skate park.

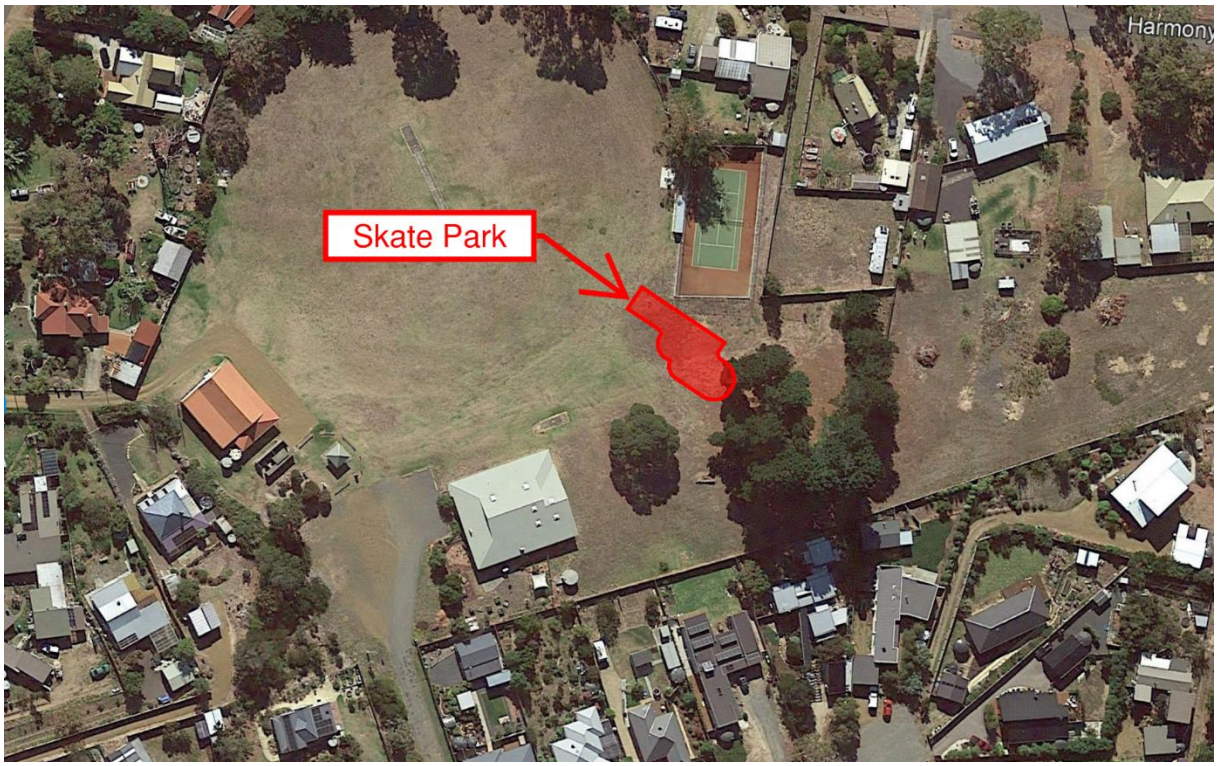


Figure 2.2 – Skate Park and Local Environment

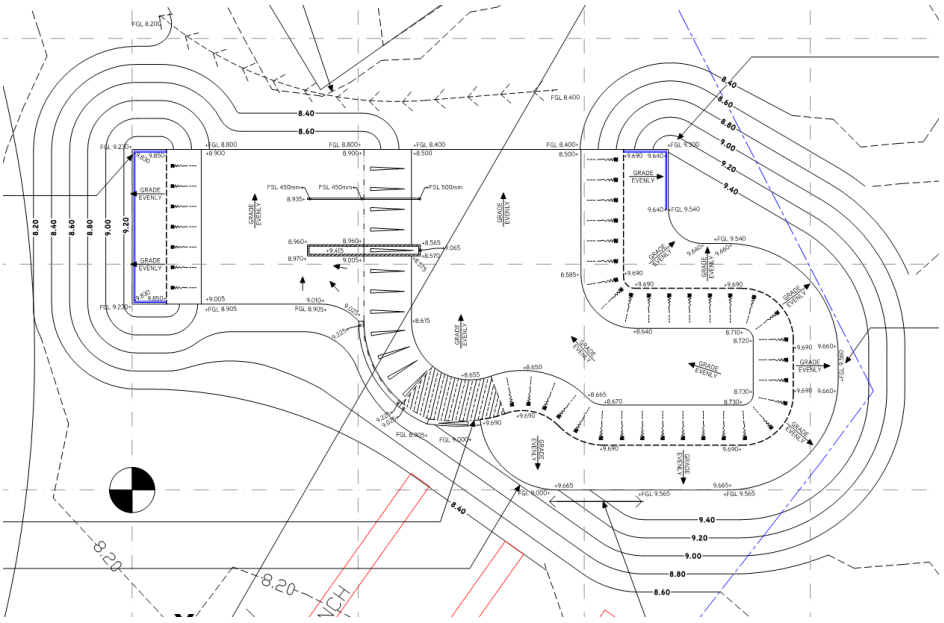


Figure 2.3 – Skate Park Design

3 METHODOLOGY

3.1 Noise Emission Requirements

The Resource Management and Planning Appeal Tribunal have prescribed noise limits for the skate park located in South Arm and provides details on noise measurement procedures, including the measurement of effective noise levels.

Noise limits have been determined by the Tribunal and effective noise levels are to be measured at a point at the site boundary of the nearest noise receptors or a site of complaint. Effective noise levels are to compare with the noise limits to determine compliance.

3.1.1 Noise Limit Criteria

The Resource Management and Planning Appeal Tribunal has set out conditions for the Council by varying the planning permit for the Skate Park at South Arm, by substituting Condition 4 of the planning permit with the following:

- Noise monitoring by a suitably qualified person is to be undertaken within 30 days of the commencement of the use. The noise monitoring is to be undertaken as far as possible at the nearest boundary of 43A Harmony Lane to the skate bowl and also at the point nearest to the skate bowl of the boundary of the nearest residential dwelling in Calverton Place.

- A report from the suitably qualified person verifying the noise levels is to be submitted to Council within 14 days of undertaking the noise monitoring. Measurements are to be in accordance with the methods of the Noise Measurements Procedures Manual issued by the Director or Environmental Management and are to be averaged over a 15-minute time interval.

- If the noise levels exceed the mean L_{max} of 70 dB(A) and an L_{eq} of 57 dB(A) then noise attenuation measures to reduce emissions to achieve compliance with the above threshold are to be determined by the suitably qualified person and implemented to the satisfaction of the Council's Senior Environmental Health Officer within a reasonable period of time, having regard to the nature of the proposed noise attenuation measures.

The environmental noise assessment conducted by Pearu Tetrs (Document Set ID: 3713059) dated the 5th of November 2019 concluded that the skate park has met all relevant permit conditions as well as the Resource Management and Planning Appeal Tribunal conditions stated above.

3.2 Sleep Disturbance Criteria

At present, there is no legislation or guidance in Tasmania for specifically assessing skate park use with regard to noise emissions, particularly during the night time period. Therefore it is proposed to adopt the sleep disturbance criteria commonly adopted in other states when assessing non-industrial, commercial or trade noise sources.

The most commonly adopted impact criteria regarding noise emissions from non industrial, commercial or trade premises is based upon sleep disturbance criteria defined in the New South Wales Environment Protection Authority (EPA) Publication *'Environmental Criteria for Road Traffic Noise'*. The research performed is based on noise associated with vehicles, however this criteria can be used and is widely accepted as an assessment tool for other sources of noise such as voices and local sporting infrastructure. The NSW Environmental Criteria for Road Traffic Noise states the following in relation to sleep disturbance:

- Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.
- One or two noise events per night with a maximum internal noise level 65-70dB(A) are not likely to affect health and wellbeing significantly.

The noise experienced within a habitable room is usually 10dB(A) lower than the noise outside, even if a window is open. Consequently a maximum noise level of 60-65dB(A) outside an open window is unlikely to cause awakenings.

The adopted criteria for this study will be L_{max} 65dB(A).

Note, noise levels below L_{max} 60 dB(A) will be considered acceptable, levels between L_{max} 60 and 65 dB(A) will be considered marginally acceptable, and levels above L_{max} 65 dB(A) will exceed the criteria.

While the sleep disturbance criteria is lower than that of the Resource Management and Planning Appeal Tribunal, it should be noted that the sleep disturbance criteria is assessed at the dwelling rather than the boundary.

3.3 Sound Power vs Sound Pressure

As part of the study being undertaken, both sound pressure and sound power values will be presented and discussed. To provide some clarity on what each of these terms means, a description of each is provided below, first the technical terms and then more simpler explanations:

3.3.1 Technical Descriptions

The sound pressure level (SPL) is the logarithmic measure of the sound pressure measured at a specific point. Specifically it is the logarithmic ratio of the pressure of interest to the reference pressure. The reference pressure is equivalent to the smallest fluctuation in pressure human ears can typically sense as sound. The intention of the SPL is to provide a measure of the sound pressure typically experienced by human ears.

The sound power level (L_w) is a logarithmic measure of source acoustic power expressed in dB. The sound power level is fixed and inherent to the source similar to how electric power is inherent to an electrical device. The resulting sound pressure level due to a given sound power level is dependent on various environmental factors such as distance, acoustic shielding, meteorological factors etc.

3.3.2 Simple Explanation

In real world terms, the sound pressure levels are the noise levels received by the ear or microphone at a particular location away from noise sources, while the sound power level is the noise level emitted by a noise source at its location.

A good analogy is a heater may have a certain power rating, say 1000 Watt, and a thermometer will measure the temperature at certain locations away from the heater. The power of the heater doesn't change whereas the temperature that the thermometer reads will vary depending on the distance to the heater.

If we swap out the heater for a speaker and the thermometer for a microphone or ear in the above analogy, the speaker would have a certain sound power level and the microphone or ear will pick up the corresponding sound pressure level at a certain distance from the speaker.

When sound power levels are discussed further in this report, they relate to the noise level of the source and are not related to a noise level at a certain distance from the source, e.g. they relate to the sound energy of skateboard wheels contacting the skate park. Sound power levels for a noise source are always higher than sound pressure levels at a distance away from the noise source as the sound gets quieter the further away it is measured or heard.

The purpose of utilising sound power levels in acoustics is an accurate prediction of sound pressure levels at a variety of distances can only be completed with sound power levels in real-world environments.

3.4 Sound Level Reduction and Perceptibility

There is a disparency between how sound is heard by humans and the actual level in decibels, especially when considering the difference between two levels. This is due to the logarithmic scale sound is measured in when using decibels, Table 3.1 provides a comparison of how a reduction in noise levels is perceived by human ears vs the actual acoustic reduction in decibels and the associated percentage change.

Table 3.1- Sound Reduction Perceived Vs Actual Reduction

Decibel Reduction from Original Level (dB)	Acoustic Energy Percentage of Original Level	Perceivable Change
1	80%	No change observable
2	63%	
3	50%	Medium reduction noticeable
4	40%	
5	33%	
6	25%	Large reduction noticeable
7	20%	
8	15.5%	
9	12.5%	Sounds half as loud
10	10%	

4 NOISE SOURCES

Noise sources and sound power data were derived from the previous noise assessment report conducted at the completion of the skate park by Pearu Tetrs (Document Set ID: 3713059) dated the 5th of November 2019.

Noise measurements were conducted on 5 separate days from the 13th to 21st of October 2019. Skateboards, Scooters, Bike and Patron noise were monitored over the assessment period of different use cases. Sound Pressure Levels and octave frequencies levels are presented in Appendix II.

JTA assumes that noise measurements were conducted in accordance with EPA Tasmania's Noise Measurement Procedure Manual.

Due to the noise measurement locations being conducted closer to the Skate Park than the residential dwellings, approximate sound power levels of each measurement was determined based on the measurement location to where the noise source was observed. The distance of the noise source was approximated to a centralised position within the Skate Park and the approximate sound power level was then calculated from that location based on measured sound pressure levels at the measurement location. From the resulting sound power levels of the skate park activity, the sound pressure level was predicted to the noise sensitive receptors. Sound Power Levels are presented in Table 4.1 below.

Table 4.1 – Sound Power Levels of Skate Park Activities

Skate Park Condition	Sound Power Level L_w, dB(A) (Noise Level of Source at Source Location)
1-2 Skateboards & Voices	79
2-3 Skateboards & Voices	92
0-1 Skateboards, 0-1 Scooters & Voices	94
0-2 Skateboards, 0-1 Scooters & Voices	96
2 Skateboards, 3 Scooters & Voices	110
0-2 Skateboards, 2-5 Scooters, 1 Bike & Voices	110
1-5 Skateboards, 5 Scooters, 1 Bike &Voices	106

5 NOISE MODELLING

The skate park's noise emissions were predicted by incorporating the relevant noise sources into a computer noise model prepared for the site. The noise modelling was conducted using the software SoundPLAN which implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The model accounts for the following factors:

- Source sound power levels as specified in Appendix II
- Source directivity, tonality and orientation
- Distance attenuation, including source and receptor heights
- Barrier effects due to fences, structures and other buildings
- Ground effects
- Atmospheric attenuation
- Meteorological effects

The skate park noise model includes the following:

- Skate park structures
- Residential dwellings
- Industrial and commercial buildings not associated with site operations
- Topography of the area
- Ground absorption of the local area
- Noise sources associated with the operation of the site

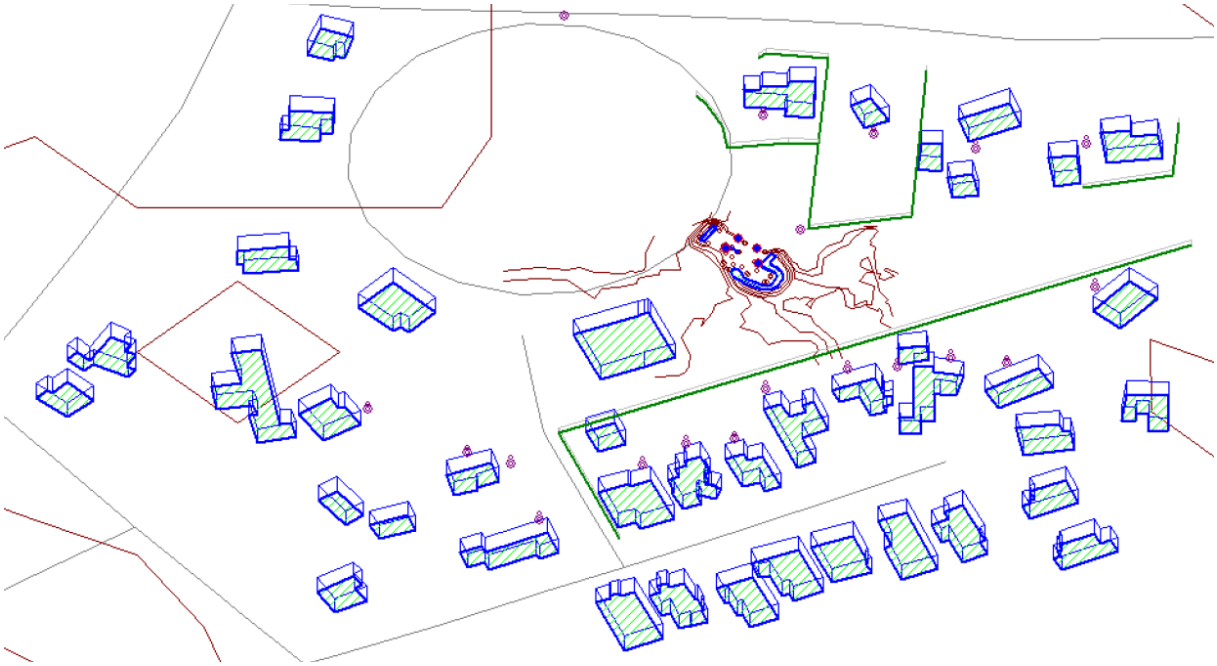


Figure 5.1 – 3D Model Wireframe of South Arm Oval and Skate Park

5.1 Predicted Results for Existing Skate Park

5.1.1 Sleep Disturbance Adopted Criteria

Table 5.1 details the predicted noise levels of the skate park during the night time period to be compared against the sleep disturbance adopted criteria. As the sleep disturbance criteria only applies to the night time period, only two conditions will be assessed, typical and worst-case.

- Typical Conditions: 0-2 Skateboards, 0-1 Scooters & Voices
- Worst-case Conditions: 0-2 Skateboards, 2-5 Scooters, 1 Bike & Voices

It is to be noted that although the worst-case conditions are presented, they are considered very unlikely to occur during the night time period and are not representative of the use of the skate park during the night time period. It is very unlikely the skate park will be utilised during the night time period to the same capacity as the busiest times during the day time period.

Table 5.1 – Predicted Effective Noise Levels at Property Dwelling

Location	Skate Park Conditions	Predicted Noise Level at Dwelling (Sound Pressure Level)	Predicted Level Below Criteria
		L_{max} dB(A)	L_{max} < 65 dB(A)
43 Harmony Lane	Typical	57	Yes
45 Harmony Lane		54	Yes
17 Calverton Place		48	Yes
19 Calverton Place		47	Yes
43 Harmony Lane	Worst-case	73	No[1]
45 Harmony Lane		70	No[1]
17 Calverton Place		64	Marginal[1]
19 Calverton Place		64	Marginal[1]

1 – Worst-case conditions are considered very unlikely to occur during the night time period are included for reference only and not for assessment.

The skate park is predicted to be below the sleep disturbance adopted criteria under typical conditions and the likelihood of causing unreasonable awaking reactions to typical populations is low.

5.1.2 Resource Management & Planning Appeal Tribunal Condition

Due to the skate park already being found to be compliant with all relevant permit conditions, the following comparison of predicted noise levels under a variety of conditions against the Resource Management & Planning Appeal Tribunal Conditions is for reference only.

Skate park effective noise levels were predicted via noise modelling for each of the assessed activities and are presented in Table 5.2 for the existing conditions.

Table 5.2 – Predicted Effective Noise Levels at Property Boundary

Location	Skate Park Conditions	Predicted Effective Noise Level at Boundary (Sound Pressure Level)		Predicted Level Below Criteria	
		L_{eq} dB(A)	L_{max} dB(A)	L_{eq} < 57 dB(A)	L_{max} < 70 dB(A)
43A Harmony Lane	1-2 Skateboards Voices	46	75	Yes	No
17 Calverton Place		39	69	Yes	Yes
19 Calverton Place		39	69	Yes	Yes
43A Harmony Lane	2-3 Skateboards Voices	52	77	Yes	No
17 Calverton Place		45	71	Yes	No
19 Calverton Place		45	70	Yes	No
43A Harmony Lane	0-1 Skateboards 0-1 Scooters Voices	45	68	Yes	Yes
17 Calverton Place		39	62	Yes	Yes
19 Calverton Place		39	62	Yes	Yes
43A Harmony Lane	0-2 Skateboards 0-1 Scooters Voices	53	84	Yes	No
17 Calverton Place		47	77	Yes	No
19 Calverton Place		47	77	Yes	No
43A Harmony Lane	2 Skateboards 3 Scooters Voices	59	72	No	No
17 Calverton Place		54	69	Yes	Yes
19 Calverton Place		54	68	Yes	Yes
43A Harmony Lane	0-2 Skateboards 2-5 Scooters 1 Bike Voices	59	73	No	No
17 Calverton Place		52	68	Yes	Yes
19 Calverton Place		51	68	Yes	Yes
43A Harmony Lane	1-5 Skateboards 5 Scooters 1Bike Voices	56	81	Yes	No
17 Calverton Place		49	74	Yes	No
19 Calverton Place		49	74	Yes	No

6 NOISE MITIGATION OPTIONS

A study of three noise mitigation design options provided by Clarence City Council were modelled to determine their effectiveness in reducing the noise emitted to nearby residences.

The three design options utilise the acoustic principle of attenuating noise by impeding transmission via physical barriers. The three designs are listed below and detailed in sections 6.1, 6.2 & 6.3:

- Option 1 – Earth Berm with Paling Lap Fence
- Option 2 – Earth Berm with Vegetation Screen
- Option 3 – Sound Attenuation Wall

Illustrated in figure 6.1 is the indicative location of the earth berm used in Options 1 & 2 shaded in green.

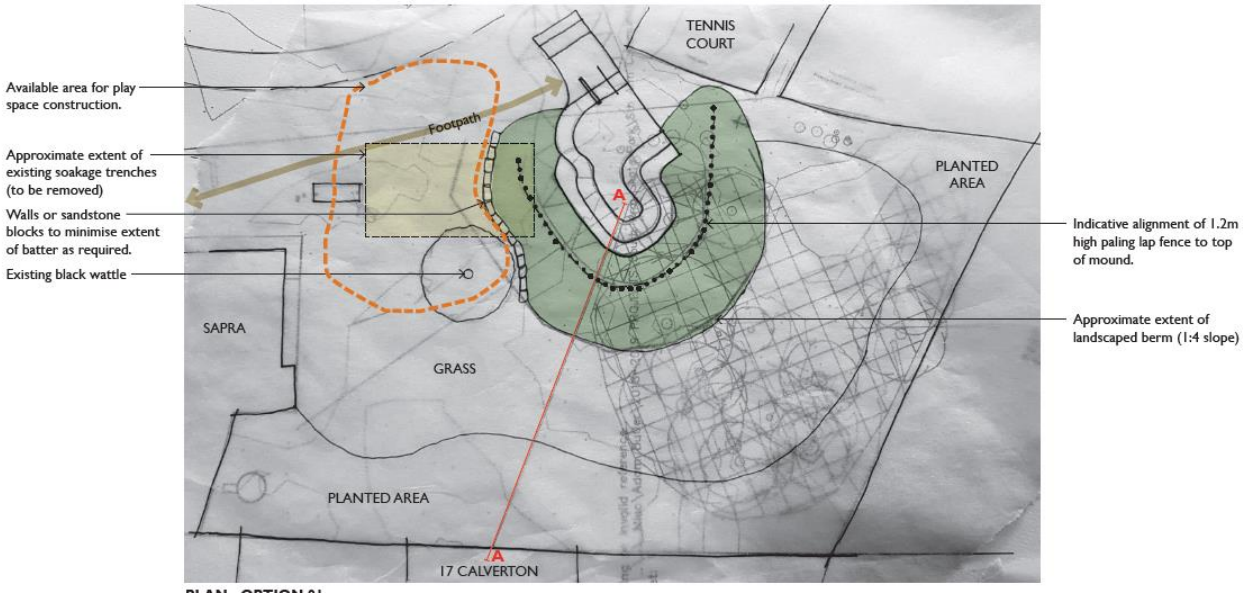


Figure 6.1 – Indicative location Option 1 & 2 earth berm.

6.1.1 Option 1 – Earth Berm with Paling Lap Fence

- 2 metre high earth by 13 metre wide earth berm surrounding the lower half of the skate park.
- At the peak of the earth berm, a 1.2 metre high paling lap fence for further noise attenuation will block the line of sight from the top of the skate park to the dwelling.

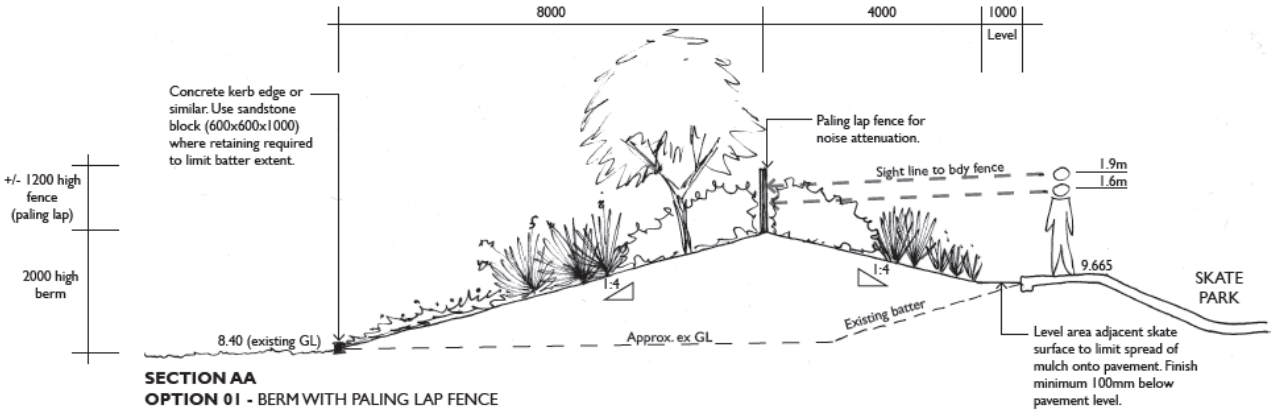


Figure 6.2 – Option 1: Section Earth Berm with Paling Lap Fence

6.1.2 Option 2 – Earth Berm with Vegetation Screen

- 2 metre high earth by 13 metre wide earth berm surrounding the lower half of the skate park.
- Planted batter with small to medium trees lining the slope facing adjacent dwellings and smaller planted batter along the slope facing the skate park.

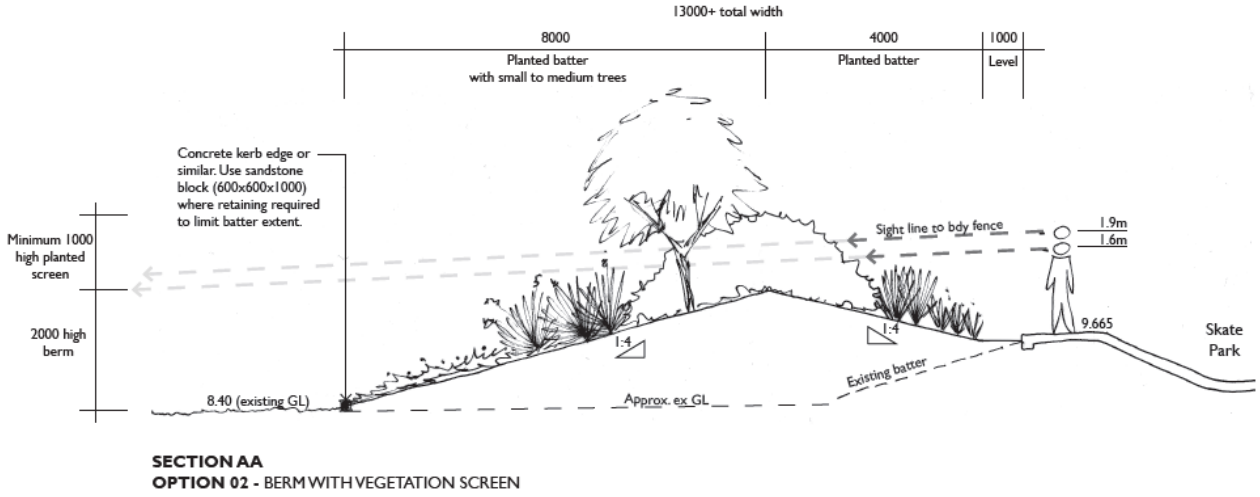


Figure 6.3 – Option 2: Section Earth Berm with Vegetation Screen

6.1.3 Option 3 – Sound Attenuation Wall

- A 3.5 metre high 'curved wall' will be erected around the parameter of the skate park (illustrated in figure 6.5 on the following page).
- Construction of an acoustic wall would consist of a perforated metal skin with an open area ranging between 10 – 30 % and is placed with the perforated side perpendicular to the noise source. A Rockwool or glass wool infill is placed between the perforated skin and a solid metal backing skin.

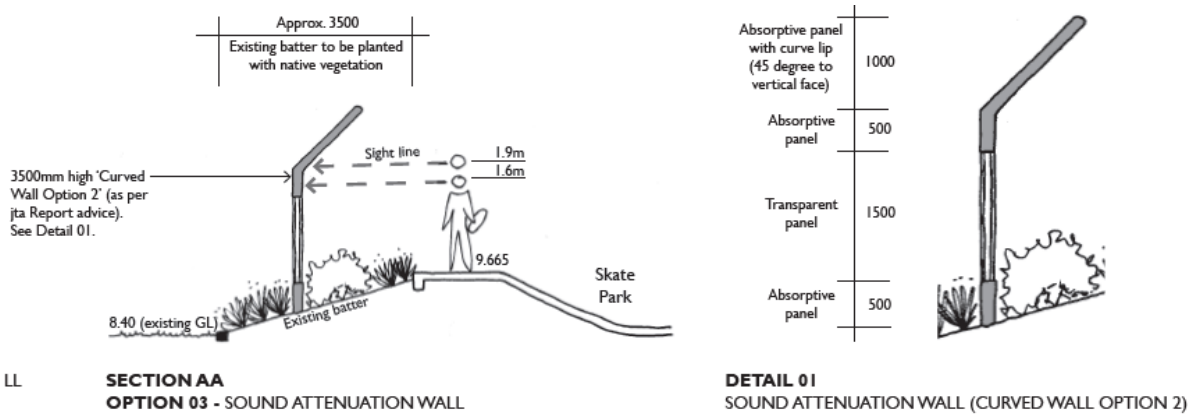


Figure 6.4 – Option 3: Section Sound Attenuation Wall

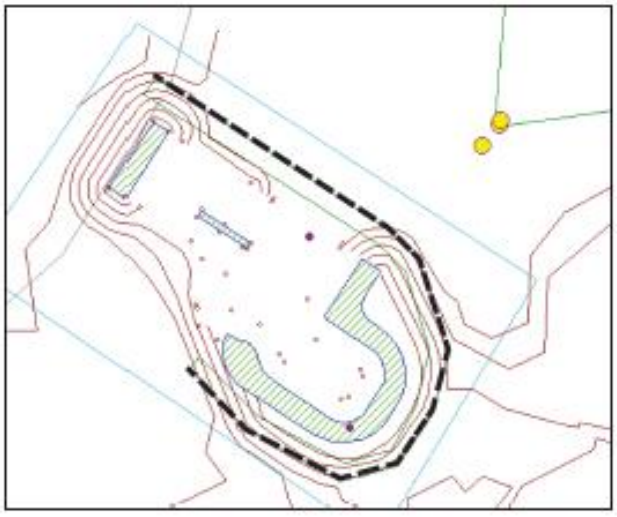


Figure 6.5 – Option 3: Attenuation Wall Location

6.2 Noise Mitigation Option Reductions

6.2.1 Typical Noise Levels

The reductions offered from each design option under typical noise levels are presented in Table 6.1 with a comparison to the base noise levels.

Table 6.1 - Noise Mitigation of Noise Walls (Typical)

Location	Noise Level Reduction (dB)			
	Base Noise Level (Typical)	Option 1	Option 2	Option 3
3 Calverton Pl	40	38 (-2)	40 (-0)	36 (-4)
7 Calverton Pl	39	37 (-2)	38 (-1)	37 (-2)
11 Calverton Pl	49	43 (-6)	48 (-1)	43 (-6)
13 Calverton Pl	51	46 (-5)	49 (-2)	45 (-6)
15 Calverton Pl	50	46 (-4)	50 (0)	44 (-6)
17 Calverton Pl	48	44 (-4)	48 (0)	43 (-5)
19 Calverton Pl	48	43 (-5)	47 (-1)	43 (-5)
21 Calverton Pl	48	45 (-3)	47 (-1)	44 (-4)
23 Calverton Pl	49	44 (-5)	48 (-1)	44 (-5)
25 Calverton Pl	48	42 (-6)	46 (-2)	39 (-9)
43 Harmony Lane	57	57 (-0)	57 (0)	49 (-8)
45 Harmony Lane	54	53 (-1)	54 (0)	48 (-6)
55 Harmony Lane	50	45 (-5)	48 (-2)	46 (-4)
65 Harmony Lane	43	37 (-6)	40 (-3)	36 (-6)
Average Reduction		**4**	**1**	**6**

6.2.2 Worst-case Noise Levels

The reductions offered from each design option was calculated to the surrounding residences and is detailed in Table 6.2. The worst-case noise profile was used to simulate the period of greatest disturbance to sleep and other relaxation periods.

Table 6.2 – Noise Mitigation of Noise Walls (Worst Case)

Location	Noise Level Reduction (dB)			
	Base Noise Level (Worst Case)	Option 1	Option 2	Option 3
3 Calverton Pl	55	54 (-1)	56 (+1)	52 (-3)
7 Calverton Pl	53	53 (0)	54 (+1)	56 (+3)
11 Calverton Pl	64	59 (-5)	64 (0)	58 (-6)
13 Calverton Pl	66	62 (-4)	65 (-1)	64 (-2)
15 Calverton Pl	66	62 (-4)	66 (0)	62 (-4)
17 Calverton Pl	64	60 (-4)	64 (0)	60 (-4)

Location	Noise Level Reduction (dB)			
	Base Noise Level (Worst Case)	Option 1	Option 2	Option 3
19 Calverton Pl	64	59 (-5)	63 (-1)	59 (-5)
21 Calverton Pl	64	61 (-3)	63 (-1)	62 (-2)
23 Calverton Pl	66	60 (-6)	64 (-2)	62 (-4)
25 Calverton Pl	63	58 (-5)	62 (-1)	55 (-8)
43 Harmony Lane	73	72 (-1)	72 (-1)	67 (-6)
45 Harmony Lane	70	69 (-1)	70 (0)	64 (-6)
55 Harmony Lane	63	60 (-3)	62 (-1)	63 (0)
65 Harmony Lane	59	53 (-6)	56 (-3)	53 (-6)
Average Reduction		**3.3**	**1**	**3.7**

7 DISCUSSION

Several noise mitigation options were investigated as possible solutions to reduce the noise emissions from the skate park. Noise modelling of each option was conducted to predict the effectiveness of the design. A worst-case scenario used to simulate the duration when the noise would be most disturbing and have the greatest effect on sleep and other relaxation periods.

Noise modelling of Option 1's earth berm and paling lap fence proved that the design provides medium to high reduction at most dwellings. The addition of the paling lap fence demonstrates the advantage of obstructing the line of sight between the skate park users and the surrounding dwellings, thus blocking a direct line of noise transmission as well.

Predicted results of Option 2's design with its similar earth berm design as Option 1 and addition of vegetation, indicates the acoustic transparency and the lack of efficiency that foliage has on attenuating noise transmissions. Although there was some noise attenuation, the average reduction is far less than the other two options. It is also to be noted that at two locations the effective noise levels increased by 1 decibel and is likely due to the noise flanking of the earth berm. This increase would also be barely noticeable by the receiver.

Option 3 results show it provided the greatest average reduction compared to the other two designs. The engineered design and incorporation of acoustic panelling, transparent opening and flanged upper section has proven that this option considers acoustic characteristics such as flanking and direct transmission and adsorption through the body wall. It was however expressed by Clarence City Council that due to the physical construction of the acoustic wall and its use of perforated metal would pose as a potential safety risk that warranted further investigation on its feasibility outside of this report. Thus the alternative design such as Option 1 may be considered preferable over option 3 due to its more simplistic design, lower construction cost and less visual impact compared with option 3.

The study of the three design option under typical and worst-case condition also indicates that Options 1 and 3 offers significate noise reductions that the effective noise levels at the dwellings along Calverton Place are below the sleep disturbance criteria of L_{MAX} 65 dB(A). Thus, less disturbance to sleep and improved respite times.

8 30 Years of Independent Tailor-Made Advice

JTA is one of Australia's leading independent workplace consultancies. For 30 years we've helped businesses manage their occupational health, safety and noise requirements. We pride ourselves on our ability to understand a client's needs and provide tailor-made advice. Our team of specialist consultants offer pragmatic recommendations based on innovative scientific solutions and legislative compliance. Creating healthy, safe and productive workplaces is what we do every day.

APPENDIX I – Glossary of Terms

ABL	The Assessment Background Level (ABL) is the single figure background level representing each assessment period (daytime, evening and night-time) for each day. It is determined by calculating the 10th percentile (lowest 10 percent) background level (L_{A90}) for each period.
Adverse meteorological conditions	Meteorological conditions under which noise propagation is enhanced. This typically includes the presence of wind and temperature inversions.
A-weighting	Refers to an adjustment made to the noise level reading to take into account the tonal composition of a noise relative to the ear's response to the various tones that make up the noise. A-weighting is done to make sure that the noise level reading properly reflects the loudness of the noise as perceived by the "average" human ear.
dB(A)	Decibel level with an applied A-weighting.
dB(Lin)	Decibel level with a Linear weighting i.e. no frequency weighting applied.
Decibel, dB	Decibel is a logarithmic unit used to describe the ratio of a signal level relative to a reference level and is used to describe sound pressure and sound power magnitudes.
L_1	The L_1 level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_1 level for 99% of the time.
L_{10}	The L_{10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{10} level for 90% of the time. The L_{10} is a common noise descriptor for environmental noise and road traffic noise.
L_{50}	The L_{50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{50} level for 50% of the time.
L_{90}	The L_{90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{90} level for 10% of the time. This measure is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level (L_{eq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{max}	The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.
L_n	The level exceeded for N% of the monitoring time.
Neutral meteorological conditions	Meteorological conditions under which no enhancements to noise propagation are presents, i.e. temperature inversions and windy conditions.
RBL	The Rating Background Level (RBL) for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night-time.
Sound Power Level (SWL)	A logarithmic measure of source acoustic power expressed in dB. The sound power level is fixed and inherent to the source similar to how electric power is inherent to an electrical device. The resulting sound pressure level due to a given sound power level is dependent on various environmental factors such as distance, acoustic shielding, meteorological factors etc.
Sound Pressure Level (SPL)	The sound pressure level is the logarithmic measure of the sound pressure measured at a specific point. Specifically it is the logarithmic ratio of the reference pressure to the pressure of interest. The reference pressure is equivalent to the smallest fluctuation in pressure human ears can typically sense as sound. The intention of the SPL is to provide a measure of the sound pressure typically experienced by human ears.
Stability Class	The system of classifying atmospheric stability using considerations of solar radiation, surface wind speed, cloud cover and temperature lapse rate. The scale ranges from A (strongly unstable) to F (moderately stable)
Temperature Inversion	An atmospheric condition when the temperature gradient in the air is inverted so that sound waves are refracted in the air back towards the ground, enhancing the distance over which noise propagates.

The following table presents example activities with their typical sound pressure level in dB(A).

Sound Pressure Level dB(A)	Example Activity
120	Jet aeroplane take off at 100m
110	Amplified rock concert
100	Pneumatic drill/jackhammer at 1 metre
80	Heavy vehicle passes close by
60	Normal conversation at 1 to 2 metres
40	Quiet business office
20	Quiet bedroom at night
0	Threshold of hearing

APPENDIX II- SOUND PRESSURE LEVEL DATA & STATISTICALS

Spectral analysis of measured noise

Date	13/10/2019		16/10/2019		17/10/2019		19/10/2019				21/10/2019				
Location	Loc 2	Loc 3	Loc 2	Loc 3	Loc 2	Loc 2	Loc 2	Loc 3	Loc 3	Loc 3	Loc 3	Loc 3	Loc 3	Loc 2	Loc 3
Time	13:54	14:23	14:31	14:51	18:23	18:41	16:22	16:40	17:04	17:22	18:08	18:25	18:45	19:05	19:24
Duration	18.5 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min
Activity	3 skb + 3 scoot + voices	4 scoot + voices	No users	No users	3 scoot + voices	No users	1-5 skb + 5 scoot + 1 bike + voices	0-2 skb + 2-5 scoot + 1 bike + voices	3-4 skb + 1-4 scoot + 0-1 bike + voices	2 skb + 3 scoot + voices	0-2 skb + 1 scoot + voices	0-1 skb + 0-1 scoot + voices	0-2 skb + voices	2-3 skb + voices	0-2 skb + 0-1 scoot + voices
Measure	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq
Overall A	49.2	44.4	39.0	39.0	46.7	38.2	57.1	52.9	53.3	54.2	48.0	39.8	44.8	51.3	47.7
C	62.7	55.1	62.9	51.0	56.8	47.7	71.3	70.3	65.3	70.2	53.8	51.5	52.0	58.6	53.6
Octave Hz 31.5	60.8	52.3	59.8	48.4	54.1	45.1	69.8	68.0	62.8	68.0	48.7	48.2	48.7	55.7	47.5
63	53.7	44.8	49.9	45.8	47.1	42.5	60.8	57.6	53.0	58.1	47.9	44.9	44.9	47.1	44.7
125	44.1	45.1	43.1	45.6	44.7	33.1	50.3	50.8	47.4	49.2	45.3	45.5	46.8	41.5	47.1
250	38.2	32.6	36.8	31.4	35.5	31.7	45.1	47.8	43.8	45.5	37.3	35.4	36.2	41.8	38.2
500	43.7	37.3	34.0	30.7	39.2	32.0	50.4	48.4	45.7	46.4	46.3	33.8	35.3	44.6	47.1
1k	44.8	41.8	34.5	32.5	42.4	33.7	52.3	48.4	47.2	46.8	43.4	33.0	34.6	46.9	43.5
2k	43.4	36.5	30.0	33.5	39.9	31.6	50.6	45.7	46.4	45.6	40.5	32.0	36.3	45.6	38.1
4k	39.3	33.6	28.7	31.6	39.0	29.6	49.2	43.0	47.3	49.5	31.6	33.9	41.4	42.0	31.2
8k	30.4	22.7	26.9	17.5	32.7	22.8	44.4	36.1	41.0	44.7	23.0	23.9	32.9	33.2	22.3

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Version: 1, Version Date: 21/11/2019

Measurements and statistical analysis of noise over 15-18.5 min periods, dB(A)

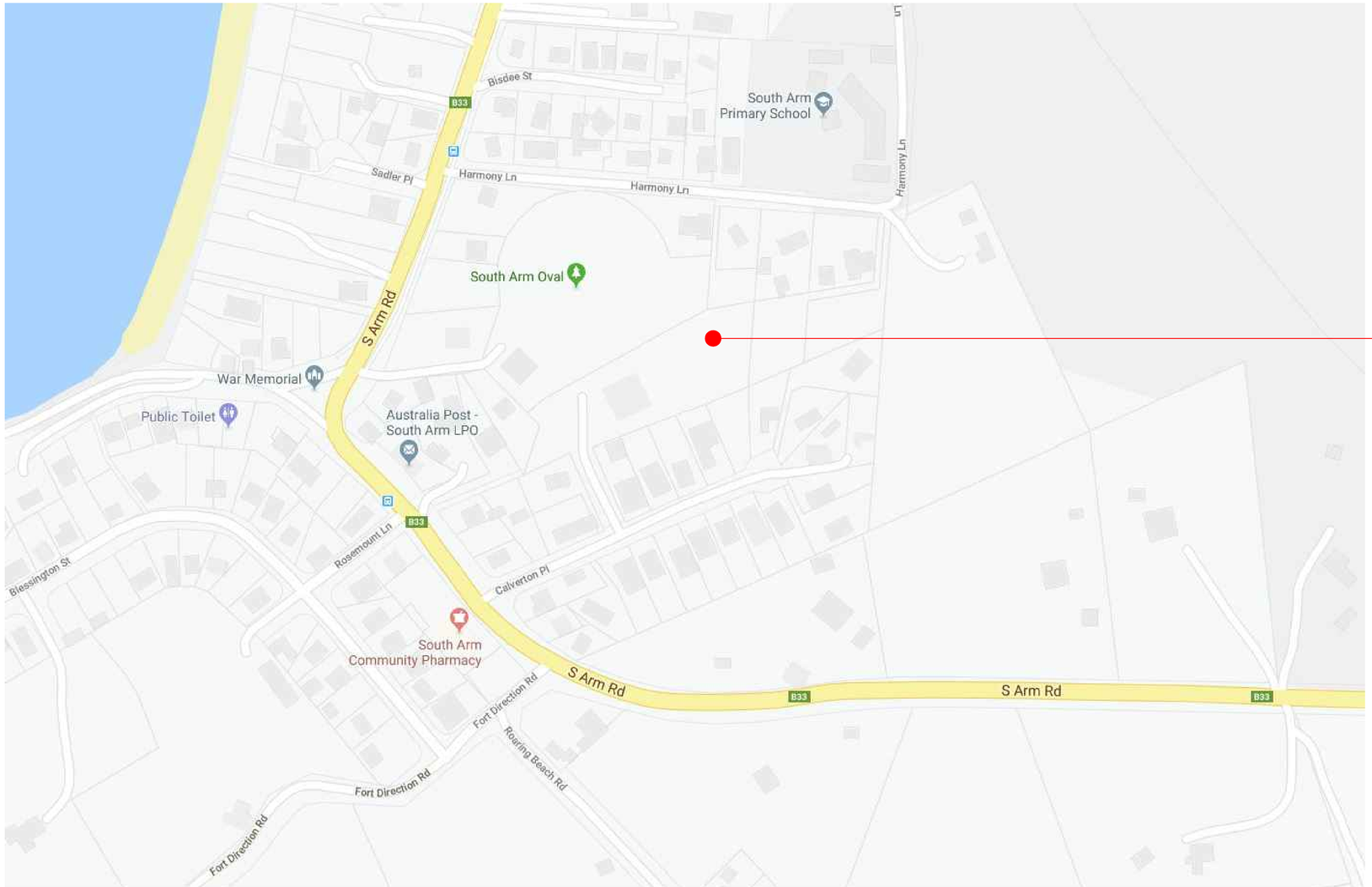
Date	13/10/2019		16/10/2019		17/10/2019		19/10/2019				21/10/2019				
Location	Loc 2	Loc 3	Loc 2	Loc 3	Loc 2	Loc 2	Loc 2	Loc 3	Loc 3	Loc 3	Loc 3	Loc 3	Loc 3	Loc 2	Loc 3
Time	13:54	14:23	14:31	14:51	18:23	18:41	16:22	16:40	17:04	17:22	18:08	18:25	18:45	19:05	19:24
Duration	18.5 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min	15 min
Samples	11100	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
Activity	3 skb + 3 scoot + voices	4 scoot + voices	No users	No users	3 scoot + voices	No users	1-5 skb + 5 scoot + 1 bike + voices	0-2 skb + 2-5 scoot + 1 bike + voices	3-4 skb + 1-4 scoot + 0-1 bike + voices	2 skb + 3 scoot + voices	0-2 skb + 1 scoot + voices	0-1 skb + 0-1 scoot + voices	0-2 skb + voices	2-3 skb + voices	0-2 skb + 0-1 scoot + voices
Lmax	72.9	76.8	55.7	64.5	70.1	58.9	83.1	68.9	74	71.5	78.7	62.7	69.6	77	76.8
L0.1	65.6	60.8	48.0	57.1	63.8	53.6	73.3	65.0	67.2	67.3	73.2	55.8	65.4	72.0	72.8
L1	59.3	51.9	43.8	49.7	57.9	48.2	68.1	59.8	62.0	63.2	50.3	49.9	55.6	62.4	52.4
L5	54.3	46.9	42.1	41.6	52.6	42.6	62.1	56.0	58.2	59.9	44.3	43.9	48.6	55.8	45.6
L10	51.9	44.5	41.1	39.0	49.8	40.3	59.3	54.6	56.5	57.8	41.9	41.2	45.4	52.3	42.5
L50	44.5	37.8	38.3	35.4	40.0	35.4	52.1	51.8	50.0	50.7	38.0	36.6	38.2	44.2	38.2
L90	39.0	34.8	36.0	33.3	35.4	32.6	46.4	49.8	47.2	47.9	36.0	34.6	35.1	40.3	35.8
L95	37.8	34.2	35.1	32.8	34.4	32.1	45.3	49.4	46.5	47.2	35.5	34.1	34.5	39.2	35.4
L99	36.0	32.8	33.2	32.0	32.9	31.2	43.8	48.9	45.6	46.4	34.6	33.5	33.5	37.1	34.8
Lmin	33.2	31.0	31.5	31.1	31.1	29.2	42.0	47.7	44.4	45.1	33.8	32.3	32.0	35.6	33.8
Leq A	49.2	44.4	39.0	39.0	46.7	38.2	57.1	52.9	53.3	54.2	48.0	39.8	44.8	51.3	47.7

The first measurement on 19/10/2019 met the Leq = 57 dB(A) threshold due in part to strong breeze interacting with the adjacent tree

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Version: 1, Version Date: 21/11/2019

APPENDIX III- SKATE PARK CONSTRUCTION DRAWINGS

SOUTH ARM SKATE PARK



PROPOSED LOCATION OF NEW FACILITY.

DRAWING INDEX

NO.	DRAWING TITLE
19013_CD000	Title Page and Drawing Index
19013_CD001	General Notes
19013_CD010	Existing Conditions Plan
19013_CD011	Demolition Plan
19013_CD012	Site Plan
19013_CD100	Grading Plan
19013_CD101	XY Coordinate Plan
19013_CD102	Dimension Plan
19013_CD103	Surface Finishes Plan
19013_CD104	Concrete Joint Plan
19013_CD105	Coping Plan and Section Key
19013_CD200	Sections 01
19013_CD300	Details 01
19013_CD301	Details 02

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
TITLE PAGE & DRAWING INDEX

SCALE	DRAWN	CHECKED	DIRECTOR
NTS	CM	MH	JUT

NTS
0 0 0 0 0 0 0
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DRAWING NUMBER **19013_CD000** REV **00**

GENERAL NOTES:

ENGINEERING:

1. ALL ENGINEERING DETAILS, SPECIFICATIONS AND CONCRETE JOINTS SHALL BE REVIEWED AND CERTIFIED BY THE DESIGNER (CONVIC).

SITE:

1. CONTRACTOR TO VERIFY LOCATION OF AND ISOLATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS (LOCATIONS SHOWN ON PLANS ARE APPROXIMATE). ALL EXISTING SERVICES TO BE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION UNLESS NOTED OTHERWISE.
2. HEIGHT DATUM, SET OUT BASE POINT/LOCAL GRID TO BE LOCATED ON SITE BY LICENSED SURVEYOR. NEW WORKS TO BE SETOUT FROM LOCAL GRID AND LOCATIONS DOUBLE CHECKED FOR DISCREPANCIES FROM KNOWN FIXED POINTS ON SITE.
3. SITE SCRAPE TO AREA OF PROPOSED CONCRETE WORKS TO DEPTH APPROVED BY GEOTECHNICAL ENGINEER.
4. CONTRACTOR TO CHECK ALL DIMENSIONS AS SHOWN. ANY DISCREPANCIES OR LACK OF CLARITY SHALL BE INDICATED BY CONTRACTOR TO DESIGNER (CONVIC) FOR CLARIFICATION IN WRITING PRIOR TO WORKS COMMENCING/CONTINUING.
5. CONTRACTOR TO ENSURE ALL EXISTING TREES AND EXISTING SITE FEATURES ARE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION UNLESS NOTED OTHERWISE ON DEMOLITION PLAN.

EARTHWORKS:

1. REFER TO SOUTH ARM SKATE PARK GEOTECHNICAL ASSESSMENT V2 - JULY 2019 BY G.E.S.
2. WITHIN THE FOOTPRINT OF ANY PROPOSED PAVEMENT, ANY LOOSE SURFACE TURF AND SOIL SHALL BE REMOVED AND STOCKPILED FOR REUSE ON MOUNDING.
3. ALL SUBGRADE PREPARATION WORK UNDER ALL CONCRETE PAVEMENT AREAS AND LOW PROFILE RETAINING WALLS ARE TO BE PROTECTED, ROLLED AND COMPACTED AS PER RECOMMENDATIONS SET OUT IN THE GEOTECHNICAL REPORT. ONCE SUBGRADE HAS BEEN PREPARED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT, THE GEOTECHNICAL ENGINEER SHALL TEST AND CONFIRM THAT A MIN. CBR OF 3% HAS BEEN ACHIEVED.
4. INSTALL STABLE CLEAN FILL COMPACTED TO 95 % (MMDD) TO ACHIEVE DESIGN LEVELS. FILL SHALL BE PLACED AND COMPACTED IN 200mm LAYERS. COMPLY WITH AS 3798.
5. ALL NEW AND DISTURBED FINISHED EARTH AREAS TO BE NEAT, CLEAN, PRESENTABLE AND EVENLY GRADED TO TIE INTO NATURAL GROUND LEVELS, EARTH SURFACE SHALL BE GRADED AWAY FROM HARDSCAPE TO ENSURE NO POOLING OF WATER OCCURS AGAINST HARDSCAPE EDGES.

LANDSCAPING:

1. ALL NEW AND DISTURBED EARTH MOUNDING SHALL BE NEAT CLEAN AND PRESENTABLE AND MOUNDING BLEND NEATLY INTO EXISTING EARTH LEVELS.
2. SPREAD AND APPLY STOCKPILED TOP SOIL NEATLY OVER MOUNDING TO A MINIMUM 100mm DEEP LAYER.
3. RAKE TO LAYER OF TOP SOIL TO GIVE A LOOSE SURFACE TO RECEIVE SEED. APPLY ALL AREAS OF TOP SOIL WITH GRASS SEEDING. COUNCIL TO CONFIRM GRASS SEED TYPE. LIGHTLY RAKE TO COVER SEED. WATER IN SEEDS AND SOAK TOP SOIL WITH A FINE SPRAY.

CONCRETE:

1. ALL MATERIALS, WORKMANSHIP, HANDLING PLACEMENT SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS AND THE SPECIFICATION.
2. ALL CONCRETE TO BE 32MPa. LIMIT MOISTURE CONTENT. (UNO)
3. ENSURE ADEQUATE VIBRATION OF CONCRETE IS ACHIEVED. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
4. SLUMP OF CONCRETE 70mm -100mm. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
5. CONCRETE THICKNESS (UNO):
   - 150mm THICK RAMPS.
   - 130mm PLATFORMS AND FLAT BOTTOMS.
6. PROVIDE EDGE BEAMS OR DOWNTURN WALLS TO APPROPRIATE DEPTH WHERE CONCRETE WORKS TERMINATE AGAINST EARTH MOUNDING.
7. CONSTRUCTION JOINTS SHALL BE CONSTRUCTED AS PER DETAILS.
8. SAW CUTS TO BE SAWN AS SHOWN ON PLANS. SAW CUT DEPTH TO BE 30MM DEEP. LOCATION OF STEEL REINFORCEMENT SHALL BE MARKED (ON FORM WORK OR SIMILAR) PRIOR TO CONCRETE POUR TO ENABLE ACCURATE POSITIONING OF SAW CUTS. REFER TO 'NOMINAL SAW CUT' DETAIL. SAW CUTS TO BE ACCURATE, STRAIGHT AND TRUE. SAW CUT ALL SLABS MAX 24 HRS AFTER POUR. CAULK ALL SAWCUTS WITH 'PARCHEM EMERSEAL PU40' OR SIMILAR APPROVED.
9. ALL CONCRETE SKATE SURFACES (PLATFORMS, BASES, FLAT BANKS, TRANSITIONS ETC) TO HAVE BURNISHED STEEL TROWEL FINISH.
10. VERTICAL OFF FORM CONCRETE SURFACES (THAT IS NOT A SKATE SURFACE) SHALL HAVE CLASS 2 OFF FORM FINISH AS PER A.S. 3610 - FORMWORK FOR CONCRETE.
11. CONCRETE BLEND ZONE
    DESCRIBES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
12. FOR CURING, COVER FOR SEVEN DAYS WITH PLASTIC OR APPLY LIQUID MEMBRANE AS PER A.S. 3799 - LIQUID MEMBRANE-FORMING CURING COMPOUNDS FOR CONCRETE WITHIN 1 HOUR OF CONCRETE FINISHING.
13. ALL EXPOSED CONCRETE SURFACES TO BE APPLIED WITH 'AVISTA GENERAL PURPOSE SEALER MATT' OR SIMILAR APPROVED. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
14. SOME SURFACE CRACKING TO CONCRETE SLABS IS TO BE EXPECTED AS THE CONCRETE CURES. THIS PROBLEM IS OF NO STRUCTURAL SIGNIFICANCE AND WILL NOT AFFECT THE PERFORMANCE OF THE SLAB. REFER TO A.S.3600 - CONCRETE STRUCTURES AND A.S.2870-1996 - RESIDENTIAL SLABS AND FOOTINGS FOR FURTHER INFORMATION.
15. CONCRETE SURFACE TO BE GRADED AS PER PLANS TO ENSURE NO POOLING OF WATER WILL OCCUR ON CONCRETE SURFACE OR AGAINST WALLS, SEATS, SKATE ELEMENTS ETC.

CONCRETE REINFORCEMENT:

1. REINFORCEMENT SHALL BE GRADE 500 MPa CONFORMING TO AUSTRALIAN STANDARD AS 4671 STEEL REINFORCING.
2. CONCRETE COVER 50mm MIN.
3. TRIMMER BARS - 2xN12x2000 LONG TO ALL INTERNAL SLAB CORNERS. LAYED OUT AS INDICATED ON PLANS. TRIMMER BARS MAY BE BENT TO AVOID CROSSING SAW CUTS.
4. FLAT SLABS - SL92 MESH OR N12 @ 200 CRS EW (UNO).
5. VERTICAL WALLS - SL92 MESH OR N12 @ 300 CENTERS EW.
6. SLOPES (TRANSITIONS, BANKS, ROLLOVERS ETC) - SL92 MESH OR N12 @ 300 CENTERS EW.
7. ALL REINFORCEMENT SHALL BE HELD RIGIDLY IN POSITION WITHIN THE SPECIFIED TOLERANCES BEFORE AND DURING CONCRETE PLACING WITH APPROVED BAR CHAIRS , NON CORROSIVE BAR CHAIRS SHALL BE USED FOR ALL OFF FORM SURFACES.
8. CONDUITS AND OTHER CAST IN ITEMS SHALL BE FABRICATED AND INSTALLED SO THAT NO CUTTING, BENDING OR DISPLACEMENT OF THE REINFORCEMENT FROM ITS PROPER POSITION WILL BE REQUIRED.
9. SPLICES SHALL ONLY BE USED AS SHOWN ON THE DRAWINGS OR WHEN BARS LONGER THAN NORMAL STOCK LENGTH WOULD BE REQUIRED. IN LAP SPLICES, THE OVERLAP LENGTH SHALL BE TO THE REQUIREMENTS OF AS 3600 OR AS OTHERWISE DIMENSIONED ON THE DRAWINGS.

SKATE STEEL WORK:

1. REFER TO PLANS AND SECTIONS FOR COPING OR MEMBER TYPE AND PROFILE. ALL STEEL PLATE AND MEMBER WALLS SHALL BE MINIMUM 5mm THICK (UNO).
2. EXPOSED ENDS OF MEMBERS SHALL BE CAPPED, FULLY WELDED AND GROUND SMOOTH.
3. ALL CONNECTIONS OF STEEL MEMBERS SHALL BE MITRED, FULLY WELDED AND GROUND SMOOTH.
4. ALL WELDS SHALL BE 6CFW (UNO)
5. ALL RADIUSED COPING PIECES TO JOIN AT TANGENT POINTS TO ENSURE A SMOOTH AND SEAMLESS JOIN (FREE OF KINKS) BETWEEN ALL COPING.
6. COPING SHALL BE INSTALLED INTO CONCRETE AS DETAILED.
7. ALL STEEL MEMBERS SHALL HAVE 'DURAGAL' OR HOT DIP GALVANISED PROTECTIVE COATING (UNO). ALL WELDS OR BROKEN PROTECTIVE COATINGS SHALL BE RECOATED WITH COLD GAL WHICH SHALL OVERLAP RETAINED PROTECTIVE COATING BY 100mm.
8. ENSURE BLOW HOLES REQUIRED FOR HOT DIP GALVANISING PROCESS ARE ON INTERNAL NON-VISIBLE FACES.
9. ENSURE NO SHARP EDGES ON ANY STEEL WORK.
10. CHS COPING:
    - 10.1. SHALL BE 50NB 4.5mm THICK (UNO).
    - 10.2. ALL LENGTH AND RADIUS MEASUREMENTS ARE TAKEN ALONG THE CENTERLINE OF CHS COPING.
    - 10.3. WHERE CHS COPING CHANGES GRADE A 3000mm (UNO) RADIUS CHS PIECE MUST BE INSTALLED BETWEEN THE ADJACENT COPING PIECES TO ENSURE A SMOOTH AND SEAMLESS JOIN (FREE OF KINKS) BETWEEN ALL COPING.
11. PREFABRICATED STEEL ELEMENTS:
    - 11.1. SHALL BE FABRICATED OFF SITE.
    - 11.2. ALL MEMBER SIZES AS DETAILED.
    - 11.3. ALL MEMBERS SHALL BE MITRED, FULLY WELDED, ENDS CAPPED, WELDS GROUND SMOOTH, REO WELDED AND ENTIRE PIECE HOT DIP GALVANISED AS ONE UNIT. NO ONSITE WELDS ARE PERMITTED.
    - 11.4. ENSURE ALL REINFORCING IS FABRICATED TO ALLOW MINIMUM 50mm CONCRETE COVER.

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
GENERAL NOTES

SCALE	DRAWN	CHECKED	DIRECTOR
NTS	**CM**	**MH**	**JUT**

NTS
0 0 0 0 0 0 0
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DRAWING NUMBER: **19013_CD001** REV: **00**

LEGEND:

EXISTING TREE

25.00 EXISTING CONTOUR - MAJOR

24.80 EXISTING CONTOUR - MINOR

DIGITAL SURVEY PREPARED AND PROVIDED BY:
CLARENCE CITY COUNCIL

5M CRICKET OVAL BUFFER.

3000 CRICKET OVAL BUFFER.

CRICKET OVAL

TENNIS COURT

43a HARMONY LANE

67 HARMONY LANE

36m SETBACK FROM ADJACENT BOUNDARY

ALL EXISTING SIGNIFICANT TREES IN THIS ZONE RECENTLY REMOVED BY OTHERS

SOAKAGE TRENCHES. EXACT LOCATION TO BE DETERMINED ON SITE.

SOAKAGE TRENCH

20m TRENCHES

SOAKAGE TRENCH

SOAKAGE TRENCH

SEPTIC TANK

SEPTIC TANK

BOUNDARY LINE

3m SETBACK FROM ADJACENT BOUNDARY

COMMUNITY CENTRE

19 CALVERTON PLACE

17 CALVERTON PLACE

15 CALVERTON PLACE

8.00 8.00 8.20 8.40 8.60 8.60 8.40 8.40 8.60 8.80 8.80 8.60 8.20

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DRAWING TITLE
EXISTING CONDITIONS PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:200 @ A1	CM	MH	JUT

1:200 @ A1
2 0 2 4 6 8 10
LENGTHS ARE IN METRES

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DRAWING NUMBER **19013_CD010** REV **00**

LEGEND:

- EXISTING SITE FEATURES - TO BE DEMOLISHED
  ALL WASTE TO BE REMOVED FROM SITE
- EXISTING TREE
  TO BE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION
- 25.00 EXISTING CONTOUR - MAJOR
- 24.80 EXISTING CONTOUR - MINOR
- EXTENT OF WORKS
- OUTLINE OF PROPOSED NEW SKATEPARK AND HARDSTAND AREA

5M CRICKET OVAL BUFFER.

SOAKAGE TRENCHES.
EXACT LOCATION TO BE
DETERMINED ON SITE.

SEPTIC TANK

5000 CRICKET OVAL BUFFER.

EXTENT OF WORKS

PERIMETER OF CONCRETE SKATE PARK

PERIMETER OF CONCRETE SKATE PARK

EXTENT OF WORKS

36m SETBACK FROM ADJACENT BOUNDARY

3m SETBACK FROM ADJACENT BOUNDARY

20m TRENCHES

SOAKAGE TRENCH

SOAKAGE TRENCH

SOAKAGE TRENCH

SEPTIC TANK

8.00 8.00 8.20 8.40 8.60 8.60 8.40 8.20 8.20 8.40 8.60 8.80 9.00 8.80 8.60 8.40

CRICKET OVAL

TENNIS COURT

43a HARMONY LANE

67 HARMONY LANE

19 CALVERTON PLACE

17 CALVERTON PLACE

15 CALVERTON PLACE

COMMUNITY CENTRE

BOUNDARY LINE

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DRAWING TITLE
DEMOLITION PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:200 @ A1	CM	MH	JUT

1:200 @ A1
2 0 2 4 6 8 10
LENGTHS ARE IN METRES

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DRAWING NUMBER **19013_CD011** REV **00**

GRADE EARTH TO ENSURE FREE SURFACE RUN OFF CAN BE ACHIEVED AND POOLING OF WATER WILL NOT OCCUR. APPLY WITH GRASS SEEDING.

BALUSTRADE AROUND BACK AND SIDES OF PLATFORM.

ENSURE EARTH MOUNDING DOES NOT ENCROACH ON 5M CRICKET OVAL BUFFER. THIS IS A CRITICAL REQUIREMENT OF THE DEVELOPMENT APPLICATION

EARTH MOUNDING AT APPROX 1:4 GRADE. REFER TO GRADING PLAN FOR STEP DOWN AT CONCRETE SLAB EDGE.

ENSURE LEVEL OF THIS PLATFORM DOES NOT EXCEED RL9.90. THIS IS A CRITICAL REQUIREMENT OF THE DEVELOPMENT APPLICATION

PROVIDE FLAT BATTER IN THIS AREA TO ALLOW ACCESS TO SKATEPARK UP GENTLE SLOPE.

SOAKAGE TRENCHES TO BE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION. EXACT LOCATION TO BE DETERMINED ON SITE. NEW EARTH MOUNDING TO AVOID TRENCHES.

SEPTIC TANK TO BE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION.

BALUSTRADE AROUND CORNER OF PLATFORM

ENSURE ACCURATE SET OUT OF PERIMETER OF FACILITY TO ENSURE IT DOES NOT ENCROACH ON THE 36m BOUNDARY SETBACK. THIS IS A CRITICAL REQUIREMENT OF THE DEVELOPMENT APPLICATION

ENSURE LEVEL OF THIS PLATFORM DOES NOT EXCEED RL9.70. THIS IS A CRITICAL REQUIREMENT OF THE DEVELOPMENT APPLICATION

EARTH MOUNDING AT APPROX 1:4 GRADE. REFER TO GRADING PLAN FOR STEP DOWN AT CONCRETE SLAB EDGE.

ENSURE ACCURATE SET OUT OF PERIMETER OF FACILITY TO ENSURE IT DOES NOT ENCROACH ON THE 36m BOUNDARY SETBACK. THIS IS A CRITICAL REQUIREMENT OF THE DEVELOPMENT APPLICATION

CRICKET OVAL

TENNIS COURT

43a HARMONY LANE

67 HARMONY LANE

19 CALVERTON PLACE

17 CALVERTON PLACE

15 CALVERTON PLACE

COMMUNITY CENTRE

BOUNDARY LINE

3000 CRICKET OVAL BUFFER

36m SETBACK FROM ADJACENT BOUNDARY

SOAKAGE TRENCH

20m TRENCHES

SEPTIC TANK

EXTENT OF WORKS

LEGEND:

- AREA OF NEW SKATE PARK
- EXISTING TREE TO BE RETAINED AND PROTECTED THROUGHOUT CONSTRUCTION
- 25.00 EXISTING CONTOUR - MAJOR
- 24.80 EXISTING CONTOUR - MINOR
- 25.20 PROPOSED NEW CONTOURS
- EXTENT OF WORKS

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
SITE PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:200 @ A1	CM	MH	JUT

1:200 @ A1
2 0 2 4 6 8 10
LENGTHS ARE IN METRES

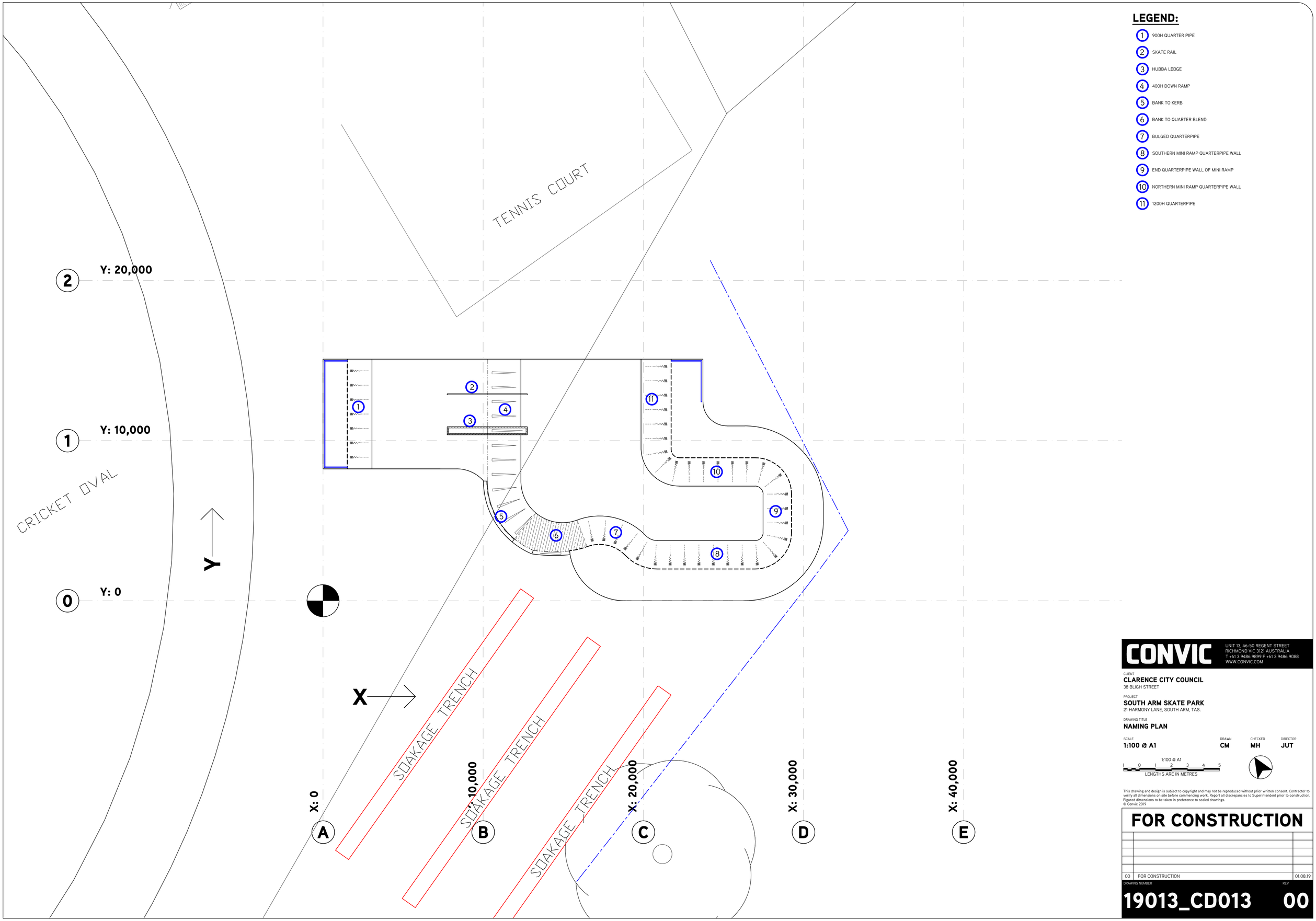
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FOR CONSTRUCTION

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DRAWING NUMBER
19013_CD012

REV
00



LEGEND:

1. 900H QUARTER PIPE
2. SKATE RAIL
3. HUBBA LEDGE
4. 400H DOWN RAMP
5. BANK TO KERB
6. BANK TO QUARTER BLEND
7. BULGED QUARTERPIPE
8. SOUTHERN MINI RAMP QUARTERPIPE WALL
9. END QUARTERPIPE WALL OF MINI RAMP
10. NORTHERN MINI RAMP QUARTERPIPE WALL
11. 1200H QUARTERPIPE

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
NAMING PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

1:100 @ A1
1 0 1 2 3 4 5
LENGTHS ARE IN METRES

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00	FOR CONSTRUCTION	01.08.19

DRAWING NUMBER
19013_CD013

REV
00

LEGEND:

- FLAT BANK
  BANK ANGLE & HEIGHT - SEE SECTIONS
- QUARTER PIPE
  RADIUS & HEIGHT - SEE SECTIONS
- CONCRETE BLEND ZONE
  INDICATES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
- SQUARE EDGE COPING
  - REFER TO STEEL WORKS DRAWINGS
- CHS COPING
  - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- +24.150 PROPOSED SURFACE LEVEL SHOWN IN METRES
- +FGL 24.150 PROPOSED FINISHED GROUND LEVEL SHOWN IN METRES
- INDICATES DIRECTION OF FALL ACROSS CONCRETE SURFACE GRADE EVENLY AND ENSURE NO POOLING OF WATER OCCURS - TYPICAL GRADE Ø 1:66 FALL
- LANDSCAPE SWALE
  GRADE AT MIN 1:100 TO ENSURE NO POOLING OF WATER OCCURS

GRADE EARTH TO ENSURE FREE RUN OFF OF SURFACE WATER AND NO POOLING OF WATER OCCURS.

APPROX. 600 STEP DOWN FROM PLATFORM TO TOP OF EARTH LEVEL. ENSURE MOUNDING DOES NOT ENCROACH ON CRICKET FIELD BUFFER. GRADE EARTH MOUND AT 1:4.

25mm EDGE TO BLEND EVENLY AND CONSITIENTLY TO MATCH END OF COPING AND ENSURE NO 'STEP' IN LIP OF RAMP.

APPROX 700mm STEP DOWN FROM PLATFORM TO TOP OF EARTH LEVEL. ENSURE MOUNDING DOES NOT ENCROACH ON SOAKAGE TRENCHES. GRADE EARTH MOUND AT 1:4.

STEP DOWN FROM PLATFORM TO TOP OF EARTH LEVEL AS SHOWN TO ALLOW FOR GRADE EARTH MOUND AT 1:4 ALONG EDGE OF QUARTER PIPE.

TYPICAL 100mm STEP DOWN FROM PLATFORM TO TOP OF EARTH LEVEL. GRADE EARTH MOUND AT 1:4.

STEP DOWN FROM PLATFORM TO TOP OF EARTH LEVEL VARIES BETWEEN MAX 900mm AND MIN 100mm. GRADE EARTH MOUND AT 1:4.

TENNIS COURT

CRICKET OVAL

SOAKAGE TRENCH

SOAKAGE TRENCH

SOAKAGE TRENCH

Y: 20,000 (2)

Y: 10,000 (1)

Y: 0 (0)

X: 0 (A)

X: 10,000 (B)

X: 20,000 (C)

X: 30,000 (D)

X: 40,000 (E)

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
GRADING PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

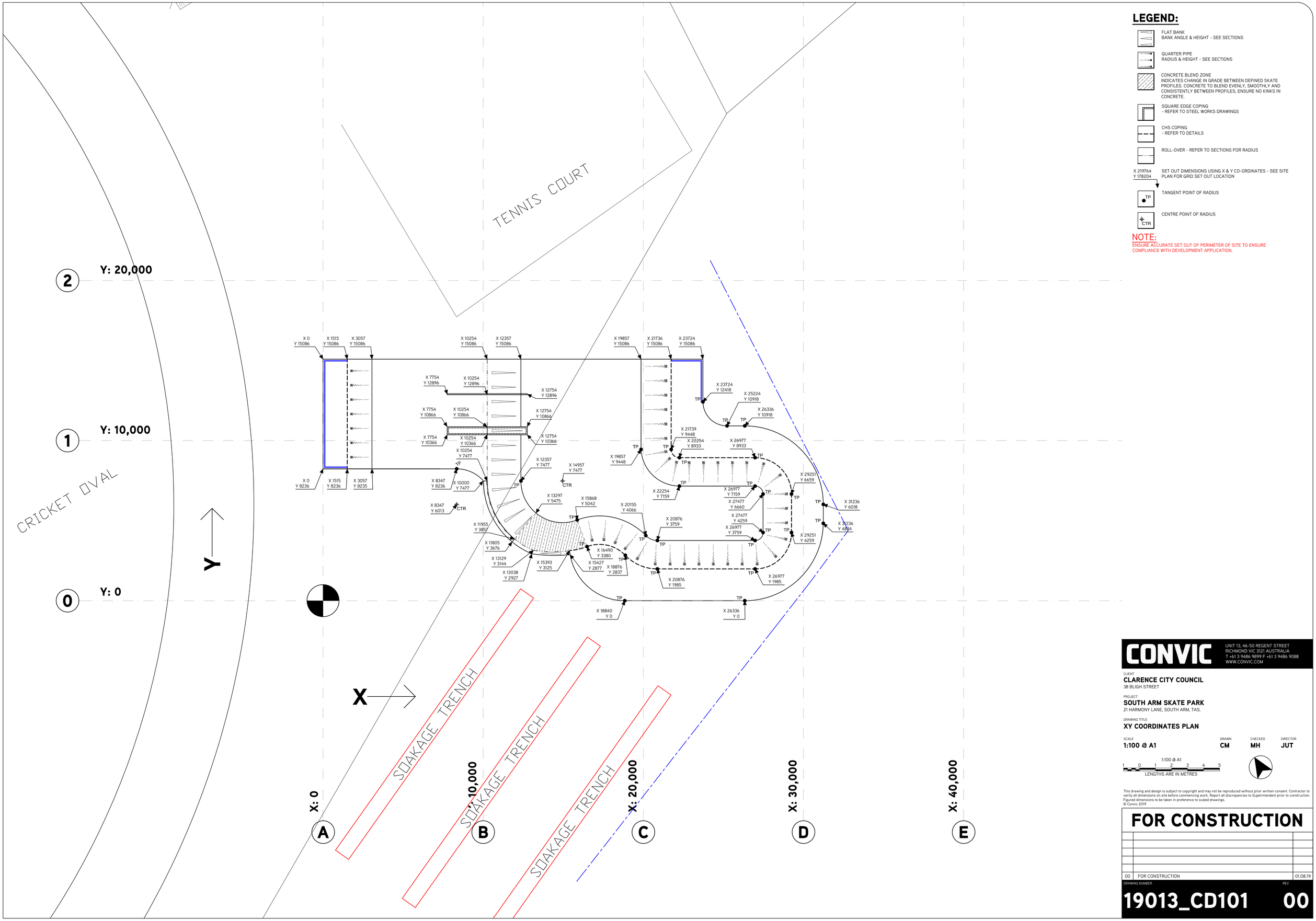
1:100 @ A1
1 0 1 2 3 4 5
LENGTHS ARE IN METRES

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DRAWING NUMBER: **19013_CD100** REV: **00**



LEGEND:

- FLAT BANK
  BANK ANGLE & HEIGHT - SEE SECTIONS
- QUARTER PIPE
  RADIUS & HEIGHT - SEE SECTIONS
- CONCRETE BLEND ZONE
  INDICATES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
- SQUARE EDGE COPING
  - REFER TO STEEL WORKS DRAWINGS
- CHS COPING
  - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- X 219764 Y 178204 — SET OUT DIMENSIONS USING X & Y CO-ORDINATES - SEE SITE PLAN FOR GRID SET OUT LOCATION
- TP — TANGENT POINT OF RADIUS
- CTR — CENTRE POINT OF RADIUS

NOTE:
ENSURE ACCURATE SET OUT OF PERIMETER OF SITE TO ENSURE COMPLIANCE WITH DEVELOPMENT APPLICATION.

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
XY COORDINATES PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

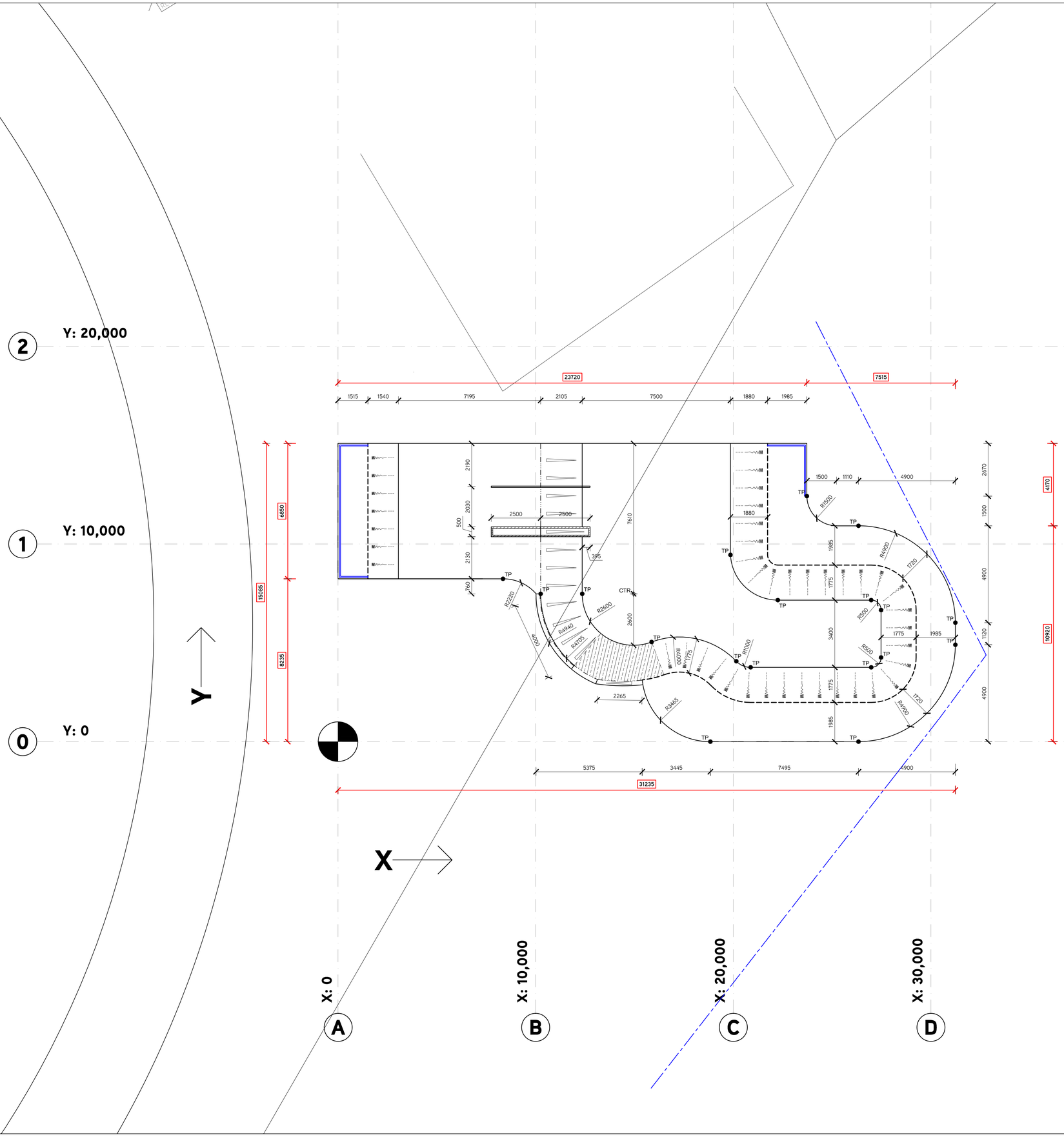
1:100 @ A1
1 0 1 2 3 4 5
LENGTHS ARE IN METRES

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DRAWING NUMBER: **19013_CD101** REV: **00**



LEGEND:

- FLAT BANK
  BANK ANGLE & HEIGHT - SEE SECTIONS
- QUARTER PIPE
  RADIUS & HEIGHT - SEE SECTIONS
- CONCRETE BLEND ZONE
  INDICATES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
- SQUARE EDGE COPING
  - REFER TO STEEL WORKS DRAWINGS
- CHS COPING
  - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- 1250 SETOUT DIMENSIONS
- 1250 MINOR DIMENSIONS
- TP TANGENT POINT OF RADIUS
- CTR CENTRE POINT OF RADIUS

NOTE:
ENSURE ACCURATE SET OUT OF PERIMETER OF SITE TO ENSURE COMPLIANCE WITH DEVELOPMENT APPLICATION.

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
DIMENSIONS PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

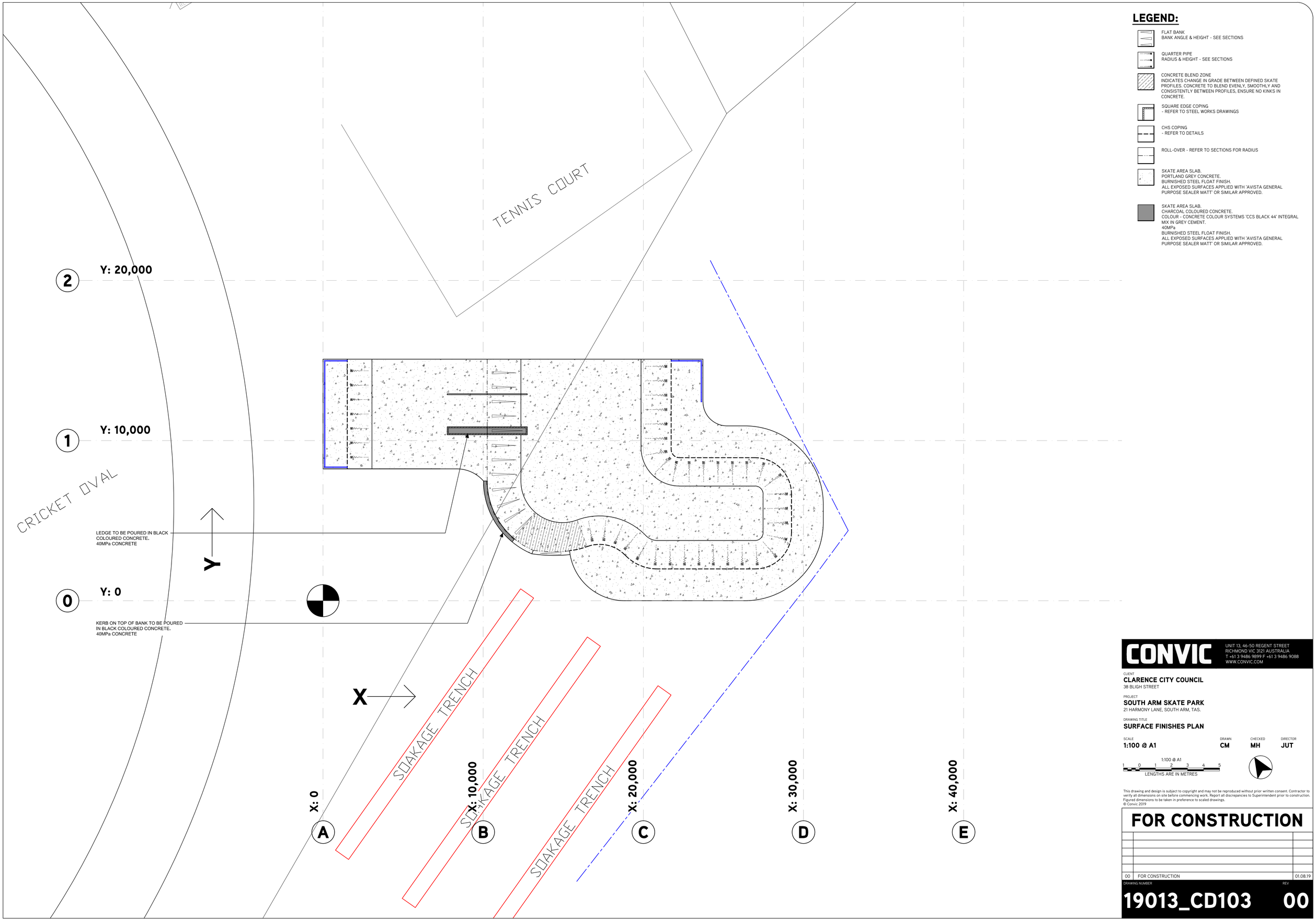
1:100 @ A1
1 0 1 2 3 4 5
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DRAWING NUMBER
19013_CD102
REV
00



LEGEND:

- FLAT BANK
  BANK ANGLE & HEIGHT - SEE SECTIONS
- QUARTER PIPE
  RADIUS & HEIGHT - SEE SECTIONS
- CONCRETE BLEND ZONE
  INDICATES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
- SQUARE EDGE COPING
  - REFER TO STEEL WORKS DRAWINGS
- CHS COPING
  - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- SKATE AREA SLAB.
  PORTLAND GREY CONCRETE.
  BURNISHED STEEL FLOAT FINISH.
  ALL EXPOSED SURFACES APPLIED WITH 'AVISTA GENERAL PURPOSE SEALER MATT' OR SIMILAR APPROVED.
- SKATE AREA SLAB.
  CHARCOAL COLOURED CONCRETE.
  COLOUR - CONCRETE COLOUR SYSTEMS 'CCS BLACK 44' INTEGRAL MIX IN GREY CEMENT.
  40MPa
  BURNISHED STEEL FLOAT FINISH.
  ALL EXPOSED SURFACES APPLIED WITH 'AVISTA GENERAL PURPOSE SEALER MATT' OR SIMILAR APPROVED.

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
SURFACE FINISHES PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

1:100 @ A1
1 0 1 2 3 4 5
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DRAWING NUMBER
19013_CD103

REV
00

LEGEND:

- SQUARE EDGE COPING - REFER TO STEEL WORKS DRAWINGS
- CHS COPING - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- SAW CUT JOINT - REFER TO DETAILS AND GENERAL NOTES
- CONSTRUCTION JOINT - REFER TO DETAILS
- EXPANSION JOINT - REFER TO DETAILS
- TRIMMER BARS - REFER TO GENERAL NOTES

TENNIS COURT

CRICKET OVAL

LEDGE POURED ON TOP OF SLAB.

KERB POURED ON TOP OF SLAB.

Y

X

2 Y: 20,000

1 Y: 10,000

0 Y: 0

X: 0 A

10,000 B

X: 20,000 C

X: 30,000 D

X: 40,000 E

SOAKAGE TRENCH

SOAKAGE TRENCH

SOAKAGE TRENCH

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DRAWING TITLE
CONCRETE JOINT PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

1:100 @ A1
1 0 1 2 3 4 5
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DRAWING NUMBER **19013_CD104** REV **00**

LEGEND:

- FLAT BANK
  BANK ANGLE & HEIGHT - SEE SECTIONS
- QUARTER PIPE
  RADIUS & HEIGHT - SEE SECTIONS
- CONCRETE BLEND ZONE
  INDICATES CHANGE IN GRADE BETWEEN DEFINED SKATE PROFILES. CONCRETE TO BLEND EVENLY, SMOOTHLY AND CONSISTENTLY BETWEEN PROFILES, ENSURE NO KINKS IN CONCRETE.
- SQUARE EDGE COPING
  - REFER TO STEEL WORKS DRAWINGS
- CHS COPING
  - REFER TO DETAILS
- ROLL-OVER - REFER TO SECTIONS FOR RADIUS
- TP — TANGENT POINT OF RADIUS
- L=2400 — COPING LENGTH SHOWN IN MILLIMETRES
- R=1800 — COPING CENTERLINE RADIUS SHOWN IN MILLIMETRES
- 200 A — REFER TO SKATE SECTIONS CD200 FOR FURTHER INFORMATION

TENNIS COURT

CRICKET OVAL

Y: 20,000

Y: 10,000

Y: 0

X: 0

X: 10,000

X: 20,000

X: 30,000

X: 40,000

A

B

C

D

E

0

1

2

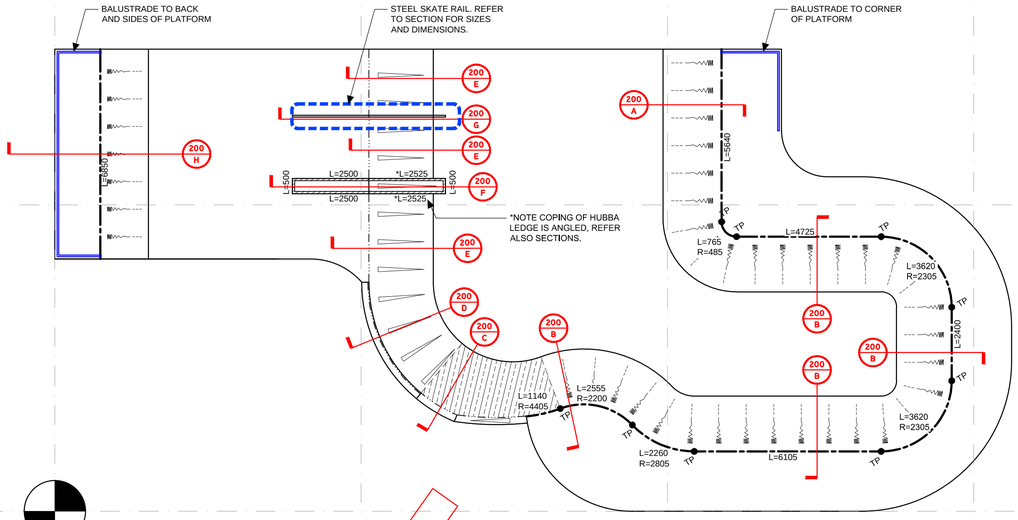
X

Y

SOAKAGE TRENCH

SOAKAGE TRENCH

SOAKAGE TRENCH



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DRAWING TITLE
COPING AND SECTION KEY PLAN

SCALE	DRAWN	CHECKED	DIRECTOR
1:100 @ A1	CM	MH	JUT

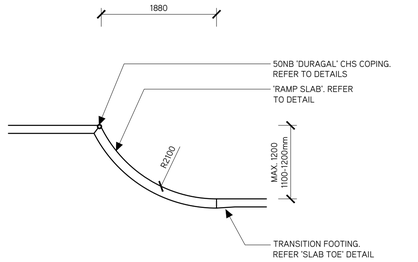
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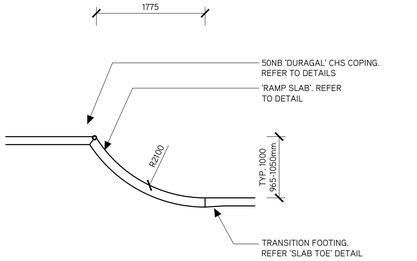
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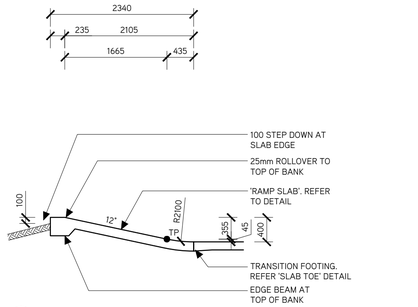
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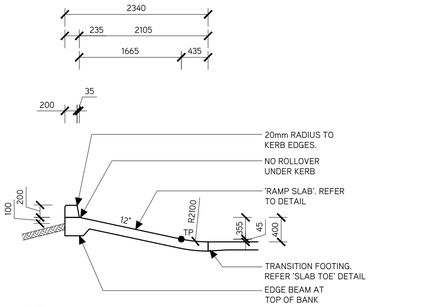
200 A **1200H QUARTER PIPE**
SECTION SCALE 1:50



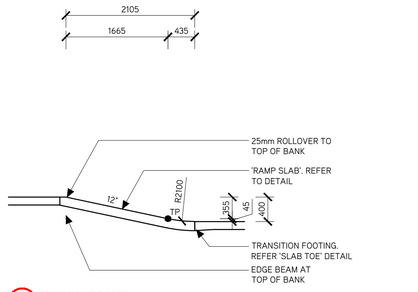
200 B **1000H QUARTER PIPE**
SECTION SCALE 1:50



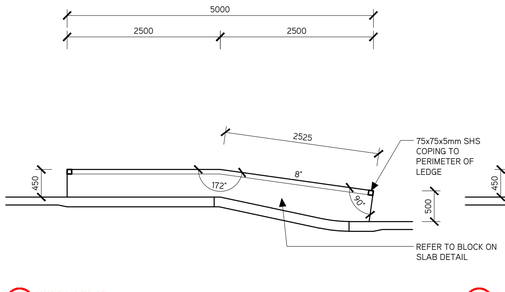
200 C **400H FLAT BANK**
SECTION SCALE 1:50



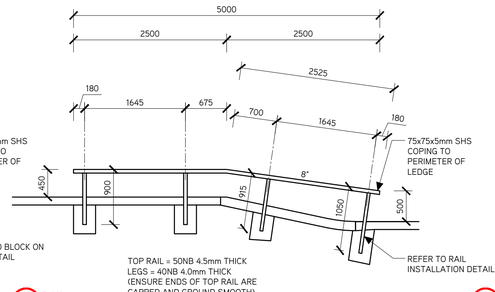
200 D **KERB ON FLAT BANK**
SECTION SCALE 1:50



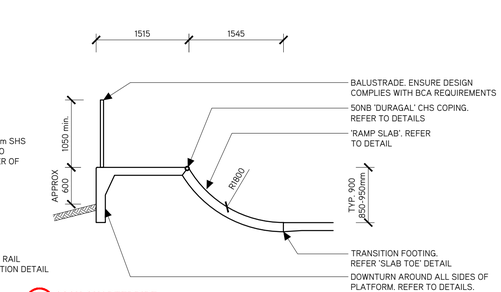
200 E **400H FLAT BANK**
SECTION SCALE 1:50



200 F **HUBBA LEDGE**
SECTION SCALE 1:50



200 G **RAIL**
SECTION SCALE 1:50



200 H **900H QUARTERPIPE**
SECTION SCALE 1:50

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PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
SECTIONS 01

SCALE	DRAWN	CHECKED	DIRECTOR
1:50 @ A1	**CM**	**MH**	**JUT**

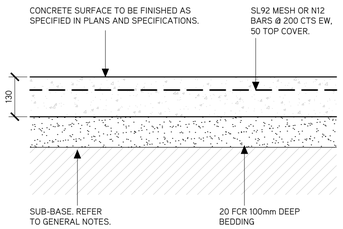
1:50 @ A1
0.5 0 0.5 1 1.5 2 2.5
LENGTHS ARE IN METRES

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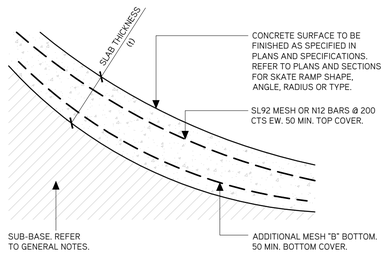
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DRAWING NUMBER **19013_CD200** REV **00**



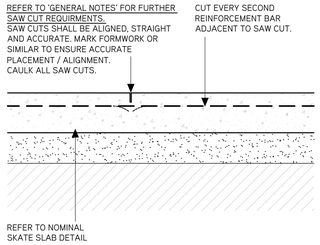
300 A **SKATE FLAT SLAB** SECTION — SCALE 1:10



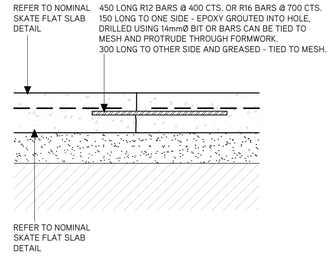
NOMINAL SKATE RAMP SLAB TABLE

SLAB THICKNESS (t) (mm)	ADDITIONAL MESH "B" BOTTOM
150 (Min) - 175	NOT REQUIRED
176 - 200	SL 62 BOTTOM OR N12 @ 400 CTS.
201 - 250	SL 72 BOTTOM OR N12 @ 400 CTS.
251 - 300 (Max)	SL 92 BOTTOM OR N12 @ 300 CTS.

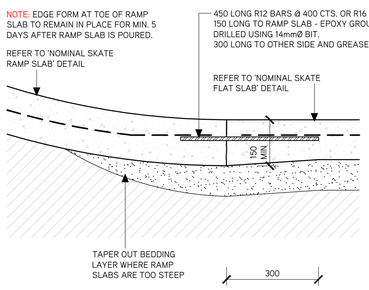
300 B **SKATE RAMP SLAB** SECTION — SCALE 1:10



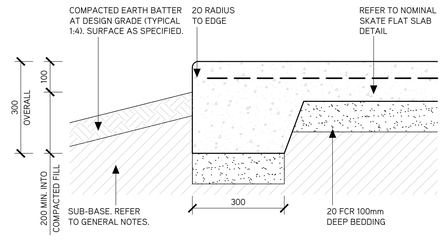
300 C **SAW CUT** SECTION — SCALE 1:10



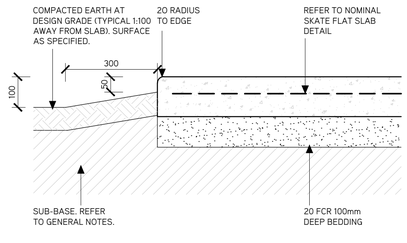
300 D **CONSTRUCTION JOINT** SECTION — SCALE 1:10



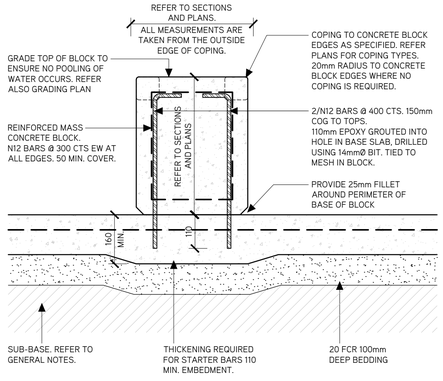
300 E **SKATE RAMP SLAB TOE** SECTION — SCALE 1:10



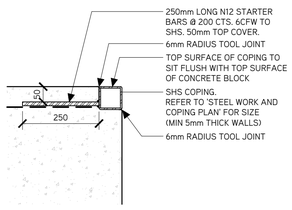
300 F **EDGE BEAM (USE ADJACENT TO MOUNDED EARTH)** SECTION — SCALE 1:10



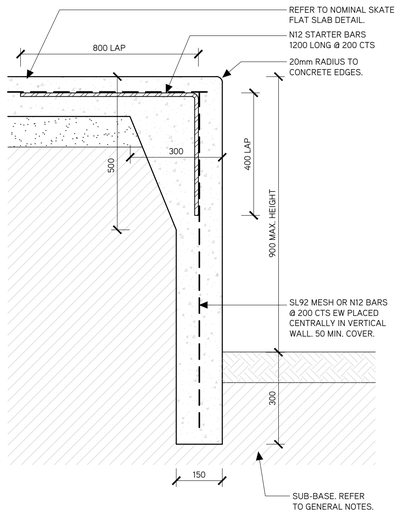
300 G **SLAB EDGE (USE ADJACENT TO FLAT EARTH)** SECTION — SCALE 1:10



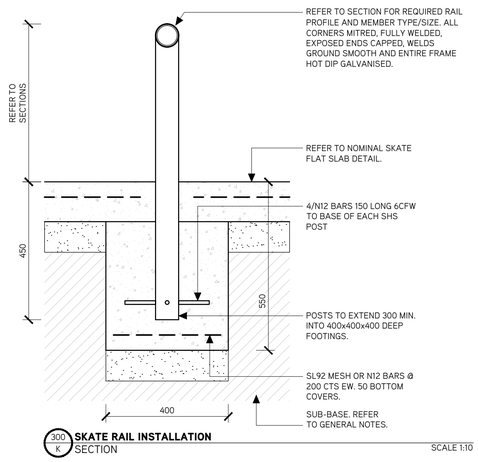
300 H **BLOCK ON SLAB** SECTION — SCALE 1:10



300 I **SHS COPING INSTALLATION** SECTION — SCALE 1:10



300 J **DOWN TURN WALL - UP TO 900H** SECTION — SCALE 1:10



300 K **SKATE RAIL INSTALLATION** SECTION — SCALE 1:10

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38 BLIGH STREET

PROJECT
SOUTH ARM SKATE PARK
21 HARMONY LANE, SOUTH ARM, TAS.

DRAWING TITLE
DETAILS 01

SCALE	DRAWN	CHECKED	DIRECTOR
As Shown	CM	MH	JUT

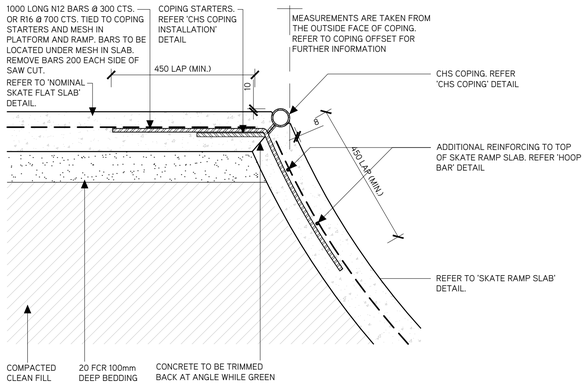
As Shown
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LENGTHS ARE IN METRES

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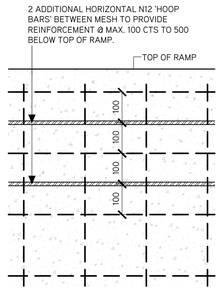
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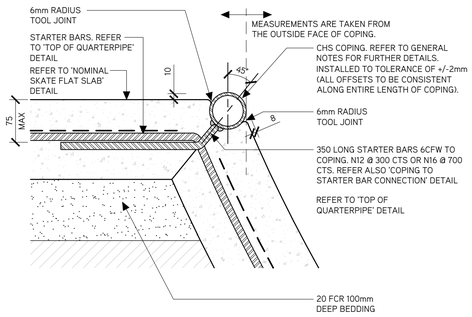
DRAWING NUMBER — REV
19013_CD300 00



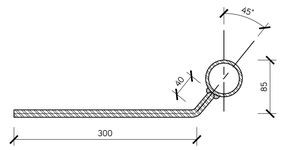
301 A **TOP OF QUARTER PIPE**
SECTION



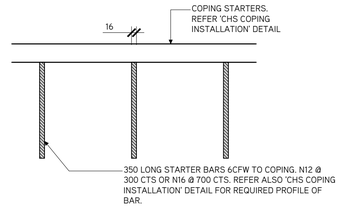
301 B **HOOP BAR DETAIL**
ELEVATION
SCALE 1:10



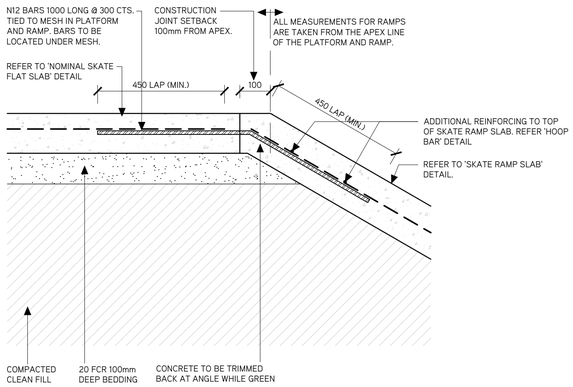
301 C **CHS COPING INSTALLATION**
SECTION
SCALE 1:5



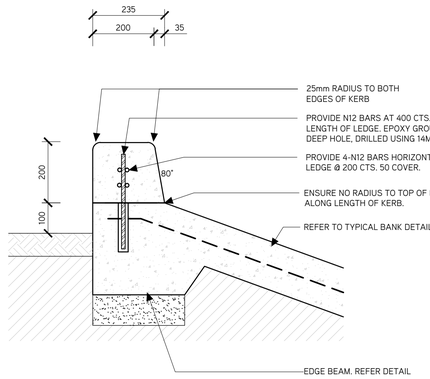
301 D **CHS COPING WELD TAB**
SECTION
SCALE 1:5



301 E **COPING TO STARTER BAR CONNECTION**
PLAN VIEW
SCALE 1:10



301 F **TOP OF RAMP**
SECTION
SCALE 1:10



301 G **BANK TO PARKING BLOCK**
SECTION
SCALE 1:10

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DRAWING TITLE
DETAILS 02

SCALE	DRAWN	CHECKED	DIRECTOR
As Shown	**CM**	**MH**	**JUT**

As Shown
0 0 0 0 0 0 0
LENGTHS ARE IN METRES

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DRAWING NUMBER **19013_CD301** REV **00**