Noise Monitoring Assessment

Austen Quarry, Hartley, NSW
April 2019

Prepared for: RW Corkery & Co Pty Limited
April 2019
MAC170523RP5V1

Muller Acoustic Consulting

Document Information

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Prepared for: RW Corkery & Co Pty Limited (on behalf of Hy-Tec Pty Ltd)

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by RW Corkery & Co Pty Limited (RWC) on behalf of Hy-Tec Industries Pty Ltd (HT) to complete a Noise Monitoring Assessment (NMA) for Austen Quarry Operations, Hartley, NSW.

The monitoring has been conducted in accordance with the approved Austen Quarry Noise Management Plan and in general accordance with Conditions L4.1 to L4.3 of EPL#12323 (EPL); at three representative monitoring locations.

The assessment was conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL#12323;
- RW Corkery & Co Pty Limited, Austen Quarry Noise Management Plan (NMP); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

This assessment was undertaken during April 2019 and forms part of the noise monitoring program to address conditions of EPL#12323, Austen Quarry Development Consent SSD 6084 (SSD-6084) and the Noise Management Plan.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

2.1 Attended Noise Compliance

Schedule 3, Condition 3 of the Austen Quarry Development Consent (SSD-6084), approved on 15 July 2015 and modified on 15 August 2018, outlines the applicable noise criteria for all privately owned residential receivers surrounding the quarry site. The operating criteria specified in SSD-6084 also aligns with criteria in EPL#12323 for the quarry at all receivers ie 35dB $LA_{eq(15min)}$.

Furthermore, SSD-6084 specifies an LA_{max} criteria for site operations of 52dBA during the morning shoulder period. **Table 1** presents the criteria for privately owned residential receivers surrounding the quarry, as outlined in SSD-6084 and EPL#12323.

Table 1 Noise Criteria

Receiver	Day dB $LA_{eq(15min)}$	Evening dB $LA_{eq(15min)}$	Morning Shoulder dB $LA_{eq(15min)}$	Morning Shoulder dB LA_{max}
All privately owned residences	35	35	35	52

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3 Methodology

3.1 Locality

The quarry is located on Jenolan Caves Road, Hartley, NSW, approximately 10km south of Lithgow, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Great Western Highway is situated to the north east of the site and Jenolan Caves Road to the west of the site.

3.2 Noise Monitoring Locations

Three monitoring locations have been selected as part of the NMA and in accordance with the Noise Management Plan (NMP) and are summarised below:

- Location A (residence identifier R24A as per NMP), is located at 200 Jenolan Caves Road, Hartley, NSW, approximately 2.5km north of the project;
- Location B (residence identifier R31 as per NMP), is located at 781 Jenolan Caves Road, Good Forest, NSW, approximately 1km south west of the project site; and
- Location C (residential identifier R48 as per NMP) is located at 64 Carroll Drive, Hartley, NSW, approximately 2.5km north east of the quarry.

The monitoring locations with respect to quarry location are presented in the locality plan shown in Figure 1.

3.3 Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, “Acoustics - Description and Measurement of Environmental Noise” and EPL#12323. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 2 April 2019 and Wednesday 3 April 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey, the operator quantified the contribution of each significant noise source. One measurement was conducted at each of the monitoring locations during the day, evening and morning shoulder monitoring periods to quantify the noise sources in the ambient noise environment.

3.4 Operational Logs

Operational logs for the primary and secondary crushers have been provided by Austen Quarry management. It is noted that transportation activities commence at 5am and work shifts for processing equipment commence at 6am. Daily pre-shift meetings and safety checks often delay commencement of onsite operations until closer to 7am. Morning shoulder measurements were conducted from 6am to 7am on Wednesday 3 April 2019 to capture the commencement of onsite operations at the nominated monitoring locations. It is noted that for noise monitoring during the morning shoulder period, the secondary crusher and associated processing equipment (screens, conveyors and the air separator) had not yet commenced operation. **Table 2** presents a summary of the hours of operation of the primary and secondary crushers with the quarry operational logs which are reproduced **Appendix B**.

Table 2 Primary and Secondary Crushers Hours of Operation

Date	Primary Crusher		Secondary Crusher	
	Commenced Crushing	Ceased Crushing	Commenced Crushing	Ceased Crushing
02/04/19	07:00	16:40	06:50	19:34
03/04/19	07:05	16:40	06:48	16:50

FIGURE 1

LOCALITY PLAN

REF: MAC170523

0 500m

KEY

A MONITORING LOCATION

SITE LOCATION

MAC
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*Imagery Source : nearmaps

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4 Results

4.1 Assessment Results - Location A, 200 Jenolan Caves Road

Operational attended noise monitoring was completed in each assessment period at Location A on Tuesday 2 April 2019 and Wednesday 3 April 2019. **Table 3** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 3 Operator-Attended Noise Survey Results – Location A

Date	Time (hrs)	Period	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
			L_{Amax}	L_{Aeq}	L_{A90}		
02/04/19	17:26	Day	83	62	45	WD: NE WS: 0.4m/s Rain: Nil	Passing Traffic 58-83 Birds 50-53 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$	
02/04/19	18:23	Evening	83	60	42	WD: NE WS: 0.2m/s Rain: Nil	Passing Traffic 50-83 Insects 42-44 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$	
03/04/19	06:18	Shoulder	86	64	41	WD: S WS: 0m/s Rain: Nil	Passing Traffic 46-86 Aircraft 43-46 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$ <40dB L_{Amax}	

4.2 Assessment Results - Location B, 781 Jenolan Caves Road

Operational attended noise monitoring was completed in each assessment period at Location B on Tuesday 2 April 2019 and Wednesday 3 April 2019. **Table 4** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 4 Operator-Attended Noise Survey Results – Location B

Date	Time (hrs)	Period	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
			L_{Amax}	L_{Aeq}	L_{A90}		
02/04/19	16:41	Day	50	38	36	WD: NE WS: 0.5m/s Rain: Nil	Quarry Operations 34-40 Car in Driveway 36-37 Distant Traffic 39-40 Insects and Birds 35-37
Austen Quarry Contribution						35dB $L_{Aeq(15min)}$	
02/04/19	19:03	Evening	58	48	46	WD: NE WS: 0m/s Rain: Nil	Quarry Operations 34-38 Distant Traffic 34-36 Insects 45-47
Austen Quarry Contribution						35dB $L_{Aeq(15min)}$	
03/04/19	06:45	Shoulder	61	43	40	WD: NW WS: 0.5m/s Rain: Nil	Quarry Operations 33-36 Distant Traffic 38-40 Birds 38-46
Austen Quarry Contribution						34dB $L_{Aeq(15min)}$ 38dB L_{Amax}	

4.3 Assessment Results - Location C, 64 Carroll Drive

Operational attended noise monitoring was completed in each assessment period at Location C on Tuesday 2 April 2019 and Wednesday 3 April 2019. Table 5 presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 5 Operator-Attended Noise Survey Results – Location C

Date	Time (hrs)	Period	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
			L_{Amax}	L_{Aeq}	L_{A90}		
03/04/19	07:22	Day	77	52	42	WD: N WS: 0.2m/s Rain: Nil	Distant Traffic 44-48 Birds 40-77 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$	
02/04/19	18:02	Evening	79	59	42	WD: NE WS: 0.1m/s Rain: Nil	Distant Traffic 40-45 Birds 40-79 Dogs Barking 40-45 Aircraft 48-53 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$	
03/04/19	05:56	Shoulder	59	44	40	WD: N WS: 0m/s Rain: Nil	Distant Traffic 46-59 Insects 40-43 Quarry not audible
Austen Quarry Contribution						<30dB $L_{Aeq(15min)}$ <40dB L_{Amax}	

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5 Noise Compliance Assessment

The compliance assessment for the nominated monitoring locations are presented in **Table 6** to **Table 9** for day, evening and morning shoulder assessment periods.

Table 6 Daytime $LA_{eq(15min)}$ Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	
A	<30	35	✓
B	35	35	✓
C	<30	35	✓

Table 7 Evening Noise $LA_{eq(15min)}$ Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	
A	<30	35	✓
B	35	35	✓
C	<30	35	✓

Table 8 Morning Shoulder $LA_{eq(15min)}$ Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	
A	<30	35	✓
B	34	35	✓
C	<30	35	✓

Table 9 Morning Shoulder LA_{max} Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB LA_{max}	dB LA_{max}	
A	<40	52	✓
B	<40	52	✓
C	<40	52	✓

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6 Discussion

6.1 Discussion of Results - Location A

Monitoring conducted at Location A, 200 Jenolan Caves Road, Hartley, NSW, was dominated by passing traffic. Traffic included trucks from Austen Quarry, adjacent (non-project) quarries and several transport firms. Local light vehicle traffic also contributed to the overall ambient environment. Quarry noise emissions were inaudible during all three monitoring periods during the April 2019 survey. Other extraneous noise sources audible during the three attended surveys included birds and insects.

The measured quarry day, evening and morning shoulder noise contribution for Location A are consistent with the noise levels predicted in the Noise and Blasting Impact Assessment (NBIA) (Ref: MAC170511RP1, Muller Acoustic Consulting, 2018) prepared for the Stage 2 extension of the quarry.

6.2 Discussion of Results - Location B

Monitoring results at Location B, 781 Jenolan Caves Road, Good Forest, NSW, identified that the quarry was audible at this monitoring location during all periods. Quarry sources included trucks accessing the pit and fixed plant hum. Notwithstanding, the noise emissions from the quarry remained below applicable noise criteria for all measurements. Extraneous noise sources dominated the noise environment which included birds, distant traffic hum and insect noise.

The measured quarry day, evening and morning shoulder noise contribution for Location B are consistent with the noise levels predicted in the NBIA.

6.3 Discussion of Results - Location C

Quarry noise was inaudible during all three survey periods at Location C, 64 Carroll Drive, Hartley, NSW during the attended noise survey for the period of April 2019. Highway traffic, local birds and dogs barking dominated the ambient noise environment.

The measured quarry day, evening and morning shoulder noise contribution for Location C are consistent with the noise levels predicted in the NBIA.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment for RW Corkery & Co Pty Limited on behalf of Hy-Tec Industries Pty Ltd for Austen Quarry, Hartley, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in EPL#12323 and SSD-6084 for three nominated residential receivers surrounding the quarry.

Operator attended noise monitoring was undertaken on Tuesday 2 April 2019 and Wednesday 3 April 2019 at the nominated monitoring locations with quarry noise contributions compared against the relevant criteria.

The assessment has identified that noise emissions generated by Austen Quarry comply with relevant noise criteria specified in EPL#12323 and SSD-6084 at all assessed locations for the three relevant assessment periods.

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Appendix A – Glossary of Terms

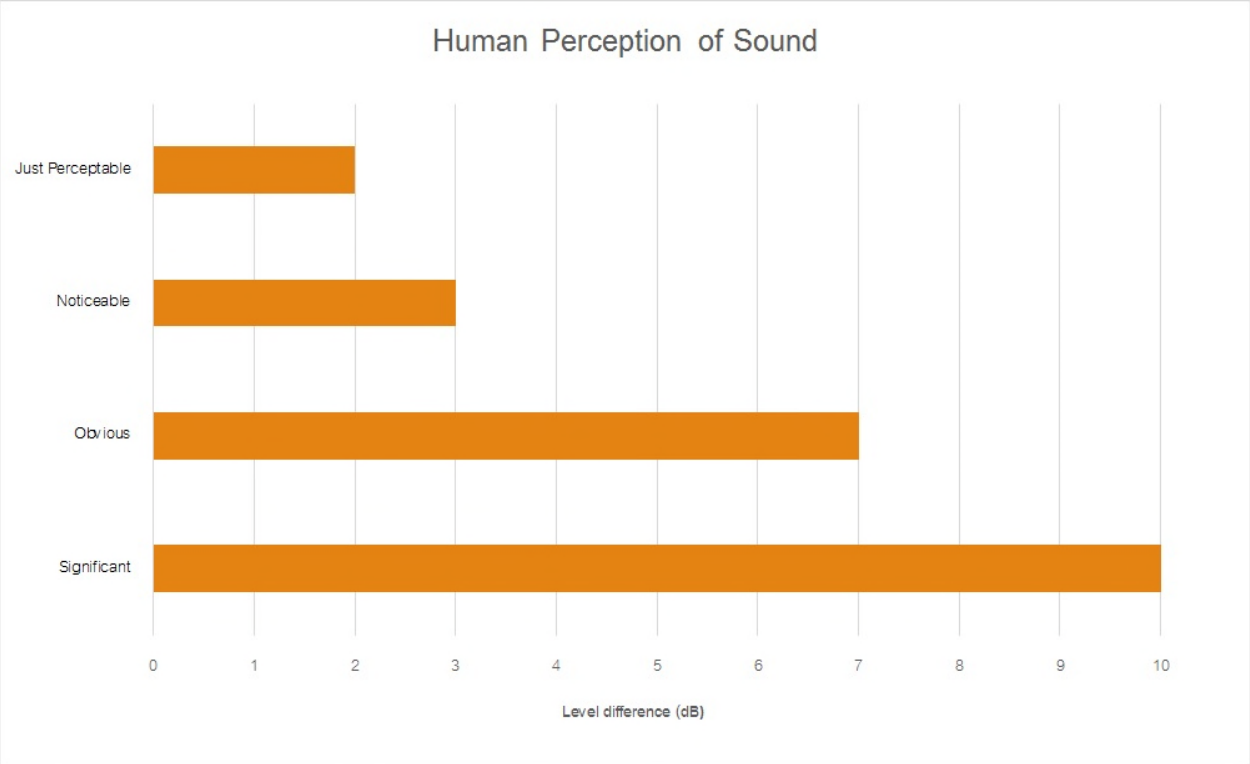
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – Operational Logs

DAILY PRODUCTION LOG & CHECKLIST - PRIMARY

Date: 2.3.19 Operator: Kingsley

Weather Conditions; fine Quarry Bench ID. 760

Shift Start Time	6.00	Shift Finish Time	5.00
Crusher Start Time	7.00	End of day Crusher stopped	4.40

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed
323559	330933	7374
Conveyor 6 Scalps Start	**Conveyor 6 Scalps Finish**	**Total Tonnes Stockpiled**
	425	

Cartage of Raw Feed from Face to Boot – Number of loads

KK1 Loads to Boot	52	KK3 Loads to Boot	
KK2 Loads to Boot	52	Contractor Loads to Boot	

Stoppages due to Trucks	Stoppages due to Jaw

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	7.00	1hr	tool box, dust capers, fuel truck
9.25	9.55	30m	smoko.
11.45	12.20	35m	pull down high wall
12.55	1.35	40m	smoko.
4.40			end crushing

Pre start checks;

Generator hours: 25497 - 25507 Generator oil level.. ✓

Plant Visual ✓

COMMENTS

* plant running - 6.50am
* 7.00 scalping

DAILY PRODUCTION LOG & CHECKLIST - PRIMARY

Date: 3/4/19 Operator: Kingsley

Weather Conditions; fine Quarry Bench ID. 760

Shift Start Time	6.00	Shift Finish Time	5.00
Crusher Start Time	7.05	End of day Crusher stopped	4.40

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed
330 933	336279	5346
Conveyor 6 Scalps Start	**Conveyor 6 Scalps Finish**	**Total Tonnes Stockpiled**
	307	

Cartage of Raw Feed from Face to Boot – Number of loads

KK1 Loads to Boot	43	KK3 Loads to Boot	
KK2 Loads to Boot	36	Contractor Loads to Boot	

Stoppages due to Trucks	Stoppages due to Jaw

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	7.05	1hr 5	bol box
9.25	9.55	30m	smoko
12.55	2.40	1hr 45	smoko, E.b.a.
4.40			and crushing

Pre start checks;

Generator hours. 25507 - 25517 Generator oil level.. ✓

Plant Visual ✓

COMMENTS

*6.35 plant running *oversize rock on scalps belt

*7.05 scalping

DAILY PRODUCTION LOG & CHECKLIST - SECONDARY

Date: 2.4.19 Operator: Jessa

Weather Conditions; wet

Shift Start Time	6.00	Shift Finish Time	9 PM
Crusher Start Time	6.50	End of day Crusher stopped	734 PM

Weightometer Reading; Start: 3023273 **Finish:**

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	6.50	50m	TOOLBOX / PRE-START
7.56	7.58	2m	Adj 450 +550
9.14	9.15	1min	" " " "
11.39	11.52	13m	Clean 10/7 chute
12.50	12.51	1m	Adj 450
1.15	1.17	2min	Adj 550
2.01	2.42	41m	Fix busted water line
4.51	4.52	1m	Adj 450+550
7.12	7.13	1m	Adj 450
7.31			20m STACKER full.

PRODUCTION SUMMARY

FINES - 348

Belts	Size	Description	Total	Gate open	Comments
CV 8	20 mm	Concrete Aggregate	1936		
CV 20	Course Sand 4-0mm	Manufactured Sand	982		
CV19*	10-7mm Blend*	Concrete Blend	1436		
CV19	7mm	Concrete Aggregate			
CV17	10mm	Concrete Aggregate			
CV15	14mm	Concrete Aggregate	141		
CV5	Ballast/40mm	Non Spec Aggregate			

TOTAL - 4843

COMMENTS

DAILY PRODUCTION LOG & CHECKLIST - SECONDARY

Date: 3.4.19 Operator: Jezza

Weather Conditions; cloudy

Shift Start Time	6.00	Shift Finish Time	5.00
Crusher Start Time	6.48	End of day Crusher stopped	4.50

Weightometer Reading; Start: 3028804 **Finish:**

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	6.48	48m	TOOLBOX/PRE-START
6.53	7.01	8m	CV19 motion
9.13	9.46	33m	Clean S3 + Clean 10/4 chute + check S2
12.48	12.51	3m	Adj to re-circ 20mm
1.20	2.36	1hr 16m	Feed off MEETING

PRODUCTION SUMMARY

FINES- 230

Belts	Size	Description	Total	Gate open	Comments
CV 8	20 mm	Concrete Aggregate	750		
CV 20	Course Sand 4-0mm	Manufactured Sand	700		
CV19*	10-7mm Blend*	Concrete Blend	1110		
CV19	7mm	Concrete Aggregate			
CV17	10mm	Concrete Aggregate			
CV15	14mm	Concrete Aggregate	113		
CV5	Ballast/40mm	Non Spec Aggregate			

TOTAL - 2903

COMMENTS

Re-circ 20mm from 12.51 - PRC - 270 TPH

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