Noise Monitoring Assessment

Austen Quarry, Hartley, NSW.

Prepared for: RW Corkery & Co Pty Limited
April 2018
MAC170523RP3

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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MAC170523RP3	Final	9 April 2018	Robin Heaton		Oliver Muller	

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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
- Standards Australia AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures.

This assessment was undertaken during April 2018 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, 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 35dBA $LA_{eq(15min)}$. **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(A) LAeq(15min)	Evening dB(A) LAeq(15min)	Morning Shoulder dB(A) LAeq(15min)
All privately owned residences	35	35	35

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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 approximately 2.5km north of the project;
- Location B (residence identifier R31 as per NMP), is located at 781 Jenolan Caves Road and approximately 1km south west of the project site; and
- Location C (residential identifier R48 as per NMP) located at 64 Carrol Drive, Hartley which is 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 1055-1997, “Acoustics - Description and Measurement of Environmental Noise” and EPL#12323. The measurements were carried out using Svantek Type 1, 971 noise analyser on Tuesday 3 April 2018 and Wednesday 4 April 2018. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-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 5.00am and work shifts for processing equipment commence at 6.00am. Daily pre-shift meetings and safety checks often delay commencement of onsite operations until closer to 7.00am. Morning shoulder measurements were conducted from 6.00am to 7.00am on Wednesday 4 April 2018 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
3 Apr 18	7.10am	4.40pm	6.30am	6.05pm
4 Apr 18	7.17am	5.00pm	7.50am	4.55pm

FIGURE 1

LOCALITY PLAN

REF: MAC170523

0 500m

KEY

A MONITORING LOCATION

SITE LOCATION

MAC
Muller Acoustic Consulting

*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 3 April 2018 and Wednesday 4 April 2018. **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}		
3/4/2018	16:20	Day	83	62	36	Dir: E Wind Speed: 0.4m/s Rain: Nil	Birds 38 - 50 Water Flowing 33 - 36 Cars 54 - 71 Trucks 64 - 83 Aircraft 39 - 41
Austen Quarry $L_{Aeq(15min)}$ Contribution							Not audible
3/4/2018	18:02	Evening	69	54	42	Dir: E Wind Speed: 0.1m/s Rain: Nil	Cars 56 - 62 Trucks 61 - 69 Insects 43 - 46 Aircraft 48 - 53
Austen Quarry $L_{Aeq(15min)}$ Contribution							Not audible
4/4/2018	6:19	Shoulder	83	64	35	Dir: NE Wind Speed: 0.1 m/s Rain: Nil	Birds 36 - 44 Water Flowing 34 - 36 Cars 64 - 68 Trucks 67 - 83
Austen Quarry $L_{Aeq(15min)}$ Contribution							Not audible

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 3 April 2018 and Wednesday 4 April 2018. **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}		
3/4/2018	15:48	Day	56	37	31	Dir: E Wind Speed: 1.0m/s Rain: Nil	Dog Noise 42 - 56 Aircraft 33 - 43 Site Hum 27 - 34 Cullen Workshop 30 - 33
			Austen Quarry $L_{Aeq(15min)}$ Contribution				29
3/4/2018	18:28	Evening	63	34	27	Dir: NE Wind Speed: 1.3m/s Rain: Nil	Insects 27 - 36 Dog 50 - 63 Aircraft 36 - 41 Site Hum 24 - 28 Gun Shots 55 - 58
			Austen Quarry $L_{Aeq(15min)}$ Contribution				26
4/4/2018	6:44	Shoulder	57	39	30	Dir: NE Wind Speed: 0.2m/s Rain: Nil	Birds 29 - 57 Traffic 26 - 33 Site Noise 32 - 45
			Austen Quarry $L_{Aeq(15min)}$ Contribution				33

4.3 Assessment Results - Location C, 64 Carrol Drive

Operational attended noise monitoring was completed in each assessment period at Location C on Tuesday 3 April 2018 and Wednesday 4 April 2018. **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}		
3/4/2018	16:42	Day	70	46	34	Dir: E Wind Speed: 1.4m/s Rain: Nil	Birds 37 – 69 Distant Dogs 33 - 34 Traffic 42 - 70 Leaves Rustling 41 - 44
			Austen Quarry $L_{Aeq(15min)}$ Contribution				Not audible
3/4/2018	18:58	Evening	55	38	30	Dir: E Wind Speed: 1.6m/s Rain: Nil	Insects 28 - 35 Traffic 27 - 55
			Austen Quarry $L_{Aeq(15min)}$ Contribution				Not audible
4/4/2018	5:57	Shoulder	75	50	32	Dir: NE Wind Speed: 0.2m/s Rain: Nil	Birds 40 - 75 Traffic 42 - 55
			Austen Quarry $L_{Aeq(15min)}$ Contribution				Not audible

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5 Noise Compliance Assessment

The compliance assessment for the nominated monitoring locations are presented in **Table 6** to **Table 8** for day, evening and morning shoulder assessment periods.

Table 6 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
A	Not Audible	35	✓
B	29	35	✓
C	Not Audible	35	✓

Table 7 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
A	Not Audible	35	✓
B	26	35	✓
C	Not Audible	35	✓

Table 8 Morning Shoulder Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
A	Not Audible	35	✓
B	33	35	✓
C	Not Audible	35	✓

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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 the Austen Quarry, adjacent (non-project) quarries and several transport firms. Local light vehicle traffic also contributed to the overall ambient environment. It was noted that Austen trucks were observed to predominantly approach and cross the Glenroy Bridge at a slower speed than other road trucks, as per the instructions of Austen Management. Quarry noise emissions were inaudible during all three monitoring periods during the April 2018 survey. Other extraneous noise sources audible during the three attended surveys included birds, and water flowing from nearby Coxs River.

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 monitoring periods, although remained within the applicable noise criteria. This is consistent with the predictions made in the EIS for Stage 2 of the Project (RWC, 2014). Mobile plant noise was intermittently audible during the morning shoulder as they accessed the pit at the start of shift from the workshop area. General quarry hum was audible during the day and evening monitoring periods. Notwithstanding, extraneous noise sources dominated the noise environment which included birds, distant traffic hum, dog barking, insects and aircraft noise.

6.3 Discussion of Results - Location C

Quarry noise was inaudible during all three survey periods at Location C, 64 Carroll Drive, Hartley, NSW. Highway and passing local traffic, local wildlife and distant dogs barking dominated the ambient noise environment.

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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 3 April 2018 and Wednesday 4 April 2018 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

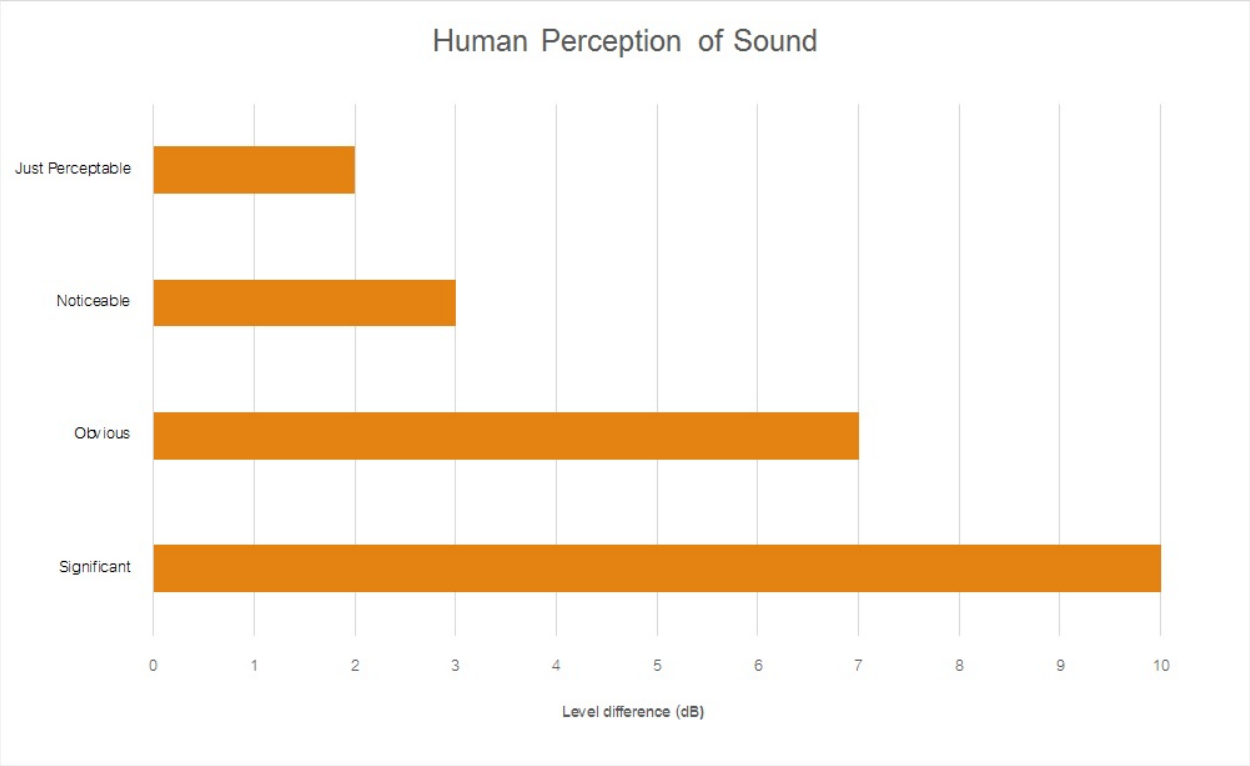
Table A1 provides a number of technical terms have been used in this report.

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

6667

Date: 3.4.18 Operator: Kingsley

Weather Conditions; raining Quarry Bench ID. 715

Shift Start Time	6.00	Shift Finish Time	5.00
Crusher Start Time	7.10	End of day Crusher stopped	4.40

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed
947602	953179	5579
Conveyor 6 Scalps Start	**Conveyor 6 Scalps Finish**	**Total Tonnes Stockpiled**
	~	

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

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

Stoppages due to Trucks	Stoppages due to Jaw

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	7.10	1hr 10m	feed box, move sand
8.15	8.35	20m	CV2 General fault - d/s ?
9.50	10.15	25m	rock in P/F
12.55	1.35	40m	smoko
4.40			end crushing

Pre start checks;

Generator hours. 22489 - 22499 Generator oil level.. ~

Plant Visual ~

COMMENTS

greaser still faulting

DAILY PRODUCTION LOG & CHECKLIST - SECONDARY

Date: 3.4.18 Operator: Leon

Weather Conditions; .....

Shift Start Time	6am	Shift Finish Time	9PM
Crusher Start Time	6.30	End of day Crusher stopped	605

Weightometer Reading; Start: 2010632 Finish:.....

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6am	630am	30min	prestart / TOOLBOX
6.30am	7.43am	1h 13min	NO Rock
9.52	9.53	1m	Adj 450
125	137	12min	Metal alarm NO TRANSPORT. PR
2.55	2.56	1m	Adj 450
4.50	5.04	14m	Take measurements + Pics @ S3
605			OUT OF STONE ON 1 + 3 feeders

PRODUCTION SUMMARY

Fines 327

Belts	Size	Description	Total	Gate open	Comments
CV 8	20 mm	Concrete Aggregate	1278		
CV 20	Course Sand 4-0mm	Manufactured Sand	971		
CV19*	10-7mm Blend*	Concrete Blend	1318		
CV19	7mm	Concrete Aggregate			
CV17	10mm	Concrete Aggregate			
CV15	14mm	Concrete Aggregate	98		
CV5	Ballast/40mm	Non Spec Aggregate			

Total 3992

COMMENTS

12246

DAILY PRODUCTION LOG & CHECKLIST - PRIMARY

Date: 4.4.18 Operator: Kingsley

Weather Conditions; fine Quarry Bench ID. 775

Shift Start Time	6 00	Shift Finish Time	5 00
Crusher Start Time	7.00	End of day Crusher stopped	4.55

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed
95 31 79	96 06 74	7490
Conveyor 6 Scalps Start	**Conveyor 6 Scalps Finish**	**Total Tonnes Stockpiled**
	356	

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

KK1 Loads to Boot	46	KK3 Loads to Boot	21
KK2 Loads to Boot	44	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, new bench cut L/T
4.55			and crushing

Pre start checks;

Generator hours. 22502-22512 Generator oil level.. ✓

Plant Visual ✓

COMMENTS

Owner: Quarry Manager		HY-TEC CONCRETE & QUARRIES	Form: HTQY-P-SFT-034
Forms & Templates	Revision: 2	Status: Approved	Issue Date: 14 Feb 2012

DAILY PRODUCTION LOG & CHECKLIST - SECONDARY

Date: 4:4:18 Operator: Jezza

Weather Conditions; cloudy

Shift Start Time	6.00	Shift Finish Time	9 PM
Crusher Start Time	7.17	End of day Crusher stopped	5 PM

Weightometer Reading; Start: 2014998 **Finish:**

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
6.00	7.17	1hr 17m	TOOLBOX / PRE-START / NO ROCK
9.41	9.42	1m	Adj: 450
11.52	11.54	2m	Adj: 450 + 550
2.30	2.31	1m	Adj: 450
5 PM			PRODUCT TO WET SPRAY LEFT ON IN MANUAL ONTOP PLANT.

PRODUCTION SUMMARY

FINES - 390

Belts	Size	Description	Total	Gate open	Comments
CV 8	20 mm	Concrete Aggregate	1424		
CV 20	Course Sand 4-0mm	Manufactured Sand	965		
CV19*	10-7mm Blend*	Concrete Blend	1439		
CV19	7mm	Concrete Aggregate			
CV17	10mm	Concrete Aggregate			
CV15	14mm	Concrete Aggregate	100		
CV5	Ballast/40mm	Non Spec Aggregate			

TOTAL - 4318

COMMENTS

Check solinoid on 20mm stacker + check sprays on sand stacker

Clean crew - clean 450/550 top down - get rid of all dust on structure

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MAC
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