APPENDIX 3 Waste acceptance full list

KMK's revised table below for the lists of wastes and associated EWC codes both accepted to date and also a full listing in the final column to be included in the proposed licence application W0113-04 under review with the EPA at the time of this EIS submission.

Broad Waste Category	**EWC codes associated with this category handled at KMK to date**	**Complete listing of EWC codes associated with this category for inclusion on the waste licence.**
For example, but not limited to:		
Hazardous WEEE	16 02 09*, 16 02 13*, 20 01 21*, 20 01 35*	16 02 09*, 16 02 13*, 20 01 21*, 20 01 35*
Non-hazardous WEEE	16 02 14, 16 02 16, 20 01 36	16 02 14, 16 02 16, 20 01 36
Fridges and freezers (if not counted above)	16 02 11*, 20 01 23*	16 02 11*, 20 01 23*
Batteries (household)	16 06 04, 20 01 33*	16 06 04, 20 01 33*
Batteries (lead acid)	16 06 01*	16 06 01*
Batteries (other)	16 06 02*, 16 06 03*, 16 06 04, 16 06 05, 20 01 33*	16 06 02*, 16 06 03*, 16 06 04, 16 06 05, 16 06 06*, 20 01 33*, 20 01 34.
Non-WEEE electrical equipment/electronics	None	16 02 09*, 16 02 10*, 16 02 11*, 16 02 12*, 16 02 14, 16 02 15*, 16 02 16,
Filter cakes	06 05 02*, 11 01 09*, 11 01 10, 12 01 20*	06 05 02*, 07 01 99*, 07 01 10*, 07 02 09*, 07 02 10*, 07 03 09*, 07 03 10*, 07 04 09*, 07 04 10, 07 05 09*, 07 05 10, 07 06 09*, 07 06 10*, 07 07 09*, 07 07 10*, 11 01 09*, 11 01 10, 12 01 20*, 19 01 05*

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Broad Waste Category	**EWC codes associated with this category to date**	**EWC codes associated with this category**
Precious metal scrap	12 01 03, 16 02 16, 16 08 01	12 01 03, 16 02 16, 16 08 01, 16 08 02*, 16 08 03, 16 08 07*
Other metallic wastes	06 04 99, 12 01 01, 12 01 03, 12 01 13, 12 01 21, 16 02 14, 16 02 16, 16 03 04, 19 12 02, 19 12 03, 20 01 40	02 01 10, 10 08 14, 11 05 01, 11 05 02, 12 01 01, 12 01 02, 12 01 03, 12 01 04, 12 01 20*, 12 01 99, 16 01 08*, 16 01 12, 16 01 17, 16 01 18, 16 11 01*, 16 11 02, 16 10 03*, 16 11 04, 17 04 01, 17 04 02, 17 04 03, 17 04 04, 17 04 05, 17 04 06, 17 04 07, 17 04 09*, 17 04 10*, 17 04 11, 17 09 01*, 18 01 10*, 19 10 01, 19 10 02, 19 10 03*, 19 10 04, 19 10 05*, 19 10 06, 19 12 02, 19 12 03, 20 01 40, 20 01 99
Sludges	None	01 03 05*, 01 03 06, 05 01 99*, 05 01 10, 06 05 02*, 06 05 03, 07 01 11*, 07 01 12, 07 02 11*, 07 02 12, 07 03 11*, 07 03 12, 07 04 11*, 07 04 12, 07 05 11*, 07 05 12, 07 06 11*, 07 06 12, 07 07 11*, 07 07 12, 08 02 02, 08 02 03, 10 01 07, 10 01 20*, 10 01 21, 10 01 22*, 10 01 23, 10 02 13*, 10 02 14, 10 02 15, 10 02 99, 10 03 25*, 10 03 26, 10 05 06*, 10 06 07*, 10 07 05, 10 08 17*, 10 08 18, 11 01 08*, 11 01 09*, 11 01 10, 11 01 15*, 11 01 16*, 11 01 98*, 11 01 99, 11 02 02*, 11 02 03, 11 02 05*, 11 02 06, 11 02 07*, 11 02 99, 12 01 12*, 12 01 14*, 12 01 15, 12 01 18*, 14 06 04*, 14 06 05*, 19 02 05*, 19 02 06,
Liquid wastes	None	06 01 01*, 06 01 02*, 06 01 03*, 06 01 04*, 06 01 05*, 06 01 06*, 06 01 99, 08 01 17*, 08 01 18, 08 03 12*, 08 03 13, 09 01 04*, 09 01 06*, 11 01 05*, 11 01 06*, 11 01 07*, 12 01 09*, 12 01 10*, 14 06 01*, 14 06 02*, 14 06 03*, 16 08 04, 16 08 05*, 16 08 06*, 16 08 07*, 16 10 01*, 16 10 02, 16 10 03*, 16 10 04*, 19 01 06*
Packaging wastes	15 01 01, 15 01 02, 15 01 03, 15 01 06, 15 01 07	15 01 01, 15 01 02, 15 01 03, 15 01 04, 15 01 05, 15 01 06, 15 01 07, 15 01 09, 15 01 10*, 15 01 11*

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Broad Waste Category	**EWC codes associated with this category to date**	**EWC codes associated with this category**
Oxide Powders (hazardous and non hazardous)	12 01 17, 12 01 20*, 12 01 21, 16 02 16	06 03 16, 12 01 17, 12 01 20*, 12 01 21, 16 02 16,
Other wastes for acceptance	19 12 04	01 03 07*, 01 03 08, 01 03 09, 01 03 99, 01 04 07*, 01 04 09, 01 04 10, 01 04 12, 01 04 99, 02 01 99, 05 01 14, 05 01 15*, 05 01 99, 05 07 01*, 06 02 01*, 06 02 04*, 06 02 05*, 06 03 11*, 06 03 13*, 06 03 14, 06 03 99, 06 04 03*, 06 04 04*, 06 04 05*, 06 04 99, 06 05 02*, 06 06 03, 06 06 99, 06 08 02*, 06 08 99, 06 11 01, 06 11 99, 06 13 02*, 06 13 03, 06 13 99, 07 01 09*, 07 02 13, 07 02 99, 07 03 99, 07 04 13*, 07 04 99, 07 05 13*, 07 05 14, 07 05 99, 07 06 99, 07 07 99, 08 01 99, 08 02 01, 08 02 99, 08 03 17*, 08 03 18, 08 03 99, 09 01 07, 09 01 08, 09 01 10, 09 01 11*, 09 01 12, 09 01 99, 10 01 01, 10 01 05, 10 01 14*, 10 01 15, 10 01 16*, 10 01 17, 10 01 18*, 10 01 19, 10 01 24, 10 01 99, 10 03 02, 10 03 04*, 10 03 05, 10 03 15*, 10 03 16, 10 03 18, 10 03 19*, 10 03 20, 10 03 21*, 10 03 22, 10 03 23* , 10 03 24, 10 03 99, 10 04 01*, 10 04 02*, 10 04 03*, 10 04 04*, 10 04 05*, 10 04 06*, 10 04 07*, 10 04 99, 10 05 01, 10 05 03*, 10 05 04, 10 05 05*, 10 05 10*, 10 05 11, 10 05 99, 10 06 01, 10 06 02, 10 06 03*, 10 06 04, 10 06 06*, 10 06 99, 10 07 01, 10 07 02, 10 07 03, 10 07 04, 10 07 99, 10 08 04, 10 08 09, 10 08 10*, 10 08 11, 10 08 13, 10 08 15*, 10 08 16, 10 08 99, 10 09 03, 10 09 05*, 10 09 06, 10 09 07*, 10 09 08, 10 09 09*, 10 09 10, 10 09 11*, 10 09 12, 10 09 13*, 10 09 14, 10 09 99, 10 10 03, 10 10 05*, 10 10 06, 10 10 07*, 10 10 08, 10 10 09*, 10 10 10, 10 10 11*, 10 10 12, 10 10 13*, 10 10 14, 10 10 99, 10 11 09*, 10 11 10,

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		10 11 11*, 10 11 12, 10 11 99, 10 12 01, 10 12 08, 10 12 12, 10 12 99, 10 14 01*, 11 05 03*, 11 05 99, 12 01 05, 12 01 16*, 12 01 17, 16 01 21*, 16 01 22, 16 01 99, 16 03 03*, 16 03 04, 16 03 05*, 16 03 06, 16 05 04*, 16 05 05, 16 11 05*, 16 11 06, 19 12 04, 19 01 07*, 19 01 10*, 19 01 11*, 19 01 12, 19 01 13*, 19 01 14, 19 01 15*, 19 01 16, 19 01 17*, 19 01 18, 19 01 19, 19 01 99, 19 02 03, 19 02 04*, 19 02 11*, 19 02 99, 19 03 04*, 19 03 05, 19 03 06*, 19 03 07, 19 04 01, 19 08 06*, 19 08 08*, 19 08 99, 19 09 04, 19 09 05, 19 12 01, 19 12 04, 19 12 05, 19 12 07, 19 12 09, 19 12 11*, 19 12 12
Filter materials	15 02 03	15 02 02*, 15 02 03
Special metal alloys	06 04 99, 06 13 99, 12 01 01, 12 01 02, 12 01 03, 12 01 04, 12 01 20*, 12 01 21, 16 02 14	06 04 99, 06 13 99, 12 01 01, 12 01 02, 12 01 03, 12 01 04, 12 01 20*, 12 01 21, 16 02 14

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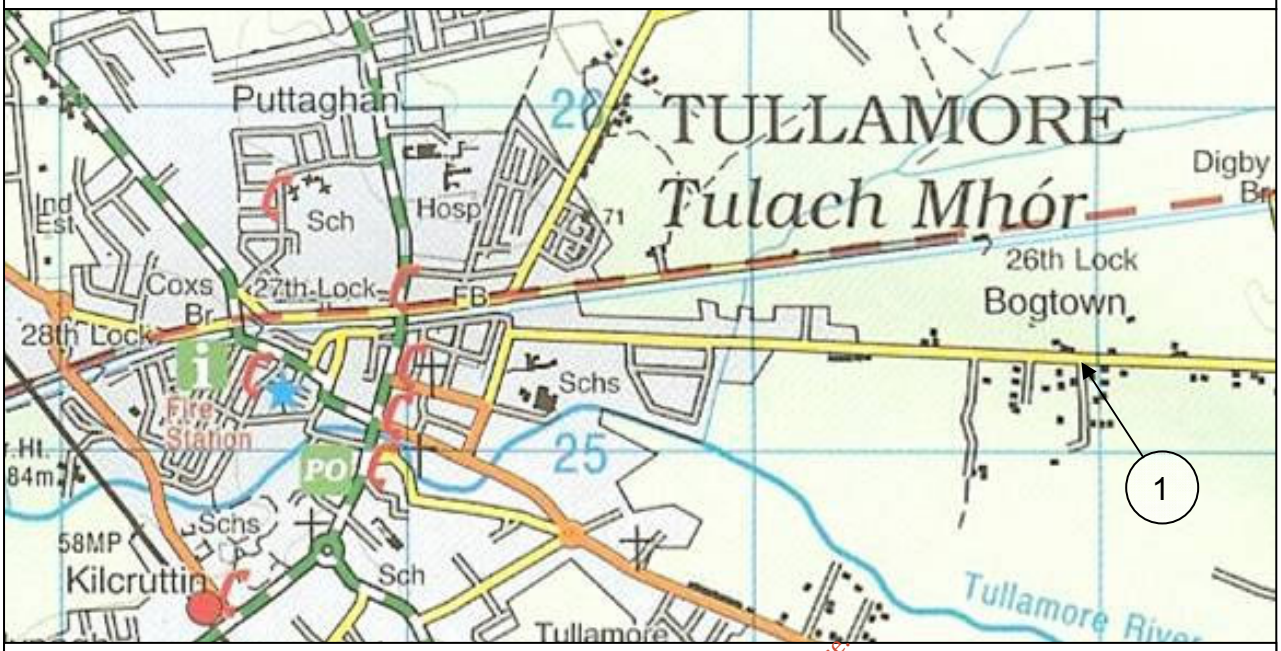
Site Location



Movement Number & Directions

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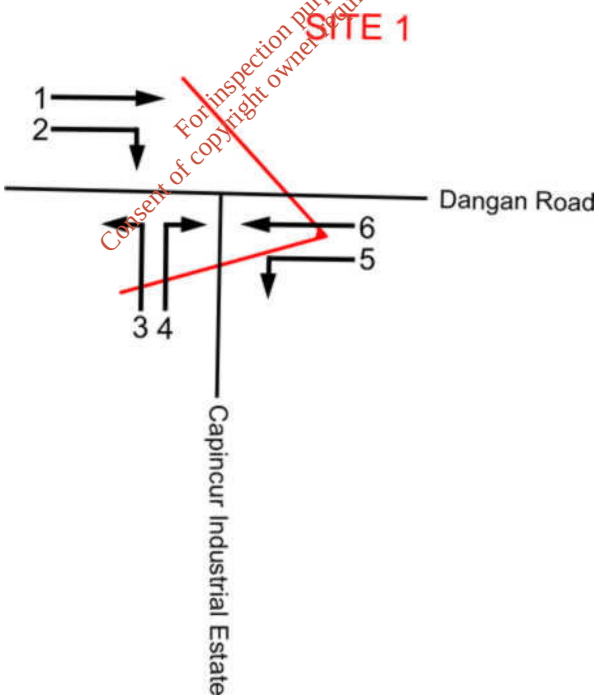

	Job number: ATH/09/086	Job date: 30th June 2009	Drawing No: ATH/09/086-1	abacus Transportation Surveys
	Client: Traffic Wise	Job day: Thursday	Author: TFK	

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ABACUS TRANSPORTATION SURVEYS

CAPINCUR INDUSTRIAL ESTATE TRAFFIC COUNT **JULY 2009**
MANUAL CLASSIFIED JUNCTION COUNT **ATH/09/086**

SITE: 01 DATE: 30th July 2009

LOCATION: Dangan Road/Industrial Estate Access DAY: Thursday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT
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07:15	3	2	0	0	0	0	5	2	0	0	0	0	0	2	0	0	0	1	0	0	1
07:30	6	0	0	0	0	0	6	1	1	1	0	0	0	3	1	0	1	1	0	0	3
07:45	10	2	0	0	0	0	12	9	2	0	0	0	0	11	0	0	0	0	0	0	0
H/TOT	24	4	0	0	0	0	28	13	3	1	0	0	0	17	1	1	1	2	0	0	5
08:00	15	4	0	1	0	0	20	5	6	1	0	0	0	12	1	3	1	0	0	0	5
08:15	16	2	0	1	0	0	19	1	3	1	0	1	0	6	2	3	0	0	0	0	5
08:30	10	6	2	1	0	0	19	4	3	0	0	2	0	9	0	3	1	2	1	0	7
08:45	14	4	0	1	0	0	19	4	1	0	0	1	0	6	1	2	0	2	1	0	6
H/TOT	55	16	2	4	0	0	77	14	13	2	0	4	0	33	4	11	2	4	2	0	23
09:00	17	4	0	0	1	0	22	2	1	2	1	0	1	9	2	4	0	0	1	0	7
09:15	12	4	0	0	0	0	16	7	0	0	0	0	0	10	7	2	2	1	0	1	13
09:30	14	3	0	1	0	0	18	6	2	0	1	0	0	9	0	0	1	1	0	0	2
09:45	16	3	1	0	0	0	20	6	4	1	0	0	0	11	5	3	1	1	0	0	10
H/TOT	59	14	1	1	1	0	76	21	12	3	2	0	1	39	14	9	4	3	1	1	32
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10:15	19	4	4	0	0	0	27	9	4	0	0	0	0	13	7	6	0	0	0	0	13
10:30	19	4	1	2	0	0	26	5	1	0	0	0	1	7	3	3	1	0	0	0	7
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H/TOT	84	11	5	4	1	0	105	18	6	4	0	0	0	28	18	6	2	0	0	0	26
12:00	18	3	0	0	0	0	21	3	2	1	0	2	0	8	3	4	1	0	0	0	8
12:15	29	9	0	0	0	0	38	0	3	0	0	1	1	5	4	2	0	1	3	1	11
12:30	22	3	1	1	0	0	27	4	4	1	0	0	0	9	2	4	0	0	1	0	7
12:45	23	1	2	0	0	0	26	4	1	2	0	0	0	7	7	1	1	0	0	0	9
H/TOT	92	16	3	1	0	0	112	11	10	4	0	3	1	29	16	11	2	1	4	1	35

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SITE: 01 DATE: 30th July 2009

LOCATION: Dangan Road/Industrial Estate Access DAY: Thursday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT
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13:15	29	4	0	0	0	0	33	2	1	1	0	0	0	4	4	1	1	0	0	0	6
13:30	30	4	0	2	0	0	36	6	0	0	1	0	0	7	4	2	1	0	0	0	7
13:45	24	4	1	1	0	0	30	12	4	1	1	0	1	19	7	2	2	0	0	0	11
H/TOT	110	13	3	3	0	0	129	26	5	2	2	2	1	38	22	7	4	0	0	0	33
14:00	21	0	0	0	0	0	21	8	3	0	1	2	0	14	5	2	0	1	1	0	9
14:15	16	1	0	0	0	0	17	4	4	1	0	0	0	9	8	3	0	1	2	0	14
14:30	22	4	1	1	0	0	28	5	3	1	0	1	0	10	6	1	1	1	2	0	11
14:45	20	5	1	0	0	0	26	12	5	1	0	1	0	19	11	4	0	0	0	0	15
H/TOT	79	10	2	1	0	0	92	29	15	3	1	4	0	52	30	10	1	3	5	0	49
15:00	30	5	1	0	0	0	36	4	1	0	0	1	0	6	3	4	0	0	1	0	8
15:15	23	7	1	0	0	0	31	4	2	1	1	0	0	8	4	2	0	0	1	0	7
15:30	24	3	1	0	0	0	28	4	1	0	0	0	0	5	3	1	0	0	0	0	4
15:45	23	3	2	0	0	0	28	5	2	0	1	0	0	8	7	2	0	0	0	0	9
H/TOT	100	18	5	0	0	0	123	17	6	1	2	1	0	27	17	9	0	0	2	0	28
16:00	25	4	2	0	0	0	31	2	1	1	1	0	0	5	6	1	0	0	0	0	7
16:15	23	3	0	0	0	1	27	7	2	1	0	1	0	11	5	1	0	0	0	0	6
16:30	33	5	0	0	0	0	38	1	2	0	2	1	0	6	4	1	1	0	2	0	8
16:45	25	3	2	0	0	0	30	1	0	0	1	1	0	3	3	5	1	2	1	0	12
H/TOT	106	15	4	0	0	1	126	11	5	2	4	3	0	25	18	8	2	2	3	0	33
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17:15	51	4	0	0	0	0	55	6	0	0	0	1	0	7	5	3	0	0	2	0	10
17:30	31	5	0	0	0	0	36	2	1	1	1	1	1	7	5	1	0	0	0	0	6
17:45	47	5	2	1	0	0	55	1	0	0	1	0	0	2	3	1	0	0	1	0	5
H/TOT	166	19	5	1	0	0	191	13	1	1	3	3	1	22	26	7	0	0	3	0	36
18:00	36	5	1	0	0	0	42	2	0	1	0	0	0	3	5	1	0	0	0	0	6
18:15	25	3	0	0	0	0	28	0	0	0	0	0	0	0	5	0	0	2	0	0	7
18:30	22	1	3	0	0	0	26	0	1	0	0	0	0	1	0	1	0	1	0	0	2
18:45	21	4	1	0	0	0	26	0	0	0	0	0	0	0	3	0	0	0	0	0	3
H/TOT	104	13	5	0	0	0	122	2	1	1	0	0	0	4	13	2	0	3	0	0	18
P/TOT	1047	163	46	17	2	1	1276	197	86	26	15	20	5	349	202	93	22	18	20	3	358

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ABACUS TRANSPORTATION SURVEYS

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SITE: 01 DATE: 30th July 2009

LOCATION: Dangan Road/Industrial Estate Access DAY: Thursday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT
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07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	12
07:30	0	0	0	0	0	0	0	0	1	0	0	0	0	1	15	5	0	0	0	0	20
07:45	0	0	0	0	0	0	0	3	0	0	0	0	0	3	27	4	1	0	0	0	32
H/TOT	0	0	0	0	0	0	0	3	1	0	0	0	0	4	71	11	2	0	0	0	84
08:00	0	0	0	0	0	1	1	1	1	0	0	0	0	2	20	2	2	0	0	0	24
08:15	1	0	0	0	0	0	1	0	1	0	0	0	0	1	25	2	2	0	0	0	29
08:30	0	0	0	0	0	0	0	0	1	0	0	0	0	1	27	6	1	0	0	0	34
08:45	0	0	0	0	0	0	0	1	1	0	0	0	0	2	40	7	1	0	0	0	48
H/TOT	1	0	0	0	0	1	2	2	4	0	0	0	0	6	112	17	6	0	0	0	135
09:00	0	0	0	0	0	0	0	0	1	0	0	0	0	2	35	1	1	0	0	0	37
09:15	0	0	0	0	0	0	0	3	0	0	0	0	0	3	45	4	1	1	0	0	51
09:30	0	1	0	0	0	0	1	1	0	0	0	0	0	1	26	5	1	0	0	0	32
09:45	0	0	0	0	0	0	0	3	2	0	0	0	0	5	42	3	2	1	0	0	48
H/TOT	0	1	0	0	0	0	1	7	4	0	0	0	0	11	148	13	5	2	0	0	168
10:00	1	0	0	0	0	0	1	1	1	0	0	0	0	2	31	11	1	1	0	0	44
10:15	1	1	0	0	0	0	2	3	0	0	0	0	0	3	35	3	0	0	0	0	38
10:30	1	0	0	0	0	0	1	2	0	0	0	0	0	2	25	3	0	2	0	0	30
10:45	1	0	0	0	0	0	1	2	0	0	0	0	0	2	25	6	3	0	0	1	35
H/TOT	4	1	0	0	0	0	5	8	1	0	0	0	0	9	116	23	4	3	0	1	147
11:00	0	0	0	0	0	0	0	2	1	0	0	0	0	3	30	6	3	0	0	0	39
11:15	0	1	0	0	0	0	1	2	1	0	0	0	0	3	30	3	2	4	0	0	39
11:30	1	0	0	0	0	0	1	2	0	0	0	0	0	2	33	3	0	2	0	0	38
11:45	3	1	0	0	0	0	4	0	1	0	0	0	0	1	35	4	2	0	0	0	41
H/TOT	4	2	0	0	0	0	6	6	3	0	0	0	0	9	128	16	7	6	0	0	157
12:00	2	0	0	0	0	0	2	0	1	1	0	0	0	2	31	3	1	0	0	0	35
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	2	0	0	0	0	32
12:30	1	0	0	0	0	0	1	0	1	0	0	0	0	1	33	5	0	1	1	0	40
12:45	2	0	1	0	0	0	3	1	0	0	0	0	0	1	26	3	0	0	0	0	29
H/TOT	5	0	1	0	0	0	6	1	2	1	0	0	0	4	120	13	1	1	1	0	136

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ABACUS TRANSPORTATION SURVEYS

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	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT	CAR	LGV	OGV1	OGV2	SKIP	BUS	TOT
13:00	0	1	0	0	0	0	1	0	0	0	1	0	0	1	31	1	2	1	0	0	35
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	4	2	1	0	0	27
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	3	0	0	0	0	28
13:45	0	0	0	0	0	0	0	1	1	0	0	0	0	2	33	2	0	0	0	0	35
H/TOT	0	1	0	0	0	0	1	1	1	0	1	0	0	3	109	10	4	2	0	0	125
14:00	1	0	0	0	0	0	1	2	1	1	0	0	0	4	24	7	0	0	0	0	31
14:15	1	1	0	0	0	0	2	0	0	0	0	0	0	0	24	4	0	0	0	0	28
14:30	1	1	0	0	0	0	2	2	1	0	0	0	0	3	15	3	1	0	0	0	19
14:45	2	0	0	0	0	0	2	1	2	0	0	0	0	3	11	1	1	0	0	0	13
H/TOT	5	2	0	0	0	0	7	5	4	1	0	0	0	10	74	15	2	0	0	0	91
15:00	0	0	0	0	0	0	0	1	1	0	0	0	0	3	21	5	1	0	1	0	28
15:15	0	1	0	0	0	0	1	1	0	0	2	0	0	3	35	3	1	0	0	0	39
15:30	1	0	1	0	0	0	2	3	1	0	0	0	0	4	22	6	0	0	0	0	28
15:45	0	0	1	0	0	0	1	2	0	0	0	0	0	2	25	3	0	0	0	0	28
H/TOT	1	1	2	0	0	0	4	7	3	0	2	0	0	12	103	17	2	0	1	0	123
16:00	1	2	1	0	0	0	4	0	0	0	0	0	0	0	31	2	0	2	0	0	35
16:15	0	1	1	0	0	0	2	1	1	1	0	0	0	3	25	4	1	0	0	0	30
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	2	1	0	0	0	15
16:45	1	1	1	0	0	0	3	1	0	1	0	0	0	2	22	4	1	0	0	0	27
H/TOT	2	4	3	0	0	0	9	2	1	2	0	0	0	5	90	12	3	2	0	0	107
17:00	3	0	0	0	0	0	3	1	0	0	0	0	0	1	24	2	0	0	0	0	26
17:15	1	0	0	0	0	0	1	1	1	0	0	0	0	2	23	6	0	1	0	0	30
17:30	2	0	0	0	0	0	2	3	0	0	0	0	0	3	22	3	1	0	0	0	26
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	6	0	0	0	0	27
H/TOT	6	0	0	0	0	0	6	5	1	0	0	0	0	6	90	17	1	1	0	0	109
18:00	2	1	0	0	0	0	3	1	1	0	0	0	0	2	15	4	0	0	0	0	19
18:15	1	0	0	0	0	0	1	0	0	0	0	0	0	0	22	0	3	0	0	0	25
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	4	0	0	0	0	23
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	2	2	0	0	0	21
H/TOT	3	1	0	0	0	0	4	1	1	0	0	0	0	2	73	10	5	0	0	0	88
P/TOT	31	13	6	0	0	1	51	48	26	4	3	0	0	81	1234	174	42	17	2	1	1470

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EPA Export 16-10-2012:23:24:01

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

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TRL SOFTWARE BUREAU
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EMAIL: SoftwareBureau@trl.co.uk

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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
Existing 2009.vpi"
(drive-on-the-left) at 11:13:06 on Tuesday, 15 September 2009

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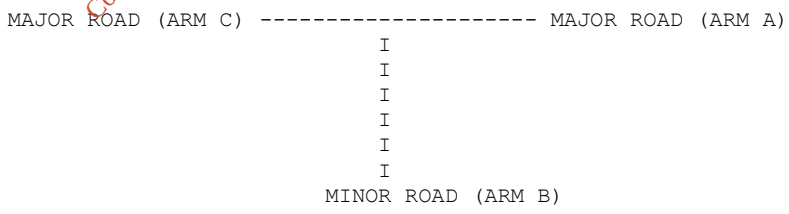
RUN TITLE
****
Existing Cappincur Industrial Estate Access

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:01

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.44	2.16	1.44
ARM B	15.00	45.00	75.00	0.52	0.79	0.52
ARM C	15.00	45.00	75.00	2.65	3.98	2.65

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.052	0.948
		0.0	6.0	109.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.143	0.000	0.857

EPA Export 16-10-2012:23:24:01

```
 I                    I          I    6.0 I    0.0 I   36.0 I
 I                    I          I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I          I        I        I        I
 I                    I   ARM C  I  0.901 I  0.099 I  0.000 I
 I                    I          I  191.0 I   21.0 I    0.0 I
 I                    I          I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I          I        I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.45      9.86    0.046                 0.0    0.0        0.7
I
 I   B-A       0.08      5.91    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.33     11.41    0.029                 0.0    0.0        0.6
I
 I   C-A       2.32
I
 I   A-B       0.08
I
 I   A-C       1.36
I
 I
I
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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.54      9.78    0.055                 0.0    0.1        0.9
I
 I   B-A       0.09      5.78    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.41     11.63    0.035                 0.0    0.0        0.7
I
 I   C-A       2.75
I
 I   A-B       0.09
I
 I   A-C       1.63
I
 I
I
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EPA Export 16-10-2012:23:24:01

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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.15-17.30
I
 I   B-C       0.66      9.67    0.068                0.1    0.1        1.1
I
 I   B-A       0.11      5.60    0.020                0.0    0.0        0.3
I
 I   C-AB      0.53     11.94    0.045                0.0    0.1        1.0
I
 I   C-A       3.34
I
 I   A-B       0.11
I
 I   A-C       1.99
I
 I
I
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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.30-17.45
I
 I   B-C       0.66      9.67    0.068                0.1    0.1        1.1
I
 I   B-A       0.11      5.60    0.020                0.0    0.0        0.3
I
 I   C-AB      0.53     11.94    0.045                0.1    0.1        1.0
I
 I   C-A       3.34
I
 I   A-B       0.11
I
 I   A-C       1.99
I
 I
I
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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.45-18.00
I
 I   B-C       0.54      9.78    0.055                0.1    0.1        0.9
I
```

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EPA Export 16-10-2012:23:24:01

```
 I   B-A       0.09      5.78    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.41     11.63    0.035                 0.1    0.0        0.7
I
 I   C-A       2.75
I
 I   A-B       0.09
I
 I   A-C       1.63
I
 I
I
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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.45      9.86    0.046                 0.1    0.0        0.7
I
 I   B-A       0.08      5.90    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.33     11.41    0.029                 0.0    0.0        0.6
I
 I   C-A       2.32
I
 I   A-B       0.08
I
 I   A-C       1.36
I
 I
I
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--------------

 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.0
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.1
17.45	0.1
18.00	0.0
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	49.4	32.9	5.3	0.11	5.3	0.11
B-A	8.2	5.5	1.4	0.18	1.4	0.18
C-AB	38.2	25.5	4.5	0.12	4.5	0.12
C-A	252.5	168.3				
A-B	8.2	5.5				
A-C	149.5	99.6				
ALL	506.0	337.3	11.3	0.02	11.3	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.

========== end of file
==========

EPA Export 16-10-2012:23:24:01

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2010 Do Nothing.vpi"
(drive-on-the-left) at 12:04:29 on Tuesday, 15 September 2009

RUN TITLE
****
2010 Do Nothing

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.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

MAJOR ROAD (ARM C) ---------- MAJOR ROAD (ARM A)
I
I
I
I
I
I
MINOR ROAD (ARM B)

ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:01

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.49	2.23	1.49
ARM B	15.00	45.00	75.00	0.54	0.81	0.54
ARM C	15.00	45.00	75.00	2.74	4.11	2.74

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.050	0.950
		0.0	6.0	113.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.140	0.000	0.860

EPA Export 16-10-2012:23:24:01

```
 I                    I          I    6.0 I    0.0 I   37.0 I
 I                    I          I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I          I        I        I        I
 I                    I   ARM C  I  0.900 I  0.100 I  0.000 I
 I                    I          I  197.0 I   22.0 I    0.0 I
 I                    I          I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I          I        I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.46      9.85    0.047                 0.0    0.0        0.7
I
 I   B-A       0.08      5.87    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.35     11.44    0.030                 0.0    0.0        0.6
I
 I   C-A       2.39
I
 I   A-B       0.08
I
 I   A-C       1.41
I
 I
I
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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.55      9.77    0.057                 0.0    0.1        0.9
I
 I   B-A       0.09      5.74    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.43     11.67    0.037                 0.0    0.1        0.8
I
 I   C-A       2.84
I
 I   A-B       0.09
I
 I   A-C       1.69
I
 I
I
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EPA Export 16-10-2012:23:24:01

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.68	9.65	0.070		0.1	0.1	1.1	I
I B-A	0.11	5.56	0.020		0.0	0.0	0.3	I
I C-AB	0.56	11.99	0.047		0.1	0.1	1.0	I
I C-A	3.44							I
I A-B	0.11							I
I A-C	2.07							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.68	9.65	0.070		0.1	0.1	1.1	I
I B-A	0.11	5.56	0.020		0.0	0.0	0.3	I
I C-AB	0.56	11.99	0.047		0.1	0.1	1.1	I
I C-A	3.44							I
I A-B	0.11							I
I A-C	2.07							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.55	9.77	0.057		0.1	0.1	0.9	I

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EPA Export 16-10-2012:23:24:01

```
 I   B-A       0.09      5.74    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.43     11.67    0.037                 0.1    0.1        0.8
I
 I   C-A       2.83
I
 I   A-B       0.09
I
 I   A-C       1.69
I
 I
I
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 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.46      9.85    0.047                 0.1    0.0        0.8
I
 I   B-A       0.08      5.87    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.35     11.44    0.030                 0.1    0.0        0.6
I
 I   C-A       2.39
I
 I   A-B       0.08
I
 I   A-C       1.41
I
 I
I
 ------------------------------------------------------------------------------
--------------

 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.0
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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.

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.0

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	50.7	33.8	5.5	0.11	5.5	0.11
B-A	8.2	5.5	1.5	0.18	1.5	0.18
C-AB	40.3	26.9	4.8	0.12	4.8	0.12
C-A	260.0	173.3				
A-B	8.2	5.5				
A-C	154.9	103.3				
ALL	522.4	348.3	11.8	0.02	11.8	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

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TRL SOFTWARE BUREAU
TEL: CROWTHORNE (01344) 770758, FAX: 770864
EMAIL: SoftwareBureau@trl.co.uk

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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2010 Do Something.vpi"
(drive-on-the-left) at 12:05:19 on Tuesday, 15 September 2009

RUN TITLE
****
2010 Do Something

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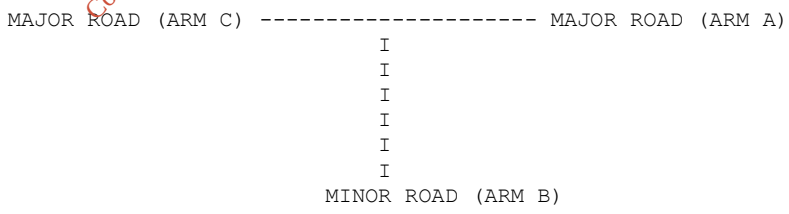
.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:01

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.49	2.23	1.49
ARM B	15.00	45.00	75.00	0.51	0.77	0.51
ARM C	15.00	45.00	75.00	2.71	4.07	2.71

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15	ARM A	0.000	0.050	0.950
		0.0	6.0	113.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.146	0.000	0.854

EPA Export 16-10-2012:23:24:01

```
 I                    I         I    6.0 I    0.0 I   35.0 I
 I                    I         I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I         I        I        I        I
 I                    I  ARM C  I  0.908 I  0.092 I  0.000 I
 I                    I         I  197.0 I   20.0 I    0.0 I
 I                    I         I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I         I        I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

.-------------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.44      9.84    0.044                 0.0    0.0        0.7
I
 I   B-A       0.08      5.90    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.32     11.44    0.028                 0.0    0.0        0.5
I
 I   C-A       2.40
I
 I   A-B       0.08
I
 I   A-C       1.41
I
 I
I
 -------------------------------------------------------------------------------------
--------------

.-------------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.52      9.76    0.054                 0.0    0.1        0.8
I
 I   B-A       0.09      5.77    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.39     11.67    0.034                 0.0    0.0        0.7
I
 I   C-A       2.84
I
 I   A-B       0.09
I
 I   A-C       1.69
I
 I
I
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I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.64	9.65	0.066		0.1	0.1	1.0	I
I B-A	0.11	5.59	0.020		0.0	0.0	0.3	I
I C-AB	0.51	11.99	0.043		0.0	0.1	0.9	I
I C-A	3.45							I
I A-B	0.11							I
I A-C	2.07							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.64	9.65	0.066		0.1	0.1	1.1	I
I B-A	0.11	5.59	0.020		0.0	0.0	0.3	I
I C-AB	0.51	11.99	0.043		0.1	0.1	0.9	I
I C-A	3.45							I
I A-B	0.11							I
I A-C	2.07							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.52	9.76	0.054		0.1	0.1	0.9	I

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EPA Export 16-10-2012:23:24:01

```
 I   B-A       0.09      5.77    0.016                 0.0    0.0        0.2
I
 I   C-AB      0.39     11.67    0.034                 0.1    0.0        0.7
I
 I   C-A       2.84
I
 I   A-B       0.09
I
 I   A-C       1.69
I
 I
I
 ------------------------------------------------------------------------------
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.------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.44      9.84    0.044                 0.1    0.0        0.7
I
 I   B-A       0.08      5.90    0.013                 0.0    0.0        0.2
I
 I   C-AB      0.32     11.44    0.028                 0.0    0.0        0.5
I
 I   C-A       2.40
I
 I   A-B       0.08
I
 I   A-C       1.41
I
 I
I
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 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.0
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.1
17.45	0.1
18.00	0.0
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-C	48.0	32.0	5.2	0.11	5.2	0.11
B-A	8.2	5.5	1.4	0.18	1.4	0.18
C-AB	36.7	24.5	4.3	0.12	4.3	0.12
C-A	260.9	173.9				
A-B	8.2	5.5				
A-C	154.9	103.3				
ALL	516.9	344.6	10.9	0.02	10.9	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2015 Do Nothing.vpi"
(drive-on-the-left) at 12:06:11 on Tuesday, 15 September 2009

RUN TITLE
****
2015 Do Nothing

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.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

MAJOR ROAD (ARM C) ---------- MAJOR ROAD (ARM A)
I
I
I
I
I
I
MINOR ROAD (ARM B)

ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:01

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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Consent of copyright owner required for any other use.

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.64	2.46	1.64
ARM B	15.00	45.00	75.00	0.60	0.90	0.60
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.053	0.947
		0.0	7.0	124.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.146	0.000	0.854

EPA Export 16-10-2012:23:24:01

```
 I                    I         I    7.0 I    0.0 I   41.0 I
 I                    I         I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I         I        I        I        I
 I                    I  ARM C  I  0.900 I  0.100 I  0.000 I
 I                    I         I  216.0 I   24.0 I    0.0 I
 I                    I         I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I         I        I        I        I
 ---------------------------------------------------------
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TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
B-C	0.51	9.80	0.052		0.0	0.1	0.8	
B-A	0.09	5.83	0.015		0.0	0.0	0.2	
C-AB	0.39	11.56	0.033		0.0	0.0	0.7	
C-A	2.61							
A-B	0.09							
A-C	1.55							

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TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
B-C	0.61	9.71	0.063		0.1	0.1	1.0	
B-A	0.10	5.68	0.018		0.0	0.0	0.3	
C-AB	0.49	11.81	0.041		0.0	0.1	0.9	
C-A	3.10							
A-B	0.10							
A-C	1.85							

EPA Export 16-10-2012:23:24:01

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.75	9.59	0.078		0.1	0.1	1.2	I
I B-A	0.13	5.48	0.023		0.0	0.0	0.3	I
I C-AB	0.63	12.15	0.052		0.1	0.1	1.2	I
I C-A	3.75							I
I A-B	0.13							I
I A-C	2.27							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.75	9.59	0.078		0.1	0.1	1.3	I
I B-A	0.13	5.48	0.023		0.0	0.0	0.4	I
I C-AB	0.63	12.15	0.052		0.1	0.1	1.2	I
I C-A	3.75							I
I A-B	0.13							I
I A-C	2.27							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.61	9.71	0.063		0.1	0.1	1.0	I

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EPA Export 16-10-2012:23:24:01

```
 I   B-A       0.10      5.68    0.018                 0.0    0.0        0.3
I
 I   C-AB      0.49     11.81    0.041                 0.1    0.1        0.9
I
 I   C-A       3.10
I
 I   A-B       0.10
I
 I   A-C       1.85
I
 I
I
 ------------------------------------------------------------------------------
--------------

.------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.51      9.80    0.052                 0.1    0.1        0.8
I
 I   B-A       0.09      5.83    0.015                 0.0    0.0        0.2
I
 I   C-AB      0.39     11.56    0.034                 0.1    0.0        0.7
I
 I   C-A       2.61
I
 I   A-B       0.09
I
 I   A-C       1.55
I
 I
I
 ------------------------------------------------------------------------------
--------------

 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.1
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.1
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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EPA Export 16-10-2012:23:24:01

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	56.2	37.5	6.2	0.11	6.2	0.11
B-A	9.6	6.4	1.7	0.18	1.7	0.18
C-AB	45.2	30.1	5.5	0.12	5.5	0.12
C-A	283.9	189.3				
A-B	9.6	6.4				
A-C	170.0	113.4				
ALL	574.5	383.0	13.4	0.02	13.4	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

EPA Export 16-10-2012:23:24:01

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

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EMAIL: SoftwareBureau@trl.co.uk

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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2015 Do Something.vpi"
(drive-on-the-left) at 12:07:10 on Tuesday, 15 September 2009

RUN TITLE
****
2015 Do Something

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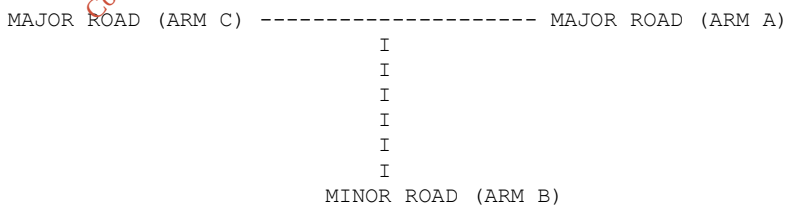
.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:01

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.64	2.46	1.64
ARM B	15.00	45.00	75.00	0.61	0.92	0.61
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15	ARM A	0.000	0.053	0.947
		0.0	7.0	124.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.143	0.000	0.857

EPA Export 16-10-2012:23:24:01

```
 I                    I          I     7.0 I    0.0 I   42.0 I
 I                    I          I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I          I         I        I        I
 I                    I   ARM C  I  0.900 I  0.100 I  0.000 I
 I                    I          I  216.0 I   24.0 I    0.0 I
 I                    I          I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I          I         I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.52      9.80    0.054                 0.0    0.1        0.8
I
 I   B-A       0.09      5.82    0.015                 0.0    0.0        0.2
I
 I   C-AB      0.39     11.56    0.033                 0.0    0.0        0.7
I
 I   C-A       2.61
I
 I   A-B       0.09
I
 I   A-C       1.55
I
 I
I
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--------------

.-------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.63      9.71    0.065                 0.1    0.1        1.0
I
 I   B-A       0.10      5.67    0.018                 0.0    0.0        0.3
I
 I   C-AB      0.49     11.81    0.041                 0.0    0.1        0.9
I
 I   C-A       3.10
I
 I   A-B       0.10
I
 I   A-C       1.85
I
 I
I
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EPA Export 16-10-2012:23:24:01

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.77	9.59	0.080		0.1	0.1	1.3	I
I B-A	0.13	5.47	0.023		0.0	0.0	0.3	I
I C-AB	0.63	12.15	0.052		0.1	0.1	1.2	I
I C-A	3.75							I
I A-B	0.13							I
I A-C	2.27							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.77	9.59	0.080		0.1	0.1	1.3	I
I B-A	0.13	5.47	0.023		0.0	0.0	0.4	I
I C-AB	0.63	12.15	0.052		0.1	0.1	1.2	I
I C-A	3.75							I
I A-B	0.13							I
I A-C	2.27							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.63	9.71	0.065		0.1	0.1	1.1	I

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EPA Export 16-10-2012:23:24:01

```
 I   B-A       0.10      5.67    0.018                 0.0    0.0        0.3
I
 I   C-AB      0.49     11.81    0.041                 0.1    0.1        0.9
I
 I   C-A       3.10
I
 I   A-B       0.10
I
 I   A-C       1.85
I
 I
I
 ------------------------------------------------------------------------------
--------------

.------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.52      9.80    0.054                 0.1    0.1        0.9
I
 I   B-A       0.09      5.82    0.015                 0.0    0.0        0.2
I
 I   C-AB      0.39     11.56    0.034                 0.1    0.0        0.7
I
 I   C-A       2.61
I
 I   A-B       0.09
I
 I   A-C       1.55
I
 I
I
 ------------------------------------------------------------------------------
--------------

 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.1
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.1
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	57.6	38.4	6.3	0.11	6.3	0.11
B-A	9.6	6.4	1.7	0.18	1.7	0.18
C-AB	45.2	30.1	5.5	0.12	5.5	0.12
C-A	283.9	189.3				
A-B	9.6	6.4				
A-C	170.0	113.4				
ALL	575.9	383.9	13.6	0.02	13.6	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

EPA Export 16-10-2012:23:24:01

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

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Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2025 Do Nothing.vpi"
(drive-on-the-left) at 12:07:59 on Tuesday, 15 September 2009

RUN TITLE
****
2025 Do Nothing

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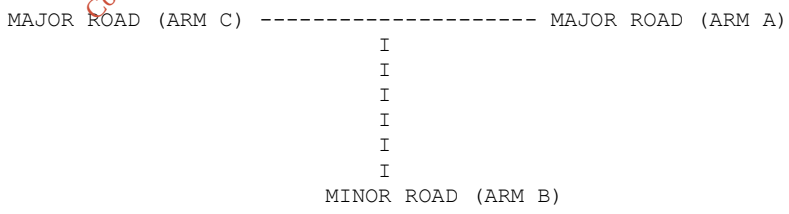
.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

EPA Export 16-10-2012:23:24:02

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.88	2.81	1.88
ARM B	15.00	45.00	75.00	0.69	1.03	0.69
ARM C	15.00	45.00	75.00	3.45	5.18	3.45

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.053	0.947
		0.0	8.0	142.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.145	0.000	0.855

EPA Export 16-10-2012:23:24:02

```
 I                    I         I    8.0 I    0.0 I   47.0 I
 I                    I         I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I         I        I        I        I
 I                    I  ARM C  I  0.902 I  0.098 I  0.000 I
 I                    I         I  249.0 I   27.0 I    0.0 I
 I                    I         I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I         I        I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.59      9.73    0.060                 0.0    0.1        0.9
I
 I   B-A       0.10      5.72    0.017                 0.0    0.0        0.3
I
 I   C-AB      0.45     11.76    0.038                 0.0    0.1        0.8
I
 I   C-A       3.00
I
 I   A-B       0.10
I
 I   A-C       1.77
I
 I
I
 -------------------------------------------------------------------------------------
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.-------------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.70      9.63    0.073                 0.1    0.1        1.1
I
 I   B-A       0.12      5.55    0.022                 0.0    0.0        0.3
I
 I   C-AB      0.57     12.05    0.047                 0.1    0.1        1.1
I
 I   C-A       3.55
I
 I   A-B       0.12
I
 I   A-C       2.12
I
 I
I
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EPA Export 16-10-2012:23:24:02

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.86	9.49	0.091		0.1	0.1	1.5	I
I B-A	0.15	5.32	0.027		0.0	0.0	0.4	I
I C-AB	0.75	12.44	0.060		0.1	0.1	1.5	I
I C-A	4.29							I
I A-B	0.15							I
I A-C	2.60							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.86	9.49	0.091		0.1	0.1	1.5	I
I B-A	0.15	5.32	0.027		0.0	0.0	0.4	I
I C-AB	0.75	12.44	0.060		0.1	0.1	1.5	I
I C-A	4.29							I
I A-B	0.15							I
I A-C	2.60							I
I								I

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I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN) (RFC)	DEMAND/ CAPACITY	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.70	9.63	0.073		0.1	0.1	1.2	I

EPA Export 16-10-2012:23:24:02

I	B-A	0.12	5.55	0.022		0.0	0.0	0.3
I								
I	C-AB	0.57	12.05	0.047		0.1	0.1	1.1
I								
I	C-A	3.55						
I								
I	A-B	0.12						
I								
I	A-C	2.12						
I								
I								
I								

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	I
I	18.00-18.15									
I	B-C	0.59	9.73	0.060		0.1	0.1	1.0		
I										
I	B-A	0.10	5.72	0.017		0.0	0.0	0.3		
I										
I	C-AB	0.45	11.76	0.039		0.1	0.1	0.8		
I										
I	C-A	3.00								
I										
I	A-B	0.10								
I										
I	A-C	1.77								
I										
I										

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WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0

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.

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	64.4	43.0	7.2	0.11	7.2	0.11
B-A	11.0	7.3	2.0	0.18	2.0	0.18
C-AB	53.3	35.5	6.7	0.13	6.7	0.13
C-A	325.2	216.8				
A-B	11.0	7.3				
A-C	194.7	129.8				
ALL	659.6	439.7	15.9	0.02	15.9	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

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TRL LIMITED

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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TRL SOFTWARE BUREAU
TEL: CROWTHORNE (01344) 770758, FAX: 770864
EMAIL: SoftwareBureau@trl.co.uk

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-
"p:\02888 KMK Recycling Tullamore [Niall Nally, Enviroco]\05 Junction Analysis\01 Raw Analysis\
2025 Do Something.vpi"
(drive-on-the-left) at 12:08:45 on Tuesday, 15 September 2009

RUN TITLE
****
2025 Do Something

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.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

MAJOR ROAD (ARM C) ---------- MAJOR ROAD (ARM A)
I
I
I
I
I
I
MINOR ROAD (ARM B)

ARM A IS Daingean Road
ARM B IS Cappincur Industriual Estate
ARM C IS Tullamore

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

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GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	180.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	90.0 M.
- VISIBILITY TO RIGHT	(VB-A)	120.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		4.40 M.
- WIDTH AT 5 M FROM JUNC.		3.00 M.
- WIDTH AT 10 M FROM JUNC.		2.20 M.
- WIDTH AT 15 M FROM JUNC.		2.20 M.
- WIDTH AT 20 M FROM JUNC.		2.20 M.
- LENGTH OF FLARED SECTION		1 VEHS

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

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ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.88	2.81	1.88
ARM B	15.00	45.00	75.00	0.70	1.05	0.70
ARM C	15.00	45.00	75.00	3.45	5.18	3.45

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.053	0.947
		0.0	8.0	142.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.143	0.000	0.857

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```
 I                    I         I    8.0 I    0.0 I   48.0 I
 I                    I         I ( 10.0)I (  0.0)I ( 10.0)I
 I                    I         I        I        I        I
 I                    I  ARM C  I  0.902 I  0.098 I  0.000 I
 I                    I         I  249.0 I   27.0 I    0.0 I
 I                    I         I ( 10.0)I ( 10.0)I (  0.0)I
 I                    I         I        I        I        I
 ------------------------------------------------------------

 TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

 DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

.-------------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 16.45-17.00
I
 I   B-C       0.60      9.73    0.062                0.0    0.1        0.9
I
 I   B-A       0.10      5.71    0.018                0.0    0.0        0.3
I
 I   C-AB      0.45     11.76    0.038                0.0    0.1        0.8
I
 I   C-A       3.00
I
 I   A-B       0.10
I
 I   A-C       1.77
I
 I
I
 -------------------------------------------------------------------------------------
--------------

.-------------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 17.00-17.15
I
 I   B-C       0.72      9.63    0.074                0.1    0.1        1.2
I
 I   B-A       0.12      5.54    0.022                0.0    0.0        0.3
I
 I   C-AB      0.57     12.05    0.047                0.1    0.1        1.1
I
 I   C-A       3.55
I
 I   A-B       0.12
I
 I   A-C       2.12
I
 I
I
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```

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I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAYI (VEH.MIN/ TIME SEGMENT) I
I 17.15-17.30								I
I B-C	0.88	9.49	0.092		0.1	0.1	1.5	I
I B-A	0.15	5.31	0.028		0.0	0.0	0.4	I
I C-AB	0.75	12.44	0.060		0.1	0.1	1.5	I
I C-A	4.29							I
I A-B	0.15							I
I A-C	2.60							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAYI (VEH.MIN/ TIME SEGMENT) I
I 17.30-17.45								I
I B-C	0.88	9.49	0.092		0.1	0.1	1.5	I
I B-A	0.15	5.31	0.028		0.0	0.0	0.4	I
I C-AB	0.75	12.44	0.060		0.1	0.1	1.5	I
I C-A	4.29							I
I A-B	0.15							I
I A-C	2.60							I
I								I

I TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAYI (VEH.MIN/ TIME SEGMENT) I
I 17.45-18.00								I
I B-C	0.72	9.63	0.074		0.1	0.1	1.2	I

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EPA Export 16-10-2012:23:24:02

```
 I   B-A       0.12      5.54    0.022                 0.0    0.0        0.3
I
 I   C-AB      0.57     12.05    0.047                 0.1    0.1        1.1
I
 I   C-A       3.55
I
 I   A-B       0.12
I
 I   A-C       2.12
I
 I
I
 ------------------------------------------------------------------------------
--------------

.------------------------------------------------------------------------------
--------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY
GEOMETRIC DELAYI
 I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/
(VEH.MIN/   I
 I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)
TIME SEGMENT) I
 I 18.00-18.15
I
 I   B-C       0.60      9.73    0.062                 0.1    0.1        1.0
I
 I   B-A       0.10      5.71    0.018                 0.0    0.0        0.3
I
 I   C-AB      0.45     11.76    0.039                 0.1    0.1        0.8
I
 I   C-A       3.00
I
 I   A-B       0.10
I
 I   A-C       1.77
I
 I
I
 ------------------------------------------------------------------------------
--------------

 *WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR
.
 QUEUE FOR STREAM   B-C
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.1
   17.15           0.1
   17.30           0.1
   17.45           0.1
   18.00           0.1
   18.15           0.1
.
 QUEUE FOR STREAM   B-A
 -------------------------
 TIME SEGMENT    NO. OF
   ENDING      VEHICLES
               IN QUEUE
   17.00           0.0
   17.15           0.0
   17.30           0.0
   17.45           0.0
   18.00           0.0
   18.15           0.0
```

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QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	65.8	43.9	7.4	0.11	7.4	0.11
B-A	11.0	7.3	2.0	0.18	2.0	0.18
C-AB	53.3	35.5	6.7	0.13	6.7	0.13
C-A	325.2	216.8				
A-B	11.0	7.3				
A-C	194.7	129.8				
ALL	660.9	440.6	16.1	0.02	16.1	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

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END OF JOB

****** PICADY 4 run completed.
========== end of file
==========

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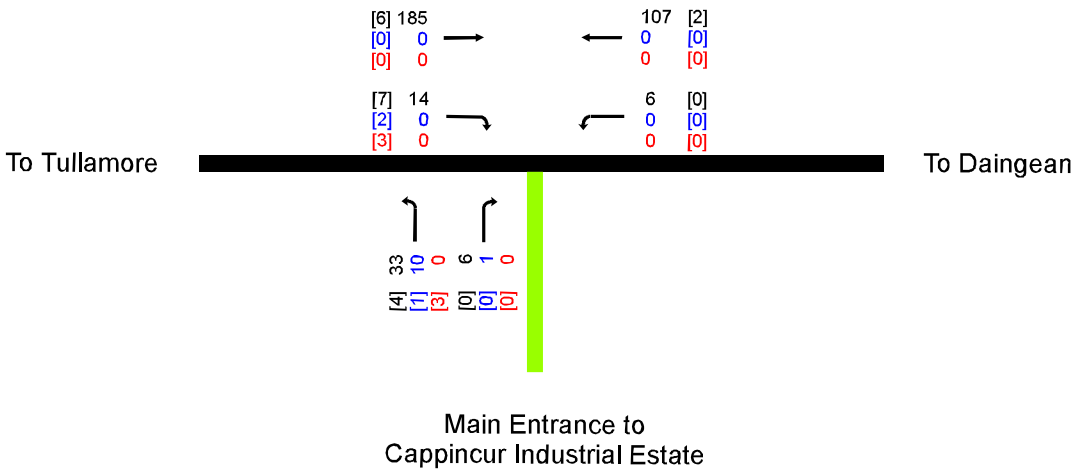
Existing Surveyed Flows



Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

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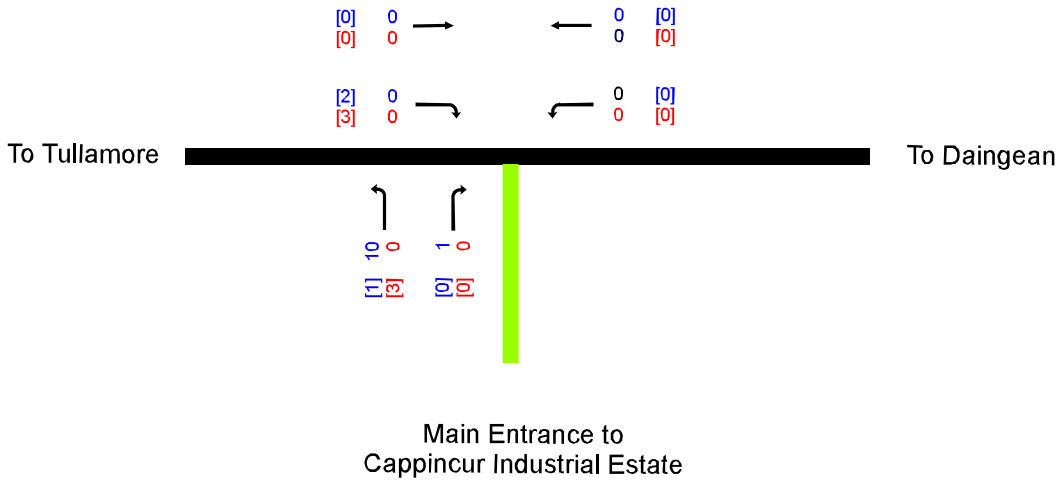
Existing Traffic Generated by Site



KMK Cars [KMK HGV]
AES cars [AES HGV]

Trafficwise traffic & transportation solutions
Suite No.5, Gowna Plaza, Bracetown Business Park, Clonee, Co. Dublin.
Telephone: +353 (0)1 8253015
Fax: +353 (0)1 8026160
Website: www.trafficwise.ie
E-mail: info@trafficwise.ie

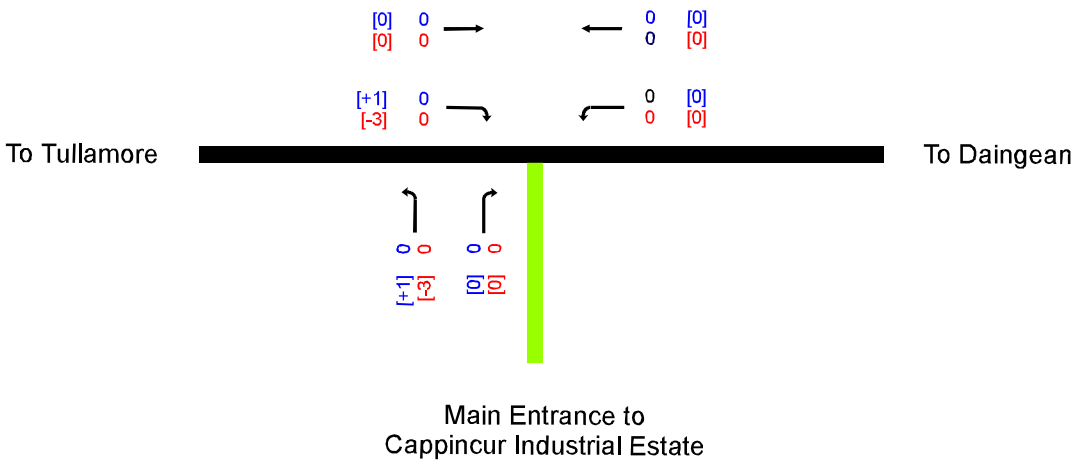
Project/Job Title: **KMK Recycling Facility**

Drawing Title: **2009 Existing Surveyed Flows in the pm peak hour (17:00-18:00hrs)**

Drawn by:	Checked by:	Approved by:
Barry May	Barry May	Julian Keenan
Date: Sept 2009	Date: Sept 2009	Date: Sept 2009
Scale: N.A	JOB No: 02888	Figure 1
	Appendix D	

EPA Export 16-10-2012:23:24:02

Development Impact on Traffic Flows in the Opening Year 2010



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

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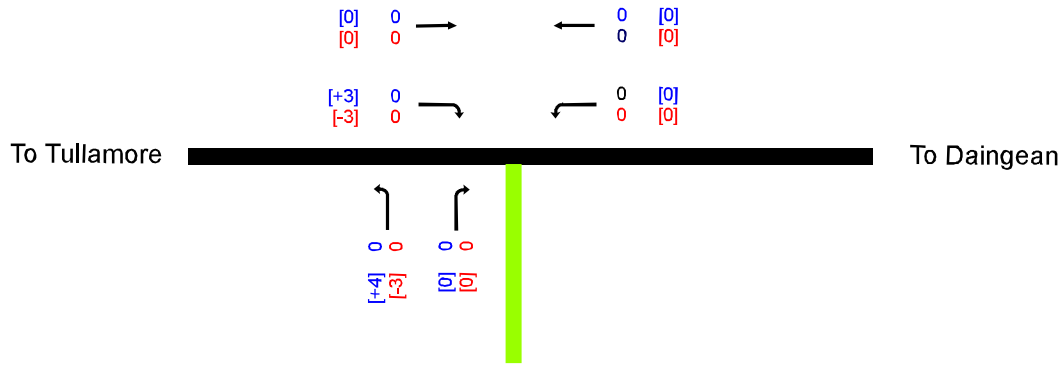
Development Impact on Traffic Flows in the Opening Year +5 2015 and beyond



Main Entrance to
Cappincur Industrial Estate

KMK Cars [KMK HGV]
AES cars [AES HGV]

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Suite No.5, Gowna Plaza, Bracetown Business Park, Clonee, Co. Dublin.
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Fax: +353 (0)1 8026160
Website: www.trafficwise.ie
E-mail: info@trafficwise.ie

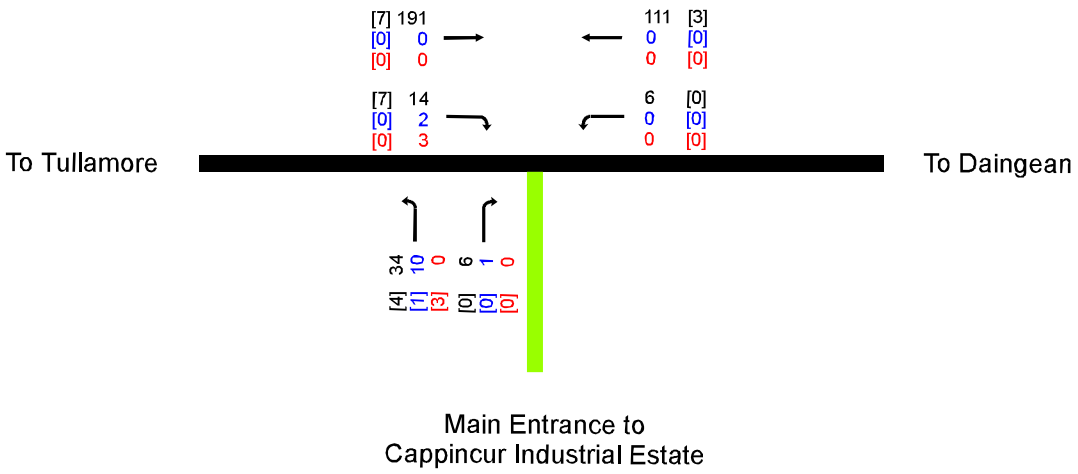
Project/Job Title: **KMK Recycling Facility**

Drawing Title: **Forecast Development Flows in the pm peak hour (17:00-18:00hrs)**

Drawn by:	Checked by:	Approved by:
Barry May	Barry May	Julian Keenan
Date: Sept 2009	Date: Sept 2009	Date: Sept 2009
Scale: N.A	JOB No: 02888	Figure 2
	Appendix D	

EPA Export 16-10-2012:23:24:02

Do Nothing



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

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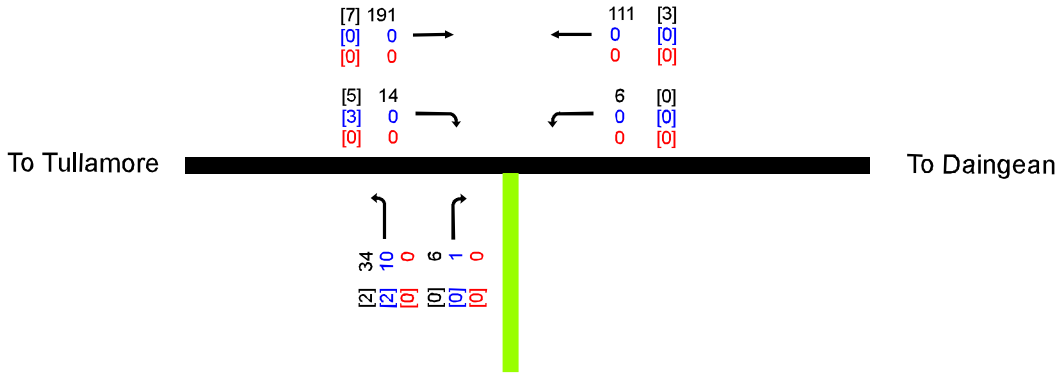
Do Something



Main Entrance to
Cappincur Industrial Estate

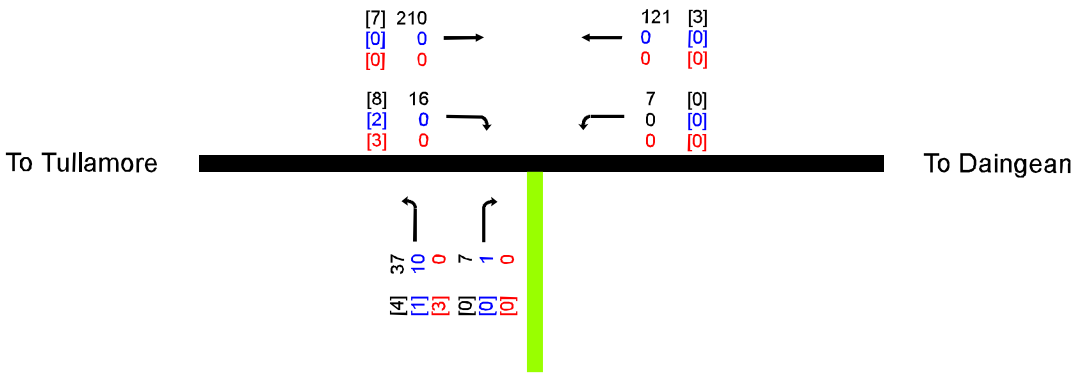
Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

Trafficwise traffic & transportation solutions
Suite No.5, Gowna Plaza, Bracetown Business Park, Clonee, Co. Dublin.
Telephone: +353 (0)1 8253015
Fax: +353 (0)1 8026160
Website: www.trafficwise.ie
E-mail: info@trafficwise.ie

Project/Job Title: **KMK Recycling Facility**	Drawn by: Barry May	Checked by: Barry May	Approved by: Julian Keenan
Drawing Title: **2010 Opening Year Flows in the pm peak hour (17:00-18:00hrs)**	Date: Sept 2009	Date: Sept 2009	Date: Sept 2009
	Scale: N.A	JOB No: 02888	Figure 3
		Appendix D	

EPA Export 16-10-2012:23:24:02

Do Nothing



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

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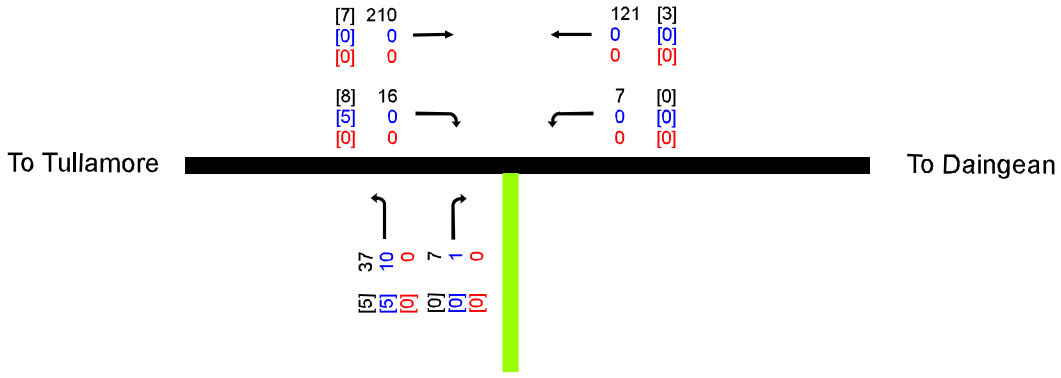
Do Something



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

Trafficwise traffic & transportation solutions
Suite No.5, Gowna Plaza, Bracetown Business Park, Clonee, Co. Dublin.
Telephone: +353 (0)1 8253015
Fax: +353 (0)1 8026160
Website: www.trafficwise.ie
E-mail: info@trafficwise.ie

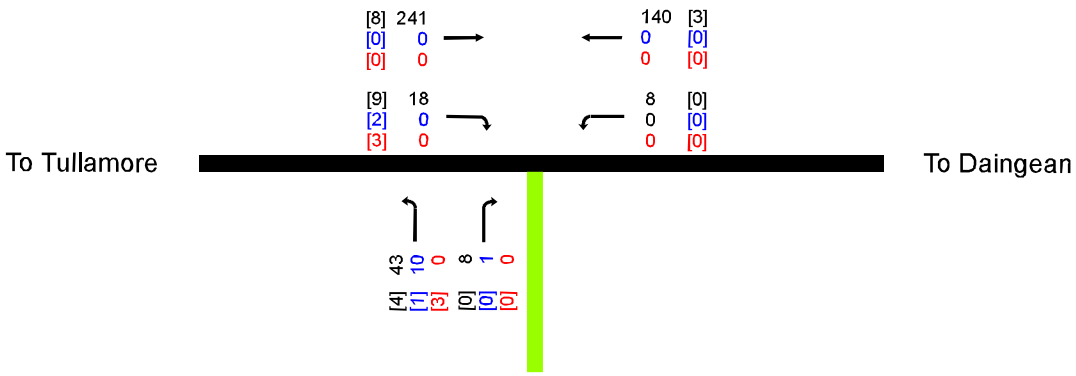
Project/Job Title **KMK Recycling Facility**

Drawing Title **2015 Opening Year +5 Flows in the pm peak hour (17:00-18:00hrs)**

Drawn by:	Checked by:	Approved by:
Barry May	Barry May	Julian Keenan
Date: Sept 2009	Date: Sept 2009	Date: Sept 2009
Scale: N.A	JOB No: 02888	Figure 4
	Appendix D	

EPA Export 16-10-2012:23:24:02

Do Nothing



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

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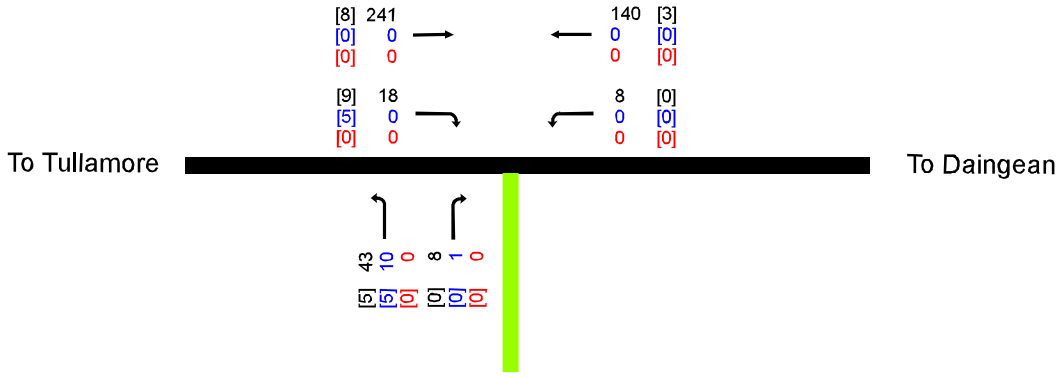
Do Something



Main Entrance to
Cappincur Industrial Estate

Total Cars [Total HGV]
KMK Cars [KMK HGV]
AES cars [AES HGV]

Trafficwise
traffic & transportation solutions
Suite No.5, Gowna Plaza, Bracetown Business Park, Clonee, Co. Dublin.
Telephone: +353 (0)1 8253015
Fax: +353 (0)1 8026160
Website: www.trafficwise.ie
E-mail: info@trafficwise.ie

Project/Job Title: **KMK Recycling Facility**	Drawn by: Barry May	Checked by: Barry May	Approved by: Julian Keenan
Drawing Title: **2025 Opening Year +15 Flows in the pm peak hour (17:00-18:00hrs)**	Date: Sept 2009	Date: Sept 2009	Date: Sept 2009
	Scale: N.A	JOB No: 02888	Figure 5
		Appendix D	

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ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail: info@odourireland.com
www.odourireland.com

AIR EMISSION TESTING OF STACK EMISSIONS FROM KMK METALS RECYCLING LTD, CAPPINCUR INDUSTRIAL ESTATE, DAINGEAN RD, TULLAMORE, CO. OFFALY.

PREFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF ENVIROCO MANAGEMENT LTD.

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PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Mr. Niall Nally
LICENCE NUMBER:	WO113-03
LICENCE HOLDER:	KMK Metals Recycling Ltd
FACILITY NAME:	KMK Metals Recycling Ltd
DATE OF MONITORING VISIT:	02nd December 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean Rd, Tullamore, Co. Offaly
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	13th Jan 2012 (ver.1) & 04th Feb 2012 (ver.2)
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	201245(2)
REVIEWERS:	Mr. Niall Nally

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TABLE OF CONTENTS

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Document Amendment Record

Client: KMK Metals Recycling Ltd.

Title: Air emission testing of stack emissions from KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean rd, Tullamore, Co. Offaly.

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Project Number: 201245(2)			**Document reference:** Air emission testing of stack emissions from KMK Metals Recycling Ltd, Cappincur Industrial Estate, Daingean rd, Tullamore, Co. Offaly		
201245(1)	Document for review	B.A.S.	JWC	B.A.S	13/01/2012
201245(2)	Minor Amendments	B.A.S.	JWC	B.A.S	04/02/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

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Signing sheet

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Brian Sheridan Ph.D Eng

For and on behalf of Odour Monitoring Ireland

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Executive summary

Odour Monitoring Ireland was commissioned by KMK Metals Recycling Ltd to perform an air emission test of their dust filtration system on the 02nd December 2011.

Monitoring was performed for Airflow rate, Total particulates, Moisture content and speciated metals (Particulate bound and gaseous based Metals). Particular reference was given to standard methodologies including EN13284-1, EN14385, EN13211 and EN14790.

A summary of the results are presented below.

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Emission points identity	Parameter	Monitoring period and date	Periodic monitoring result	Expanded uncertainty (%)	Emission limit value	Status
Dust filtration plant – Exhaust stack	Volume flow (Nm^3/hr dry gas)	02nd Dec 2011 – 11.50AM to 12.10 PM	29,197	–	–	--
	Cd and Tl (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00052	<1.0	–	--
	Mercury (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.000015	<1.0	–	--
	Lead (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.00512	<1.0		
	Chromium (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	0.0392	<1.0		
	Remaining metals (mg/Nm^3, dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	<0.00182	<1.0	–	--
	Total particulate matter (mg/Nm^3 dry gas)	02nd Dec 2011 – 13.20PM to 15.30 PM	1.68	<2.0	–	--

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1. Introduction

Odour Monitoring Ireland was requested by KMK Metals Recycling Ltd to perform air emission testing of their dust filtration emission points in accordance with standard European methods. The parameters listed in *Table 1.1* were monitored using the appropriate instrumentation as illustrated in *Table 1.1*.

Table 1.1. Monitored parameters and techniques for dust filtration emission point in KMK Metals Recycling Ltd.

Sample location	Parameter	AG2 Compliant	SOP	Analytical method
Exhaust dust filtration plant	Volumetric Flow Rate and temperature	Yes	2000	Pilot tube method and temperature probe-EN13284-1:2002
Exhaust dust filtration plant	Speciated Metals	Yes	2027	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN14385
Exhaust dust filtration plant	Mercury	Yes	2028	TCR Tecora automatic Total particulate sampling train and heated probes / impinger set-EN13211
Exhaust dust filtration plant	Water vapour	Yes	2017	Impingement – Gravimetric weight gain - EN14790:2005
Exhaust dust filtration plant	Total Particulates	Yes	2002	TCR Tecora automatic Total particulate sampling train and associated probes-EN13284-1:2002

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This report presents details of this monitoring programme. This environmental monitoring was carried out by Dr. Brian Sheridan and Dr. John Casey, Odour Monitoring Ireland on the 02nd December 2011. Methodology, Results, Discussion, Conclusions and calculations are presented herein.

1.1 Plant details

The following surface plant details were noted during the study.

Company:	KMK Metals Recycling Ltd
Site:	KMK Metals Recycling Ltd
Stack:	Exhaust dust filtration plant
Sampling date:	02nd December 2011
Time sampling started:	11.50 AM
Time sampling ended:	15.30 PM
Licence Number:	WO113-03
Fuel type:	N/A
Plume appearance:	Not visible
Process:	Dust filtration from WEEE recycling / separation

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1.2 Special Monitoring Requirements

There were no special monitoring requirements for this campaign.

1.3 Summary of methods

The summaries of methods are contained in *Table 1.1*.

Substance	Standard Method	Limit of Detection	Calculation Spreadsheet
Metals	EN 14385	<0.005 mg/m^3	6018
Mercury	EN 13211	<0.001 mg/m^3	6020
Flow Rates	EN 13284-1	0.80 m/s	6011

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2. Monitoring Results

This section describes the results obtained through the study period.

2.1 Volumetric flow rate, temperature and stack static pressure

Sampling for airflow rate was performed in accordance with EN13284-1:2002. *Table 2.1* summarises the flow measurements from the stack and includes the stack velocity, expressed in metres per second (m s^{-1}) and volumetric airflow rates expressed in m^3 hr^{-1} at both actual and standard reference conditions of 273.15 K, 101.3 kPa (i.e. normalised temperature and pressure) on a dry gas basis.

Table 2.1. Volumetric airflow rate results for exhaust emission point from dust filter located in KMK Metals Recycling Ltd.

Stack Reference	Results Dust plant exhaust emission point
Stack diameter (m)	0.80
Average temperature (K)	286
Average airflow rate (m/s)	17.68
Area (m^2)	0.50272
Atmospheric pressure (kPa)	99.55
Average static pressure (kPa)	0.021
Standard barometric pressure (kPa)	101.30
Actual volumetric airflow rate (Am^3/hr)	31,997
Normalised volumetric airflow (Nm^3/hr)[1]	30,038
Moisture content (%)	2.80
Oxygen %	20.90
Normalised volumetric airflow rate dry (Nm^3/hr)	**29,197**
Limit value	--
Maximum pressure recorded (Pa)	255
Minimum pressure recorded (Pa)	218
Ratio b/n max and min pressure	1.169
Angle of swirl (deg) (must be less than <15)	2
Did measurement location comply with standard.	No (one port, doubled up on sampling across one plane)
Leak check pass on pitot	Yes
Dynamic pressure	>5Pa

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Notes: [1] denotes normalised to 273.15 Kelvin and 101.3 kPa, with no correction for moisture content.

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2.2 Results for Total particulates and metals species concentration

Flue gas analysis was performed on the exhaust emission points located on the dust filtration equipment. Total particulates and metals sampling and analysis was performed using a TCR Automatic Iso stack plus sampling train with heated probe and impinger train. The results of the testing are presented in *Table 2.2*.

Stack based concentrations have been presented at standard reference conditions of 273.15 K and 101.3 kPa, dry gas.

For Total particulates and metals sampling monitoring, the average DI% for monitoring of:

Emission point dust filtration plant was -0.21%,

This value were inside the lower and upper limit value of –ive 5% to +ive 15% in order to comply with reference standard EN13284-1:2002.

Sampling for Total particulates and Metals was performed on one sample plane. Sample points were doubled up on this single plane.

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Table 2.2. Stack concentrations and emission value results from emission point dust filtration plant.

Emission Point Reference: Dust filtration plant										
Substance to be Monitored	**Emission Limit Value (see Table 7 TALuft) (kg/hr)**	**Periodic Monitoring Result (mg/Nm^3, dry gas)**	**Units Reference Conditions 273 K, 101.3 kPa, dry gas**	**Uncertainty Of Measurement +/-**	**Stack Flow Rate (Nm^3/hr dry gas)**	**Limit (Nm^3/hr dry gas)**	**Date of Sampling**	**Sampling Start/End Times**	**Method Reference**	**Operating Status**
Particulate matter		**1.68**	mg/Nm^3	<2%	29,197	-	02/12/11	11.50AM to 15.30PM	EN13284-1	---
Cadmium	0.0025	<0.00026	mg/Nm^3	<1%						
Thallium	0.0025	<0.00026	mg/Nm^3	<1%						
Total	--	--	mg/Nm^3						EN 13211	
Mercury	0.0025	<0.000015	mg/Nm^3	<1%					EN 14385	
Antimony	--	<0.00026	mg/Nm^3	<1%						
Arsenic	0.0025	<0.00026	mg/Nm^3	<1%						
Lead	0.025	**0.00512**	mg/Nm^3	<1%						
Chromium	--	**0.0392**	mg/Nm^3	<1%						
Cobalt	--	<0.00026	mg/Nm^3	<1%						
Copper	--	<0.00026	mg/Nm^3	<1%						
Manganese	--	<0.00026	mg/Nm^3	<1%						
Nickel	0.025	<0.00026	mg/Nm^3	<1%						
Vanadium	--	<0.00026	mg/Nm^3	<1%						
Total	--	--	mg/Nm^3	<1%						

Additional Information
Metals were tested by ICP-MS - Analysis was carried out in accredited laboratories.
The pre and post leak check were within the requirements of BS EN 13284-1 (Start – 100cc/min: End – 110 cc/min at 62 KPa).
Isokinetic conditions were -0.21% for the test
Number of ports = 1
Straight length before sample point = <5 –not in compliance
Straight length after sample point = >2 – in compliance
Sample blank = < 0.80% which is <10% ELV – Compliant
Pitot leak check = OK

Angle of Flow with regard to duct axis: <15 degrees
Differential pressure at pitot tube: >5Pa
Ratio of maximum to minimum velocity: <3:1
There was no negative flow in the stack
Moisture content of the gas: 2.80%
The temperature of stack gas was: 13 degrees C
Values in bold are the only detectable metals/dust in the air stream.

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4. *Appendix I* - Sampling and analysis details

A.4.1 Location of Sampling
KMK Metals Recycling Ltd.

A.4.2 Date & Time of Sampling
02nd December 2011

A.4.3 Personnel Present During Sampling
Dr. John Casey, and Dr. Brian Sheridan Odour Monitoring Ireland, Trim, Co. Meath. MCERT Level 1 MM06743 and MM0674.

A.4.4 Instrumentation
S type pitot (OMI08) and PT100 thermocouple (OMI02);
Testo 400 handheld (OMI11) and appropriate probes.
Automatic ISOSTACK Plus TCR Tecora particulates sampling train (OMI 13).
Impinger train (OMI 14) and heated probe (OMI 09).

A.4.5 Standards
EN13284-1:2002
MID 13284-1, MCERTS Documentation, www.s-t-a.org.
EN14385
EN14790:2005
EN13211

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6. *Appendix II* - Quality assurance checklist

Velocity measurements:	
Were water droplets present?	No
Direction of gas flow within ± 15^0 of stack axis	Yes
Absence of swirling flow	Yes
Dynamic pressure > 5 Pa at all sampling points	Yes
Ratio of the highest to lowest dynamic pressure < 9:1.	Yes
Sampling:	
Sampling plane was correctly positioned	Yes
Area of sampling apparatus was < 10% of stack area	Yes
Sampling was from centres of equal areas	Yes
Sampling at each point not less than 3 minutes	Yes
Nozzle was facing directly upstream to within ±10^0	Yes
Leak check performed before and after each run and passed	Yes
Sampling handling:	
Minimum weight of sample collected > 0.30% of filter weights	Yes
Samples achieved stable weight	Yes
Particulate samples sent for analysis	Yes
QA procedure:	
Isokinetic data sheet completed and signed off	Yes
Report saved electronically to server	Yes
Raw data and hard copy of report filed together	Yes

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GLENSIDE
ENVIRONMENTAL SERVICES
Environmental and Engineering Consultants

DOCUMENT AUTHORISATION	
Glenside Report Reference	012-050
Client:	KMK Metals
EPA IPPC Licence REF:	W0113-03
Site Address:	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly
Document Title:	Stack Emissions Monitoring Report
Date of Survey:	24th May 2012
Document prepared by:	Glenside Environmental, Unit 7, Westpoint Buildings, Ballincollig, Cork

Preparation and technical review (including design review for design work) carried out by: Patrick O' Brien MCERTS Level II. Sampling carried out by Patrick Power & Ewa Piatek

Position/Discipline	Name	Signed	Date
Risk Assessor	Patrick Power		14/06/2012

Issue for Review to Client: Mr. Niall Nally, Enviroco on 15th June 2012.

This document has been produced and checked in accordance with the requirements of the Glenside Environmental Quality Management System and is duly authorised for issue.

Position/Discipline	Name	Signed	Date
Quality Manager	Patrick O' Brien	P. O' Brien	14/06/2012

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Report Summary:

Job Quotation No:	**n/a**
Operator Licence No:	**W0113-03**
Operator Name:	**KMK Metals Recycling Ltd.**
Installation:	**Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly**
Contact Name:	**Mr. Niall Nally**
Monitoring dates	**24/05/2012**
Phone No:	**087/1221422**
Monitoring Organisation:	**Glenside Environmental Unit 7, Westpoint Buildings Link Road Ballincollig Cork**
Phone No:	**(021) 4810016**
Email:	**info@glenenv.ie**
Report Date:	**15/06/2012**
Report written by:	**Ewa Piatek**
MCERTS reg No:	**MM07 799**
Competency:	**Level 1**
Function:	**Technician**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	
Report approved by:	**Patrick O'Brien**
MCERTS reg No:	**MM08 992**
Competency:	**Level 2**
Function:	**Team Leader**
Endorsements:	**TE1, TE2, TE3, TE4**
Signed:	

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1. Introduction

Glenside Environmental was commissioned by KMK Metals Recycling Ltd to perform air emission monitoring at the facility in Cappincur Industrial Estate, Dalngean Road, Tullamore, Co. Offaly. The monitoring was carried out as required by company representative Mr. Niall Nally from Enviroco Environmental Consultants. This report presents details of this monitoring programme.

2. Objectives

2.1. Substances to be monitored at each emission point

Sample Locations	Parameter
Dust Filtration Plant – Exhaust Stack	Particulates Run 1
	Particulates Run 2
	Particulates Run 3
	Metals (Total of Cd+Tl)
	Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)
	Mercury

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2.2. Special Requirements

There were no special requirements for this monitoring campaign.

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3. Monitoring Results

Tables 3.1 presents the results of the air emission monitoring sampling program carried out at the emission stacks listed below.

3.1. Monitoring Results at Dust Filtration Plant Exhaust Stack

Substances	Emission Limit Value	LOD	Results mg/Nm^3	Uncertainty %	Start –End
Particulates Run 1	n/a	0.17	0.98	0.03	10:06-10:36
Particulates Run 2	n/a	0.31	1.82	0.06	10:55-11:25
Particulates Run 3	n/a	0.32	0.41	0.01	11:34-12:04
Particulates	n/a	0.32	0.75	0.02	09:35-09:41
Metals (Total of Cd+Tl)	n/a	0.0018	<0.0018	n/a	12:23-12:53
Chromium	n/a	0.0030	0.0048	n/a	12:23-12:53
Lead	n/a	0.0009	0.0059	n/a	12:23-12:53
Metals (Total of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Be)	n/a	0.0175	0.0277	n/a	12:23-12:53
Mercury	n/a	0.0008	<0.0008	n/a	13:09-13-39

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3.2. Reference Conditions

Emission Point	Reference Temperature	Reference Pressure	Reference Moisture	Reference Oxygen
Dust Filtration Plant – Exhaust Stack	273 K	101.3 kPa	No correction	No correction

3.3. Methods and Accreditation Status

Emission Point	Substances	Method	SOP Number	Accreditation Status	Analysis Laboratories	Accreditation Status
Dust Filtration Plant – Exhaust Stack	Particulates	BS EN 13284-2002	GEN3-001	n/a	SAL Laboratories Manchester	UKAS
Dust Filtration Plant – Exhaust Stack	Metals	BS EN 14385:2004	GEN3-014	n/a	SAL Laboratories Manchester	UKAS

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4. Operating Information

Process Status Load /Feedstock	Process Details	Fuel /Feedstock	Abatement System	Status of Abatement System
Normal Operation	Continuous	1/3 of Load	Dust Filter	In Operation
Normal Operation	Continuous	Full Load	Dust Filter	In Operation

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5. Monitoring Deviation

Requirements	Comments
Substances were monitored as per monitoring objectives	Yes
Substances were monitored in accordance with the monitoring stated in AG2 (Air Emissions Monitoring Guidance Note#2)	Yes
All monitoring substances were carried out as per Standard/Methods requirements.	Yes

Sampling Location Summary

Requirements	Comments
Stack Shape	Circular
Dimensions	0.8
Recommended 5 hydraulic diameters straight length before sampling plane	Yes
Recommended 2 hydraulic diameters straight length after sampling plane	No
Sufficient ports number Small stacks – 1 port <1.5m – 2 ports >1.5m – 4 ports	1 port
Appropriate port size	Yes
Suitable working platform	Yes
Safe and clean working environment	Yes

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6. Annex 1

6.1. Personnel

Scientist/Technician Name	Position	Qualification	Technical Endorsements	MCERTS Number
Ewa Piatek	Technician	Level 1	TE1, TE2, TE3, TE4	MM07 799
Patrick Power	Technician	Trainee	-	MM12 1183

6.2. Equipment used

Equipment
TCR Tecora
Probe
Impinger Set

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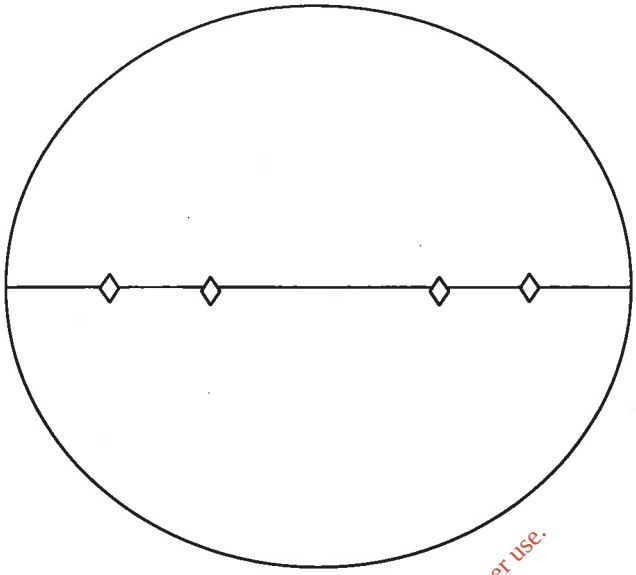
7. Annex 2

7.1. Diagrams of the stack indicating Probe Positions



7.2. Sampling measurements

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Determinant	Result	Units
Number of Ports Sampled	2	-
Number of Points Sampled	16	-
Average Velocity v'a	9.04	m/s
Average Pressure	100.3	kPa
Average Temperature	25.73	°C
Stack Diameter	0.8	m
Actual Moist Flow Rate	16362.02	m^3/Hr
Moist Flow Rate at STP	14805.33	m^3/Hr
Dry Flow Rate at STP	14760.91	m^3/Hr
T Reference	273	Deg K
P Reference	101.3	kPa
Isokinetic condition	Run 1 -1.73 Run 2 1.44 Run 3 2.11 Metals -1.59 Mercury -1.01	%
Oxygen	n/a	%
Water vapour	0.3	%

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8. Annex 3

8.1. Results and uncertainty calculations, certificates of analysis

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Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2404

Report Number: 280936-1

Date of Report: 08-Jun-2012

Customer: Glenside Environmental
Unit 7
Westpoint Buildings
Ballincollig.
CO. CORK, VAT REG 9683448N

Customer Contact: Mr Patrick Power

Customer Job Reference: KMK METALS
Customer Purchase Order: 012-050 KMK
Date Job Received at SAL: 29-May-2012
Date Analysis Started: 30-May-2012
Date Analysis Completed: 08-Jun-2012

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Tests covered by this certificate were conducted in accordance with SAL SOPs

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Report checked
and authorised by :
Jennifer Wraith
Customer Services Manager

Issued by :
Jennifer Wraith
Customer Services Manager

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SAL Reference: 280936
Customer Reference: KMK METALS

Probe Wash (27.5%HNO3) Analysed as Probe Wash (27.5%HNO3)

BS EN 14385 Metals Suite

				SAL Reference	280936 013	280936 014
				Customer Sample Reference	050-13	050-14
				Test Sample	AR	AR
Determinand	Method	LOD	Units	Symbol		
Antimony	ICPMS (HF BS EN 14385)	1	µg	U	<1	<1
Arsenic	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Beryllium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Cadmium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Chromium	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Cobalt	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Copper	ICPMS (HF BS EN 14385)	0.5	µg	U	(13) <0.5	(13) <0.5
Lead	ICPMS (HF BS EN 14385)	0.5	µg	U	(13) <0.5	(13) 0.6
Manganese	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Nickel	ICPMS (HF BS EN 14385)	2	µg	U	<2	<2
Thallium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5
Vanadium	ICPMS (HF BS EN 14385)	0.5	µg	U	<0.5	<0.5

SAL Reference: 280936
Customer Reference: KMK METALS

Impinger (5%HNO3/5%H2O2) Analysed as Impinger (3.3%HNO3/1.5%H2O2)

BS EN 14385 Metals Suite

				SAL Reference	280936 009	280936 010	280936 011	280936 012
				Customer Sample Reference	050-09	050-10	050-11	050-12
				Test Sample	AR	AR	AR	AR
Determinand	Method	LOD	Units	Symbol				
Antimony	ICPMS (BS EN 14385)	0.5	µg/l	U	<0.5	<0.5	<0.5	<0.5
Arsenic	ICPMS (BS EN 14385)	0.2	µg/l	U	<0.2	<0.2	<0.2	<0.2
Beryllium	ICPMS (BS EN 14385)	0.5	µg/l	U	<0.5	<0.5	<0.5	<0.5
Cadmium	ICPMS (BS EN 14385)	0.5	µg/l	U	<0.5	<0.5	<0.5	<0.5
Chromium	ICPMS (BS EN 14385)	0.5	µg/l	U	<0.5	0.8	0.8	<0.5
Cobalt	ICPMS (BS EN 14385)	0.2	µg/l	U	<0.2	<0.2	1.2	<0.2
Copper	ICPMS (BS EN 14385)	1	µg/l	U	<1	<1	3	<1
Lead	ICPMS (BS EN 14385)	0.3	µg/l	U	1.8	4.1	9.2	<0.3
Manganese	ICPMS (BS EN 14385)	2	µg/l	U	3	<2	3	<2
Nickel	ICPMS (BS EN 14385)	2	µg/l	U	<2	3	<2	<2
Thallium	ICPMS (BS EN 14385)	0.3	µg/l	U	<0.3	<0.3	<0.3	<0.3
Vanadium	ICPMS (BS EN 14385)	0.3	µg/l	U	<0.3	<0.3	<0.3	<0.3
Volume	ICPMS (BS EN 14385)	1	ml	U	-	-	-	-

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SAL Reference: 280936
Customer Reference: KMK METALS

Filter Analysed as Filter

BS EN 14385 Metals Suite

				SAL Reference	280936 015	280936 016
				Customer Sample Reference	050-15	050-16
				Test Sample	AR	AR
Determinand	Method	LOD	Units	Symbol		
Antimony	ICPMS (HF BS EN 14385)	0.05	µg	U	<0.05	<0.05
Arsenic	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) <0.05	(13) <0.05
Beryllium	ICPMS (HF BS EN 14385)	0.05	µg	U	<0.05	<0.05
Cadmium	ICPMS (HF BS EN 14385)	0.05	µg	U	<0.05	<0.05
Chromium	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) 1.3	(13) 0.40
Cobalt	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) 0.06	(13) <0.05
Copper	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) 0.17	(13) <0.05
Lead	ICPMS (HF BS EN 14385)	0.05	µg	U	2.0	0.22
Manganese	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) 0.61	(13) 0.10
Nickel	ICPMS (HF BS EN 14385)	0.05	µg	U	(13) 1.1	(13) 0.49
Thallium	ICPMS (HF BS EN 14385)	0.05	µg	U	<0.05	<0.05
Vanadium	ICPMS (HF BS EN 14385)	0.05	µg	U	<0.05	<0.05

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SAL Reference: 280936
Customer Reference: KMK METALS

Probe Wash (27.5%HNO3) Analysed as Probe Wash (27.5%HNO3)
Miscellaneous

	SAL Reference	280936 020
	Customer Sample Reference	050-20
	Test Sample	AR

Determinand	Method	LOD	Units	Symbol	
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U	(13) <0.01

SAL Reference: 280936
Customer Reference: KMK METALS

Impinger (2%KMnO4/10%H2SO4) Analysed as Impinger (2%KMnO4/10%H2SO4)
Miscellaneous

	SAL Reference	280936 017	280936 018	280936 019
	Customer Sample Reference	050-17	050-18	050-19
	Test Sample	AR	AR	AR

Determinand	Method	LOD	Units	Symbol			
Mercury	CVAFS (BS EN 13211)	5	µg/l	U	<5	<5	<5

SAL Reference: 280936
Customer Reference: KMK METALS

Filter Analysed as Filter
Miscellaneous

	SAL Reference	280936 021
	Customer Sample Reference	050-21
	Test Sample	AR

Determinand	Method	LOD	Units	Symbol	
Mercury	CVAFS (HF Digest BS EN 13211)	0.01	µg	U	(13) <0.01

SAL Reference: 280936
Customer Reference: KMK METALS

Wash(DI) Analysed as Wash(DI)
Miscellaneous

	SAL Reference	280936 005	280936 006	280936 007	280936 008
	Customer Sample Reference	050-05	050-06	050-07	050-08
	Test Sample	AR	AR	AR	AR

Determinand	Method	LOD	Units	Symbol				
Particulates (Total)	Grav	0.1	mg	U	0.5	0.8	<0.1	0.3

SAL Reference: 280936
Customer Reference: KMK METALS

Filter GFA 47mm Analysed as Filter GFA 47mm
Miscellaneous

	SAL Reference	280936 001	280936 002	280936 003	280936 004
	Customer Sample Reference	050-01	050-02	050-03	050-04
	Test Sample	AR	AR	AR	AR

Determinand	Method	LOD	Units	Symbol				
Particulates (Total)	Grav (5 Dec)	0.05	mg	U	0.37	0.09	0.09	<0.05

Index to symbols used in 280936-1

Value	Description
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited

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Company Name:	KMK Metals	Technicians:	
Site Name:	KMK Metals	MCERTS No:	
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1,
Date:	24/05/2012	Doc No	

Stack Information:
Circular Stack

Stak Diameter:	0.8	m
Average Flow:	9.042	m/s
Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%

Reeference Conditions:

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Mass Emissions Calculations:

Volumetric Flow Rate	4.55	m3/s
Volumetric Flow Rate	16362.02	m3/hr
Volumertic Flow Rate corrected to STP	14805.33	m3/hr
Volumertic Flow Rate corrected to STP and O2 ref	14805.33	m3/hr
Volumertic Flow Rate corrected to STP	14760.91	m3/hr

	Run 1	Run 2	Run 3	Run 4	Run 5	Average:
Flow	12.14	6.51	6.19	10.19	10.18	9.042
Temp.	22.33	24.78	25.96	27.78	27.78	25.726
Pressure	100.3	100.3	100.3	100.3	100.3	100.3

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EPA Export 16-10-2012:23:24:03

Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 1
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.37	280936001
Run Nozzle Wash:	0.5	280036006
	0.15	
Blank	0.35	
Run	0.87	

Air Volume corrected to STP:	0.89122	m3
Moisture:	0	%
Air Volume corrected to Moisture:	0.89122	m3

Stack Conditions

Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33	m3/hr

Reference Conditions

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.17	0.17	0.00	n/a
Blank	0.39	0.39	0.01	0.01
Run	0.98	0.98	0.01	0.03

Note: Blank result should be < 10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

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Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0	% by volume
Measured concentration	1.0	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertainty	Uncertainty	Requirement of std
Sampled Volume	Vm	0.89122	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	pm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.87	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff	u (in units of fs)			
	pm	0.009	0.009		$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{p_m}{101.3}$	
	Hm	0.009	0.009			
	Tm	0.003	0.006			
	ufs		0.014			1.56
Corrected volume	V	0.80	uV	0.013 m3	$V = V_m f_s$	1.57
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff	u			
	O2,m	0.05	0.005		$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$	
Factor for O2 Correction	ufc	1.00	0.005			0.48

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard cond	V	0.80	m3	1.21	0.02 mg.m-3	#DIV/0! %
Mass	m	0.87	mg	1.12	0.00 mg.m-3	#DIV/0! %
Factor for O2 Correction	fc	1.00		0.98	0.00 mg.m-3	#DIV/0! %
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0! %
Uncollected mass	UCM	0.00	mg	1.12	0.00 mg.m-3	#DIV/0! %
Combined measurement uncertainty					0.02 mg.m-3	

Expanded uncertainty as percentage of measured value	3.28	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.03	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

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Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

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Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.4	mg.m-3	(at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaini	Uncertaini	Requirement of std
Sampled Volume	Vm	0.89122	uVm	0.001	m3	0.11		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	pm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff	u (in units of fs)			
	pm	0.009	0.009			
	Hm	0.009	0.009			
	Tm	0.003	0.006			
	ufs		0.014			
Corrected volume	V	0.80	uV	0.013	m3	1.57
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff	u			
	O2,m	0.05	0.005			
Factor for O2 Correction	ufc	1.00	0.005			0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{p_m}{101.3}$$

$$V = V_m f_s \quad 1.56$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard conx	V	0.80	m3	0.49	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.39	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	1.12	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.28	% measured of value
Expanded uncertainty in units of measurement	0.01	mg.m-3
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV

expressed with a level of confidence of 95%
(Using a coverage factor k=2)

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EPA Export 16-10-2012:23:24:03

Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 2
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.09	280936002
Run Nozzle Wash:	0.8	280036007
	0.15	
Blank	0.35	
Run	0.89	

Air Volume corrected to STP:	0.48901	m3
Moisture:	0	%
Air Volume corrected to Moisture:	0.48901	m3

Stack Conditions

Average Temperature:	298.726	K
Average Pressure:	100.3	kPa
Average Moisture:	0.3	%
Average Oxygen:	0	%
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33	m3/hr

Reference Conditions

Reference Temperature:	273.15	K
Reference Pressure:	101.325	kPa
Reference Oxygen:	0	%
Reference Moisture:	0	%

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.31	0.31	0.00	n/a
Blank	0.72	0.72	0.01	0.02
Run	1.82	1.82	0.03	0.06

Note: Blank result should be < 10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

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Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0 % by volume
Measured concentration	1.8	mg.m-3 (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.48901	uVm	0.001	m3	0.20		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.89	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff		u (in units of fs)		
	ρm	0.009		0.009		
	Hm	0.009		0.009	$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$	
	Tm	0.003		0.006		
	ufs			0.014		1.56
Corrected volume	V	0.44	uV	0.007 m3	$V = V_m f_s$	1.58
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff		u	$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$	
	O2,m	0.05		0.005		
Factor for O2 Correction	ufc	1.00		0.005		0.48

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.44	m3	4.13	0.03 mg.m-3	#DIV/0!	%
Mass	m	0.89	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		1.82	0.01 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.03 mg.m-3		

Expanded uncertainty as percentage of measured value	3.30	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.06	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

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Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.7	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertainty	Uncertainty	Requirement of std
Sampled Volume	Vm	0.48901	uVm	0.001	m3	0.20		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	ρm	100.3	uρm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations						
Factor for std conds	fs	0.90				
uncertainty components	symbol	sensitivity coeff	u (in units of fs)			
	ρm	0.009	0.009			
	Hm	0.009	0.009			
	Tm	0.003	0.006			
	ufs		0.014			
Corrected volume	V	0.44	uV	0.007	m3	1.58
Factor for O2 correction	fc	1.00				
uncertainty components	symbol	sensitivity coeff	u			
	O2,m	0.05	0.005			
Factor for O2 Correction	ufc	1.00	0.005			0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s \qquad 1.56$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.44	m3	1.62	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.72	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.04	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.30	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

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Company Name:	KMK Metals	Technicians:	EP/PP
Site Name:	KMK Metals	MCERTS No:	MM07 799
Stack ID:	Dust Filtration Plant- Exhaust Stack	TE's:	TE1, TE2, TE3, TE4
Date:	24/05/2012		

Run 3
Paticulates Data:

Certs Results:	mg	Certs No
LOD Filter:	0.05	
LOD Nozzle Wash:	0.1	
Blank Filter:	0.05	280936004
Blank Nozzle Wash:	0.3	280036008
Run Filter:	0.09	280936002
Run Nozzle Wash:	0.1	280036007
	0.15	
Blank	0.35	
Run	0.19	

Air Volume corrected to STP:	0.46601 m3
Moisture:	0 %
Air Volume corrected to Moisture:	0.46601 m3

Stack Conditions

Average Temperature:	298.726 K
Average Pressure:	100.3 kPa
Average Moisture:	0.3 %
Average Oxygen:	0 %
Volumertic Flow Rate corrected to STP O2 ref and Moisture	14805.33 m3/hr

Reference Conditions

Reference Temperature:	273.15 K
Reference Pressure:	101.325 kPa
Reference Oxygen:	0 %
Reference Moisture:	0 %

Particulates Results :

	mg/m3	mg/m3 corrected to O2	kg/hr	Uncertainty mg/m3
LOD	0.32	0.32	0.00	n/a
Blank	0.75	0.75	0.01	0.02
Run	0.41	0.41	0.01	0.01

Note: Blank result should be <10% of ELV
<20% for ELV 5mg/m3 or lower
Blank result is: #DIV/0! % of ELV
If the blank result is higher than requirements of ELV result should be rejected

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Particulates Uncertainty Run Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)		mg.m-3	Reference oxygen	0	% by volume
Measured concentration	0.4	mg.m-3 (at reference conditions)			

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.46601	uVm	0.001	m3	0.21		<=2%
Sampled gas Temperature	Tm	298.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	pm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.19	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%
Intermediate calculations								
Factor for std conds	fs	0.90						
uncertainty components	symbol	sensitivity coeff		u (in units of fs)				
	ρm	0.009		0.009				
	Hm	0.009		0.009				
	Tm	0.003		0.006				
	ufs			0.014				1.56
Corrected volume	V	0.42	uV	0.007	m3			1.58
Factor for O2 correction	fc	1.00						
uncertainty components	symbol	sensitivity coeff		u				
	O2,m	0.05		0.005				
Factor for O2 Correction	ufc	1.00		0.005				0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s$$

$$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.42	m3	0.97	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.19	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.41	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.31	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.01	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Requirement in standard is for uncertainty to be < 30% at ELV at standard conditions

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Particulates Uncertainty Blank Calculations

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

v14

Limit value (ELV)	0	mg.m-3	Reference oxygen	0 % by volume
Measured concentration	0.8	mg.m-3 (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty		Units	Uncertaint	Uncertaint	Requirement of std
Sampled Volume	Vm	0.46601	uVm	0.001	m3	0.21		<=2%
Sampled gas Temperature	Tm	288.726	uTm	2	k	0.67		<=1%
Sampled gas Pressure	pm	100.3	upm	1	kPa	1.00		<=1%
Sampled gas Humidity	Hm	0.3	uHm	1	% by volume	333.33		<=1%
Oxygen content	O2,m	0	uO2,m	0.1	% by volume	#DIV/0!		<=5%
Mass particulate	m	0.35	um	0.00	mg	0.00	#DIV/0!	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter								
Leak	L	0			%	0.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0			mg	0		<=10%

Intermediate calculations							
Factor for std conds	fs	0.90					
uncertainty components	symbol	sensitivity coeff	u (in units of fs)				
	pm	0.009	0.009				
	Hm	0.009	0.009				
	Tm	0.003	0.006				
	ufs		0.014				
Corrected volume	V	0.42	uV	0.007	m3		1.58
Factor for O2 correction	fc	1.00					
uncertainty components	symbol	sensitivity coeff	u				
	O2,m	0.05	0.005				
Factor for O2 Correction	ufc	1.00	0.005				0.48

$$f_s = \frac{(100 - H_m)}{100} \frac{273}{T_m} \frac{\rho_m}{101.3}$$

$$V = V_m f_s \quad 1.56$$

$$f_c = \frac{21}{21 - O_{2,m}}$$

Parameter		Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %	
Corrected Volume (standard con	V	0.42	m3	1.79	0.01 mg.m-3	#DIV/0!	%
Mass	m	0.35	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Factor for O2 Correction	fc	1.00		0.75	0.00 mg.m-3	#DIV/0!	%
Leak	L	0.00	mg.m-3	1.00	0.00 mg.m-3	#DIV/0!	%
Uncollected mass	UCM	0.00	mg	2.15	0.00 mg.m-3	#DIV/0!	%
Combined measurement uncertainty					0.01 mg.m-3		

Expanded uncertainty as percentage of measured value	3.31	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	
Expanded uncertainty as percentage of limit value	#DIV/0!	%ELV	

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Noise Assessment of
Stack Emission Point (A2-8)

For

KMK METALS RECYCLING LTD.

CAPPINCUR INDUSTRIAL ESTATE, DAINGEAN ROAD, TULLAMORE, CO. OFFALY

November 2011

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A: Noise Results & Charts

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1.0 INTRODUCTION

ENVIROCO Management has been commissioned by Mr. Kurt Kyck of KMK Metal Recycling Ltd, Cappincur Industrial Estate, Tullamore, Co Offaly; Waste Licence Number W0113-03 to assess the likely noise arising from a new emission point (A2-8) from the recently constructed D-WEEE Plant (building).

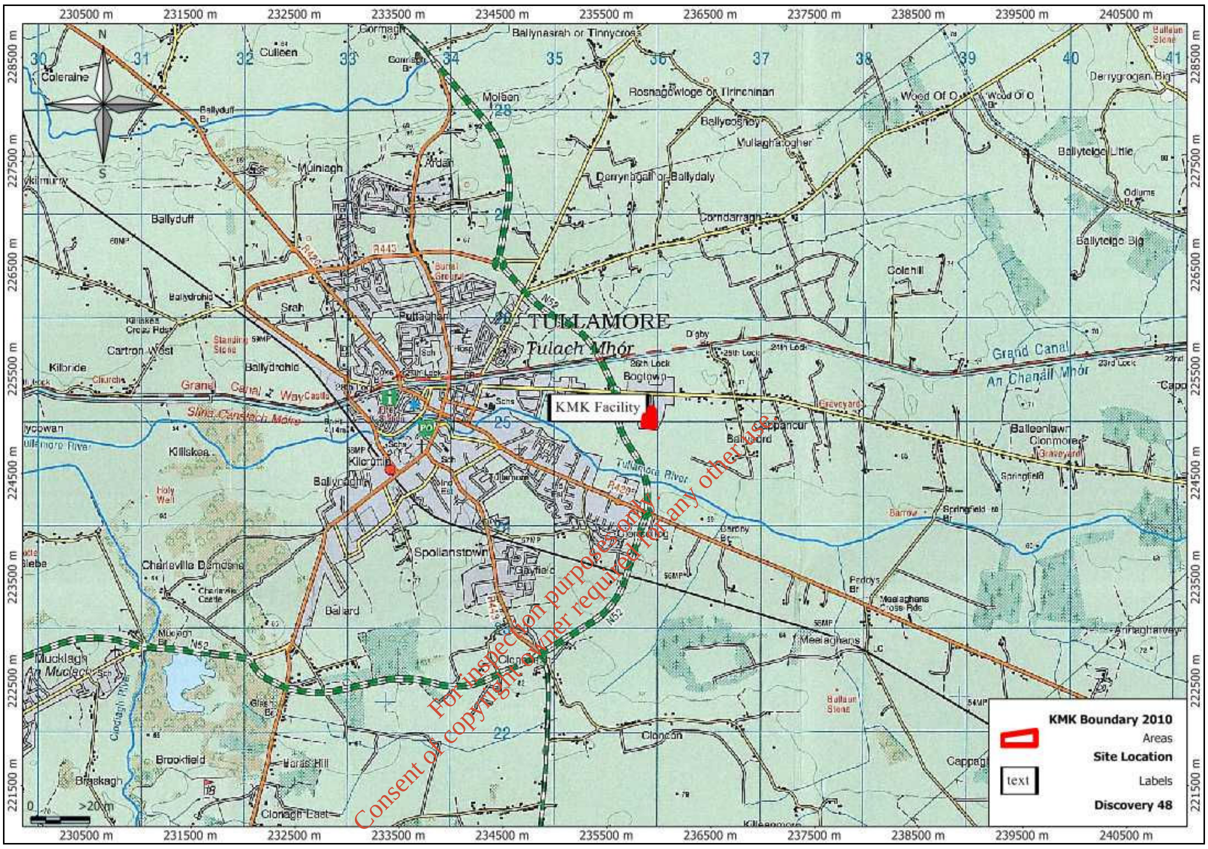

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Figure 1: Site Location map of the KMK Facility, Tullamore, Co. Offaly

The KMK LTD facility is located in the Cappincur Industrial Estate towards the east of Tullamore town, off the L-02025 road to Daingean – Figure 1.0. The Cappincur Industrial Estate is dominated by enclosed industrial units, with little mobile machinery operating outside of these units.

The objectives of the environmental noise survey were to:

- Investigate the level of noise arising from the new emission point (A2-8), located to the south of the recently constructed D-WEEE Plant (building)
- Assess whether the noise levels recorded are similar to, exceed or are lower than the predicted levels for this emission point
- Evaluate whether the noise associated with the new emission point is likely to cause a nuisance to potential receptors.

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1.1 ENVIRONMENTAL MONITORING

ENVIROCO Management was commissioned by KMK Metals Recycling LTD, Cappincur Industrial Estate, Tullamore, Co Offaly to carry out environmental noise monitoring at the new emission point (A2-8) from the D-WEEE Plant (Building).

Monitoring occurred on the 10th November 2011. Monitoring took place during the course of a normal working day.

2.0 NOISE SURVEY

Noise has many sources, both manmade and environmental. Noise is observer defined, as levels unacceptable to one person may be perceived as necessary or enjoyable to another. As such the monitoring of noise is primarily an observational discipline requiring a full identification of the sources of possible noise and the type of sound that is been emitted (continuous, intermittent, tonal, broad-spectrum, single source, multiple source). The Environmental Protection Agency (EPA) has adopted a noise level (as a continuous equivalent noise reading – Leq) of 55 dB(A) as an indicator of annoyance due to noise arising from industrial activity.

2.1 METHODOLOGY

Noise monitoring was carried out to the International Standard ISO 1996/1 "Acoustics – Description & measurement of environmental noise", using a Type 1 Bruel Kjaer 2250 Sound Level Meter with outdoor equipment that was fully calibrated prior to and after the monitoring event. The meter was set to Fast Response with an effective averaging time of 0.25sec during noise monitoring. All noise monitoring was 'A' weighted which attenuates low frequencies strongly so noise measuring is more specific to human hearing and environmental noise.

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Noise monitoring was carried out on the 10th November 2011. The KMK facility in the Cappincur Industrial Estate does not operate over night; therefore noise monitoring was not carried out overnight. Each monitoring location is identified on the map shown in Figure 2.1.1.

Weather conditions during sampling were; bright and sunny with a light breeze changing to a moderate breeze as the morning progressed.

Table 2.1.1: Gurteen College Weather Station Report

REPORTS FROM GURTEEN WEATHER STATION						
Date	**Rainfall (mm)**	**Max Temp**	**Min Temp**	**Sunshine (hours)**	**Gusts**	**Wind speed (knots)**
10/11/2011	0.1	14.2	8.2	-	-	11

The monitoring equipment was manned throughout the sampling period and comments/notes taken to assist the interpretation and assessment of results.

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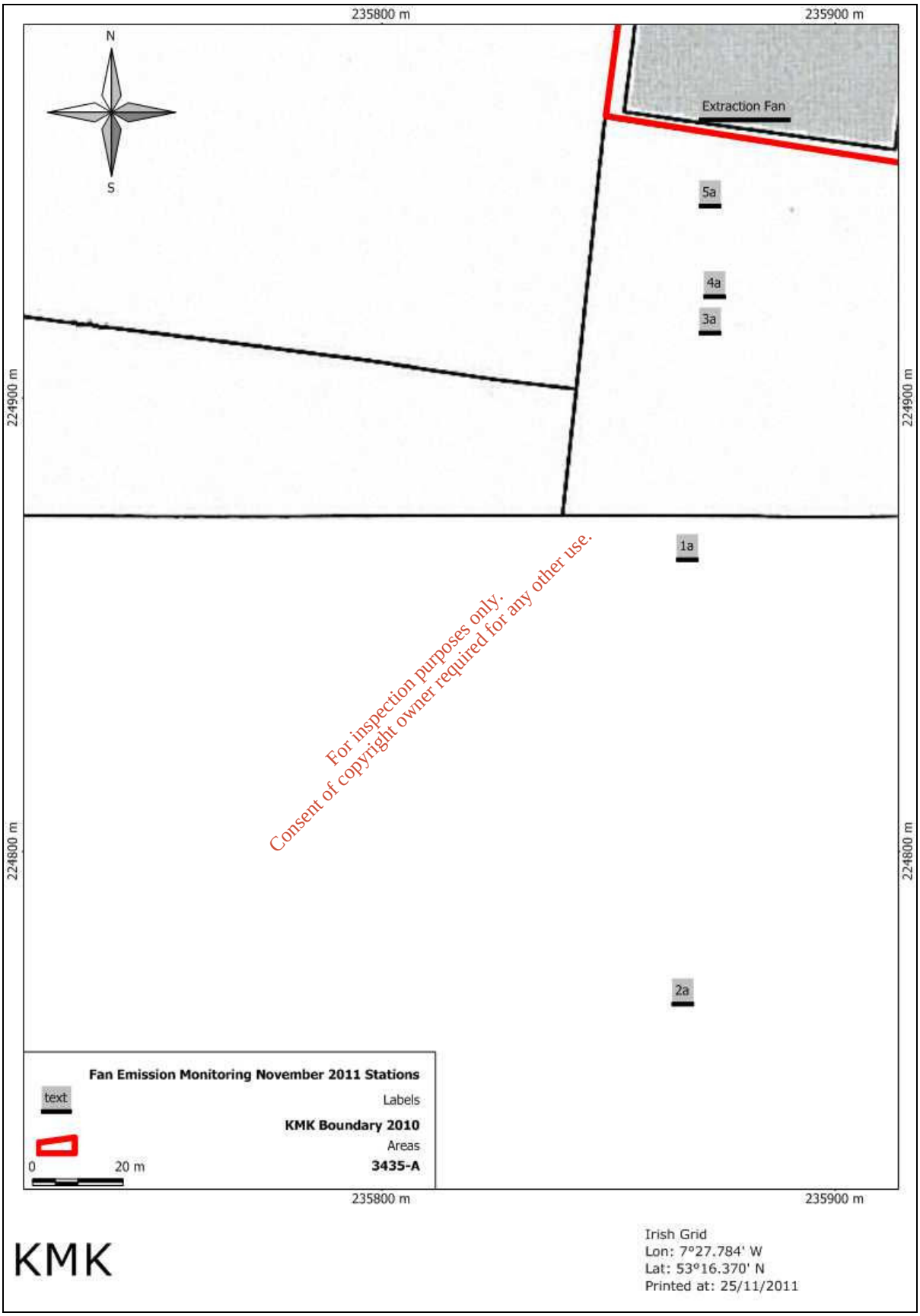

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Figure 2: Monitoring Locations

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Sampling was carried out at 5 locations at various distances from the emission point A2-8 (Figure 2). ENVIROCO Management staff selected these monitoring locations.

The monitoring locations were:

N1	100 meters from source
N2	200 meters from source
N3	50 meters from source
N4	40 meters from source
N5	20 meters from source

Table 2.1.2: Grid Location of Monitoring Stations

Monitoring Locations	Grid Reference (ITM)	
	Easting	Northing
N1	635807	724895
N2	635805	724796
N3	635811	724945
N4	635813	724952
N5	635812	724972

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2.2 RESULTS

The complete set of noise measurement results is included in Appendix A. These are summarised and discussed below.

Table 2.2.1: Comments Recorded at Each Monitoring Station

Location	Start Time	L_{Aeq}	Comments
N1(a)	14:16	54	Audible noise sources – road traffic on the N52 Tullamore By-Pass and along the R420, Birdsong, Maniscopic forklift moving through fields
N2 (a)	14:29	54	Road Traffic on the N52 Tullamore By-Pass and the R420 Some induced wind noise audible through hedging and thistles within the field
N1(b)	14:41	54	Road traffic on the N52/Tullamore By-Pass and on the R420 Rumble audible from the 'Drum Separator' operating at the plant and on occasion reversing alarms audible Occasional dog bark's
N3(a)	14:52	57	Road Traffic on the N52/Tullamore By-Pass and the R420 Road, Rumble from the 'Drum Separator' unit audible along with reversing alarms
N4(a)	15:03	57	Drum unit audible along with reversing alarms (door is partially open into the plant) Road Traffic on the N52/Tullamore By-Pass audible Occasional 'venting' audible from the plant
N4(b)	15:14	58	Stack emission noise is audible Drum unit audible along with reversing alarms (door is partially

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Location	Start Time	L_{Aeq}	Comments
			open into the plant) Road Traffic on the N52/Tullamore By-Pass audible Occasional 'venting' audible from the plant
N5(a)	16:03	54	Road Traffic from the N52/Tullamore By-pass
N5(b) 15:25		62	stack emission audible, drum audible, fall of material within drum perceptible Road Traffic audible, occasional venting occurring

2.3 DISCUSSION BROADBAND NOISE

There are currently no statutory limits for the control of environmental noise in Ireland. However, the EPA has issued a guidance note on noise emissions that states, '*Ideally, if the total noise level from all sources is taken into account, the noise level* ***at sensitive locations*** *should be kept below an L_{Aeq} value of 55dB(A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed a $L_{Aeq\ T}$ value of 45dB(A).*'

This assessment is concerned with the potential for impact arising from the newly developed stack emission piont, linked to the new plant installed within the building D-WEEE Plant building, to the south of the KMK Facility.

Previous prediction of the noise levels arising from this new emission point, used the listed sound pressure at 1 meter from the stack emission, and typical noise attenuation information. This table is now shown below again, along with the actual readings recorded on site during the survey conducted on the 10th November 2011.

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Table 2.3.1: Comparison of Background, Recorded and Predicted Noise Values

Distance from Source (stack emission)	Sound Pressure dB(A)	Recorded L_{Aeq} (site operational)	Recorded L_{Aeq} (site not operational)
1	84	-	-
10	64	-	-
20	58	62	54
40	52	58	-
50	50	57	-
80	46	-	-
100	44	54	54
200	-	-	54

The operational sound levels within the table show higher values that predicted. This is primarily due to the relatively high ambient noise present to the south of the KMK facility. Station N1 and N2, located at 100 meters and 200 meters respectively, show similar readings for when the plant is running, not running and at notably increased distances from the plant. This would imply that the level of ambient noise, during the day within the vicinity south of the KMK facility, is 54 dB(A), L_{Aeq}. As such, all measurements close to, or below, this value, cannot be achieved, as existing ambient noise levels cannot be lowered by an activity or new source.

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It is normally assessed that where ambient noise levels are relatively high, it takes a minimum of a tonal aspect or 3dB increase above the ambient for a noise source to become noticeable. Taking an ambient measurement of 54 dB(A) this requires that the new noise source either must show a tonal feature or be a minimum L_{eq} of 57dB(A) to become noticeable.

At distances of 50 meters, the recorded on site L_{eq} values show the site attenuates to 57 dB. Therefore it is likely that at distances greater than 50 meters south of the noise source, the noise arising from the stack emission's will not cause nuisance, and at greater distances will not be audible above current ambient noise levels.

Higher levels of noise are present in closer proximity to the stack emission than predicted. This is due to the following:

- The prediction was conducted based upon stack noise emission in isolation
- Monitoring recorded the stack noise emission, along with relatively high ambient noise (approximately L_{eq} of 54 dB(A)), existing facility noise and facility noise arising from within the new D-WEEE Plant (building), due to the rear roller doors been partially open.

It is understood that when the facility is fully operational, the roller doors to the rear of the plant will not be required to be left open, which will significantly reduce the level of noise audible from within the D-WEEE Plant (building).

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2.4 DISCUSSION TONAL NOISE

Full page diagrams and information on the 1/3 octave analysis from the monitoring event are shown in Appendix A. This chapter is interested in the likelihood or not of a tonal noise arising from the operation of the new stack emission, erected at the KMK facility.

The acoustician notes, show that the stack emission was only audible at 2 monitoring events – N5 (b) at a distance of 20 meters from the facility, and at station N4(b) at 40 meters. Both of these stations were repeated when the stack emission noise was not audible. This gave a distinct capability to assess for tonal aspects from the new stack emission unit.

Charts 1 & 2 compare the 1/3 octave results for both stations side by side. The charts clearly show that at both (b) events – when the stack emission noise was audible, a notable peak occurred at 31.5 Hz.

Station N4(b) this peaks at 68dBZ, while at station N5(b) the peak occurs at 73 dB(Z). A distinctive decrease of nearly 6 dB with a doubling of distance from the likely sound source is present.

It is therefore likely that the new emission point has a distinctive tonal feature at 31.5Hz, which decreases with distance from the stack emission point.

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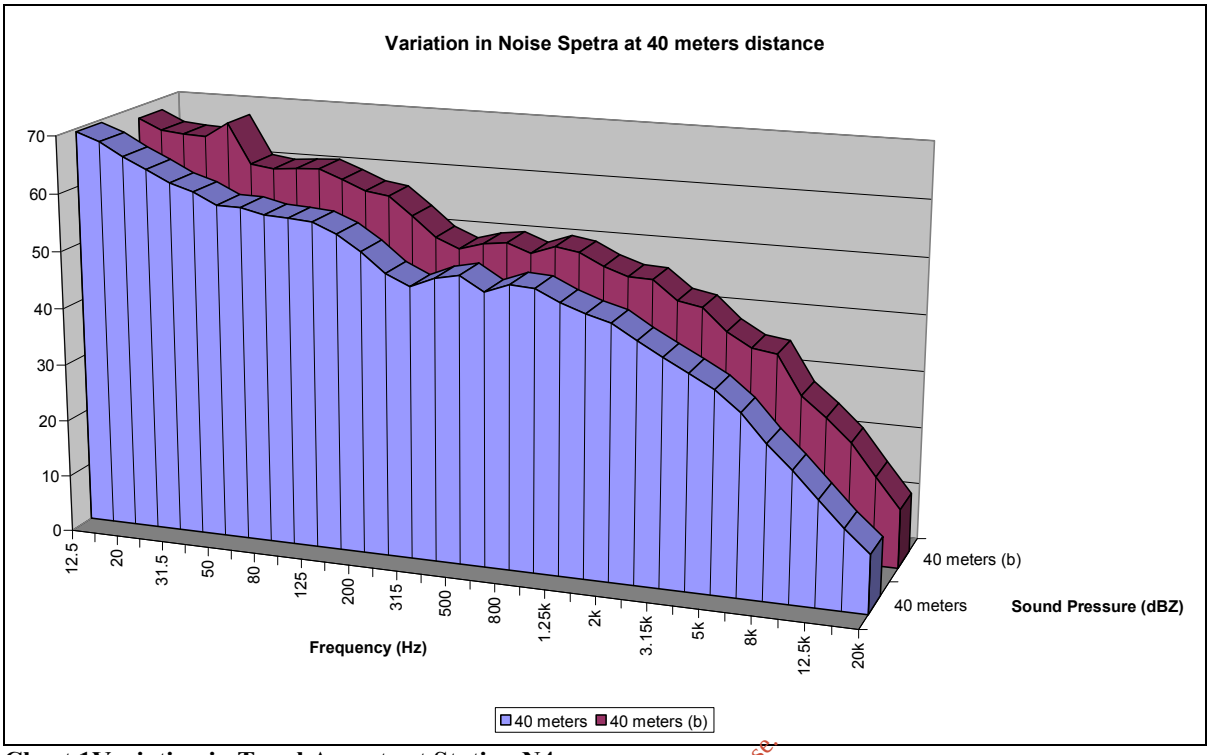

Chart 1Variation in Tonal Aspects at Station N4

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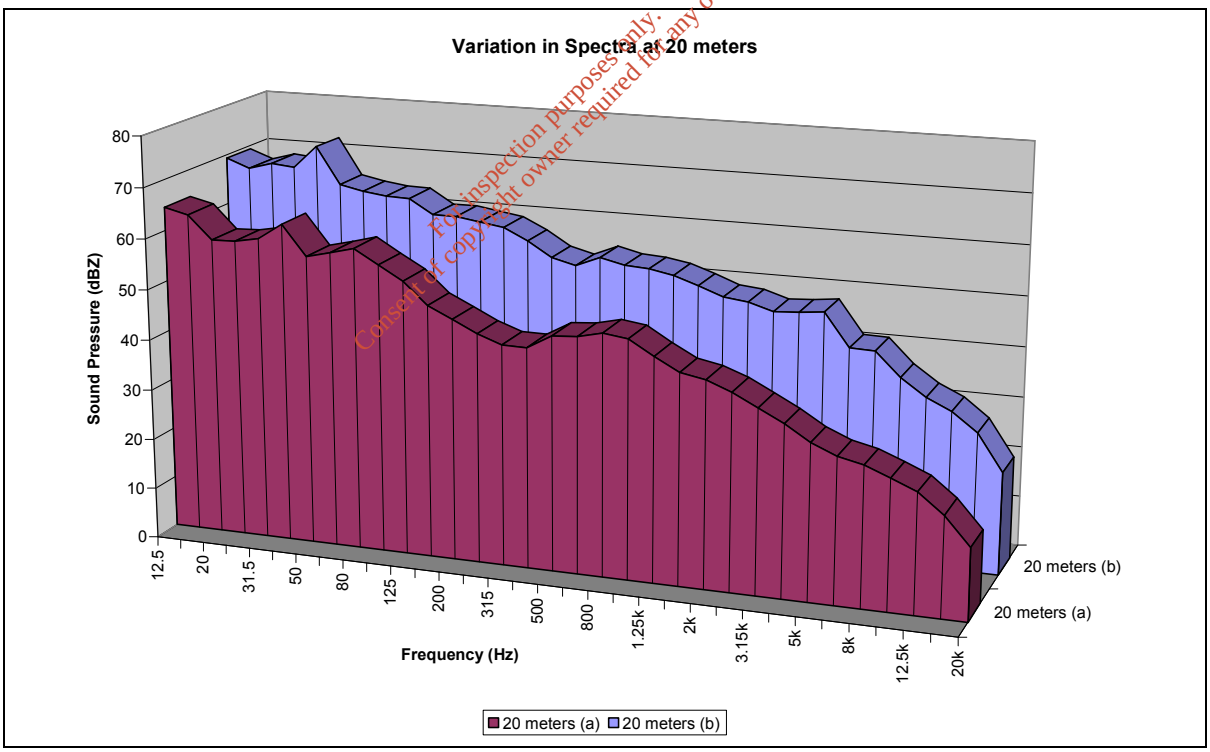

Chart 2: Variation in Tonal Aspects at Station N5

At a distance of 40 meters the tone arising from the operation of the stack emission is just perceptible as a tone (i.e. a minimum of 3dB rise above the neighbouring spectra). At a distance of 80 meters (another doubling of distance) a drop of 5 dB will bring the 31.5 Hz spectra in line with recorded values for measurements at 50 meters and 100 meters.

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Therefore it is not likely that the tonal aspect will affect any sensitive receptors. The development does have a slight tonal aspect at distances up to 40 meters from the source.

No other tonal aspects are visible on the 1/3 octave data concerning stations where the stack emission was audible. No tones were recorded at higher frequencies (between 800 Hz to 20kHz).

3.0 CONCLUSIONS

ENVIROCO Management Ltd conducted a noise assessment in the green field to the south of the newly constructed D-WEEE Plant (building) at the KMK facility, Tullamore.

This monitoring was carried out to assess the accuracy of predictions conducted on the basis of a new stack emission point (A2-8) that was to be installed, and to assess whether or not this new emission point is likely to cause a nuisance.

The land to the south of the KMK facility is currently green-field. There are no dwellings or places of gathering located between the facility southern boundary and the R420 Tullamore to Geashill/Portarlington Road.

Ambient noise recorded within the field, when the KMK plant was not operational, show a L_{Aeq} value of 54 dB.

At distances greater than 50 meters, the level of noise arising from the KMK D-WEEE Plant (building) is significantly low that it is unlikely to be a nuisance (L_{Aeq} of 57 dB).

Tonal analysis of the stack emission point (A2-8), show the presence of a tone at 31.5Hz at 20 and 40 meters distance from the stack emission.

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Assessment of the data concerning recorded spectral data indicate that at further distances, this tone is absorbed into the normal ambient and background acoustic environment. This correlates with the broadband noise conclusion of no likely impact at distances of 50 meters from the facility.

Levels predicted, prior to the installation of the stack emission were exceeded during the monitoring event.

The reasons for the higher 'real world' levels over the prediction included –

- A higher ambient noise level than assumed in the prediction
- Roller doors to the D-WEEE Plant (building) been open during the survey period
- Activity noise from within the D-WEEE Plant (building) been audible

From the monitoring event and an assessment of the local area to the south of the facility it is not seen that the new emission point from the D-WEEE Plant (building) will be an acoustical nuisance. There are no dwellings in proximity; there are no roads to enable dwellings to be likely built within proximity.

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Appendix A

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- **Noise Results & Charts**

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Noise Results

Client: KMK Metals Recycling Ltd
Site: Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly
Monitoring Date: 10th November 2011
Sampler: Kenneth Goodwin (ENVIROCO Management Ltd)
Weather: Clear, cold, with light air
Equipment: Type 1 Bruel Kjaer 2250 SLM with wind muffler

Table 1 Noise Results

Location	L_{eq} dB(A)	L_{max} dB(A)	L_{min} dB(A)	$L_{(1)}$ dB(A)	$L_{(5)}$ dB(A)	$L_{(10)}$ dB(A)	$L_{(50)}$ dB(A)	$L_{(90)}$ dB(A)	$L_{(95)}$ dB(A)	$L_{(99)}$ dB(A)
100 meters (a)	54	60	47	59	58	57	53	50	49	48
200 meters (a)	54	63	43	60	58	57	53	48	47	46
100 meters	54	64	46	60	58	57	53	50	48	47
50 meters	57	70	52	67	60	59	56	54	54	53
40 meters (a)	57	71	52	60	59	59	57	55	55	53
40 meters (b)	58	73	53	62	60	60	58	56	56	55
20 meters (b)	62	81	48	67	65	65	62	56	54	51
20 meters (a)	68	50	88	62	57	56	53	51	51	50

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Notes

Table 2 Notes Regarding Monitoring Positions

ID	Distance	Grid Ref.*		Comments
		Easting	Northing	
Extraction Stack emission	1	635813	724993	
1a	100	635807	724895	Monitored when no activity occurring
2a	200	635805	724796	Monitored when no activity occurring
1b	100	635810	724892	Activity occurring within D-WEEE Plant (Building)
3	50	635811	724945	Activity occurring within D-WEEE Plant (Building)
4a	40	635813	724952	Activity occurring within D-WEEE Plant (Building)
4b	40	635813	724952	Activity occurring within D-WEEE Plant (Building), stack emission noise audible
5a	20	635812	724972	Monitored when no activity occurring
5b	20	635812	724972	Activity occurring within D-WEEE Plant (Building), stack emission noise audible

*Grid reference are 6 figure ITM reference

Table 3 Weather Data 10th November 2011

Weather Station	Rain (mm)	Max temp (˚C)	Min temp (˚C)	Sun (hours)	Gust (knots)	Wind (knots)
Gurteen	0.1	14.2	8.2	-	-	11

The above data refer to the period midnight to midnight. They are provisional data and have not been quality controlled Rain is total precipitation plus deposition in mm. Max is the maximum temperature in Degrees Celsius Min is the minimum

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temperature in Degrees Celsius Sun is the total sunshine in hours Gust is the highest gust of wind in knots if 34 knots or greater Wind is the mean wind speed in knots

Table 4: Weather Report from the Vantage Vue Station, based Tullamore

	Date		10/11/2011	
Start Time	10:00:00		**Finish Time**	17:00:00
Temperature	12.62		**High Temperature**	14.30
			Low Temperature	10.30
Humidity	85.91		**Dew Point**	10.28
Wind Speed	1.67		**Wind Direction**	SSE
			High Wind Speed	7.20
Wind Chill	12.40		**THW Index**	12.38
Bar	728.54			
Rain	0.20		**Rain Rate**	0.00

Wind Speed in m/s; Temperature in ºC

Wind Rose from Tullamore Vantage Vue Weather Station, 10 November 2011

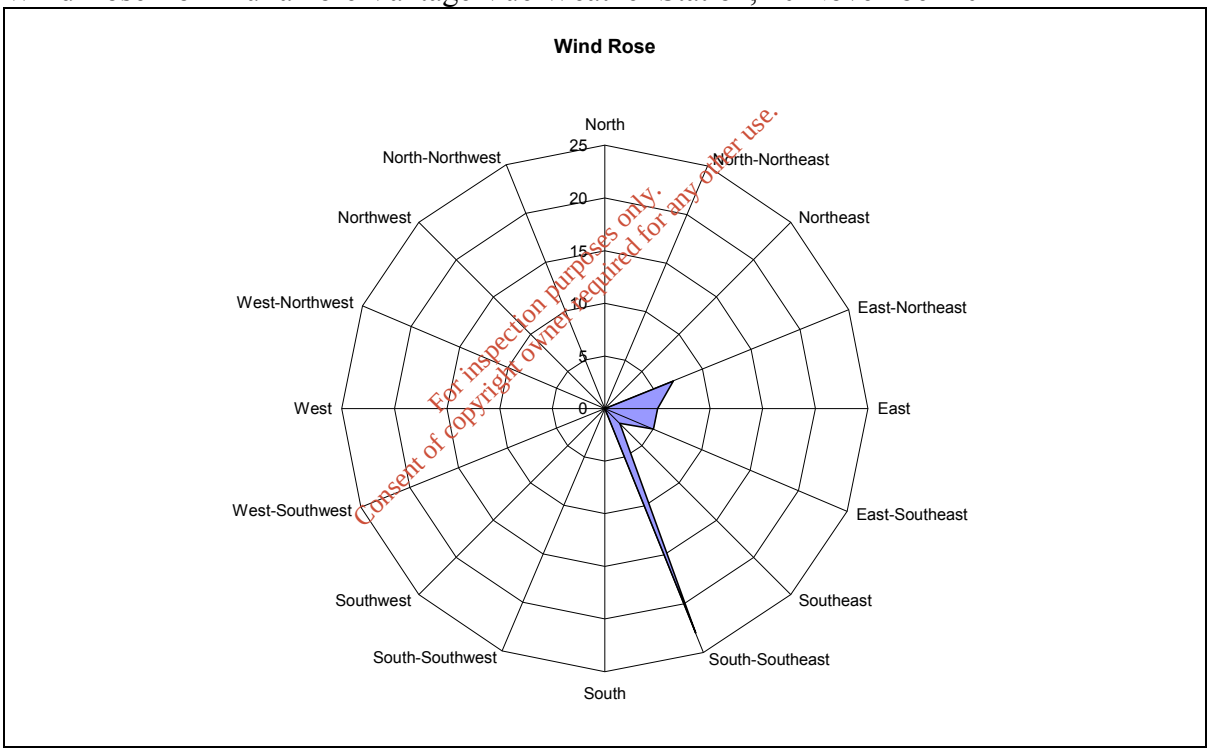

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Table 5 L_{Aeq} Full Octave Analysis of Noise Measurements, taken on the 10th November 2011

	L_{Aeq} Frequency (Hz)																		
Project Name	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**
200 meters (a)	62	61	58	56	54	56	**60**	58	54	50	46	44	42	37	41	43	46	48	49
100 meters (a)	68	66	64	62	62	60	57	58	55	51	50	47	45	43	42	42	44	46	48
100 meters (b)	67	66	64	62	59	57	56	**59**	56	52	53	51	48	44	42	43	45	46	48
50 meters	69	67	65	62	60	59	58	58	57	57	**62**	58	53	52	51	49	51	48	49
40 meters (a)	70	68	66	64	62	61	59	59	58	57	57	55	53	49	47	49	50	48	49
40 meters (b)	68	66	66	65	**68**	61	60	61	61	59	58	57	54	50	49	50	51	49	51
20 meters (a)	65	63	59	59	60	**63**	57	58	60	57	54	50	47	45	43	43	46	46	48
20 meters (b)	69	68	69	68	**73**	66	65	64	64	61	61	60	60	57	54	53	55	54	54

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Table 5 L_{Aeq} Full Octave Analysis of Noise Measurements, taken on the 10th November 2011 (Continued)

	L_{Aeq} Frequency (Hz)													
Project Name	**1k**	**1.25k**	**1.6k**	**2k**	**2.5k**	**3.15k**	**4k**	**5k**	**6.3k**	**8k**	**10k**	**12.5k**	**16k**	**20k**
200 meters (a)	47	44	42	38	34	30	27	23	19	17	14	13	11	9
100 meters (a)	47	45	43	38	34	31	28	24	21	18	14	13	11	9
100 meters (b)	48	45	43	40	35	30	26	23	23	22	15	14	12	9
50 meters	49	47	45	43	41	38	35	33	30	26	22	18	14	11
40 meters (a)	49	47	45	44	42	39	37	35	31	27	23	18	14	10
40 meters (b)	50	48	46	46	43	42	38	36	35	28	25	21	16	10
20 meters (a)	47	44	41	41	39	36	34	31	29	28	26	24	20	14
20 meters (b)	53	51	49	49	47	48	48	42	42	37	33	31	28	20

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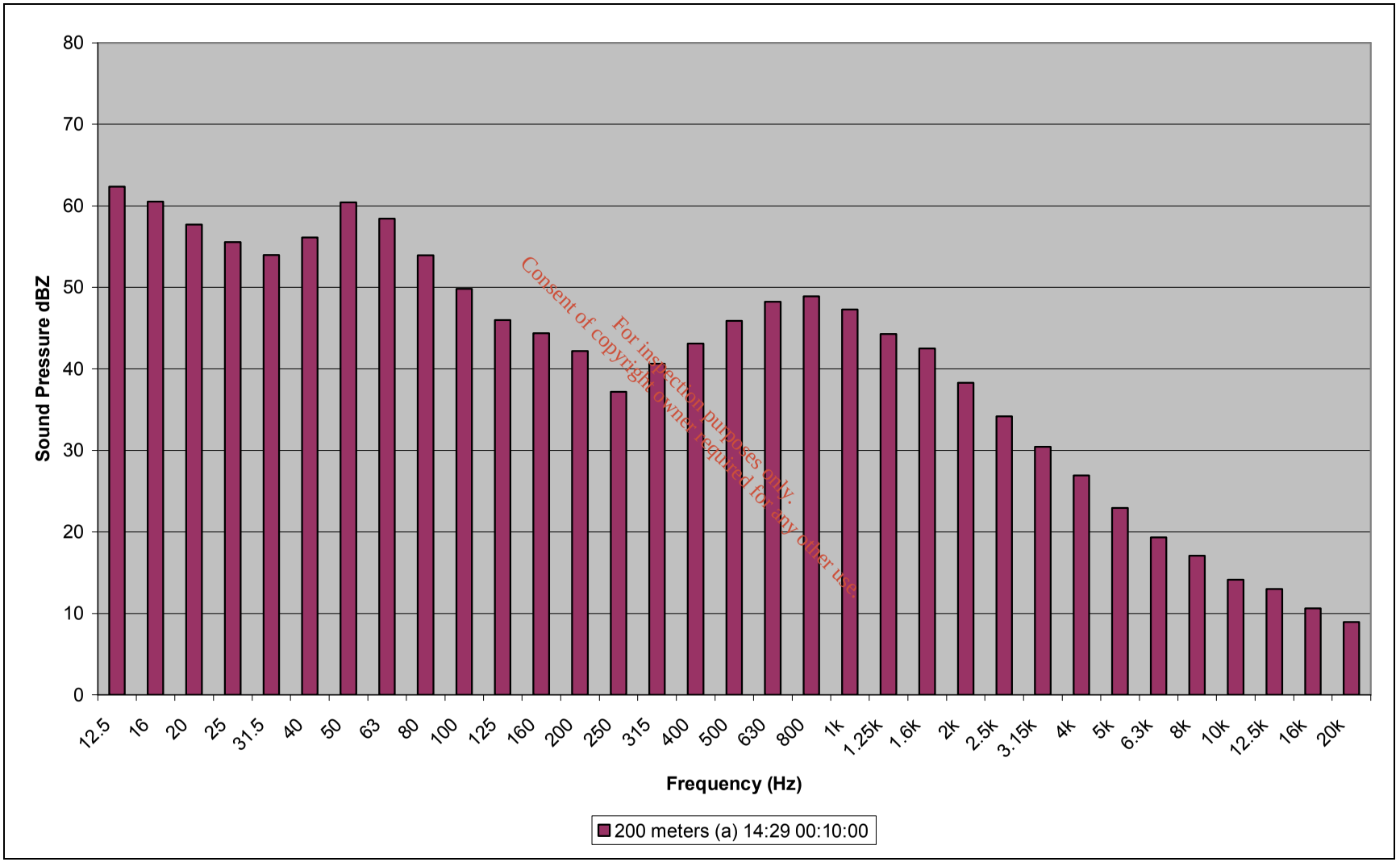

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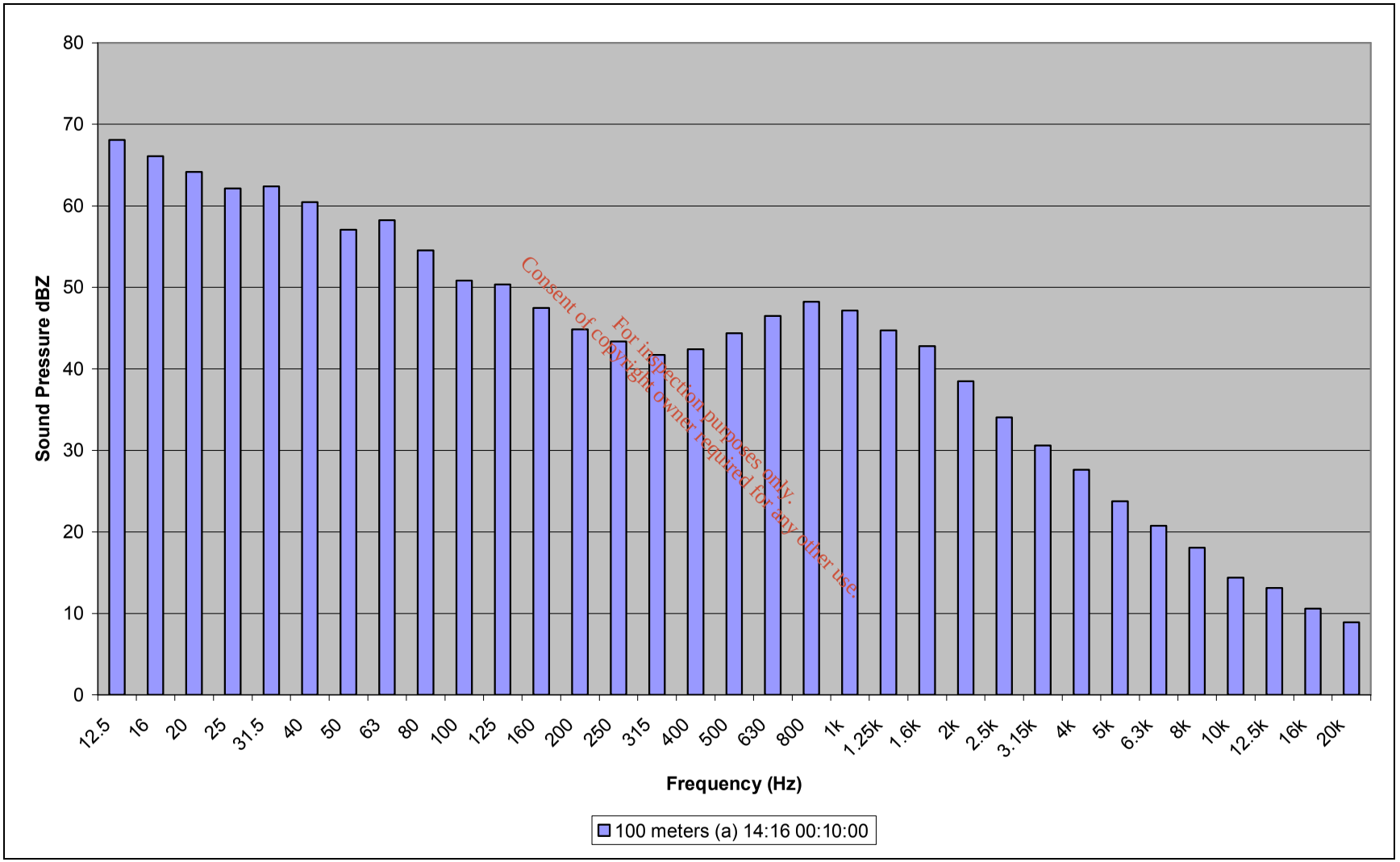

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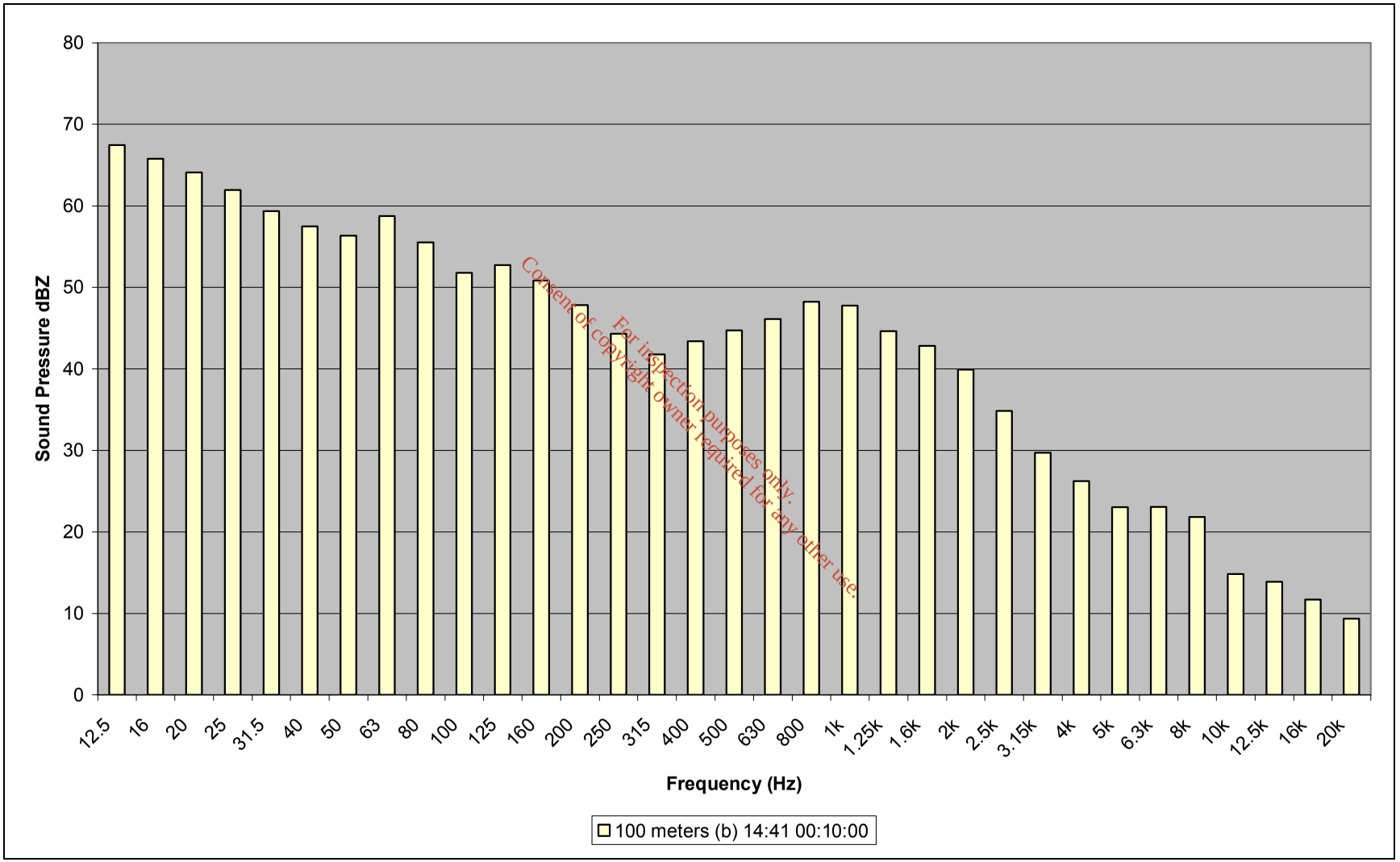

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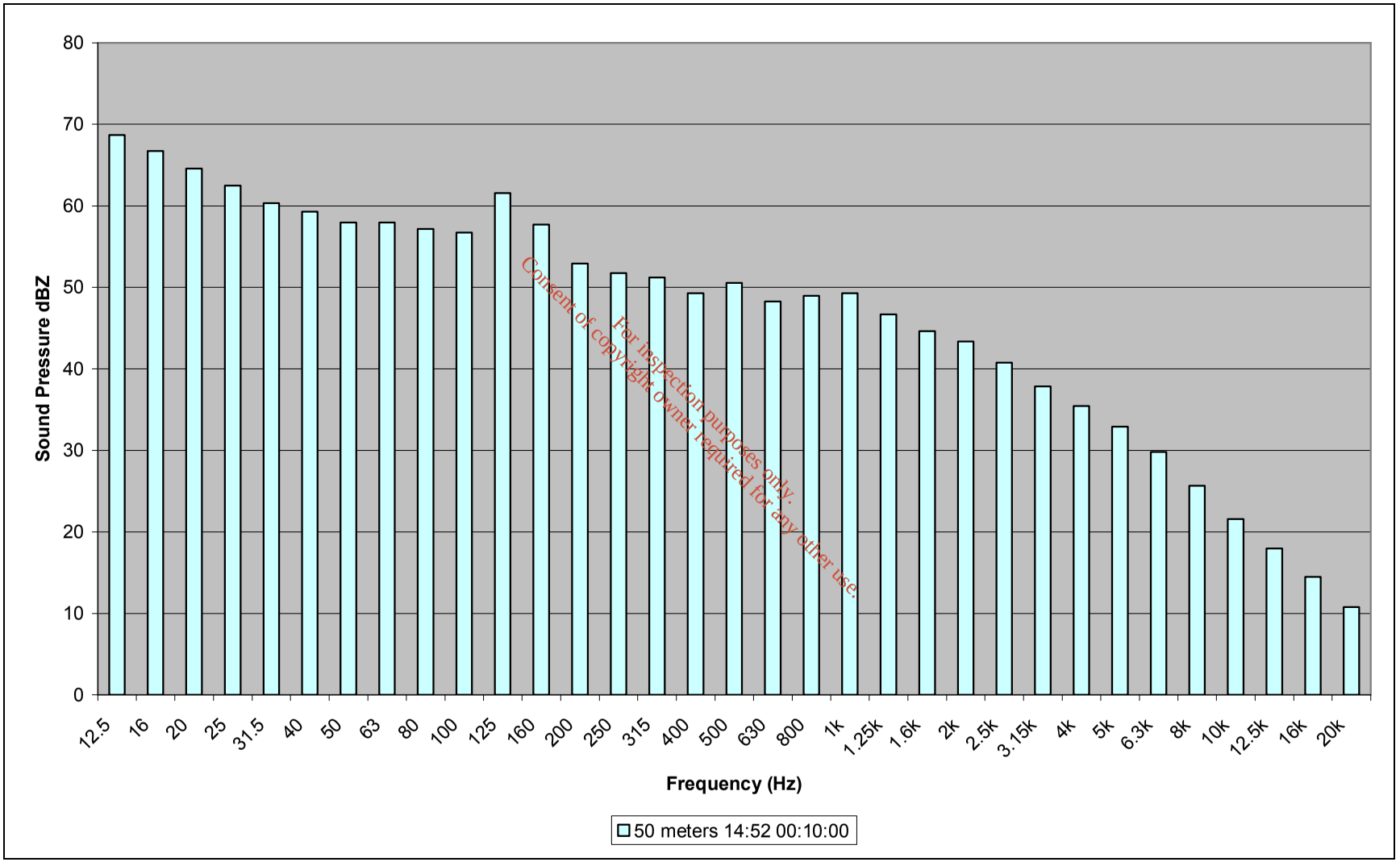

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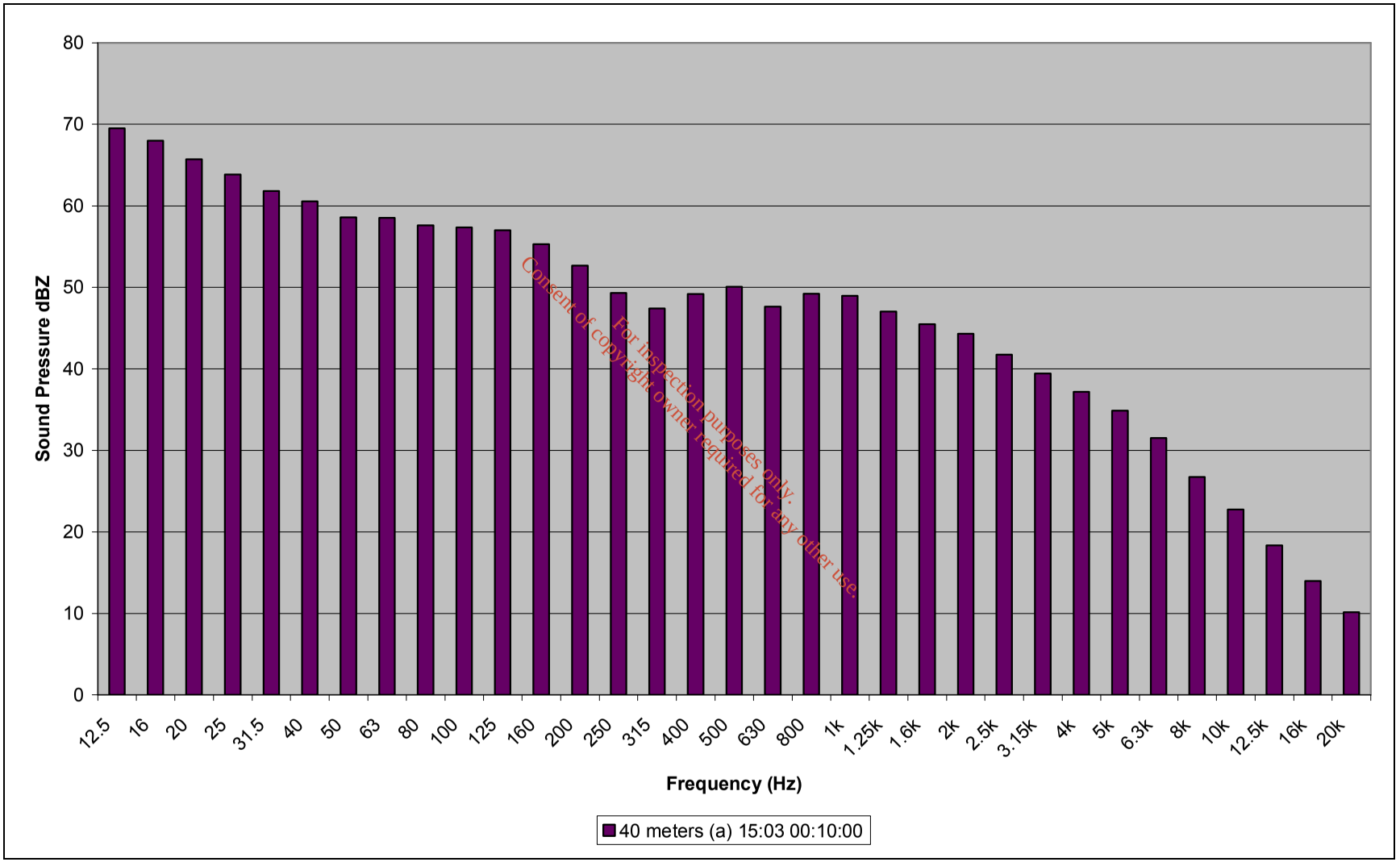

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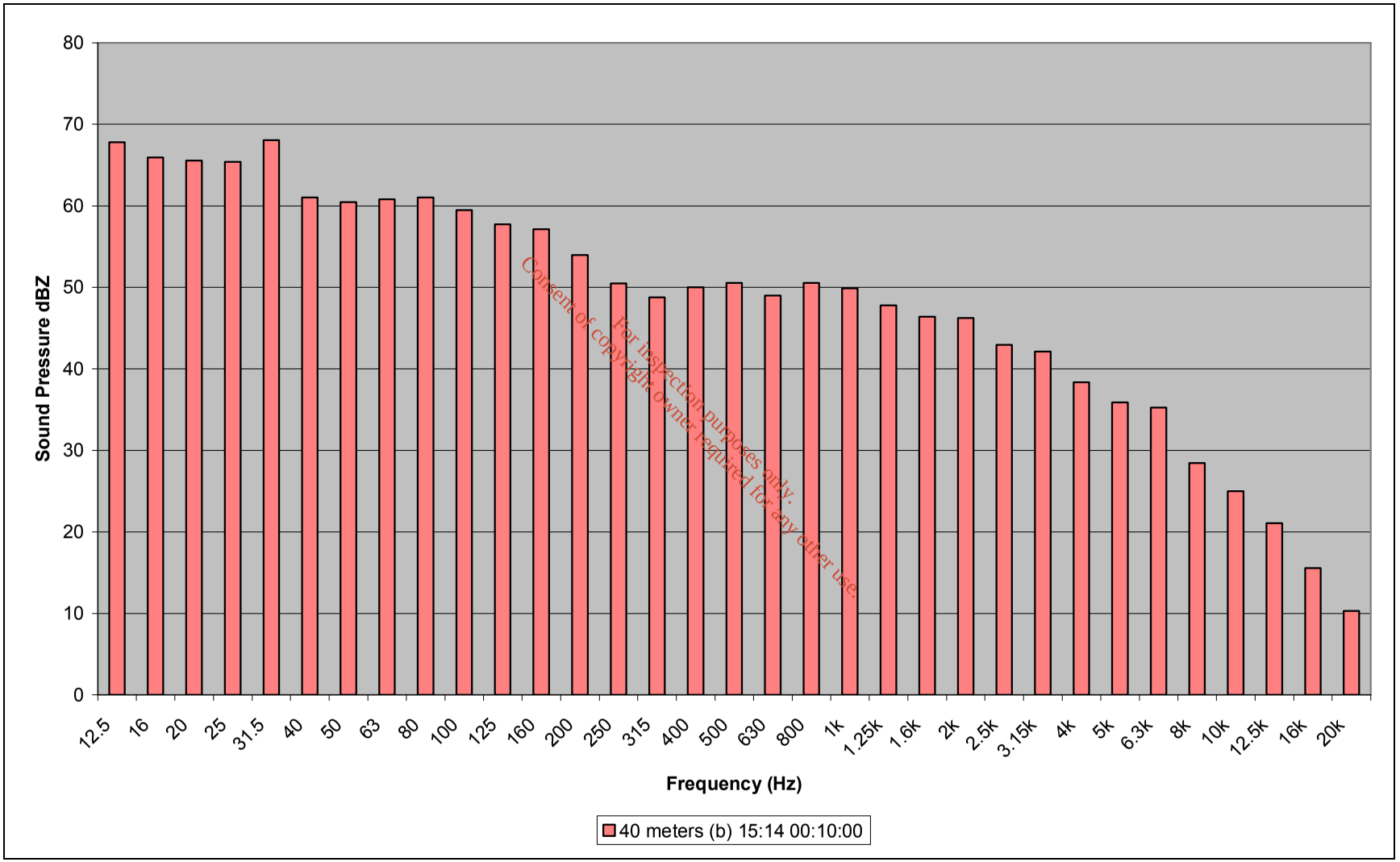

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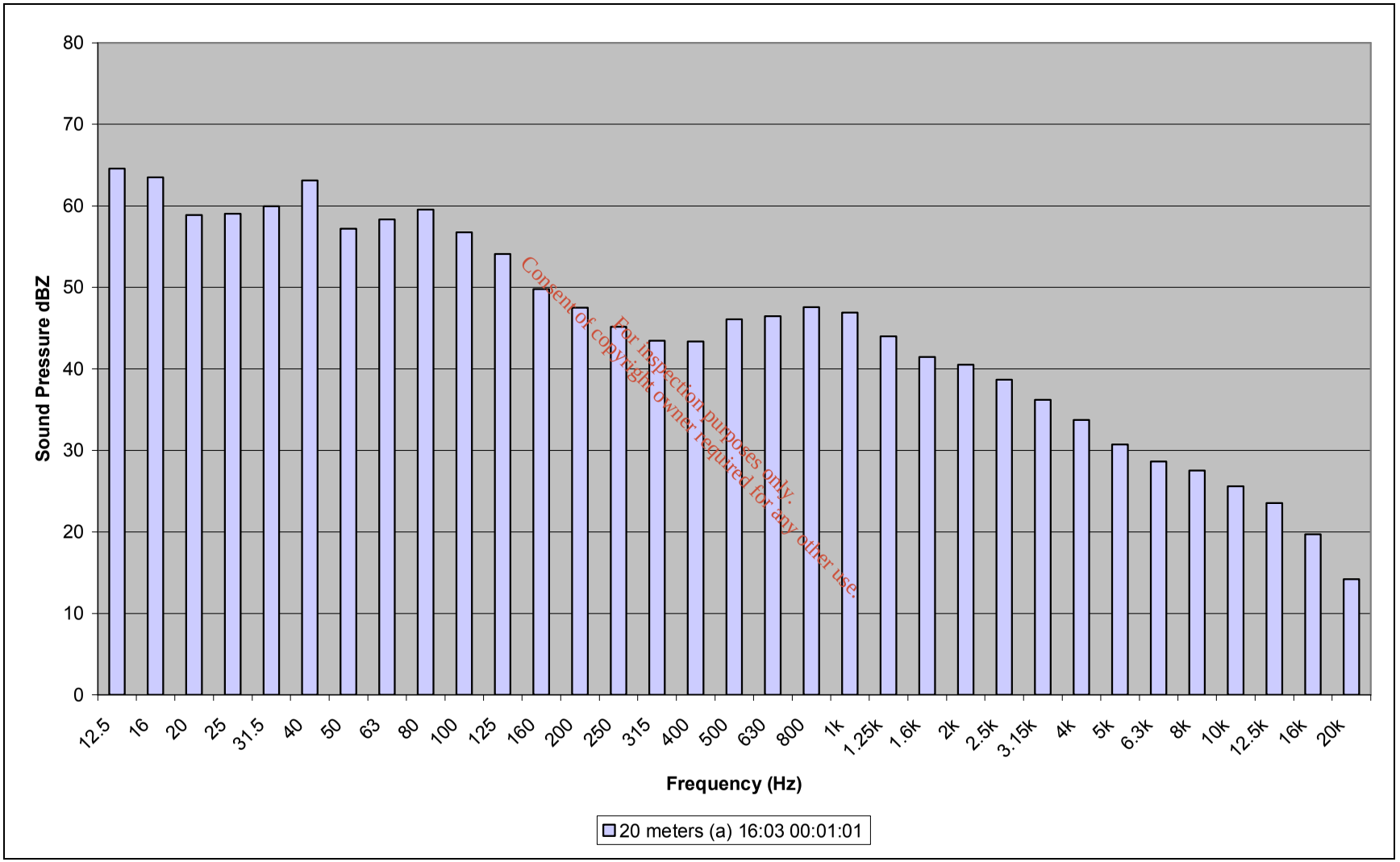

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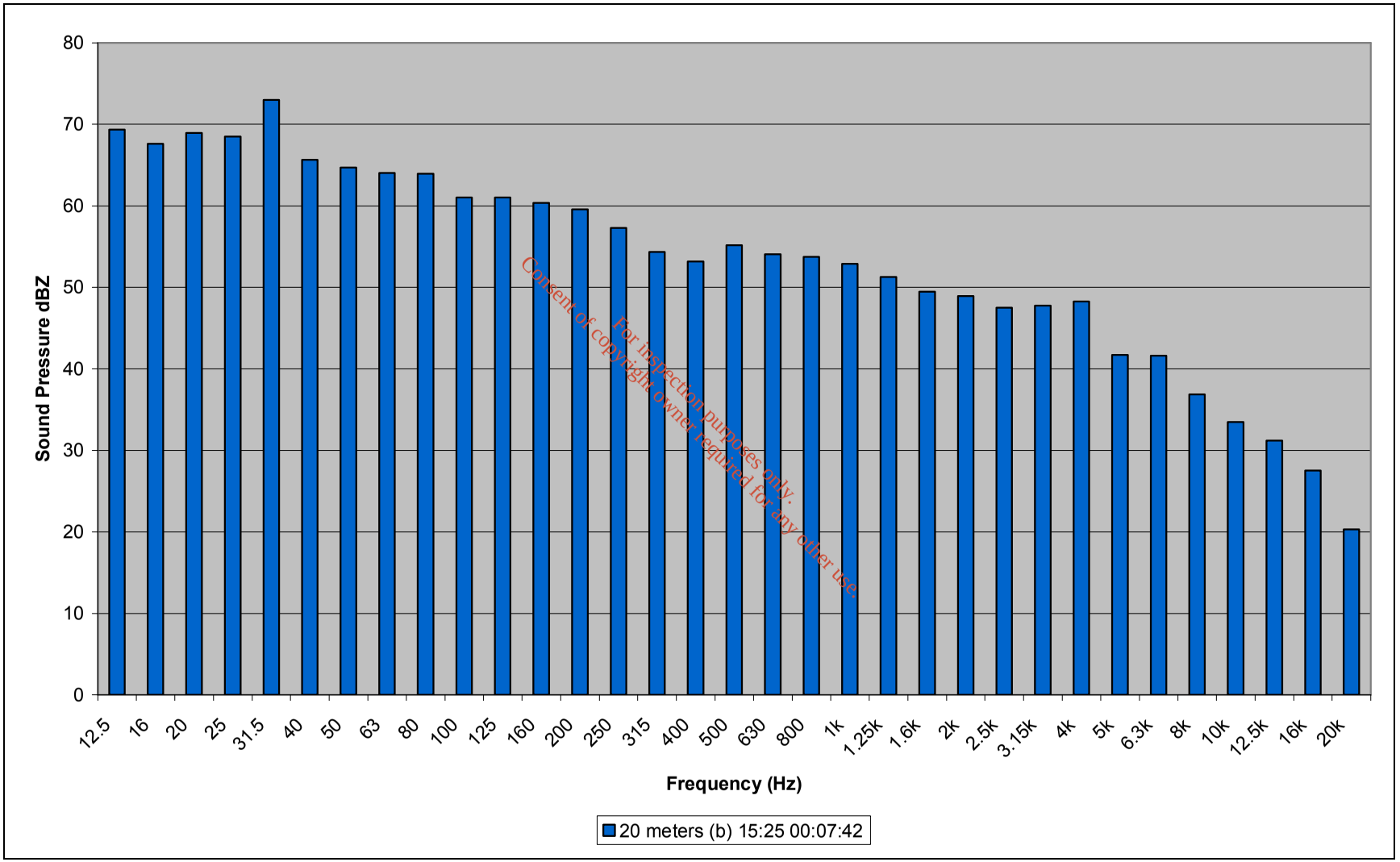

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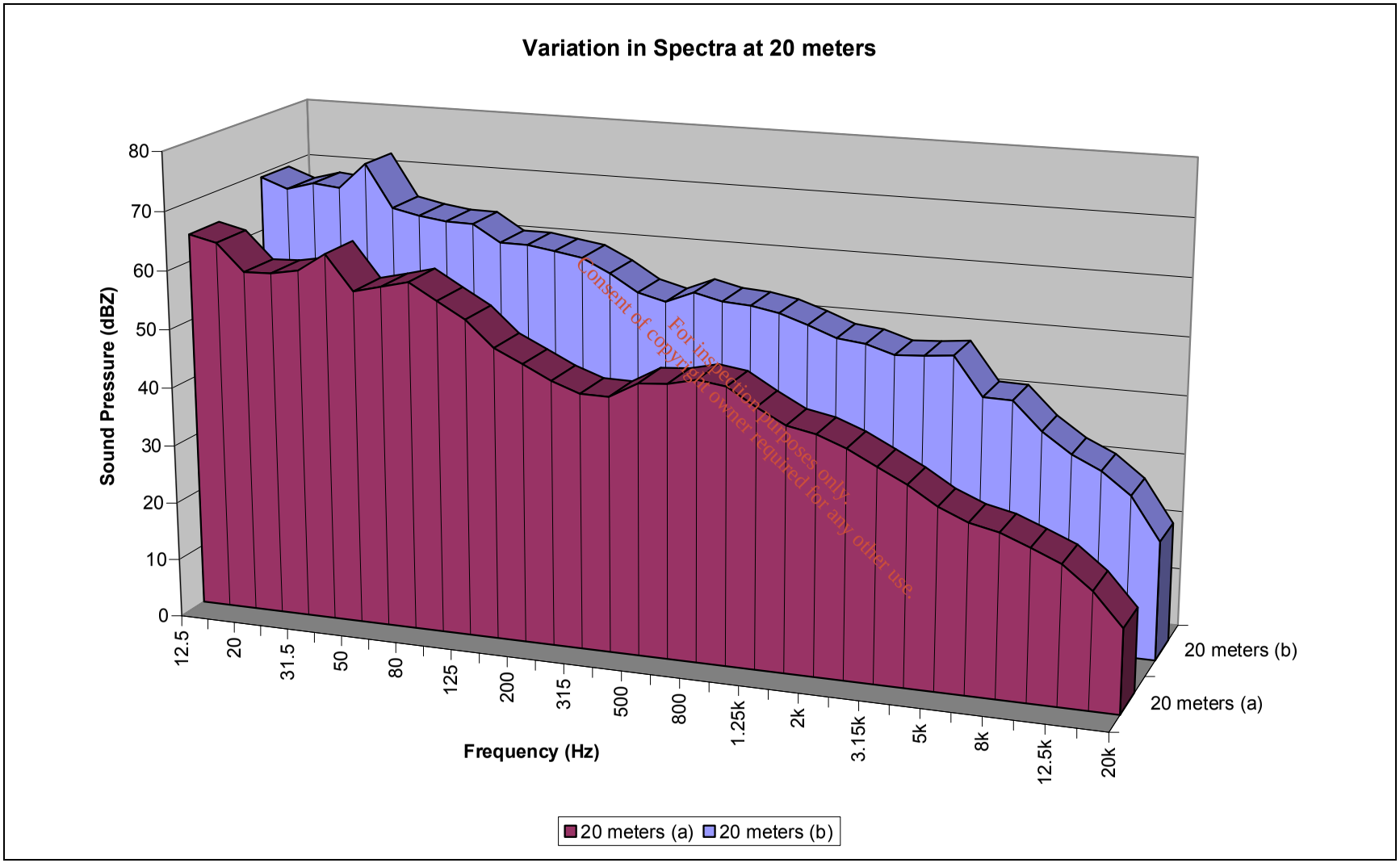

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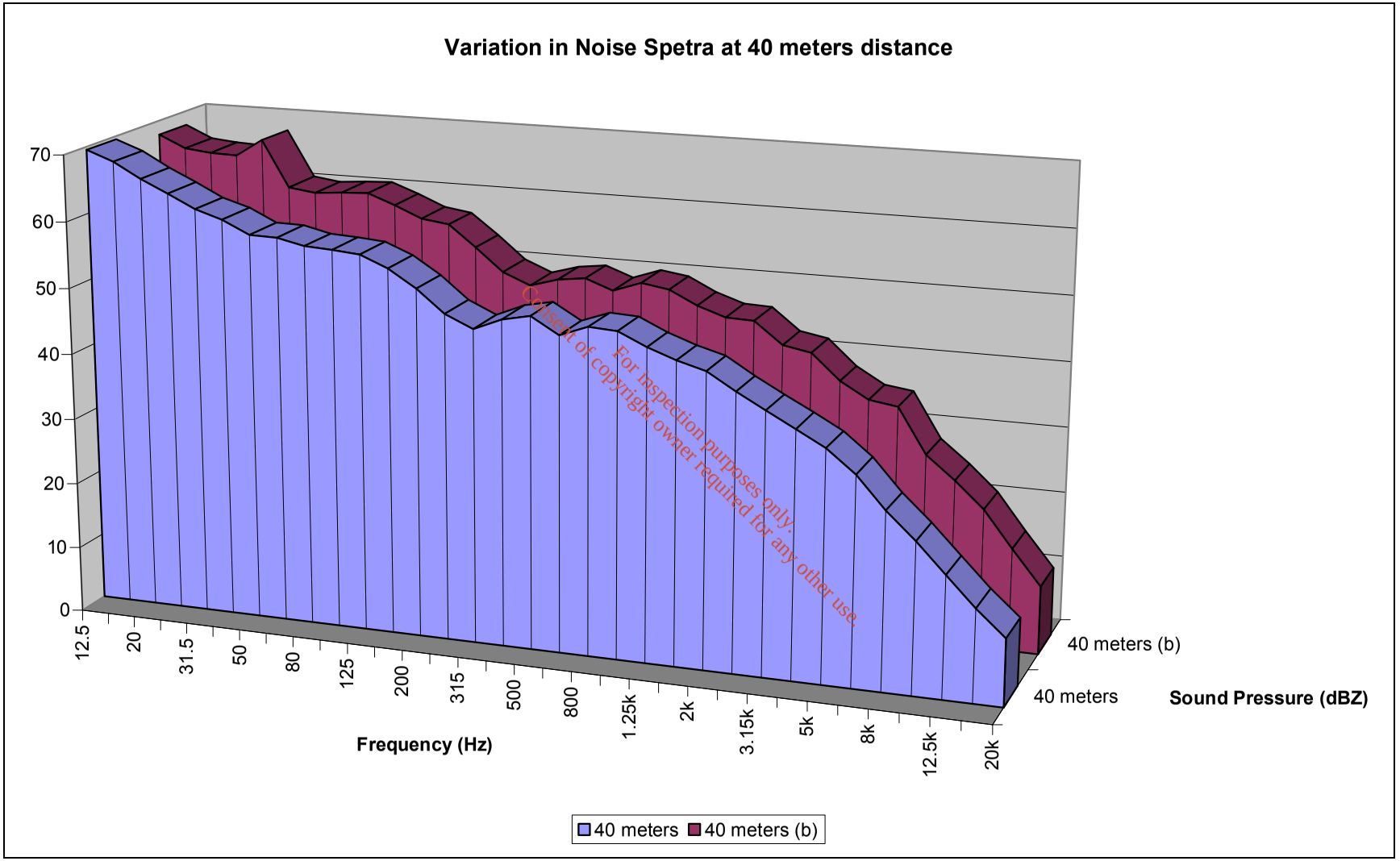

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