Client Name:

O'Connor Sutton Cronin & Assoc. Ltd

Report: Solid

Reference:

Location: Contact: JE Job No.: St Pauls

Cian O'Hora 15/14318

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

							 		-		
J E Sample No.	11					THE STATE					
Sample ID	ВН4					Jin Ali					
		35.54		F-12							
	3.00-4.00									e attached n	
COC No / misc			Part			13,11			abbrevia	ations and a	cronyms
Containers	Т				0.19	THE SE					
Sample Date	03/10/2015					The same					
Sample Type	Soil										
Batch Number	1										Method
Date of Receipt	06/10/2015								LOD/LOR	Units	No.
Antimony	2								<1	mg/kg	TM30/PM15
Arsenic #	10.0								<0.5	mg/kg	TM30/PM15
Barium *	121								<1	mg/kg	TM30/PM15
Cadmium #	2.0								<0.1	mg/kg	TM30/PM15
Chromium#	33.4								<0.5	mg/kg	TM30/PM15
Copper#	25								<1	mg/kg	TM30/PM15
Lead*	20							2	<5	mg/kg	TM30/PM15
Mercury *	<0.1								<0.1	mg/kg	TM30/PM15
Molybdenum #	4.2								<0.1	mg/kg	TM30/PM15
Nickel #	39.8								<0.7	mg/kg	TM30/PM15
Selenium *	9								<1	mg/kg	TM30/PM15
Zinc*	86								<5	mg/kg	TM30/PM15
PAH MS											
Naphthalene #	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03								<0.03	mg/kg	TM4/PM8
Acenaphthene *	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03								<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04								<0.04	mg/kg	TM4/PM8
Fluoranthene *	<0.03								<0.03	mg/kg	TM4/PM8
Pyrene *	<0.03								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06								<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene *	<0.07								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene *	<0.04								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene *	<0.04								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04								<0.04	mg/kg	TM4/PM8
Coronene	<0.04								<0.04	mg/kg	TM4/PM8
PAH 6 Total*	<0.22								<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05								<0.05	mg/kg	TM4/PM8
Panza (k) fluorenthana	40.00										

Benzo(k)fluoranthene

Mineral Oil >C8-C10

Mineral Oil >C10-C12

Mineral Oil >C12-C16

Mineral Oil >C16-C21

Mineral Oil >C21-C40

Mineral Oil >C8-C40

PAH Surrogate % Recovery

<0.02

99

<5

<10

<10

<10

<10

<45

TM4/PM8

TM4/PM8

TM5/PM16

TM5/PM16

TM5/PM16

TM5/PM16

TM5/PM16

mg/kg

mg/kg

mg/kg

mg/kg

mg/kg

mg/kg

mg/kg

< 0.02

<0

<5

<10

<10

<10

<10

<45

Client Name:

O'Connor Sutton Cronin & Assoc. Ltd

Report: Solid

Reference: Location:

St Pauls

Cian O'Hora

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Contact:

JE Job No.:	15/14318									
J E Sample No.	11									
Sample ID	BH4									
	2 22 4 22		-							
	3.00-4.00								e attached rations and a	notes for all
COC No / misc								applevia	nioris and a	cronyms
Containers	Т									
Sample Date	03/10/2015									
Sample Type	Soil									
Batch Number	1									
Date of Receipt	06/10/2015							LOD/LOR	Units	Method No.
TPH CWG	00/10/2010									
Aliphatics										
>C5-C6	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12*	<0.2							<0.2	mg/kg	TM5/PM16
>C12-C16*	<4							<4	mg/kg	TM5/PM16
>C16-C21*	<7							<7	mg/kg	TM5/PM16
>C21-C35*	<7							<7	mg/kg	TM5/PM16
>C35-C40*	<7							<7	mg/kg	TM5/PM16
Total aliphatics C5-40	<26							<26	mg/kg	ТМО/ТМООРМ12/РМ16
>C6-C10	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C25	<10							<10	mg/kg	TM5/PM16
>C25-C35	<10							<10	mg/kg	TM5/PM16
Aromatics	-0.4									T. 400 (D1440)
>C5-EC7 >EC7-EC8	<0.1							<0.1	mg/kg	TM36/PM12 TM36/PM12
>EC8-EC10	<0.1							<0.1	mg/kg mg/kg	TM36/PM12
>EC10-EC12	<0.2					-		<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4							<4	mg/kg	TM5/PM16
>EC16-EC21	<7							<7	mg/kg	TM5/PM16
>EC21-EC35	<7				-			<7	mg/kg	TM5/PM16
>EC35-EC40	<7							<7	mg/kg	TM5/PM16
Total aromatics C5-40	<26							<26	mg/kg	TMS/TMSS/PM12/PM10
Total aliphatics and aromatics(C5-40)	<52							<52	mg/kg	ТМ5/ТМ96/РМ12/РМ16
>EC6-EC10	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10							<10	mg/kg	TM5/PM16
>EC25-EC35	<10							<10	mg/kg	TM5/PM16
MTBE	<5							<5	ug/kg	TM31/PM12
Benzene	<5							<5	ug/kg	TM31/PM12
Toluene Ethylbenzene	<5 <5							<5 <5	ug/kg	TM31/PM12 TM31/PM12
m/p-Xylene	<5							<5	ug/kg ug/kg	TM31/PM12
o-Xylene	<5							<5	ug/kg	TM31/PM12
									-9,119	
PCB 28 *	<5							<5	ug/kg	TM17/PM8
PCB 52 *	<5							<5	ug/kg	TM17/PM8
PCB 101 *	<5							<5	ug/kg	TM17/PM8
PCB 118*	<5							<5	ug/kg	TM17/PM8
PCB 138 *	<5							<5	ug/kg	TM17/PM8
PCB 153*	<5							<5	ug/kg	TM17/PM8
PCB 180*	<5							<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35							<35	ug/kg	TM17/PM8

Client Name:

O'Connor Sutton Cronin & Assoc. Ltd

Report: Solid

Reference:

Location:

St Pauls

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Contact: Cian O'Hora
JE Job No.: 15/14318

Hexavalent Chromium \$\frac{\pi}{2.1 \text{ Ext}}\$\$\text{ Chromium III}\$\$ Total Organic Carbon \$\frac{\pi}{2.1 \text{ Ext}}\$\$ The state of the stat	T 110/2015 Soil 1 110/2015						attached no	
Depth 3.00-4.0 COC No / misc Containers T Sample Date 03/10/20 Sample Type Soil Batch Number 1 Date of Receipt 06/10/20 Natural Moisture Content 11.9 % Dry Matter 105°C 89.0 Hexavalent Chromium < 0.3 Sulphate as SO4 (2:1 Ext) -	T 10/2015 Soil 1 10/2015 11.9							
COC No / misc Containers T Sample Date 03/10/20 Sample Type Soil Batch Number 1 Date of Receipt 06/10/20 Natural Moisture Content 11.9 % Dry Matter 105°C 89.0 Hexavalent Chromium # <0.3 Sulphate as SO4 (2:1 Ext) # - Chromium III 33.4 Total Organic Carbon # 0.65 pH # Mass of raw test portion 0.100	T (10/2015 Soil 1 (10/2015 11.9							
Containers T	10/2015 Soil 1 10/2015					abbrevia	tions and ac	FORVESO
Sample Date 03/10/20 Sample Type Soil Batch Number	10/2015 Soil 1 10/2015							ronyms
Sample Type Soil	Soil 1 (10/2015 11.9							
Date of Receipt 06/10/20	1 (10/2015 11.9							
Date of Receipt 06/10/20	11.9							
Natural Moisture Content	11.9					LOD/LOR	Units	Method
% Dry Matter 105°C 89.0 Hexavalent Chromium * <0.3 Sulphate as SO4 (2:1 Ext) * - Chromium III 33.4 Total Organic Carbon * 0.65 pH * - Mass of raw test portion 0.100								No.
Hexavalent Chromium # <0.3 Sulphate as SO4 (2:1 Ext) # - Chromium III 33.4 Total Organic Carbon # 0.65 pH # - Mass of raw test portion 0.100	89.0					<0.1	%	PM4/PM0
Sulphate as SO4 (2:1 Ext) # - Chromium III 33.4 Total Organic Carbon # 0.65 pH # - Mass of raw test portion 0.100		-				<0.1	%	NONE/PM4
Chromium III 33.4 Total Organic Carbon * 0.65 pH * - Mass of raw test portion 0.100	<0.3					<0.3	mg/kg	TM38/PM20
Total Organic Carbon 0.65 pH Mass of raw test portion 0.100						<0.0015	g/l	TM38/PM20
pH * Mass of raw test portion 0.100	33.4					<0.5	mg/kg	NONE/NONE
Mass of raw test portion 0.100	0.65					<0.02	%	TM21/PM24
And the second s						<0.01	pH units	TM73/PM11
A CONTRACTOR OF THE PARTY OF TH	0.1008						kg	NONE/PM17
	0.09						kg	NONE/PM17
			_					
		1 1						
								1
								-

Client Name:

O'Connor Sutton Cronin & Assoc. Ltd

Report: CEN 10:1 1 Batch

Reference:

Location: Contact:

St Pauls

Cian O'Hora

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Job No.:	15/14318										
J E Sample No.	1	2	3	4	5	6	7	8	9	10	
Sample ID	BH1	BH1	ВН2	BH2	ВН2	ВН2	внз	BH4	BH4	BH4	
Depth	0.00-1.00	1.00-2.00	0.50	1.00	2.00	3.00	0.50	0.00-1.00	1.00-2.00	2.00-3.00	Plea
COC No / misc											at
Containers	Т	т	Т	Т	Т	Т	Т	Т	Т	Т	
Sample Date	28/09/2015	28/09/2015	30/09/2015	30/09/2015	30/09/2015	30/09/2015	01/10/2015	03/10/2015	03/10/2015	03/10/2015	
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Batch Number	1	1	1	1	1	1	1	- 1	1	1	1001
Date of Receipt	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	LOD/
Dissolved Antimony#	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.0
Dissolved Antimony (A10) #	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.0
	(6) (6) (6) (6)	10000000	A CONTRACTOR OF THE PARTY OF TH	100000	2756	13 5 3 3 3 3 3 3 3	C. ASSESSED		71 12	- N. C. C.	

Sample ID	BH1	BH1	BH2	BH2	BH2	BH2	BH3	BH4	BH4	BH4			
Depth	0.00-1.00	1.00-2.00	0.50	1.00	2.00	3.00	0.50	0.00-1.00	1.00-2.00	2.00-3.00		e attached r	
COC No / misc											abbrevi	ations and a	cronyms
Containers	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т			
Sample Date	28/09/2015	28/09/2015	30/09/2015	30/09/2015	30/09/2015	30/09/2015	01/10/2015	03/10/2015	03/10/2015	03/10/2015			
Sample Type	Soil												
Batch Number	1	1	1	1	1	1	1	1	1	1			Method
Date of Receipt	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	06/10/2015	LOD/LOR	Units	No.
Dissolved Antimony#	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10)#	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic*	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium *	0.015	0.012	<0.003	<0.003	0.011	0.051	<0.003	<0.003	0.005	0.004	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.15	0.12	<0.03	<0.03	0.11	0.51	<0.03	<0.03	0.05	0.04	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium *	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.005	<0.003	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.0015	<0.0015	<0.0015	<0.015	<0.0015	<0.015		TM30/PM17
Dissolved Copper#	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.007	<0.07	<0.07	<0.07	<0.07	<0.007	<0.007	<0.007	300000	<0.007		mg/l	TM30/PM17
Dissolved Copper (A10)	<0.005	<0.005	<0.005	<0.005					<0.07		<0.07	mg/kg	
					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) *	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum	0.035	0.037	0.013	0.021	0.029	0.020	0.006	0.011	0.029	0.028	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) *	0.35	0.37	0.13	0.21	0.29	0.20	0.06	0.11	0.29	0.28	<0.02	mg/kg	TM30/PM17
Dissolved Nickel*	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) *	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium *	<0.003	0.027	<0.003	<0.003	<0.003	0.028	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10)*	<0.03	0.27	<0.03	<0.03	<0.03	0.28	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc*	<0.003	<0.003	0.004	0.004	<0.003	0.004	0.005	0.004	0.005	0.004	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	0.04	0.04	<0.03	0.04	0.05	0.04	0.05	0.04	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF*	<0.00001	<0.00001	0.00028	0.00006	<0.00001	0.00001	0.00029	0.00007	0.00003	0.00002	<0.00001	mg/l	TM61/PM38
Mercury Dissolved by CVAF*	<0.0001	<0.0001	0.0028	0.0006	<0.0001	<0.0001	0.0029	0.0007	0.0003	0.0002	<0.0001	mg/kg	TM61/PM38
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	0.3	<0.3	<0.3	0.3	0.5	0.5	<0.3	<0.3	<0.3	ma/l	TM27/PM0
Fluoride	<3	<3	3	<3	<3	<3	5	5	<3	<3	<3	mg/l	TM27/PM0
Chloride			<0.3	<0.3	<0.3	<0.3	<0.3	0.4				mg/kg	TM27/PM0
Chloride	1.1	<0.3	<3	<3	<3	<0.3	<3	4	<0.3	<0.3	<0.3	mg/l	
Sulphate	11	16.54	0.28	0.52	4.67	29.70	0.32	0.82	<3		<0.05	mg/kg	TM27/PM0
	3.59				1.000				0.50	0.61		mg/l	TM27/PM0
Sulphate	35.9	165.5	2.8	5.2	46.7	296.8	3.2	8.2	5.0	6.1	<0.5	mg/kg	TM27/PM0
Mass of raw test portion	0.1051	0.1036	0.1056	0.1003	0.1011	0.1003	0.105	0.1133	0.1007	0.1022		kg	NONE/PM17
Leachant Volume	0.885	0.887	0.885	0.89	0.889	0.889	0.885	0.877	0.889	0.887		T.	NONE/PM17
Eluate Volume	0.65	0.75	0.83	0.83	0.85	0.6	8.0	0.75	0.85	0.83		1	NONE/PM17
Dissolved Organic Carbon	3	2	7	4	3	3	7	6	4	4	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30	20	70	40	30	30	70	60	40	40	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	75	119	71	97	80	149	56	180	107	98	<10	mg/l	TM20/PM0
. Diagontos Guilda			710	970				,50				gri	11120/1100

Client Name:

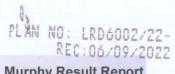
O'Connor Sutton Cronin & Assoc. Ltd

Report: CEN 10:1 1 Batch

Reference:

Location:	St Pauls	Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Cian O'Hora	
JE Job No.:	15/14318	

J E Sample No.	11		
Sample ID	BH4		
Depth	0.00-4.00	Please see attached	notes for all
COC No / misc		abbreviations and	
Containers	T		
Sample Date			
Sample Type	Soil		_
Batch Number	1	LOD/LOR Units	Method
Date of Receipt	5/10/2015		No.
Dissolved Antimony*	<0.002	<0.002 mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02 mg/kg	TM30/PM17
Dissolved Arsenic *	<0.0025	<0.0025 mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025 mg/kg	TM30/PM17
Dissolved Barium *	0.017	<0.003 mg/l	TM30/PM17
Dissolved Barium (A10) *	0.17	<0.03 mg/kg	TM30/PM17
Dissolved Cadmium *	<0.0005	<0.0005 mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005 mg/kg	TM30/PM17
Dissolved Chromium *	<0.0015	<0.0015 mg/l	TM30/PM17
Dissolved Chromium (A10)#	<0.015	<0.015 mg/kg	TM30/PM17
Dissolved Copper*	<0.007	<0.007 mg/l	TM30/PM17
Dissolved Copper (A10)*	<0.07	<0.07 mg/kg	TM30/PM17
Dissolved Lead *	<0.005	<0.005 mg/l	TM30/PM17
Dissolved Lead (A10) *	<0.05	<0.05 mg/kg	TM30/PM17
Dissolved Molybdenum *	0.043	<0.002 mg/l	TM30/PM17
Dissolved Molybdenum (A10) *	0.43	<0.02 mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002 mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02 mg/kg	TM30/PM17
Dissolved Selenium *	<0.003	<0.003 mg/l	TM30/PM1
Dissolved Selenium (A10) *	<0.03	<0.03 mg/kg	TM30/PM17
Dissolved Zinc*	0.003	<0.003 mg/l	TM30/PM17
Dissolved Zinc (A10)	0.03	<0.03 mg/kg	TM30/PM1
Mercury Dissolved by CVAF	<0.00001	<0.00001 mg/l	TM61/PM38
Mercury Dissolved by CVAF #	<0.0001	<0.0001 mg/kg	TM61/PM3
Phenol	<0.01	<0.01 mg/l	TM26/PM0
Phenol	<0.1	<0.1 mg/kg	TM26/PM0
Fluoride	0.3	<0.3 mg/l	TM27/PM0
Fluoride	3	<3 mg/kg	TM27/PM0
Chloride	<0.3	<0.3 mg/l	TM27/PM0
Chloride	<3	<3 mg/kg	TM27/PM0
Sulphate	3.38	<0.05 mg/l	TM27/PM0
Sulphate	33.8	<0.5 mg/kg	TM27/PM0
Mass of raw test portion	0.1008	kg	NONE/PM1
Leachant Volume	0.889	1	NONE/PM1
Eluate Volume	0.63	1	NONE/PM1
Dissolved Organic Carbon	3	<2 mg/l	TM60/PM
Dissolved Organic Carbon	30	<20 mg/kg	TM60/PM
Total Dissolved Solids #	94	<10 mg/l	TM20/PM
Total Dissolved Solids *	940	<100 mg/kg	TM20/PM0



Mass of sample taken (kg)	0.1051	Dry Matter Content Ratio (%) =		85.9	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.885	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.65	
JEFL Job No		15/14318	Land	fill Waste Ac	
Sample No		1		Criteria Lin	nits
Client Sample No		BH1		Try paring	
Depth/Other		0.00-1.00			
Sample Date		28/09/2015	Inert	Stable Non-reactive	Hazardous
Batch No		1			
Solid Waste Analysis					
Total Organic Carbon (%)	0.50		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	- 7	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<45		500	-	-
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
			- (-)		
	+				
Eluate Analysis	10:1 concn leached		le	values for co eaching test I 12457-2 at	using
Eluate Analysis	concn leached		le	eaching test I 12457-2 at	using
	concn leached A10 mg/kg		BS EN	eaching test I 12457-2 at mg/kg	using L/S 10 l/kg
Arsenic	A10 mg/kg <0.025		BS EN	mg/kg	using L/S 10 l/kg
Arsenic Barium	A10 mg/kg <0.025 0.15		0.5 20	mg/kg 2 100	using L/S 10 l/kg 25 300
Arsenic Barium Cadmium	concn leached A10 mg/kg <0.025 0.15 <0.005		0.5 20 0.04	mg/kg 2 100 1	25 300 5
Arsenic Barium Cadmium Chromium	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015		0.5 20 0.04 0.5	mg/kg 2 100 1 100 100 100 100 100 100 100 100	25 300 5 70
Arsenic Barium Cadmium Chromium Copper	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.07		0.5 20 0.04 0.5 2	mg/kg 2 100 1 10 50	25 300 5 70
Arsenic Barium Cadmium Chromium Copper Mercury	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.07 <0.0001		0.5 20 0.04 0.5 2	mg/kg 2 100 1 10 50 0.2	25 300 5 70 100 2
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35		0.5 20 0.04 0.5 2 0.01	mg/kg 2 100 1 10 50 0.2 10	25 300 5 70 100 2 30
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.07 <0.0001 0.35 <0.02		0.5 20 0.04 0.5 2 0.01 0.5	mg/kg 2 100 1 10 50 0.2 10	25 300 5 70 100 2 30 40
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.05		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5	mg/kg 2 100 1 10 50 0.2 10 10	25 300 5 70 100 2 30 40
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.05 <0.02		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7	25 300 5 70 100 2 30 40 50
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.05 <0.02 <0.03		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7 0.5	25 300 5 70 100 2 30 40 50 5
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.05 <0.02 <0.03 <0.03		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1	mg/kg 2 100 1 10 50 0.2 10 10 0.7 0.5 50	25 300 5 70 100 2 30 40 50 5 7 200
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.02 <0.03 <0.03 11		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4	mg/kg 2 100 1 10 50 0.2 10 10 0.7 0.5 50 15000	25 300 5 70 100 2 30 40 50 5 7 200 25000
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.02 <0.03 <11 <3		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800	mg/kg 2 100 1 10 50 0.2 10 10 10 10 50 0.5 50 15000	25 300 5 70 100 2 30 40 50 5 7 200 25000 500
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.02 <0.03 <11 <3 35.9		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	mg/kg 2 100 1 10 50 0.2 10 10 0.7 0.5 50 15000 150 20000	25 300 5 70 100 2 30 40 50 5 7 200 25000 50000
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	concn leached A10 mg/kg <0.025 0.15 <0.005 <0.015 <0.007 <0.0001 0.35 <0.02 <0.02 <0.03 <11 <3		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800	mg/kg 2 100 1 10 50 0.2 10 10 10 10 50 0.5 50 15000	25 300 5 70 100 2 30 40 50 5 7 200 25000 500

Mass of sample taken (kg)	0.1036	Dry Matter Content Ratio (%) =		86.9	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.887	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.75	
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance
Sample No		2		Criteria Lin	nits
Client Sample No		BH1			
Depth/Other		1.00-2.00			
Sample Date		28/09/2015	Inert	Stable Non-reactive	Hazardou
Batch No		1			
Solid Waste Analysis					
Total Organic Carbon (%)	1.03		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	87		500	-	-
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
Eluato Analysia	10:1 concn		le	values for co	using
Eluate Analysis	A10		BS EN	1 12457-2 at	L/S 10 I/kg
	mg/kg			mg/kg	
Arsenic	<0.025		0.5	2	25
Barium	0.12		20	100	300
Cadmium	<0.005		0.04	1	5
Chromium	<0.015		0.5	10	70
Copper	< 0.07		2	50	100
The state of the s					
Mercury	<0.0001		0.01	0.2	2
				0.2	30
Mercury Molybdenum	<0.0001		0.01		
Mercury	<0.0001 0.37		0.01 0.5	10	30
Mercury Molybdenum Nickel Lead	<0.0001 0.37 <0.02		0.01 0.5 0.4	10	30 40
Mercury Molybdenum Nickel Lead Antimony	<0.0001 0.37 <0.02 <0.05		0.01 0.5 0.4 0.5	10 10 10	30 40 50
Mercury Molybdenum Nickel Lead Antimony Selenium	<0.0001 0.37 <0.02 <0.05 0.03		0.01 0.5 0.4 0.5 0.06	10 10 10 0.7	30 40 50 5
Mercury Molybdenum Nickel Lead Antimony Selenium Zinc	<0.0001 0.37 <0.02 <0.05 0.03 0.27		0.01 0.5 0.4 0.5 0.06	10 10 10 0.7 0.5	30 40 50 5 7
Mercury Molybdenum Nickel	<0.0001 0.37 <0.02 <0.05 0.03 0.27 <0.03		0.01 0.5 0.4 0.5 0.06 0.1	10 10 10 0.7 0.5 50	30 40 50 5 7 200
Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride	<0.0001 0.37 <0.02 <0.05 0.03 0.27 <0.03 <3		0.01 0.5 0.4 0.5 0.06 0.1 4	10 10 10 0.7 0.5 50 15000	30 40 50 5 7 200 25000
Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	<0.0001 0.37 <0.02 <0.05 0.03 0.27 <0.03 <3 <3		0.01 0.5 0.4 0.5 0.06 0.1 4 800	10 10 10 0.7 0.5 50 15000	30 40 50 5 7 200 25000 500
Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	<0.0001 0.37 <0.02 <0.05 0.03 0.27 <0.03 <3 <3		0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	10 10 10 0.7 0.5 50 15000 150 20000	30 40 50 5 7 200 25000 500 5000

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Jones Environmental Laboratory

Mass of sample taken (kg)	0.1056	Dry Matter Content Ratio (%) =		85.4	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.885	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.83	
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance
Sample No		3		Criteria Lin	nits
Client Sample No		BH2			
Depth/Other		0.50			
Sample Date		30/09/2015	Inert	Stable Non-reactive	Hazardou
Batch No		1			7
Solid Waste Analysis					
Total Organic Carbon (%)	1.20		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<45		500	-	-
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
Eluate Analysis	10:1 concn leached		le	values for co eaching test I 12457-2 at	using
	mg/kg			mg/kg	
Arsenic	<0.025		0.5	2	25
Barium	<0.03		20	100	300
Cadmium	<0.005		0.04	1	5
Chromium	<0.015		0.5	10	70
Copper	<0.07		2	50	100
Mercury	0.0028		0.01	0.2	2
Molybdenum	0.13		0.5	10	30
	<0.02		0.4	10	40
Nickel	0.02				50
Nickel Lead	<0.05		0.5	10	30
Lead			0.5	0.7	5
Lead Antimony	<0.05			_	
Lead Antimony Selenium	<0.05 <0.02		0.06	0.7	5
Lead Antimony Selenium Zinc	<0.05 <0.02 <0.03		0.06	0.7	5 7
Lead Antimony Selenium Zinc Chloride	<0.05 <0.02 <0.03 0.04		0.06 0.1 4	0.7 0.5 50	5 7 200
Lead Antimony Selenium Zinc Chloride Fluoride	<0.05 <0.02 <0.03 0.04 <3 3		0.06 0.1 4 800	0.7 0.5 50 15000	5 7 200 25000
Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	<0.05 <0.02 <0.03 0.04 <3 3 2.8		0.06 0.1 4 800 10 1000	0.7 0.5 50 15000 150 20000	5 7 200 25000 500 50000
	<0.05 <0.02 <0.03 0.04 <3 3		0.06 0.1 4 800 10	0.7 0.5 50 15000	5 7 200 25000 500

Mass of sample taken (kg)	0.1003	Dry Matter Content Ratio (%) =		89.6	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.89	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.83	
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance
Sample No		4		Criteria Lin	nits
Client Sample No		BH2			
Depth/Other		1.00			
Sample Date		30/09/2015	Inert	Stable Non-reactive	Hazardou
Batch No		1			
Solid Waste Analysis					
Total Organic Carbon (%)	0.44		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<45		500	-	
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
Eluate Analysis	10:1 concn leached		le	values for co eaching test N 12457-2 at	using
	mg/kg			mg/kg	
Arsenic	<0.025		0.5	2	25
Barium	<0.03		20	100	300
Cadmium	<0.005		0.04	1	5
Chromium	<0.015		0.5	10	70
Copper	<0.07		2	50	100
o o p p o i				0.2	2
Mercury	0.0006		0.01	0.2	
Mercury Molybdenum	0.0006		0.01	10	30
Mercury Molybdenum Nickel	0.0006 0.21 <0.02		15950	1000000	30 40
Molybdenum Nickel	0.21 <0.02		0.5	10	
Molybdenum Nickel Lead	0.21 <0.02 <0.05		0.5	10 10	40
Molybdenum Nickel Lead Antimony	0.21 <0.02		0.5 0.4 0.5	10 10 10	40 50
Molybdenum Nickel Lead Antimony Selenium	0.21 <0.02 <0.05 <0.02		0.5 0.4 0.5 0.06	10 10 10 0.7	40 50 5
Molybdenum Nickel Lead Antimony Selenium Zinc	0.21 <0.02 <0.05 <0.02 <0.03		0.5 0.4 0.5 0.06	10 10 10 0.7 0.5 50	40 50 5 7 200
Molybdenum Nickel Lead Antimony Selenium Zinc Chloride	0.21 <0.02 <0.05 <0.02 <0.03 0.04		0.5 0.4 0.5 0.06 0.1 4 800	10 10 10 0.7 0.5	40 50 5 7
Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	0.21 <0.02 <0.05 <0.02 <0.03 0.04 <3 <3		0.5 0.4 0.5 0.06 0.1 4 800	10 10 10 0.7 0.5 50 15000	40 50 5 7 200 25000 500
Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	0.21 <0.02 <0.05 <0.02 <0.03 0.04 <3 <3 5.2		0.5 0.4 0.5 0.06 0.1 4 800	10 10 10 0.7 0.5 50 15000	40 50 5 7 200 25000 500 5000
Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	0.21 <0.02 <0.05 <0.02 <0.03 0.04 <3 <3		0.5 0.4 0.5 0.06 0.1 4 800 10	10 10 10 0.7 0.5 50 15000 150 20000	40 50 5 7 200 25000 500

Mass of sample taken (kg)	0.1011	Dry Matter Content Ratio (%) =		88.8	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.889	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.85	
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance
Sample No		5		Criteria Lin	nits
Client Sample No		BH2			
Depth/Other		2.00			
Sample Date		30/09/2015	Inert	Stable Non-reactive	Hazardous
Batch No		1			
Solid Waste Analysis					
Total Organic Carbon (%)	0.53		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<45		500	-	-
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
Eluate Analysis	10:1 concn leached		le	values for co eaching test I 12457-2 at	using
	mg/kg			mg/kg	
Arsenic	<0.025		0.5	2	25
Barium	0.11		20	100	300
Cadmium	<0.005		0.04	1	5
Chromium	<0.015		0.5	10	70
Copper	<0.07		2	50	100
Mercury	<0.0001		0.01	0.2	2
Molybdenum	0.29		0.5	10	30
Nickel	<0.02		0.4	10	40
Lead	<0.05		0.5	10	50
Antimony	<0.02		0.06	0.7	5
Selenium	<0.03		0.1	0.5	7
Zinc	<0.03		4	50	200
Chloride	<3		800	15000	25000
Fluoride	<3		10	150	500
Sulphate as SO4	46.7		1000	20000	50000
Total Dissolved Solids	800		4000	60000	100000
Phenol	<0.1		1	-	-
1 1101101					

Mass of sample taken (kg)	0.1003	Dry Matter Content Ratio (%) =		89.6			
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.889			
Particle Size <4mm =	>95%	Eluate Volume (I)		0.6			
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance		
Sample No		6		Criteria Limits			
Client Sample No		BH2					
Depth/Other		3.00					
Sample Date		30/09/2015	Inert	Stable Non-reactive	Hazardou		
Batch No		1		Tron roadure			
Solid Waste Analysis							
Total Organic Carbon (%)	0.53		3	5	6		
Sum of BTEX (mg/kg)	<0.025		6	-	-		
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-		
Mineral Oil (mg/kg)	132		500	-	-		
PAH Sum of 6 (mg/kg)	<0.22		-	-	-		
PAH Sum of 17 (mg/kg)	<0.64		100	-	-		
Eluate Analysis	10:1 concn leached		Limit values for complian leaching test using BS EN 12457-2 at L/S 10 lb		using		
	A10						
	mg/kg			mg/kg			
Arsenic	<0.025		0.5	2	25		
Barium	0.51		20	100	300		
Cadmium	<0.005		0.04	1	5		
Chromium	<0.015		0.5	10	70		
Copper	<0.07		2	50	100		
Mercury	<0.0001		0.01	0.2	2		
Molybdenum	0.20		0.5	10	30		
Nickel	<0.02		0.4	10	40		
Lead	<0.05		0.5	10	50		
Antimony	<0.02		0.06	0.7	5		
Selenium	0.28		0.1	0.5	7		
Zinc	0.04		4	50	200		
Chloride	<3		800	15000	25000		
Fluoride	<3		10	150	500		
Sulphate as SO4	296.8		1000	20000	50000		
Total Dissolved Solids	1489		4000	60000	100000		
Phenol	<0.1		1	-	-		
1 1101101							

Mass of sample taken (kg)	0.105	Dry Matter Content Ratio (%) =		85.5			
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.885			
Particle Size <4mm =	>95%	Eluate Volume (I)		0.8			
JEFL Job No		15/14318	Landfill Waste Acceptance				
Sample No		. 7		Criteria Lin	nits		
Client Sample No		BH3					
Depth/Other		0.50					
Sample Date		01/10/2015	Inert	Stable Non-reactive	Hazardou		
Batch No		1					
Solid Waste Analysis							
Total Organic Carbon (%)	2.27		3	5	6		
Sum of BTEX (mg/kg)	<0.025		6	-	-		
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-		
Mineral Oil (mg/kg)	<45		500	-	-		
PAH Sum of 6 (mg/kg)	<0.22		-	-	-		
PAH Sum of 17 (mg/kg)	<0.64		100	-	-		
Eluate Analysis	10:1 concn leached		Limit values for complia leaching test using BS EN 12457-2 at L/S 10		using		
	A10						
	mg/kg			mg/kg			
Arsenic			0.5	mg/kg	25		
Arsenic Barium	mg/kg		0.5	_	25 300		
- Annual de Contraction	mg/kg <0.025			2			
Barium	mg/kg <0.025 <0.03		20	100	300		
Barium Cadmium	mg/kg <0.025 <0.03 <0.005		20 0.04	100	300 5		
Barium Cadmium Chromium	mg/kg <0.025 <0.03 <0.005 <0.015		20 0.04 0.5	2 100 1 10	300 5 70		
Barium Cadmium Chromium Copper	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07		20 0.04 0.5 2	2 100 1 10 50	300 5 70 100		
Barium Cadmium Chromium Copper Mercury Molybdenum	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029		20 0.04 0.5 2 0.01	2 100 1 10 50 0.2	300 5 70 100 2		
Barium Cadmium Chromium Copper Mercury	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06		20 0.04 0.5 2 0.01 0.5	2 100 1 10 50 0.2 10	300 5 70 100 2 30		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02		20 0.04 0.5 2 0.01 0.5 0.4	2 100 1 10 50 0.2 10	300 5 70 100 2 30 40		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05		20 0.04 0.5 2 0.01 0.5 0.4	2 100 1 10 50 0.2 10 10	300 5 70 100 2 30 40 50		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02		20 0.04 0.5 2 0.01 0.5 0.4 0.5	2 100 1 10 50 0.2 10 10 10	300 5 70 100 2 30 40 50 5		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02 <0.03		20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06	2 100 1 10 50 0.2 10 10 10 0.7 0.5	300 5 70 100 2 30 40 50 5 7		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02 <0.03 0.05		20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1	2 100 1 10 50 0.2 10 10 10 0.7 0.5 50	300 5 70 100 2 30 40 50 5 7 200		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02 <0.03 0.05 <3 5		20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4	2 100 1 10 50 0.2 10 10 10 0.7 0.5 50 15000	300 5 70 100 2 30 40 50 5 7 200 25000		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02 <0.03 0.05 <3 5 3.2		20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800	2 100 1 10 50 0.2 10 10 10 0.7 0.5 50 15000	300 5 70 100 2 30 40 50 5 7 200 25000 500		
Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	mg/kg <0.025 <0.03 <0.005 <0.015 <0.07 0.0029 0.06 <0.02 <0.05 0.02 <0.03 0.05 <3 5		20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	2 100 1 10 50 0.2 10 10 10 0.7 0.5 50 15000 150 20000	300 5 70 100 2 30 40 50 5 7 200 25000 5000		

Mass of sample taken (kg)	0.1133	Dry Matter Content Ratio (%) =		79.7				
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.877				
Particle Size <4mm =	>95%	Eluate Volume (I)		0.75				
JEFL Job No					ceptance			
Sample No		8		Criteria Limits				
Client Sample No		BH4						
Depth/Other		0.00-1.00						
Sample Date		03/10/2015	Inert	Stable Non-reactive	Hazardou			
Batch No		1						
Solid Waste Analysis								
Total Organic Carbon (%)	2.02		3	5	6			
Sum of BTEX (mg/kg)	<0.025		6	-	-			
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-			
Mineral Oil (mg/kg)	<45		500	-	-			
PAH Sum of 6 (mg/kg)	<0.22		-	-	-			
PAH Sum of 17 (mg/kg)	<0.64		100	-	-			
	10:1 concn			values for co				
Eluate Analysis	leached		leaching test using BS EN 12457-2 at L/S 10 l/k					
	A10							
	mg/kg			mg/kg				
Arsenic	<0.025		0.5	2	25			
Barium	<0.03		20	100	300			
Cadmium	<0.005		0.04	1	5			
Chromium	<0.015		0.5	10	70			
Copper	<0.07		2	50	100			
Mercury	0.0007		0.01	0.2	2			
Molybdenum	0.11		0.5	10	30			
Nickel	<0.02		0.4	10	40			
Lead	<0.05		0.5	10	50			
Antimony	<0.02		0.06	0.7	5			
Selenium	<0.03		0.1	0.5	7			
Zinc	0.04		4	50	200			
Chloride	4		800	15000	25000			
Fluoride	5		10	150	500			
Sulphate as SO4	8.2		1000	20000	50000			
Total Dissolved Solids	1800		4000	60000	100000			
Phenol	<0.1		1	-	-			

Mass of sample taken (kg)	0.1007	Dry Matter Content Ratio (%) =		88.9			
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.889			
Particle Size <4mm =	>95%	Eluate Volume (I)		0.85			
JEFL Job No		15/14318	Landfill Waste Acceptance				
Sample No		9		Criteria Lin	nits		
Client Sample No		BH4					
Depth/Other		1.00-2.00					
Sample Date		03/10/2015	Inert	Stable Non-reactive	Hazardou		
Batch No		1					
Solid Waste Analysis							
Total Organic Carbon (%)	0.34		3	5	6		
Sum of BTEX (mg/kg)	<0.025		6	-	-		
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-		
Mineral Oil (mg/kg)	<45		500	-	-		
PAH Sum of 6 (mg/kg)	<0.22		-	-	-		
PAH Sum of 17 (mg/kg)	<0.64		100		-		
Eluate Analysis	10:1 concn leached		Limit values for complia leaching test using BS EN 12457-2 at L/S 10				
	A10		BS EN	12457-2 at	L/S 10 I/kg		
	A10 mg/kg		BS EN	M 12457-2 at mg/kg	L/S 10 l/kg		
Arsenic			0.5		L/S 10 l/kg 25		
	mg/kg			mg/kg			
Arsenic	mg/kg <0.025		0.5	mg/kg	25		
Arsenic Barium	mg/kg <0.025 0.05		0.5	mg/kg 2 100	25 300		
Arsenic Barium Cadmium Chromium	mg/kg <0.025 0.05 <0.005		0.5 20 0.04	mg/kg 2 100 1	25 300 5		
Arsenic Barium Cadmium	mg/kg <0.025 0.05 <0.005 <0.015		0.5 20 0.04 0.5	mg/kg 2 100 1 10	25 300 5 70		
Arsenic Barium Cadmium Chromium Copper Mercury	mg/kg <0.025 0.05 <0.005 <0.015 <0.07		0.5 20 0.04 0.5	mg/kg 2 100 1 10 50	25 300 5 70 100		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum	mg/kg <0.025 0.05 <0.005 <0.005 <0.015 <0.07 0.0003		0.5 20 0.04 0.5 2 0.01	mg/kg 2 100 1 10 50 0.2	25 300 5 70 100 2		
Arsenic Barium Cadmium Chromium Copper	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29		0.5 20 0.04 0.5 2 0.01 0.5	mg/kg 2 100 1 10 50 0.2 10	25 300 5 70 100 2 30		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02		0.5 20 0.04 0.5 2 0.01 0.5 0.4	mg/kg 2 100 1 10 50 0.2 10 10	25 300 5 70 100 2 30 40		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02 <0.05		0.5 20 0.04 0.5 2 0.01 0.5 0.4	mg/kg 2 100 1 10 50 0.2 10 10 10	25 300 5 70 100 2 30 40 50		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02 <0.05		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7	25 300 5 70 100 2 30 40 50		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02 <0.05 0.02 <0.03		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7 0.5	25 300 5 70 100 2 30 40 50 5		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride	mg/kg <0.025 0.05 <0.005 <0.015 <0.007 0.0003 0.29 <0.02 <0.05 0.02 <0.03 0.05		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7 0.5 50	25 300 5 70 100 2 30 40 50 5 7 200		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02 <0.05 0.02 <0.03 0.05 <3 <3		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7 0.5 50 15000	25 300 5 70 100 2 30 40 50 5 7 200 25000		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	mg/kg <0.025 0.05 <0.005 <0.015 <0.007 0.0003 0.29 <0.02 <0.05 0.02 <0.03 0.05 <3 5.0		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800	mg/kg 2 100 1 10 50 0.2 10 10 10 0.7 0.5 50 15000 150	25 300 5 70 100 2 30 40 50 5 7 200 25000 500 5000		
Arsenic Barium Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	mg/kg <0.025 0.05 <0.005 <0.015 <0.07 0.0003 0.29 <0.02 <0.05 0.02 <0.03 0.05 <3 <3		0.5 20 0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	mg/kg 2 100 1 10 50 0.2 10 10 0.7 0.5 50 15000 150 20000	25 300 5 70 100 2 30 40 50 5 7 200 25000 500		

Murphy Result Report

Mass of sample taken (kg)	0.1022	Dry Matter Content Ratio (%) =		87.7	
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.887	
Particle Size <4mm =	>95%	Eluate Volume (I)		0.83	
JEFL Job No	T	15/14318	Land	fill Waste Ac	ceptance
Sample No		10		Criteria Lin	nits
Client Sample No		BH4			
Depth/Other		2.00-3.00			
Sample Date		03/10/2015	Inert	Stable Non-reactive	Hazardous
Batch No		1		1101110404170	
Solid Waste Analysis					
Total Organic Carbon (%)	0.38		3	5	6
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<45		500	-	-
PAH Sum of 6 (mg/kg)	<0.22		-	-	-
PAH Sum of 17 (mg/kg)	<0.64		100	-	-
	10:1 concn			values for co	
Eluate Analysis	A10			12457-2 at	
	mg/kg			mg/kg	
Arsenic	<0.025		0.5	2	25
6 HOME CANDIAN					
Barium	0.04		20	100	300
Barium Cadmium	0.04 <0.005		0.04	100	300 5
	0.04 <0.005 <0.015			-	
Cadmium Chromium	<0.005		0.04	1	5
Cadmium Chromium Copper	<0.005 <0.015 <0.07		0.04	1 10	5 70
Cadmium Chromium	<0.005 <0.015		0.04 0.5 2	1 10 50	5 70 100
Cadmium Chromium Copper Mercury	<0.005 <0.015 <0.07 0.0002		0.04 0.5 2 0.01	1 10 50 0.2	5 70 100 2
Cadmium Chromium Copper Mercury Molybdenum Nickel	<0.005 <0.015 <0.07 0.0002 0.28 <0.02		0.04 0.5 2 0.01 0.5 0.4	1 10 50 0.2 10	5 70 100 2 30 40
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead	<0.005 <0.015 <0.07 0.0002 0.28		0.04 0.5 2 0.01 0.5	1 10 50 0.2 10	5 70 100 2 30
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06	1 10 50 0.2 10 10 10 0.7	5 70 100 2 30 40 50
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02		0.04 0.5 2 0.01 0.5 0.4 0.5	1 10 50 0.2 10 10	5 70 100 2 30 40 50
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1	1 10 50 0.2 10 10 10 0.7 0.5	5 70 100 2 30 40 50 5
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02 <0.03 0.04		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1	1 10 50 0.2 10 10 10 0.7 0.5 50	5 70 100 2 30 40 50 5 7 200 25000
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02 <0.03 0.04 <3		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4	1 10 50 0.2 10 10 10 0.7 0.5 50 15000	5 70 100 2 30 40 50 5 7 200 25000 500
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02 <0.03 0.04 <3 <3 6.1		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	1 10 50 0.2 10 10 10 0.7 0.5 50 15000 150 20000	5 70 100 2 30 40 50 5 7 200 25000 5000
Cadmium Chromium Copper Mercury Molybdenum Nickel Lead Antimony Selenium Zinc Chloride Fluoride	<0.005 <0.015 <0.07 0.0002 0.28 <0.02 <0.05 <0.02 <0.03 0.04 <3 <3		0.04 0.5 2 0.01 0.5 0.4 0.5 0.06 0.1 4 800 10	1 10 50 0.2 10 10 10 0.7 0.5 50 15000	5 70 100 2 30 40 50 5 7 200 25000 500

All solid results are expressed on a dry weight basis unless stated otherwise.

Mass of sample taken (kg)	0.1008	Dry Matter Content Ratio (%) =	89.0				
Mass of dry sample (kg) =	0.09	Leachant Volume (I)		0.889			
Particle Size <4mm =	>95%	Eluate Volume (I)		0.63			
JEFL Job No		15/14318	Land	fill Waste Ac	ceptance		
Sample No		11	Criteria Limits				
Client Sample No		BH4					
Depth/Other		3.00-4.00					
Sample Date		03/10/2015		Stable Non-reactive	Hazardous		
Batch No		1					
Solid Waste Analysis							
Total Organic Carbon (%)	0.65		3	5	6		
Sum of BTEX (mg/kg)	<0.025		6	-	-		
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-		
Mineral Oil (mg/kg)	<45		500	-	-		
PAH Sum of 6 (mg/kg)	<0.22		-	-	-		
PAH Sum of 17 (mg/kg)	<0.64		100	-			
Eluate Analysis	10:1 concn leached		le	values for co eaching test I 12457-2 at	using		
	mg/kg			mg/kg			
Arsenic	<0.025		0.5	2	25		
Barium	0.17		20	100	300		
Cadmium	<0.005		0.04	1	5		
Chromium	<0.015		0.5	10	70		
Copper	<0.07		2	50	100		
Mercury	<0.0001		0.01	0.2	2		
Molybdenum	0.43		0.5	10	30		
Nickel	<0.02		0.4	10	40		
	<0.05		0.5	10	50		
Lead			7.000		5		
Lead Antimony	<0.02		0.06	0.7			
Antimony	_		0.06	0.7	7		
Antimony Selenium	<0.02						
Antimony Selenium Zinc	<0.02 <0.03		0.1	0.5	7		
Antimony Selenium Zinc Chloride	<0.02 <0.03 0.03		0.1	0.5 50	7 200		
Antimony Selenium Zinc Chloride Fluoride	<0.02 <0.03 0.03 <3		0.1 4 800	0.5 50 15000	7 200 25000		
Antimony Selenium Zinc Chloride Fluoride Sulphate as SO4	<0.02 <0.03 0.03 <3 3		0.1 4 800 10	0.5 50 15000 150	7 200 25000 500		
	<0.02 <0.03 0.03 <3 3 33.8		0.1 4 800 10 1000	0.5 50 15000 150 20000	7 200 25000 500 50000		

Notification of Deviating Samples

Matrix: Solid

Client Name:

O'Connor Sutton Cronin & Assoc. Ltd

Reference:

Location: St Pauls
Contact: Cian O'Hora

JE Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
5/14318	1	BH1	0.00-1.00	1	EPH	Sample received in inappropriate container
5/14318	1	BH1	1.00-2.00	2	EPH	Sample received in inappropriate container
5/14318	1	BH2	0.50	3	EPH	Sample received in inappropriate container
5/14318	1	BH2	1.00	4	EPH	Sample received in inappropriate container
5/14318	1	BH2	2.00	5	EPH	Sample received in inappropriate container
5/14318	1	BH2	3.00	6	EPH	Sample received in inappropriate container
5/14318	1	BH4	0.00-1.00	8	EPH	Sample received in inappropriate container
5/14318	1	BH4	1.00-2.00	9	EPH	Sample received in inappropriate container
5/14318	1	BH4	2.00-3.00	10	EPH	Sample received in inappropriate container
5/14318	1	BH4	3.00-4.00	11	EPH	Sample received in inappropriate container

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.



NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.:

15/14318

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

• agative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

'JRROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
В	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 15/14318

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified USEPA 8163. Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes

Method Code Appendix

Jones Environmental Laboratory

JE Job No: 15/14318

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM27	Modified US EPA method 9056. Determination of water soluble anions using Dionex (Ion-Chromatography).	РМО	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AR	Yes

JE Job No: 15/14318

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Appendix - Methods used for WAC (2003/33/EC)

Leachate tests							
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and						
101/kg; 4mm	filtered over 0.45 µm membrane filter.						
Eluate analysis							
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Ва	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)						
Мо	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)						
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)						
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)						
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)						
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)						
DOC	I.S. EN 1484						
TDS	I.S. EN 15216						
Compositional analys	sis						
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.						
BTEX	GC-FID						
PCB7**	I.S. EN 15308 analysis by GC-ECD.						
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.						
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS						
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)						
Other							
	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-						
Dry matter	titration and either volumetric or coulometric detection.						
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.						
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range						

Notes

^{*}If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS

^{**}PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

^{***}Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

Appendix 4: Groundwater Monitoring

GROUNDWATER MONITORING

PLAN NO: LRD6002/22-83 REC:06/09/2022

St Pauls Raheny

BOREHOLE	DATE	GROUNDWATER		DATE GROUNDW		Comments
		m BGL	m OD			
ВН1	19/10/2015	1.08	23.772			
BH2	19/10/2015	1.79	20.699			
ВН3	19/10/2015	2.17	19.773			
ВН6	19/10/2015	Dry	-			
ВН9	19/10/2015	2.40	19.021			





Appendix J Surface Water Sampling Laboratory Reports





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Email:

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www.cityanalysts.ie

PLAN NO: LRD6002/22-REC:06/09/2022

Customer

Muriel Ennis **Enviroguide Consulting** Unit 3D, Block 71c The Plaza Parkwest Dublin 8

Certificate Of Analysis

Job Number:

19-53505

Issue Number:

1

Report Date:

5 April 2019

Site:

Not Applicable

PO Number:

Not Supplied

Date Samples Received: 07/03/2019

Please find attached the results for the samples received at our laboratory on 07/03/2019.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By:

Authorised Date:

5 April 2019

Shane Reynolds Laboratory Manager

Notes:

Results relate only to the items tested.

Information on methods of analysis and performance characteristics is available on request. Any opinions or interpretations indicated are outside the scope of our INAB accreditation.

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Certificate Of Analysis

Customer

Dublin 8

Sample Type:

Muriel Ennis **Enviroguide Consulting** Unit 3D, Block 71c The Plaza Parkwest

Report Reference: 19-53505

Report Version: 1

Site: Not Applicable

Sample Description: SW1 Date of Sampling: 07/03/2019

07/03/2019

Date Sample Received:

Lab Reference Number:

431227

Surface

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	08/03/2019	Ammonia as N	0.256	mg/l	-
D/D1003#	07/03/2019	CBOD5	3	mg/l O2	-
D/D3001#	13/03/2019	Cadmium	< 0.2	ug/l	-
D/D3006	07/03/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	08/03/2019	Chloride	42.744	mg/l	-
D/D3001#	13/03/2019	Chromium	1.2	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	
*U		Chromium III	< 0.020	mg/l	-
D/D1009#	08/03/2019	COD	9	mg/l O2	-
D/D3011#	07/03/2019	Conductivity @ 20°C	600.0	uS/cm @20°C	-
D/D3001#	13/03/2019	Copper	3.1	ug/l	-
D/D3015#	08/03/2019	Fluoride	0.3	mg/l	-
D/D3001#	13/03/2019	Hardness as CaCO3	341.135	mg/l	-
D/D3001#	13/03/2019	Lead	2.2	ug/l	-
D/D3001#	13/03/2019	Nickel	1.6	ug/l	-
EW188#*	-	Arsenic - Total	0.9	ug/L	-
DEAFULT*U	3	Total Cyanide Low	< 10.0000	ug/L	-
D/D3000#	08/03/2019	Orthophosphate as P	0.115	mg/l	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored

indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon





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Customer

Muriel Ennis **Enviroguide Consulting** Unit 3D, Block 71c The Plaza Parkwest Dublin 8

Report Reference: 19-53505

Report Version: 1

PLAN NO: LRD6002/22-83 REC:06/09/2022

Site:

Not Applicable

431227

Sample Description:

SW1

Sample Type:

Surface

Date of Sampling:

07/03/2019

Date Sample Received:

07/03/2019

Lab Reference Number:

PV Value Site / Analysis Parameter Units (Drinking Result Method Ref. Start Date Water Only) D/D1041# 07/03/2019 PH 7.84 pH Unit D/D1049# 08/03/2019 Total Suspended Solids < 2 mg/l D/D3001# 13/03/2019 10.2 Zinc ug/l

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Dublin 8

Muriel Ennis Enviroguide Consulting Unit 3D, Block 71c The Plaza Parkwest

Report Reference: 19-53505

Report Version: 1

Site: Not Applicable

 Sample Description:
 SW2
 Date of Sampling:
 07/03/2019

 Sample Type:
 Surface
 Date Sample Received:
 07/03/2019

Lab Reference Number: 431228

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	08/03/2019	Ammonia as N	0.163	mg/l	-
D/D1003#	07/03/2019	CBOD5	2	mg/l O2	-
D/D3001#	13/03/2019	Cadmium	< 0.2	ug/l	-
D/D3006	07/03/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	08/03/2019	Chloride	48.961	mg/l	-
D/D3001#	13/03/2019	Chromium	1.1	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	12/03/2019	COD	10	mg/l O2	-
D/D3011#	07/03/2019	Conductivity @ 20°C	620.0	uS/cm @20°C	-
D/D3001#	13/03/2019	Copper	5.6	ug/l	-
D/D3015#	08/03/2019	Fluoride	0.3	mg/l	
D/D3001#	13/03/2019	Hardness as CaCO3	349.416	mg/l	-
D/D3001#	13/03/2019	Lead	2.1	ug/l	-
D/D3001#	13/03/2019	Nickel	1.1	ug/l	-
EW188#*	-	Arsenic - Total	1.0	ug/L	-
DEAFULT*U	-	Total Cyanide Low	< 10.0000	ug/L	-
D/D3000#	08/03/2019	Orthophosphate as P	0.048	mg/l	-

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Note:

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

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Report Reference: 19-53505

Report Version: 1

PLAN NO: LRD6002/22-83 REC:06/09/2022

Site:

Not Applicable

Sample Description:

SW2

Date of Sampling:

07/03/2019

Sample Type:

Surface

Date Sample Received:

07/03/2019

Lab Reference Number:

431228

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	07/03/2019	PH	7.95	pH Unit	-
D/D1049#	08/03/2019	Total Suspended Solids	< 2	mg/l	-
D/D3001#	13/03/2019	Zinc	11.6	ug/l	-

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Note: PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water

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Customer

Muriel Ennis
Enviroguide Consulting
Unit 3D, Block 71c
The Plaza
Parkwest
Dublin 8

Certificate Of Analysis

Job Number:

19-54627

Issue Number:

4

Report Date:

29 April 2019

Site:

Not Applicable

PO Number:

Not Supplied

Date Samples Received: 04/04/2019

Please find attached the results for the samples received at our laboratory on 04/04/2019.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By:

Authorised Date:

29 April 2019

Shane Reynolds Laboratory Manager

Notes:

Results relate only to the items tested.

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Report Reference: 19-54627

Report Version: 1

PLAN NO: LRD6002/22-REC:06/09/2022

Site:

Not Applicable

Sample Description:

Sample Type:

SW1

Surface

Date of Sampling:

04/04/2019

Date Sample Received:

04/04/2019

Lab Reference Number: 434422

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	05/04/2019	Ammonia as N	0.288	mg/l	-
D/D1003#	04/04/2019	CBOD5	< 2	mg/l O2	-
D/D3001#	17/04/2019	Cadmium	< 0.2	ug/l	-
D/D3006	05/04/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	05/04/2019	Chloride	34.099	mg/l	-
D/D3001#	17/04/2019	Chromium	< 0.9	ug/l	-
*U		Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	05/04/2019	COD	8	mg/l O2	
D/D3011#	04/04/2019	Conductivity @ 20°C	495.0	uS/cm @20°C	-
D/D3001#	17/04/2019	Copper	7.2	ug/l	-
D/D3015#	05/04/2019	Fluoride	0.4	mg/l	-
D/D3001#	17/04/2019	Hardness as CaCO3	230.386	mg/l	-
D/D3001#	17/04/2019	Lead	4.4	ug/l	
D/D3001#	17/04/2019	Nickel	1.3	ug/l	-
EW188#*	-	Arsenic - Total	< 1.0	ug/L	-
DEAFULT*U	-	Total Cyanide Low	< 0.7000	ug/L	-
D/D3000#	05/04/2019	Orthophosphate as P	0.146	mg/l	-

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PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

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Report Reference: 19-54627

Report Version: 1

Site:

Dublin 8

Not Applicable

Sample Description:

Sample Type:

SW1

Surface

Date of Sampling:

04/04/2019

Date Sample Received:

04/04/2019

Lab Reference Number:

434422

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	04/04/2019	PH	7.91	pH Unit	-
D/D1049#	05/04/2019	Total Suspended Solids	< 2	mg/l	-
D/D3001#	17/04/2019	Zinc	15.2	ug/l	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored

indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

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Customer

Muriel Ennis **Enviroguide Consulting** Unit 3D, Block 71c The Plaza Parkwest Dublin 8

Report Reference: 19-54627

Report Version: 1

PLAN NO: LRD6002/22-

REC:06/09/2022

Site: Not Applicable

SW2 Sample Description: Surface Sample Type:

Date of Sampling: 04/04/2019

Date Sample Received: 04/04/2019

Lab Reference Number: 434423

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	05/04/2019	Ammonia as N	0.144	mg/l	-
D/D1003#	04/04/2019	CBOD5	< 2	mg/l O2	-
D/D3001#	17/04/2019	Cadmium	< 0.2	ug/l	-
D/D3006	05/04/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	05/04/2019	Chloride	35.624	mg/l	7.0
D/D3001#	17/04/2019	Chromium	< 0.9	ug/l	-
*U		Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	05/04/2019	COD	10	mg/I O2	-
D/D3011#	04/04/2019	Conductivity @ 20°C	506.0	uS/cm @20°C	-
D/D3001#	17/04/2019	Copper	3.4	ug/l	-
D/D3015#	05/04/2019	Fluoride	0.4	mg/l	-
D/D3001#	17/04/2019	Hardness as CaCO3	230.136	mg/l	-
D/D3001#	17/04/2019	Lead	4.6	ug/l	
D/D3001#	17/04/2019	Nickel	1.8	ug/l	-
EW188#*	-	Arsenic - Total	1.1	ug/L	-
DEAFULT*U	-	Total Cyanide Low	< 0.7000	ug/L	-
D/D3000#	05/04/2019	Orthophosphate as P	0.075	mg/l	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note: PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored

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Certificate Of Analysis

Customer

Muriel Ennis **Enviroguide Consulting** Unit 3D, Block 71c The Plaza Parkwest

Report Reference: 19-54627

Report Version: 1

Site:

Dublin 8

Not Applicable

Sample Description:

SW2

Sample Type:

Surface

Date of Sampling:

04/04/2019

Date Sample Received:

04/04/2019

Lab Reference Number: 434423

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	04/04/2019	PH	8.14	pH Unit	-
D/D1049#	05/04/2019	Total Suspended Solids	< 2	mg/l	-
D/D3001#	17/04/2019	Zinc	11.5	ug/l	-

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Muriel Ennis
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Dublin 8

Certificate Of Analysis

Job Number:

19-56085

Issue Number:

1

Report Date:

11 June 2019

Site: Not Applicable
PO Number: Not Supplied

Date Samples Received: 14/05/2019

Please find attached the results for the samples received at our laboratory on 14/05/2019.

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Authorised Date: 11 June 2019

Shane Reynolds Laboratory Manager

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Report Reference: 19-56085

Report Version: 1

Site: Not Applicable

Sample Description: SW1 Date of Sampling:

14/05/2019

Sample Type:

Surface

Date Sample Received:

14/05/2019

Lab Reference Number:

438617

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	15/05/2019	Ammonia as N	1.270	mg/l	-
D/D1003#	15/05/2019	CBOD5	2	mg/I O2	-
D/D3001#	16/05/2019	Cadmium	0.3	ug/l	-
D/D3006	14/05/2019	Chlorine, Free	0.020	mg/l	-
D/D3000#	15/05/2019	Chloride	36.478	mg/l	-
D/D3001#	16/05/2019	Chromium	1.1	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	14/05/2019	COD	11	mg/I O2	
D/D3011#	14/05/2019	Conductivity @ 20°C	526.0	uS/cm @20°C	-
D/D3001#	16/05/2019	Copper	3.8	ug/l	-
D/D3015#	17/05/2019	Fluoride	0.4	mg/l	-
D/D3001#	16/05/2019	Hardness as CaCO3	249.329	mg/l	-
D/D3001#	16/05/2019	Lead	2.2	ug/l	-
D/D3001#	16/05/2019	Nickel	1.6	ug/l	-
DEAFULT*U	-	Total Cyanide Low	< 9.0000	ug/L	-
EW188#*		Arsenic - Total	< 1.0	ug/L	-
D/D3000#	15/05/2019	Orthophosphate as P	0.096	mg/l	-

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Report Reference: 19-56085

Report Version: 1

Site:

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Sample Description:

SW1

Date of Sampling:

14/05/2019

Sample Type:

Surface

Date Sample Received:

14/05/2019

Lab Reference Number:

438617

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	14/05/2019	PH	7.64	pH Unit	-
D/D1049#	15/05/2019	Total Suspended Solids	2	mg/l	-
D/D3001#	16/05/2019	Zinc	13.1	ug/l	-

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Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

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Site:

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438618

Sample Description:

SW2

Sample Type:

Surface

Lab Reference Number:

Date of Sampling:

14/05/2019

Date Sample Received:

14/05/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	15/05/2019	Ammonia as N	0.618	mg/l	-
D/D1003#	15/05/2019	CBOD5	< 2	mg/l O2	-
D/D3001#	16/05/2019	Cadmium	0.4	ug/l	-
D/D3006	14/05/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	15/05/2019	Chloride	35.882	mg/l	-
D/D3001#	16/05/2019	Chromium	< 0.9	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	14/05/2019	COD	10	mg/I O2	-
D/D3011#	14/05/2019	Conductivity @ 20°C	632.0	uS/cm @20°C	-
D/D3001#	16/05/2019	Copper	3.5	ug/l	-
D/D3015#	17/05/2019	Fluoride	0.4	mg/l	-
D/D3001#	16/05/2019	Hardness as CaCO3	247.782	mg/l	-
D/D3001#	16/05/2019	Lead	2.7	ug/l	-
D/D3001#	16/05/2019	Nickel	< 0.5	ug/l	-
EW188#*	-	Arsenic - Total	1.2	ug/L	-
DEAFULT*U		Total Cyanide Low	< 9.0000	ug/L	-
D/D3000#	15/05/2019	Orthophosphate as P	0.066	mg/l	-

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Dublin 8

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Report Version: 1

Site:

Not Applicable

438618

Sample Description:

SW2

16/05/2019

Date of Sampling:

14/05/2019

Sample Type:

Site /

Method Ref.

D/D1041#

D/D1049#

D/D3001#

Surface

Date Sample Received:

8.5

14/05/2019

ug/l

Lab Reference Number:

PV Value Parameter **Analysis** (Drinking Result Units Start Date Water Only) 14/05/2019 PH 7.65 pH Unit 15/05/2019 Total Suspended Solids < 2 mg/l

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Certificate Of Analysis

Job Number:

19-58097

Issue Number:

1

Report Date:

22 July 2019

Site:

Not Applicable

PO Number:

Not Supplied

Date Samples Received: 27/06/2019

Please find attached the results for the samples received at our laboratory on 27/06/2019.

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Authorised Date:

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Site: Not Applicable

Sample Description: SW1 Date of Sampling: 27/06/2019 Sample Type: Date Sample Received: 27/06/2019 Surface

Lab Reference Number: 444595

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D3000#	02/07/2019	Ammonia as N	0.102	mg/l	-
D/D1003#	27/06/2019	CBOD5	4	mg/l O2	-
D/D3001#	01/07/2019	Cadmium	< 0.2	ug/l	-
D/D3006	28/06/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	02/07/2019	Chloride	32.097	mg/l	-
D/D3001#	01/07/2019	Chromium	< 0.9	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	
D/D1009#	28/06/2019	COD	28	mg/I O2	-
D/D3011#	28/06/2019	Conductivity @ 20°C	575.0	uS/cm @20°C	
D/D3001#	01/07/2019	Copper	< 2.0	ug/l	-
D/D3015#	29/06/2019	Fluoride	0.5	mg/l	-
D/D3001#	01/07/2019	Hardness as CaCO3	291.779	mg/l	-
D/D3001#	04/07/2019	Lead	< 1.7	ug/l	-
D/D3001#	01/07/2019	Nickel	0.8	ug/l	-
EW188#*		Arsenic - Total	< 1.0	ug/L	-
DEAFULT*U	-	Total Cyanide Low	< 0.7000	ug/L	-
D/D3000#	02/07/2019	Orthophosphate as P	< 0.025	mg/l	-

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Report Reference: 19-58097

Report Version: 1

Site: Not Applicable

Sample Description: SW1 Date of Sampling: 27/06/2019 Sample Type: Surface Date Sample Received: 27/06/2019

Lab Reference Number: 444595

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	28/06/2019	PH	8.11	pH Unit	-
D/D1049#	01/07/2019	Total Suspended Solids	2	mg/l	-
D/D3001#	01/07/2019	Zinc	6.6	ug/l	-

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PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

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Report Reference: 19-58097

Report Version: 1

Site: Not Applicable

Sample Description: SW2 Date of Sampling: 27/06/2019 Sample Type: Surface Date Sample Received: 27/06/2019

Lab Reference Number: 444596

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only
D/D3000#	02/07/2019	Ammonia as N	0.083	mg/l	-
D/D1003#	27/06/2019	CBOD5	< 2	mg/l O2	-
D/D3001#	01/07/2019	Cadmium	0.3	ug/l	-
D/D3006	28/06/2019	Chlorine, Free	< 0.010	mg/l	-
D/D3000#	02/07/2019	Chloride	30.953	mg/l	
D/D3001#	01/07/2019	Chromium	< 0.9	ug/l	-
*U	-	Chromium VI	< 0.020	mg/l	-
*U	-	Chromium III	< 0.020	mg/l	-
D/D1009#	28/06/2019	COD	26	mg/l O2	-
D/D3011#	28/06/2019	Conductivity @ 20°C	570.0	uS/cm @20°C	-
D/D3001#	01/07/2019	Copper	< 2.0	ug/l	-
D/D3015#	29/06/2019	Fluoride	0.4	mg/l	-
D/D3001#	01/07/2019	Hardness as CaCO3	289.799	mg/l	-
D/D3001#	04/07/2019	Lead	< 1.7	ug/l	-
D/D3001#	01/07/2019	Nickel	1.1	ug/l	-
EW188#*	-	Arsenic - Total	< 1.0	ug/L	-
DEAFULT*U		Total Cyanide Low	< 0.7000	ug/L	-
D/D3000#	02/07/2019	Orthophosphate as P	0.068	mg/l	-

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Report Reference: 19-58097

Report Version: 1

Date of Sampling:

Date Sample Received:

Site:

Not Applicable

Sample Description:

Lab Reference Number:

SW2

Sample Type:

Surface

444596

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1041#	28/06/2019	PH	8.11	pH Unit	-
D/D1049#	01/07/2019	Total Suspended Solids	< 2	mg/l	-
D/D3001#	01/07/2019	Zinc	5.6	ug/l	-

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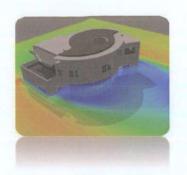
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Appendix K Computational Fluid Dynamics (CFD) Model







WIND AND MICROCLIMATE MODELLING

Mixed Use Residential Development

at lands to the East of St. Pauls College, Sybil Hill Road, Dublin 5

Prepared by: B-Fluid Ltd.| Buildings Fluid Dynamics Consultants

B-Fluid

Buildings Fluid Dynamics

For: Raheny 3 Limited Partnership

	Document Reference		
Project Name	WIND AND MICROCLIMATE MODELLING Mixed Use Residential Development St. Pauls College, Sybil Hill Road, Dublin 5		
Project Ref.	W_2109255		
Site location	Lands to the East of St. Pauls College, Sybil Hill Road, Dublin 5		
CFD Study by	B-Fluid Ltd.		
Engineers	Dr. Cristina Pa CFD Modelling S CEng MIEI, PhD. Mech Eng.,	Specialist	
	Dr. Patrick Okolo CFD Modelling Specialist CEng MIEI, PhD., MEng. Mech Eng.	Dr. Arman Safdari CFD Modelling Specialist PhD. MEng, MSc. Mech.Eng	
Report issued on	August 31, 2022		

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B - Fluid | Wind Modelling

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PLAN NO: LRD6002/22-83 REC:06/09/2022

1. EXECUTIVE SUMMARY

B-Fluid Limited has been commissioned by 'Raheny 3 Limited Partnership' to carry out a Wind and Micro-climate Modelling Study for the proposed Mixed Use Residential Development at lands to the East of St. Pauls College, Sybil Hill Road, Dublin 5. Figure 1.1 shows an isometric view of the proposed development.



Figure 1.1: Proposed Mixed Use Residential Development

Wind microclimate studies identify the possible wind patterns around the existing environment and the proposed development under mean and peak wind conditions typically occurring in Dublin. A wind microclimate assessment is performed through advanced Computational Fluid Dynamics (CFD) which is a numerical method used to simulate wind conditions and its impact on the development and to identify areas of concern in terms of downwash/funneling/downdraft/critical flow accelerations that may likely occur. The Advanced CFD numerical algorithms applied here are solved using high performance computing cluster.

The results of this analysis are utilized by the design team to configure the optimal layout for the proposed Mixed Use Residential Development to achieve accounting for the use of each areas/building (i.e. comfortable and pleasant for potential pedestrian) and not to introduce any critical wind impact on the surrounding areas and on the existing buildings.

This technical report describes the wind microclimate study performed and rationals of the methodology and assumptions that B-Fluid Ltd. has adopted for this analysis.

For the purpose of performing an elaborate wind microclimate study, 18 different wind scenarios and directions have been modeled as shown in Table 1.1 in order to take into account all the relevant wind directions in Dublin. In particular, a total of 18 compass directions on the wind rose are selected. For each direction, the reference wind speed is set to the 5% exceedance wind speed for that direction, i.e. the wind speed that is exceeded for over 5% of the time whenever that wind direction occurs.

This technical report focuses on reporting the 8 worst case and most relevant wind speeds with cardinal directions, which are the speeds and directions showing the most critical wind speeds relevant to the development. The modelled scenarios reported in this study are presented in Figure 1.2.

DUBLIN WINI	SCENARIOS AN	ND DIRECTIONS
Velocity (m/s)	Direction (deg)	Frequency
5.601	225	11.233
4.626	135	6.849
5.847	236.25	6.792
6.049	258.75	6.747
6.034	247.5	6.689
5.888	270	5.662
4.994	315	4.338
5.503	281.25	3.904
4.974	292.5	3.436
5.357	213.75	3.288
4.736	123.75	3.105
4.406	146.25	2.751
5.101	303.75	2.648
5.246	112.5	2.500
4.121	157.5	2.386
4.581	101.25	2.340
4.169	45	2.180
3.558	90	2.135

Table 1.1: Summary of The 18 Wind Scenarios Modelled for Proposed Development

PLAN NO: LRD6002/22-S3 REC:06/09/2022

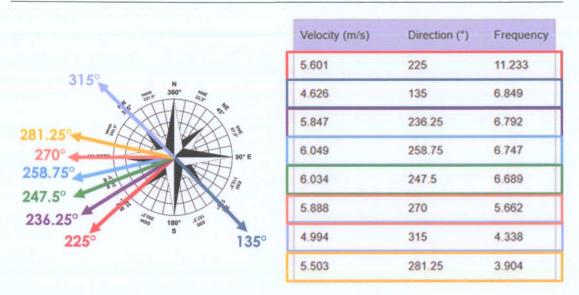


Figure 1.2: Summary of 8 Wind Scenarios Reported

A qualitative and quantitative summary of the wind microclimate modelling study performed for the proposed Mixed Use Residential Development shows that:

- The wind profile around the existing development environment was built using the annual average meteorology data collected at Dublin Airport Weather Station. In particular, the local wind climate was determined from historical meteorological data recorded 10 m above ground level at Dublin Airport.
- The prevailing wind directions for the site are identified as West, South-East and West-South-West, with magnitude of approximately 6m/s.
- The proposed Mixed Use Residential Development has been designed in order to
 produce a high-quality environment that is attractive and comfortable for pedestrians
 of all categories. To achieve this objective, throughout the design process, the impact
 of wind has been considered and analysed, in the areas where critical patterns were
 found, the appropriate mitigation measures were introduced.
- As a result of the final proposed and mitigated design, wind flow speeds at ground floor are shown to be within tenable conditions. Some higher velocity indicating minor funnelling effects are found between block D and G and the corners of block A, B, C and G. However, these areas can be utilised for the intended use such as short-term sitting, walking and strolling.
- Area between Block A and Block D is suitable for short-term sitting instead of long-term sitting due to flow acceleration between the Blocks.
- Courtyard on Block D is well protected and good shielding is achieved. Therefore, it can be used for all activities including long-term sitting.
- Small areas of Courtyard on Block G are suitable for short term sitting instead of

long-term sitting, however the majority of the area is appropriate for long term sitting.

- Tree planting all around the development has been utilised, with particular attention to the corners of the Blocks has positively mitigated any critical wind effects.
- Regarding the balconies, higher velocities are found for some directions, only on some of the balconies (mostly on the South and West sides of the blocks). However, these velocities are below the threshold values defined by the acceptance criteria and therefore are not critical for safety.
- The proposed development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for "Frail persons or cyclists" and for members of the "General Public" in the surrounding of the development.
- The proposed development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings.

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2. PROJECT DESCRIPTION

2.1 INTRODUCTION

B-Fluid Limited has been commissioned by 'Raheny 3 Limited Partnership' to carry out a Wind and Micro-climate Modelling Study for the proposed Mixed Use Residential Development at lands to the East of St. Pauls College, Sybil Hill Road, Dublin 5.

Figure 2.1 shows an isometric view of the proposed development with locations of its Blocks.



Figure 2.1: Proposed Mixed Use Residential Development

The following paragraphs detail all the project information used throughout the study, together with results of the assessment carried out.

2.2 DESCRIPTION OF DEVELOPMENT

The proposed development consists of the construction of a residential and nursing home development set out in 7 no. blocks, ranging in height from 4-7 storeys to accommodate 580 no. apartments, residential tenant amenity spaces, a crèche and a 100 bed nursing home. The site will accommodate car parking spaces, bicycle parking spaces, storage, services and plant areas at both basement and podium level. Landscaping will include extensive communal amenity areas, and a significant public open space provision on the east and south of the site. The proposed application includes all site landscaping works, green roofs, substations, boundary treatments, lighting, servicing, signage, surface water attenuation facilities and associated and ancillary works, including site development works and services above and below ground. For a full description of the proposed development please refer to the Statutory Notices.

Figure 2.2 shows the position of the development site in 3D model.



Figure 2.2: The proposed Mixed Use Residential 3D Model South View

2.3 EXTENTS OF ANALYSED AREA

The proposed Mixed Use Residential Development will be situated at lands to the East of St. Pauls College, Sybil Hill Road, Dublin 5. The Existing Environment site is shown in Figure 2.3. The area considered for the existing environment and proposed development are represented in Figure 2.4.



Figure 2.3: The proposed Mixed Use Residential Development Site Location and Existing Environment



Figure 2.4: Extents of Analysed Existing Environment Around the proposed Mixed Use Residential Development

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2.4 OBJECTIVE OF THE WIND MICROCLIMATE STUDY

The CFD wind model is adopted to identify areas of concern in terms of critical flows and areas where the pedestrian safety and comfort could be compromised. Pedestrian Wind Comfort and Safety Studies are conducted to predict, assess and, where necessary, mitigate the impact of the development on pedestrian level wind conditions. The objective is to maintain comfortable and safe pedestrian level wind conditions that are appropriate for the season and the intended use of pedestrian areas. Pedestrian areas include sidewalks and street frontages, pathways, building entrance areas, open spaces, amenity areas, outdoor sitting areas, and accessible roof top areas among others.

2.4.1 National Policies

According to the 'Urban Development and Building Heights, Guidelines for Planning Authorities (Government of Ireland, December 2018)' document, specific impact assessment of the micro-climatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. (In the same guidance, standard buildings height is considered 6-8 storeys. Above this height, buildings are considered 'taller' for Dublin standards.)

Usually, the recommended approach to wind microclimate studies is based on the building height, as presented in Figure 2.5 and prescribed by the Wind Microclimate Guidelines for Developments in the City of London (August 2019).

Building Height	Recommended Approach to Wind Microclimate Studies
Similar or lower than the average height of surrounding buildings Up to 25m	Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location
Up to double the average height of surrounding buildings 25m to 50m	Computational (CFD) Simulations OR Wind Tunnel Testing
Up to 4 times the average height of surrounding buildings	Computational (CFD) Simulations AND Wind Tunnel Testing
50m to 100m	
High Rise	Early Stage Massing Optimization: Wind Tunnel Testing OR Computational (CFD) Simulations
Above 100m	Detailed Design: Wind Tunnel Testing AND Computational (CFD) Simulations to demonstrate the performance of the final building design

Figure 2.5: Recommended Approach to Wind Microclimate Studies based on Building Height, as prescribed by the Wind Microclimate Guidelines for Developments in the City of London (August 2019)

Good wind microclimate conditions are necessary for creating outstanding public spaces. Adverse wind effects can reduce the quality and usability of outdoor areas, and lead to safety concerns in extreme cases.

Computational fluid dynamics (CFD) tools can create high quality output that provide a good understanding of fundamental flow features. The CFD models must include a detailed three-dimensional representation of the proposed development.

Maximum cell sizes near critical locations (e.g. entrances, corners, etc.) must be 0.3m or smaller. Sufficient cells should be also used between buildings with a minimum of 10 across a street canyon. However, the cell size of buildings away from the target can be larger to allow for modelling efficiency. The CFD models should represent all surrounding buildings that are within 400m from the centre of the site. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site. The models must contain at least 3 prism layers below 1.5m height, to capture near-ground effects.

CFD analysis also reports conditions in areas away from the site where cumulative effects of a cluster of tall buildings could lead to adverse wind conditions.

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3. STUDY METHODOLOGY

3.1 STUDY METHODOLOGY

The methodology adopted for the wind microclimate analysis of the proposed development is outlined as follows;

The following sections give details on the methodology utilized.

- Perform a wind desktop study of the existing environment.
- Perform computational wind microclimate analysis of the proposed development within the existing environment.

3.2 WIND IMPACT ASSESSMENT ON BUILDINGS

3.2.1 PLANETARY BOUNDARY LAYER AND TERRAIN ROUGHNESS

Due to aerodynamic drag, there is a wind gradient in the wind flow just a few hundred meters above the Earth's surface – "the surface layer of the planetary boundary layer".

Wind speed increases with increasing height above the ground, starting from zero, due to the no-slip condition. In particular, the wind velocity profile is parabolic. Flow near the surface encounters obstacles that reduce the wind speed, and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the velocity profile is given by a fluctuating velocity along a mean velocity value. Figure 3.1 shows the wind velocity profile, as described above.

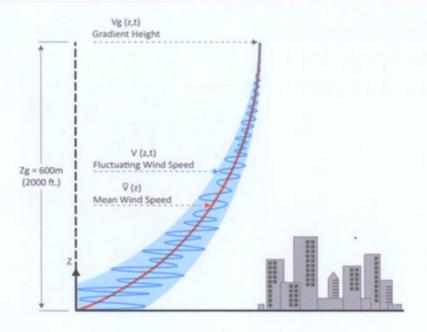


Figure 3.1: Wind Velocity Profile

Two effects influence the shape of the wind speed profile:

 Contours of the terrain: a rising terrain such as an escarpment will produce a fuller profile at the top of the slope compared with the profile of the wind approaching the slope. • Aerodynamic 'roughness' of the upstream terrain: natural roughness in the form of woods or man-made roughness in the form of buildings. Obstructions near the ground create turbulence and friction, lowering the average wind speed. The higher the obstructions, the greater the turbulence and the lower the windspeed. As a general rule, windspeed increases with height.

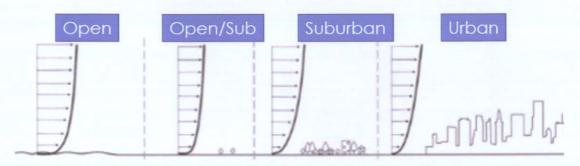


Figure 3.2: Wind Velocity Profile for different terrains

In order to assess the wind conditions in a particular area, it is important to know (Figure 3.3):

- Weather conditions in the area
- Location and orientation of the site
- · Buildings distribution in the area
- Flow patterns at the building

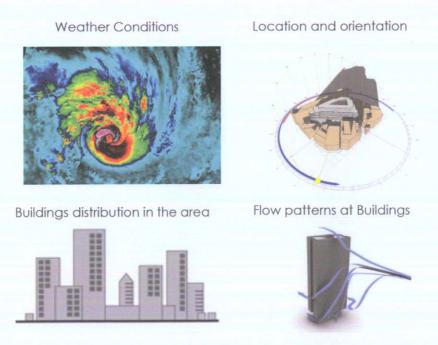


Figure 3.3: Parameters to know for Wind Conditions Assessment

Moreover, it is important to understand key flow features (Figure 3.3):

- Broad Building Face creates "DOWNWASH"
- · Low Building Upwind Increases Wind Effects
- Gaps Between Buildings Increases Wind Velocity
- · Low Building Upwind Increases Wind Effects

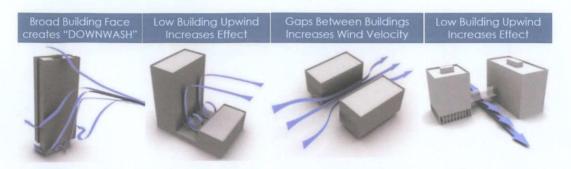


Figure 3.4: Parameters to know for Wind Conditions Assessment

3.3 ACCEPTANCE CRITERIA

3.3.1 PEDESTRIAN COMFORT AND LAWSON CRITERIA

Pedestrian Wind Comfort is measured in function of the frequency of wind speed threshold exceeded based on the pedestrian activity. The assessment of pedestrian level wind conditions requires a standard against which measured or expected wind velocities can be compared.

Only gust winds are considered in the safety criterion. These are usually rare events, but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these "gust equivalent mean" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by municipal authorities as well as the international building design and city planning community:

- DISCOMFORT CRITERIA: Relates to the activity of the individual. Onset of discomfort:
 - Depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM) which is exceeded for 5% of the time.
- DISTRESS CRITERIA: Relates to the physical well-being of the individual. Onset of distress:
 - 'Frail Person Or Cyclist': equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. This is intended to identify wind conditions which less able individuals or cyclists may