# Environmental Impact Assessment Report Vol. II(Appendices)

FORMER GALLAHER'S SITE, AIRTON

**FEBRUARY 2020** 

Prepared by: McGILL PLANNING, 45 HERBERT LANE, DUBLIN 2 PH: +353 1 2846464

### In Association with:

Ferreira Architects, Traynor Consulting, Barrett Mahony Consulting Engineers, IAC Archaeology, Mitchell+ Associates, Whitehill Environmental, Tree Management Services, 3D Design, IN2 Engineering Design partnership, and Renaissance Engineering ltd.





Chartered Town Planners

FORMER GALLAHER'S SITE, AIRTON

# CONTENTS

## CHAPTER 5 BIODIVERSITY - APPENDICES

5.1 SPECIES LIST 5.2 PHOTOGRAPHS

### CHAPTER 6 LAND, SOIL & GEOLOGY - APPENDICES

6.1 SITE INVESTIGATION REPORT

### CHAPTER 7HYDROLOGY AND WATER SERVICES - APPENDICES

7.1 EXISTING WATER SUPPLY INFRASTRUCTURE 7.2 MICRO-DRAINAGE CALCULATIONS

### **CHAPTER 9 CLIMATE AIR QUALITY - APPENDICES**

9.1 AMBIENT AIR QUALITY STANDARDS9.2 TRANSPORT INFRASTRUCTURE IRELAND SIGNIFICANCE CRITERIA9.3 DUST MINIMISATION PLAN

### **CHAPTER 11TRAFFIC & TRANSPORTATION - APPENDICES**

11.1 CYCLE NETWORK PLAN11.2 BUS CONNECTS PROPOSAL11.3 BUS CONNECTS ROAD LAYOUT

### **CHAPTER 13WASTE MANAGEMENT - APPENDICES**

13.1 OPERATIONAL WASTE AND RECYCLING MANAGEMENT PLAN

### CHAPTER 14ARCHAEOLOGY AND CULTURAL HERITAGE - APPENDICES

14.1 SMR/RMP SITES WITHIN THE SURROUNDING AREA
14.2 STRAY FINDS WITHIN THE SURROUNDING AREA
14.3 LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE
14.4 IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE
14.5 MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE



# 5 BIODIVERSITY - APPENDICES

# 5.1 SPECIES LIST

Common Name	Scientific Name
Ash	Fraxinus excelsior
Autumn hawkbit	Scorzoneroides autumnalis
Barberry	Berberis
Black medick	Medicago lupulina
Bramble	Rubus fruticosus agg.
Broadleaved Dock	Rumex obtusifolius
Butterfly bush	Budleia
Cat's ear	Hypochaeris radicata
Cleavers	Galium aparine
Cock's-foot	Dactylis glomerata
Coltsfoot	Tussilago farfara
Common chickweed	Stellaria media
Cow parsley	Anthriscus sylvestris
Cowslip	Primula veris
Common ragwort	Senecio jacobaea
Bearberry	Cotoneaster
Blackthorn	Prunus spinosa
Creeping buttercup	Ranunculus repens
Creeping cinquefoil	Potentilla reptans
Creeping thistle	Cirsium arvense
Cuckoo flower	Cardamine pratensis
Daisy	Bellis perennis
Dandelion	Taraxacum officinale
Dog rose	Rosa canina
Dogwood	Cornus sp.
Firethorn	Pyracantha
Germander speedwell	Veronica chamaedrys
Groundsel	Senecio vulgaris
Hairy bittercress	Cardamine hirsuta
Hawthorn	Crategus monogyna
Hazel	Corylus avellana
Herb Robert	Geranium robertianum

Hogweed	Heracleum sphondylium
Honeysuckle (ornamental)	Lonicera periclymenum
lvy	Hedera helix
Lilac	Syringa vulgaris
Meadow buttercup	Ranunculus acris
Meadow grasses	5.2Poa sp
Mouse ear	Cerastium fontanum
Nettle	Urtica dioica
Norway maple	Acer platanoides
Oak	Quercus sp
Red clover	Trifolium pratense
Red fescue	Festuca rubra.
Rhododendron	Rhododendron
Rye grasses	5.2Lolium sp.
Ribwort plantain	Pantago lanceolate
Self-heal	Prunella vulgaris
Sheep's sorrel	Rumex acetosella
Silver birch	Betula pendula
Smooth sow thistle	Sonchus oleraceus
Spear thistle	Cirsium vulgare
Sycamore	Acer pseudoplatanus
Timothy grass	Phleum pratense
Tufted vetch	Vicia cracca
Tutsan	Hypericum
Whitebeam	Sorbus sp
White clover	Trifolium repens
Weeping willow	Salix babylonica
Willow (Sally)	Salix cinerea
Willowherb	Ebilobium sp
Vetches	Vicia sp
Vibernum	Vibernum
Yarrow	Achillea millefolium
Yorkshire fog	Holcus lanatus



# ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOL 2 FORMER GALLAHER'S SITE, AIRTON

# 5.2 PHOTOGRAPHS



Buildings and Surfaces to the West of the Site



Fence and Scattered Trees at the Front of the Site



Grassland Habitat Within the Site







The Existing Building on the Eastern Side of the Site



Driveway and Grassy Verge Habitat



Black Poplar Treeline



# 6 LAND, SOIL & GEOLOGY - APPENDICES

# 6.1 SITE INVESTIGATION REPORT



AIRTON ROAD DEVELOPMENT FOR AIRTON ROAD PROPERTIES

B.M.C.E. CONSULTING ENGINEERS

#### CONTENTS

1	INTRODUCTION
п	FIELDWORK
III	TESTING
ш	DISCUSSION

#### APPENDICES

- I BOREHOLE LOGS
- II ROTARY CORE LOGS / MONITORING DATA
- III TRIAL PIT RECORDS
- IV PLATE BEARING TESTS
- V BRE DIGEST 365 TEST
- VI LABORATORY
  - a. Geotechnical / Rock
  - b. Chemical
- VII SITE PLANS

#### FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

#### General.

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

#### Standards

The ground investigation works for this project have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). The following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 Geotechnical Design Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 2: Classification Principles

#### Routine Sampling.

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler or Piston Sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strate section.

#### In-Situ Testing.

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 to obtain the Energy Ratio (E) of each hammer. A calibration certificate is available upon request. The  $E_c$  is defined as the ratio of the actual energy  $E_{max}$  (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy ( $E_{host}$ ) as calculated from the drive weight assembly. The recorded number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

#### Groundwater

The depth of entry of any influx of groundwater is recorded during the course of horing operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to durnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

#### Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004.

Where peat has been encountered during site works, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992, Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QIEG, Vol. 19, 1986).

#### Retention of Samples.

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

#### Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

This report has been prepared for the project client and the information should not be used without prior written permission. Any recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

#### REPORT ON A SITE INVESTIGATION FOR A DEVELOPMENT AT AIRTON ROAD TALLAGHT

FOR AIRTON ROAD PROPERTIES LTD

# BARRETT MAHONY CONSULTING ENGINEERS (BMCE)

Report No. 21813

**JULY 2019** 

**1** Introduction

٠

A new commercial development is proposed for a brownfield site located off Airton Road in Tallaght A large disused commercial building occupies much of the site.

An investigation of sub soil conditions in the area of the development has been carried out by IGSL for Barrett Mahony Consulting Engineers on behalf of Airton Road Properties Ltd.

7 nr.

This work was carried out by IGSL Ltd. following a competitive tender process.

The site investigation included the following elements:

- Boreholes
- \* Rotary Core Drilling 7 nr.
- Trial Pit Excavations 9 nr.
- CBR by Plate Test 7 nr.
- BRE Digest 365 Percolation 3 nr.
- Geotechnical Laboratory Testing
- Environmental Laboratory Testing

This report includes all factual data from field operations and soils laboratory and discusses these findings relative to the proposed new development.

Page 1

#### **II** Fieldwork

The site and the exploratory locations are noted on the drawing enclosed in Appendix VII. This drawing was provided by BMCE.

The site is located off the Airton Road in Tallaght. The area contains a large disused building with surrounding surfaces of concrete, hardcore and grass.

The various elements of the investigation are detailed in the following paragraphs. All field works were supervised by an experienced geotechnical engineer who carefully recorded stratification, recovered samples as required and prepared detailed records.

Each location was scanned electronically (CAT) to ensure that existing services were not damaged. At borehole locations a 1.00 metre deep inspection pit was opened by hand to confirm the absence of services. All locations have been referenced to National Grid and OD levels have been determined.

#### Boreholes

Seven exploratory holes were bored with conventional 200mm cable-tool methods using a Dando Exploratory Rig. Locations were referenced as per the original drawing. One re-bore was taken following shallow refusal on obstruction in BH02.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. In general it was not possible to recover undisturbed samples because of the high stone/cobble content of the strata encountered.

The findings are relatively consistent. Surface Concrete and Hardcore overlies some generally firm CLAY FILL. The fill extends generally to approximately 1.00 to 1.50 metres, but in three locations to an average depth of 2.80 metres.

Below these upper zones very stiff to hard GLACIAL TILL or BOULDER CLAY is encountered. This comprises stiff BROWN BOULDER CLAY which extends to depth ranging from 1.90 to 2.90 metres. Very stiff to hard BLACK BOULDER CLAY forms the base stratum and all seven boreholes were terminated in this stratum when further advancement was not possible despite the use of the heavy chisel.

Final borehole refusal depths ranged from 5.90 to 8.30 metres, with boulder obstruction noted at each location.

Ground water was encountered as light seepage in several of the boreholes, probably indicative of some granular zones within the generally cohesive boulder clays.

#### **Rotary Core Drilling**

Rotary drilling was scheduled at each location to advance the borehole depths and establish bedrock horizon if practical.

A tracked GEO305 rig was mobilised to drill 90 mm diameter boreholes with 78mm diameter core recovered if possible using triple tube diamond drilling technique.

Detailed drilling records are presented in Appendix II, noting stratification, core recovery and in-situ test data.

The exploratory drill holes penetrated to depths ranging from 12.00 to 13.70 metres BGL. Limestone bedrock was not identified within this depth range.

Recovery of core was generally impractical, however some core of the hard black boulder clay was possible at RC01 and RC05.

The overburden stratum is variously described as very stiff to hard brown and black very gravelly CLAY with cobbles and boulders grading in places to more granular material described as silt or clay-bound sandy GRAVEL.

Standard penetration tests were carried out at intervals in each rotary hole to establish in-situ soil strength. N values are noted in the RH column of the individual records.

Monitoring standpipes were installed in three locations (RC01, RC06 and RC07) to facilitate long term ground water and possible landfill gas concentrations. Each installation was protected by a steel cover. Readings have been taken in the period following the site works. Results are presented with the drilling data in Appendix II.

#### **Trial Pits**

Pits were excavated at nine locations under experienced engineering supervision. Each location was electronically scanned (CAT) to ensure that underground services were not damaged. Detailed trial pit logs are enclosed in Appendix III.

The records confirm the borehole findings. Surface FILL extends to up to 0.90 metres. Firm to stiff brown BOULDER CLAY is then encountered and penetrated to depths ranging from 2.10 to 2.90 metres. Hard black BOULDER CLAY was noted at the base of each excavation with excavator refusal on very hard black clay / boulders generally at 2.80 to 3.00 metres BGL.

Four of the trial excavations were dry, however, some minor water ingress was recorded at varying depth in TPs.01, 02, 04, 08 and 09. All trial excavations were recorded as stable during the short-term investigation period.

Page 2

#### In Situ CBR by Plate Bearing Test

The CBR value of the soils at shallow depth was established at seven trial pit locations locations using Plate Bearing Test Apparatus.

A steel plate is loaded and off-loaded incrementally over two stages and the deflection under load and recovery under off-load is measured by a system of dial gauges. The data is processed and load settlement graphs are prepared. An equivalent CBR value is calculated in accordance with NRA HD25-26/10.

Results are summarised in the following table and details are presented in Appendix IV

#### TABLE A

Test No.	Depth	CBR at Load Cycle (%)	CBR @ Re-Load (%)
PBT 1	0.50	12.2	55.5
PBT 2	0.50	14.5	106.4
PBT 3	0.50	6.2	21.2
PBT 4	0.50	6.1	37.3
PBT 5	0.50	3.7	23.6
PBT 6	0.50	26.7	N/A
PBT 7	0.50	9.6	50.2

#### Percolation Tests (BRE Digest 365)

Infiltration testing was performed at three locations in accordance with BRE Digest 365 'Soakaway Design'. Details are presented in Appendix V. The Test Pits were opened to approximately 2.00 metres deep in gravelly boulder CLAY and detailed logs were prepared.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. The test is carried out over two cycles following initial soakage.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. In these calculations the exposed area is the sum of the base area and the average internal area of the pit sides over the test duration.

Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle. In each location no fall in water level was measured over the test period and the results confirm the very low permeability of the glacial till or boulder clay.

#### Page 4

#### **III.** Testing

#### (a) In-Situ

Standard penetration tests were carried out in the boreholes at 1.00 metre intervals to establish relative soil strength. In addition SPT values were also established at intervals during rotary drilling. Results are presented in the right hand column of the boring and drilling records and are summarised as follows in Table B.

#### TABLE B

Stratum / Depth	N Value Range	Comment
FILL DEPOSITS	3 to 25	Variable soft to stiff
BROWN BOULDER	CLAY	
1.00 metres BGL	18 to 24	Stiff
2.00 metres BGL	21 to 44	Stiff to Very Stiff
BLACK BOULDER C	LAY	
3.00 metres BGL	28 to 55	Stiff to Hard
4.00 metres BGL	44 to 64	Hard
5.00 metres BGL	42 to 56	Hard
> 5.00 metres BGL	40 to 60	Hard

Refusal of SPT apparatus was recorded on numerous boulders throughout and at the base of the respective boreholes.

#### (b) Laboratory

A programme of laboratory testing was scheduled following completion of site operations. Geotechnical soil testing was carried out by IGSL in it's INAB-Accredited laboratory. Chemical and Environmental testing was carried out in the UK by specialist laboratory. All test results are presented in Appendices VIa and VIb. The test programme includes the following elements:

- Liquid and Plastic Limits / Moisture Content
- PSD Grading by wet sieve and hydrometer.
- Sulphate and pH
- RILTA Environmental Suite

Individual test results are discussed in the following paragraphs.

#### Classification

Thirteen samples from the boreholes and trial pits had index properties established. Results consistently fall into Zones CL and Cl of the standard Classification, indicative of low plasticity sensitive clay matrix soils.

Two samples have been classified as clay-bound sandy GRAVEL. Moisture content for the clay samples range from 8% to 18% while for the gravel samples moisture contents of 3.9 and 8.1% were established.

#### Grading

Wet sieve analysis and hydrometer was used to establish PSD grading curves for samples of the boulder clay. The graphs reflect material graded from the clay to gravel fraction, the straight line pattern of the graphs is typical of the local boulder clays.

Two graphs from the more granular soils confirm coarser grading in the sand gravel fraction with up to 18% of material passing to the fine silt/clay fraction.

#### Sulphate and pH.

Three soil samples were selected for sulphate and pH analysis. Sulphate concentrations (SO4 2:1 extract) of from < 0.010 g/l to 0.076 g/l were established with pH values from 7.6 to 8.6. No special precautions are necessary to protect foundation concrete from sulphate aggression. A sulphate design class of DS-1 (ACEC Classification for Concrete) is indicated for concentrations less than 0.5 g/l.

#### **RILTA Environmental**

Twenty-five soil samples were submitted for detailed environmental analysis to RILTA (WAC) parameters. The results confirm that the soils can be classified as INERT with no elevated contaminant levels recorded on any of the samples submitted. Results indicate that material excavated from this site can be readily disposed of either on-site or to a licensed landfill facility.

No asbestos traces were found during routine screening.

#### **IV. Discussion:**

The new development is to be carried out on a Brownfield site located at Airton Road in Tallaght.

A comprehensive site investigation has been carried out for BMCE and Airton Road Properties Ltd. to establish design parameters for new structures and confirm that the sub soils are not contaminated.

#### Summary Stratification

The findings reflect the general stratification of the Airton Road / Tallaght area where GLACIAL TLL deposits are encountered below superficial surface soils comprising FILL / OLD TOPSOIL / RECENT SANDY CLAY OR SILT.

The glacial till comprises firm to stiff brown sandy gravelly CLAY (Brown Boulder Clay) overlying at an approximate depth of 2.00 metres very stiff to hard black silty gravelly CLAY (Black Boulder Clay or Lodgement Till)

Exploratory holes have been formed using both cable percussion and rotary drilling to depths in excess of 15.00 metres. Bedrock was not encountered within this depth zone.

Pockets or more extensive zones of GRAVEL can typically and randomly occur within the cohesive boulder clay deposits. These are generally water bearing.

Variation in the general grading pattern of the till can also occur, with a higher granular content and increased moisture content classifying the material as either clay or silt bound sandy GRAVEL.

#### Foundations

The made ground encountered over the site area is variable in both composition and compaction and no information is available as to it's origin and method of placement.

This material is therefore regarded as unsuitable as a founding medium and structural loads should be transferred to the competent underling boulder clays.

The following table outlines the allowable bearing pressures available in the various strata at various depths BGL based on in-situ test results, visual assessment of soils during trial pit excavation and consideration of the geotechnical laboratory data.

The characteristics of the local boulder clays are well documented in numerous publications. These have also been considered in preparing this report.

Page 6

#### TABLE C

Stratum	Depth	Allowable Bearing Pressure
FILL	GL to 2.00	Not Suitable
Brown Boulder CLAY	1.00 m 2.00 m	200 КРа 250 КРа
Black Boulder CLAY	2.00 m 3.00 m 4.00 m +	250 KPa 300 KPa 400 Kpa

Settlement in the glacial till under the above loads will be less than10mm in the brown boulder clay and less than 5mm in the black lodgement till.

Conventional reinforced strip or pad foundations are therefore recommended for this development. If basements are proposed the black lodgement till below 2.00 metres will be the obvious founding medium with allowable bearing pressures probabaly exceeding design requirements.

Significant ground water ingress during shallow foundation construction is not expected. Should isolated seepages occur they will be readily controlled using light pumping from local sumps.

Installed standpipes indicate that the final standing ground water level is approximately 1.20 metres BGL. This will be significant if basement construction is envisaged.

Visual inspection of all foundation excavation is strongly recommended to ensure uniformity and suitability of the founding medium. Any soft or suspect material should be removed and replaced with low-grade concrete.

#### Excavation

Trial Pit excavations were quite stable and foundation or trench excavations should remain stable during the construction period.

Statutory safety regulations should however be observed. These prohibit personnel entering unsupported excavations greater than 1.20 metres deep, irrespective of apparent stability.

The very high strength of the black boulder clay and presence of boulders may present excavation difficulties. Experienced local contractors will be well acquainted with excavation in this material and plant requirements for the purpose. Ground water and gas levels were monitored in the three installed standpipes over two site visits after completion of works. Full details are presented in Appendix II.

Water levels ranged from 3.25 to 4.40 metres BGL on the initial visit with levels rising to 2.30 to 3.80 metres BGL one month after completion of drilling. A final standing water table of 1.50 to 2.00 metres BGL can be expected and would be typical of the local boulder clay deposits.

Landfill gas concentrations were also established at both site visits. Levels for CH4, CO2, o2, CO and H2S were negligible and no issues relating to gas generation arise.

#### Roads

CBR values have been established at seven locations over the site area Tests were carried out on generally granular material (FILL) at a depth of 0.50 metres.

High values were established with an average CBR in excess of 10% indicating suitability for road or car park construction.

We would recommend careful visual inspection of excavated formation to ensure that all top soil and organic peaty soils is removed.

#### Percolation (BRE Digest 365)

Three percolation tests carried out in the gravelly boulder clay all recorded refusal. The results are typical of the highly impermeable soils of the greater Dublin area.

Disposal of storm or surface water to the local authority system of to a suitable watercourse should be considered.

#### Concrete

Low sulphate content and near neutral pH values confirm that no special precautions are required for protection of foundation concrete.

#### Environmental

Comprehensive RILTA Suite (WAC) testing confirms that the made ground and sub soil is INERT and no issues arise as to safety of personnel on site or disposal of excavated material either on or off site.

IGSL/JC July 2019

-	ر رده ا			GE	OTECHNIC	AL BORI	NG R	ECO	ORD				R	21813	l.	
co	NTRAC	T A	rton Roa	d, Tailaght							BOREHOLE NO. BH01					
			m AOD)			YPE Dando 2000 HOLE DIAMETER (mm) 200 HOLE DEPTH (m) 5.70						SHEET Sheet 1 of 1 DATE COMMENCED 27/05/2019 DATE COMPLETED 27/05/2019				
-	ENT			d Properties L	the second	the local day in the local day	MER REF. NO.						BORED BY D. Tolster			
ENG	GINEEF	Ba	rrett Mat	iony CE	ENERG	Y RATIO (%)	1010	_	-		PROC	ESSEC	BY E Kearney		_	
(m) updan				Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	tideo (	n .	Recovery	Field Test Results	Standpipe	
1	MADE GROUND comprised of: Stiff brown sandy gravelly CLAY. MADE GROUND comprised of: Firm to stiff brown motified grey sandy gravely sitly CLAY.							0.20	AA38088 AA38089	8 8	1.00			N+25 (4.6.6.6.6.7) N=14		
	a med	Very stiff to hard black sandy gravelly sifty CLAY. Ha a medium cobbie and boulder content which are >500mm in size.						2.80	AA38090	Ð	3.06			(2, 1, 2, 3, 4, 6) N = 35 (5, 7, 9, 6, 9, 6)		
									AA38391	9	4.00			N = 50150 nm (19, 6, 32, 18)		
4	0000	OBSTRUCTION End of Borehole at 5.70 m			-0-X -0-X		5.90	AA111709	8	5.00			N = 42 (7. 6. 11, 11, 10, 10) N = 50/75 mm			
	End o	(Boreho	n Ne at 5.7	0 m										(18, 28, 50)		
-		1	ORING/C	HISELLING		Water	Casi		Sealed	Ris			-	TER STRIKE DETA	ILS	
4	1000	fo (m) 4.3	(h) 1	Comments		Strike	Dep		At	To		nime min)	1	mments	_	
5		5,9	2											lo water strike		
			_			-			-	-	-	0	RO	UNDWATER PROC	3RE	
10	TALLA1	Tip Dec		op RZ Base	Туре	Date	H	ole epth	Casing Depth	P\$	oth to ater	Com				
		lan -	anned k		(Abe		1	Same	ie Legens							
								5-54RC	ile Legens (blubel pit) Noted blob Diracted contents Sam		inter Text	0.41	I - Linck Angle - Lincov I - Vilute	ebuted 100mm Daveler Woled Melm Banyte r Sample		

Appendix I Boring Records

لحت ا		GEOTE	CHNIC	AL BORI	NG R		REPORT NUMBER					
CONTRACT	Airton Ros	sd, Taliaght							BOREH	OLE NO	D. BH02	
CO-ORDINA	TES VEL (m AOD)	e	RIG TY BOREH	PE IOLE DIAMET IOLE DEPTH	1) :	Dando 20 200 1.40	000	ATE COMMENCED 28/05/2019 DATE COMPLETED 28/05/2019				
CLIENT		d Properties Ltd.	SPT HA	MMER REF.			1.40		BORED	BY	D. Toister	
Depth (m)		Description		Legend	Elevation	Oepth (m)	Ref. Number	the second se	Depth Cepth (iii)	ŝ	_	Standpipe Details
MADE GROUND comprised of Soft sandy ( sity CLAY Has a low cobble and bouider co which are >400mm in size. OBSTRUCTION: Possibly a large cobble or End of Borehole at 1.40 m		content			1.40					N=11 (2,2,1,3,5,2)		
94												
om (m) To	TA BORING(C (m) Time (h) 4 1.5 DN DETAILS ip Depth R2 1	Comments	Туре	Water Strike Date	Casin Dept	h	Sealed At Casing Depth	Rise To Dep	0	ime nin)	ATER STRike DET. Comments No water strike ROUNDWATER PRO	

	ىرى يەدە			GEO	TECHNIC	AL BORI	NG	RECO	ORD				F	21813	
co	NTRACT	r A	irton Roi	ad, Tailaght							BOREHOLE NO. BH02A				
	ORDIN/		(m AOD)	1		PE HOLE DIAME HOLE DEPTH		im)	Dando 20 200 6.10	000	SHEET Sheet 1 of 1 DATE COMMENCED 28/05/2019 DATE COMPLETED 28/05/2019				
	ENT			ad Properties Ltd.	SPT HA	AMMER REF.	MMER REF. NO. BOREL				D BY D. Toister				
	AMEER		arrett Mal	hony CE	ENERG	SY RATIO (%	)		1	Sar	PROC nples	ESSEC	DBY	E Kearney	-
Depth (m)		Description pusces (III) Up to the company of the c						Ref. Number	Sample Type	Depth	(m) Recovery	Recovery	Field Test Results	Standpipe	
0 11 2 3	silty CL	AY F	UND com las a low 00mm in	prised of: Soft san cobble and bould size.				AA30092	0	1.00			N=7 (3,4,2,2,1,2) N=3		
	Cliff on		ander				2.70						(0, 0, 0, 0, 1, 2)		
3	Has a >500m	mediu	m cobble	wn sandy graveliy and boulder conit	×			AA36094	8	3.00			N=25 (11, 6, 4, 6, 8, 10)		
	Has a r	ry stiff to hardblack very sandy gravelly sity CLAY. s a medium cobble and boulder content which are 00mm in size.						3.90	AA38095	в	4.00			(0, 13, 15, 12, 12, 14).	
5						× 9- × -9-			AA38066	6	500			N = 48 (5, 14, 10, 10, 15, 11)	
5	OBSTR End of		ON ole at 6.1	10 m		20	-	6,10						N × 50/150 avn (12, 18, 27, 23)	
7															
HAF	ED STR	ATA B	And in case of the Owner,	HISELLING									WA	TER STRIKE DETA	JLS
4	A	4.4	(0)			Water Strike 4.00	Cas Dep	dh	At	Ris		Time (min) 20	1	omments Seepage	
5.5	3	5.4 0.75										20		verballe	
						-	1	tole	Casine	L Pr	othete		the states	UNDWATER PROC	RE
	ate			op IRZ Base	Туре	Date		epth	Cásing Depth	- No	oth to ater	Comr	ment	5	-
REM.	ARKS	CATS	canned k	ocation.			-	Samp 0 - Small 5 - Sup 1	ie Legens Ostated (ub) National Planted	5		0	t over	logvided 100kmir Dameter dursed Picton Sample el Sample	

1	ر بەق			GEOTE	CHNIC/	AL BORI	NG F	RECO	ORD				5	21813	
co	NTRAC	T A	irton Roa	id, Tallaght						- 1	BORE		NO.	BH03	
		ATES	(m AOD)			HOLE DIAMETER (mm) 200						DATE COMMENCED 31/00 DATE COMPLETED 04/00			
-	ENT			d Properties Ltd.		interioce ber mility 0.45						DBY	LEI	ED 04/06/2019 D. Toister	-
	SINEER		arrett Mal		10.71006.000	Y RATIO (%)					PROC		D BY		
(m) under			ĝ	Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Sample Sample	Depth	Ē	Recovery	Field Test Results	Standpipe
0		ACAD		mprised of CL804 sto	ana fill with		-	0.10				1			01
1	cobbl	es)				******	-	0.50	- 1						
	Patro	BueAubuc	wn SiL n	CLAY with some gra	ivel				AA117458	Đ	1.00			N = 18 (7,3.3,4.5,5)	
	Firm dark brown/grey gravely CLAY Very stiff to hard black sandy gravely CLAY with angular cobbles					10	1.40						3152375382 C		
,						0.0		1.90	AA117459	n	2.00			N= 34 (4, 3, 6, 6, 10, 10)	
						0 0 0 0			AA117470	8	300			N = 55  4, 8, 12, 14, 14, 15)	
									AA117471	8	4.00			N = 54 (8, 0, 15, 10, 12, 17)	
						10°0			AA117472	8	5.00			N = 63 (6, 12, 14, 18, 18, 12)	
	00007	RUCTIO				0.0		6,40	AA117423	8	6.00	6		N = 59/75.mm (76, 50)	
			ole at 6.4	0 m											
IAI	- T		ORING/C	HISELLING		Water	Cas	ing 13	Sealed	Rise		Time	-	TER STRIKE DETA	ULS
om 5	2.0.5	To (m) 5.3	(h) 1.5	Comments		Strike 4.00	De 4.0	pth	At No	To 3.50	1.0	min) 20	C	omments Slow	
5.	7	5.8 6.4	0.5 1.5					50 C		3.36		20		ALC: NOTE	
										-			GRO	UNDWATER PROC	SRE
-10		TION DE	100000			Date		Hole Nepth	Casing Depth	Der	oth to ater	Com			
C	ale	Tip De	pth RZ 1	op IRZ Base	Туре	31-05-19 04-06-19	1	5.00 5.00	5.00 NE	- 4	00	End of End of	1st Da DH	ay	
EN	ARKS	CATS	canned le	scation and hand du	g inspection	pit carried ou	t	Samp C- Small	le Legend Desired table Rocked Tabletation Scotter Stream (Second	9 9 2		L.	r . Use	Solwied 100mm Diameter dia bed Police Sample e Dample	

đ	5		GEOTE	CHNIC	AL BORI	NGE	FCC	RD				F	REPORT NUMBER	
1	531		GLUIE	.ormio/	L DOIN								21813	_
CON	TRACT	Airton R	load, Tallaght							BORE		NO.	BH04 Sheet 1 of 1	
	ORDINATE		D)		PE IOLE DIAMET	Dando 20 200 6.40	00	DATE COMMENCED 30/05/20			ED 30/05/2019	1		
CLIE		Airton R	oad Properties Ltd.	-	AMMER REF.		-			BORE	DBY	D. Totster		
ENG	INEER	Barrett A	tahony CE	ENERG	Y RATIO (%)			-		PROCE	ESSEC	BY	F.C	
Depth (m)			Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth	nu	Recovery	Field Test Results	Standpipe
0	Termacad					5	0.10	-		-	-	-		
	Firm brow	n sandy S	Comprised of CL 804 st SILT/CLAY with some fi	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1.60	AA105095	D	1,00			N # 24 (3.5, 5, 5, 5, 6)		
	Very stiff t cobbles	arewn gra	velly CLAY with occasi	0 0 0 0		2.80	AA 100C97	B	2.00			N = 44 (6, 7, 8, 12, 11, 12)		
3	Hard blac cobbles	k sandy g	ravelly CLAY with large	0000		2.00	AA106008	в	3.00			19 = 48 (6, 8, 13, 12, 12, 11)		
4				01010			AA106099	8	4.00			17, 11, 15, 15, 16, 18)		
5					0.010.0			AA 106100	Ð	6.00			N = 56 (9, 14, 10, 54, 54, 18)	
	Obstructio End of Bo		5.40 m		0.0	_	6.40	AA105101	8	8.00			N = 60(75.mm (75, 50)	
7														
9														
HAR	DSTRAT		CHISELLING									WA	TER STRIKE DETA	ul.s
rom	1.04	1.05	<sup>0</sup> Comments		Water Strike	Cas		Al	Rise		(min)	Ċ	omments	
3.1 5.6 6.3	5.8		5		2-0/04/01	-		- 7.54			1990		lo water strike	
	-		4		_							GRO	UNDWATER PROC	RE
0.2520	ALLATION ate Tip		2 Top R2 Base	Туре	Date		tale epth	Cesing Depth	2	oth to ater	Com	ment	5	
REMA	ARKS CA	T scanned	flocation and hand du	g inspection	pit carried o	sut .	Sampi o Senili 5-Susc	le Legend Diversioner But Decree	1		, in the second s	17 - Und Sample	Issuites 100em Durrent Autor Palor Secole d'Angle	

200	لرب دوه			G	EOTEC	HNICA	L BORI	NG F	RECO	ORD				F	21813	
CO	NTRACT	T Airt	an Roa	d, Tallaght	)						1	BOREHOLE NO. BH05				
co.	ORDIN	ATES		and the second		RIG TYP							SHEET Sheet DATE COMMENCED 28/05/2			
GRØ	OUNDL	EVEL (n	AOD)			BOREH	OLE DIAMETER (mm) 200 DLE DEPTH (m) 8.30						COMP			
CLI	ENT	Airt	on Roa	d Propertie	s Ltd.	- Antonio -	AMMER REF. NO.						D BY		D, Tolster	
N	INEER	Bar	rett Mah	ony CE	····	ENERG	YRATIO (%)			_	_		ESSEE	BY	E Kearney	
Depth (m)			t	Description			Legend	Elevation	Depth (m)	Ref. Number	Type a	nples Htdag	Ē	Recovery	Field Test Results	Standpipe Details
1	MADE GROUND comprised of: Firm brown sandy gravelly sitly CLAY, MADE GROUND comprised of: Firm to stiff brown sandy gravelly sitly CLAY. Has a low cobble content								1.10	AA11401	8	10	,		N = 22 (2. 5. 6, 6, 6, 4)	
2									2,90	AA11402	в	2.0			N = 10 (2.2.4.4.5.6)	
•		Very stiff dark grey sandy gravely sity CLAY. Has a low cobble and boulder content which are >400mm in size. Very stiff to hard black sandy gravely sity CLAY. Has a low cobble and boulder content which are >500mm in size.							3.40	AA11400	в	3.0	2		N = 53 (8, 7, 13, 16, 14, 10)	
•	a low o									A& 11404	в	4.0			N = 37 (5, 4, 7, 9, 10, 11)	
							×			4411405	8	50	ř.		N = 50150 mm (8, 11, 18, 34)	
6							×			AA11406	в	6.00			N = 55 (8, 11, 12, 14, 13, 16)	
							X9 - X - 0			AA31407	•	7.00	2		(8, 10, 12, 14, 12, 13)	
e 7	End of	Borehol	e at 8.3	0 m			-0-X		8,30	AA11408	0	8.03			N × 50/225 mm (16, 9, 20, 22, 0)	
4	RD STR	ATA BO	RING/C	HISELLING										WA	TER STRIKE DETA	MLS
on	1 (m) T	io (m)	Time (h)	Commen	is.		Water Strike	Cas	oth	Sealed	Ris To		Time (min)	1	omments	
5	3.2 3.5 0.5 5.2 5.4 0.75 3.1 8.3 2				0.5 0.75		6.50		50	6.70	5.8		20	1	Voderale	
_							-	1	- I.,		-			GRO	UNDWATER PROC	GRE
100		ION DET					Date		Hole Dépth	Casing Depth	P.	pth to Vater	Com	men	fs	
1	Jate	Tip Dep	RZT	op RZ Ba	se Ty	pe	-									
EN	ARKS	CAT SC	anned lo	ocation.			1		Samp D-Small	lle Legend Osatel ka Deuted p D-A Deuted p D-A Deuted averenal tary	-			JF - Un Lunicie	daluradi 190mm Diameter du Gert Proven Dangiti dr Dangek	

نے دور	لىر دو		GEOTE	CHNICA	L BORIN	IG F	ECC	RD				RE	21813	
CONTR	1920	Virton Roa	d, Tallaght							BORE		NO.	BH06	
	DINATES	(m AOD)	x	RIG TYP BOREH BOREH	PE OLE DIAMET OLE DEPTH	ER (m	m) :	Dando 20 200 5.60	00	DATE DATE	COMM		Sheet 1 of 1 D 30/05/2019 D 30/05/2019	
CLIENT	1947 - 1978 - 1978 1979 - 1979 - 1978		d Properties Ltd.	SPT HA	MMER REF.					BORE			D. Toister	
ENGINE	ER E	larrett Mah	iony CE	ENERG	Y RATIO (%)	-		1		PROCI	ISSED	BY	F.C	-
Depth (m)		i	Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth		Recovery	Field Test Results	Standpipe
	AY with s	ome cobb	mprised of brown sar les } dy SiLT/CLAY with s				1.30	44114409	в	100			N= 13 (3.3.4.4.4.3)	
		nai cobble		and and a			2.90	AA 154210	6	2.00			N=21 (2.2.4.5.6.6)	
60	ry stiff to I me cobble	hard black is and occ	sandy gravelly CLA asional boulders	Y with	10.00 000 00			AA154611 AA154612	B U	4.00			N = 32 (7. 7. 8, 8, 9, 9) N = 44 (10. 6, 11, 10, 11, 12)	
5								AA114413	0 11	5.00			N = 46 (12, 13, 56, 8, 10, 12) N = 50/225 ann (10, 19, 12, 15, 23)	
o o o b En	struction d of Borel	hole at 6.6	10 m		66		6.60	_						
	1	BORING/C	HISELLING		Water	1 Cas	ing [ ]	Sealed	Ris		Time	T.	ER STRIKE DET	AILS
from (m 3 4.5	i) To (m) 3.3 4.7	(h) 0.5 0.5	Comments		Strike 6.00	De:	th	At No	To 5.3	6. 174	(min) 20	1.20	mments oderate	-
6.4	6.6	2												
					2018-00-1	1.	iole	Casing	De	oth in	1		INDWATER PRO	GRE
Date		epth R21	Top IRZ Base	Туре	0.05-19		epth 6.03	Depth		pth to later 5.00	Com	12.11		
REMAR	KS CAT	scanned k	ocation and hand du	g inspection	pit carried ou	t.	0-5440 9-5440	le Legend Disturber (143) Polarber • Due Disturbed • Due Disturbed		- Yat + Tuk	1000	T - Londe antiple - Lincoles C - Water	ruted 100mm Diameter astad Pissio Sancia Sange	

~	 551	-			GE	OTECH	INICA	BORI	NG F	RECO	ORD				F	21813	ł
- 6	TRAC	T A	inton	Road, T	alleght								BORE		NO.	BH07	-
		ATES		0.01				LE DIAMET		im)	Dando 20 200	00	DATE (	COMN			
-	ENT	LEVEL	-		roperties LM	ii.		LE DEPTH MER REF.			7.40	-	BORE		LE	D. Toister	
	INEEP			Mahony				RATIO (%)		-		_	PROCE	2000	) BY		
Ē									c	Ê			nples	-	>	4	*
neptu V				Des	cription			Legend	Elevation	Depth (m)	Ref. Number	Sample	Depth	1	Recovery	Field Test Results	Standpipe
1		ACAD		-					-	0.10	1	1			-		1
					LAY with so			x x 		1.50	AA114415	8	1.00	1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 -		N = 17 (3, 2, 3, 4, 5, 5)	
	occa:	sional co	obble	15	.T/CLAY wi			O Ro A		2.60	AA114416	Ð	2.00	ŝ		N = 21 (5, 3, 3, 7, 6, 8)	
	some	still to h cobble	ard n s ann	d occasi	dy veryy gri onal boulde	avelly CL/ Hs	vy with				AA318437	B	3.00			% = 44 (8, 7, 10, 10, 14, 10)	
											AA114418	3	4.00			N = 50 (8, 13, 13, 10, 14, 13)	
											AA114419		3.00			N=43 (8, 7, 7, 9, 12, 16)	
											AA114420	Ð	6.00			N = 65 (4, 12, 19, 15, 10, 16)	
								25		7.40	44114421	я	7.00			N = 58 (8, 12, 11, 17, 13, 15)	
		uction of Boreh	ole :	at 7.40 m	1												
A	RD ST	RATA E		NG/CHIS											WA	ATER STRIKE DET	AILS
		To (m)	1	107	omments			Water Strike	De	oth	Sealed	Ri	2	Time (min)	1.5	Comments	
3.57	2	3.4 5.5 7.4	1.1	1 1.5 2				4.30 5.50		30 50	4.50 7.00	3.6		20 20	1	Moderate	
				-		_		-	1	1	10		-		GRC	DUNDWATER PRO	GRE
		TION D			03.0		-	Date		Hola Depth	Casing Depth	9	opth to Vater	Com	men	nts	_
- 0	Jate	TID De	pus	NZ TOP	RZ Base	Тур	e	-									
EN	ARKS	CATE	can	ned loca	tion and ha	nd dug in	spection p	it carried o	ut.	Same	Die Legen Disustes nuk Disustes piek Diruste wonnertil Se	3			UT - Un Sample	sparpled 100em Clander Social Sect Rates Netwood Factor Rates Net Salepa	-

Appendix II Rotary Core Records

-	5 % 199	5 . I			GEOT	ECł	INIC	CAL CO	RE LOO	RECO	RD	£				т NUM 2181	
00	NTR	ACT	A	inton	Road, Tallaght							DRIL	LHOLE	NO	RC	01 et 1 of	•
				(mO	D)			RIG TYPE FLUSH			Geo 305	DATE	DRILL		28/	05/2019	2
CLI	GINE		A	intorn	Road Properties Mahony CE	Ltd.		INCLINATI	ON (deg) METER (m	m)	Ain/Mist -90 78	100000	LED BY GED BY			3SL ).O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.0.D.%	Fracture Spacing Log (mm) c 250 500	Non-Intact Zone	Legend	20		Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	1,50	0	0	0			8 0 N 0 0	SYMMET as sandy	RIX DRILL gravelly CL	ING: No rec AY with occ	overy, obse casional cot	eved by d obles	riller				No. 20
2	3.00	0	D	o			A D D D D										N = 30 (6, 7, 5, 2, 4) N = 35
4	4.50	0	a	0			10 010 01 01										(2.4, 8, 11, 8) N = 27
5	6.00	D	a	0			010,010,010										0.6.7.9. 7) N=45
7	7.50	0	٩	0			100 01 0 10							7.50			(0, 11, 22, 4, 9)
п		47	o	o			0,040,14	subround	d cobbles.	slightly sar Sand is tine carse of tim one	. Gravel is :	angular to	h	9.00		munuum	N = 29,60 n (25, 23)
0	9.00	0	0	0			del did	SYMMET as gravel	RIX DRILL y cobbly Cl	ING: No rec LAY	overy, obse	arved by d	niller				
	MAR	-	0.00-	12.00	Im.	_	-		Water	Casing	Sealed	Rise	Time	1	TER S		DETAILS
									Strike 8.50	Depth 8.50	No	To	(min)		Slow		
														GRO	DUND	WATE	DETAIL
NS	TAL	LATI	OND	ETA	LS				Date	Hole Depth	Casing Depth	Depth to Water	Corr	ment			
	Date -05-1	11		epth	RZ Top RZ Base 1.50 12.00		Typ 50mm			- MARKAI	College .						

	£ 30	7			GEOT	ECI	HNIC	CAL CO	RE LOO	RECO	RD			R		т NUMI 2181	
<u></u>	NTR	20	A	irton R	load, Tallaght							DRIL	LHOLE	NO	RC	01	
co	OR	DINA'	TES					-				<b>Notestation</b>	E DRILLI	ED		et 2 of 05/2019	
			-	(mOD)				RIG TYPE FLUSH			Geo 305 Air/Mist		LOGG			06/2019	é
	GINE				oad Properties I Ashony CE	Ltd.		CORE DIA	ION (deg) METER (m	m)	1-90 78	10.0400	LED BY GED BY			3SL 1.O/She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.0.D%	Fracture Spacing Log (mm) 250 505	Non-intact Zone	bregend			Descrip	lian	Y		Depth (m)	Elevation	Standpipe Details	SPT (N Value)
15	10.50	a l			9		00	SYMMET as gravel	RIX DRILL y cobbly C	ING: No red LAY (contin	covery, obsi ued)	erved by d	riller			0 10 0	
'n		o	0	0			NU 00010					E.		2000			N ± 65 (9, 11, 17, 50, 19
13 13 14	12,00	100	0	Q			9 9	CLAY, Sa	to hard, me rid is fine. of limestor	dium brown Gravel is an 10.	n slightly sa ngular to su	ndy grave brounded	By .	12.00		T.	N = 51 (7, 4, 11 59, 17
13	13.50						0						1000	13.50			
								End	of Borehold	e at 13.50 m	1			100.000		1	
14																	
15									а.								
18												8					
17																	
18																	
18					i.				<b>3</b> .								9
-	MAR	and strength							141-2	Carlos	Caster	0	-	WAT	TER S	TRIKE	DETAILS
Holi	e cas	ed 0	.00-1	2.00m					Water Strike 8.50	Casing Depth 8.50	Sealed At No	Rise To	Time (min)	Co	mmer Slow	265	
_	107.77		_						1	Hole	Casing	Danit 1				WATER	DETAIL
INS	Date			ETAILS	3 Z Top   RZ Base	-	Typ	10	Date 28-05-19	Depth 13.50	Depth 12:00	Depth to Water 4.75	Com	ment	· · · ·	at 5 prime -	ther end of

-	<u>د ا</u>	-			GEOT	ECI	HNIC	CAL CORE	LOC	G RECO	RD					181	
co	NTR	ACT	1	irton	Road, Tallaght							1.2382	LHOLE	NO	RC		2
			1033755	(mO	Di			RIG TYPE			Geo 305		E DRILL LOGG		23/0	et 1 of 15/2011 15/2011	9
cu	IENT	0.	A	arton	Road Properties I Mahony CE	Lid.	ļ.	FLUSH INCLINATION CORE DIAME	10000000	im)	Air/Mist -90 78	0.000	LED BY			SSL	18
<ul> <li>Downhole Depth (m)</li> </ul>	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.0.D.%	Fracture Spacing Log (mm) 250 500	Non-intact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
	1.50	o	Ø	o				SYMMETRIX as very sand	( DRILL y grave	ING: No rec Iy CLAY wit	overy, obs h occasion	erved by d al cobbles	rillor				
2	1.30	C	o	0			da bi bi ab	SYMMETRIX as sandy gra	( DRILL velly CL	ING: No rec AY with occ	overy, obs asional co	erved by d bbles	riller	1.50			N = 24 (3, 4, 4, 4, 7)
4	<u>3.00</u> 4.50	a	0	0			del a ko lor	SYMMETRIX as very sand	ORILL y grave	ING: No rec ly CLAY wit	overy, obsi h occasion	erved by d al cobbles	riller	3.00			N = 33 (12, 9, 7, 31, 7)
5	8.00	0	0	0			01010 610 K										N - 29 (6.5.5.9, 9]
2	7.50	0	0	0			N-DFO DFO										N = 48 (7.6, 7, 1 11, 20)
		0	0	0			0.0.0.0										N = 52 (5, 5, 6, 1 14, 22)
9	9.00	0	0	O			Nd 100 000	SYMMETRIX as GRAVEL	DRILL	ING: No rec	overy, obse	arved by d	riller	9.60			N + 54 (4, 19, 11, 14, 12)
lok	MARI e cas	and 0	00-1	2.00	im.				Vater	Casing	Sealed	Rise	Time	100-	mmen	11	DETAILS
25	-24		0.5						Strike 9.60	9.60	No	То	(min)	5.541	Slow	<u> </u>	
		_						1						GRO	UNDV	NATER	ROETAILS
NS	TAL			ETAI					Date	Hole Depth	Casing Depth	Depth to Water	Com	ments	-	ana orta	
1	Date	3	ip Di	apth	RZ Top IRZ Base	-	Typ	e									

-	E ja	1			GEOT	ECI	HNIC	CAL COF	RE LOO	RECO	RD			R		г NUM 2181	
- 22	NTR	2.	A	irton	Road, Tallaght							DRILL SHEE	HOLE	NO	RC		
	-ORE			(mOE	n			RIG TYPE			Geo 305	DATE	DRILL		23/0	5/2011	9
CLI	ENT		A	inton I	Road Properties   Mahony CE	Ltd.		INCLINATIO		m)	Air/Mist -90 78	100000	LED BY GED BY			O'She	98
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Specing Log (mm)	Non-Intact Zone	Legend		t	Descript	ion			Depth (m)	Elevation	Standpipe Detaits	SPT (N Value)
10	10.50						000	SYMMETR as GRAVE	lix dhill. L (continu	ING: No rec 6d)	overy, obsi	arved by di	illor				11.3350
"		0	0	0			000000										N = 31 (2, 3, 7, 5, 30)
17	12,00	ġ.	-	_			00	End o	f Borehold	at 12.00 m	6		4	12.00			N=25 (5.5.5.5
°13													201				80
14								e.									
16																	
17																	
18																	
10																	
1	ł																
	MAR		-	_		_								WAT	ER SI	FRIKE	DETAILS
Hole	e cas	ed 0	.00-1	2.00r	n.				Water Strike 9.60	Casing Depth 9.60	Sealed At No	Rise To	Time (min)	Co	mmen Slow	ts	4
								+		1	ana ana di		10	GRO	DUNEN	NATER	DETAIL
INS	TALL			ETAIL					Date	Hole Depth	Casing Depth	Depth to Water	Com	ments	5		
1	Date	T	lp De	ipthi i	Top RZ Base	-	Ţ'n	90	29-05-19	12.00	12.00	3.75	Water drilling	levvali na	conted a	d 5 mirrs	after and of

		5 1			GEOT	ECI	HNIC	CAL CO	RE LOO	G RECO	RD					181	
01	TR/	ACT	A	inton	Road, Tallaght							226732	HOLEN	10	RC		2
2	ORD	ANA.	TES	2								DATE	DRILLE	D		st 1 of 6/2019	
-		DLE	VEL	(mO	D)			RIG TYPE FLUSH			Geo 305 Air/Mist	- 2007 <i>/</i>	LOGGE		1000	6/2019	
	INE	ER			Road Properties Mehony CE	.td.		INCLINATI		m)	-90 78	100000000000000000000000000000000000000	ED BY			SL O'She	а
T	Ê						Γ				- Aliante in						[
had and an anomalance	Core Run Depth (	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Spacing Log (mm) 9. 250 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
I							0.0			ING: No rec AY with occ			ller				
		0	0	0			8										
	.50						Pole t							.50	2		
ſ							0.00	SYMMET as sandy	RIX DRILL GRAVEL	ING: No rec	overy, obs	erved by dr	ller				N = 25 (3, 7, 9, 5, 5, 7]
		0	0	0			00										035
	100				-		00										
ľ							20										N = 37 (2. 2, 14, 7, a 8)
	2	0	0	0			00										
							00	1									
ľ	1.50		-				0000										(3, 2, 3, 4, 3, 4)
		a	o	0			00										4
		e					00										
ľ	5.00	-	-				0000										N=15 (2.2,2,3,5,
		O.	0	0			0.00								1		8)
							0.00										
1	7.50	-					000										N = 22 (3, 4, 5, 5, 6, 5)
		0	0	0			000										6)
		1	2.05				00										
1	2.00	-	-				00										N = 12 (2, 2, 2, 3, 3, 4)
		0	0	0			0000										4)
N	IARI	cs			L		100	1				Pri		WAT	ER ST	FISKE	DETAILS
le	cas	ed 0	00-1	2.00	)m.				Water Strike 1.90	Casing Depth 1.90	Sealed At No	Fise To	Time (min)	Co	mmen Slow	IS	
									1.90	1.50	NU				31011		
										Section of the		1		GRO	UNDY	VATER	DETAILS
		-		ETA					Date	Hole	Casing	Depth to Water	Com		-		*********

	e-1,	4			GEOT	ECI	HNIC	CAL CORE LO	OG REC	ORD				R	99522315 		3.085 2.085
	SS	Z.,	A	irtan	Road, Tallaght							32120	LHOLE	NO	RC		
co	ORE	INA	TES	-		_					-	SHEE	1000			st 2 of	10
GR	OUN	DLE	VEL	(mOt	D¥			RIG TYPE FLUSH		Geo S			LOGG			6/2011	
CLI	ENT		A	inton	Road Properties	Ltd.		INCLINATION (deg		Air/Mi -90	sl	DRIL	LED BY	1	IG	ISL	
	INE	ER	8	arrett	Mahony CE	-	r	CORE DIAMETER	(mm)	78		LOG	GED BY	-	D	O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	SCR%	R.O.D.%	Fracture Spacing Log (mm) p. 250 500	Non-Intact Zone	Legend		Desc	ription				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	0.50	11					000	SYMMETRIX DR as sandy GRAVE	LLING: No	ecovery,	obse	rved by di	rillar				0.00
-13	0.30	0	0	٥	× (		000000000000000000000000000000000000000	1									N = 32 (4, 7, 7, 8, 9)
12	12.00	į.,					0.0						/	12.00			
12								End of Borel	nole at 12.0	m (							N 0 24 (3, 3, 3, 5 9)
																	244
я																	
		ģ												- 3			
14		2															
14		i j															
- A. C. I.					ŵ.												
15																	
16																	
17																	
18																	
19																	
														177,81.7			
-	AR	and the second second	00.4	2.00				Wate	r Casing	Seale		Rise	Time	1.000			DETAILS
TON	a CBS	90.0	-00-1	2.00				Strike 1.90	Depth	At		To	(min)	Co	mmen Slow	ts	
									100	1					200		
														(PP)	VIRGINI	MATER	DETAIL
				_						-			100	LANIL	VOINDA	AIC	DETAIL
NS	TAL	ATIC	ON D	ETAI	LS			Dat	e Hok Dep		ng	Depth to Water	Com	ments	6		1000000000

	1 1 1 1 1 1 1	4			GEOT	ECI	HNIC	CAL CO	RELOO	RECO	RD			RI		181	
co	NTRA	ACT	A	irton	Road, Tallaght							1.11.11.11.11.11	LHOLE	NO	RC	20.000	
	ORC							RIG TYPE			Geo 305	100,000	et E daille E logg		04/0	et 1 of 18/2011 16/2011	9
-	OUN	DLE			D) Road Properties	w.	-	FLUSH	ON (den)		Ain/Mist -90		LED BY	e que su	2006	SL	
1000	INE	ER			t Mahony CE	State -		CORE DIA		m)	78	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	GED BY		2.578	O'She	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Spacing Log (mm) p. 250 spa	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0	1.50	o	o	0			00000000	SYMMET as sandy	RIX DRILL GRAVEL	ING: No rec	overy, obsi	rved by d	riller	1.50			
z	3.00	¢	o	0			10, DI 0, DI 0	SYMMET as sandy (	RIX DRILL gravelly CL	ING: No rec AY with occ	overy, obsi casional col	erved by d obles	riller	1.00			N = 19 [2, 3, 3, 4, 7 9]
•	4.50	o	o	o			010101010							4.50			N # 16 (3.3.3.3.1 5)
5		0	0	o			0000	SYMMET as cobbly		NG: No rec	overy, obsi	erved by d	riller	3.00			N = 14 (8, 2, 4, 3, 1 4)
7	6.00	•	Q	٥			00000					-		0.00			N = 18 (3, 8, 4, 4, 5 0)
	7.59	õ	o	0			02000	SYMMETI as cobbly		ING: No rec	overy, obsi	M. Stanger	ritler	7.50			N = 36 (5.7, 11, 8, 9)
0	9.00	0	a	o			00000000	SYMMETI as GRAVE	rix drillu El	ING: No rec	overy, obsi	arved by d	riller	9.00			N = 29 (4, 0, 8, 9, 9 11)
Tel	AR	(S	.00-1	2.00	lm.				Water	Casing	Sealed	Rise	Time	1 1 2 2 3			DETAILS
	- usla						Ð		Strike 8,50	Depth 8.50	At No	To	(min)	-	Slow	115	
														GRO	UNDA	VATER	RDETAILS
NS	TALL								Date	Hole Depth	Casing Depth	Depth to Water	Corr	ments			
	)ate	T	ip De	apth	RZ Top RZ Base		Typ	e									

~	r h	A			GEOT	ECI	HNIC	CAL COF	RELOG	RECO	RD			R		181	
123	SS NTR/	1	A	iton F	Road, Tailaght							DRILL	LHOLE	NO	RC		
		INAT		(mOD	0			RIG TYPE			Geo 305	DATE	DRILLI LOGGI		04/0	6/2019 6/2019	1
CLI	ENT	6.11	A	irton F	, Road Properties I Mehony CE	.td.		INCLINATIO		m)	Air/Mist -90 78	C 5527	LED BY GED BY			ISL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	SCR%	R.O.D.%	Fracture Spacing Log (mm) 250 spo	Non-intact Zone	Legend			Descript	ion	0 10		Depth (m)	Bevation	Standpipe Details	SPT (N Value)
10	10.50	0	0	0			000000000000000000000000000000000000000	as GRAVE	L (continu IIX DRILLI	NG: No rec ed) NG: No rec				10.50			No 43 (5, 6, 6, 1 12, 12)
12	2.00	-	_	_			5	End o	f Borehole	at 12.00 m			_	12.00	100		N = 32 15, 7, 7, 7, 93
13																	
												3					
14																	
15																	
18													Ì				
17																	
											<u>(</u>						
18							17										
10																	
REN	AFI	cs			1	_		L			_			WAT	ER ST	RIKE	DETAILS
iole	e cas	ed 0	.00-1	2.00n	n,				Water Strike 8.50	Casing Depth 8.50	Sealed At No	Rise To	Time (min)	Co	mmen Slow	ts	
_							_			11				GRO	UNDV	NATER	DETAIL
				ETAIL			-		Date	Hole Depth	Casing Depth	Depth to Water		ments			
-	Date	T	ip De	epth F	IZ Top IRZ Base	-	Ty	0e	04-05-19	12:00	12.00	4.90		leval ro	conded a	t 5 métai	atter ent of

24	53	4			GEOT	EC	HNIC	CAL COR	ELOO	G RECO	RD					181	
01	VTR	ACT	A	irton	Road, Tallaght							DRILL SHEE	LHOLE T	NO	RC	05 at 1 of	2
				(mOl				RIG TYPE			Geo 305	DATE	DRILL		30/0	5/201	9
	ENT	DLE			Road Properties	Lid.		FLUSH	N (dec)		Air/Mist -90		LED BY	5.02	1874.0	iSL	
T	INE	ER	8	anett	Mahony CE		-	CORE DIAM	ETER (m	m)	78	LOGO	ED B	-	D	O'She	ia
- 1	Core Run Depth (m)	T.C.R.%	SCA%	R.O.D.%	Fracture Spacing Log (mm) p 250 500	Non-trisact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
	1.50	٥	0	0			P10-010-010	SYMMETRI as sandy gr	avelly CL	ING: No rec AY with acc	overy, obs asional col	nved by dr bles	iller				
	3.00	٥	0	0			0.010										N+21 (3.3.4.5. 6)
	4.50	0	o	0			NO PRO 10 DI										N = 30 (9, 12, 7, 7 10)
	8.00	0	٥	0			010 010 010		R								N = 38 (4, 4, 5, 5, 14)
	7.50	O	ø	o			000100										19, 11, 10, 11, 52)
i.		a	o	ø			A PAPIS										N = 47 (7, 7, 7, 1 12, 14)
	9.00	0	0	0			FID 0 0	SYMMETRI as very san	IX DRILL dy gravel	ING: No rec ly CLAY wit	overy, obse h occasions	arved by di al cobbles	iler	9.00			N = 65 (9, 12, 38, 10, 15)
EN	AR	KS and 0	.00-	12.00	lm.	-		-	Water	Casing	Sealed	Rise	Time		mmen	ana mana a	DETAILS
1			000						Strike 6.90	Depth 8.90	At No	To	(min)		Słow		
									1			100000		GRO	DUND	NATE	R DETAILS
451	TALL			ETAI		23	_		Date	Hole	Casing Depth	Depth to Water	Corr	menta	B.		
	Date	T	ip D	epthi	RZ Top. RZ Base	2	Ţy	8									

~	6 ] (33	2			GEOT	ECI	HNIC	CAL COF	RE LOG	RECO	RD			R		181	
co	NTRA	ACT	A	irton	Road, Tailaght							1.000	LHOLE	NO	RC	7.792 Aug	
co	ORD	ANA	TES				1					DATE	DRILL	ED		at 2 of 5/2019	
	-	D LE	VEL	(mOl	0			RIG TYPE FLUSH			Geo 305 Air/Mist	DATE	LOGG	ED	31/0	5/2019	1
	ENT	ER			Road Properties I Mehony CE	Ltd		INCLINATIO		m)	-90 78	1200162	LED BY GED BY			SL O'She	
Ê	Ê		2.0				Γ.					1.55.55					
Downhols Depth (m)	Core Run Depth ()	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Spacing Log (mm) p 250 soo	Non-Intact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50	ļ,					19	as very sar	ndy gravel	NG: No rec y CLAY wit	overy, obse h occasion:	erved by di al cobbles	niller				
	10.50	1					0 10	(continued)	1	*							N=27 (17, 12, 6, 7, 7)
11		0	0	0			00010						0.040				7,7)
12	12.00	9	_	-			9	Very still to	hard me	dium brown	sightly on	ody orausi		12.00			N= 2950
								CLAY, Sar to coarse of	id is fine. (	Gravel is an	gular to sut	prounded (	ine				(27, 29)
		0	0	0			0.10						- 7				
13	3.50	_					0										
	3.70	0	0	0			-0	End o	f Borehole	at 13.70 m			17.0	13.70			
54													2				
					1								ī				
18		Š.															
				3													
16																	
					Ē												
17									9								
					1				1								
18																	
19																	
REA	AAR	s	_	_		_					w			WAT	ERS	RIKE	DETAILS
lole	e cas	ed 0	.00-1	2.00	AI.				Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mmen	ts	
									6.90	8.90	No				Slow		
								-						GRO	UNDA	VATER	DETAIL
NST	TALL			ETAI					Date	Hole Depth	Casing Depth	Depth to Water		ment			
_	Date	T	ip De	ept?r	RZ Top RZ Base		Typ	8	31-05-19	13,70	12.00	4.50		lovel re-	corded a	t 5 mine	ahar and of

-	e -				GEOT	ECI	HNIC	CAL CO	RELOO	G RECO	RD			R		181 2181	
0	NTR	ACT	A	inton	Road, Tallaght							DRIL	LHOLE	NO	RC		2
		DINA		(mO	D)	2311		RIG TYPE			Geo 305	DATE	DRILL		06/0	et 1 of 26/2019 26/2019	1
:	ENT		A	inton	Road Properties Mahony CE	Ltd.		FLUSH INCLINATI CORE DIA	ON (deg) METER (m	m)	Air/Mist -90 78	10000	LED BY GED BY			35L ).O'She	a
now	Core Run Depth (m)	T.C.R.%	SCR%	AQD%	Fracture Spacing Log (mm) p 250 500	Non-Intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	1.50	ø	0	o			10-00 0H 0-10			ING: No rec AY with occ			riller				
	3.00	o	D	a			0 0 0 0		a) A								N = 28 (7, 2, 3, 14, 4)
2	4.50	0	a	o			10-01 010 0			<u></u>				4.50			N = 23 (3, 3, 3, 3, 3 5)
	6.00	a	٥	o			D D D D C	as very sa	ndy gravel	ING: No rec ly CLAY wit	overy, oos h occasion	erved by di ai cobbies	hier	6.00			N = 24 (2, 3, 4, 4, 1 6)
		0	Q.	0			000000000	SYMMET as claysy	RIX DRILLI GRAVEL	ING: No rec	ovary, obsi	erved by d	iller		31		N = 25 (3.4,4,5,6 7)
•	7.50	0	ø	٥			10 0 0 0			ING: No rec AY with occ			illar	7.50			N = 27/225 non (7. 0. 9. 6, 14
1	9.00	٥	D	0			00000	SYMMET as sandy	RIX DRILLI GRAVEL	ING: No rec	overy, obsi	erved by dr	iller	9.00		A colored as	
EN	AR	KS ad 0	00-1	2.00	m.				Water	Casing	Sealed	Rise	Time	100	mmer	Concernance of the	DETAILS
									Strike 5.70	Depth 5.70	At No	To	(min)	00	Slow		
														CP	MINES	WATER	DETAILS
is1	TAL	ATK	ON D	ETA	LS	-			Date	Hole	Casing	Depth to Water	Com	ment		MAILER	DETAILS
E	Date 06-1	T		apth	RZ Top RZ Base 1.00 12.00	+	Typ 50mm			Depth	Depth	wator					

1	1	-			1922201				205899	93.032			R	EPOR	TNUM	BER
~	- 193	5			GEOT	EC	HNIC	CAL CORE L	OG REC	ORD				2	2181	3
co	NTR	ACT	A	irton	Road, Tallaght	-					10000	LHOLE	NO	RC		362
60	ORC	INA	TES	$\mathcal{L}^{(2)}$					1		SHE DAT	et E drill	ED	1000	et 2 of	
GR	OUN	DLE	VEL.	(mOE	5)			RIG TYPE FLUSH		Geo 305 Air/Mist	10000	ELOGG	7.2.10		06/201	
	GINE	-			Road Properties Mahony CE	Ltd.		INCLINATION (de)		-90		LED B			SSL	e.
100				aneu	Mariony GC		1	CONE DIAMETER	(mm)	78	100	GEDB		-	O'She	8
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Spacing Lóg (mm) 250 500	Non-intact Zone	Legend		Descr				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50						000	SYMMETRIX DR as sandy GRAVE	LLING: No i L <i>(continued</i>	recovery, obs	served by a	triller			0 10	
	102						00	1								N = 30 (4, 8, 8, 7
Ħ		0	٥	0			00	1							e III	69
	200	1					00	1							° Ilie	
12	12.00		-	-			-0	End of Sore!	ole at 12.00	) m			12.00		-8-	N=41 (3.5.9.9
														(		(2, 5, 9, 9, 12)
13																
			1													
14																
15								†1i								
16												1				
								¥2								
16																
16																
19																
	ARK case		00-1	2 000	п,		-	Wate	Casing	Sealed	Rise	Time		ER S'		DETAILS
								Strike 5.70	5.70	At Na	То	<u>(min)</u>	1.00	Slow		
									A suggest	1			GRO	UND	NATER	DETAIL
				TAIL				Date	Hole Dept		Depth to Water	Com	ments			
-	late		p De		1.00 RZ Base 1.00 12.00		Typ 50mm		9 12.00		3.10	Water	lowel roc	unded a	t 5 mina i	her end of

	8 <u>1</u> 193				GEOT	ECI	HNIC	AL CO	RE LOO	G RECO	RD			R	2000.C	2181	87580 
:0	NTR	ACT	1	inton	Road, Tallaght							100.10	LHOLE	NO	RC	100 C 100	2
				(mOl				RIG TYPE			Geo 305		et E drill I logg		05/0	net 1 of 06/2019 06/2019	,
:u	ENT		A	inton	Road Properties I Mahony CE	.ld	J	FLUSH INCLINATI CORE DIA	ION (deg) METER (m	m)	Air/Mist -90 78	10.000	LED BY GED BY			GSL ).O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.O.D.%	Fracture Spacing Log (mm) 250 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Defaits	SPT (N Value)
1	1.50	0	0	o				SYMMET as CLAY	RIX DAILL	ING: No rec	owery, obsi	srved by d	niler	1.50			
2		0	0	0			00000000	SYMMET as clayey	RIX DRILL saridy GR/	ING: No rec AVEL	overy, obsi	arved by d	ritter	1.00			N = 13 (2, 2, 3, 3, 4) 4)
6	<u>3.00</u> 4.50	O	٥	0			00000	as clayøy	RIX DAILL COBBLES	ING: No rec	overy, obsi	erved by d	nller	3,00			N = 25 (3, 3, 9, 5 4)
1220	6.00	٥	0	0			P Jol d P							6.00			N = 52 (14, 7, 24, 12, 6)
		0.	0	0			1000000	SYMMET as clayey	AIX DRILL GRAVEL	ING: No rec	overy, obsi	erved by d	riller				N=23 (4.4,4.5 T)
3	9.00	0	0	o			1900690										No 37 (6.7.7.9, 11)
1	MAR	0	0	0			06.9.9							WAT			N = 36 (7, 7, 7, 8 12) DETAILS
No.	<b>Shipping</b>	address the second	00-	12.00	im.				Water	Casing	Sealed At	Fise	Time (min)	1 2 2	mmer	7.7	1111123
									Strike 5.40	Depth 5.40	No	To	(min)		Slow		
									-					GRO	DUND	WATER	DETAIL
¥S'	TAL	LATIC	ON D	ETAI	LS				Date	Hole Depth	Casing Depth	Depth to Water	Com	ments	5		
	Date -06-1		12.0		RZ Top RZ Base 1.00 12.00		Typ 50mm	NB NSP									

No.	<u>ह है</u> जन्न	1			GEOT	ECI	HNIC	CAL CO	RELOO	RECO	RD			H		1 NUM	
co	NTR	ACT	A	irton	Road, Tallaght	-			1			DRIL	LHOLE	NO	RC		~~
co	ORC	INAT	TES					RIG TYPE			Geo 305		DRILL		05/0	et 2 of 96/2019	)
		DLE	VEL				_	FLUSH			Air/Mist	-	LOGG	21.5	- 9000	36/2019	•
	ENT	ER			Road Properties Mahony CE	Ltd.		CORE DIA		m)	-90 78	- N. C. C.	LED BY GED BY			3SL I.O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.W	S.C.R.%	R.Q.D.%	Fracture Specing Log (mm) 250 500	Non-intact Zone	Legend			Descrip				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50	0	0	0			8000000	as clayey		ING: No rec continued)	overy, obs	arved by d	riter				N = 34 (6.7, 8, 8, 9)
12	12.00						PQ	End	of Borehole	at 12.00 n	1		11	12.00		ůmí I	N = 30 (5, 5, 7, 8, 9)
14																	
15 16																	
17																	
18																	
18																	
REA	AAR	cs												WAT	ERS	TRIKE	DETAILS
	and includes	and in case of the	.00-1	2.00	m. ı				Water Strike 5.40	Casing Depth 5.40	Sealed At No	Rise To	Time (min)		mmer Slow	nts	
2										1	10			GRO	DUND	WATER	DETAIL
1	TALL Date 06-1	11	Ip De	oth	LS RZ Top  RZ Base 1.00   12.00	-	Tv: 50mm	e CD	Date 96-09-19	Hole Depth 12:00	Casing Depth 12.00	Depth to Water 3.65	Com	iments level re	-	at 5 mirs.	atter end of

#### RC01 Box 1 of 1 - 7.50-13.50m



#### RC05 Box 1 of 1 - 12.00-13.70m



.

the second s	Ga	s & Groundwa	ter Monitoring	
Site Location	Airton Road, Tallaght			
Project No.	21813			
	Barrett Mahoney Cha	rtered Engineers		-UIGSL
	21-Jun-19	· · · · · · · · · · · · · · · · · · ·		
Engineer	E. Keamey			
Equipment	Dip meter and gas mo	onitor		
and the second s	Peak / Steady State			
Location ID			BH01	
	1		1	
Water Level (mbgl)	4.05m		di	102
Gas Flow (I/hr)				
CH4 (%)	0.0			
CO2 (%)	0.4			
02 (%)	18.2			
CO (ppm)	0.0			
H2S (ppm)	0.0			
Balance (%)	81.4			
Barometric Pressure (mbar)	1016	-		
Weather/Temp.	Dry			
Location ID	Liy		BH05	
Time (sec)				
Water Level (mbgl)	4.40m		1	
Gas Flow (l/hr)				
CH4 (%)	0.0			
CO2 (%)	0.2			
02 (%)	18.8		the second second	
CO (ppm)	0.0			
H2S (ppm)	0.0			
Balance (%)	81.0			
Barometric Pressure (mbar)	1016			_
Weather/Temp.	Dry			
Location ID			BH07	
Time (sec)		atter of an and a state		
Water Level (mbgl)	3.25			
Gas Flow (I/hr)				
CH4 (%)	0,0	1		
CO2 (%)	0.2			
02 (%)	18.8			
CO (ppm)	0,0			
H2S (ppm)	0.0			
Balance (%)	81.0			
	1013	an man a	570	0.54.941.941.041.04
Weather/Temp.	Dry			
Comments				

Nirton Road, Tallaght 19813 Barrett Mahoney Chart M-Jul-19 E Kearney Xip meter and gas mon	ered Engineers			
Barrett Mahoney Chart M-Jul-19 5. Kearney	ered Engineers			IGSL
Barrett Mahoney Chart M-Jul-19 5. Kearney	lered Engineers			TIGSL/
Kearney				- X 10 /
. Kearney )p meter and oss mon				$1 \sim$
to meter and oss mon				A CONTRACTOR OF A CONTRACT
	nitor			
eak / Steady State R				
		BH01	in second	
	Sec. Sec.			
.5m				
01507			1	
0.0			-	
0.6				
18.0				
0.0		and the second second		
0.0				
81.4				
013				
Dry		Sector States		
		BH05		
.8			2-5 - C	
			í	
0.0			í l	
0.1				
18.8				
0.0				
0.0				
81.1				
013				
iγ				
50 II.		BH07		
	1.1			
3				
0.0			1	
0.0				
20.1				
0.0				
0.0				
79.9				
013				
ny				
	0.0 0.6 18.0 0.0 81.4 013 Ty 8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.0 81.1 013 Ty 3 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.6 18.0 0.0 0.0 81.4 013 Ty 8 8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.6 18.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 81.4 003 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0 0.6 18.0 0.0 0.0 0.0 0.0 81.4 013 Ty BH05 8 0.0 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.1 18.8 0.0 0.0 0.1 18.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0

**III Trial Pit Records** 

01	551		TRIAL PIT	RECO	RD					REPORT N	813	2
CON	TRACT	Airton Road, Tailaght					1	TRIAL PI	T NO.	TPO		
LOG	GED BY	E. Kearney	CO-ORDINA	TES				DATE ST		27/0	5/2019 5/2019	
CLIE	INEER	Airton Road Properties Ltd. Barrett Mahory CE	GROUND LE	ivel. (m)				EXCAVA	TION	JCB		_
								1	Sample	6	(8	neter
		Geolechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Cepth	Vane Test (KPa)	Hand Penetrometer
6.0		ETE with a plastic membrane und	HUDARDA	12.22	0.20							
	Gravel	k brown sandy gravelly CLAY. San s fine to coarse and subangular to redium subangular to subrounded	subrounded.	9 9 9				AA118502	B	0.50		
1.0					h			AA118503	B	1.00		
2.0		412.4			2.10			AA118504	в	2.00		
	Gravel is Has a lo	f black sandy gravety CLAY. Sand s fine to coarse and subangular to w subangular to subrounded cobb which are >600mm in size	subrounded	14114	1		1					
30	OBSTRU End of T	JCTION rial Pit at 2.90m			2.90		₹ (ieraa)	AA1 18505	B	2.90		
40												
ieep	age at 2.8	anditions Om										
itabil itabic												
Jenor LAT s	ral Remark scanned k	ks scation										

3	100		TRIAL PIT	RECO	RD					REPORT N	813	1
CON	TRACT	Airton Roed, Tallaght						TRIAL PI	TNO.	TPO	ST	
LOG	GED BY	E. Kearney	CO-ORDINA					DATE ST. DATE CO		27/0	st 1 of 1 5/2019 5/2019	-
CLIE	ineer	Airton Road Properties Ltd. Barrett Mahony CE	GROUND LI	EVEL (m)			_	EXCAVA METHOD	TION	JCB		
								s	Samplei		(e	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Raf	aqvit	Depth	Vane Test (KPa)	Hand Penetrometer
0,0		ETE with a plastic membrane unc	the state of the s	333	0.20							
	Gravel i Has a m	k brown sandy gravelly CLAY. Sat s fine to coarse and subergular to ledium subergular to subrounded content which are >600mm in size	subrounded.					AA113509	B	0.50		
1.0				9   9   9   9				AA113510	B	1.00		
20				6 6 6 6				AA113511	в	2.00		
30	Gravel is Has a to content	f black sandy gravelly CLAY. Same fine to coarse and subangular to w subangular to subrounded cobt which are >600mm in size.	subrounded.		2.80 3.00		1 Gentrepu	AA113512	в	3.00		
4.0	OBSTRI End of T	JOTION rial Pil at 3.00m										
Grou	ndwater C	Conditions										
Seep	age al 2.9	10m,										
Stabi Stabi	le											
Gene CAT	eral Remai scanned I	ks ocation.										

3	535		TRIAL PIT	RECO	RD					REPORT N	UMBER	
	ITRACT	Airton Road, Tallaght						TRIAL P	TNO.	TPO		-
LOG	IGED BY	E. Kearney Airton Road Properties Ltd.	CO-ORDINAT					DATE ST DATE CO EXCAVA	MPLE	24/05	et 1 of 1 5/2019 5/2019	
ENG	INEER	Barrett Mahony CE		1			-	METHOD	<u> </u>		_	1.
		Geotechnical Description				ug	Water Strike		Sample		Vane Test (KPa)	Hand Penetrometer
				Legend	(m)	Elevation	Water	Sample	Type	Depth	Vane 1	Hand
0.0	CONCR	ETE (Large bricks) IL		25 35	0.05	1						
100	Stiff brow	k grey brown gravelly CLAY. Grav and subangular to subrounded. Ha ded cobble content. (Possible ma wn sandy gravelly CLAY. Sand is	is a medium de ground)/ medium. Gravel	9 9 9	0.30 0.50			AA99943	в	0.50		
1.0	subrand >600mm	coarse and angular. Has a low si ed cobble and boulder content wh t in size. (Possible made ground).	ich are	1 1 4 1 4 1 4 6 1 1 4 1 4				AA99944	B	1.00		
2.0								AA99945	ß	2.00		
	Has a lo	black sandy gravelty CLAY. Sanc fine to coarse and subangular to w subangular to subrounded cobb which are >600mm in size. rial Pil at 2.40m	subrounded	ज 	2.20 2.40			AA99946	в	2.40		
3.0												
10												
rou	ndwater C	enditions										
itabi Itabi	lity B								-			
AT s	ral Remari	ks scation,					-					

2	-	1	<b>FRIAL PIT</b>	RECO	RD					REPORT N	UMBEF	1
Mr.	SJL.	Airton Road, Tallaght						TRIAL PI	TNO.	TPO	14	
CLIE		E. Kearney Airton Road Properties Ltd.	CO-ORDINAT					DATE ST DATE CO EXCAVA METHOD	TION	24/0	et 1 of 1 5/2019 5/2019	8
ENG	INEER	Barrett Mahony CE					1	1	, Sample	5		lit.
		Geotechnical Description		Legend	Depth (m)	Elevation	Writter Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer
0.0	is fine to made gr	wn sandy gravelly CLAY. Sand is n coarse and subengular to subroun ound).	ded. (Possibly		0.30			AA99938	в	0.50		
10	Has a lo	r brown sendy gravelly CLAY. Sand line to coarse and subangular to s w subangular to subrounded cobble which are >400mm in size. (Possib)	and headdar	9 9 9 9 9 9 9	0.80		€ Geesage	AA99930	В	1.00		
20	Stiff blac	k sandy gravely CLAY. Sand is me coarse and subangular to subrours	dium. Gravel ded. Has a	P   9   9	2.50			AA99540 AA99542	B	2.00		
30	OBSTRU	n ennoy griovity CAL, Seinite me coarse and Subangular to subrounded cobbe and b which are 2700mm in size. ICTION inial Pit at 2.90m	oulder		2.90			AA99941	в	2.90		
AD												
Groui Seepi Stabil	ndwater Ci age at 1.81 litty	onditions Im.										
Gene	e ral Remark scanned lo						_					
213		and a start of the										

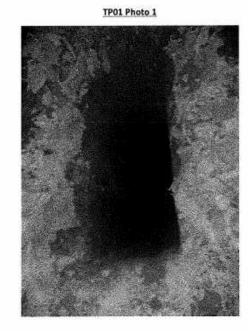
d'	101		TRIAL PIT	RECO	RD					REPORT N	JMBER B13	2
	TRACT	Airton Road, Tallaght						TRIAL PI	TNO.	TPO	75	
log	GED BY	E. Keamey	CO-ORDINAT					DATE ST. DATE CO	MPLET	27/08 ED 27/08	<u>t 1 of 1</u> 92019 92019	
CLIE	NT	Airlon Road Properties Ltd. Barratt Mahony CE	GROOND LE	ver (m)				EXCAVA METHOD	TION	JCB		
								5	Samples	1	(j)	meter
		Geotechnical Description		puagend	(m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer
0.0		ETE with a plastic membrane und	14443M	22.23	0.20	1480	-		152	20201	60	
	Gravel i	k brown sandy gravely CLAY. Sar s line to coarse and subangular to redium subangular to subrounded	subrounded.					AA113513	в	0.50		
1,6								AA113514	B	1.00		
				9 9 9								
2.0				0	2.50			AA113515	в	2.00		
	End of 1	UCTION Frial Pit at 2.50m										
30												
4.0												
irosa	ndwator (	Conditions										
tabi itabi	iity P											
iono AT :	ral Roma scanned	riks location.										
-3.01/3												

10-1	س دده		TRIAL PIT	RECO	RD					REPORT N	UMBER 813	
CON	TRACT	Airton Road, Tallaght						TRIAL PI	T NO.	TPO	CT	_
	GED BY	E. Kearney	CO-ORDINAT					DATE ST DATE CO	MPLET	27/0 ED 27/0	et 1 of 1 5/2019 5/2019	
CLIE	INEER	Airton Road Properties Ltd. Barrett Mahony CE	Chicono Le	vec (m)				EXCAVA METHOD	TION	JCB		
								5	Sample		6	relet
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometes MCPair
5.0		ETE with a plastic membrane unde	Constraint and a second second	12.45	0.20					-		
	Gravel is	c brown sandy graveily CLAY. San I fine to coarse and subangular to edium subangular to subrounded o	subrounded.					AA113516	8	0.50		
1.0								AA113517	В	1,00		
2.9				9 9 9 9				AA113518	в	2.00		
20	OBSTRL	black sandy gravelly CLAY. Sand fine to coarse and subangular to v subangular to subrounded cobbi vision are >600mm in size. ICTION ral Pit at 3.10m	is medium. subrounded. e and bouilder		2.90 3.10			AA113519	в	3,00		
4.0												
Dry	ndwator C	onditions										
Stabil Stable	lity 1											
Sener CAT s	ral Remark scanned to	ks Ication					111			(- <u>()</u>		_

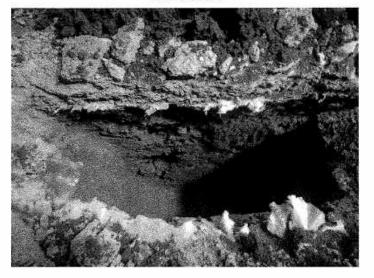
س کی 1881		TRIAL PIT RECORD									REPORT NUMBER			
CON	TRACT	Ainton Road, Tallaght	0.152					TRIAL PIT NO. TPO			55			
LOGGED BY E. Kearney									ARTED					
CLIE	NT NEER	Airton Road Properties Ltd. Barrett Mahony CE	GROUND LE	VEL (m)				EXCAVA METHOD	TION	JCB				
						1		Samples		6	î			
		Geotechnical Description	Géotechnical Description		Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer		
0.0	TOPSO			11 11 2 11 1 2 11 1	0.30									
10	gravelly coarse a	MADE GROUND comprised of Firm brown slightly sandy gravelty CLAY. Send is fine to medium. Gravel is fine to coarse and subangular to subrounded. Has a low subangular to subrounded cobble content. Contains infrequent red brick fragments. Firm brown slightly sandy gravely CLAY. Sand is fine to medium. Gravel is fine to coarse and subangular to subrounded. Has a low subangular to subrounded cobble content. (Possibily made ground). Stift dark brown sandy gravely CLAY. Sand is medium. Gravel Is fine to coarse and subangular. Has a low subangular to subrounded cobble and boulder content. which are >600mm in size. (Possibly made ground).			0.60			AA99935	в	0.50				
	Firm bro medium subroun				0.90			AA99936	в	1.00				
	Stiff dari Gravel In subanou													
2.0	OBSTR	107104		5	2.30			AA99937	в	2.00				
		rial Pit at 2.30m												
10														
10														
irou iry	ndwater C	Conditions							,					
itabi itabi	lity p			_										
ienei AT 4	ral Remar	ks nesting												
ali	seamed i	ovation.												

TRIAL PIT RECORD										REPORT NUMBER				
1937											21813			
CONTRACT Airton Road, Tallagh! TRIAL PI									TNO.					
LOG	GED BY	E. Keamey	res				ATE STARTED 24/05/2019 DATE COMPLETED 24/05/2019							
CLIE	NT	Airton Road Properties Ltd.	GROUND LE	VEL (m)				EXCAVA	TION	ED 24/0	5/2019			
ENG	NEER	Barrett Mahony CE		-			r	METHOD	07. 		-	-		
	Geotechnical Description			Legend	Depth (m)	Elavation	Water Shike	Samples			(ed	meter		
								Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)		
0.0	MADE	TARMACADAM MADE GROUND comprised of: Dense grey coarse												
	MADE (	anguint GRAVEL (HRODCKE). MADE GROUND comprised of Firm to still brown slightly sandy gravely CLAY. Sand is medium. Gravel is fine to coarse and subangular. Has a low subangular to subrounded cobble and boulder content which are >500mm in size. Contains infrequent rebar, plastic and			0.40 0.90			AA99931 AA99932	B	0.50				
	subrour >500mr													
10	red brick fragments. Firm to stiff brown slightly sandy gravelly CLAY. Sand is medium. Gravel is fine to coarse and subangular. Has a			- Q.										
	10W SUD	content which are >500mm in size. (Possibly made									ł.			
	Brodino)			a										
2.0				a			¥	AA99933		2.00				
	CONTLA	Aug. 1			2.30	0	Series	4499933	в	2.00				
	is fine to low sub-	coarse and subangular to subrou	sandy gravely CLAY. Sand is medium, Gravel parse and subangular to subrounded. Has a gular to subrounded cobble and boulder ich are >700mm in size.											
3.0	OBSTR End of 1	UCTION frial Fit at 2.80m	TION al Fit at 2.80m					AA99934	в	2.80	4			
40														
	ndwater ( age al 2.1	Conditions 10m.												
itabil Stabil														
	ral Rema scanned I		n 1											

TRIAL PIT					RD			REPORT NUMBER					
								100.000	1964 R. 2010 C. Grandel 100			209	
LOGGED BY E. Kearney GROUND LEV								DATE ST DATE CO	MPLET	TED 24/05/2019			
ENG	NT NEER	Airton Road Properties Ltd. Barrett Mahony CE						EXCAVA		JC8		0	
								Samples		6	8	teller	
		Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer		
6.0		CADAM			0,10		1	11-12-0	146-3		12	1	
	Firm to s medium low subs	SROUND comprised of: Dense gri GRAVEL (HARDCORE). stiff brown slighty sandy gravelly Gravel is fine to coarse and sublianguitar to subrounded cobble and which are >500mm in size. (Posal		0.30			AA99927	в	0.50				
10	ground)	10).						AA99628	в	1.00			
20						.¥.	AA99929	в	2.00				
3.0	is fine to low subs	x sandy gravely CLAY. Sand is medium. Gravel coarse and subangular to subrounded. Has a ngular to subrounded cobble and boulder duch are >700mm in size.		2.80			AA99530	в	3.00				
40	End of T	friał Pit at 3.50m			3.50								
Seep	age at 2.1	Conditions 10m.											
Stabl Stabl													
	ral Remar scanned 3												



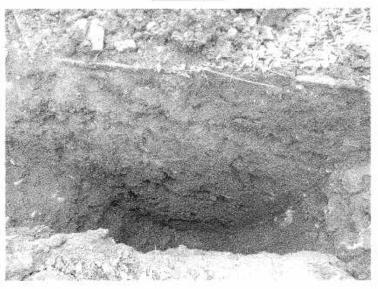
TP02 Photo 1 of 2



TP02 Photo 2 of 2



TP03 Photo 1 of 2



Avonmore, Delgany Report No: 21813

TP03 Photo 2 of 2



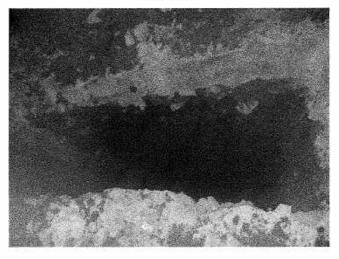
TP04 Photo 1



TP05 Photo 1

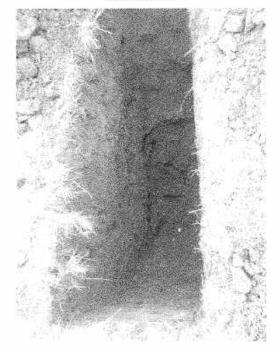


TP06 Photo 1



Avonmore, Delgany Report No: 21813

TP07 Photo 1 of 2



TP07 Photo 2 of 2



TP08 Photo 1 of 2



TP08 Photo 2 of 2



Avonmore, Delgany Report No: 21813



TP09 Photo 2 of 2



TP01 Photo 1



TP02 Photo 1 of 2



Avonmore, Delgany Report No: 21813

TP02 Photo 2 of 2



TP03 Photo 1 of 2



TP03 Photo 2 of 2

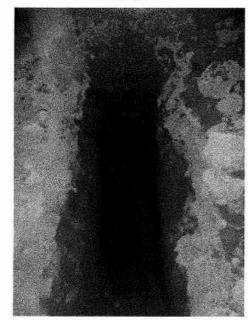


TP04 Photo 1

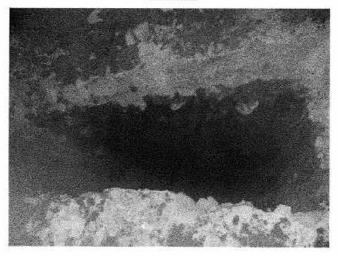


Avonmore, Delgany Report No: 21813

TP05 Photo 1



TP06 Photo 1



Avonmore, Delgany Report No: 21813

TP07 Photo 1 of 2



TP07 Photo 2 of 2



Avonmore, Delgany Report No: 21813

TP08 Photo 1 of 2

TP08 Photo 2 of 2



Avonmore, Delgany Report No: 21813

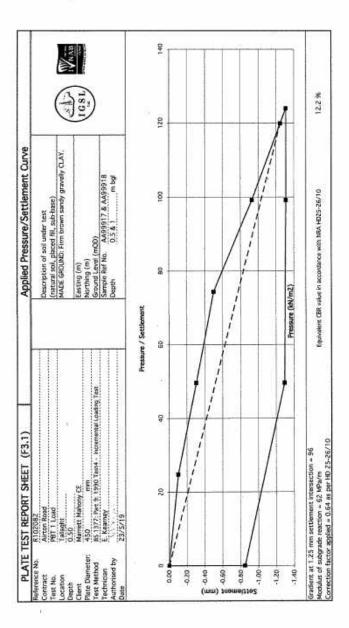
#### TP09 Photo 1 of 2



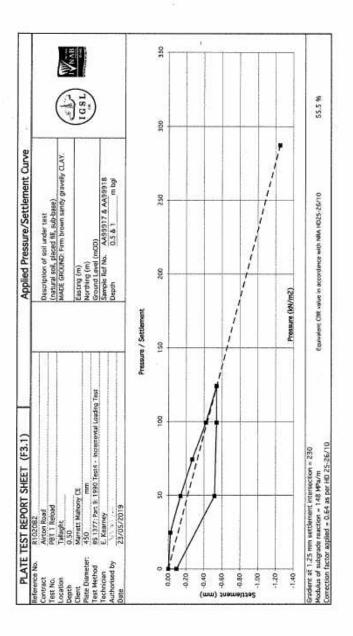
TP09 Photo 2 of 2



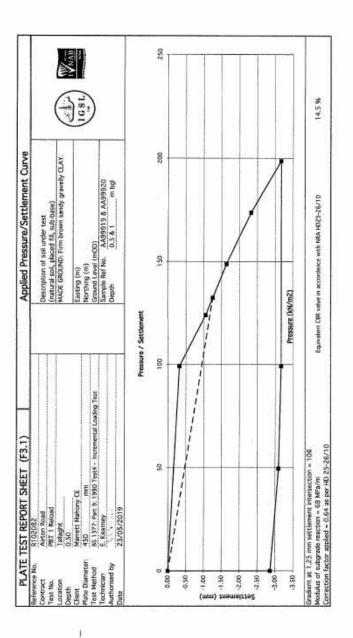
IV Plate Bearing Tests



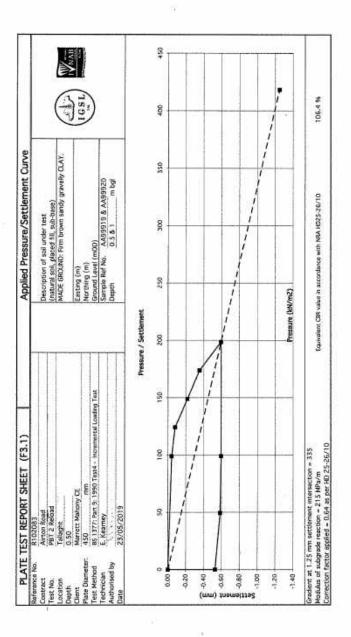
Page 1 of 2

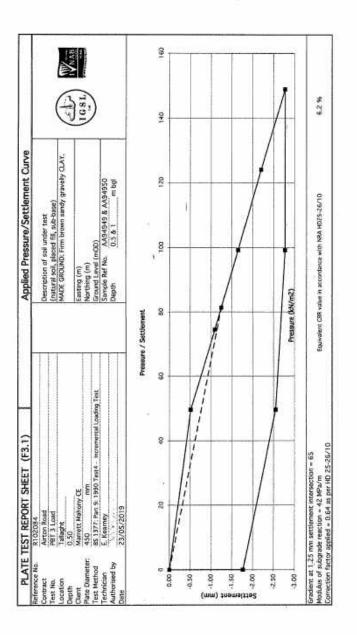


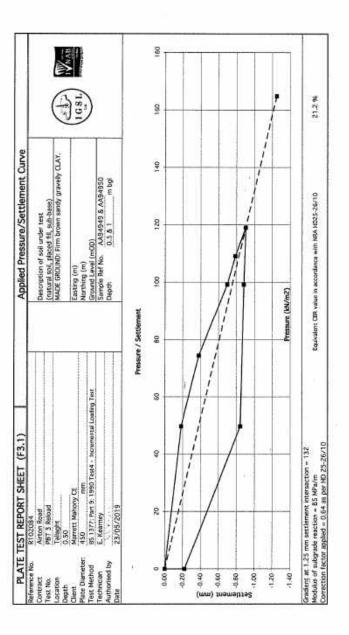
1

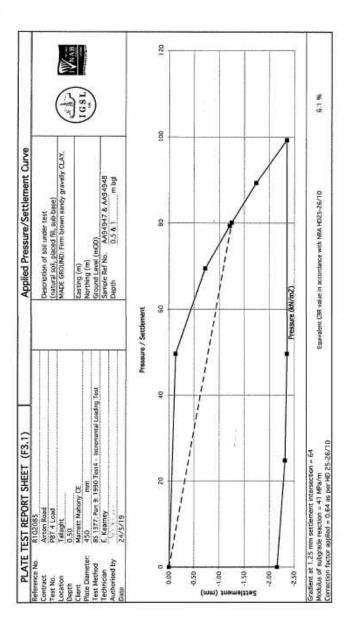


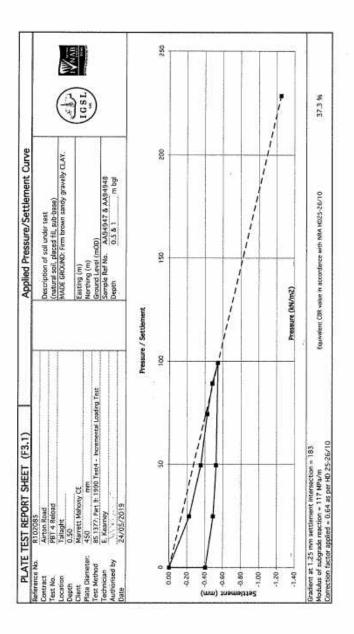
Page 2 of 2



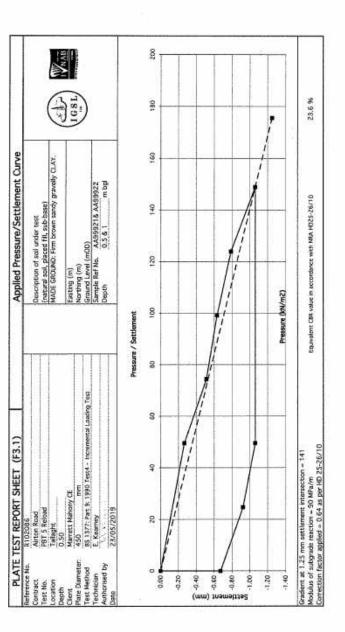


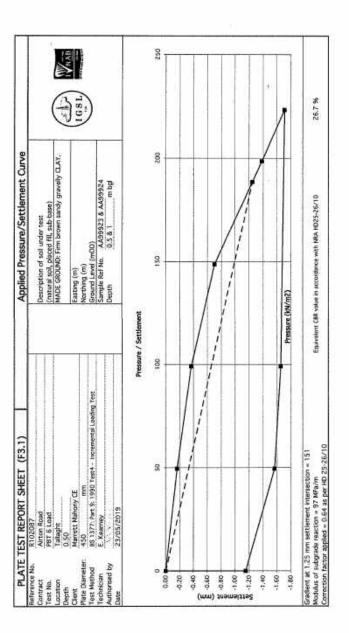


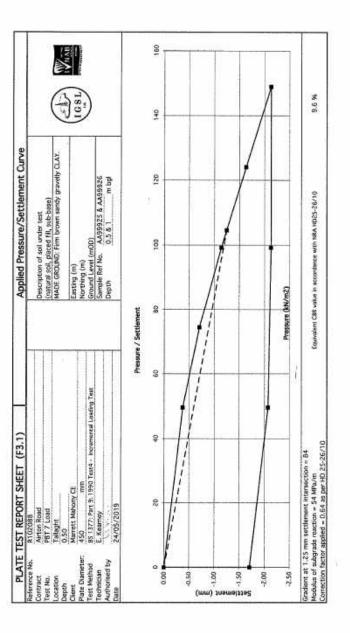


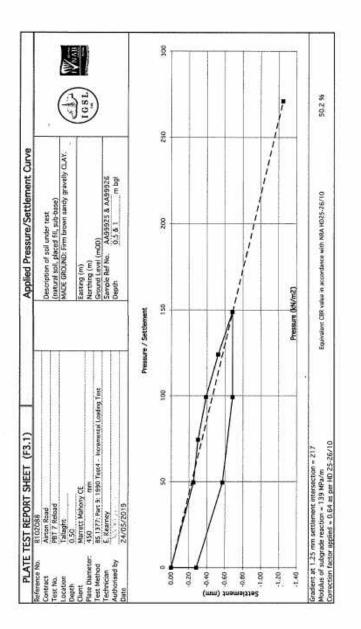


No. AL 160 ÷27 3.7 % 40 Applied Pressure/Settlement Curve Description of soil under teat (natural soil, placed fill, sub-base) MADE GROUND: Firm brown sandy gravely CLAY. Easting (m) Northing (m) Sround Level (mOD) Samoun Ref No. <u>0.5 & 1</u> m bg 2 Equivalent CBR value in accordance with NRA HD25-26/10 1 8 Pressure (kN/m2) 8 뷶 ure / Settle Æ 8 Arten faad PRI 5 Load Tallight 0.50 Marrett Mahcoy (c. 6.50 Marrett Mahcoy (c. 8. 1377, Pan 9. 1990 Text + hoorenenda Loading Text E. Kenney h fl 1 PLATE TEST REPORT SHEET (F3.1) 8 11 Gradient at 1.25 mm settlement intersection - 48 Modulus of subgrade reaction = 31 MPa/m Correction factor applied = 0.64 as per HD 25-26/10 h 2 2/05/2019 contract Test No. Location Depth Client Plate Diameter: Plate Diameter: Technician Authorised by Data Settlement (mm) 89 89









ł.

١

Page 2 of 2

Appendix V Percolation

	way L	esign f -value fron	n field tests	(F2C) IGS
Contract: Fest No. Client Date:	Airton Rd, SA01 Barrett Ma 28.05.20	hony CE	Contract No.	21813
iummary s	of ground c	anditions		25
from	to	Description		Ground water
0.00	0.30	TOPSOIL	22 - 24-5 Ubdrasso	
0.30	0.90	MADE GROUND: Firm brown mottled	grey sandy gravelly CLAY. Has a	Dry
		low subangular to subrounded cobble	content. Contains infrequent	
		plastic and concrete block fragments		
0.90	2.00	Stiff brown sandy gravelly CLAY. San		
		subangular to subrounded. Has a low	subangular to subrounded cobb	ole content.
ield Data		Field Test		
Depth to	Elapsed	Depth of	Pit (D) 2.00	7
Water	Time	Width of I		m
(m)	(min)	Length of		100
Mild	farmit.	Langth of	Indel [ ned	10
1.40	0.00	Initial dem	th to Water - 1.40	lm
1.40	1.00		h to water = 1.40	
1.40	2.00		me (mins)= 60.00	-
1.40	3.00			1
1.40	4.00	Top of pe	rmeable soil	lm
1,40	5.00		ermeable soil	- m
1.40	10.00	. Hotel and the second		
1.40	15.00	Base area	= 0.36	_m2
1.40	20.00	*Av. side area of permeable stratum		m2
1.40	25.00	Total Exp	osed area = 2.16	m2
1.40	30.00			
1.40	40.00			
	60.00	Infiltration rate (f) = Volume of	f water used/unit exposed area	a / unit time
1.40				
1.40		f= 0 m/min	or (	) m/sec
	<sup>70.00</sup> Г	f= 0 m/min Depth of water vs Elapsed		) m/sec
				) m/sec
	<sup>70.00</sup> Г			) m/sec
and from the second	70.00			0 m/sec
and for the second	70.00			) m/sec
(N 1 Thread Posters)	70.00			) m/sec
er - 19	70.00 60.00 50.00 40.00			) m/sec
er - 19	70.00 50.00 10.00 10.00 20.00 20.00			) m/sec
ter 10	70.00 20.00 50.00 40.00 20.00 10.00			0 m/sec
ter in 19	70.00 50.00 10.00 10.00 20.00 20.00	Depth of water vs Elapsed		0 m/sec
ter in 19	70.00 20.00 40.00 20.00 10.00 0.00	Depth of water vs Elapsed	Time (mins)	
ter in 19	70.00 20.00 40.00 20.00 10.00 0.00	Depth of water vs Elapsed	Time (mins)	-

AND THE REAL PROPERTY.		Design f -value from field tests	(F2C) IGS
Test No. Client Date:	Airton Rd, SA02 Barrett M 28.05.20	ahony CE 19	21813
Summary e			
from	to	Description	Ground water
0.00	0.20	TOPSOIL	
0.20	0.90	MADE GROUND: Firm brown mottled grey sandy gravelly CLAY. Has a	a Dry
		low subangular to subrounded cobble content. Contains infrequent	
0.00		red brick fragments.	
0.90	2.00	Stiff brown sandy gravelly CLAY. Sand is medium. Gravel is fine to co	
		subangular to subrounded. Has a low subangular to subrounded cob	ble content.
Field Data		Field Test	
Depth to	Elapsed	Depth of Pit (D) 2.00	lm
Water	Time	Width of Pit (B) 0.30	m
(m)	(min)	Length of Pit (L) 1.50	m
1.411040		11454 - 11454 - 11454 - 11454 - 11454 - 11454 - 11454 - 11454	
1.10	0.00	Initial depth to Water = 1.10	m
1,10	1.00	Final depth to water = 1.10	m
1.10	2.00	Elapsed time (mins)= 60.00	
1.10	3.00		13 C
1.10	4.00	Top of permeable soil	m
1.10	5.00	Base of permeable soil	m
1.10	10.00		
1.10	15.00	Base area= 0.45	m2
1.10	20.00	*Av, side area of permeable stratum over test perior 3.24	m2
1.10	25.00	Total Exposed area = 3.69	m2
1.10	30.00		
	10.00	1	
1.10	40.00		
1.10	40.00 60.00	Infiltration rate (f) - Volume of water used/unit exposed area	a / unit time
		f= 0 m/min or 0	a / unit time 0 m/sec
1.10			
1.10	70.00 50.00 40.00	f= 0 m/min or 0	
1.10	60.00 70.00 60.00 50.00 40.00	f= 0 m/min or 0	
1.10	60.00 70.00 60.00 50.00 40.00 30.00 10.00	f= 0 m/min or 0	
1.10	60.00 70.00 60.00 50.00 40.00 20.00	f= 0 m/min or ( Depth of water vs Elapsed Time (mins)	
1.10	60.00 70.00 60.00 50.00 40.00 20.00 10.00 0.00	f= 0 m/min or ( Depth of water vs Elapsed Time (mins)	0 m/sec
1.10	60.00 70.00 60.00 50.00 40.00 20.00 10.00 0.00	f= 0 m/min or 0 Depth of water vs Elapsed Time (mins)	0 m/sec

Soaka	away [	Design f -value from field test	S	(F2C) IGSI
Contract: Test No. Client Date:	SA03 Barrett M 28.05.20	ahony CE 19	ntract No.	21813
	of ground (			
from	to	Description		Ground water
0.00	0.20	Concrete		
0.20	2.00	MADE GROUND: Stiff brown sandy gravelly CLAY. Sand	s medium.	Dry
		Gravel is fine to coarse and subangular to subrounded.	Has a mediur	n
_		subangular to subrounded cobble content.		1
Field Data		Field Test		
Depth to	Elapsed	Depth of Pit (D)	2.00	lm
Water	Time	Width of Pit (B)	0.30	m
(m)	(min)	Length of Pit (L)	1.30	m
1.167.56	(Acores)			
1.04	0.00	Initial depth to Water =	1.04	m
1.04	1.00	Final depth to water =	1.04	m
1.04	2.00	Elapsed time (mins)=	60.00	
1.04	3.00			- 5.A. 
1.04	4.00	Top of permeable soil		m
1.04	5.00	Base of permeable soil		m
1.04	10.00	State Aller and the second second		
1.04	15.00	Base area=	0.39	m2
1.04	20,00	*Av. side area of permeable stratum over test perio	3.072	m2
1.04	25.00	Total Exposed area =	3.462	m2
1.04	30.00			
1.04	40.00			
1.04	60.00	Infiltration rate (f) = Volume of water used/unit	exposed are	a / unit time
				20.05/200751
	-	f= 0 m/min or	1	0 m/sec
				- t
	70.00 50.00	Depth of water vs Elapsed Time (mins)		_
1	ge0.00			
1	E50.00			
	₿ \$40.00			
	\$30.00		- Charles	
E I	man ne		1	
E I	800.00 T			
E 1 1	20.00		:	
E 1 1	ő.		:	
E 1 1	10.00		÷	
E 1 1	20.00 -	0.20 0.40 0.60 0.80	1.00	1.20
E 1 1	10.00		1.00	1.20
E 1 1	10.00	) 0.20 0.40 0.60 0.80 Depth to Water (m)	1.00	1.20

Appendix VI Laboratory

a. Geotechnical

Totaled in accordance with IS317/7Fart 2:1980, Glauses 3.2", 4.3, 4.4.8.5.3         Totaled in accordance with IS317/7Fart 2:1980, Glauses 3.2", 4.3, 4.4.8.5.3           Report No.         Report No.         21813         Contract Name:         Anton Road, Tallaght, Dublin           Customer         Barrett Mahony Consulting Engineers, Sandwith House, S2-54 Sandwith Street Lower, Dublin 2.         Contract No.         21813         Contract No.         21813         Contract No.         21813         Contract No.         21813         Contract Name:         Anton Road         Anton Road         Contract Name:         Anton Road         Anton Road<	Materiais Laboratory Unit J5, M7 Business Park Newhall, Naas Co. Klidare	ž			Determ	ination of	Moisture	Determination of Moisture Content, Liquid & Plastic Limits	, Liquid 8	& Plastic	Limits			INAE
No.         H102259         Contract No.         21813         Contract Name:         Anton Road, Tallapht, Dublin 2           ner         Barrett Mahony Consulting Engineers, Sandwith House, 62-54 Sandwith Street Lower, Dublin 2         Anton Road, Tallapht, Dublin 2           ss Recaived:         06/06/19         Date Tested:         07/06/19         Pastic         07/06/19           e No.         Depth (m)         Lab. Ref         Sample         Moisture         Limit %,	045 846176	1.0			lested in ac	cordance	MILL IS 137	ALC NBALL	au, clause	5 3 21.4 3	4.4 & 5.3			
Instruction         Barret Mahony Consulting Engineers, Sandwith House, 62-54 Sandwith Street Lower, Dublin 2           Is Received:         06/06/19         Date Tested:         07/06/19           Is No.         Depth (m)         Lab. Ref         Sample         Molisture         Limit %, Limit %	Report No.			Contract	No.	21813		Contract N	ame:	Airton Roa	id , Tallagh	t, Dublin		
Bit Received:         06/06/19         Date Tested:         07/06/19         Plast ic         Plast ic <th>Customer</th> <th>Barrett Mal</th> <th>nony Consul</th> <th>ting Engin</th> <th>eers, Sandw</th> <th>rith House,</th> <th>52-54 Sar</th> <th>idwith Stree</th> <th>et Lower, D</th> <th>Jublin 2</th> <th></th> <th></th> <th></th> <th></th>	Customer	Barrett Mal	nony Consul	ting Engin	eers, Sandw	rith House,	52-54 Sar	idwith Stree	et Lower, D	Jublin 2				
e No. Depth (m) Lab. Ref Sample Molsture Liquid Flastic Plastic Plastic Plastic Plastic Plastic Reservation Liquid Limit Conservation 10,416 Limit Conservation 10,416 Limit Conservation 10,416 Limit Conservation 10,416 Limit Conservation 10,417 17 55 WS 4.4.4 C.L. 131 1.0 A19/2425 B 13 3.3 1.6 1.7 17 30 WS 4.4.4 C.L. 131 1.0 A19/2425 B 13 3.3 1.6 1.7 17 30 WS 4.4.4 C.L. 131 1.0 A19/2425 B 13 3.3 1.6 1.7 17 17 55 WS 4.4.4 C.L. 10,911 4.0 A19/2425 B 15 3.0 16 1.7 17 17 55 WS 4.4.4 C.L. 10,911 4.0 A19/2426 B 15 3.0 16 1.4 13 4.6 1.4 13 4.4 C.L. 10,911 4.0 A19/2442 B 8.1 3.0 16 1.4 13 4.6 1.4 13 4.4 C.L. 10,912 4.1 1.0 A19/2442 B 8.1 3.0 16 1.4 13 4.6 1.4 13 4.4 C.L. 10,912 4.1 1.0 A19/2445 B 2.5 NP NP 7 4.1 13 4.6 NY 4.4 C.L. 10,912 4.1 1.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 13 4.6 NY 7 4.4 C.L. 10,913 4.1 1.1 1.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 13 4.6 NY 7 4.4 C.L. 1472 5.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 13 4.6 NY 7 4.4 C.L. 1472 5.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 17 4.6 NY 7 4.4 C.L. 1412 4.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 NY 7 4.4 C.L. 1418 5.0 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 4.1 NY 7 4.4 C.L. 1418 5.0 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 3.1 NY 7 4.4 C.L. 1418 5.0 NY 7 4.4 C.L. 1418 5.0 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 3.1 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 3.1 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 3.1 NY 7 4.4 C.L. 1418 5.0 A19/2456 B 7.9 2.8 NP NP 7 3.1 NY 7 4.4 C.L. 1418 5.0 NY 7 5.0 NY 7 4.4 C.L. 1418 5.0 NY 7 5.0 NY 7 4.4 C.L. 1418 5.0 NY 7 5.	Samples R		06/06/19	Date Tes	ted:	07/06/19								
929         2.0         A19/2420         B         11         33         16         17         57         WS         4.4         C.L           9512         3.0         A19/2422         B         13         33         16         17         30         WS         4.4         C.L           940         2.0         A19/2422         B         13         36         17         19         47         WS         4.4         C.L           951         1.0         A19/2425         B         13         36         17         17         55         WS         4.4         C.L           951         1.0         A19/2432         B         15         30         16         14         53         WS         4.4         C.L           051         4.0         A19/2445         B         8.1         30         16         14         53         WS         4.4         C.L           051         4.0         A19/2445         B         8.0         27         14         13         46         WS         4.4         C.L           051         4.0         A19/2445         B         8.0         2.5         NP	Sample No	_	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Clansfication (B66990)	Description	
3512         3.0         A19/2422         B         18         33         16         17         30         WS         4.4         C.L           940         2.0         A19/2425         B         13         36         17         19         47         WS         4.4         C.L           3517         1.0         A19/2425         B         13         36         17         17         55         WS         4.4         C.L           958         1.0         A19/2442         B         81         30         16         14         53         WS         4.4         C.L           966         4.0         A19/2445         B         81         30         17         13         46         WS         4.4         C.L           7470         3.0         A19/2445         B         8.0         27         14         13         46         WS         4.4         C.L           7470         3.0         A19/2455         B         3.0         NP         NP         NP         NP         4.4         C.L           7470         5.0         A19/2455         B         3.0         NS         4.4         C.L	AA99929		A19/2420	B	11	33	16	17	57	WS	4.4	CL	Greybiden sand	dy gravely CLAY
040         2.0         A19/2425         B         13         36         17         19         47         WS         44         C1           3517         1.0         A19/2425         B         12         34         17         17         55         WS         44         C1           926         1.0         A19/2432         B         15         36         16         14         53         WS         44         C1           036         4.0         A19/2442         B         8.1         30         16         14         53         WS         44         C1           7470         3.0         A19/2445         B         8.0         27         14         13         46         WS         44         C1           7470         3.0         A19/2465         B         3.0         32         17         60         WS         44         CL           7470         5.0         A19/2465         B         3.0         75         17         60         WS         44         CL           7410         5.0         A19/2465         B         3.0         NS         4.4         CL           4415	AA113512	Ц.	A19/2422	8	18	33	16	17	30	WS	4.4	CL	Black slightly sau	ndy, gravely, CLAY
3517         1.0         A19/2432         B         12         34         17         17         55         WS         44         CL           928         1.0         A19/2442         B         15         36         18         15         35         WS         44         CL           091         4.0         A19/2442         B         8.1         30         16         14         53         WS         44         CL           0705         3.0         A19/2442         B         8.0         27         14         13         46         WS         44         CL           7470         3.0         A19/2455         B         9.0         32         15         17         60         WS         44         CL           7472         5.0         A19/2455         B         9.0         32         15         17         60         WS         44         CL           7410         5.0         A19/2455         B         3.0         21         16         16         16         16         16         16         16         16         16         17         60         WS         44         CL         16	AA99940		A19/2425	В	13	36	17	19	47	WS	4,4	5	Dark brown sark	dy gravely CLAY
828         1.0         A19/2440         B         15         36         18         18         53         WS         4.4         C.1           0091         4.0         A19/2442         B         8.1         30         16         14         53         WS         4.4         C.1           7470         3.0         A19/2442         B         8.0         27         14         13         46         WS         4.4         C.1           7470         3.0         A19/2445         B         9.0         32         15         17         60         WS         4.4         C.1           7472         5.0         A19/2455         B         9.0         32         15         17         60         WS         4.4         C.1           660         M5/2457         0         9.6         25         NP         NP         41         WS         4.4         C.1           1412         4.0         A19/2457         0         9.6         25         NP         NP         NS         4.4         C.1           1412         4.0         A1         WS         4.4         WS         4.4         C.1         NS	AA113517		A19/2432	8	12	34	17	17	55	WS	4.4	CL	the brow signal well	N. (Pareny, CLAY wentered con
(031         4.0         A19/2442         B         8.1         30         16         14         53         WS         4.4         C.L           7470         3.0         A19/2443         B         9.8         25         NP         NP         58         WS         4.4         C.L           7470         3.0         A19/2445         B         9.0         32         15         17         60         WS         4.4         C.L           7472         5.0         A19/2445         B         9.0         32         15         17         60         WS         4.4         C.L           660         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         C.L           1412         4.0         A10/2457         0         9.6         25         NP         NP         41         WS         4.4         C.L           1412         4.0         A19/2457         0         9.6         25         NP         NP         NS         4.4         C.L           1413         5.0         A19/2459         B         3.2         15         NP         NS         4.4 <td>AA99928</td> <td></td> <td>A19/2440</td> <td>8</td> <td>15</td> <td>36</td> <td>18</td> <td>18</td> <td>53</td> <td>WS</td> <td>4.4</td> <td>10</td> <td>Brown sandy gra</td> <td>weby CLAY</td>	AA99928		A19/2440	8	15	36	18	18	53	WS	4.4	10	Brown sandy gra	weby CLAY
0056         4.0         A19/2443         B         9.8         25         NP         NP         58         WS         4.4         CL           7470         3.0         A19/2445         B         8.0         27         14         13         4.6         WS         4.4         CL           7472         5.0         A19/2445         B         9.0         32         15         17         60         WS         4.4         CL           680         4.0         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         CL           1412         4.0         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         CL           1412         4.0         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         CL           1413         5.0         A19/2459         B         12         32         16         16         45         WS         4.4         CL           160         WS         4.0         NP         NP         NP         33 <td< td=""><td>AA38091</td><td>4.0</td><td>A19/2442</td><td>8</td><td>8.1</td><td>30</td><td>16</td><td>14</td><td>53</td><td>SM</td><td>4.4</td><td>CL</td><td>Grey stayers, samply, 50%</td><td>Bollow Artin the Thys</td></td<>	AA38091	4.0	A19/2442	8	8.1	30	16	14	53	SM	4.4	CL	Grey stayers, samply, 50%	Bollow Artin the Thys
7470         3:0         A19/2444         B         8:0         27         14         13         46         WS         4.4         C.L           7472         5:0         A19/2445         B         9:0         32         15         17         60         WS         4.4         C.L           669         4.0         A19/2455         B         7.9         28         15         13         34         WS         4.4         C.L           1412         4.0         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         C.L           1412         4.0         A19/2459         B         12         32         16         16         45         WS         4.4         C.L           1419         5.0         A19/2459         B         3.9         21         NP         NP         33         WS         4.4         C.L           16m:         WS - Wet size of a concertation of the standard due to paint         NP         33         WS         4.4         C.L           16m:         WS - Wet size of the standard due to paint         NP         33         WS         4.4         C.L	AA38096		A19/2443	8	9.8	25	dN	ЧN	58	SM	4.4		Dist Novem Kauber Hong	TSI gradiy, SLT
7472         5.0         A19/2445         B         9.0         32         15         17         60         WS         4.4         C L           689         4.0         A19/2456         B         7.9         28         15         13         34         WS         4.4         C L           1406         6.0         A19/2457         0         9.6         25         NP         NP         41         WS         4.4         C L           1412         4.0         A19/2459         B         12         32         16         16         45         WS         4.4         C L           1419         5.0         A19/2459         B         3.9         21         NP         NP         33         WS         4.4         C L           160         WS - Wet size of a to some size of size of a size of size of a to some size of size of a size of size of a to some size of size of a to some size of size of a to some size of size of a size of size of a size of size of a to some size of size of a to some size of size of a to some size of size of size of a to some size of size of a to some size of size of size of size of a to some size of siz	AA117470		A19/2444	8	8.0	27	14	13	46	WS	4.4	CL	Black sandy gran	volly CLAY
6699         4.0         A19/2456         B         7.9         28         15           1406         6.0         A19/2457         0         9.6         25         NP           4412         4.0         A19/2457         0         9.6         25         NP           4419         5.0         A19/2459         B         12         32         16           4419         5.0         A19/2459         B         3.9         21         NP           10n:         W5 - Wet slewed         Sample Type: B - Bulk Disturbed         Indisturbed         An         An         An           10n:         W5 - Wet slewed         Sample Type: B - Bulk Disturbed         Indisturbed         Indisturbed           Init< 4.3 Cone Peretrometer are point method	AA117472		A19/2445	8	9.0	32	15	17	60	WS	4.4	CL	Black slightly sai	ndy, gravely, CLAY
1406         6.0         A19/2457         0         9.6         25         NP           4412         4.0         A19/2450         B         12         32         16           4419         5.0         A19/2450         B         3.9         21         NP           4419         5.0         A19/2450         B         3.9         21         NP           10n:         WS - Wet slewed         A19/2459         B         3.9         21         NP           10n:         WS - Wet slewed         Sample Type: B - Bulk Disturbed         N         N         N         N           10n:         WS - Wet slewed         Sample Type: B - Bulk Disturbed         N         N         N         N           10n:         WS - Wet slewed         Sample Type: B - Bulk Disturbed         N         N         N         N           10n:         Lone Preventionmet definitive method         U - Undisturbed         N         N         N         N           10n:         Lone Preventionmet revelocitiester and point method         U - Undisturbed         N         N         N         N	AA10699		A19/2456	B	7.9	28	15	13	34	WS	4.4	CL	Bleck sandy gran	vely CLAY
4412         4.0         A19/2460         B         12         32         16           4419         5.0         A19/2459         B         3.9         21         NP           4419         5.0         A19/2459         B         3.9         21         NP           Ion:         WS - Wet stewed         Sample Type: B - Butk Disturbed         N         N         N           Ion:         WS - Wet stewed         Sample Type: B - Undisturbed         N         N         N           AR - As received         Sample Type: B - Undisturbed         U - Undisturbed         N <td>AA111406</td> <td>Ű,</td> <td>A19/2457</td> <td>0</td> <td>9.6</td> <td>25</td> <td>dN</td> <td>NP</td> <td>41</td> <td>WS</td> <td>4.4</td> <td></td> <td>Black slightly sau</td> <td>ndy, gravely, SLT</td>	AA111406	Ű,	A19/2457	0	9.6	25	dN	NP	41	WS	4.4		Black slightly sau	ndy, gravely, SLT
4419     5.0     A19/2459     B     3.9     21     NP       Ion:     WS - Wet steved     Sample Type:     B - Bulk Disturbed       AR - As received     Sample Type:     B - Undisturbed       Int:     +.3 Core Pensioneare definitive method       4.4 Core Pensioneare method	AA114412		A19/2460	8	12	32	16	16	45	WS	4.4	CL	Black sandy grav	vally CLAY
Ion: WS - Wet sieved Sample Type: B - Buit: Disturbed AR - As received Sample Type: B - Buit: Disturbed IN - Non Patishin MR - 4.3 Core Prentioneare definitive method 4.4 Core Perentometer are point method	AA114419	1	A19/2459	8	3.9	51	ЧN	ΝP	33	WS	4,4		Elect shy, serch, GRA)	ALL with many collifies
Ion: WS - Wet served Sample Type: B - But Disturbed AR - As received U - Undisturbed NP - Non pasts mit 4.3 Cone Penetrometer inte point method 4.4 Cone Penetrometer inte point method														
NP - Non received NP - Non Persion and Celinitive method mit 4.3 Cone Persioneter inte point method	Preparation:	WS - Wet sign	ber		Sample Type:	B - Bulk Distu	rbod	Hemarks: Deerder sonde	a share of	received				
4.4 Cone Penetrometer time point method	Liquid Limit	NP - Non plas 4.3 Cone Pen	alc elrometer defin	tive method			8	NOTE: Claur Opinions and	se 3.2 of BS1 interpretation	377 is a "with are outside	drawn" stand the scope of	ard due to p accreditatio	ublication of ISC n.	117892-1:2014
	Clause:	4.4 Cone Pen	etrometer time p	baint method				The results re	alate to the sp	recimens test	ed. Any reme	cining materi	al will be retaine	ed for one month.
	IGSL LTD Ma		erials Laboratory			H Burne (Laboratory Mananer)	ahoratory 1	Mananeri		A Repair			25/06/19	1 of 1

R102259.PLxis

DEDODT

ŭ

Tmp: PUI Rev 02/10

		Tested i	n accordance v (note: St	Tested in accordance with: 8S1377:Part2:1990 , clause 9.2 & 9.5 (note: Sedimentation stage not accredited)	t2:1990 , claus ot accredited)	e 9.2 & 9.5			n ter bir Alfen is operate Notaen	
particle size	% Dassing		0.0	Contract No: Contract:	21813 Airton Road	21813 Report No. R Airton Road Talladht Dublin	R102565			
	100	COBBLES		BH/TP:	TP02					
	3 8		U) U	Sample No. Samula Tunar	AA113512 B	AA113512 Lab. Sample No. R	No.	A19/2422		
37.5	32		, ם	Depth (m)	3.00	Customer:	Barrett Mehony Co	neutrino Engineers. Sand	Barnet Mehonv Consultivo Endineers. Sandwith House. 52-54 Sandwith Street Lower Durkin 2	h Street Lower 7
	88			Date Received	06/06/2015		started	07/06/2019		
	83		5	Description:	Black slightly	Black slightly sandy, gravelly, CLAY	by. CLAY			
	79	COAVEL								
	75	BRAVEL	æ	Remarks	Not One 17 et Design	and the state of the state of a still of the state of the	INCOMPANY AND INCOMPANY			
	70									5
	67						:1:0 907	5,0 1,11 0,6 0,5 0,3 1,11 2,2 2,2 2,3 2,3 2,3 3,4 2,5 3,5 3,5 3,5 3,5 3,5 3,5 3,5 3,5 3,5 3	01 2 2 3 3 3 3	54 05 28 05 05 05 05 05
3.35	64		1001				E	0	WHELL!	
	60		- 06							X
	56		80						X	
0.6	51	10.11	9%)							
0.425	49	SAND	Guis						/	
-	46							/		
0.15	14						-1			
0.063	33						1			
0.041	28		ຸ ອີ			1	X			
0.029	26		20							
0.018	24	CILTICIAN	10		1					
0.011	61	SELVERAL	-							
0.008	16		0.0001		0.001	0.01	0.1	1	10	100
0.005	13									
0.002	6				CLAY	SILT Sie	Sieve size (mm)	SAND	GRAVEL	
		1001	- Manadal L	1 - handler	23		Approved by:		Date:	Page no:
		ופאר דנו	Materials	IGSE LTO MATERIAIS LADOFATORY			11 R		17/06/19	1 14 1

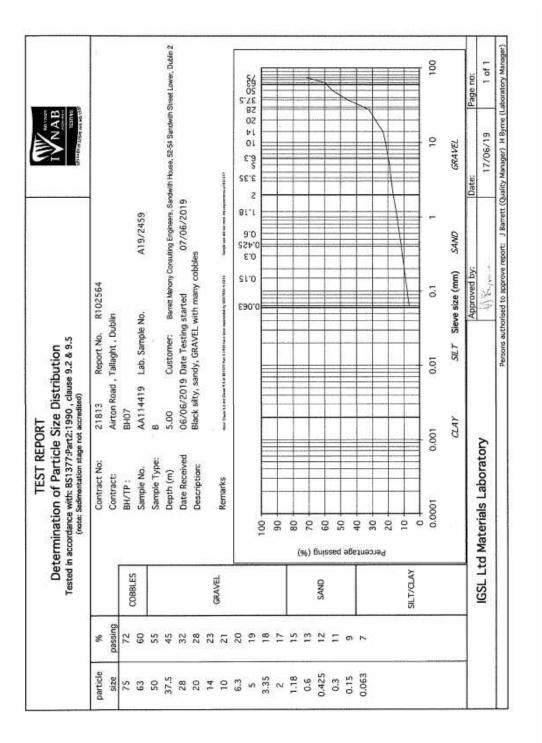
TEST REPORT Tested in accordance with: BSI 3772-Particle Size Distribution Tested in accordance with: BSI 3772-Particle Size Distribution Tested in accordance with: BSI 3772-Particle Size Distribution Contract: Sedimentation stage not accredited) Contract: Marton Road, Tallaght, I BH/TP: TPD6 Contract: Ariton Road, Tallaght, I BH/TP: TPD6 Sample No. 21813 Report No Contract: Ariton Road, Tallaght, I BH/TP: TPD6 Sample Type: B Depth (m) 1.00 Customer: Dark brown slightly sand Sample passing SAND SAND SAND SAND SAND SAND SAND SAND SAND Contract: Ariton Road, Tallaght, I COBBLES Sample Type: B Depth (m) 1.00 Customer: Dark brown slightly sand Customer: Dark brown slightly sand Customer: Dark brown slightly sand Customer: Dark brown slightly sand Customer: Contract: Ariton Road, Tallaght, I Customer: Sample Passing Sample Passing Contract: Ariton Road, Tallaght, I Customer: Contract: Ariton Road, Tallaght, I Customer: Custom
--

						Customer: Barret Mahony Corsulting Engineers, Sandwith House, 62-54 Sandwith Street Lower, Ducin 2					s	14 28 30 37							A						100			Page no:	3 1 of 1
IN AB						Indwith House, 52-54 S					s	10 2'3 2'3 5 2'3					/							1111111	10	100.11	GRAVEL	Date:	17/06/19
				A19/2438		nsulting Engineers, Sa	07/06/2019				s	5.0 54.0 1.1						1							1		SAND		
	R102567	uldu		e No.		Barrett Mahony Co	g started	Brown slightly sandy, gravelly, SILT/CLAY		A LOCAL DAY (1911) 4 (1919) A	1	90.0							1						0.1		Sieve size (mm)	Approved by:	A Rome
tribution use 9.2 & 9.5	Report No.	Airton Road, Tallaght, Dublin	E	Lab. Sample No.		Customer:	06/06/2019 Date Testing started	htly sandy, grav		times these 3.2 we live as 9.6 of 611.17.9 million (2019) free block factor reconstruction (2011 e) 311				+							/	A			0.01		SILT S		
PORT le Size Dist art2:1990 , cla e not accredited)	21813	Airton Roa	TP08	AA99934	8	2.80	06/06/20	Brown slig		the Descripted for														-	0.001		CLAY		≥
TEST REPORT Determination of Particle Size Distribution Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5 (note: Sedimentation stage not accredited)	Contract No:	Contract:	BH/TP:	Sample No.	Sample Type:	Depth (m)	Date Received	Description:		Remarks			1001	06	80	02	60		2	- 04	30	20	10	0	0.0001				165L Ltd Materials Laboratory
Deterr Tested in acc		ſ	COBBLES						GRAVEL		L	-	-		(	(96)	SAND SAND	sed	986	ente	2795	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	SELIVERA			_		ISL Ltd M
10 10	8	passing	-	100	100	97	90	86			72	20	66	62	58	53	51 5	49	44	39	32	28	25	21 31	21	15	10		2
	particle	size	75	63	50	37.5	28	20	14	10	6.3	5	3.35	2	1.18	0.6	0.425	0.3	0.15	0.063	0.039	0.028	0.018	0.010	0.007	0.005	0.002		

Determination of Particle Size Distribution Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5 (note: Sedimentation stage not accredited)	Contract No:	Contract:	COBBLES BH/TP : Sample No.	Sample Type:	Depth (m)	Date Received	Description:	GRAVEL		100	06	80		SAND 60	OS ed af	49 49			SILT/CLAY 10	0.0001			IGSL Ltd Materials Laboratory
of Particle Size Distu 1851377:Part2:1990, clau entation stage not accredited)	21813	Airton Road	BH01 AA38091		4.00		Grey clayey	Here Dave 12 wellhare												0.001	CLAY		tory
ibution se 9.2 & 9.5	Report No. R1025600	Airton Road , Tallaght , Dublin	Lab. Sample No.		Customer: Barren Mar	06/06/2019 Date Testing started	Grey clayey, sandy, GRAVEL with many cobbles	then these its we form its of the first station are second in the first of station	89	0.0								1		0.01 0.1	StLT Sieve size (mm)	Approved by:	19 C
	00		A19/2442		ony Consulting Engineers, S	07/06/2019	ny cobbles	and the for the second se	81 9 52 6 51	0.40							/	V			CINPS (mu	d by:	4 Erecan
					Customer: Barrett Mahony Consulting Engineers, Santiwith House, 52-54 Sandwith Stream Lower, Dubin 2	0		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	. 5											10	GRAVEL	Date:	17/06/19
					Street Lower, Dut				540				-	/						100		Page no:	1 of 1

IWAB TANAB						Barrett Mahony Consulting Engineers, Sandwith House, 52-54 Sandwith Street Lower, Dublin 2						56.3 14 28 282 563 563 563 563 563 563 563 563 563 563			X										10 100		CKA VEL	Page	1//06/19 1 01 1
				A19/2448		gineers, Sandwith House	07/06/2019		Ť		8	2 3'3 1'1 0'6					X								1			Date:	11
	R102561					amett Markony Consulting Er		ravelly, CLAY		ad tay till i fill it a carts	5	90.0 1.0 22.0 22.0							7						0.1		CIVING (TITIT) BYRE BYRE	Approved by:	W Tryen
ribution se 9.2 & 9.5	Report No. R	Airton Road , Taltaght , Dublin		Lab. Sample No.		Customer: Ba	06/06/2019 Date Testing started	Black slightly sandy, slightly gravelly, CLAY		Note Deer 5.4 and Deer k.1 of EU littries.1 (1918) yant into approximating 522 (1918) 4-3231															0.01		SALI SIEVE	<u>&lt;</u> ]	
EPUKI cle Size Dist Part2:1990 , clau ge not accredited)	21813	Airton Road	BH02	AA38096	8	4.00		Black slight		Nor Deer 14 at Own													/		0.001	~ ~ ~	CLA!	N	
IESI KEPOKI Determination of Particle Size Distribution Tested in accordance with: BSI377-Part2:1990, clause 9.2 & 9.5 (note: Sedimentation stage not accredited)	Contract No:	Contract:	BH/TP:	Sample No.	Sample Type:	Depth (m)	Date Received	Description:		Remarks			1001	06	80	20	- 09 6urs				30 30	50	10	0	0.0001			IGSL Ltd Materials Laboratory	
Dete Tested in a			CORRIES			_			GRAVEL		<u>L.</u>						SAND						CULTURE AV	SILIVULAT	_		_	IGSL Ltd	
	8	passing	100	100	100	100	98	94	88	83	78	76	72	68	64	58	56	53	47	38	33	30	26	22	18	14	6		
	particle	Size	52	63	50	37.5	28	20	14	10	6.3	ŝ	3.35	2	1.18	0.6	0.425	0.3	0.15	0.063	0.038	0.027	210.0	0.010	0.007	0.005	0.002		

	particle % %	100	00 6	88	62	76	22	63	_	3.35 61	58	55	0.6 51	0.425 49	47	0.15 42	0.063 35	_	_	0.018 25	0.011 21	0.008 17	0.005 13	0.002 7		
Der		COBBLES					GRAVEL						(1, 1, 1, 2, 0, 1)	SAND						ALT/C AV	1977/1720				11 1001	ופאר דר
terminati in accordance (note:										1001	- 06	80	2 %)	δuis				Perc		- 01	0	1000.0			d Matteria	u Malelia
Determination of Particle Size Distribution Tested in accordance with: 851377:Part2:1990, clause 9.2 & 9.5 (note: Sedimentation stage not according)	Contract No: Contract:	BH/TP:	Sample No.	Depth (m)	Date Received	Description:	Damarke	CUBIIDU																	and a laboration	וסטר דנת שומנפוומוט במטולט
Size Dist rt2:1990, clau not accredited)	21813 Airton Roa	BH03	AA117472 B	5.00	06/06/20	Black slight	)	All One Line Date												Y		0.001		CLAT		>
ribution se 9.2 & 9.5	21813 Report No. R Airton Road , Tallacht , Dublin		AA117472 Lab. Sample No.	Customer:	06/06/2019 Date Testing started	Black slightly sandy, gravelly, CLAY		And Chemical and Chemical State (1971) find 2.5 Million and Antonia Statements (1976) (2021) and (1971)										/				0.01		2151 21		
	R102562 blin		No.	Barrett Mahony C	a started	IJy, CLAY		success to 500 7950 = 2916	890°							-1						0.1		S/L. I Sieve size (mm)	Approved by:	- Alexanor
			A19/2445	consulting Engineers, Sa	07/06/2019				6.0 854, 81,1 81,1						1							5		SAND		
IWAB				Customer: Barren Mahony Consulting Endineers, Sandwith Houze, 52-54 Sandwith Street Lower: Dukin 2					02 14 01 2'9 2'3 2'32 2'32 2'32	1111111												10		GRAVEL	Date:	17/06/19
9 N				th Street Lower. D					52 05 92 92 92 02													100			Page no:	1 of 1



Appendix VI Laboratory

b. Environmental and Chemical



#### The right chernistry to celliver results The right chernistry to celliver results Chernited Lide Newmarket

pri chemistry to deniver results Chemister Lid, Depot Road Newmarket CBB 0AL Tel: 01638 606070 Email: info@chemiset.com

1

#### Final Report

Report No.:	19-19643-1		
Initial Date of Issue:	19-Jun-2019	1	
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	21813 Airton Road, Tallaght, Dublin (BMCE)		
Quotation No.:		Date Received:	11-Jun-2019
Order No.:		Date Instructed:	12-Jun-2019
No. of Samples:	28		
Turnaround (Wkdays):	5	Results Due:	18-Jun-2019
Date Approved:	18-Jun-2019		
Approved By:			

#### Approved By:

Details:

Robert Monk, Technical Manager

# Results - Leachate

## 

t: 25813. Airton Road. Tsilsaht. Dublin (E

Client: IGSL			Cher	Chemtest Job No.:	th No.:	19-19643	19-19643	19-19543	12-19643	19-19643	19-19643	19-19643	19-19643	19-15943
Oustation No.:		Ĩ	Chemte	Chemtest Sample ID.:	le ID.:	641051	841052	841054	84'055	841056	841057	841058	841059	841061
Order No.1			Clier	Client Sample Ref.	B Ref.	38092	117468	10886	11401	114409	114415	AA99927	AA99928	AA113509
			Sa	Sample Location:	collion	BH2	EH3	BH4	BHS	BHB	5HB	TP01	TP01	TP02
				Sample Type:	Type:	SOIL	SOIL	SDRL	SOIL	SOR	SOL	SOIL	SOIL	SOIL
				Top Depth (m)	th (m):	1.00	1.00	1,00	1,00	1.00	1,00	0.50	1.00	0.50
			Bat	Bottom Depth (m):	11 (m); 11	1.00	1,00	100	1.00	1.00	1.00	0.50	1.00	0.50
				<b>Date Sampled</b>	mpled.	31-May-2019	31-May-2019	30-May-2019	29-May-2019	30-May-2019	27-May-2019	27-May-2019	27-May-2019	27-May-2019
<b>Determisand</b>	Accred.	SOP	Type	Units	LOD	and the second of	internal in	- areas	A MAN	1	10 min 11	1	Contraction of	
Ammonium	2	1220	101	Nom	0/080	0.36	0.34	0.079	0.11	0.16	0.19	0.10	0.12	0.12
Anmonium	z	1220	10:1	maka	0.10	3.6	2.4	0.79	11	9.6	1.9	1.0	1.2	1,2
Soron (Dissolved)	D	1450	10:1	1000	20	+20	<20	<20	<20	< 20	< 20	< 20	< 20	< 20
<b>Barran</b> (Disscrived)	5	1450	10:1	marka	0.20	< 0.20	< 0.20	< 0.20	< 0,20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

÷



#### Results - Leachate

Client: 105L	-		Ches	Chemtest Job No.	th No.	10-10040	19-19843	19-19643	49-18943	19-19/143	19-19643	19-19043	19-19941	19-19643
Quotation No.:			Chamtost San	st Samp	The ID.T	841062	841063	841064	841065	841068	841067	841059	841070	841071
Order No.:			Clien	Client Sample	The Ref.		AAB9943	AA96944	AABBAE	AA99938	AA88939	AA113513	AA113514	AA113516
			Sa	Sample Lot	ocation:	20c41	TP03	ED41	TP03	1041	TPOH	TP05	1P05	BOHI
				Sample 1	Type:	1	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Fop Dept	Depth (m):	2.00	0.50	1.8	200	090	1,00	0'50	1.00	0.50
			Both	Bottom Depth (m)	(m):	2.00	0:50	1.00	200	0.50	1,00	0.50	1.00	0.60
				Date: Sar	mpled	24-May-2019	24-May-2019	24-May-2019	24-May-2019	24-May-2019	24-May-2019	27-May-2019	27-May-2019	27-May-2019
Determinand	Accred.	SOP	Type	Units	LOD					the state of the	The second se		Harrison H	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Ammonium	n	1220	10:1	hgm	0.050	0.12	0.13	24.0	0.097	0.12	0.17	0.18	0.13	0.16
Ammonium	N	1220	10.1	maika	0.10	12	1.3	1.7	280	1.2	1.7	18	1.3	1.6
Boron (Cissolved)	n	1450	10:1	hgit	20	< 20	+20	*20	82×	< 20	< 20	< 20	< 20	< 20
Boron (Dissolved)	-	1450	10-1	maña	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	- < 0.20	< 0.20

Page 3 of 46



#### Results - Leachate

(BMCE) det Dubu Project, 21813 Airton Road, Talla

Client: IGSL			Che	Cheminst Job No.	D. No.:	19-19643	19-19043	19-19643	19-19645	19-19643	12-120333	19-19643
Quotation No.:			Chemtest Sar	at Samp	mpie ID.:	841072	841073	841074	84:075	841076	841077	841078
Order Nc.			0jo	Client Sample Ref.	a Ref.;	AA113518	AA99835	A499936	A469931	AA98932	AA99927	AA99929
			Ø	Service Location	cetion:	TPOG	10d1	TP07	TPOB	11908	50d1	TPOS
				Sample Type	5 Type:	SOIL	SOIL	SDAL	SOIL	SOIL	SOIL	SOIL
				Top Depth	(H) (H);	2.00	C50	1.00	020	1.00	0,50	2,00
			Bo	Bottom Depth	th (m):	2.00	0.50	1.00	0.50	1.00	0.50	2.00
				Date Sampled	mplad:	24-May-2019	24-May-2019.	26-May-2019	24-Mey-2019	24-May-2019	24-May-2019	24-May-2019
Determinant	Accred.	SOP	Type	Units	100	i marine i	the second	Ser Marine	1 where a	Harris H	and the second second	and a second
Ammonium	5	1220	10:1	1)Out	0.050	0.22	C.17	0.17	0.16	0.12	0.12	0,12
Ammoniam	z	1220	10:1	marka	0.10	22	173	1.7	1.6	1.2	10	1.2
Boron (Disadved)	,	1450	10:1	10rt	8	< 20	+ 20	< 20	<20	< 20	< 20	< 20
Boron (Dissolved)	n	1450	10:1	maya	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Page 4 of 46

ł.

	BMC
-	ublin
ŝ	ver res
Ť	to cat
L	ATTENT
e	Airlo
0	2181
E.	Project

#### Results - Soil

	NUCEN	TWO WITH
	्ष	1
1	벽	
١	85	1
)	23	100
1	108	9
	8	
:		8
)	chen	NUM IN
•	5	1
Í	91	
	-	1

	1-61	R.A.
	19-19643	841062
	19-10643	RANGE
E E	Chamtest Job No.:	Chambast Samula ID -

Client IGSL		to	tentest	Chamtest Job No.	19-10643	19-19043	19-19643	19-19643	19-19643	19-19643-	19-19643	15-19643
Quotation No.:		Chem	thest Sa	Chembest Sample ID.:	841051	841052	841053	841054	841055	841056	841057	841058
Order No :		0	Sent Sar	Clent Sample Rof	38062	117468	117470	10696	11401	114409	114415	AA88827
			Sample	Sample Location	EH2	843	8H3	8944	BHB	BHB	24部	10dl
			Ser	Sample Type	L	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top1	(m) ritepth (m);	1.00	1,00	3,00	1.00	1.00	1.00	1.00	0.50
		100	Jottom L	Bottom Depth (m)		1,00	3.00	1.00	1.00	1.00	1.00	0.50
			Date	Date Sampled	1 31-May-2019	31-May-2019	31-May-2019	30-May-2019	29-May-2019	30-May-2019	27-May-2019	27-May-2019
			Asbe	Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	P Units	1007 S					1111			
ACM Type	2	2192	27	NN							Treeds 1	
Asbestos Identification	9	2392	*	0001	No Asbestos	No Ashestos		No Astrestos	No Asbestos	No Asbestos Detected	No Asbestos Detertad	No Asbestos Deterted
ACM Detection Stans	=	2400	2	NIA	+	nanouan		mannan	- manual man	-	-	-
Molsture	2	2030	100	F	12	10	8.7	12	5.8	8.6	#	15
DH	-	2010		t			8.6					
Boron (Hot Weter Soluble)		2120	20 mg/kg	-	< 0.40	< 0.40		< 0.40	< 0.40	+ 0.40	× 0.40	< 0.40
Sulphate (2:1 Water Solutie) as SO4	-	2120	10 00	0100	6	North State	0.078		Sector Sector			
Sulphur (Elemental)	-	2180	30 mg/kg	1.0	1.3	2.0		1.6	1,2	1.4	23	1.7
Cyanide (Total)	0	2300	00 mg/kg	050 0.00	< 0.50	< 0.50		< 0.50	< 0.50	+ 0.50	[B] < 0.50	[B] < 0.50
Subhide (Easily Liberatable)	2	2325		NO 0.50	2.7	16		2.4	13	14	13	14
Subhate (Acid Soluble)	9	2430	3 00	0.010	< 0.010	< 0.010		0.013	0.020	0.026	01010	0.029
Arsenic	0	2450	50 mp/sg	0.1 10	19	30		22	2	18	2	23
Bartum	-	2450		01 10	42	68		42	44	62	37	48
Cedmium	•	2450		010 010	L	2.5		1,8	21	2.4	2.4	1.8
Chromium	-	2450	50 mg/ug	1.0	12	13		13	뫄	16	13	13
Molybdenum	-	2450	50 mg/kg	60 2.0	L	4.0		38	3,1	3.1	2.8	3.2
Antimony	N	2450		0.2 0	<2.0	< 2.6		< 2,0	<2.0	< 2.0	s.2.0	< 2.0
Copper	•	2450	50 mg/ug	090 0		名		8	12	27	19	24
Marcury	-	2450	SO mights	01:10	< 0,10	< 0.10		< 0,10	0.33	< 0.10	< 0.10	< 0.10
Nicket	>	2450	50 mg/kg	0.50	L	52		4	48	51	37	44
Lead	0	2450	EU/Em 05	09'0 50	13	16		18.	21	23	13	15
Selenium	-	2450	SO marka	0.20		0.45		680	0.40	< 0.20	0.21	< 0.20
Zinc	>	2460	S0 ma/kg	02.0 0.50	19	68		21	72	74	24	8
Chromium (Trivalent)	z	2490		0.1 1.0	12	13		13	15	16	13	13
Chromium (Hexavalent)	z	2490	police of	08.0 0.00	- 0'£0	< 0.60		< 0.50	< 0.50	< 0.60	< 0.50	× 0.50
Total Organic Carbon	>	2625	1 90	0:20	0.40	0.40		0.33	0.59	0.44	0.33	0.29
Mineral Oil	z	2670	70 maño	10	< 10	< 10		< 10 <	< 10	< 10	< 10	< 10
Alphatic TPH >C5-C6	z	268	2880 mp/kg	01 00	<1.0	< 1.0		<10	< 1,0	< 1.0	[E] < 1.0	[B] < 1.0
Alphatic TPH >C6-C6	N	2680	30 ma/kg	0.1 0	<1.0 <	< 1.0		< 1.0	< 1.0	<-1.0	(E) < 1.0	(日)<1.0
Apphatic TPH >C8-C10	>	2680	palam 08	1.0		<1.0		< 1,0	<1.0	< 1,0	[6] < 1.0	回<1.0
Alichatic TPH >C10-C12	5	2680	an maker	01 10	<1.0	< 1.0		< 1.0	< 1.0	< 1.0	[B] < 1.0	(E) < 1.0
Aichate TPH >C12-C16	2	2680		01 1.0	L	< 1.0		<1.0	< 1.0	< 1.0	[8] < 3.0	[E] < 1.0
Alchatic TPH >C18-C21	0	2680	50 malva	0 1.0	<1.0	<10 <		<10 1	< 1,0	< 1,0	[B] < 1.0	国<1.0
Alphatic TPH »C21-C35	0	266	2680 me/kg	0.1 00	C1 >	<1.0		<1.0	< 1.0	<1.0	[E] < 1.0	(E) < 1.0
Alphatic TPH >C35-C44	z	2680	pollom 08	01 1.0	<10	< 1.0		0'£>	< 1.0	< 1.0	[B] < 1.0	[E] < 1.0
Total Alightatic Hydrocarbons	x	385	2680 mg/kg	0 20	< 5.0	< 5.0		< 5,0	<5.0	< 5.0	18 < 5.0	[E] < 5.0
			Sector Sector									

Page 5 of 46

## 

Results - Soil

Client: 16SL		Che	Chamitest Job No.;	101	19-19943	19-19643	19-19643	19-19643	19-19643	19-19643	15-19643	18-19643
Outstation No.		Chemte	Chemtest Sample ID ::	:0	841061	841052	841053	841054	841055	841058	841057	841058
Order No :		Che	Client Sample Ref	et -	38092	117468	117470	10696	11401	114409	114415	AA99927
		in lan	Sample Location:	100	BH2	8H3	BHS	8H4	BHB	848	2148	1001
			Sample Type:	-per:	SOL	SOL	SOIL	SOIL	SOIL	SOIL.	SOIL	SOIL
			Top Depth (m):	il mi	1,00	1.00	3.00	1.00	1,00	1,00	1.00	0.50
		Bo	Bottom Depth (m)	÷	1.00	1:00		1,00	1.00	1.00	1,00	0:20
			Date Sampled:	_	31-May-2019	31-May-2019	31-May-2019	30-May-2019	29-May-2019	30-May-2019	27-May-2019	27-May-2019
			Asbestos Lab:		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determitand	Accred.	SOF	Units	TOD					100000000000000000000000000000000000000			
Aromatic TPH >C5-C7	z	2880	Bayduu	1.0	<10	<1.0		< 1.0	<1.0	< 1.0	1回<1.0	(引 < 1.0
Arometic TPH >C7-C8	z	2680	make	1.0	< 10	<1.0		< 1.0	<1.0	< 1.0	[6] < 1.0	(日<1.0
Anomatic TPH >C8-C10	0	2680	BMgm	1.0	<1.0	<1.0		<1.0	< 1.0	<1.0	[E] < 1.0	(1)<1.0
Aromatic TPH >C10-C12	ji ji	2680	DWgm	1.0	<1.0	<1.0		<1.0	<1.0	<1.0	[1] < 1.0	(日 < 1.0
Arometik TPH >C12-C16	2	2680	make	1.0	<10	< 1.0		< 1.0	<1.0	< 5.0	[B] < 1.0	[四]<1.0
Aromatic TPH >C16-C21	2	2080	ma/kg	1.0	<10	<1.0		< 1,0	<1.0	<1.0	(B) < 1.0	(1) (1)
Aronatic TPH >C21-C35	5	2680	ma/kg	1.0	< 1.0	<1.0		<1.0	< 1.0	<1.0	[6] < 1.0	E] < 1.0
Aromatic TPH >035-044	z	2680	ma/kg	1.0	<10	< 1,0		< 1.0	< 1.0	<1.0	[6] < 1.0	[E] < 1.0
Total Aromatic Hydrocarbans	2	2680	10%em	50	< 5.0	< 6.0		< 5.0	< 5.0	< 5.0	(1) < 5.0	[E] < 5.0
Total Pergeum Hydrocarbons	z	2680	ma/kg	10.0	< 10	< 10		< 10	< 10	< 10	[B] < 10	[B] < 10
Benzene	2	2760	519/00	1.0	< 1.0	< 1.0		< 1.0	<1.0	<1.0	101 > 10	国<1.0
Toluene	5	2760	LIN/60	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	(日 < 1.0	[E] < 1.0
Ethylbercere	2	2760	10/00	1.0	< 10	<1.0		< 1.0	<1.0	<1.0	18 < 1.0	E <1.0
m & p-Xylane	9	2760	210/901	1.0	< 10	< 1.0		< 1.0	×1.0	<1.0	0.1 > 18]	[E] < 1.0
o-Xytene	5	2760	palkgu	1.0	< 1.0	<1,D		< 1.0	< 1.0	< 1.0	(B] < 1.0	[E] < 1.0
Methyl Tert-Bulyl Ether	2	2760	19/kg	1.0	<1.0	<1.0		< 1.0	< 1.0	<1.0	[8] < 1.0	[E] < 1.0
Naphthaene	3	2800	mplikg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	× 0.10
Approaphthylene	2	2800	mg/kgr	0.10	< 0.10	<0.0		< 0.10	< 0.10	< 0.10	< 0,10	< 0.10
Acenaphthene	D	2600	marka	0,10	< 0.10	< 0.10	-	< 0,10	< 0.10	< 0,10	<0.10	< 0.10
Fluorene	3	2800	2800 mg/kg 0.1	0.10	< 0.10	< 0, 0 >		< 0.10	< 0.10	× 0.10	< 0.10	< 0.10
Phanantrane	0	2800	mg/kg	0.10	< 0.10	< 0,10		< 0.10	< 0.10	< 0.50	< 0,10	< 0,10
Anthracene	n	2600	marka	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	c.0.10	< 0.10
Fluoranthene	0	2800	mg/kg	0.10	< 0.10	< 0(:)0 >		< 0.10	< 0.10	< 0.10	< 0,10	< 0.10
Pyrane	0	2800	_	0.10	< 0,10	< 0.10		< 0.10	< 0,10	< 0.10	< 0.30	< 0.10
Benzulajanthragene	n	2500	2800 mg/kg 0.1	0.10	< 0.10	< 0, 10		< 0,10	< 0.10	< 0.10	c 0.10	< 0.10
Chrysene	0	2800	marka	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(b)flucrenthene	n	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)suoranthene	n	2800	mg/kg	0.10	< 0.10	< 0.30		< 0.10	< 0.10	< 0.10	c.0.10	< 0,10
Benzo(a)pyrene	2	2600	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	× 0,10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	0	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	<0,10 ⇒	< 0,10	< 0.10	< 0.10
Dibenz(s,h)Arthracene	z	2800	mg/kg	0,10	< 0.10	< 0.10		< 0,10	< 0.30	< 0.10	< 0.10	< 0.10
Benzolg.h.ipen/iene	2	2800	marka	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	<.0.10	< 0.10
Cortonecte	z	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.30	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	z	2800	mg/kg	2.0	<20	< 2.0		< 2.0	< 2.0	<2.0	< 2.0	< 2,0
PCB 28	0	2815	mg/kg 0.010	010	< 0.010	< 0.010		< 0,010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	2	2815	mg/kg 0.010	010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	+ 0.010	+ 0.010
Public State and		ALC: NO										and the second se

Chemtest Barrier Annual Annual Annual

Results - Soil

Client: 155L		Chei	Chembest Job No.	ob No.!	19-19143	19-19643	19-19643	19-19843	19-19643	19-19643	15-19643	19-19643	
Quotetion No.		Chamta	Chemiest Sample 10.:	ple 10.:	841051	841052	841053	841054	841055	841058	841057	841058	
Order No.:		Clie	Client Sample Ref.	ole Ref.	38092	117468	117470	10696	11401	114409	114415	AA99927	
		Ø	smple L	Sample Location	BHC	8943	848	BH4	BHB	の日本	BH7	1041	
			Samp	Sample Type:	SOL	SOL	SOIL	SOIL	SOIL	SOIL	BOIL	SOIL	
			Top De	Top Depth (m):	1:00	1.00	3.00	1.00	1.00	1.00	1.00	0.60	
		Bal	Battors Depth (m)	pth (m):	1.00	-1:00	3.00	1,00	1.00	1.00	1.00	0,50	
			Dale S	Dale Sampled	31-Mey-2019	-31-May-2019	31-May-2019	30-May-2019	29-May-2019	30-May-2019	27-May-2019	27-May-201B	
			Asbes	Athestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD							The second se		
PCB 116		2815	-	010 0,010	< 0.010	< 0.010		< 0.010	< 0.010	< 0,010	< 0.010	<0.010	
PCB 150	3	2815		mp/tig 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	<0.010	
PCB 136	5	2815		mp/kg 0.010	< 0.010	< 0.010		< 0.010	< 0.010 ×	< 0.010	< 0.010	< 0.010	
PCB 180	-	2815		mp/kg 0.010	× 0.010	< 0.010		< 0.010	< 0.010	< 0,010	<0.010	<0.010	
Tolsi PCBs (7 Congeners)	z	2815	Bytu	0.10	< 0,10	< 0.10		< 0,10	< 0,10	< 0,10	< 0,10	× 0.10	
Total Phyrods	2	2920	-	mp/kg 0.30	< 0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	× 0.30	

Page 7 of 46

## Chemtest Protect: 21813 Afrion Read. Tailaght, Dublin

Results - Soil

		COMPANY OF THE OWNER		Contraction of the local division of the loc		the state of the s		100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1000 m 100	10100101	1000000	
CHENTER RUSH		AUN	LINUWSE	CUBINIESE JOD KO		19-13042	18-18043	THE PARTY AND	THORNEY A	10110010	0100000	0100010
Ouotation No.:		Chemte	est Sam	Chemtest Sample ID.:		841000	841061	841062	841063	841054	841060	841066
Order No.:		Gen	Client Sample Ref	otie Ref.	AA99528	AA999209	AA113509		AA59943	AA99944	AA99945	AA999938
		ŝ	ampie L	Sample Location:	10d1	TPOT	1P002	TPO2	1P03	TP03	TP03	TP04
			Samp	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	BOIL	SOIL	SOIL
			Top De	Top Depth (m):	1.00	2.00	0.60	2.00	0.50	1.00	2.00	0.50
		Bot	floon De	Bottom Depth (m)		2.00	0:50	2.00	0.50	1.00	2,00	0.50
			Disks 5	Dele Sempled:	27.4	27-May-2019	27-May-2019	24-May-2019	24-May-2019	24-May-2019	24-May-2019	24-May-2019
			AGDES	Asbestos Lab.	COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Beterminand	Accred.	SOP	Units	1000								
VCM Type	9	2192		N/N	1.4		1.1.1					
utbestos Identification	3	2192	*	0.001	No Asbestos Detected		No Ashestos Detected	No Asbestos Delected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	-	2192		NIN	L							
Aciahure	N	2030	3 <sup>4</sup>	0:020	7.2	6.5	9.7	10	10	17	12	- 18
2.	=	2010		N/A		8.6						
Boron (Hot Water Soluble)	-	2120	mo/sq	0.40	< 0.40		< 0.40	< 0,40	< 0.40	× 0.40	4 0,40	< 0.40
Sulphate (2:1 Water Soluhle) as SO4	0	2120		0.010		<0.0.0 >					Contraction of the	
Sulphur (Elemental)	9	2180	mpling	1.0	12		1.4	1.4	1,2	1.4	2.8	1.2
Cymide (Total)	2	2300	molea	0.60	[B] < 0.50		[B] < 0.50	[B] < 0.50	181 < 0.50	[B] < 0.60	[B] < 0.50	[B]< 0.50
Sutphide (Easily Liberate/le)	2	2325	m0%0	0.50	2.8		19	16	16	27	15	0.93
Sulphate (Acid Soluble)	9	2430	2	0:010	0.010		< 0.010	× 0.010	< 0.010	0,045	< 0.010	0.029
rsenic	2	2450	mp/kg	101	27		26	28	24	20	23	14
Serium	5	2450	mp9kg	1 10	41		88	81	37	16	41	2/2
Cadmium	0	2450	2450 mp/kg	0.10	1.8		1.6	1.9	2.9	4.7	1.9	2.1
Chromium	-	2450	2450 mp/kg	1.0	\$		14	12	13	26	13	23
Aoybdenum	0	2450	mo/leg	2.0	3.5		3.6	3.7	3.6	4.9	3.6	2,3
Antimony	x	2450	2450 mg/kg	2.0	<2.0		<20	< 2.0	< 2.0	2.5	¢ 2.0	<2.0
Copper	0	2450	mg/kg	0.50	23		22	31	52	45	23	27
Asiciary	2	2450	m0 <sup>1kg</sup>	0.10	< 0.10		< 0.10	< 0.10	< 0.10	0.10	× 0.10	< 0.10
fictual	0	2450	2450 mg/kg	0.50	42		43	48	44	100	46	50
ead	0	2450	mg/kg	0.50	15		16 1	14	4	27	-18	8
Selenium	2	2450	610 <sup>1</sup> kg	0.20	< 0.30		0.42	< 0.20	0.30	0.94	2.4	0.51
Sinc	0	2450	2450 mg/kg	0.50	8		56	70	62	120	62	100
Chromium (Trivalent)	x	2490	2490 mg/kg	1.1.0	13	1	14	12	13	26	m#	53
Chromitum (Haxavalent)	z	2490	2490 mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	+0.50	< 0.50
fotal Organic Carbon	2	2625	2	0.20	620		0.34	0.64	0.33	0,87	0.32	0,65
Ansraí Oil	z	2670	2670 mg/kg	101 10	< 10		× 10	< 10	< 10	<10	< 10	<10
Niphatic YPH >C5-C8	z	2690	marka	0.1	(B) < 1.0		[B] < 1.0	[B] < 1.0	[B] < 1.0	[8] < 1.0	E < 1.0	101<10
Vibbalic TPH >C6-C8	z	2680	muha	1.0	[B] < 1.0		[B] < 1.0	[B] < 1.0	B] < 1.0	(B) < 1.0	[E] < 1.0	10/1 > (8)
Uphatic TPH >C8-C10		2680		1.0	[B] < 1.0		[B] < 1.0	16] < 1.0	[8] < 1.0	(田<1.0	[E] < 1.0	[8] < 1.0
Viphatic TPH >C10-C12	2	2680	marka	1.0	[B] < 1.0		[B] < 1.0	[8] < 1.0	[B] < 1.0	[B] < 1.0	181<1.0	18 < 1.0
Viphalic TPH >C12-C16		2680	marka	0/1 10	[B] < 1.0		[B] < 1.0	[B] < 1.0	[8] < 1.0	(1) < 1.0	[E] < 1.0	[日] < 1.0
Alphatic TPH >C16-C21		2680	mg/kg	0.1	(I) < 1.0		[B] < 1.0	[6] < 1.0	[B] < 1.0	[8] < 1.0	[E] < 1.0	18] < 1.0
Alphatic TPH >C21-C35		2680		1.0	[B] < 1.0		[B] < 1.0	[8] < 1.0	[1] < 1.0	[8] < 1.0	[E] < 1.0	[E] < 1.0
Niphalic TPH >C35-C44	N	2680	marka		(B) < 1.0		B] < 1.0	[8] < 1.0	[B] < 1,0	[B] < 1.0	[E] < 1.0	(日<1.0
Total Attalentic Lindenensinan	-11	CHREE	5680 marker	0.5	TOTAK D		DEV DE	181 < 5.0	10-4 F.O	181 4 50	101 - 100	

	-
-	의통
in	53
a	퉒
2	동물
T	르
E	Fon
(1)	50
<u>۳</u>	55
	5m
()	218
$\sim$	
12	욁
2	6

#### Results - Soil

Client: I3SL		Che	Chemtest Job No.:		19-16643	19-19143	18-19843	18-19843	19-19613	19-19643	18-19943	15-19643
Quotation No.1	_	Chemit	Chemiest Sample ID.:		841059	841050	641061	B41062	641063	841064	841065	841066
Order No.1		Cilo	Client Sample Rel :	L	AA999328	AA99929	AA113509		A499943	A496944	AA99945	AAEBB36
		05	Sample Location:	one	1041	TPOI	TPOS	TP02	1P00	1P03	TP03	TPOM
			Sample Type:	Dec	SOL	SOL	SOI.	SOIL	SOIL	SOIL	SOIL	SOIL.
			Top Depth (m):	글	1.00	2.00	050	2.00	0.50	1,00	2.00	0.50
		Bo	Bottom Depth (m):	X	1.00	2.00	0.50	2.00	0.50	1,00	2.00	0.50
			Date Sampled:	-	27-Mey-2019	27-May-2019	27-May-2019	24-May-2019	24-May-2019	24-May-2019	-	24-May-2019
			Asbestos Lab:		COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	-
Determinand	Accred.	30P	Units LOD	00								
Anomatic TPH >C5-C7	z	2680	mg/kg	1,0	Bj < 1.0		[B] < 1,0	181 < 1,0	(B) < 1.0	[B] < 1.0	(B) < 1.0	[E] < 1.0
Nomatic TPH >C7-C8	z	2680	marka		B]<1.0		[B] < (.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[E] < 1.0
Anomatic TPH >C8-C10	n	2680	ma/kg	1.0	B] < 1.0		[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[E] < 1.0
vnematic TPH >C10-C12	0	2680	mailia	1.0	(B) < 1.0		[8]<1.0	[B] < 1,0	[B] < 1.0	[B] < 1.0	81<1.0	[E] < 1.0
Anomatic TPH >C12-C16	n	2680	mg/kg	1.0	B]<1.0		[B]<1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[1]<1.0	[B] < 1.0
Arometic TPH >C16-C21	0	2680	(Bilight	1.0	Bj < 1.0		[B] < 1.0	[B] < 1.0	[B] < 1.0	(1) < 1,0	国<1.0	[E] < 1.0
Anomatic TPH >C21-C35	n	2880	mg/kg	1.0	[B] <1.0		[B] < 1.0	B] < 1.0	[B] < 1.0	[B] < 1.0	(日) < 1.0	[6] < 1,0
Aromatic TPH >C35-C44	Z	2680	mg/kg/	1.0	[B]<1.0		[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[8]<1.0	[E] < 1.0
olal Arematic Hydrocarbons	z	2980	mang	5.0	B] < 5.0		(B) < 5.0	[B] < 5.0	[B] < 6.0	[B] < 5.0	[B] < 5.0	[E] < 5.0
otal Petroleum Hydrocarbons	z	2680	mg/mg 10.0	9	[B] < 10		[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	1  < 10
Benziene	0	2760	pana	1.0	(B) < 1.0		181<1.0	[B]<1.0	[B] < 1.0	(B) < 1.0	[B] < 1.0	[B] < 1.0
olusno	2	2760	pyke.	1.0	[B] < 1.0		[B] < 1.0	B)<1,0	[B] < 1.0	[B] < 1,0	国<1.0	[E] < 1.0
Ethylberzene	0	2780	payer.	1.0	[B] < 1.0		[8] < 1.0	[B] < 1.0	[B] < 1.0	[6] < 1.0	[B]<1.0	B<1.0
n & p-X/lene	n	2760	pakg.	1.0	B] < 1.0		[B] < 1.0	B1<1.0	[B] < 1.0	[8] < 1.0	回 < 10	B < 1.0
o-Xytene	n	2760	Dave.	1.0	(B) < 1.0		[B] < 1.0	B] < 1.0	(国)<1.0	(B)<1.0	[8] < 1.0	[8] < 1.0
Methyl Tert-Butyl Ether	2	2760	payed.	1.0	[B] <1.0		[B]<1.0	B] < 1.0	B<1.0	8 < 1.0	[B] < 1.0	B < 1.0
Japhthalene	2	2800	Divolu	2	< 0.10		+0.10	< 0.50	< 0.10	< 0.10	< 0.10	< 0.10
kosnaphthylene	z	2800	Biydhu	2	< 0.10		+ 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphihene	þ	2800	they due	10	< 0.10		< 0.10	< 0.10	< 0,10	< 0.10	< 0.10	< 0.10
tuorene	>	2800	mg/kg	9	< 0.10		< 0,10	< 0.10	< 0.10	< 0.10	× 0.10	< 0.10
<sup>shenardhrone</sup>	2	2800	Baybu	9	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
snittracerte	-	2800	they have	2	< 0.10		< 0,10	< 0.10	< 0.10	< 0.10	< 0.10	< 0,10
luprenthere	2	2800	mg/kg	10	< 0.10		< 0.0 >	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
ylene	2	2800		0.10	< 0.10		<0;0>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
3enzo[d]anthrizcend	>	2800	mp/kg	9	< 0.10		0,0>	< 0.10	< 8.10	< 0.10	< 0,10	¢ 0,10
Chryserte	3	2800	ma/kg.	10	< 0.10		0,0>	< 0,10	< 0.10	< 0.10	< 0.10	¢ 0,10
Senzo[b]fluoranthene	n	2800	mo/kg	10	< 0.10		< 0, 0	< 0.10	< 0.10	< 0.10	< 0.10	c 0, 10
Benzo(k)tuorenthene	0	2800	ma/kg.	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0,10	< 0,10	< 0.10
Benzo[ajaynene	n	2800	mg/kg 0.10	10	< 0.10		0,'0 >	< 0.10	< 0.10	< 0,10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	5	2800	maka	0.10	< 0.10		< 0', 0 >	< 0.10	< 0.10	< 0.10	< 0.10	< 0.30
Dibenz(a,h)Arithracene	z	2800	mg/log 0.10	10	< 0.10		< 0.10	< 0.10	< 0.10	< 0,10	< 0.10	< 0,10
Benzojgih, ijperylene	2	2800			< 0.10		< 0,10	< 0.10	< 0.10	< 0.10	< 0,10	c 0.10
Coronere	z	2800			< 0.10 ×		< 0'-0	< 0.10	< 0.10	<0.10	< 0.10	< 0.10
olas Of 17 PAH's	z	2800	2800 mg/kg 2.0		< 20		+20	<20	< 2.0	< 2.0	< 2.0	< 2.0
PCB:26	n	2815	2815 mg/kg 0.010		< 0.010		< 0.010	< 0:010	< 0.010	< 0.010	< 0.010	×0.010
PCB 52	0	2815	2815 mg/tg 0.010	_	< 0.010		< 0.010	< 0.010	< 0.010	<0.010	< 0.010	< 0.010
			and the second sec	ļ					and the second se	and the second se		

Page 9 of 46

## M Chemtest

#### Results - Soil

Accretion         19-15643         19-15643         19-15643         19-15643         19-15643         19-15643         18-1563         18-1563														
Mo.:         Chemittent Sample ID:         641050         641061         641062         641063         641064         641064         641063         641063         641063         641063         641063         641063         641063         641063         641063         641063         641063         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641064         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016         641016     <	Client: 163L		Cher	ntest Jo	b.No.	19-19143	19-19443	18-18643	19-19843	19-19643	18-19643	15-19843	19-19643	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Chotation No.:		Chamte	st Samp	ole ID.:	841055	841060	841061	841062	841063	841064	841065	841066	
Ammile Localison         TPQ1         TPQ2         TPQ2         TPQ3         TD3         TD3         TD3	Order No.:		Clier	It Sampl	e Ref:	AA96928	AA99929	AA113509		AA99943	AA98944	AA96946	AA99836	
Sample Type         SOL         SOIL			es.	Imple Lo	celson:	TPOT	TPDI	1P02	1P02	TP03	1F03	1P03	1004	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				Sample	Type	SOL	SOL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
Activity         T(0)         2(0)         0.5(c)         2(0)         0.5(c)         1(0)         1(0)           and         Date Sempler:         27.May-2019         24.May-2019         24.May-2019 <td< td=""><td></td><td></td><td></td><td>Top Dep</td><td>(h (m):</td><td>1,00</td><td>2.00</td><td>0.50</td><td>2,00</td><td>0.60</td><td>1.00</td><td>2.00</td><td>0.50</td><td></td></td<>				Top Dep	(h (m):	1,00	2.00	0.50	2,00	0.60	1.00	2.00	0.50	
Clue Sampled         27.May-2019         24.May-2019			Bot	tors Dep	dh (m):	1,00	2.00	0.50	2,00	0.60	1.00	2.00	0.50	
Actract         Actract SOP         Ultis         LOD         COVENTRY         C				Date 54	mplect	27-May-2019	27-May-2019	27-May-2019	24-May-2019	1.2.		24-84-2019	24-May-2019	
Actred.         SOP         Units         LOD          U         2815         mylap         0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <<0.010         <0.010         <<0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010				Asbesk	os Lab:	COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	
U         2815         mp/lg         0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010         < < 0.010	Determinand	Actred.	-	1.54-02	LOD	1000			1.000	- and -	1	induced in	Contraction of	
U         2816         mphg         0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010         <0.010	PCB 116	0	2815		0.010	- < 0.010		< 0.010	< 0.010	< 0.010	< 0.010	<0.010	<0.010	
J         2815         myhrg         0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010 <td>PCB 150</td> <td>2</td> <td>2815</td> <td></td> <td></td> <td>&lt; 0.010</td> <td></td> <td>&lt; 0.010</td> <td>&lt; 0.010</td> <td>+ 0.010</td> <td>&lt; 0.010</td> <td>&lt; 0.010</td> <td>&lt;0.010</td> <td></td>	PCB 150	2	2815			< 0.010		< 0.010	< 0.010	+ 0.010	< 0.010	< 0.010	<0.010	
J         2815         mg/kg         0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010         < 0.010 <td>PCB 135</td> <td>7</td> <td>2815</td> <td></td> <td>0:010</td> <td>&lt; 0.010</td> <td></td> <td>&lt; 0:010</td> <td>&lt; 0.010</td> <td>&lt; 0.010</td> <td>&lt; 0.010</td> <td>&lt; 0.010</td> <td>&lt;0.010</td> <td></td>	PCB 135	7	2815		0:010	< 0.010		< 0:010	< 0.010	< 0.010	< 0.010	< 0.010	<0.010	
N 2815 mgAg 0.10 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 < 0.0 <	PCB 180	0	2815		0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.010	
1 1000 1000 1000 1000 1000 1000 1000 1	Total PCBs (7 Congeners)	7	2815	maha	0.50	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	× 0,10	
	Total Phenois	2	2820	ma/kg	0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	+ 0.30	< 0.30	

1

1

ξ.

+-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
S	t Du
0	200
÷	Tall
E	stry I
(D)	tion F
ž	1 AC
1	010101
Q	En H
5	alo.
2.	ã

#### Results - Soil

(BMCE)	
	l
Dubit	
dener	И
SH.	l
2.4	l
in Road	I
5.0	ł
Airton	
100.00	н
011	
92	н
P?	l
ect	
2	l

Period:         641037         641047         641045	19 4 · · · ·	841071	841072	841073	011074
Titlendian         Clent Sample Fei- sample Location         Adeeda         Addeeda         Addeeda         Addeeda           Final         Earnifie Location         TPOI         200.         200.         200.         200.           Final         Earnifie Location         TPOI         200.         200.         200.         0.50           Final         Earnifie Location         TPOI         200.         200.         0.50         0.50           Final         Earnifie Location         TPOI         200.         200.         200.         0.50           Final         U         2182         %         0.001         Dentected         200.         0.50           Addentic         U         2182         %         0.001         Dentected         200         0.50           Addentic         U         2182         MA         0.010         21.2         MA         200         0.50           Mater Solution         U         2120         myleg         0.0         1.1         2.00         0.50           Mater Solution         U         2120         myleg         0.0         1.1         2.00         0.50           Mater Solution         U         2120		A N N N N N N N N N N N N N N N N N N N			+JD1+0
Sample Type         Solit         FP04         TP04		0.4113535	AATTERN	A469935	AA99836
Top Depth (m)         Top Depth (m)         Top         Solution	Solt	1000	TOOR	1001	11007
Top Depin I ryle:         SOIL         SOIL <td>SUL</td> <td>0012</td> <td>in the</td> <td>1041</td> <td>- ILOI</td>	SUL	0012	in the	1041	- ILOI
Top Deshh (m):         1.00         2.06         0.65           Anter Deshh (m):         1.00         2.00         0.65           Anter Deshh (m):         1.00         2.00         0.65           Anter Deshh (m):         2.01         0.65         0.65           Anter Deshh (m):         1.00         2.04         0.65           Anter Deshh (m):         2.01         0.65         0.65           Anter Deshh (m):         1.00         No. Abbetton         2.04         0.65           Anter Deshh (m):         2.13         No.         2.02         1.1         9.7         19           Anter Deshh (m):         1.01         0.010         0.010         2.04         0.65         0.65           Anter Deshh (m):         1.0         2.140         No.         0.010         0.45         0.010           Anter Deshh (m):         1.0         2.140         No.         0.010         0.45         0.010         0.45           Anter Deshh (m):         1.0         0.010         1.2         0.010         0.45         0.005           Anter Deshh (m):         1.2         0.010         0.12         0.12         0.010         0.45         0.005           Anter		SOIL	SOIL	5011	SOIL
Eutoner Osphit (m):         1.00         2.00         0.0.5           Accored.         Step         Untrial         LOID         2142         0.01         2146         27-Milly-2019         27-	1,00	0.50	2,00	0,50	1.00
Accreate         Stantine Lob         Concente Lance         Data Sampled         274,May-2019         274,May-2019 <td>1.00</td> <td>0.50</td> <td>2.00</td> <td>0.50</td> <td>1,00</td>	1.00	0.50	2.00	0.50	1,00
Accerted:         SOP         Units         LOD         COVENTRY         COVENTRY         COVENTRY           U         1 2162         NA	27-May-2019	27-May-2019	33	24-May-2019	24-May-2018
Accreat         SQP         Units         LOD         -	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
U         2182         MA         -         -         -           Mello         U         2182         %         0.001         Databatos         No. Adbettos         No. Adbettos<					
1         1         2192         %         0.001         No Astheticos         No         Astheticos           1         1         2192         %         0.001         11         9.7         19         Denecoted           1         1         2192         %         0.020         11         9.7         19         Denecoted           1         1         2120         market         0.010         ~0.010         6.613         0.613 <td></td> <td></td> <td></td> <td></td> <td></td>					
Hell         U         2192         NA         Deficient         Deficient <thdeficient< th="">         Deficient         &lt;</thdeficient<>	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos
N         2736         NA         *         9.7         5         7         5           Abio         U         2730         NA         NA         8.4         15         15         15           Abio         U         2712         malked         0.40         ×0.40         0.61         1.3         1.43	-	Detected	CIBIDEDED :	CHERCERCE	CINED OF COLOG
N         2000 2010         % 0.020 % 0.020         11         9.7         19           Abbib ses SO4         U         2720         m/m         0.010         4.3         0.43         4.04           Abbib ses SO4         U         2720         m/m         0.010         4.3         0.43         4.45           Mabbib ses SO4         U         2720         m/m         0.010         4.3         0.43         4.45           U         2720         m/m         0.010         5.0         9.10         4.45         4.45         4.45           U         22456         m/m         0.10         2.0110         2.0110         0.033         0         0.033         0         1.3         4.45 <t< td=""><td></td><td></td><td></td><td></td><td></td></t<>					
(a)         U         2000         NMA         NMA         SA         A           Abie) aes SO4         U         2120         mMA         0.010         <0.400	=	10	1.7	30	8.4
Jaio         Lu         2120         maked         0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.45         H </td <td></td> <td></td> <td>-</td> <td></td> <td></td>			-		
Able) as SOA         U         2120         p/l         0.010         4.000         1.3           (sole)         U         2205         mg/log         1.6         1.3         1.3           (sole)         U         2205         mg/log         0.60         9.0         1.3         1.3           (sole)         N         2205         mg/log         0.60         2.010         5.00         9.0         4.45         0.033         0.010         0.010	< 0,40	< 0,40	< 0.40	< 0.40	× 0.40
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					
(a)         (a) <td>1.3</td> <td>5,1</td> <td>&lt; 1.0</td> <td>&lt;1.0</td> <td>¢ 1.0</td>	1.3	5,1	< 1.0	<1.0	¢ 1.0
NI         2235         myka (0.016)         0.50         9.6         9.6         9.6         9.5         9.5         0.0303         0.040         0.030         0.0303         0.040         0.040         0.010         0.040         0.010         0.040         0.010         0.040         0.010         0.040         0.010         0.040         0.010         0.010         0.010         0.010         0.010         0.010         0.010         0.010         0.010 <th< td=""><td>0 [B] &lt; 0.50</td><td>18] &lt; 0.50</td><td>[B] &lt; 0.50</td><td> B  &lt; 0.60</td><td>(B) &lt; 0.50</td></th<>	0 [B] < 0.50	18] < 0.50	[B] < 0.50	B  < 0.60	(B) < 0.50
1         2430         %         0.010         <0.010         <0.030         0           1         2456         mylkg         1.0         21         1.9         1.9           1         2456         mylkg         0.10         1.1         21         1.9           1         2456         mylkg         0.10         1.1         21         3.4           1         2456         mylkg         0.10         1.1         2.9         3.4           1         2456         mylkg         0.10         1.1         2.0         2.0           1         2456         mylkg         0.10         2.1         2.4         3.4         0.3           1         2456         mylkg         0.10         2.0         2.1         2.0         2.0         2.0           1         2456         mylkg         0.10         2.1         2.0         2.0         2.4         2.0           1         2456         mylkg         0.50         2.1         2.0         2.4         2.4           1         2456         mylkg         0.50         2.1         2.4         2.4         2.4           1         1	19	9.6	9.7	6.0	11
U $2460$ $mylog$ $1.0$ $241$ $mylog$ $1.0$ $241$ $1.0$ $241$ $1.0$ $2410$ $mylog$ $0.10$ $1.7$ $3.4$ $3.3$ $0$ $0$ U $2460$ $mylog$ $0.10$ $1.7$ $3.4$ $3.3$ $0$ $0$ $3.6$ $0$ $0.6$ $3.6$ $0.6$ $3.6$ $0.6$ $3.6$ $0.6$ $3.6$ $0.6$ $3.6$ $0.6$ $3.6$ $0.6$ </td <td>0.23</td> <td>0.016</td> <td>&lt; 0.010</td> <td>D:048</td> <td>&lt; 0.010</td>	0.23	0.016	< 0.010	D:048	< 0.010
U         2460         making         10         44         93         1           U         2460         making         1.0         1.7         3.4         9.3           U         2450         making         1.0         1.7         3.4         9.3           U         2450         making         2.0         1.7         3.4         9.3           U         2450         making         2.0         0.0         2.0         2.0         0.0         2.0         2.0         0.0         0.0         0.0	14	35	19	拐	27
U         2460         mplug         0.10         1.1         3.4         0           U         2450         mplug         1.0         1.2         20         20         20           U         2450         mplug         3.0	130	57	42	96	18
U         2450         mp/kg         1.0         1.2         2450         mp/kg         2.0         3.0         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         3.4         2.0         2.0         3.4         2.0         2.0         3.4         2.0         2.0         3.4         2.0         3.4	0.39	2.1	41	2.8	1.7
U         24450         mpkg         2.0         3.0         3.4           N         24460         mpkg         2.0         <2.0	42	18	4	23	12
N         2450         mplug         2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2.0         <2	4.6	3.0	2.5	8.6	3.3
U         2450         mg/kg         0.50         21         29           U         2460         mg/kg         0.10         <0.10	×2.0	< 2.0	< 2.0	2.0	5.1
U         2460         mg/kg         0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.10         < 0.14         0         <	27	26	6	野	20
U         2460         mplog         0.60         36         36         66           U         2460         mplog         0.60         15         24	< 0.10	< 0.10	< 0,10	< 0.10	< 0.10
U         24/50         mp/up         0.560         15         24           U         24/60         mp/up         0.50         +0.20         0.49         0.49           U         24/60         mp/up         0.50         <0.20		49	45	60	40
U         2450         mpkg         0.20         < 0.10         6.49         0.49         0           U         2460         mpkg         0.60         58         62         < 0.10	52	15	14	34	96
U         24/50         mg/kg         0.60         58         82           N         24/50         mg/kg         0.60         58         82           N         24/50         mg/kg         0.50         53         20           N         24/50         mg/kg         0.50         53         20           N         2655         mg/kg         0.50         6.30         6.10         4           N         2656         mg/kg         1.0         81         0.34         0.42         6           N         2656         mg/kg         1.0         81         0.33         0.43         6         4           N         2660         mg/kg         1.0         81         0.33         0.42         6         4           N         2660         mg/kg         1.0         81         0.33         0.42         6         4           N         2660         mg/kg         1.0         81         1.0         81         1.0         81         4           N         2660         mg/kg         1.0         81         1.0         81         4         0         4         4         4	0.67	< 0.20	< 0.20	0.70	< 0.20
N         2460         mgkg         1.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2         2.0         1.2 <th1.2< th="">         1.2         <th1.2< th=""></th1.2<></th1.2<>	100	62	64	120	51
N         2850         mgNg         0.50         < 0.30         0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.40         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41         < 0.41		18	14	52	12
U         2605         %         0.20         0.33         0.42         0           N         2600         mgNg         10         <10		< 0.50	< 0.50	< 0.50	< 0.50
N         2870         mpMp         10         <10         <13         <14         <15         <15         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <16         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10         <10	0.27	0.38	0.21	0.87	< 0.20
N         2880         mg/kg         1.0         [B] < 1.0	<10	> 10	< 10	< 10	< 10
N         Zeno mayle         1.0         Bis1.0         01	[B]	[B] < 1.0	[B] < 1.0	围<10	[B] < 1.0
U         2860         mpAg         1.0         BI<<1.0         BI<<1.0         BI<<1.0         BI<<1.0         BI<<1.0         BI	_	[B] < 1.0	[B] < 1.0	国<1.0	[B] < 1.0
U         2860 mg/kg         1.0         183 < 1.0         183 < 1.0         18 < 1.0         19 < 1.0         19 < 1.0         10 < 10          10	B	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
U 2660 mg/kg 1.0 [B]<1.0 [B]<1.0 [B]<1.0 [B] 1.1 2000	_	[B] < 1.0	[B] < 1,0	[B] < 1.0	[B] < 1.0
101 101 101 101 101 101 101 101 101 101	0 問<1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
AT CAL AT CAL AT Futbul And	-	国<1.0	B]<1.0	[8] < 1.0	(1) < 1.0
[B]<1.0 [B]<1.0	-	[B] < 1.0	[B] < 1.0.	[B] < 1.0	[6] < 1.0
N 2660 mg/ng 1.0 [B] <1.0 [B] <1.0	0  B] < 1.0	[B] < 1.0	[B] < 1.0	[8] < 1.0	[8] < 1.0
[B] < 5.0	-	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0

## M Chemtest

Results - Soil

Client: IGSL		Cher	Chembest Job No.:	Colo No.:	19-19343	19-19643	19-19643	19-19843	19-19643	19-19643	16-19643	19-19643
Quotation No.		Chemtest Sample ID.:	et sam	ple ID.;	641067	B41068	841068	841070	841071	841072	841073	841074
Order No.1		Clier	Client Sample Ref.	de Ref	AA96930	A495940	AA153613	AA153514	AA113516	AA113518	AA59935	AA999336
		88	Sample Location	ocstion.	TP04	TPON	30d1	1P06	3P06	1P06	2041	1P07
			Samp	Sample Type.	SOL	SOL	SOIL	SOIL	SOIL	SOIL	BOIL	SOIL
			Top De	Top Depth (m):	1.00	2.00	0.60	1,00	0.50	2.00	0.50	1.00
		Bat	Battors Depth (m):	pth (m):	1.00	2.00	0.60	1,00	0.50	2:00	0.50	1.00
			Dale Su	Date Sampled:	_	27-May-2019	27-May-2019	-	27-May-2019		-	24-May-2019
					COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							and a second sec	
Aromatic TPH >C5-C7	z	2680	mphig	1.0	[B] < 1.0		16] < 1,0	[8] < 1,0	[8] < 1.0	[B] < 1.0	[E] < 1.0	(1~1)
Aromatic TPH >C7-C8	z	2680	mgikg	1.0	(B) < 1.0		(B) < 1.0	[8] < 1.0	[B] < 1.0	[B] < 1.0	E]<1.0	[B] < 1.0
Arometic TPH >C6-C10	2	2680	phighter.	1.0	B] <1.0		0'. > (B)	[B] < 1.0	[B] < 1.0	[B] < 1.0	[E] < 1.0	[B] < 1.0
Aromatic TPH >C10-C12	2	2680	Dividia.	1.0	[B] < 1.0		0'. > [9]	[B]<1.0	[B] < 1.D	[B] < 1.0	[B] < 1.0	0.1 > [9]
Aromatic TPH >C12-C16	3	2680	Billigm	1.0	[B] < 1.0		0、>(日)	[B]<1.0	[B] < 1.0	[B] < 1.0	[E] < 1.0	[B] < 1.0
Arometic TPH >C16-C21	2	2680	mpkgm	1.0	B] < 1.0		0'. > [E]	101 < 1.0	[8] < 1.0	[B] < 1.0	EI<1.0	(II) < 1.0
Aromatic TPH >C21-C35	2	2680	marking	1.0	[B] < 1,0		[H] < 1,0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	(E) < 1.0
Aromatic TPH >C35-C44	z	2680	Biytu	1.0	[B]<1.0		01.>10	[B] < 1.0	[B] < 1.0.	B]<1.0	同 < 1.0	回<1.0
fotal Aromatic Hydrocarbons	z	2680	Dydu	0.5	[8] < 5.0		[B] < 5,0	[B] < 5.0	[B] < 5.D	[B] < 5.0	[B] < 5.0	(E) < 5.0
Total Perroleum Hydrocarbons -	z	2680	marked	10.01	(B) < 10		B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	国 < 10
Benzene	2	2760		1.0	[B] < 1.0		1日<1.0	[B] < 1.0	[B] < 1.0	[8]<1.0	[6] < 1.0	(日) < 1.0
olushe	2	2760	DNg4		8]<1.0		[E] < 1.0	[B] < 1.0	[B] < 1.0	国<1.0	[8] < 1.0	[E] < 1.D
Ethytheruene	2		pin/git		[B] < 1.0		[B] < 1.0	[B] < 1.0	[B] < 1.0	[B]<1.0	[8] < 1.0	(日<1.0
m & p-Xylene	2		page	1.0	[B] < 1.0		B] < 1.0	[B] < 1.0	[B] < 1.0	[6] < 1.0	(日 < 1.0	[E]<1.0
o-Xyfene	D	2760	1979G	-	[B] < 1.0		[B] < 7.0	[B] < 1.0	[8] < 1.0	国 < 1.0	[8] < 1.0	(E) < 1.0
Methyl Tent-Butyl Ether	2	2760	Dividit	1.0	[B] < 1,0		[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	(8) < 1.0	国 < 1.0
Vephtha ene	2	2800	make	0.10	< 0.10		< 0,10	< 0.10	< 0,10	< 0.10	< 0.10	× 0,10
Voenaphthylane	z	2800	Bydu	0.10	< 0.10		< 0,10	< 0,10	< 0,10	< 0.10	< 0.10	< 0.10
Accemationerse	2	2800	ma/kg	0.10	< 0.10		< 0,10	< 0.10	< 0,10	< 0.10	< 0.10	+0.10
luorene	3	2800	Bildm.		< 0.10		< 0,10	< 0.10	< 0.10	< 0.10	< 0.10	× 0,10
Pheneritrene	3	2800	Bildm		× 0.10		< 0,10	< 0,10	< 0,10	< 0.10	< 0.10	< 0.50
Anthracene	2	2800	mp/kg	0.10	< 0,10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tuoranthene	2	2800	polygim.	0.10	< 0,10		< 0.10	< 0,10	< 0.10	< 0.10	< 0.10	× 0.10
Pytene	2	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0,30	< 0.10
Benzojajanthracene	2	2600	ma/kg	0.10	< 0,10		< 0,10	< 0,10	< 0.10	< 0.10	< 0.30	< 0.10
Chrystene	2	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0,10
Benzo[b]fluoranthene	5	2800	Вк/бш	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzojkjiuoranthene	2	2800	mo/kg	0.10	< 0,10		< 0.10	< 0.10	< 0.10	< 0,10	< 0.10	< 0.10
Benzo[e]pyrene	3	2800	mg/kg-	0.10	< 0,10		< 0.10	< 0.10	< 0,10	< 0.10	< 0.10	< 0.10
ndeno(1,2,3-c,d)Pyrene	2	2800	mp/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.30	< 0.10	< 0.10
Dithaniz(a,ht)Ainthrecene	z	2800	mg/kg	0.10	<0,10		< 0.10	< 0.10	< 0.10	< 0,10	< 0.10	< 0.10
Banzo(g.h.i)perylane	9	2800	Big/6uu	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronena	N	2800	mp/98	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fotal Of 17 PAH's	z	2800	malkg	2.0			< 2.0	<2.0	<2.0	< 2.0	< 2.0	< 2.0
PCB 28	2	2815	mg/kg	mg/kg 0.010			< 0:010	< 0.010	< 0.010	< 0.010	<0.010	× 0.010
PCB 52	1	2815	2815 mg/kg 0.010	0.010			< 0.010	< 0.010	< 0.010	< 0:010	< 0.010	< 0.010
and states in the second												

Results - Soil

Client MSL		Cher	Chemitest Job No.;	toN of	19-19543	19-19043	18-19643	19-19040	19-19643	.18-19643	19-19843	16-19643
Quotation No.:		Chemte	Chemiest Sample ID.:	fie ID.:	841067	841058	841069	841070	841071	841072	841073	841074
Order No.:		Clint	<b>Clinnt Sample Ref.</b>	B Ref :	AA99339	AA99940	A4113513	AA113514	AA113516	AA113518	AA99935	A499936
		ß	Sample Location:	cation:	TP04	TPOG	1P05	TPOS	90-d1	1906	TP07	1001
			Sample Type:	+ Type:	SOL	SOIL	SOIL	SOIL	SOIL.	SOIL	SOIL.	SOIL
			Top Depth (m):	th (m):	1.00	2,00	0.60	1.00	0,50	2.00	0.50	1.00
		Bott	Bottom Depth (m):	(h (m):	1.00	2.00	0.50	1.00	0.50	2.00	0.50	1.00
			Date Sampled:	mpled:	24-May 2018	27-May-2019	27-May-2019	27-Mary-2019	27-May-2019	24-May-2019	24-Mey-2019	24-May-2019
			Asbestos Lab:	12 Lab:	COVENTRY		COVENTRY	COVENTRY.	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	EOD								
PCB 118	1	2815	mp/kg 0.010	01000	< 0,010		< 0.010	< 0.010	< 0.010	×.0.010	<0.010	<0.010
PCB 163	0	2815	mg/kg 0.010	0.010	< 0.010		< 0.010	< 0.010	< 0,010	< 0,010	< 0.010	<0.010
PCB 136	0	2815	mg/kg 0.010	0:030	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	<0.010	<0.010
PCB 160	0	2615	mg/kg 0.010	0100	< 0.010		< 0.010	< 0.010	< 0,010	× 0.010	< 0.010	<0.010
Total PCBs (7 Congeners)	z	2815	maikg	0.10	< 0.10		< 0.10	< 0,10	< 0.10	< 0.10	< 0,10	× 0,10
Total Phanois	-	2920	Billipm	0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	× 0.30

11

Page 13 of 46

#### Chemtest The optic mension is of the optic of 21833 Airon Road, Tallaght, Dubli ×.

Results - Soil

Client IGSI		Che	Chemtest Job No.	sh No.	10.10649	10-10643	19-19643	10-10043
Quotation No.		Chernite	Chembest Sample ID.	Die ID	841075	841076	841077	841078
Order No.		Cle	Clerit Sample Ref.	le Ref.	1009931	AA99632	AA99827	AA98629
		65	Sample Location	ocation:	TPOB	1P08	1P09	1P09
1			Samph	Sample Type:	SOL	SOL	SOIL	SOIL
	L		Tap Depth (m):	(im) #10	0.50	1,00	0.50	2.00
		80	Bottom Depth (m):	(m) (l)	0.50	1.00	0.50	2.00
			Date Sampled:	impled:	24-May-2019	24-May-2019	24-May-2019	24-Muy-2019
			Asbest	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	100				
ACM Type	0	2102		MA		8	1	1
Asbestos Identification	0	2102	sit.	0,001	No Asbestos Detected	No Astestos Detecied	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	0	2192		NUA	9	+		
Moisture	2	2030	2	0.020	13	10	13	10
Hd	0	2010		N/A				
Boron (Hot Water Soluble)		2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40
Sulphate (2:1 Water Schuble) as SO4		2120	10	0.010				
Suptur (Elemental)	5	2180	mg/kg	-	52	< 1.0	1.0	1.3
(Cyanide (Total)	5	2300	marka		[H] < 0.50	[B] < 0.50	[13] < 0.50	EI < 0.50
Sulphide (Easily Liberatishle)	z	2325		0.50	18	15	13	17
Suphata (Acid Schuble)	0	2430	2	0.010	0.046	0,010	< 0.010	< 0.010
Arsanic	-	2450	ma/ka	1.0	26	26	24	23
Baium	5	2450	mallia	10	41	41	ŝ	33
Cadmiun	-	2450		0.10	2.0	1.9	1.9	2.0
Chromium	-	2450			#	5	12	
Molybdenum	-	2450	malka	2.0	3.7	3.3	2.9	33
Antimony	z	2450	eng/kg	2.0	4.0	50	3.0	23
Copper	0	2450		_	24	23	22	16
Mercury	-	2450			< 0.10	< 0.10	< 0.10	< 0.10
Nicket	0	2450		0:20	43	40	41	31
Load	2	2450		0.50	16	26	21	13
Selenium	2	2450		0.20	< 0.20	< 0,20	< 0.20	0.48
Zinc	2	2450	marka	0.50	S	65	13	72
Chromium (Trivalent)	7	2490	marka	1.0	14	15	15	11
Chromium (Hexervient)	7	2490			< 0.50	< 0,50	< 0.50	< 0.50
Total Organic Carbon	-	2625	st.	0.20	0.31	0.24	0.36	0.29
Mineral Oil	7	2670	mgrkg	10	< 10	< 16	< 10	< 10
Alphatic TPH >C5-C6	7	0892	make	1.0	8 < 1.0	B]<1.0	[B] < 1.0	[3] < 1.0
Alphatic TPH >C8-C6	7	2680	man	1	B] < 1,0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Alphalic TPH >C8-C10	2	2680	makin	1.0	[B] < 1.0	[B] < 1,0	[B] < 1.0	国<1.0
Alphabic TPH >C10-C12	-	2680	maha	1.0	[B] < 1.0	[B] < 1.0	18] < 1.0	[B] < 1.0
Alphatic TPH >C12-C18	2	2680	manua	1.0	[B] < 1.0	B] < 1,0	B] < 1,0	[B] < 1.0
Alphatic TPH >C18-C21	-	2880	_	1.0	[B] < 1.0	[B] <1,0	国<1.0	[]<1.0
Aliphatic TPH >C21-C35	5	2680			[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0.
Alighmetic TPH >C35-C44	z	2680		E . 1	[B] < 1.0	B] < 1.0	[B] < 1.0	BI < 1.0
Total Aliabatic Hutmosthore	2	2680		5.0	[B] < 5.0	BI<5.0	18] < 5.0	国 < 5.0

## Chemtest Project 21613 Articin Read, Tollaght, Dublin

#### Results - Soil

Client: IGSL		Chen	Chemtest Job No.	D.No.1	19-1943	18-1943	19-19643	19-19643
Quetation No.:		Chemte	Chemtest Sample ID.:	= 1D.:	841075	841076	- 841077	841078
Order No.1		Clier	Client Sample Ref.	Ref	AA96931	AA90932	AA99627	AA96929
	_	80	Sample Location	allon:	1P08	TP08	1P09	1P09
			Sample Type:	Type	SOL	SOL	SOIL	SOIL
	_		Top Depth (m):	H (m):	0,50	1.00	0.50	2.00
		Bot	Bottom Depth (m):	h (m):	0.50	1.00	0.50	2.00
			Date Sampled	npled.	24-May-2019	24-May-2019	24-May-2019	24-May-2019
			Asbestos Lab	8 Lab	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Delerminand	Actred	SOP	Units	LOD	S Annual Contraction	and and	Constant -	The second of the
Arometic TPH >C5-C7	z	2680	mg/kg-	1.0	B] < 1.0	(1) < 1,0	(1) ~ (1)	[B] < 1,0
Aromatic TPH >C7-C8	Z	2680	manual	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0.
Arontatic TPH >C8-C10	-	2680	maha	1.0	[B] < 1.0	[B] <1.0	0、>(日)	[B] < 1.0
Aromatic TPH >C10-C12	2	2680	mg/kg	1.0	[B] < 1.0	(B) < 1,0	(1) < 1,0	[B] < 1,0
Aromatic TPH >C12-C16	5	2680	maña	1.0	B]<1.0	[B] < 1.0	日子 (0)	[B] < 1.0.
Aroniatic TPH >C16-C21	5	2680	marka!	1.0	B] < 1.0	(B) < 1.0	[B] < '.0	[B] < 1.0
Aromatic TPH >C21-C35	-	2680	mp/kg	1.0	[B]<1.0	B] < 1,0	[1] < 1.0.	[B] < 1.0
Aromatic TPH >C35-C44	z	2680	mp/kg	1.0	B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Total Aromatic Hydrocarbons	z	2880	mpring	5.0	(B) < 5.0	BJ < 5.0	[B] < 5.0	[B] < 5.0
Total Percleum Hydrocarbons	z	2680		10.01	[B] < 10	[8] < 10	181 < 10	BI<10
Benzene	0	2760	Dyllin	1.0	[B] < 1.0	[B] < 1,0	[B] < 1,0	[B] < 1.0
Toluene	0	2780	Digit.	1.0	[B] < 1.0	B <1,0	[B] < 1.0	国<1.0
Ethytbanzana	2	2760	Dayler!	1.0	[B] < 1.0	[B] < 1.0	国<1.0	[B] < 1.0
m & p-Xylene	3	2760	Dydri	1.0	B] < 1.0	[B] < 1.0	[B] < 1.0.	[B] < 1.0
o-Xylisine	0	2760	Division 1	1.0	[8] < 1.0	[B] < 1.0	[B] < 1.0	(日)<1.0
Methyl Text-Butyl Ether	1	2760	EN/6ri	1.0	[B] < 1.0	B] < 1.0	B] < 1.0	B] < 1.0
Vaph/haiene	0	2800	mp%q	0.10	< 0.10	< 0.10	< 0, 10	< 0,10
Acenaphthylene	z	2800	Dis/dua	0,10	< 0.10	< 0,10	< 0.10	< 0.10
Acenaphthene	3	2800	mg/kg:	0.10	< 0.10	< 0,10	< 0.10	< 0.10
- Judrene	9	2800	ma/ka	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenenthrane	2	2800	ma/kg	0.10	< 0,10	< 0,'0 >	< 0.10	< 0.10
Anthracehor	3	2800	mg/kg	0.10	< 0.10	< 0,10	< 0.10	< 0.10
Fluoranthene	9	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyiene	2	2800	ma/kg	0.10	< 0,10	0,10 >	< 0.10	× 0.10
Benzo[ejanthracene	2	2800	mg/kg	0,10	< 0.10	< 0.10	< 0.40	< 0.10
Chrystens	5	2600	mg/kg	0.10	< 0.10	< 0, 0	< 0.10	< 0.10
Benzo(b)fluccardhene	Þ	2600	ma/kg	0.10	< 0.10	0,0 >	< 0.10	< 0.10
Benzo(k//uoranthene	2	2800	mg/kg	0.10	< 0.10	< 0.50	< 0.10	< 0.10
Benzo(a pyrans	0	2800	malka	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indena(1,2,3-c,d)Pyrene	2	2600	make	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	z	2800	malkg	0.10	< 0.10	< 0.10	< 0.10	× 0.10
Benzo(ghui)penylene	0	2800	mg/kg	0.10	< 0.10	< 6.10	< 0.10	< 0.10
Coronette	z	2600	marka	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tolal Of 17 PAH's	z	2800	mg/kg	2.0	< 20	<20	<2.0	×2.0
PCB 28	0	2615	make	0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	D	2815	marka	0.010	< 0.010	< 0.050	< 0.010	< 0.010
D/D 0/1404	-	3046	2646 mollen 0.010	0000	A DURING WITH	0.000		100000

Page 15 of 46

¥.

## **Chemtest**

#### Soil alle ň

- 1	
1	
CINCD	
21	
21	

Project: 21513. Airton Road, Tallaght, Dublin (BMCE)	aht, Dublin (BM	<u>8</u>						
Client: IGSL		Cher	Chemtest Job No.:	::oN do	19-19643	19-18643	19-19843	19-19643
Quotation No.:	_	Chemte	Chemtest Sample ID.:	pie ID.:	841075	841076	841077	841078
Order No.:		Clier	Client Sample Ref	le Ref	AABBB1	A499532	A456927	A499929
		38	Semple Location	Sation	TPOB	TPOI	1PO9	1P09
	_		Sample	Sampla Type:	SOL	SOIL	SOIL	SOIL
			Top Depth	(E) 45	0.50	1,00	0.50	200
		Bat	Bottom Depth (m)	(m):40	0.50	1.00	0.50	2,00
	-		Date Sampled:	mplect:	24-May-2019	24-May-2019	24-May-2019	24-May-2019
			Asbest	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	COD				
PCB 118	2	2815	Dividian	0,010	< 0.010	< 0,010	< 0.010	< 0,010 ×
PCB 153	5	2845	manita	01010	< 0.010	< 0.010	< 0.010	< 0.010
PC8 138	9	2815	mgNg	010.0	< 0.010	< 0.010	< 0.010 >	< 0.010
PCB 160	n	2815	5	010/010/00/05	< 0.010	< 0.010	< 0,010	< 0.010
Total PCBs (7 Congeners)	z	2815		mg/kg 0.10	< 0,10	< 0,10	< 0.10	< 0,10
Total Disconts	100	CLOC-	ODD address ODDC	000	0.04	10.01	10.00	10.00

#### Chemtest

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19643 841051				Landnis	Landfill Waste Acceptance Criteria Limite	e Critoria
Sample Ref: Sample Location: Tros Desthins:	38082 8H2 100	¥(			Inert Waste	Stable, Non- reactive hazardous waste in non-	Hazardous Waste
Bottom Depth(m) Sampling Date:	0				Landfill	hazardeus Landfill	Illibuari
Determinand	GOP	Accred.	Units				
Fotal Organic Carbon	2020	-	92	0.40	0	5	
Loss On Ignition	2610	2	25	53	1	1	10
Total BTEX	2760	n	mg/log	< 0.010	9	1	t
Total PCBs (7 Congeners)	2016	2	mg/kg	< 0,10	-	+	7
TPH Total WAC (Minanal Oil)	2670	n	malita	< 10	600	+	1
Total (Of 17) PAHs	2800	z	mang	× 2.0	100	14	
pH	2010	n		8.8	4	92	1
Acid Neutralisation Capacity	2016	N	moVkg	0.095	1	To svaluate	To evaluate
Eluato Analysis			10:1 Eluate	10:1 Eluate malka	Limit value: using E	Limit values for compliance leaching test using BS EN 12457 at LIS 10 Ukp	eaching test \$ 10 Ukg
Arearit	1450	,	< 0.0010	< 0.050	0.5	2	26
Bartum	1460	0	< 0.0010	<0.50	20	100	300
Cadmium	1450	n	< 0.00010	<0.010	0.04	1	9
Chiomum	1400	2	< 0.0010	< 0.050	0.5	10	70
Copper	1450	n	< 0.0010	< 0.050	2	50	100
Morcury	1450	n	< 0.00050	< 0.0050	0.01	0.2	ei,
Malybdenum	1450	0	0.0020	< 0.050	0.5	10	30
Nickel	1450	0	< 0.0010	< 0.050	0.4	10	40
Load	1450	0	< 0.0010	<0.010	0.5	10	93
Antimony	1450	n	< 0.0010	×0,010	0.05	0.7	sin .
Selenium	1450	0	< 0.0010	< 0.010	0.1	0.5	2
Znc	1450	n	< 0.0010	< 0.50	4	50	200
Chlorida	1220	0	3.5	35	800	15000	25000
Fluoride	1220	0	0.79	H.1	10	150	800
Suppose	(220	0	2.3	23	1000	20000	20000
Total Dissofred Solids	10201	z	22	530	4000	00000	100000
			- N BARN	1000		and the second second	

rtionkg Uny mass of les Moisture (%)

Solid Inform

0.090

Waste Acceptance Criteria

hing test results) must not be used for hazardous waste classification purposes. This analysis is only applicable to and does not give any indication as to whether's waste may be hazardous or non-hazardous. 1 Alle Landfill WAC analysis (specifical for hazardous waste landfill acc

Page 17 of 46

#### 

### Results - Single Stage WAC

97 2315 2417 468 1.00 1.00 2.00 2.00 2.00 2.00 2.00 2.00				Landilli	LandIIII Waste Acceptance Criteria LandIII Waste Acceptance Criteria	e Criteria
Alfon: BH3 (100 BH3 (					Carbito Man-	
BH3 100 100 1.000 1.000 1.000 1.000 1.000 1.000 2.000 1.000 2.000 1.000 2.000					reactive	
1,00 1,000 1,00					Provinced on the	Herandonia
Address (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)				Van Andrews	COMPANY AND	CITY OF CALL O
	0.9			Inert Wate	-uou ui atsaw	Waster
31.469         31.469         4019           uthern         31.469         4019           Opperters)         2815         2815           Opperters)         2815         2815           Opperters)         2816         2815           Opperters)         2816         2816           Opperters)         2816         2816           Opperters)         2816         2816           Opperters)         2816         2816           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480         1480         1480           1480				Landfill	hazardous	Inbas
800 2810 2810 2810 2810 2810 2810 2810 2					Landfill	
	Actred.	Units				
in a	0	×	0%0	0	52	
Я A	0	*	2.1	×	1	10
	1	maña	< 0.010	10		1
	,	maña	<0.10		1	3
	,	marka	< 10	800		1
2	N	maña	+20	100	1	ł
8			5.7	1	95	1
	N	motha	0.097	,	To evaluate	To evaluate
		10-1 Eluato	10:1 Elunte	Limit values	Limit values for compliance leaching test	eaching test
		Ingen	tng/kg	Unsing E	using BS EN 12467 at L/S 10 likg	5-10 Ukg
	0	< 0.0010	< 0,050	0.5	2	8
	0	< 0.0010	< 0.50	50	100	300
	0	< 0/00010	< 0.010	0,04	-	-0
	0	< 0.0010	< 0.050	0.5	10	02
	n	< 0.0010	< 0.050	2	50	100
	0	< 0.00050	< 0.0050	10/0	02	e4
	0	0.0016	< 0.050	0.5	10	8
	+ n	< 0.0010	< 0.050	9.4	10	6 <del>4</del>
	0	< 0.0010	< 0.010	0.5	10	8
	n	< 0.0010	< 0,010	90'0	2'0	10
	0	< 0.0010	< 0,010	0.1	0.5	*
	n	< 0.0010	< 0.50	4	50	200
	,	1.5	92	900	15000	25000
	-	0.19	61	10	150	500
	-	1.1	44	1000	20000	50000
	N	57	570	4000	60000	100000
	0	< 0.030	< 0.30	1		
Disanved Organic Carbon 1610	0	3.7	c.50	560	800	1000
Scalled Indonensitions	-					
Provinces of test motionity	T				i	

 $\mathbf{i}_{i}$ 

a.

Waste Acceptance Criteria rieture (%)

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

ct 21813

### Results · Single Stage WAC

Chemtest Job Ne: Chemtest Sample ID:	19-19643 841054				Illipuer	Landfill Waste Acceptance Griteria Limits	e Griteria
Sample Ref: Sample ID:	10696					Stable, Non- reactive	
Sample Location:	BH4				The state of the state of the	hazardous	Farardous
Top Depth(m):	1.00				Inert Waste	waste in non-	Watto
Bottom Depth(m): Samoling Date:	30-Msw-2019				Landfill	hazardous	Landill
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	0	*	た中の	m	0	¢
Loss Or Ignition	2610	0	æ	2.4	4	t	10
Total BTEX	2760	n	mg/kg	<0.010	9	1	
Total PCBs (7 Congesters)	2815	n	mp/kg	< 0.10	-	1	4
TPH Total WAC (Mnerst Oil)	2670	0	mg/kg	01 ×	2005	4	
Total (Of 17) PAHs	2800	N	maha	<2.0	100	1	E
pH	2010	0		8.7	4	Đ.	+
Acid Neutralisation Capacity	2015	N	molMg	0.099	4	To evaluate	To evaluate
Eluato Analysis			10:1 Eluate	10:1 Ehuste	Limit value:	Limit values for compliance leaching test	eaching test
			10u	THE DEC	a gallau	USING ES EN 1265/ at L/S 101/KG	BAILOLS
Arsenic	1450		< 0.0010	×10.050	0.5	2	ц
Banum	1450	0	< 0.0010	< 0.50	20	100	300
Cadmium	1450	0	< 0.00010	< 0.010	0:04	1	10
Chromium	1450	n	< 0,0010	< 0.050	0.5	10	20
Copper	1450		< 0.0010	< 0.060	2	8	1001
Marcury	1450	1	< 0.00050	< 0.0060	0.01	0.2	2
Molybdenum,	1450	n	0.0040	< 0,050	0.5	10	8
Nickut	1450	n	< 0.0010	< 0.050	0.4	10	40
Load	1450	n	< 0.0010	< 0.010	0.5	10	60
Antenny.	1450	n	< 0.0010	<0.010	0.06	0.7	60
Selanium	1450		< 0.0010	<0.010	0.1	0.5	4
Zina	1450	n	< 0.0010	× 0.50	я	50	200
Chloride	1220	5	1.1	11	800	15000	25000
Fluoride	\$220	n	0.15	1.5	10	150	600
Suphate	1220	n	1.9	19	1000	20000	50010
Total Dissolved Solids	1020	z	40	490	4000	60000	100000
Phenol Index	1920	n	< 0.030	+ 0.30	-		
Deschard Ontanic Carbon	1610	5	3.5	< 50	800	800	1000

j

Waste Acceptance Criteria

Solid Information Dry mass of test portion/kg Motsure (%) Landfill WAC analysis (specifically feacthing test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste may be hazardous or non-hazardout.

à.

0.080

Page 19 of 46

#### Chemtest

### Results · Single Stage WAC

Chemtest Jab Na; 19643	19-19643				Landfill	Landilli Waste Acceptance Criteria	e Criteria
Chemiest Sample ID:	841055					Limits	COMPLEX.
Sample Ref: Sample ID:	11401					Stable, Non- seactive	
Estrate Landlan	plus					home	Management
Ton Denth(m)-	4 00				inore Wineto	tesete in non-	Winete
Bottom Death(m)	1.00				Iandfill	hazardous	Landfill
Sampling Date:	29-May-2019					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	0	2	0.59	-	-0	10
Loss On Ignition	2610	0	N.	3.1	1	t	10
Total BTEX	2760	0	molika	< 0.010	9	1	ı
Total PCBs (7 Congeners)	2815		malka	< 0.10	-	ı	
TPH Total WAC (Meetal Or)	2670		maka	c 10	500	1	1
Total (OF 17) PAHs	2800	N	mp/ka	<20.	100	-	¢
Ho	2010			8.6	1	8	1
Add Neutralisation Capacity	2015	2	mol/kg	0.049	1	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	1011 Eluator	Limit value	Limit values for compliance leaching test	eaching test
			mg/l	THO/KD	a Suisn	uning BS EN 12457 at L/S 10 mg	5 10 Mg
Arsenio	1450	0	< 0.0010	<0.050	0.5	2	25
Bartum	1450	0	< 0.0010	< 0.50	20	100	300
Cadmium	1450	0	< 0.00010	<0.010	0:04	-	5
Chramium	1450	0	< 0.0010	< 0.050	0.5	10	20
Copper	1450	0	< 0.0010	<0.050	N	50	100
Maroury	1450	0	< 0.00080	< 0.0050	0.01	0.2	2
Malybdenum	1450	n	< 0.0010	< 0.050	0.5	04	30
Nicross	1450	0	< 0.0010	< 0.050	0.4	10	04
Lead	1450	0	< 0.0010	<0.010	0.5	10	90
Antimony	1450	0	< 0.0010	<0.010	0.05	0.7	ŝ
Selenium	1450	0	< 0.0010	< 0.010	0.1	0.5	2
Zino	1450	n	< 0.0010	< 0.50	+	50	200
Chioride	1220	0	4,0	40	800	15000	25000
Fluoride	1220	0	0.19	1.9	10	150	500
Sulphate	1220	n	1.21	12	1000	20000	50000
Total Dissolved Selids	1020	N	52	520	4000	80000	100000
Phenol Index	1920	0	< 0.030	< 0.30	-	4	*
Dissolved Organic Carbon	1610	0	4.8	< 50	500	800	1000
Solid Information		_					
Dry mass of test portionikg	0.090						

Molsture (%)

5.8

Waste Acceptarce Criteria

Lundril WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only spplicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

21813

### Results - Single Stage WAC

Chemtest Jab No: Chemtest Sample ID:	19-19643 841066				Tandfill	Landfill Waste Acceptance Criteria Limits	e Criteria
Sumple Ref: Sumple ID:	114409					Stable, Non- reactive	
Sample Location:	69-481				The second se	hazardous	Hazardous
Top Depth(m):	1.00				Inert Waste	waste in non-	Waste
Bottom Depth(m): Samelino Date:	1.00 30-Min-2019				Landilli	hazardous	Landfill
Determinand	SOP	Accred	Unita				
Total Organic Camon	222	n	2	0.44		5	9
Loss On Ignition	2810	0	2	2.6	1	1	10
Total BTEX	2700	n	marka	< 0.010	g		t
Total PCBs (/ Corgeners)	2816	n	000u	<0.10	1	4	4
TPH Total WAC (Mineral Oil)	2870	n	Day but	×10	200	- 10	3
Total (Of 17) PAH's	2800	N	mgAgg	+20	100	10	t
H	2010	n		8.7	4	36	1
Acid Neutralisation Capacity	2015	N	matria	0.17	1	To evaluate	To eveluate
Etuate Analysis			10:1 Eluato	10:1 Eluate	Lindt values	Linit values for compliance feaching test union BS PN 52417 at LS 10 liter	caching test
Areartic	1460	-	< 0.0010	< 0.050	50	2	26
Barum	1450	0	0.0012	<0.50	20	100	300
Cadmium	1450	n	< 0.00010	< 0.010	0.04	+	st.
Chromium	1450	n	< 0.0010	< 0.050	0.0	10	20
Copper	1480	n	< 0.0010	< 0.050	2	20	1005
Morcury	1450	n	<0.00050	< 0.0060	0.01	0.2	Đ,
Molybdsnum	1460	n	< 0.0010	< 0.050	0.5	10	30
Nckel	1450		< 0.0010	< 0:050	0.4	10	69
Lead	5450	0	< 0.0010	< 0.050	0,5	10	8
Anternotiv	1450		< 0.0010	<0.010	0.06	0.7	10
Selenium	5450	n	< 0.0010	< 0,010	0.1	0,5	4
Zine	1450		< 0.0010	< 0.50	4	20	200
Chloride	1220	0	<1.0	< 10	800	15000	25000
Fluoride	1220 -	0	0.17	1.7	10	150	500
Suphate	1220	0	3.1	31	1000	20000	00000
Total Discolved Solids	1020	N	2	530	4000	60000	100000
Phanol Index	1920	n	< 0.030	< 0.30	-		
Dissolved Organic Carbon	1610	0	50	50	500	800	1000

Waste Acceptance Criteria

Stoffel Information Dry mass of test portion/kg Motehure (%)

0.090

Landfill WAC analysis (specifically leaching test resuks) must not be used for hazardous waste classification purposes. This arelysis is only applicable for hazardous waste classification purposes. This arelysis is only applicable for hazardous waste may be hazardous or non-hazardous.

Page 21 of 46

#### Chemtest The Hord of the State

### Results - Single Stage WAC

Chemitest Sample (D: Sample Ref: Sample ID: Sample ID: Sample Location: Top Depting Sampling Date: Determinand Total Organic Loss On fightion	C+00:-R1				Landill	Landilli Waste Acceptance Orberia	e Crterta
Sample Ref: Sample Ref: Bample Los Top Depthm: Top Depthm: Sampling Date: Tetal Organe Carton Tetal Organe Carton	841057					Limits	and the second s
Sampte a constant: Sampte Location: Top Depthm: Bootom Depth(m): Sampting Date: Determinande: Total Organic Carton Loss On Sprinco	114415					Stable, Non-	
Top Depthin): Top Depthin): Botton Dephfin): Sampling Date: Total Organic Carton Loss On Spillion	100					a and a second	Contraction of the
Top Depthym: Samphing Date: Samphing Date: Total Organic Carbon Loss On Sprition	140				No. Contraction	Pazardous	Mazardous
Bottom Depth/m): Sampting Date: Staterminante: Testi Organic Carbon Loss On Aprilion	1.00				Inert Waste	waste in non-	Waste
Sampling Date: Determinand Total Organic Carton Loss On Ignition	1,00				LandRI	hazardous	Landfill
Determinand Total Organic Carbon Loss On Ignilion	27-May-2019					Landfill	
Total Organic Carton Loss On Ignition	SOP	Accred.	Units				
Loss On Ignition	2625	0	3	0.33		5	9
	2610	3	25	2.1		1	10
Total BTEX	2760	0	mg/kg	[B] < 0.01D	-	*	
Total PCBs (7 Congenera)	2815	0	mg/kg	<0.10	+	1	1
TPH Total WAC (Mnecal OI)	2670	9	Dalipmi	用21	200	1	
Total (Of 17) PAH's	2600	z	ma/ka	0Z.x	100	;	t
H	2010	2		8.8	1	9~	1
Acid Neutralisation Capacity	2016	Z	maWka	0.16	1	To evaluate	To evaluate
Eluate Analysis			10:1 Eluato	10:1 Eluate	Limit value	Limit values for compliance leaching test	eaching test
			mail	malka	uning E	uning BS EN 12457 at L/S 10 Mg	5 10 Mg
Mrsenic	1450	0	< 0.0010	< 0.050	0.5	54	25
Bañum	1450	n	< 0.0010	< 0.50	30	100	300
Cadmium	1450	n	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	n	< 0.0010	< 0.050	90	10	20
Copper	1450	n	< 0,0010	< 0:050	2	50	100
Mercury	1450	n	< 0.00060	< 0.0050	0,01	0.2	the
Molybdenum	1450	n	0:0012	<0.050	0.5	10	30
McRei	1450	n	< 0.0010	< 0.050	0.4	10	40
Lead	1450	n	< 0.0010	< 0.010	0.5	10	09
Antimory	1450	5	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	n	< 0.0010	< 0.050	0.1	0.5	1
Znc	1450	n	< 0.0010	<0.50	+	50	200
Ohlorida	1220	n	11	11	600	15000	25000
Flucride	1220	•	0.27	2.7	10	150	500
Suthhete	1220	0	2.4	24	1000	2000	50000
Fotal Dissolved Solids	1020	N	97	090	4000	60000	100000
Phenol Index	1920	0	× 0,030	< 0.30	-		
Dissolved Organic Carbon	1610	0	4,1	< 50	2005	600	1000
Solid Information							
Dry mass of test portion/kg	0.050						
Moistum (%)	÷						

Waste Acceptance Criteria

Landfill WAC antitysts (specifically leaching test results) must not be used for hazarious waste classification purposes. This analysis is only applicable for bazaridous waste landfill acceptance and does not give any indication as to whether a waste may be hazaridous or non-hazardous.

#### Chemtest Tranget community in trainer states

### Results - Single Stage WAC

Chemtest Job Nc: Chemtest Sample ID:	19-19643 641058				Landfill	Landfill Wiste Acceptance Criteria Limite	e Crteria
Sample Ref: Sample ID: Sample Location:	7.00327 TP01					Stable, Non- reactive hazardous	Pazardou
Top Depth(m): Bottom Depth(m): Sampling Dete:	0.50 0.50 27-May-2019				Inert Waste Landfill	waste in non- huzardous Landfili	Waste
Determinand	SOP	Accred.	Units				141
Total Organic Carbon	2625	5	at.	0.29	m	-	10
Loss On Ignition	2610	2	*	22	1	*	10
Total BTEX	2760	n	mg/kg	B] < 0.010	9	1	t
Total PCBs (7 Congenera)	2815	n	mana	< 0.10	1	1	1
TPH Total WAC (Mnensi Oil)	2870	n	mg/kg	[B] < 10	500	1	1
Totat (Of 17) PAHs	2600	N	marka	<2.0	100	ł	1
H	2010	n		8.8	1	36	T
Acid Neutralisation Capacity	2015	z	motha	0.092	+	To evaluate	To svalued
Etuate Analysis			10c1 Eluate	10:1 Eluste	Limit value:	Limit values for compliance leaching test	eaching test
			mgill	mglkg	using E	using BS EN 12457 at L/S 10 Mg	\$ 10 Mg
Areanic	1450	n	< 0/00/10	<0.050	0.0	2	99N
Bartum	1450	9	0.0010	< 0.50	20	100	300
Cadmium	1460	n	< 0.00010	< 0.010	0.04	1.	'n
Chromium	1450	n	< 0,0010	<0.050	0.0	10	20
Copper	1450	n	< 0.0010	<0.050	2	20	100
Marcury	1450	9	< 0.00050	< 0,0050	0.01	0.2	0
Molybdenum	1450	n	0,0031	< 0.050	0.5	10	30
Nicket	1450	n	< 0.0010	< 0.050	0.4	10	40
Lesd	1450	n	< 0.0010	< 0.010	97	10	8
Anterrony	1450	n	< 0.0010	< 0.010	90:08	0.7	-
Selenium	1450	n	<0.0010	< 0.010	0.1	0.5	2
Zhc	1450	0	< 0.0010	< 0.50	4	50	200

Waste Acceptance Criteria

0:090

Solid Information Dry mass of test portioning Motsture (%)

ed Solids

Landfill VAC analysis (specifically feacthing test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Page 23 of 46

#### 

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19643				Landtill	Landfill Waste Acceptance Griteria Limits	e Critaria
Sample Rof: Sample ID: Sample Location: Top Depth(m):	1901 1,00				Insert Wasta	Stable, Non- reactive hezardous waste in non-	Hazardous Waste
Bottom Depth(m); Sampling Date:	1.00 27-May-2019				Landfill	Landfill	Illboart
Determinand	30P	Accred.	Units				
Votat Organic Carbon	2625	0	*	620	115	5	9
Loss On Ignition	2610	n	*	22		*	10
Total BTEX	2760	0	marka	[B] < 0.010	9	ł	t
Total PCBs (7 Corgeners)	2815	0	mawa	<0.10			x
TPH Total WAC (Mineral Oil)	2670	0	make	[B] < 10	500	+	1
Total (Of 17) PAH's	2800	N	mg/kg	× 2.0	100	1	1
pH	2010	0		8.8	1	36	t
Acid Neutralisation Capacity	2015	N	methg	0,22	*	To evaluate	To eveningto
Etuate Analysis			10:1 Eluate	10:1 Elunte	Limit values	Umit values for compliance leaching test	leaching test
	1000		mg/l	mg/kg	B grileu	using BS EN 12457 at L/S 10 likg.	5 10 l/kg
Arsenic	1450		< 0.0010	<0.050	0.0	2	25
Barium	1450	0	< 0.0010	< 0.50	20	100	300
Cadmium	1450	0	< 0.00010	< 0.010	0.04	-	ja
Chromium	1450	n	< 0.0010	< 0.050	0.5	10	20
Copper	1450	n	<0.0010	< 0,050	2	8	100
Mercury	1450	n -	< 0,00050	< 0.0060	0.01	0.2	N
Mohbdemum	1450	0	0.0039	< 0,050	0.5	10	8
Nickel	1450	0	< 0.0010	< 0.050	0.4	4	40
Lesd	1450	n	< 0.0010	< 0.010	0.5	10	8
Antimany	1450	0	< 0.0010	< 0.010	0,05	0.7	10
Selenium	1450	0	< 0.0010	< 0.010	0.1	0.5	1
Zina	1450	0	< 0.0010	< 0.50	4	50	200
Chicode	1220	0	1.0	05	008	15000	25000
Fluoride	1220	0	0.17	1.1	10	150	200
Sulphate	1220	n	3.4	Ħ	1000	20000	20000
Total Disectived Solids	1020	z	8	200	4000	60000	100000
Phanal Index	1920	n	< 0.030	< 0.30		*	•
Dissolved Organic Carbon	1610	0	3.9	<50	500	800	1000
Solid Information		_					
Dry mass of test prytioniko	0:030						

Moisture (%)

a,

Waste Acceptance Criteria

Landfill WAC anistysis (specifically leaching test results) must not be used for hazarious waste classification purposes. This analysis is only applicable for hazarious waste riay be hazarious or non-hazarious.

#### Chemtest

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19643 841061				Landen	Landfill Waste Acceptance Griteria Limits	e Critoria
Bample Ref. Sample ID: Sample Location: Top Depth(m); Sampling Deta: Samming Deta:	AA113609 TP02 0.50 0.50 27-May-2019				Insert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfit	Hazardous Waste Landfilt
Determinand	sop	Accred	Units				
Total Organic Carbon	2625	n	*	0.34	10	-	1D
Loss On Ignition	2610	0	#	23		1	101
Total BTEX	2760	0	maña	[3] < 0.010	ġ	r	I
Total PCBs (7 Cangeners)	2815	n	marka	< 0.10	-	1	3
TPH Total WAC (Mineral OI)	2670	n	maña	間<10	000	I	1
Total (Df 17) PAHs	2600	N	manua	< 2.0	100	Ē	1
PH	2010	n		8.8	1	26	1
Acid Neutralisation Capacity	2015	N	molika	0.098	+	To evaluate	To evaluate
Eluate Analysia			10:1 Eluate	10:1 Eluste	Limit value using 8	Limit vatues for compliance leaching test using BS EN 12457 at LIS 10 like	eaching test 5 10 Med
Research			10,000	10000			and a second
PH BOIH	0010		A MANUAL	ADA A	10	100	500
conum * * * * *	1011		120/0	non v	10	M	NOC N
Cedmum	3490		< 0,10010	nuns -	070		•
Chromum -	1490		< 0.0010	<0,000	Q'0	0	2
Capper	3450	n	< 0.0010	<0.050	2	8	100
Mercury	1450	n	< 0.00050	< 0.0050	0.01	0.2	est.
Mohtdenum	1450	2	0.0023	< 0.050	0.5	10	8
Nickel	5450		< 0.0010	< 0.050	40	10	40
Load	1450	n	< 0.0010	< 0.010	0.5	10	8
Antimony.	1450	n	< 0.0010	<0.010	0.06	0.7	0
Selenium	1450		< 0.0010	<0.010	0,1	0.5	1
Zhe	1450		<0.0010	< 0.60	4	33	200

ived Solds

18 2 8 8

Solid Informat Dry mass of lev Moishure (%)

0.090

fifcally leaching test resurts) must not be used for hazardous waste classification purposes. This analysis is only applicable I acceptance and does not give any indication as to whether a weste may be hazardous or non-hazardous. Landfill WAC analysis (specificaly lea for hazardous waste landfill acceptar Waste Acceptance Criteria

Page 25 of 46

#### Chemtest

### Results - Single Stage WAC

Chemtest Jeb No: Chemtest Sample ID:	19-19643 841082				Lamfill	Lamifili Washe Acceptance Criteria Limits	e Criteria
Sample Ref: Sample ID: Sample Location: Top Depth(m): Bettom Depth(m) Beampling Date:	TP02 2.00 2.00 2.019				Inert Waste Lendfill	Stable, Non- reactive hazardous waste in non- hazardous Landfill	Hazardous Waste Landfill
Determinand	50P	Accred.	Units				
Total Organic Carbon	2022	n	8	0.64	-	-	10
Loss On Ignition	2610	0	36	1.8			10
Total BTEX	2760	0	maka	181 < 0.010	9	4	a
Total PCBs (7 Congeners)	28.02	0	mg/kg	< 0.10	1		*
TPH Total WAC (Minars! OII)	2870	n	mg9cg	[B] < 10	500	1	4
Total (OF 17) PAHs.	2800	×	Exited 1	×20	100	r	F
HB	2010	0		8.7	-	9<	
Acid Neutralization Capacity	2016	N	molving	0.22	1	To evaluate	To evaluate
Eluate Analysis			10:1 Eluato	10:1 Eluato	Limit values uning B	Limit values for compliance leaching test uning BS EM 12457 at LIS 10 Mag	eaching test 5 10 Uku
Arsenic	1460	-	< 0.0010	<0.050	0.6	2	35
Barlum	1450	0	0,0012	<0.50	20	100	300
Cadmium	1450	0	< 0.00010	< 0.010	0.04	1	9
Chromburn	1450	0	< 0.0010	<0.050	90	40	02
Copper	1450	0	< 0.0010	< 0.050	2	12	100
Mercury	1450	0	< 0.00060	< 0.0050	0,01	0.2	2
Molybdenum	1460	0	0.0050	0/020	20	10	30
Makel	1450	0 +	< 0.0010	< 0.050	0.4	10	40
Lend	1450	0	< 0.0010	< 0.010	0.5	40	20
Antimony	1450	0	< 0.0010	< 0.010	0.06	0.7	ua.
Salanium	1450	0	< 0.0010	<0.010	0.1	0.5	1
Zinc	1460	0	< 0.0010	< 0.50	4	50	200
Chiorida	1220	n	2.0	50	800	15000	25000
Fuoride	1220	n	0.18	1.8	10	150	500
Sulphete	1220	n	2.5	21	1000	2000	80000
Total Dissolved Solids	1020	Z	題	990	4000	80000	100000
Phenol Index	1920	n	× 0.030	<0.30	-		
Dissolved Organic Carbon	1610	2	2.7	< 50	500	800	1000

Moleture (%)

2

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

#### Chemtest Transmission

### Results · Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19543 841063				Landal	Landfill Wash Acceptance Criteria Limits	e Criteria
Sample Ref. Sample LD: Sample Location: Top Depth(m); Buntoin Doptie:	A498943 TP03 0.50 0.50 24 May 2019				Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfil	Hazardoun Waste Landfill
Determinand	50P	Accred.	Units				
Total Organic Carbon	2626	0	2	0.33	27	47	φ
Loss On Ignition	2810	0	20	2.0	,	:	10
Total BTEX	2700	n	DM/DM	[B] < 0.010	9		
Total PCBs (7 Corgeners)	2816	n	Dolyperi	<0.10	1	z	t
TPHS Total WAC (Mineral OII)	2670	0	Dig Ma	[B] < 10	200		a
Total (Of 17) PAH's	2800	N	mg/kg	×20	100		t
14	2010	0		8.7	1	₽.	1
Acid Neutralisation Capacity	2016	N	maVka	0.17	4	To evaluate	To evaluate
Eluate Analysis			10:1 Eluato	10:1 Eluate	Limit values	Limit values for compliance leaching test	saching test
and the second se	1.		mail	mgika	uning B	uning BS EN 12457 at LIS 10 Ukg	10 Ukg
Argentic	1450	n	<0,0010 ×	< 0.050	9.0	2	25
Barham	1450	3	0.0011	<0.50	20	100	300
Cadmium.	1450	n	< 0.00010	< 0.010	0:04	1	in,
Chromium	1450	0	< 0.0010	< 0.050	0.5	10	70
Copper	1450	n	< 0.0010	< 0.050	N	150	100
Mercury	1450	0	< 0.00060	< 0.0060	0.01	0.2	2
Volybdervum	1450	0	0.0334	< 0.050	0.5	10	30
Mokel	1450	n	< 0.0010	< 0.050	0.4	10	8
, neid	1450	n	< 0.0010	< 0.610	0.5	10	60
Antimony	1450	0	< 0,0010	< 0.010	0.06	0.7	10
Selenium	1450	0	< 0.0010	< 0.010	0.1	0.5	7
2nd	1450	n	< 0.0010	<0.50	4	20	200
Chilorida	1220	n	<1.0	< 10	000	15000	25000
Flughter	1220	n	0.17	17	10	150	500
Sulphale	1220	n	<1.0	< 10	1000	20000	80000
Total Dissofted Solids	1020	N	48	470	4000	60000	100000
Phenol Index	1920	n	× 0.030	< 0.30	-		•
Distributi Omanin Carbon	10,01	-	0 11	< SD	RUN	the second	1000

Waste Acceptance Criteria

3

Solid Information Dry mass of test portion/log Moisture (%)

0000

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

÷

Page 27 of 46

#### 

## Results - Single Stage WAC

8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Chemtest Job No: Chemtest Sample ID:	19-18643 841084				LandIII	LandIIII Waste Acceptance Criteria Limits	e Criteria
SQP*         Accred.         Units         S         0.37         5	Sample Ref Sample ID: Sample Location: Top Depth(m): Bottom Depth(m): Barnelines Dete:	AAB9944 TPO3 1.00 1.00 24-May-2019				Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfil	Hazardous Waste Landfill
2025         U         %         0.67         3         5           2760         U         mgNg         161-0.00         6         -         -           2760         U         mgNg         161-0.00         6         -         -         -           2760         U         mgNg         161-0.00         6         -         -         -           2760         N         mgNg         161-0.00         6         -         -         -         -           2700         N         mgNg         161-10.00         0.00         -	Determinand	SOP	Accred.	Units				
2610         U         %         6.2         -         -           0.         2815         U         mghg         [8]<0.010	Total Organic Carbon	2625	,	*	0.67	10	10	e
2750         U         mg/kg         [51:5]         U         =	Loss On Ignition	2610		*	42	1		10
(1)         2815 (1)         U         mg/ng (1)         (1)         1         -           25010         N         N         mg/ng (1)         (1)         000         -	Total BTEX.	2760	0	Diffigm	[B] < 0.010	8	,	1
(J)         2573 (2000)         (J)         0904 (2000)         (G)	(Total PCBs (7 Congeneral)	2815	R	maña	<0.50	-	1	ĩ
2800         N         mplag         <2.0         100         -         <	(TPH Total WAC (Nineral OI)	2670	n	marka	10 < 10	500		1
2010         U         S3         -         > >6         >         >         > >6           101         N         md/gq         0.8.3         -         To evaluate mark         -         resultate mark         - </td <td>Total (Of 17) PAH's</td> <td>2800</td> <td>×</td> <td>mp/kg</td> <td>&lt;20</td> <td>100</td> <td></td> <td>ŧ</td>	Total (Of 17) PAH's	2800	×	mp/kg	<20	100		ŧ
V         2015         N         mol/bg mg/d         0.049         -         Towns for compliance law mg/d         Towns for compliance law mg/d           1450         U         <.0.0010	D-L	2010	9		6.3	T	80	ï
10:1 Etunits         10:1 Etunits         10:1 Etunits         10:1 Values' fer compliance hash mark mark and set of the set o	Actd Neutralisation Capacity	2015	z	Emologia	0.049	,	To evaluate	To evaluate
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Eluate Analysis			10:1 Ehuate	10:1 Eluste moles	Limit values using B	s for compliance h 15 EN 12457 at L/S	eaching test 5.10 Ner
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Arsenic	1460		< 0.0010	< 0.050	0.6	2	100
4420         U         <         <         0.044         1           14400         U         <	Bartum	1460		0.0021	×0,50	20	100	300
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cadmium	1460	2	< 0.00010	< 0.010	0.04	+	ŝ
1450         U         < 0.0010         < 0.050         2         50           1450         U         < 0.01090	Chromium	1450	_	< 0.0010	< 0.050	0.5	10	20
1450         U         < <0.0100         <0.01         0.2           1450         U         0.0011         < <0.050	Capper	1460	,	< 0.0010	< 0.050	0	8	100
1450         U         0.0011         < 0.050         0.5         10           1470         U         < 0.0010	Mercury	1460	9	< 0.000000	< 0.0050	0.01	02	¢4
1450         U         < 0.0010         < 0.0010         0.4         10           1450         U         < 0.0010	Mohrbanum	1450	0	0.0011	< 0.050	0.5	10	30
1450         U         < 0.0010         < 0.010         0.55         10           14450         U         < 0.0010	Nickel	1400	n	< 0,0010	< 0.050	9.4	10	40
1450         U         < 0.0010         < 0.010         0.05         0.7           1480         U         < 0.0010	Load	1450	2	< 0,0010	< 0,010	0.5	10	80
H420         U         < 0.0010         < 0.010         0.1         0.5           H450         U         < 0.0610	Antimony	1460	2	< 0,0010	< 0.010	90'0	2'0	41
1450         U         < 0.0010         < 0.56         4         50           12200         U         < 10	Selenium	1460	1	< 0.0010	< 0.010	0.1	0.5	2
1220         U         < 1.0         < 1.0         1500           1220         U         0.0         150         1500           1220         U         0.0         2.0         160         150           1220         U         2.6         2.6         100         2000           1220         U         2.6         2.6         100         2000           1220         U         2.6         2.6         100         2000           1220         U         -0.00         <0.00	Znc	1450	0	< 0.0010	< 0.50	*	8	200
1220         U         0.20         2.0         10         150           1220         U         2.6         2.0         10         150           1220         U         2.6         2.0         100         2000           1220         U         2.6         2.0         4000         2000           1320         U         -         -         -         -           1320         U         -         -         0.0         500         -	Chloride	t220	0	<1.0	× 10	800	15000	25000
1220         U         2.6         2.6         1000         20000           1020         N         520         400         20000           1020         U         -0.030         <0.30	Fluoride	1220	0	0.20	2.0	10	150	600
10200         N         520         520         600.00         600.00           18200         U         <0.0300	Sulphate	t220	0	2.6	26	1000	20000	50000
1920         U         < 0000         < 0.30         1         =           t610         U         4.0         < 50	Tatal Dispotred Solids	1020	z	1	520	4000	00000	100000
1610 U 4.0 ≺50 500 800	Phenol Index	1920	n	< 0.030	< 0.30			
8	<b>Dissolved Organic Carbon</b>	1810	n	4.0	+50	500	800	1000
	Solid Information		_					

Molsture (34)

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazaroous waste classification purposes. This analysis is only applicable for hazardous weste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19543 841065				Landfill	Landfill Waste Acceptance Criteria Limits	s Criteria
Sample Ref: Sample ID: Sample Location: Top Depth(m); Samolina Data:	AA69945 TP03 2.00 2.00 24-May-2019	S.			Inert Waste Landill	Stable, Non- reactive hazardous wasto in non- hezardous Landfil	Mazardous Waste Landfill
Determinand	SOP	Accred.	I Units				
Total Organic Carbon	2833	0	2	0.32	-	5	9
Loss On Ignition	2610	9	2	2.2	1	1	10
Total BTEX	2760	n	molica	[B] < 0.010		1	
Total PCBs (7 Congeners)	2815	3	malkg	< 0.10	F	,	ï
TPH Total WAC (Mineral OIL)	2670	n	mailua	(B) < 10	000	4	
Total (Df 17) PAH's	2800	N	maka	<2.0	100	E.	t
Dir.	2010			B.7	1	2	*
Acid Neutralisation Capacity	2015	N	molika	0.20		To evaluate	To evaluate
Eluate Analysis	1		10:1 Eluate	10:1 Eluate	Limit values	Limit values for compliance leaching test	saching test
1.5 million 1.5			ngit	mg/kg	using E	using BS EN 12457 at L/S 10 Mg	5 10 Mg
Arsenic	1450	0	< 0,0010	< 0.050	0.5	2	25
Bartum	1450	9	0,0011	< 0.50	20	100	300
Cadmium	1450	0	< 0.00010	< 0.010	0.04	-	ø
Chromium	1450	0	< 0.0010	< 0.050	0.6	10	- 70
Copper	1460	n	< 0.0010	< 0.050	2	50	100
Marcury	1450	n	< 0.00050	< 0.0050	0.01	0.2	14
Motyodenum	1450	0	0.0037	< 0:050	0.5	10	30
Nicites	1450	n	< 0.0010	< 0.050	4.0	40	4
Lead	1450	D	< 0.0010	< 0.010	0.6	40	50
Antimony	1450	n	< 0,0010	× 0.010	0.06	0.7	s
Selankum	1450	0	< 0.0010	< 0.010	0.1	0.5	4
Zhc	1450	0	< 0.0010	<0.50	4	60	200
Chiorida	1220	n	<1.0	< 10	800	15000	25000
Fluorida	1220	n	0.13	13	10	150	500
Sulphate	1220	n	<1.0	<10	20005	2000	50000
Total Dissolved Solids	1020	N	48	480	4000	60000	100000
Phanol Index	1920	0	<0.030	< 0.30		4	
Dissolved Organic Carbon	1610	0	4.4	<50	2005	600	1000

Waste Acceptance Criteria

olid Informatio Solid Informa Ory mass of te Molshure (%)

100

applicable Ing test results; must not be used for hazarbous waste classification purposes. This analysis is and does not give any indication as to whether a waste may be hazardous or non-hazardous. Landfill WAC analysis (specifical for hazardous waste landfill acc

A.

Page 29 of 46

#### Chemtest

### Results - Single Stage WAC

AR8600           FD4         Subtrant from the standard from t	Chemtest Job No: Chemtest Sample ID:	19-19643 841065				Landfill	Landfill Waste Acceptance Criteria Limits	e Criteria
TPO4 0.50 0.50 0.50 0.50         TPO4 0.50         TPO4 0.65          TPO4 0.65	Sampte Ref: Sampte ID:	AA9993B					Stable, Non- resolive	
Under	Sample Location: Top Depth(m):	0.50				Inert Waste	hazardous wasta in non-	Hazardous Waste
On         SOP         Accreted.         Units         On         %         2.9         5	Bottom Depth(m); Sampling Date:	0.50 24-May-2019				Landfill	Landfill	Indhi
on         2835         U         %         086         3         5         5           Referencio         2760         U         mplag         <10         1         -         -           Referencio         2760         U         mplag         <10         1         -         -         -           Referencio         2760         U         mplag         <10         1         -         -         -           Referencio         2760         U         mplag         <10         50         50         - <th>Daterminand</th> <th>50p</th> <th>Accred.</th> <th>Units</th> <th></th> <th></th> <th></th> <th></th>	Daterminand	50p	Accred.	Units				
2010         U         %6         2.9         =         =         =           geners1         2870         U         mphb         [50,010]         6         = </td <td>Total Organic Carbon</td> <td>2625</td> <td>0</td> <td>z</td> <td>0.85</td> <td>10</td> <td>10</td> <td>9</td>	Total Organic Carbon	2625	0	z	0.85	10	10	9
2750         U         mpha         E3.10.01         6         -           Section         U         mpha         E3.10         1         -         -           Section         U         mpha         E3.10         1         -         -         -           Section         U         mpha         E3.10         1         -         -         -         -         -           Section         N         mpha         E3.10         1         -	Loss On Ignition	2610	0	*	2.9	*	*	10
Differention         2815         U         mpkg mode         Cl         T	Total BTEX	2760	n	marka	[B] < 0.010	9	-	1
freed (01)         2870         U         mplan         [8]<(0)         500         -         -         I           c         2010         U         mplan         6.5         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         56         -         -         100         10         -         -         -         56         10         -         -         56         10         -         56         10         10         10         10         10         10         10         10	[Total PCBs (7 Congeners)	2615	0	Billigm	< 0.10			1
*         2000         N         mpling         \$2,0         100         ~        <	TPH Total WAC (Mineral Oil)	2670	n	maha	[B] < 10	2009	*	1
Capeedly         2010         U         65.         -         <	Total (Of 17) PAH's	2800	N	mpMp	× 2.0	100		1
Capeacity         2015         N         mm/ing         0.037          To ovaluatis            11450         U         <0.010	Hd	2010	0		8.5	1	36	t
T01 Elevative (101 Elevative 1450         T01 Elevative (1450         T01 Elevative (1450         L010t values (1450         Compliance (acce) (1450         L010t values (1450         L010t values (1450 <thl100tvalues (1450         L010tvalues (1450<td>Acid Neutralisation Capacity</td><td>2015</td><td>N</td><td>moing</td><td>0.037</td><td>1</td><td>To ovaluate</td><td>To evaluate</td></thl100tvalues 	Acid Neutralisation Capacity	2015	N	moing	0.037	1	To ovaluate	To evaluate
main         main <th< td=""><td>Eluate Analysis</td><td></td><td></td><td>10:1 Eluxie</td><td>10:1 Ebuate</td><td>Limit value</td><td>a for compliance</td><td>leaching test</td></th<>	Eluate Analysis			10:1 Eluxie	10:1 Ebuate	Limit value	a for compliance	leaching test
1480         U         < C10010         < 0.155         2         2           1480         U         < C10010	and the second se			TOT	mg/kg	using i	BG EN 12467 at L0	S 10 Uhg
1450         U         < 0.0010         < 0.50         20         100           1450         U         < 0.0010	Arsenic	1450	n	< 0.0010	< 0.050	0.5	2	28
1460         U         <           0.04         1           1430         U         <	Barlum	1450	n	< 0.0010	< 0.50	20	100	300
1430         U         < 0.0010         < 0.050         0.5         0.5           1430         U         < 0.0010	Cadmium	1450	n	< 0.00010	< 0.010	0,04	1	0
1480         U         < 50.0010         < 50.056         2         50           1480         U         < 6.00010	ichromium.	1430	0	< 0.0010	< 0.050	0.5	10	20
1430         U         < < < < < < < < < < < < < < < < < < <	Copper	5480	0	< 0.0010	<0.050	2	8	100
1450         U         < 0.0010         < 0.050         0.5         10           1450         U         < 0.0010	Mercury	1450	1	< 0.00050	< 0.0050	0.01	0.2	01
1450         U         < 0.0010         < 0.0550         0.4         10           1430         U         < 0.0010	Matyboarum	1450	n	< 0.0010	<0.050	0.5	10	8
1450         U         < 0.0010         < 0.010         0.5         10           1450         U         < 0.0010	Pulsionet	\$450	p	< 0.0010	< 0.050	0.4	10	40
1450         U         < 0.0010         < 0.010         0.06         0.7         0.5           1450         U         < 0.0010	Load	5460	n	< 0.0010	< 0.010	0.5	10	20
1450         U         < 0.0010         < 0.01         0.5         0.5           1300         U         < 0.0010	Antimony	1450	n	< 0.0010	<0.010	0.06	0,7	5
1450         U         < 00010         < 0.501         4         50           1220         U         < 1.0	Salanium	1450	0	< 0.0010	<0.010	0.1	0.5	ł
12200         U         <1.0         <1.0         1900         15000 <th15000< th=""> <th15000< th=""> <th15000< td="" th<=""><td>Zinc</td><td>1450</td><td>0</td><td>&lt; 0.0010</td><td>&lt; 0.50</td><td>4</td><td>50</td><td>200</td></th15000<></th15000<></th15000<>	Zinc	1450	0	< 0.0010	< 0.50	4	50	200
1220         U         0.19         1.9         1.0         1.60         1.60         1.60         1.60         1.60         2.0000         1.60         2.0000         1.60         2.0000         1.60         2.0000         1.600         2.0000         1.600         2.0000         1.600         2.0000         1.600         2.0000         1.6000         2.0000         1.6000         2.0000         1.6000         2.0000         1.6000         2.0000         1.6000         2.0000         1.6000         2.0000         1.6000         2.0000	Chloride	1220	0	<1.0	c 10	800	15000	25000
Item         12:00         U         <1.0         2000<	Fluerdo	1220	0	0.19	3.9	10	150	900g
etas         102/0         N         49         490         4000         60000         60000         60000         60000         60000         60000         60000         60000         60000         60000         6000	Subhate	1220	0	<1,0	< 10	1000	20000	50000
1920         U         < 0.030         < 0.30         1         +         Larticle         1610         U         4.6         < 600         600 <th< td=""><td>Total Dissohed Solids</td><td>1020</td><td>z</td><td>49</td><td>490</td><td>4000</td><td>60000</td><td>100000</td></th<>	Total Dissohed Solids	1020	z	49	490	4000	60000	100000
Cartron 1910 U 4.5 c 50 800 800 Milen kg 0.090	Phenol Index	1920	1	< 0.030	< 0.30	-		
ortionitio	Dissolved Organia Cartion	1610	0	4.6	€ 50	500	800	1000
ottonko								
	Solid Information							
	Dry mass of test portioning	0,090						

Motsture (%)

Waste Acceptance Criteria

Landfill WAC anniysti (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

#### M Chemtest

### Results · Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19643 841067		3		Landtill	Landfill Waste Acceptance Orlana Limits	e Criteria
Sample Ref. Sample ID: Sample Location: Top Depth(m): Benotion Dath(m)	AABB39 1,00 1,00 1,00 1,00				Intert Waste Landfill	Stable, Non- neac6/w huzardous wasta in non- házzrdous I andříus	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units				
Total Organic Carton	2625	n	2	0.33		10	10
Loss On Ignition	2610	0	2	1.6	1		10
Total BTEX	2760	n	man	[B] < 0.010	9	1	3
Total PCBs (7 Corgeners)	2815	2	marka	< 0.10	+	1	4
TPH Total WAC (Mineral Oil)	2670	0	malka	固<10	000	1	I
Total (Of 17) PAH's	2600	2	mphia	<2.0	100	1	t
	2010	0		8.7	1	36	1
Acid Neutralisation Capacity	2015	N	molikig	0.085	1	To evaluate	To ervaluate
Eluate Analysis			10:1 Elunte	10:1 Elunte	Limit values	Limit values for compliance leaching test select its pre 12457 at 1 is 10 line.	eaching test
		-	10000	Russel V			and and a
91360110	Note:		- A0010	10100	a ne	400	Not I
To denis env	UKP+		<0.00010	<01010	0.04	1 INN	24
Nomine	0974	-	< 0.0010	<0.050	50	10	02
Deboar	\$450		< 0.0010	<0.050	2	22	106
Annaury	1450	0	< 0.00050	< 0.0050	0.01	0.2	ы
Malybdenum	1450	0	0.0018	< 0.050	9.0	10	30
Victor	3450	0	< 0.0010	< 0.050	0.4	10	40
ead	1450	n	< 0.0010	< 0.010	0.5	10	99
Antimory	\$450	n	< 0.0010	<0.010	0.06	0,7	5
Selenium	1450	0	< 0.0010	<0.010	0.1	9.0	*
Zinc	1450	n	< 0.0010	< 0.50	*	50	200
Chloride	1220	n	1.9	19	800	15000	25000
Fluorida	1220	0	0.10	1.6	10	150	500
Subhate	1220	0	<1.0	c 10	1000	20000	50000
Total Dissolved Solids	1020	2	47	470	4000	60000	100000

Solid Information Dry mass of lest po Molsture (%)

Fluoride Sulphate Total Disso Phonol Indi

11

Waste Acceptance Criteria

tching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable noe and does not give any indication as to whether a waste may be hazardous or non-hazardous. cally les Landfill WAC analysis (specifically for hazardous waste landfill accep

Page 31 of 46

#### Chemtest Transportements to conversion

## Results - Single Stage WAC

Chemitest Jeb No: 18-19643	19-19643				Landfill	Landfill Washe Acceptance Criteria	e Criteria
Chemtest Sample ID:	841069					Limits	
Sample Ref: Sample ID:	AA113513					Stable, Non- reactive	
Sample Location:	1P06					hazardous	Hazardous
Top Depth(m):	0.50				Inert Waste	-usta in stars.	Waste
Bottom Depth(m):	0.50				Landfill	hazardous	Landfill
Sampling Date:	27-May-2019					Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	0	2	0.42	2)	427	IP
Loss On Ignition	2810	n	22	2.9	1	+	10
Total BTEX	2780	n	mpNg	(B) < 0.010	8	+	3
Total PC8s (7 Corgenars)	2015	1	marka	< 0.10	1	1	a.
TPH Total WAC (Mineral Oil)	2670	n	marka	[B] < 10	200	1	4
Total (Of 17) PAH's	2800	N	marka	×20	1001		t
DHI	2010	n		8.5	1	94	4
Acid Neutralisation Capacity	2015	N	mothig	0.048	1	To evaluate	To evaluate
Etuate Analysis			10:1 Ehusto	10:1 Eluate	Limit value	Limit values for compliance leaching test	eaching test
			MBM	mging	Buist	USING DO EM 149/ 91 PO 10 IN 10	Buildi a
Arsenic	1450		< 0.0010	×0.050	90	-	8
Barham	1450	0	0.0621	<0'90 ×	30	100	300
Cadmium	1450	n	< 0.00010	<0.010	0.04	1	10
Chigmian	1450	n	< 0.0010	< 0.050	0.5	10	70
Copper	1450	0	< 0.0010	<0.050	24	50	100
Mercury	1450	0	< 0.00050	< 0.0050	0.01	0.2	2
Wolybdensim	1460	n	< 0.0010	< 0.050	0.5	10 1	30
Nickel	1450	0	< 0.0010	< 0.050	0.4	10	40
Lead	1450	0	<0.0010	< 0.010	0.6	10	50
Antimony	1450	n	< 0.0010	< 0.010	0.05	0.7	10
Selenium	1450	n	< 0.0010	< 0.010	0.1	0.5	7
202	1450	n	< 0.0010	< 0.50	7	20	200
Chiorida	1220	n	<1.0	< 10	800	15000	25000
Fuoride	1220	n	0.15	1.0	10	150	500
Suphale	1220	0	7.6	76	1000	20000	50000
Total Dissolved Solids	1020	N	61	610	1000	60000	100000
Phenal Index	1920	0	< 0.030	< 0.30	+		
Dissolved Organic Carbon	1610	n	3.5	< 50	500	800	1000
Solid Information							
Dry mass of test partion/kg	0600						

į,

ture (%)

Waste Acceptance Criteria

Landfill WAC anilysis (specifically leaching test results) must not be used for hazartous waste classification purposes. This analysis is only applicable for-hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

### Results - Single Stage WAC

Chemtest Jeb No: 19-19943	19-19543				Landfill	Landfill Waste Acceptance Criteria	e Criteria
Chemtest Sample ID:	841070			n.	2779 C 19 C 20	Limita	SAC WASH
Sample Ref: Sample ID:	AA113514					Stable, Non- reactive	
Sample Location:	TP06				AND DESCRIPTION	hazardous	Hazardous
Top Depth(m):	1,00				Inert Waste	waste in non-	Waste
Bottom Depth(m):	1,00				Landfill	hszardous	Landill
Sampling Date:	27-14ay-2019		and the second se			Landfil	
Determinand	SOP	Accred	Units				
Total Organic Carbon	2625	0	14	0.27		9	10
Loss On Ignition	2610	n	*	65	1	1	10
Total BTEX	2760	n	Dog Bull	[B] < 0.010	8		1
Total PCBs (7 Congeners)	3810	5	Daybur	< 0,10	-		
TPH Total WAC (Mineral Off)	2670	n	mana	国<10	200		+
Total (Of 17) PAH's	2800	N	E4/6ml	*2.0	100	•	1
HG	2010	n		8.5	1	30	*
Acid Neutralisation Capacity	2016	N	molika	0.15	ī	To evaluate	To evaluate
Etuate Analysis			10:1 Ehuete	10:1 Eluate	Limit value	Limit values for compliance leaching test	eaching test
			figm	mg/kg	using E	using BS EN 12457 at L/S 10 Mg	5 10 Mg
Arsenio	1450	0	01000 >	< 0.050	5.0	2	25
Barlum	1450	n	0.0015	<0.50 ×	20	100	300
Cadmium	1450	2	< 0.00010	< 0.010	0.04	+	æ
Chronistum	1460	n	< 0.0010	< 0.050	0,5	10	70
Copper	1450	0	< 0.0010	× 0.050	1.4	20	100
Mercury	1450	0	< 0.00050	< 0.0050	10.0	0.2	2
Motyodenum	1450	n	0:0041	< 0.050	0.5	10	30
Note	1450	n	<0100/0>	< 0.050	0.4	10	40
Lead	1450	n	< 0.0010	< 0.010	970	10	20
Antimomy	1460	0	< 0.0010	< 0.010	0.05	0.7	5
Satantum	1450	n	< 0.0010	< 0.010	1.0	0.5	4
Znc	1460	n	< 0.0010	< 0.50	4	98	200
Chlorida	1220	0	34	940	600	15000	25000
Flueride	1220	0	0.18	1,6	10	150	800
Sulphate	1220	0	3,6	96	1000	20000	50000
Total Dissolved Solids	1020	N	40	490	4000	6000	100000
Phenoi Index	1920	0	< 0.030	< 0.30	1		+
Discrived Ornards Carbon	1610	9	3.7	<50	800	800	1000

1

Waste Acceptance Criteria

Solid Information Dry mass of test perforving Moteture (%)

0,090

Landfill WAC analysis (specifically leaching text results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste rineffill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Page 33 of 46

#### 

## Results - Single Stage WAC

Chemtest Job No: 19-19043 Chemtest Sample ID: 841071	18-19043				Landill	Landilli Waste Acceptance Griteria Limits	e Criteria
Sample Ret: Sample ID: Top Depth(n): Top Depth(n):	AA112516 TP05 0.50				Inert Waste	Stable, Non- reactive hazardous waste in non-	Hazaedous Waste
Sampling Date:	27-May-2019				Landhi	Landfill	TENGU
Determinand	SOP	Accred.	Units				
Total Organic Carton	2625	n	*	0.38	2	15	10
Loss On Ignition	2610	0	20	2.1	1	3	10
Total BTEX	2760	n	Difigm	[B] < 0.010	Ð		1
Total PCBs (7 Congenere)	2815	n	bydu	< 0.30	V		1
TPH Total WAC (Nineral OI)	2670	n	Dig00	IB] < 10	2005	ï	1
Total (Of 17) PAH's	2800	N N	marka	×2.0	100	8	1
E	2010	U		8.8	1	¥	1
Acid Neutransation Capacity	2015	N	motified	0.095	-	To evaluate	To evaluate
Eluste Analysis			10:1 Eluate	10:1 Elunte	Limit value:	Limit values for compliance leaching test	eaching test
Arbanin	6450	-	- 0.0010	09007	20	Contraction of the local division of the loc	36
Benum	1460		0.0015	< 0.50	8	100	300
Cadmium	1460	2	< 0.00010	< 0.030	0.04	+	10
Chromium	1450	n	< 0.0010	< 0.050	0.5	10	10
Copper	1450	0	< 0.0010	< 0.050	×	8	100
Mancury	1450	U.	< 0.00050	< 0.0050	10.0	0.2	04
Molybdenum	1460	0	0.0016	< 0,050	0.5	10	30
Nickel	1450	n,	< 0.0010	< 0.050	0.4	10	40
Lead	1460	0	< 0,0010	< 0.010	0.5	10	205
Antimony	1450	n	< 0.0010	< 0.010	0.05	0.7	0
Selenium	1450	0	< 0.0010	< 0.010	0,1	0.5	2
Zho	1450	0	< 0.0010	< 0.50	+	8	200
Chloride	t220	n	5.0	99	800	16000	25000
Flaoride	1220	n	0.58	1.8	10	150	2005
Sulphote	1220	n	6.3	19	1000	20008	20003
Total Dissohed Solds	1020	×	55	550	4000	80008	100000
Phenol Index	1920	n	< 0.030	< 0.30	1	*	1
Dissolved Organic Carbon	1610	n	4,5	< 50	2009	800	1000

Sture (%) 18

10

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazarroous waste classification purposes. This analysis is only applicable for hazardous weste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

## - Manual Chemtest

## Results - Single Stage WAC

(BMCE)

21813

19 19 10 10 10 10 10 10 10 10 10 10	Chemtest Job No:	19-19643				Landfill	Landfill Waste Acceptance Criteria	e Criteria						
At 13518         At 13518         At 13518         TP06         Stable, Mon- 2.00         2.00	Chemtest Sample ID:	841072					Limits	100000						
TP00         TP00           2.00         Colspan="6">Imen Ywaats in non- 2.00         Imen Ywaats in non- 2.00         Imen Ywaats in non- manden           0         U         U         Imen Ywaats in non- Landfill           0         U         Imen Ywaats in non- manden           0         U         Imanden           0         Imanden           0         Imanden           0 <th colspan="6" imanden<="" t<="" th=""><th>Sample Ref:</th><th>AA113518</th><th></th><th></th><th></th><th></th><th>Stable, Non-</th><th></th></th>	<th>Sample Ref:</th> <th>AA113518</th> <th></th> <th></th> <th></th> <th></th> <th>Stable, Non-</th> <th></th>						Sample Ref:	AA113518					Stable, Non-	
200         200         Accruit         Units         Franchistion         Instantian           an         200         U         500         U         Visition         Visitio         Visitio	Sample Location:	1P06					hazardous	Hazardous						
2.00           2.01         Landini         Landini <th <<="" colspan="2" th=""><th>Top Depth(m):</th><th>2,00</th><th></th><th></th><th></th><th>Inert Waste</th><th>waste in non-</th><th>Waste</th></th>	<th>Top Depth(m):</th> <th>2,00</th> <th></th> <th></th> <th></th> <th>Inert Waste</th> <th>waste in non-</th> <th>Waste</th>		Top Depth(m):	2,00				Inert Waste	waste in non-	Waste				
activity         Activity         Landfill           0n         2650         0         0         1         5         2           0n         2651         0         0         1         5         5         1           27010         0         0         1         1         1         5         5         5           27010         0         0         1         1         1         1         5	Bottom Depth(nt):	2.00				Landfill	hszardous	Landfill						
on         250P (10)         Accmut. (11)         Units (11)         (12)         3         5         5           27100         U         19         -	Sampling Date:	24-May-2019			1.0		Landfill							
on         2855         U         %         0.21         3         5         5           Referenci)         2700         U         mg/kga         6.0         1.9         -	Determinand	SOP	Accred.	Units										
2810         U         %         1.3         -         -           Reveals)         2816         U         mg/kg         [9]<0,010	Total Organic Carbon	2825	0	20	0.21		5	9						
2200         U         mptrag         []]<0.010         6          -           Interact OII         23/0         U         mg/kg         <2/0	Loss On Ignition	2610	n	18	1.0	t	+	10						
general)         2015         U         mg/gg	Total BTEX	2760	n	EN9m	[B] < 0.010	9		*						
Intend (0)         2010         U         mg/ag         [E]<10         500	Total PCBs (7 Corgeneus)	2815	n	mgRg	< 0.10	1	4	3						
i         2000         N         marka         5:20         100          >-  <	TPH Total WAC (Mineral OII)	2670	n	marka	[B] < 10	500		1						
Capace/v         2010         U         mm/s         = -   -         -         -         -	Total (Cf. 17) PAH's	2800	Z	marka	×20	100	4	1						
Capacity         2015         N         method         0.15          Classification           1456         U         20110         10:11 Elunits         10:11 E	pH	2010	n		8.8	1	- 20							
101         101         101         101         101           1450         U         < 63010	Acid Neutralisation Capacity	2016	N	matha	0.15	1	To evaluate	To evelopte						
1450         U         < 0.0010         < 0.0510         0.5         2           1430         U         < 0.0010	Elunts Analysis			\$0:1 Elunts mail	10:1 Eluate malko	Limit values usino E	a for compliance h 38 EN 12457 at L/S	sacking test 5 18 like						
1400         U         0.0022         <0.00         20         100           1450         U         <0.0010	Arsenic	1480	n	< 0.0010	< 0.050	0.5	2	35						
1450         U         <         0.0010          0.011         0.04         1           1430         U         <	Bertum	1450	n	0.0022	< 0.50	20	100	300E						
1400         U         < 00010         < 0.0010         0.5         10           14100         U         < 0.0010	Cadmlum	1450	0	< 0.00010	< 0.010	0:04	-	up.						
1430         U         < 0.0010         < 0.0010         2         60           1430         U         < 0.00564	Chamium	1450	2	< 0/0010	< 0.050	0.5	10	70						
1450         U         <           0.01         0.2         0.1           1430         U          0.01010         0.5         10         0.5         10           1430         U          0.01010           0.5         10           1430         U          0.01010          <0.010	Copper	1450	0	< 0.0010	< 0.050	64	20	100						
1430         U         0.0044         <0.001         0.5         10           1430         U         <0.0044	Mercury	1450	n	< 0.00060	* 0.0050	0.01	0.2	ti						
1450         U         < 0.0010         < 0.050         0.4         10           1430         U         < 0.0010	Molybdenum	1450	0	0.0044	< 0.050	0.5	10	30						
14:00         U         < 6001:0         < 6001:0         0.05         10           14:00         U         < 9.001:0	Mickel	1450	0	< 0.0010	<0.050 ×	0.4	10	40						
1450         U         < 0.0010         < 0.010         0.05         0.7           1450         U         < 0.0010	L ead	1450	n	< 0.0010	< 0.050	0.6	10	60						
1450         U         < 0.0010         < 0.010         0.1         0.5           1200         U         < 0.0010	Antimony	1460	n	< 0.0010	< 0.010	0.06	0.7	10						
1430         U         < 0.0010         < 0.40         4         50           12200         U         2.1         2.1         800         1500           12200         U         0.14         1.4         10         1500           12200         U         0.14         1.4         10         1500           1200         U         3.6         360         15000         6000           1200         N         3.6         300         6000         6000           1200         U         3.7         < 30	Salanium	1450	n	<0.0010	< 0.010	0.1	0.5	1						
1200         U         2.1         2.1         600         1500         1           12200         U         0.14         1.4         1.0         1.60         1600         1600           12200         U         3.6         3.6         1.00         20001         1.60           12200         U         3.6         5.9         5.00         20001         20001           12200         U         3.5         5.90         4000         20001         20001           13200         U         3.7         < 5.0	Zinc	1450	0	< 0.0010	< 0.50	4	60	200						
12:00         U         0.14         1.4         1.0         155           1ds         12:20         U         3.6         3.6         2000         2000           1ds         16:00         N         3.6         5.0         4000         2000           11:00         U         5.3         5.0         4000         6000         6000           Carbon         16:0         U         5.7         < 50	Chloride	1220	n	2,1	21	800	15000	25000						
Ids         1200         U         3.6         3.000         20001           Ids         1020         U         3.6         300         6003         6003           Carbon         1820         U         3.7         < 50	Fluceda	1220	n	0.14	4.5	10	150	500						
Ids 1020 N 53 530 4000 60003 Cattorn 1670 U <0.030 1 1 Cattorn 1670 U 3.7 <50 500 800 months 77	Sutphate	1220	n	3.6	8	1000	20000	50000						
1920         U         < 0.30         1         *           Carbor         1610         U         3.7         < \$0	Total Diseoved Solids	1020	N	53	630	4000	60000	100001						
Carbon 1610 U 3.7 <50 600 600 m	Phenol Index	1920	0	< 0,030	< 0.30	-	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							
ution/ig	Disjoiwind Organic Carthon	1610	0	3.7	× 50	200	600	1000						
rifervilg.														
	Solid Information													
	Dry mass of lest portionlig	060'0												
	Moisture (%)	E2												

#### Waste Acceptance Criteria

Landfill WAL analysis [specifically leaching text results] must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste innoffill acceptance and does not give any indication as to whether a waste may be hazardous of non-hazardous.

Page 35 of 46

#### Chemtest Transcrienters & Connection

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	19-19843 841073				Landill	Landfill Waste Acceptance Griteria Limits	e Criteria
Sample Ref. Sample ID;	AA88835					Stable, Non- reactive	
Sample Location:	TP07					hazardous	Hazardous
Top Depth(m):	0.50				Inert Waste	waste in non-	Waste
Sampling Date;	0.50 24-May-2019				Landfill	Landfill	Landhi
Determinand	80P	Accred.	Units				
Total Organic Carbon	2825	0	*	0.87	2	20	19
Loss On Ignition	2810	n	24	4.0	1	1	10
Total BTEX	2760	n	THOMAS .	[B] < 0.010	9	1	1
Total PCBs (7 Corgeners)	2815	n	EM9m	<0.10	+	1	a
TPH Total WAC (Mineral Cil)	2870	0	mana	B <10	009		a 0
Total (Of 12) PAH's	2800	z	mañig	< 2,0	100	1	ŀ
H	2010	0		8.4		29	1
Acid Neutralisation Capacity	2015	N	moVkg	0.029		To evaluate	To entituate
Elunto Analysis			10:1 Eluato	10:1 Eluate	Limit value	Limit values for compliance leaching test	leaching test
			Ingri	mg/kg	a Buisn	35 EN 12457 at LJ	S 10 UNG
Arsenic	1450	n	< 0.0010	< 0.050	0.5	2	See
Barkun	1450	n	< 0.0010	<0.50	30	100	300
Cadmium	1450	n	< 0.00010	< 0.010	10:04	1	in
Chromium	1450	n	< 0.0010	< 0.050	0.5	10	70
Copper	1450	n	< 0.0010	× 0.050	2	50	100
Mercury	1450	n	> 0.00050	< 0.0050	0.01	0.2	t i
Molybdenum	1450	n	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	n	< 0.0010	< 0.050	0.4	10	40
Lead	1450	2	< 0.0010	< 0.010	0.5	10	8
Antimony	1450	n	< 0.0010	< 0.010	0.06	0.7	US.
Selenium	1450	0	< 0.0010	< 0.010	0.1	0.5	1
Zh6	1450	n	< 0.0010	< 0.50	4	60	200
Chilorida	1220	n	×1.0	< 10	800	15000	25000
Fluoride	1220	n	0.18	1.8	10	150	800
Sulphate	1220	n	<1.0	× 10	1000	20000	20000
Fotal Dissolved Solids	1020	N	48	480	4000	60000	100001
Phenol Index	1820	n	< 0.030	< 0.30	1		
Dissolved Organic Carbon	1610	n	5.6	99	2005	800	1000
Solid Information	3						
Dry muss of test portion/kg	0600	_					

#### Waste Acceptance Criteria Moisture (%)

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

### Results - Single Stage WAC

Chemitest Job No: 19:49643 Chemitest Sample ID: 841074	18-18643 841074				Landfill	Landfill Wiste Acceptance Criteria Limits	e Criteria
Sample Ref. Sample ID: Sample Location: Top Depth(m); Bantoino Depth(m); Samplino Debt:	AA06036 TP07 1.00 1.00 24-May-2019				Inact Waste	Stable, Non- reactive hszardous waste in non- hazardous Landfill	Hazardous Waste Landfil
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	n	₽¢	< 0.20	19	10	10
Lass On Ignition	2610	9	×	1.7	1	1	10
Total BTEX	2760	n	maña	[B] < 0.010	9		1
(Total PCBs (7 Congeners)	2845	ħ	Difigm	< 0.10	+	,	1
TPH Total WAC (Minaral OII)	2670	n	mgNg	11 < 10	202	1	1
Total (OF 17) PAH's	2800	z	BwBw	<2.0	100	4	É
Ha	2010			8.7	4	炉	1
Acid Neutralisation Capacity	2015	z	troliting	0.064	1	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Ekunte	Limit values	Limit values for compliance leaching test	eaching test
2			mg/l	mg/kg	a graina a	culing BS EN 12457 at L/B 10 /kg	510 Mg
Arsenic	1450	n	< 0.0010	< 0.050	0.5	2	22
Banium	1450	R	< 0.0010	< 0.50	20	100	300
Cadmium	1460	p	< 0.00010	< 0,010	90:04	1	æ
Chromium	1450	n	< 0.0010	< 0.060	0.5	10	20
Copper	1460	0	< 0,0010	< 0.050	5	8	100
Mercury	1460	n	< 0.00050	< 0.0050	10.0	02	
Molybdenum	1450	n	0.0025	< 0.050	0.5	10	30
Nickel	1450	p	< 0,0010	< 0.050	40	10	40
Lead	1450	9	< 0.0010	< 0.010	0.5	10	8
Antimiony	1450	0	< 0.0010	< 0.010	90.0	0.7	s
Selerium	1450	n	< 0.0010	< 0.010	0.1	中の	1
Zino	1450	2	< 0.0010	<0.60	*	cs.	200
Chloride	1220	0	1.5	15	800	15000	25000
Fluoride	1220	n	0.56	1.6	10	150	500
Sulphate	1220	0	1.4	14	1000	20000	50000
Total Dissolved Solds	1020	N	46	480	4000	60000	100000
Phenol Index	1920	9	< 0.030	< 0.30	-	A	
Dissolved Organic Carbon	1610	9	4,8	< 50	200	800	1000

#### Waste Acceptance Criteria

Solid Information Dry mass of last pertion/kg Moisture (%)

Landfill WAC analysis (specifically leaching test re-ulis) must not be used for hazaroous waste classification purposes. This analysis is only applicable for hazardous weste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hizardous.

Page 37 of 46

#### 

## Results - Single Stage WAC

Chemiest Sample ID:	19-19043 841075				Landia	Landfill Waste Acceptance Criteria Limits	e Criteria
Sample Ref:	AA99931					Stable, Non-	
Sample ID:						reactive	
Sample Location:	BUHL				100000000000000000000000000000000000000	hazardous	Hazardous
Tap Depth(m):	0.50				Inert Waste	waste in non-	Waste
Bottom Depth(m):	0.50				Landill	hazardous	Landfill
Sampling Date:	24-May-2019					Landlil	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2292	0	34	0.31	-71	10	10
Loss On Ignition	2610	0	y	22	T	.1	10
Total BTEX	2760	n	00/0m	[B] < 0.010	Ð	+	1
(Total PCBs (7 Congeners)	2815	9	marka	< 0.10	-	+	1
TPH Total WAC (Mineral Oil)	2670	n	Dig Ma	[B] < 10	500		r
Total (Of 17) PAH's	2800	z	malka	<20	100		
pH	2010	n		8.3	1	9<	1
Acid Neutralisation Capacity	2015	N	molNa	0,15	1	To evaluate	To evaluate
Eluate Analysia			10:1 Eluate	10:1 Eluate	Limit value	Limit values for compliance leaching test	eaching test
63	and the second se		Ingitt	mallea	using E	35 EN 12457 at L/B	S 10 0kg
Arsenic	1450	0	< 0,0010 ×	< 0.050	0.5	2	26
Barlum	1450	9	0.0019	< 0.50	20	1001	300
Cadmium	1450	N	< 0.00010	< 0.010	0.04	-	5
Chromium	1450	0	< 0.0010	< 0.050	0,5	10	20
Copper	1450	1	< 0.0010	< 0.050	P4	105	100
Mercury	1450	n	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	0	0.0031	< 0.050	0.5	10	30
Nickst	1450	n	< 0.0010	< 0.050	0.4	10	07
Lead	1450	U	< 0.0010	< 0.010	9'0	10	50
Antimony	1450	n	< 0.0010	< 0.010	0.06	0.7	ŋ
Selanhum	1450	n	< 0.0010	< 0.010	0.1	0.5	2
Zhc.	1450	n	< 0.0010	< 0.50	*	50	200
Chloride	1220	0	1.7	15	800	15000	25000
Fluctide	1220	n	0.22	22	10	150	500
Suphate	1220	0	4	170	1000	20000	\$0000
Total Disselved Solds	1020	N	22	210	4000	60000	100000
Phanol Index	1920	n	< 0.030	<0.30	Ŧ		
Desolved Organic Carbon	1610	n	50	× 50	200	800	1000
Solid Information							
Day means of fact motion has	1000						
ANY RESIDENCE RESIDENCE FOR DAMAGE	1000						
(Wolsture (%)	13						

Waste Acceptance Criteria Moleture (%)

Landfill WAC analysis (specifically feaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste analysis to more and fores not give any indication as to whether a waste may be hazardous or non-hazardous.

i.

### Results - Single Stage WAC

Chemlest Job No. 19-19543	19-19643				Landfill	Landfill Waste Acceptance Criteria	a Criteria
Chemtest Sample ID:	841076				101.01.01.01.01	Lämitts	States and
Sample Ref; Sample ID:	A409032					Stable, Non- reactive	
Sample Location:	1P08				100 P (000 P (00	hazardous	Hazardous
Top Depth(m): Bottom Depth(m):	100				Inert Waste	waste in non-	Waste
Sampfing Date:	24-May-2019					Landfill	
Determinand	BOP	Accred.	Units				
Total Organic Carbon	2020	2	2	0.24	en	in	æ
Kass On Ignition	2810	5	2 <sup>12</sup>	1.9	a r	- 10	10
Total BTEX	2760	n	0000	[B] < 0.010	9		1
(Total PCBs (7 Congeners)	部位	0	malka	< 0.10	+		1
[TPH Total WAC (Mineral OII)	2870	n	D/06/0	[B] < 10	200		1
Total (Of 17) PAH's	2800	z	ma/ka	<20	100		1
2H	2010	0		8.7	1	9<	1
Acid Neutralisation Capacity	2015	z	moliva	0.18	1	To evaluate	To svaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	<ul> <li>Limit values</li> </ul>	Limit values for compliance leaching test	eaching test
	and a second sec		mgill	mg/kg.	using E	using BS EN 12457 at L/S 10 Vkg	10.Vkg
Arsenic	1450	0	< 0.0010	< 0.050	0.0	2	26
Bartum	1450	0	< 0.0010	<0.50	20	100	300
Cadmium	1450	2	< 0.00010	< 0.010	0.04	1	45
Schromium	1450	0	< 0.0010	< 0.050	0.5	10	20
Capper	1450	0	< 0.0010	< 0:050	<b>C</b> 4	90	100
Mile repury	1450	0	< 0.00050	< 0.0050	0.01	0.2	2
Malybdanum	1450	2	0.0027	< 0.050	970	10	30
Nickel	1450	D	< 0.0010	< 0.050	0,4	10	40
1.080	1450	2	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	n	< 0.0010	< 0.010	0.06	0.7	5
Setentum,	1450	•	< 0.0010	< 0.010	0.1	0.5	7
Zho	1450	9	< 0.0010	< 0.50	4	50	200
Ottoride	1220	n	1.6	16	800	15000	25000
Flucinitie	1220	n	0,15	15	10	150	500
Suphate	1220	n	3.6	98	1000	20000	50000
Total Desolved Solds	1020	z	52	620	4000	80000	100000
Phenol Index	1820	2	< 0/030	< 0.30			
Dissolved: Organic Carbon	1610	n	35	< 50	2002	800	1000

Waste Acceptance Criteria

Solid Information Dry mass of test portion/ng Molecure (%)

0,000

Landfill WAC analysis (specifically feaching test results) must not be used for hazaroous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Page 39 of 46

#### 

### Results - Single Stage WAC

Chemtest Job No: Chemtest Sample ID:	18-19843				Landfill	Landfill Waste Acceptance Criteria Limits	e Criberia
Sample Ref: Sample ID: Sample Location: Top Depth(m): Beneding Dete:	AA98927 TP09 0.50 0.50 24.Mav-2019				Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous i andrite	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units				
Total Organic Carton	2625	n	*	0.36			
Loss On Ignition	2610	0	31	23		•	10
Total BTEX	2760	n	makia	[B] < 0.010	9	+	1
(Total PCBs (7 Congeners)	2815	0	maka	< 0.10	-		
TPH Total WAC (Nineral Oil)	2670	n	malva	(B) < 10	800	1	i
Total (Of 17) PAH's	2800	N	molitic	*20	100	1	ŕ
PH	2010	9	100 CON 211	B.7	1	9	1
Acid Neutralisation Capecity	2015	R	molitig	0.075	1	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	Limit values for compliance leaching test	eaching test
Arsenic	1450	-	< 0.0010	C 1250	50	2 C	SC
Bartum	1450		< 0.0010	< 0.60	07	100	300
Cadmium	1450	2	< 0.00010-	< 0:010	90:0	-	0
Chromium	1450	0	< 0,0010	< 0.060	6.5	10	20
Copper	1450	1	< 0.0010	< 0.050	2	8	1001
Manqury	1450	n	< 0.00050	< 0,0050	0.01	0.2	~
Mohdenum	1450	n	0,0014	< 0,050	50	10	30
Nicket	1450	10	< 0.0010	< 0.050	0.4	10	40
Lead	1450	0	< 0.0010	< 0.010	0.5	10	60
Antemony	1450	n	< 0.0010	< 0.010	0.08	0.7	0
Seleman	1450	n	< 0.0010	< 0.010	0.1	0.5	7
Zht	1460	n.	< 0.0010	< 0.50	4	20	200
Chloride	1220	20	2.6	26	800	15000	25000
Fisionide	1220	5	0.27	2.7	10	150	600
Sulphale	1220	n	2.0	20	1001	20000	- 50000
Totel Dissorved Solida	1020	N	51	510	1000	80000	100000
Phenal Index	1920	2	< 0.030	< 0,30	-		
Dissolved Organic Carbon	1810	R	117	+ 50	000	808	1000
Solid Information		-					
The more of test sector to	0.000						
ALL OF TAXABLE IN THE PARTY OF TAXABLE PARTY.	1000						

Moature (%) Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazarcous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indicition as to whether a waste may be hazardous or non-hazardous.

Chemiest Job Nc: Chemiest Sample ID:	19-12643 641078				Landfill	Landfill Waste Acceptance Criteria Limits	e Criteria
Sample Ref. Sample ID:	A499825					Stable, Non- reactive	
Sample Location: Ton Denthim!-	1P06	1			Incer Minetes	hazardous.	Hazardous
Bottom Depth(m): Sampling Date:	2.00 24-May-2019				Landfill	hazardous	Landfill
Determinand	SOP	Accred.	Units				
Total Organic Carton	2625	0	*	0.29	0	10	0
Loss On Ignition	2610	0	×	3.5	8	1	9
Total BTEX	2760	U	maka	[B] < 0.010	9	1	
Total PCBs (7 Corgeners)	2815	0	marke	<0.10	+	1	1
TPH Total WAC (Mineral Oit)	2670	0	maka	[B] < 10	909		1
Total (Of \$2) PAH's	2000	N	maña	× 2.0	100	1	t
五	2010	0		8.8	1	穷	x
Acid Neutralisation Capacity	2015	N	molikg	0.14	1	To evaluate	To evaluate
Ekrate Analysis			10:1 Ehunte	10-1 Elvate	Limit values	Limit values for compliance leaching test	eaching test
55 mm			mail	mg/kg	using B	using BS EN 12467 at L/S 10 ling	101/19
Arsenic	1450	n	< 0.0010	< 0.050	0.5	2	22
Barhum	1450	0	0.0012	< 0.50	20	100	300
Cadmium	\$450	n	<0.00010	< 0.010	0.04	-	ш
Ohomum	\$450	0	< 0.0010	< 0.050	0.5	10	70
Copper	5450	0	< 0.0010	< 0.050	2	99	100
Mancury	1460	n	< 0,00050	< 0.0050	0.01	02	CN.
Maybdenum	1450	n	0.0021	< 0.050	5.0	10	30
Nickel	1450	- 0	< 0.0010	< 0.050	40	10	40
Load	1460	0	< 0.0010	< 0.010	0.5	10	8
Antimony	1450	0	< 0.0010	× 0,010	0.05	0.7	io.
Salarium	1450	0	< 0.0010	< 0,010	0.1	0.5	7
Zina	1450	0	< 0.0010	< 0.50	4	8	200
Chloride	1220	n	26	260	800	15000	25000
Pluoride	1220	n	0.16	1.6	10	150	200
Sulphale	1220	n	8,4	84	1000	20000	50000
Total Dissolved Solids	1020	z	48	480	4000	60000	100000
Phenol Index	1920	0	< 0.030	< 0.30	+		•
Dissolved Omanic Carbon	10-01		9.0	- CO	.002	000	1000

Waste Acceptance Orlterla

ot be used for hazardous waste classification purposes. This analysis institution as to whether a waste may be hazardous or non-hazardou 10 tr Ē results) 1 đ does iching test The sector Landfill WAC analysis (specifically lea for hazardous waste landfill acceptar

Page 41 of 48

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Container Received
841057	114415		BH7	27-May-2019	в	Amber Glas 250ml
841057	114415		BH7	27-May-2019	в	Amber Glas 60ml
841058	AA99927		TP01	27-May-2019	8	Amber Glas 250ml
841058	AA99927		TP01	27-May-2019	В	Amber Glas 60ml
841050	AA00928		TP01	27 May 2010	в	Amber Glas 250ml
841059	AA99928		TP01	27-May-2019	В	Amber Glas 60ml
B41061	AA113509		TP02	27-May-2019	В	Amber Gias 250ml
B41001	AA113509		TP02	27-May-2019	ß	Amber Glas 60ml
841062			TP02	24-May-2019	в	Amber Glas 250mi
841062			TP02	24-May-2019	В	Amber Glas 60ml
841063	AA99943		TP03	24-May-2019	в	Amber Glas 250ml
841083	AA99943		TP03	24-May-2019	В	Amber Glas 60ml
841064	AA99044		TP03	24-May-2019	в	Amber Glas 250ml
841064	AA99944		TP03	24-May-2019	В	Amber Glas 60ml
841065	AA99945		TP03	24-May-2019	ß	Amber Glas 260ml
841085	AA99845		TP03	24-May-2019	В	Amber Glas 60ml
841086	AA99938		TP04	24-May-2019	В	Amber Glas 250ml
841066	AA99938		TP04	24-May-2019	В	Amber Glas 60ml
641067	AA99939		TP04	24-May-2019	B	Amber Glas 250ml
841067	AA99939		TP04	24-May-2019	D	Amber Glas 60ml
841069	AA113513		TP05	27-May-2019	В	Amber Glas 250ml
841069	AA113513		TP05	27-May-2019	в	Amber Glas



Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chamtest have a procedure to ensure typon receipt of each sample a competent taboratory shall assess whether the sample is suitable with regard to the requested tort(s). This policy and the requestive holding times applied, can be supplied upon inquired. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compremised.

Page 42 of 48



Deviations

In accordance with LIKAS Policy on Deviating Semples TPS 63. Chemiest have a procedure to ensure upon receipt of each sample a competent laboratory shall assesses whether the campte is suitable with regard to the requested test(a). This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as devisting is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
841070	AA113514		TP05	27-May-2019	В	Amber Glass 250ml
841070	AA113514		TP05	27-May-2019	в	Amber Glass 60ml
841071	AA113516		TPOS	27-May-2019	В	Amber Glass 250ml
841071	AA113518		TPOB	27-May-2019	В	Amber Glass 60ml
841072	AA113518		TPO6	24-May-2019	в	Amber Glass 250ml
B41072	AA113518		TPOB	24-May-2019	в	Amber Glas 60ml
841073	AA99935		TP07	24-May-2019	В	Amber Glas 250ml
841073	AA99935		TP07	24-May-2019	Ħ	Ambar Glas
841074	AA99936		TP07	24-May-2019	в	Amber Glas 250ml
841074	AA99936		TP07	24-May-2019	в	Amber Glass 60ml
841075	AA99931		TP06	24-May-2019	В	Amber Glas 250ml
841075	AA99931		TP06	24-May-2019	В	Amber Glass 60ml
841076	AA99932		TPOB	24-May-2019	в	Amber Glas 250ml
541076	AA99932		TP08	24-May-2019	В	Amber Glass 60ml
841077	AA99927		TP09	24-May-2019	B	Amber Glass 250ml
841077	AA99927		TP09	24-May-2019	8	Amber Glass 60ml
841078	AA99929		TP09	24-May-2019	в	Amber Glas 250ml
841078	AA99929		TP09	24-May-2019	в	Amber Glass

# Chemtest

# Test Methods

SOP	Title	Parameters Included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium In Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakern 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsecic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercuy; Molyödenum; Nickel; Selenium; Tin; Vanadium; Zihc	Filtration of samples followed by direct determination by inductively coupled plasms mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon In Waters	Organic Carbon	TOC Analyser using Catatytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimelhylphenols Note: Chlorophenols are excluded.	Determination by High Performance Uquid Chromatography (HPLC) using electrochemica detection.
2010	pH Value of Soits	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Molsture and Stone Content of Sols(Requirement of MCERTS)	Moisture content	Determination of moisture content of soit as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphale, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Solls	Free (or easy liberatable) Cyanide: total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Sleam distillation with sulphuric acid / analysis by 'Aquakam 600' Discrete Analyse, using N.Ndimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	t Adid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Gaémium; Chromium; Cobalt; Coppur; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is detarmined by 'Aquakem 600 Discrete Analyzer using 1,5-diptenyloarbacids.
2610	Loss on Ignition	lass on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2025	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Solls by GC-FID	TPH (C8–C40); optional cartion banding, e.g. 3- band – GRO, DRO & LRO*TPH C8–C40	Dictionomethane extraction / GC-FID
2880	TPH AVA Split.	Alphatics: >C5-OI, >C8-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21- C35, >C35-C44Aromatics: >C5-C7, >C7-C8, >C8-C10, >C10-C12, >C12-C18, >C18-C21, >C21-C35, >C35-C44	Dichloromethane extraction / GCxGC FID detection

# Chemtest 6

# **Test Methods**

SOP	Title	Parameters included	Method summary		
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Arcmatics. (cf. USEPA Method 8360)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, its received, with mass spectrometric (MS) detection of volatile organic compounds.		
Speciated Polynuclear Aromatic Hydrocarbons (PAH) In Soll by GC-MS		Acenaphthene"; Acenaphthylene; Anthracene"; Benzo(ajAnthracene"; Benzo(a)[Pyrane"; Benzo(b)Fluoranthene"; Benzo(a)[[Perylene"; Benzo(k)[Fluoranthene; Chrysene"; Dibenz(a)[Anthracene; Fluoranthene"; Fluorane"; Indeno(1230d]Pyrane"; Naphthalene"; Phenanthrane*; Pyrane*	Dichlaromethane extraction / GC-MS		
2815	Polychiorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS		
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.		
640	Observindention of Marts		ComplianceTest for Leaching of Granular Waste Material and Sludge		

# Chemtest

## Report Information

# Key

- U UKAS accredited M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry

weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

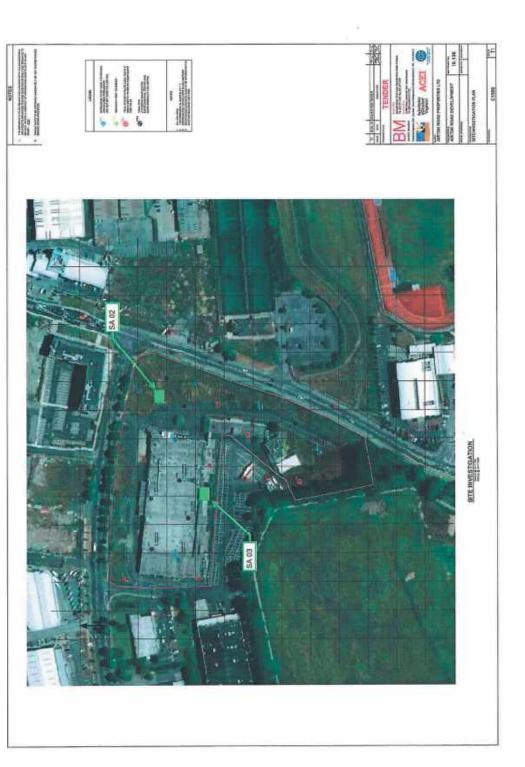
#### Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

## Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: customerservices@chemtest.com



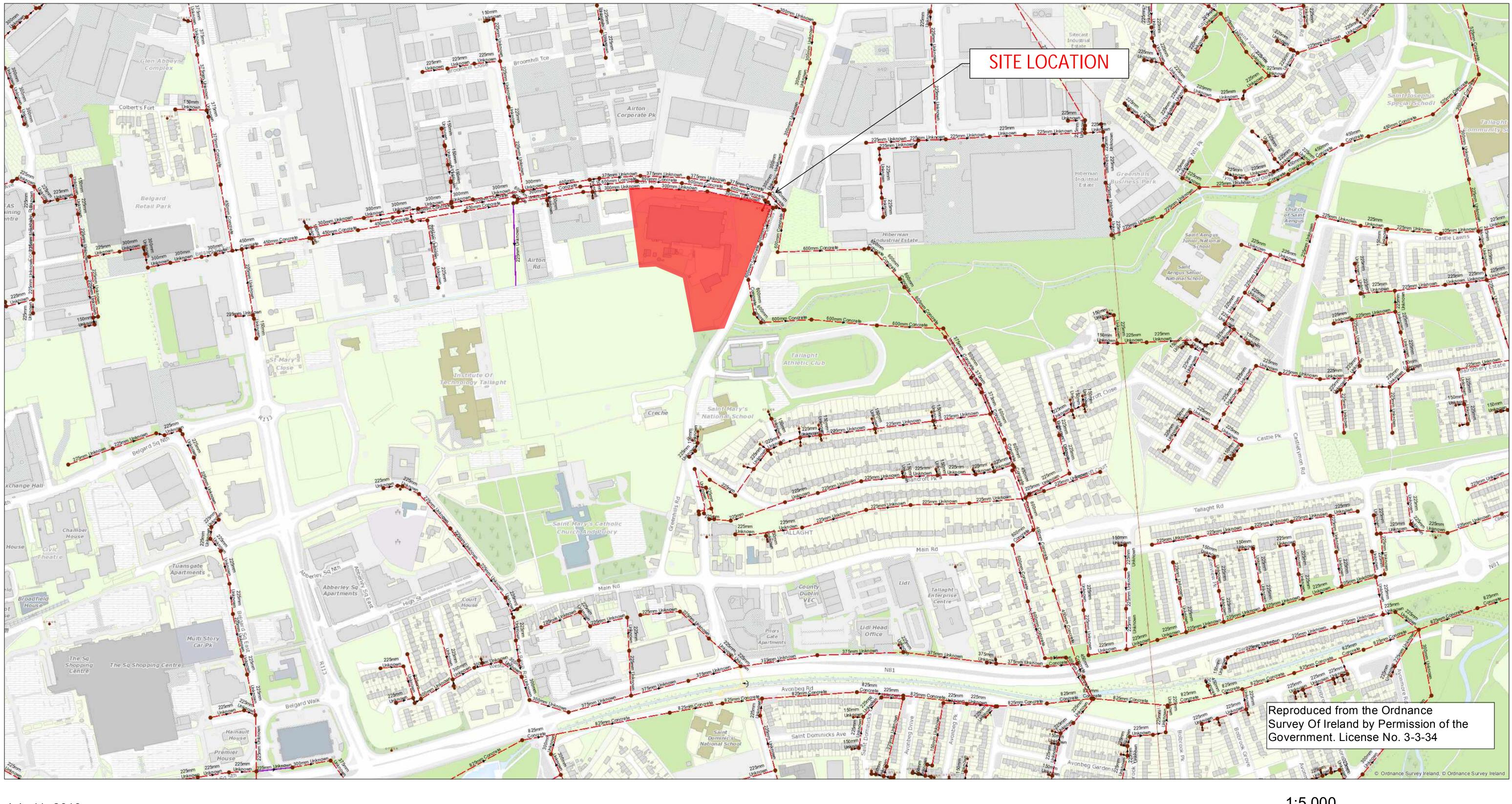
Appendix VII Site Plan

FORMER GALLAHER'S SITE, AIRTON

# 7 HYDROLOGY AND WATER SERVICES - APPENDICES

# 7.1 EXISTING WATER SUPPLY INFRASTRUCTURE





# July 11, 2019

# Legend

Sewer Disc	harge Points		Flushing Structure		Gully	Ē.	Lamphole	_	Foul
÷	Outfall	1.,, 1	Other; Unknown	÷	Standard	<u>.</u>	Standard	_	Overflow
:	Overflow		Sewer Flow Control Valves	( <u> </u>	Other; Unknown		Other; Unknown	_	Unknown
Ξ	Soakaway	<u>+-</u>	Treatment plant	Sewer Man	holes	Sewer Fitti	ngs	Sewer Grav	ity Mains (Non-Irish Water owne
	Standard Outlet	±	Pump station		Cascade	<u>17</u>	Vent/Col	-	Combined
1 _ 1	Other; Unknown	Sewer Inlet	S	_	Catchpit	2 <u>-</u> 1	Other; Unknown	_	Foul
Sewer Clea	in Outs	_	Catchpit	.1:	Hatchbox	Sewer Grav	vity Mains (Irish Water owned)	_	Overflow
77	Rodding Eye						Combined		

# Irish Water Web Map

--- Unknown

Sewer Pressurized Mains

- Combined
- <del>–</del>∺ Foul
- Overflow
- Unknown

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water

Irish Water

		1:5,00	JU		
<b>)</b>	0.125	0.25		(	0.5 mi
C	0.175	0.35		0.7 km	



FORMER GALLAHER'S SITE, AIRTON

# 7.2 MICRO-DRAINAGE CALCULATIONS



# NORTH WEST CATCHMENT SIMULATION

	ianony Co	nsult:	ing Eng							Pag	je l
2 Mill S	Street				-						
ondon										1	-
El 2AY										M	irin.
ate 24/0	1/2020 1	2:17		Des	signed by	Tmach	ale			Dr	ainane
`ile Surf					ecked by					E.O	amage
IP Soluti	ons			Net	work 2018	3.1					
	STOR	M SEWE	ER DESI	GN by ·	the Modif.	ied Ra	ation	al Me	ethod	L	
			Desi	lqn Cri	teria for	Stor	<u>m</u>				
		Pip	be Sizes	STANDAR	D Manhole :	Sizes S	standa	RD			
		FS	R Rainfa	ill Mode	l - Scotlan	d and i	Irelar	nd			
Maximum T	Maximur 'ime of Co Fou	n Rainf ncentra 11 Sewa	all (mm/ tion (mi	mm) 14.0 o R 0.3 hr) ns) ha) 0.0	000 300 50 30 Min Des 000 Min	Min Max ign Dep Vel fo:	imum H imum H pth fo r Auto	Backdr Backdr or Opt Desi	te Ch op He op He imisa gn on	ight () tion () ly (m/)	%) 0 m) 0.200 m) 1.500 m) 1.200
			Des	igned w	ith Level S	offits					
			Time	Area E	iagram fo	r Sto	rm				
			Time A	real Ti	me Area	Time	Area				
			mins) (				(ha)				
				mar) (mar		(mins)	(IIGL)				
			0-4 0.		4-8 0.575	8 <b>-</b> 12		L			
			0-4 0.	036		8-12	0.081	L			
			0-4 0. Total A	.036 rea Cont	4-8 0.575	8-12 na) = 0	0.081	L			
			0-4 0. Total A	.036 rea Cont	4-8 0.575	8-12 na) = 0	0.081	L			
			0-4 0. Total A Total	.036 rea Cont . Pipe V	4-8 0.575	8-12 na) = 0 = 19.8	0.081 ).692 79	L			
			0-4 0. Total A Total <u>Networ</u>	.036 rea Cont . Pipe V k Desid	4-8 0.575	8-12 na) = 0 = 19.8 for St	0.081 ).692 79 <u>corm</u>	L			
	ongth Fall (m) (m)		0-4 0. Total A Total <u>Networ</u> « - In • I.Area	.036 rea Cont . Pipe V. <u>k Desi</u> dicates <b>T.E.</b>	4-8 0.575 ributing () olume (m <sup>3</sup> ) gn Table	8-12 ha) = 0 = 19.8 for St hty < f k	0.081 ).692 79 <u>corm</u> flow <b>HYD</b>	DIA	Secti	on Typ	e Auto Design
		(1:X)	0-4 0. Total A Total <u>Networ</u> « - In ; I.Area (ha)	.036 rea Cont . Pipe V. <u>k Desi</u> dicates <b>T.E.</b>	4-8 0.575 ributing () slume (m <sup>3</sup> ) gn Table pipe capac: Base Flow (l/s)	8-12 ha) = 0 = 19.8 for St hty < f k	0.081 0.692 79 2007M 10w HYD SECT	DIA (mm)		on Typ Condui	Design
S1.000 26 S1.001 36	(m) (m) 5.312 0.13 5.476 0.18	(1:X) 2 200.0 2 200.0	0-4 0. Total A Total A 	.036 rea Cont . Pipe V. <u>k Desi</u> dicates <b>T.E.</b> (mins) 4.00 0.00	4-8 0.575 pributing () an Table pipe capac: Base Flow (1/s) 0.0	8-12 ha) = 0 = 19.8 <sup>-</sup> for St Lty < f k (mm) 0.600 0.600	0.081 ).692 79 :low HYD SECT 0	DIA (mm) 225 225	Pipe/ Pipe/	Condui Condui	Design t
S1.000 26 S1.001 36	(m) (m) 5.312 0.13	(1:X) 2 200.0 2 200.0	0-4 0. Total A Total A 	.036 rea Cont . Pipe V. <u>k Desi</u> dicates <b>T.E.</b> (mins) 4.00 0.00	4-8 0.575 pributing () an Table pipe capac: Base Flow (1/s) 0.0	8-12 ha) = 0 = 19.8 for St Lty < f k (mm) 0.600	0.081 ).692 79 :low HYD SECT 0	DIA (mm) 225 225	Pipe/ Pipe/	Condui	Design t
s1.000 26 s1.001 36 s1.002 42	(m) (m) 5.312 0.13 5.476 0.18	(1:X) 2 200.0 2 200.0 6 110.0	0-4 0. Total A Total A <u>Networ</u> « - In (ha) 0.133 0.000 0.097	.036 rea Cont . Pipe V. dicates <b>T.E.</b> (mins) 4.00 0.00 0.00	4-8 0.575 pributing () an Table pipe capac: Base Flow (1/s) 0.0	8-12 ha) = 0 = 19.8° for St Lty < f k (mm) 0.600 0.600 0.600	0.081 0.692 79 20rm 10w HYD SECT 0 0 0	DIA (mm) 225 225 225	Pipe/ Pipe/ Pipe/	Condui Condui Condui	Design t t t
s1.000 26 s1.001 36 s1.002 42	(m) (m) 3.312 0.13 3.476 0.18 3.438 0.38	(1:X) 2 200.0 2 200.0 6 110.0	0-4 0. Total A Total « - In (ha) 0.030 0.030 0.097 0.120	.036 rea Cont . Pipe V. dicates <b>T.E.</b> (mins) 4.00 0.00 0.00 4.00	4-8 0.575 pributing () gn Table pipe capac: Base Flow (1/s) 0.0 0.0	8-12 ha) = 0 = 19.8 for St k (mm) 0.600 0.600 0.600 0.600	0.081 0.692 79 20rm 10w HYD SECT 0 0 0	DIA (mm) 225 225 225	Pipe/ Pipe/ Pipe/	Condui Condui Condui	Design t t t
s1.000 26 s1.001 36 s1.002 42	(m) (m) 3.312 0.13 3.476 0.18 .438 0.38 705 0.25 Rain	(1:x) 2 200.0 2 200.0 6 110.0 9 200.0 <b>T.C.</b>	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.037 0.120 Né US/IL E	.036 rea Cont k Desir dicates T.E. (mins) 4.00 0.00 4.00 4.00 4.00	4-8 0.575 pributing () an Table pipe capac: Base Flow (1/s) 0.0 0.0 0.0 0.0 Results T Σ Base	8-12 ha) = 0 = 19.8 <sup>-</sup> for St ty < f k (mm) 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000	0.081 ).692 79 COTM SECT 0 0 0 0 0 0 0	DIA (mm) 225 225 225 225 225	Pipe/ Pipe/ Pipe/ Pipe/ <b>Vel</b>	Condui Condui Condui Condui	Design t d t d t t f Flow
\$1.000 26 \$1.001 36 \$1.002 42 \$2.000 51	(m) (m) 	(1:x) 2 200.0 2 200.0 6 110.0 9 200.0 <b>T.C.</b>	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.037 0.120 Né US/IL E	.036 rea Cont k Desir dicates T.E. (mins) 4.00 0.00 4.00 4.00 4.00	4-8 0.575 ributing () olume (m <sup>3</sup> ) gn Table : pipe capac: Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	8-12 ha) = 0 = 19.8 <sup>-</sup> for St ty < f k (mm) 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000 0.6000	0.081 ).692 79 COTM SECT 0 0 0 0 0 0 0	DIA (mm) 225 225 225 225 225	Pipe/ Pipe/ Pipe/ Pipe/ <b>Vel</b>	Condui Condui Condui Condui	Design t d t d t t f Flow
\$1.000 26 \$1.001 36 \$1.002 42 \$2.000 51	(m) (m) 3.312 0.13 3.476 0.18 .438 0.38 .705 0.25 Rain (mm/hr)	(1:X) 2 200.0 2 200.0 6 110.0 9 200.0 T.C. (mins)	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.037 0.120 Né US/IL E	.036 rea Cont k Desir dicates T.E. (mins) 4.00 0.00 4.00 4.00 4.00	4-8 0.575 (ributing () olume (m <sup>3</sup> ) gn Table : pipe capac: Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Results T E Base Flow (1/s)	8-12 8-12 for st for st k (mm) 0.6000 0.6000 0.6000 0.6000 0.6000 00	0.081 0.692 79 COTM Clow HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 225 225 225 225 225	Pipe/ Pipe/ Pipe/ Vel (m/s)	Condui Condui Condui Condui <b>Cap</b> (1/s)	Design t d t d t t f Flow
\$1.000 26 \$1.001 36 \$1.002 42 \$2.000 51 <b>PN</b> \$1.000 \$1.001	(m) (m) 3.312 0.13 4.476 0.18 .438 0.38 .705 0.25 Rain (mm/hr) ( 50.00 50.00	(1:X) 2 200.0 2 200.0 6 110.0 9 200.0 9 200.0 T.C. (mins) 4.48 : 5.14 :	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.097 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.133 0.000 0.0097 0.120 Networ 0.120 Networ 0.0097 0.120 Networ 0.120 Networ N	036 rea Cont Pipe V. k Desi dicates T.E. (mins) 4.00 0.00 4.00 4.00 4.00 4.00 4.00 4.00 0.103 0.133 0.133	4-8 0.575 ributing (l slume (m <sup>3</sup> ) gn Table pipe capac: Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	8-12 8-12 10 8 8 8 8 10 10 10 10 10 10 10 10 10 10	0.081 0.692 79 corm flow HYD sect 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 225 225 225 225 225 225 9 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 0.92 0.92	Condui Condui Condui Condui Condui 36.6 36.6	Design t t t f t f t f t t f t f t f t f t f
\$1.000 26 \$1.001 36 \$1.002 42 \$2.000 51 <b>PN</b> \$1.000 \$1.001	(m) (m) 3.312 0.13 4.476 0.18 4.438 0.38 705 0.25 Rain (mm/hr) ( 50.00	(1:X) 2 200.0 2 200.0 6 110.0 9 200.0 9 200.0 T.C. (mins) 4.48 : 5.14 :	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.097 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.133 0.000 0.0097 0.120 Networ 0.120 Networ 0.0097 0.120 Networ 0.120 Networ N	036 rea Cont Pipe V. <u>k Desi</u> dicates <b>T.E.</b> (mins) 4.00 0.00 4.00 2twork <b>I.Area</b> (ha) 0.133	4-8 0.575 ributing (l slume (m <sup>3</sup> ) gn Table pipe capac: Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	8-12 8-12 10 8 8 8 8 10 10 10 10 10 10 10 10 10 10	0.081 0.692 79 corm flow HYD sect 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DIA (mm) 225 225 225 225 225 225 9 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 0.92 0.92	Condui Condui Condui Condui <b>Cap</b> (1/s) 36.6	Design t t t f t f t f t t f t f t f t f t f
\$1.000 26 \$1.001 36 \$1.002 42 \$2.000 51 <b>PN</b> \$1.000 \$1.001 \$1.002	(m) (m) 3.312 0.13 4.476 0.18 .438 0.38 .705 0.25 Rain (mm/hr) ( 50.00 50.00	(1:X) 2 200.0 2 200.0 6 110.0 9 200.0 9 200.0 7.C. (mins) 4.48 5 5.14 5 5.14 5	0-4 0. Total A Total A Networ « - In (ha) 0.133 0.000 0.097 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.120 Networ 0.133 0.000 0.0097 0.120 Networ 0.120 Networ 0.0097 0.120 Networ 0.120 Networ N	036 rea Cont Pipe V. k Desi dicates T.E. (mins) 4.00 0.00 4.00 4.00 4.00 4.00 4.00 4.00 0.103 0.133 0.133	4-8 0.575 ributing () olume (m <sup>3</sup> ) gn Table : pipe capac: Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	8-12 8-12 10 8 8 8 8 10 10 10 10 10 10 10 10 10 10	0.081 0.692 79 COTM 10w HYD SECT 0 0 0 0 0 Add : (1/	DIA (mm) 225 225 225 225 225 0.0 0.0 0.0 0.0	Pipe/ Pipe/ Pipe/ <b>Vel</b> (m/s) 0.92 0.92 1.25	Condui Condui Condui Condui Condui 36.6 36.6	Design t t t t t t t t t t t t t t t t t t t

12 Mill London SE1 2AY		-	isult	ing Eng							Pag	je 2
Date 24.	/01/20	20 1:	2:17		Dea	signed by	Tmach	ale			Mi	cio
File Su:	rface.	mdx				ecked by					DI	aina
KP Solu	tions				Net	twork 2018	3.1					
				Networ	<u>k Desi</u>	gn Table :	for St	orm				
PN	Length (m)		Slope (1:X)	e I.Area (ha)		Base Flow (1/s)	k (mm)	HYD SECT	DIA (mm)	Secti	on Typ.	e Aut Desi
S2.001	29.327	0.147	200.0	0.000	0.00	0.0	0.600	0	225	Pipe/	'Condui	t 🗃
S1.003	5.523	0.028	200.0	0.030	0.00	0.0	0.600	0	225	Pipe/	'Condui	t 🚡
S1.004	14.000	0.070	200.0	0.030	0.00	0.0	0.600	0	225	Pipe/	'Condui	
S3.000	90.000	0.450	200.0	0.099	4.00	0.0	0.600	0	225	Pipe/	'Condui	t 🍖
S4.000	27.113	0.195	139.0	0.123	4.00	0.0	0.600	0	225	Pipe/	'Condui	t 🗃
S3.001	10.660	0.053	201.3	L 0.060	0.00	0.0	0.600	0	225	Pipe/	'Condui	t 🖥
				0.000			0.600				'Condui	
				7 0.000							Condui	
				0.000							'Condui 'Condui	
PN	(mm/	hr) (1	nins)	(m)	(ha)	Σ Base Flow (l/s)	(l/s)	(1/	s)	(m/s)	Cap (1/s)	
S2.00				88.741	0.120					0.92		16.2
S1.00 S1.00				88.595 88.567	0.380 0.410						36.6« 36.6«	51.5 55.5
s3.00	0 50	.00	5.63	89.255	0.099	0.0	0.0		0.0	0.92	36.6	13.4
S4.00	0 50	.00	4.41	89.000	0.123	0.0	0.0		0.0	1.11	44.0	16.7
S3.00	)1 50	.00	5.82	88.805	0.282	0.0	0.0		0.0	0.92	36.5«	38.2
S1.00		.00		87.497	0.692						36.6«	
S1.00		.00		87.217	0.692						36.5«	93.7
S1.00 S1.00				87.183 86.779	0.692						36.6« 36.6«	93.7 93.7

Barrett Mahony Consulting Eng		Page 3
12 Mill Street		
London		
SE1 2AY		Micro
Date 24/01/2020 12:17	Designed by Tmachale	Drainanna
File Surface.mdx	Checked by	uranaye
XP Solutions	Network 2018.1	

#### Manhole Schedules for Storm

MH Name	M CL	H (m)	MH Depth (m)	Coni	MH nection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SS1.0	91.	000	1.680	Open	Manhole	1200	s1.000	89.320	225				
SS1.1	90.	100	0.912	Open	Manhole	1200	S1.001	89.188	225	S1.000	89.188	225	
SS1.2	89.	800	0.794	Open	Manhole	1200	S1.002	89.006	225	S1.001	89.006	225	
ss2.0	90.	125	1.125	Open	Manhole	1200	S2.000	89.000	225				
ss2.1	90.		1.259	Open	Manhole	1200	s2.001	88.741	225	s2.000	88.741	225	
SS1.3	90.		1.405	Open	Manhole	1200	S1.003	88.595	225	S1.002	88.620	225	25
										S2.001	88.595	225	
ss1.4	90.	000	1.433	Open	Manhole	1200	S1.004	88.567	225	S1.003	88.567	225	
SS4.0	91.		1.745	Open	Manhole	1200	S3.000	89.255	225				
SS3.0	90.	125	1.125	Open	Manhole	1200	S4.000	89.000	225				
ss4.1	90.	100	1.295	Open	Manhole	1200	S3.001	88.805	225	S3.000	88.805	225	
										S4.000	88.805	225	
ss5.0	89.	700	2.203	Open	Manhole	1200	S1.005	87.497	225	S1.004	88.497	225	1000
										S3.001	88.752	225	1255
SS5.1	88.	850	1.633	Open	Manhole	1200	S1.006	87.217	225	S1.005	87.217	225	
ss5.2	88.	750	1.567	Open	Manhole	1200	S1.007	87.183	225	S1.006	87.183	225	
SS5.3	88.	500	1.721	Open	Manhole	1200	S1.008	86.779	225	S1.007	86.779	225	
S	88.	500	1.835	Open	Manhole	0		OUTFALL		S1.008	86.665	225	

Barrett Mahony Consulting Eng	1	Page 4
12 Mill Street		
London		and the second s
SE1 2AY		Mirco
Date 24/01/2020 12:17	Designed by Tmachale	Ocairaan
File Surface.mdx	Checked by	Dramage
XP Solutions	Network 2018.1	

#### PIPELINE SCHEDULES for Storm

# <u>Upstream Manhole</u>

PN	_	Diam (mm)		C.Level : (m)	I.Level I (m)	).Depth (m)	MH N Connection	H DIAM., L*W (mm)
S1.0	0 0	225	SS1.0	91.000	89.320	1.455	Open Manhole	1200
S1.00	)1 o	225 ;	ss1.1	90.100	89.188	0.687 (	Open Manhole	1200
S1.0	)2 o	225 ;	SS1.2	89.800	89.006	0.569 (	Open Manhole	1200
S2.0			SS2.0	90.125	89.000		Open Manhole	1200
S2.0	)1 o	225 :	SS2.1	90.000	88.741	1.034 0	Open Manhole	1200
S1.00	)3 o	225	SS1.3	90.000	88.595	1.180 (	Open Manhole	1200
S1.00	)4 o	225	ss1.4	90.000	88.567		Open Manhole	1200
S3.00	o 00	225	ss4.0	91.000	89.255	1.520 (	Open Manhole	1200
S4.00	o 00	225	ss3.0	90.125	89.000	0.900 (	Open Manhole	1200
S3.00	01 0	225	SS4.1	90.100	88.805	1.070 (	Open Manhole	1200
S1.0	)5 o	225	SS5.0	89.700	87.497	1.978	Open Manhole	1200
S1.0	)6 O	225	ss5.1	88.850	87.217		Open Manhole	1200
S1.0					87.183		Open Manhole	1200
S1.00	)8 o	225	ss5.3	88.500	86.779	1.496	Open Manhole	1200
				Downs	tream M	<u>lanhole</u>		
PN	Length	g1 opo	MIT	a				
T 14	-	-			I.Level	-		MH DIAM., L*W
£ 14	(m)	-	Name		I.Level (m)	-	Connection	MH DIAM., L*W (mm)
s1.000	(m) 26.312	(1:X) 200.0	Name SS1.1	(m) 90.100	(m) 89.188	(m) 0.687	Connection Open Manhole	(mm) 1200
s1.000 s1.001	(m) 26.312 36.476	(1:X) 200.0 200.0	Name 551.1 551.2	(m) 90.100 89.800	(m) 89.188 89.006	(m) 0.687 0.569	Connection Open Manhole Open Manhole	(mm) 1200 1200
s1.000 s1.001	(m) 26.312	(1:X) 200.0 200.0	Name 551.1 551.2	(m) 90.100 89.800	(m) 89.188 89.006	(m) 0.687 0.569	Connection Open Manhole	(mm) 1200 1200
s1.000 s1.001 s1.002	(m) 26.312 36.476	(1:X) 200.0 200.0 110.0	Name 551.1 551.2 551.3	(m) 90.100 89.800 90.000	(m) 89.188 89.006 88.620	(m) 0.687 0.569 1.155	Connection Open Manhole Open Manhole	(mm) 1200 1200 1200
s1.000 s1.001 s1.002 s2.000	(m) 26.312 36.476 42.438	(1:X) 200.0 200.0 110.0 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1	(m) 90.100 89.800 90.000 90.000	(m) 89.188 89.006 88.620 88.741	(m) 0.687 0.569 1.155 1.034	Connection Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200
s1.000 s1.001 s1.002 s2.000	(m) 26.312 36.476 42.438 51.705 29.327	(1:X) 200.0 200.0 110.0 200.0 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3	(m) 90.100 89.800 90.000 90.000 90.000	(m) 89.188 89.006 88.620 88.741 88.595	(m) 0.687 0.569 1.155 1.034 1.180 1.208	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200
s1.000 s1.001 s1.002 s2.000 s2.001 s1.003	(m) 26.312 36.476 42.438 51.705 29.327	(1:X) 200.0 200.0 110.0 200.0 200.0 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4	(m) 90.100 89.800 90.000 90.000 90.000	(m) 89.188 89.006 88.620 88.741 88.595 88.567	(m) 0.687 0.569 1.155 1.034 1.180 1.208	Connection Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200
s1.000 s1.001 s1.002 s2.000 s2.001 s1.003 s1.004	(m) 26.312 36.476 42.438 51.705 29.327 5.523	(1:X) 200.0 200.0 110.0 200.0 200.0 200.0 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0	(m) 90.100 89.800 90.000 90.000 90.000 90.000 89.700	(m) 89.188 89.006 88.620 88.741 88.595 88.595 88.567 88.497	(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200
s1.000 s1.001 s1.002 s2.000 s2.001 s1.003 s1.004 s3.000	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000	(1:X) 200.0 200.0 110.0 200.0 200.0 200.0 200.0 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1	(m) 90.100 89.800 90.000 90.000 90.000 89.700 90.100	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805	(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200
S1.000 S1.001 S1.002 S2.000 S2.001 S1.003 S1.004 S3.000 S4.000	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000	<pre>(1:x) 200.0 200.0 110.0 200.0 200.0 200.0 200.0 200.0 139.0</pre>	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1	(m) 90.100 89.800 90.000 90.000 90.000 89.700 90.100 90.100	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805 88.805	<pre>(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070</pre>	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200
\$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000 27.113 10.660 56.000	(1:X) 200.0 200.0 200.0 200.0 200.0 200.0 200.0 139.0 201.1 200.0	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1 SS5.0 SS5.0	(m) 90.100 89.800 90.000 90.000 90.000 89.700 90.100 89.700 89.700 88.850	(m) 89.188 89.006 88.620 88.741 88.595 88.595 88.805 88.805 88.805 88.805 88.805	(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070 0.723 1.408	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
\$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005 \$1.005	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000 27.113 10.660 56.000 6.824	(1:X) 200.0 20	Name SS1.1 SS1.2 SS1.3 SS1.3 SS1.4 SS5.0 SS4.1 SS5.0 SS5.0 SS5.1 SS5.2	(m) 90.100 89.800 90.000 90.000 89.700 90.100 89.700 89.700 88.850 88.750	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805 88.805 88.752 87.217 87.183	<pre>(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070 0.723 1.408 1.342</pre>	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
\$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$3.000 \$3.001 \$1.005 \$1.005 \$1.007	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000 27.113 10.660 56.000 6.824 80.753	(1:X) 200.0 20	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1 SS5.0 SS4.1 SS5.0 SS5.1 SS5.1 SS5.2 SS5.3	(m) 90.100 89.800 90.000 90.000 89.700 90.100 89.700 89.700 88.850 88.850	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805 88.805 88.752 88.752 87.217 87.183 86.779	(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070 0.723 1.408 1.342 1.496	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
\$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$3.000 \$3.001 \$1.005 \$1.005 \$1.007	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000 27.113 10.660 56.000 6.824	(1:X) 200.0 20	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1 SS5.0 SS4.1 SS5.0 SS5.1 SS5.1 SS5.2 SS5.3	(m) 90.100 89.800 90.000 90.000 89.700 90.100 89.700 89.700 88.850 88.850 88.500	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805 88.805 88.752 88.752 87.217 87.183 86.779	(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070 0.723 1.408 1.342 1.496	Connection Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
\$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$3.000 \$3.001 \$1.005 \$1.005 \$1.007	(m) 26.312 36.476 42.438 51.705 29.327 5.523 14.000 90.000 27.113 10.660 56.000 6.824 80.753	(1:X) 200.0 20	Name SS1.1 SS1.2 SS1.3 SS2.1 SS1.3 SS1.4 SS5.0 SS4.1 SS5.0 SS4.1 SS5.0 SS5.1 SS5.1 SS5.2 SS5.3	<pre>(m) 90.100 89.800 90.000 90.000 89.700 90.100 89.700 89.700 88.850 88.500 88.500</pre>	(m) 89.188 89.006 88.620 88.741 88.595 88.567 88.497 88.805 88.805 88.752 88.752 87.217 87.183 86.779	<pre>(m) 0.687 0.569 1.155 1.034 1.180 1.208 0.978 1.070 1.070 0.723 1.408 1.342 1.496 1.610</pre>	Connection Open Manhole Open Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200

©1982-2018 Innovyze

	lting	Eng					Page 5
Barrett Mahony Consul 12 Mill Street		Ling					ago o
London							
SE1 2AY							and the second
Date 24/01/2020 12:1	7		Des	igned by	Tmachale		Micro
File Surface.mdx				cked by			Drainage
XP Solutions				work 2018	8.1		
		<u>Area</u>	a Summ	ary for a	Storm		
Pipe	PIMP	PIMP	PIMP	Gross	Imp. Pi	pe Total	
Number	r Type	Name	(%) A:	rea (ha) A	rea (ha)	(ha)	
1.000	- (	_	100	0.133	0.133	0.133	
1.001			100	0.000	0.000	0.000	
1.002			100	0.097	0.097	0.097	
2.000	- 0	-	100	0.120	0.120	0.120	
2.001			100	0.000		0.000	
	3 –	-	100	0.030	0.030	0.030	
1.004	4 -	-	100	0.030	0.030	0.030	
3.000	- 0	-	100	0.099	0.099	0.099	
4.000	) – ) – 1 –	-	100	0.123	0.123	0.123	
3.001	. –	-	100	0.060	0.060	0.060	
1.005	o –	-	100	0.000	0.000	0.000	
1.000	o –	_	100 100 100	0.000	0.000	0.000	
1.005	-	_	100	0.000	0.000	0.000	
1:000	,		100	Total	Total	Total	
				0 692	0.692	0.692	
Fr	ree Fl	Lowing	g Outf	all Deta	0.030 0.099 0.123 0.060 0.000 0.000 0.000 0.000 Total 0.692 ils for S	torm	
Outfal	LI OI	utfall	C. Lev	vel I. Leve		D,L W	
Outfal Pipe Num	LI OI	utfall Name	C. Lev (m)	vel I. Leve	el Min I. Level (m)	D,L W	
Outfal Pipe Num	Ll Ou nber .008	utfall Name S	C. Lev (m) 88.5	rel I. Leve (m)	el Min I. Level (m)	D,L W (mm) (mm)	
Outfal Pipe Num Sl.	Ll On nber .008 <u>Si</u>	utfall Name s mulat	C. Lev (m) 88.5 ion Ci	vel I. Leve (m) 500 86.66 riteria f	el Min I. Level (m) 65 0.000	D,L W (mm) (mm)	Elow 0 000
Outfal Pipe Num S1. Volumetric Areal Redu Hot Hot Star	Ll On nber .008 <u>Si</u> Runoff action Start t Leve	s <u>mulat</u> Coeff Factor (mins)	C. Lev (m) 88.5 ion Ci 5 0.750 5 1.000 0 0	vel I. Leva (m) 500 86.64 riteria f Additic MAD Flow per	al Min I. Level (m) 55 0.000 For Storm D Factor * In: Person per	D,L W (mm) (mm) 0 0 % of Total 10m <sup>3</sup> /ha Sto Let Coeffico Day (1/per/	rage 2.000 ient 0.800 day) 0.000
Outfal Pipe Num Sl. Volumetric	Ll On mber .008 <u>Si</u> Runoff action Start t Leve peff (G	utfall Name S mulat Coeff Factor (mins) el (mm) Slobal)	C. Lev (m) 88.5 ion Ci 0.750 0.000 0.000	rel I. Leva (m) 500 86.60 riteria f Additio MAD Flow per	al Min I. Level (m) 55 0.000 For Storm mal Flow - D Factor * In: Person per	D,L W (mm) (mm) 0 0 % of Total 10m <sup>3</sup> /ha Sto Let Coeffico Day (1/per/	rage 2.000 ient 0.800 day) 0.000 ins) 60
Outfal Pipe Num S1. Volumetric Areal Redu Hot Hot Star Manhole Headloss Co Foul Sewage per h Number of	nber .008 <u>Si</u> Runoff action Start t Leve eeff (G eectare Input	s mulat Coeff Factor (mins) (mm) (lobal) (1/s) Hydroo	C. Lev (m) 88.5 ion Ci 0.750 1.000 0.500 0.500 0.000 graphs	<pre>/el I. Leva (m)</pre>	al Min I. Level (m) 55 0.000 For Storm onal Flow - D Factor * In: Person per Output of Storage	D,L W (mm) (mm) 0 0 % of Total 10m <sup>3</sup> /ha Sto let Coeffiec Day (1/per/ Run Time (m Interval (m Structures :	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1
Outfal Pipe Num S1. Volumetric Areal Redu Hot Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of	nber .008 <u>Si</u> Runoff ction Start t Leve eff (G ectare Input of Onl:	s mulat Coeff Factor (mins) (mm) Cobal) (l(mm) Cobal) (l/s) Hydrov ine Cos	C. Lev (m) 88.5 ion Ci 0.750 1.000 0.000 0.500 0.000 graphs ntrols	rel I. Leva (m) 500 86.60 riteria f Additio MAE Flow per 0 Number o 1 Number o	Min     I. Level     (m)     65 0.000     Or Storm     Or Storm     Person per     Output     Of Storage     of Storage     f Time/Are	D,L W (mm) (mm) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1
Outfal Pipe Num S1. Volumetric Areal Redu Hot Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of	11 On mber .008 <u>Si</u> Runoff action Start t Leve eeff (G mectare Input of Onlis	s mulat Coeff Factor (mins) 1 (mm) Clobal) (1/s) Hydroc ine Co	C. Lev (m) 88.5 ion Ci 0.7500 0.5000 0.5000 0.0000 graphs ntrols	rel I. Leva (m) 500 86.60 riteria f Additio MAE Flow per 0 Number o 1 Number o	Al Min I. Level (m) 55 0.000 Cor Storm Cor Storm Cor Storm D Factor * In: Person per Output of Storage of Time/Are of Real Tim	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coeffiec Day (1/per/ Run Time (m Interval (m Structures : a Diagrams (	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1
Outfal Pipe Num S1. Volumetric Areal Redu Hot Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of	Ll ou nber .008 <u>Si</u> Runoff action Start t Leve beff (G bectare Input of Onl: f offl: <u>S</u>	S mulat Coeff Factor (mins) (mm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Factor (mins) (nm) Coeff Coeff Coeff Coeff Coeff Factor (mins) (nm) Coeff	C. Lev (m) 88.5 ion Ci 0.7500 0.5000 0.5000 0.0000 graphs ntrols	rel I. Leva (m) 500 86.60 riteria f Additic MAE Flow per 0 Number ( 0 Number ( 0 Number ( 0 Number (	Min I. Level (m) 55 0.000 For Storm D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details	D,L W (mm) (mm) 0 0 % of Total 10m*/ha Sto Let Coeffice Day (1/per/ Run Time /M Interval (m Interval (m Structures : a Diagrams ( e Controls (	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1
Outfal Pipe Num S1. Volumetric Areal Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Ll on mber .008 <u>Si</u> Runoff iction Start t Leve beff (G iectare Input of Onli f Offl: <u>S</u> Model vears)	s mulat Coeff Factor (mins) (mins) (l (mm) (l (mm) (l (mm) (l (mm) (l (mm) (l (mm)) (l (mm))) (l (mm)) (l (mm))) (l (mm)) (l (mm))) (l (mm	C. Lew (m) 88.5 ion Cr c 0.750 c 0.500 0.000 0.000 graphs ntrols ntrols atic R	rel I. Leva (m) 500 86.60 riteria f Additio MAD Flow per 0 Number 0 1 Number 0 0 Number 0 3 Number 0 5 SR 100	al Min I. Level (m) 55 0.000 For Storm D Factor * D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pl (	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type by (Summer)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L L Summer 0.750
Outfal Pipe Num S1. Volumetric Areal Redu Hot Saral Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Ll on mber .008 <u>Si</u> Runoff action Start t Leve seff (G acctare Input of Onl: f offl: <u>Si</u> Model years) Region	stfall Name S <u>mulat</u> Coefff Factor (mins) ((mins) ((mins) (lobal) (1/s) Hydrov ine Co: () Synthe	C. Lew (m) 88.5 ion Cr c 0.750 c 0.500 0.000 0.000 graphs ntrols ntrols atic R	rel I. Leva (m) 500 86.64 riteria f Additio MAD Flow per 0 Number 0 1 Number 0 0 Number 0 0 Number 0 1 Number 0 1 Number 0 1 Number 0 0 Number 0 1 Number 0 1 Number 0 0 Number 0	al Min I. Level (m) 65 0.000 For Storm D Factor * D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pi ( 0) ( 0)	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type cv (Summer) Cv (Summer) Cv (Winter)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L Summer 0.750 0.840
Outfal Pipe Num S1. Volumetric Areal Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Il On orbitation of the second	S mulat ( Coeff Coeff (mins) (mins) (mins) (lobal) Hydrov ine Coi ine Coi Synthe	C. Lew (m) 88.5 ion Cr c 0.750 c 0.500 0.000 0.000 graphs ntrols ntrols atic R	<pre>/vel I. Leve (m) // (m) /</pre>	al Min I. Level (m) 65 0.000 For Storm D Factor * D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pi ( 0) ( 0)	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type by (Summer)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L Summer 0.750 0.840
Outfal Pipe Num S1. Volumetric Areal Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Ll on mber .008 <u>Si</u> Runoff action Start t Leve seff (G acctare Input of Onl: f offl: <u>Si</u> Model years) Region	S mulat ( Coeff Coeff (mins) (mins) (lobal) Hydrov ine Coi ine Coi Synthe	C. Lew (m) 88.5 ion Cr c 0.750 c 0.500 0.000 0.000 graphs ntrols ntrols atic R	rel I. Leva (m) 500 86.64 riteria f Additio MAD Flow per 0 Number 0 1 Number 0 0 Number 0 0 Number 0 1 Number 0 1 Number 0 1 Number 0 0 Number 0 1 Number 0 1 Number 0 0 Number 0	al Min I. Level (m) 65 0.000 For Storm D Factor * D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pi ( 0) ( 0)	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type cv (Summer) Cv (Summer) Cv (Winter)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L Summer 0.750 0.840
Outfal Pipe Num S1. Volumetric Areal Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Il On orbitation of the second	S mulat ( Coeff Coeff (mins) (mins) (lobal) Hydrov ine Coi ine Coi Synthe	C. Lew (m) 88.5 ion Cr c 0.750 c 0.500 0.000 0.000 graphs ntrols ntrols atic R	<pre>/vel I. Leve (m) // (m) /</pre>	al Min I. Level (m) 65 0.000 For Storm D Factor * D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pi ( 0) ( 0)	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type cv (Summer) Cv (Summer) Cv (Winter)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L Summer 0.750 0.840
Outfal Pipe Num S1. Volumetric Areal Redu Hot Star Manhole Headloss Co Foul Sewage per h Number of Number of Number of Rainfall Return Period (	Il On orbitation of the second	S mulat Coeff Factor (mins) (lobal) (l	C. Lev (m) 88.5 ion C1 5 0.750 1.000 0.500 0.500 0.000 graphs ntrols ntrols atic R land an	<pre>/vel I. Leve (m) // (m) /</pre>	An Min I. Level (m) 55 0.000 Cor Storm Cor Storm D Factor * In: Person per Output of Storage of Time/Are of Real Tim Details Pr ( ( Storm Durat	D.L W (mm) (mm) 0 0 % of Total 10m³/ha Sto let Coefficc Day (1/per/ Run Time (m Interval (m Structures : a Diagrams ( e Controls ( coffile Type cv (Summer) Cv (Summer) Cv (Winter)	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1 L Summer 0.750 0.840

	lting Eng					Page 6
12 Mill Street						
London						
SE1 2AY						Million
Date 24/01/2020 12:1	.7	Designed	d by Tm	achale		MILLU
File Surface.mdx		Checked				Drainage
XP Solutions		Network				
m boluciono		110 01101 11	2010.1			
		ne Controls				
<u>Hydro-Brake® Opt</u>	imum Manho	le: SS5.0,	DS/PN:	<u>s1.005,</u>	Volume (1	<u>m³): 3.4</u>
		nit Reference		0072-2500-		
HYDROBRAKE DES		sign Head (m)			1.200 2.5	
PARAMETERS	Desig	n Flow (l/s) Flush-Flo <sup>n</sup>		C	2.5 alculated	
				.se upstrea		
		Application	L	~	Surface	
		ump Available			Yes	
		Diameter (mm) ert Level (m)			72 87.497	
Minimum (	utlet Pipe I				100	
	ted Manhole I				1200	
	Control	Points	Head (m	) Flow (l/s	;)	
D	esign Point					
		Flush-Flo <sup>TH</sup>				
	lean Flow ove	Kick-Flo®		4 1. - 2.		
Hydro-Brake Optimum®   invalidated Depth (m) Flow (1/s)						
0.100 1.9		2.5	3.000	3.8	7.000	
0.200 2.2		2.7	3.500	4.1	7.500	
0.300 2.3		2.8	4.000	4.4	8.000	
0.400 2.3		3.0	4.500	4.6	8.500	
0.500 2.2 0.600 2.0		3.2	5.000 5.500	4.8 5.1	9.000 9.500	
0.800 2.0		3.4	6.000		9.300	0.0
1.000 2.3		3.6	6.500			

Barrett Mahony Consulting Eng	1	Page 7	]	Barrett Mahony Consulting	Eng	Page 8
12 Mill Street			-	12 Mill Street	-	
London				London		
SE1 2AY		THE ADD		SE1 2AY		WEINER, AND
Date 24/01/2020 12:17	Designed by Tmachale	Micro		Date 24/01/2020 12:17	Designed by Tmachale	Micro
File Surface.mdx	Checked by	Drainage		File Surface.mdx	Checked by	Drainage
XP Solutions	Network 2018.1			XP Solutions	Network 2018.1	
			-			
<u>Stora</u>	age Structures for Storm			<u>l year Return Period Summ</u>	nary of Critical Results by Maximum for Storm	n Level (Rank 1)
<u>Cellular Stora</u>	age Manhole: SS5.0, DS/PN: S1.0	<u>)05</u>			Simulation Criteria	
I I I I I I I I I I I I I I I I I I I	Invert Level (m) 87.497 Safety Fact	or 1.0			Factor 1.000 Additional Flow - % of To	
Infiltration Coeffici	ient Base (m/hr) 0.00000 Porosi			Hot Start Hot Start Leve	(mins) 0 MADD Factor * 10m³/ha 1 (mm) 0 Inlet Coef	fiecient 0.800
	ient Side (m/hr) 0.00000	2			lobal) 0.500 Flow per Person per Day (1/	
	. Area (m <sup>2</sup> ) Depth (m) Area (m <sup>2</sup> ) Inf.				Hydrographs 0 Number of Storage Structu:	
0.000 260.0 1.000 260.0	0.0 0.0	0.0		Number of Onli	ine Controls 1 Number of Storage Structu ine Controls 1 Number of Time/Area Diagr ine Controls 0 Number of Real Time Contro	ams 8
AQUACELL ATTENU	ATION TANK -				Synthetic Rainfall Details	
1m dp X 260m <sup>2</sup>				Rainfall Mod	el FSR Ratio R 0.30 on Scotland and Ireland Cv (Summer) 0.75	
• • • •					m) 14.000 Cv (Winter) 0.84	
				Margin for Floo	od Risk Warning (mm) 100.0 DVD Statu:	5 ON
					Analysis Timestep Fine Inertia Statu: DTS Status OFF	
				Profil	e(s) Summer :	and Winter
				Duration(s) (m.	ins) 15, 30, 60, 120, 180, 240, 360, 720, 960, 1440, 2160, 2880, 4	480, 600, 320, 5760,
1				Return Period(s) (ye		540, 10080 L, 30, 100
				Climate Change		20, 20, 20
				US/MH Retur	m Climate First (X) First (Y)	First (Z) Overflow
				PN Name Storm Perio	od Change Surcharge Flood	Overflow Act.
				S1.000 SS1.0 240 Winter	1 +20%	
					1 +20%	
				S1.002 SS1.2 240 Winter S2.000 SS2.0 240 Winter	1 +20% 100/1440 Winter 1 +20% 100/1440 Winter	
				S2.000 SS2.0 240 Winter S2.001 SS2.1 240 Winter		
				S1.003 SS1.3 240 Winter	1 +20% 100/30 Winter	
				S1.004 SS1.4 240 Winter		
				S3.000 SS4.0 240 Winter S4.000 SS3.0 240 Winter	1 +20% 1 +20% 100/1440 Winter	
				S3.001 SS4.1 240 Winter	1 +20% 100/960 Winter	
				S1.005 SS5.0 1440 Winter		-
				S1.006 SS5.1 1440 Winter S1.007 SS5.2 1440 Winter	1 +20% 1 +20%	
					1 +20%	
	01000 0010 Tenor				@1000_0010_Text.	
	©1982-2018 Innovyze		]		©1982-2018 Innovyze	

# RESULTS FOR 1-in-1 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

arrett Mah	nony C	onsult	ing Eng						Page 9
2 Mill Str	reet								
ondon									the second
El 2AY									Micco
ate 24/01/	2020	12:17		Desigr	ned by	Tmachal	Э		Drainage
ile Surfac	e.mdx			Checke	ed by				Drainage
P Solutior	ıs			Networ	ck 2018	3.1			
1 year Ret	urn P	eriod	Summary of			sults by	Maxi	mum Lev	rel (Rank 1)
				<u>for S</u>	torm				
		Water	Surcharged	Flooded			Pipe		
			Depth						Level
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
s1.000	SS1.0	89.362 89.228	-0.183	0.000	0.08		2.6	OK	7
S1.001	SS1.1	89.228	-0.185	0.000			2.4		
S1.002	SS1.2	89.052	-0.179	0.000			4.3		
		89.038		0.000			2.3		
		88.779		0.000			2.2		
		88.674 88.642		0.000			7.1 7.6		
		88.642		0.000			1.4	OK	
		89.036		0.000			2.4	OK	
		88.865		0.000			4.8		
		87.699		0.000			2.2		2
		87.259		0.000			2.2		
S1.007	SS5.2	87.219	-0.189	0.000	0.06		2.2	OK	
S1.008	SS5.3	86.817		0.000			2.2	OK	
								-	
			A1 ^	0.0.0.1.0	Terre				
			©19	82-2018	Innov	yze			

	lanony	Consulting	Eng				Page 10
l2 Mill S	treet						
London							-
SE1 2AY							Michael
Date 24/0	1/202	0 12:17		Desig	ned by Tmachal	Le	WILLU
File Surf	ace.m	dx		Check	-		Draina
(P Soluti					rk 2018.1		
30 year B	Return	Period Sum	mary c	o <u>f Criti</u> for S	.cal Results k Storm	y Maximum Le	vel (Rank
	Ie Head 1 Sewad Nu	Hot Start Hot Start Leve dloss Coeff (G ge per hectare mber of Input	Factor (mins) el (mm) Global) e (l/s) Hydrog	1.000 0 0.500 F 0.000 raphs 0	<u>n Criteria</u> Additional Flow MADD Factor Low per Person p Number of Storag Number of Time/ <i>I</i>	* 10m³/ha Stor Inlet Coeffieci er Day (l/per/d ge Structures 1	age 2.000 ent 0.800
			ine Con	trols 0	Number of Real 1		
		Rainfall Moo Reg: M5-60 (r	del ion Scot		<u>nfall Details</u> FSR Ra I Ireland Cv (Su 14.000 Cv (Wi		
	М	argin for Flo		ysis Tim	(mm) 100.0 estep Fine Iner tatus OFF		
:	Return	Profil Duration(s) (m Period(s) (ye Climate Change	ains) ears)		, 60, 120, 180, 960, 1440, 2160		600, 5760, L0080 100
	Return ( <b>US/MH</b>	Duration(s) (m Period(s) (ye Climate Change	nins) ears) e (%) Return	720, Climate	960, 1440, 2160 First (X)	240, 360, 480, , 2880, 4320, 5 7200, 8640, 1 1, 30, 20, 20 First (Y)	600, 5760, 10080 100 0, 20 First (Z)
PN	Return ( US/MH Name	Duration(s) (M Period(s) (ye Climate Change <b>Storm</b>	nins) ears) e (%) Return Period	720, Climate Change	960, 1440, 2160 First (X)	240, 360, 480, , 2880, 4320, 5 7200, 8640, 1 1, 30, 20, 20	600, 5760, 10080 100 0, 20
<b>PN</b> 51.000	Return ( US/MH Name SS1.0	Duration(s) (M Period(s) (ye Climate Change <b>Storm</b> 60 Winter	nins) ears) e (%) Return Period 30	720, Climate Change +20%	960, 1440, 2160 First (X)	240, 360, 480, , 2880, 4320, 5 7200, 8640, 1 1, 30, 20, 20 First (Y)	600, 5760, 10080 100 0, 20 First (Z)
PN 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
PN 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
PN 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
PN 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
<b>PN</b> 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
PN 51.000 51.001	US/MH Name SS1.0 SS1.1	Duration(s) (m Period(s) (ye Llimate Change Storm 60 Winter 60 Winter	Return Period 30 30	720, Climate Change +20% +20%	960, 1440, 2160 First (X) Surcharge	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z)
PN \$1.000 \$1.001 \$1.002 \$2.000 \$2.001 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001	US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.1 SS1.3 SS1.4 SS1.4 SS3.0 SS3.0 SS3.0 SS4.1	Period(s) (ye limate Change <b>Storm</b> 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 60 Winter 120 Winter 120 Winter 120 Winter	nins) ears) e (%) Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	720, <b>Climate</b> <b>change</b> +20% +20% +20% +20% +20% +20% +20% +20% +20% +20%	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/720 Winter 100/60 Winter 100/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow
PN \$1.000 \$1.001 \$1.002 \$2.000 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005	US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.1 SS1.3 SS1.4 SS4.0 SS4.0 SS4.0 SS4.1 SS5.0	Period(s) (ye limate Change Storm 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 60 Winter 120 Winter 120 Winter 120 Winter	nins) Return Period 30 30 30 30 30 30 30 30 30 30	720, <b>Climate</b> <b>change</b> +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20%	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/30 Winter 100/60 Winter 100/960 Winter 30/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow
PN \$1.000 \$1.001 \$1.002 \$2.001 \$1.003 \$1.003 \$1.000 \$4.000 \$3.001 \$1.005 \$1.005	Return US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.0 SS2.1 SS1.4 SS4.0 SS3.0 SS4.1 SS5.0	Period(s) (ye Limate Change Storm 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 120 Winter 60 Winter 120 Winter 120 Winter 1440 Winter 2880 Winter	<pre>mins)   Return   Period</pre>	720, <b>Climate</b> <b>change</b> +20% +20	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/30 Winter 100/60 Winter 100/960 Winter 30/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow
PN \$1.000 \$1.001 \$2.001 \$2.001 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005 \$1.006 \$1.007	US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.1 SS1.3 SS1.4 SS3.0 SS3.0 SS3.0 SS5.1 SS5.2	Period(s) (ye limate Change Storm 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 60 Winter 120 Winter 120 Winter 120 Winter	ains) Return Period 30 30 30 30 30 30 30 30 30 30	720, <b>Climate</b> <b>change</b> +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20%	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/30 Winter 100/60 Winter 100/960 Winter 30/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow
PN \$1.000 \$1.001 \$2.001 \$2.001 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005 \$1.006 \$1.007	US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.1 SS1.3 SS1.4 SS3.0 SS3.0 SS3.0 SS5.1 SS5.2	Period(s) (ye limate Change Storm 60 Winter 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 60 Winter 120 Winter	ains) Return Period 30 30 30 30 30 30 30 30 30 30	720, <b>Climate</b> <b>change</b> +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20%	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/30 Winter 100/60 Winter 100/960 Winter 30/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow
PN \$1.000 \$1.001 \$2.001 \$2.001 \$1.003 \$1.004 \$3.000 \$4.000 \$3.001 \$1.005 \$1.006 \$1.007	US/MH Name SS1.0 SS1.1 SS1.2 SS2.0 SS2.1 SS1.3 SS1.4 SS3.0 SS3.0 SS3.0 SS5.1 SS5.2	Period(s) (ye limate Change Storm 60 Winter 60 Winter 60 Winter 60 Winter 120 Winter 120 Winter 60 Winter 120 Winter	ains) Return Period 30 30 30 30 30 30 30 30 30 30	720, <b>Climate</b> <b>change</b> +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20% +20%	960, 1440, 2160 First (X) Surcharge 100/1440 Winter 100/1440 Winter 100/30 Winter 100/60 Winter 100/960 Winter 30/60 Winter	240, 360, 480, , 2880, 4320, E 7200, 8640, 1 1, 30, 20, 20 First (Y) Flood	600, 5760, 10080 100 0, 20 First (Z) Overflow

# RESULTS FOR 1-in-30 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

Barret	tt Mah	nony Con	sulting	Eng					Pag	e 11
2 Mi	ll Str	reet								
ondor	n									-
1 22	AY								3.61	COLONIA COLONIA
te 2	24/01/	2020 12	:17	D	esigned	l by Tn	achale		1WIL	uin age
le s	Surfac	e.mdx		c	hecked	by			Elfe	ainage
So:	lution	IS			etwork	-				
0 ye	ar Ret	turn Per	iod Sur	nmary of	Critica	l Resu	lts by M	faximu	m Level (	Rank 1)
					for Sto	rm				
			Water	Surcharged	Flooded			Pipe		
	US/MH	Overflow		Depth			Overflow			Level
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
.000	SS1.0		89.402	-0.143	0.000	0.27		9.3	OK	
	SS1.1		89.269	-0.143 -0.145	0.000	0.26		9.1	OK	
.002	SS1.2		89.096	-0.135	0.000	0.33		15.5	OK	
	SS2.0		89.076		0.000			8.4	OK	
	SS2.1		88.817		0.000			8.2	OK	
	SS1.3		88.767	-0.053				25.7	OK	
	SS1.4		88.729		0.000			27.6	OK	
	SS4.0 SS3.0				0.000			5.1	OK	
	SS3.0 SS4.1		89.071 88.927		0.000			8.6 17.6	OK	
	SS5.0		88.283		0.000				SURCHARGED	2
	SS5.1		87.260		0.000			2.3	OK	
	SS5.2		87.220		0.000			2.3	OK	
	SS5.3		86.817		0.000			2.3	OK	
				©1982	-2018 I	nnovvz	e			

		iony Co:	nsul	ting E	ng			Pag	e 12
12 Mil	ll Str	reet							
Londor	n								
SE1 27	AY								-
Date 2	24/01/	2020 1	2:17		D	esigned by Tm	achale	IVI	ци
		ce.mdx	4.00 • .4. 1			hecked by	a chia i c	186	ainac
XP Sol						letwork 2018.1			
AF SUI	TUCIOI	15			14	etwork 2010.1			
100	year l	Return	Peri	.od Sur		f Critical Res for Storm	ults by Max	imum Level	(Ranl
					Simu	<u>lation Criteria</u>			
		Areal	Reduc	ction Fa	actor 1.0	000 Additional	Flow - % of T	otal Flow 0	.000
			Hot S	Start (n	nins)	0 MADD F 0	actor * 10m³/h	na Storage 2.	.000
м	anhala					0 500 Flow per Per			
141					(l/s) 0.0		son per bay ()	/per/day) 0	.000
						hs 0 Number of S			
						ls 1 Number of T			
		Numbe	er of	Offlin	e Contro	ls 0 Number of F	eal Time Cont	rols O	
					Syntheti	.c Rainfall Detai	15		
		Ra	infal	Ll Model		FSR		300	
						nd and Ireland C			
			M5-	-60 (mm)		14.000 C	v (Winter) 0.8	340	
		Margi	in fo			rning (mm) 100.0			
						s Timestep Fine		us ON	
						DTS Status OFF			
						DTS Status OFF			
				rofile(	s)		Summer	and Winter	
		Dura			s) 1s) 1	5, 30, 60, 120,	Summer 180, 240, 360	, 480, 600,	
		Dura			s) 1s) 1		Summer 180, 240, 360 2160, 2880,	, 480, 600, 4320, 5760,	
	Rei		tion(	s) (mir	s) is) 1	5, 30, 60, 120,	Summer 180, 240, 360 2160, 2880,	, 480, 600, 4320, 5760, 8640, 10080	
	Ret	turn Per.	tion( iod(s	s) (mir	s) s) 1 s)	5, 30, 60, 120,	Summer 180, 240, 360 2160, 2880,	, 480, 600, 4320, 5760,	
	Ret	turn Per.	tion( iod(s	s) (min	s) s) 1 s)	5, 30, 60, 120,	Summer 180, 240, 360 2160, 2880,	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100	
	US/MH	turn Per. Clim	tion( iod(s ate C	s) (min ) (year Change ( Return	s) s) 1 s) %) Climate	5, 30, 60, 120, 720, 960, 1440, First (X)	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y)	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
PN		turn Per. Clim	tion( iod(s ate C	s) (min ) (year Change ( Return	s) is) 1 is) %)	5, 30, 60, 120, 720, 960, 1440, First (X)	Summer 180, 240, 360 2160, 2880, 7200, 3	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 8640, 10080 1, 30, 100 20, 20, 20 First (Z)	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 100/1440 Winter 100/720 Winter 100/30 Winter 100/60 Winter 100/960 Winter	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) (s) 1 (s) (s) (s) (s) (climate (change) +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 5 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	
s1.000	US/MH Name SS1.0	turn Per Clim Stor	tion( iod(s ate C m nter	s) (min ) (year Change ( Return Period 100	s) s) s) s) climate change +20% +20% +20% +20% +20% +20% +20% +20%	5, 30, 60, 120, 720, 960, 1440, First (X) Surcharge	Summer 180, 240, 360 2160, 2880, 7200, 3 First (Y) Flood	, 480, 600, 4320, 5760, 6640, 10080 1, 30, 100 20, 20, 20 First (2) Overflow	

# RESULTS FOR 1-in-100 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

2 Mill St ondon 51 2AY ate 24/01 ile Surfa 2 Solutic 100 year	1/2020 ace.mo								
1 2AY te 24/01 le Surfa Solutio	ace.mo								. W
te 24/01 le Surfa Solutio	ace.mo								1-0
le Surfa Solutio	ace.mo								Mirce
le Surfa Solutio	ace.mo		7	Desi	aned h	y Tmacha	ale		MICTO
Solutio					ked by	-			Drain
	5.10				ork 20				
100 year									
	Retu	rn Per	iod Summa:	-	ritica. or Stor		s by	Maximum L	evel (F
				<u>1) IC</u>	or stor	111			
		Water	Surcharged	Flooded			Pipe		
	US/MH		Depth		Flow /	Overflow			Level
PN	Name	(m)	(m)	(m <sup>3</sup> )	Cap.	(1/s)	(1/s)	Status	Exceede
					-		,		_
		89.421			0.41		13.8	OK	
		89.376			0.08		2.7	OK	
		89.348					4.7		
		89.323 89.583		0.000				SURCHARGED	
		89.583						SURCHARGED SURCHARGED	
		89.697						SURCHARGED	
53.000			-0.116				1.6		
		89.368		0.000				SURCHARGED	
		89.511		0.000				SURCHARGED	
S1.005	SS5.0	89.700	1.978	1.639	0.09		3.0	FLOOD	
		87.266		0.000			3.1	OK	
		87.227			0.09		3.1	OK	
S1.008	SS5.3	86.825	-0.179	0.000	0.09		3.1	OK	
OODING IAN 960 00mm -A RACTICE	G IN S min - AS SU E. AN	STORN HOWE ICH UN Y OVE	iole is li As of du Ever flo Nlikely t Rflow W On site i	RATION OD DEI O OCC /HICH N	N GRE/ PTH = UR IN MAY O	CCUR			
ASIN									

©1982-2018 Innovyze

# NORTH EAST CATHCMENT SIMULATION

12 Mill S			ing Eng							ray	ie 1
	Street									-	_
London											-
SE1 2AY										Mi	<b>FID</b>
Date 16/0				Dea	signed by	Tmach	nale			E.C.	ainan
File Surf	Eace C2.m	ndx		Che	ecked by					01	annag
XP Soluti	ions			Net	twork 2018	3.1					
	<u>stof</u>	RM SEWE			the Modif: iteria for			nal M	ethod	1	
		Pip	e Sizes	STANDAR	RD Manhole \$	Sizes :	stand.	ARD			
Maximum T	Maximu Time of Co Fo	urn Per: m Rainfa ncentra ul Sewa	iod (yea: M5-60 (r Rati: all (mm/) tion (min ge (l/s/) noff Coe: Des <u>Time</u> T:	rs) mm) 14. o R 0. or) ns) na) 0. ff. 0. igned w <u>Area I</u> ime Ar ins) (H	000	Add F Min Max ign De Vel fo n Slop offits or Sto Area (ha)	low / imum pth f r Aut e for	Clim Backd Backd or Op o Des	ate Ch rop He rop He timisa ign on	ange (% ight (n ight (n tion (n ly (m/s	s) 1.00
					tributing () olume (m³)						
			Total	Pipe V		= 12.6	24				
			Total <u>Networ</u>	Pipe V k Desi	olume (m³)	= 12.6 for Si	torm				
		L Slope	Total <u>Networ</u> « - Ind • <b>I.Area</b>	Pipe V <u>k Desi</u> dicates <b>T.E.</b>	olume (m³) gn Table :	= 12.6 <u>for Si</u> ity < f <b>k</b>	24 torm flow <b>HYD</b>			on Type	e Auto Design
S1.000 15		L Slope (1:X) 3 250.0	Total <u>Networ</u> « - Inc <b>I.Area</b> (ha) 0.070	Pipe V <u>k Desi</u> dicates <b>T.E.</b> (mins) 4.00	gn Table : pipe capaci Base Flow (1/s) 0.0	= 12.6 for Si ity < f k (mm) 0.600	torm flow HYD SECT	(mm) 225	Pipe/	<b>on Type</b> 'Conduit	Design
S1.000 15 S1.001 25	(m) (m) 5.871 0.06	L Slope (1:X) 3 250.0 5 135.5	Total <u>Networ</u> « - Inc • I.Area (ha) 0.070 0.000	Pipe V <u>k Desi</u> Sicates <b>T.E.</b> (mins) 4.00 0.00	gn Table : pipe capaci Base Flow (1/s) 0.0	= 12.6 for Sf ity < f k (mm) 0.600 0.600	torm flow HYD SECT	<b>(mm)</b> 225 225	Pipe/ Pipe/	Conduit	Design
S1.000 15 S1.001 25	(m) (m) 5.871 0.06 5.105 0.18	L Slope (1:X) 3 250.0 5 135.5	Total <u>Networ</u> <b>« -</b> Inc <b>1.Area</b> (ha) 0.070 0.000 0.106	Pipe V <u>k Desi</u> dicates <b>T.E.</b> (mins) 4.00 0.00 4.00	gn Table : pipe capaci Base Flow (1/s) 0.0	= 12.6 <u>for Si</u> ity < f <b>k</b> (mm) 0.600 0.600 0.600	torm flow HYD SECT	<b>(mm)</b> 225 225	Pipe/ Pipe/	Conduit Conduit	Design
S1.000 15 S1.001 25	(m) (m) 5.871 0.06 5.105 0.18 9.747 0.07 Rain	L slope (1:X) 3 250.0 5 135.5 9 250.0 T.C.	Total <u>Networ</u> « - Inc (ha) 0.000 0.106 <u>Ne</u> US/IL E	Pipe V k Desi dicates T.E. (mins) 4.00 0.00 4.00 twork I.Area	gn Table : pipe capaci Base Flow (1/s) 0.0 0.0	= 12.6 <u>for Si</u> ity < f (mm) 0.600 0.600 0.600 <u>cable</u> Foul	24 torm flow HYD SECT o o o	(mm) 225 225 225 Flow	Pipe/ Pipe/ Pipe/ <b>Vel</b>	Conduit Conduit Conduit	Design
S1.000 15 S1.001 25 S2.000 19 PN	(m) (m) 5.871 0.06 5.105 0.18 9.747 0.07 Rain (mm/hr)	L Slope (1:X) 3 250.0 5 135.5 9 250.0 T.C. (mins)	Total <u>Networ</u> (ha) 0.070 0.000 0.106 <u>Ne</u> (m)	Pipe V k Desi dicates T.E. (mins) 4.00 0.00 4.00 4.00 twork I.Area (ha)	gn Table :: pipe capaci Base Flow (1/s) 0.0 0.0 0.0 Results T Σ Base Flow (1/s)	= 12.6 for Si ity < f (mm) 0.600 0.600 0.600 0.600 Cable Foul (1/s)	24 torm flow HYD SECT o o o Add (1	(mm) 225 225 225 Flow /s)	Pipe/ Pipe/ Pipe/ <b>Vel</b> (m/s)	Conduit Conduit Conduit Conduit Cap (1/s)	Design
S1.000 15 S1.001 25 S2.000 19 PN	(m) (m) 5.871 0.06 5.105 0.18 9.747 0.07 Rain (mm/hr)	L Slope (1:X) 3 250.0 5 135.5 9 250.0 T.C. (mins)	Total <u>Networ</u> (ha) 0.070 0.000 0.106 <u>Ne</u> (m)	Pipe V k Desi dicates T.E. (mins) 4.00 0.00 4.00 4.00 twork I.Area (ha)	gn Table : gn Table : pipe capaci Base Flow (1/s) 0.0 0.0 0.0 Results T E Base Flow (1/s) 0.0	= 12.6 <u>for Si</u> ity < f (mm) 0.600 0.600 0.600 <u>cable</u> Foul	24 torm flow HYD sect o o o Add (1	(mm) 225 225 225 Flow /s) 0.0	Pipe/ Pipe/ Vel (m/s) 0.82	Conduit Conduit Conduit Conduit Cap (1/s)	Design t t f f f f f f f f f f f f f f g.5
\$1.000 15 \$1.001 25 \$2.000 15 <b>PN</b> \$1.000 \$1.001	(m) (m) 5.871 0.06 5.105 0.18 9.747 0.07 Rain (mm/hr)	<b>I Slope</b> (1:X) 3 250.0 5 135.5 9 250.0 <b>T.C.</b> (mins) 4.32 ( 4.69 (	Total <u>Networ</u> (ha) 0.070 0.000 0.106 <u>Ne</u> US/IL 2 (m) 87.775 87.7712	Pipe V k Desi dicates T.E. (mins) 4.00 0.00 4.00 4.00 twork I.Area (ha) 0.070 0.070	gn Table : gn Table : pipe capaci Base Flow (1/s) 0.0 0.0 0.0 Results T E Base Flow (1/s) 0.0	= 12.6 for S1 k (mm) 0.600 0.600 0.600 0.600 0.600 0.600 0.600 0.000 0.000 0.000	24 torm flow HYD SECT o o o Add (1	(mm) 225 225 225 Flow /s) 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 0.82 1.12	Conduit Conduit Conduit Cap (1/s) 32.7 44.6	Design t t Flow (1/s) 9.5 9.5

arrett	Mahor	ny Cor	ısulti	.ng Eng							Pag	e 2
2 Mill	Stree	et										
ondon												-
E1 2AY											1100	and a
ate 16.	/01/20	20 16	5:38		Des	signed by	Tmach	ale			- WI	ų u
ile Su						ecked by					06	ainac
P Solu		02.110	A25			twork 2018	: 1					100
1 0014	0110											
				<u>Networ</u>	k Desi	gn Table 1	Eor St					
PN	Length (m)		-	I.Area (ha)		Base Flow (l/s)	k (mm)			Secti	on Type	e Auto Desig
S1 002	25 568	0 102	250 0	0.044	0.00	0.0	0.600	0	225	Pine/	Conduit	
				0.058			0.600				Conduit	
S3.000	34.941	0.175	200.0	0.159	4.00	0.0	0.600	0	225	Pipe/	Conduit	0
S3.001	29.067	0.145	200.0	0.000	0.00	0.0	0.600	0	225	Pipe/	Conduit	1
S3.002	30.147	0.134	225.0	0.000	0.00	0.0	0.600	0	225	Pipe/	Conduit	
S4.000	22.744	0.114	199.5	0.202	4.00	0.0	0.600	0	225	Pipe/	Conduit	đ
S1.004	18.125	0.073	250.0	0.000	0.00	0.0	0.600	0	225	Pine/	Conduit	-
				0.100							Conduit Conduit	
S1.006	7.633	0.031	246.2	0.065	0.00	0.0	0.600	0	225	Pipe/	Conduit	-
				0.033							Conduit	-
S1.008	12.535	0.050	250.7	0.000	0.00	0.0	0.600	0	375	Pipe/	Conduit	8
				<u>N</u> e	etwork	<u>Results</u> T	<u>able</u>					
PN	Rai (mm/	in 1 hr) (n		US/IL Σ (m)		Σ Base Flow (l/s)					Cap (1/s)	Flow (1/s)
\$1.00 \$1.00			5.21 8	37.526	0.220					0.82	32.7 32.7«	29.8 37.6
01.UC	,S JU		0.70 (		0.270	0.0	0.0		0.0	0.02	52.7K	57.0
s3.00	0 50	.00	4.63 8	37.775	0.159	0.0	0.0		0.0	0.92	36.6	21.5
S3.00				37.600	0.159	0.0	0.0				36.6	
S3.00	)2 50	.00	5.74 8	37.455	0.159	0.0	0.0		0.0	0.87	34.5	21.5
S4.00	0 50	.00	4.41 8	87.875	0.202	0.0	0.0		0.0	0.92	36.7	27.4
S1.00	04 50	.00	6.10 8	37.327	0.639	0.0	0.0		0.0	0.82	32.7«	86.5
S1.00			6.39 8		0.739						32.7«	
S1.00			6.54 8		0.804						33.0«	
S1.00				36.768	0.837		0.0				32.7«	
S1.00	08 50	.00	7.04 8	36.706	0.837	0.0	0.0		0.0	1.14	125.9	113.3

main         main <th< th=""><th></th><th></th><th>-</th><th>onsu</th><th>lting E</th><th>ng</th><th></th><th></th><th></th><th></th><th>Page 3</th><th></th><th></th></th<>			-	onsu	lting E	ng					Page 3		
Math       MH       MH       Pipe Out       Pipe Out       Pipes In       Invert       Diameter       R       Pipes In       Invert       Diameter       R       Pipes In       State 120       State 120 <th>12 Mil</th> <th>ll Str</th> <th>reet</th> <th></th>	12 Mil	ll Str	reet										
Mathe         Designed by Tmachale Checked by         Machale Checked by           Manhole         Schedules         for Storm           MH         MH         MH         Connection (m)         MH         MH         Pipe Out (mm)         Pipe Out Level (m)         Pipes In (mm)         Diameter         Pipes In Level (m)         Diameter         Pipe Out Level (m)         Diameter         Pipe Out Level (m)         Diameter         Dischape Out         Diameter <t< th=""><th>Londor</th><th>n</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>1000</th><th></th><th></th></t<>	Londor	n									1000		
Mate       16/01/2020       16:38       Designed by Tmachale       Designed by Tmachale         Sile       Surface C2.mdx       Checked by       Decided by         Metwork 2018.1         Manhole Schedules for Storm         Manhole       Depth (m)       MH       MH       MH       MH       Pipe Out (mm)       Pipe Out (mm)       Pipes In (mm)       Pipes In (mm)       Pipes In (mm)       Deameter (mm)       Pipes In (mm)       Deameter (mm)       Pipes In (mm)       Deameter (mm)       Pipes In (mm)       Pipe In (mm)       Pipe In (mm)       Pipe In (mm)       Pipes In (mm)       Pipe In In (mm)       Pipe In In (mm)       Pipe In In (mm)	SE1 2 <i>1</i>	AY									Mirro	100	
Checked by       Network 2018.1         Manhole Schedules for Storm       Pipe Out       Pipes In         MH       MH       MH       MH       MH       MH       Connection       MH       Pinestication	Date 1	16/01/	2020	16:3	8	Des	igned	by Tmach	ale		PROJECT AND A	1000	
MH         MH         MH         MH         MH         MH         MH         MH         MH         Pipe Out (mm)         Diameter         Pipe Out (mm)	File S	Surfac	e C2.	mdx		Che	cked b	У			Dialite	ige	
MH NameMH DepthMH DepthMH Dam., L*W (mm)MH PNPN Invert Invert Nevel (m)Pipe Ot Invert methPNPipes In Invert methPipes In methPipes In methPipe In<	XP Sol	lution	IS			Net	work 2	018.1					
Name         CL (m)         Depth (m)         Connection         Diam., L*W (mm)         PN         Invert Level (m)         Diametry (mm)         PN         Invert Level (m)         Diametry (mm)         PN         Invert Level (m)         Diametry (mm)         Diametry Level (m)         Diametry Level (m)         Diametry Level (m)					Mar	nhole Sch	edules	for Stor	<u>cm</u>				
Mail         (m)         (mm)         Level (m)         (mm)         Level (m)         (mm)         Level (m)         (mm)         (mm) <th>MH</th> <th>MH</th> <th>MH</th> <th></th> <th>МН</th> <th>MH</th> <th></th> <th>Pipe Out</th> <th></th> <th> </th> <th>Pipes In</th> <th></th> <th></th>	MH	MH	MH		МН	MH		Pipe Out			Pipes In		
SS.1       89.000       1.28       Open Manhole       1200       \$1.001       87.712       225       \$1.000       87.712       225         SS.0       88.750       1.125       Open Manhole       1200       \$2.000       87.625       225       \$1.001       87.526       225       \$2.000       87.526       225       \$2.000       87.526       225       \$2.000       87.526       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.500       225       \$3.000       87.775       225       \$3.001       87.600       225       \$3.001       87.600       225       \$3.001       87.600       225       \$3.001       87.425       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.424       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001	Name (	CL (m)		Conr	nection		PN			PN			
837.0       88.750       1.125       open Manhole       1200       \$2.000       87.625       225       \$1.001       67.526       225       \$2.000       87.526       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.546       225       \$2.000       87.626       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.424       225       \$2.000       87.455       225       \$2.000       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.001       87.455       225       \$3.002       87.327       225       \$3.002	ss6.0	88.500	0.725	Open	Manhole	1200	s1.000	87.775	225				
38.8.2       88.600       1.074       open Manhole       1200       \$1.002       \$7.526       225       \$2.000       \$7.526       225       \$2.000       \$7.546       225       \$2         \$8.8.3       88.750       1.326       open Manhole       1200       \$1.003       \$7.424       225       \$1.002       \$7.424       225       \$2         \$8.8.3       88.750       1.326       open Manhole       1200       \$3.000       \$7.775       225       \$3.000       \$7.455       225       \$3.000       \$7.455       225       \$3.000       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.001       \$7.455       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.321       225       \$3.002       \$7.57	SS6.1	89.000		Open	Manhole	1200	S1.001	87.712	225	S1.000	87.712	2:	25
sea         n				Open	Manhole	1200		87.625	225				
88.5.3       88.750       1.326       open Manhole       1200       \$1.003       87.424       225       \$1.002       \$7.424       225         88.8.0       88.500       0.725       open Manhole       1200       \$3.000       87.775       225       \$3.000       87.600       225         88.8.0       1.200       Open Manhole       1200       \$3.001       87.600       225       \$3.000       87.455       225         88.8.0       1.200       Open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         88.70       1.125       Open Manhole       1200       \$3.002       87.457       225       \$3.001       87.455       225         85.4       88.750       1.429       Open Manhole       1200       \$1.004       87.327       225       \$1.003       87.321       225         85.5       88.750       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.004       87.255       225         85.6       88.750       1.496       Open Manhole       1200       \$1.006       87.199       225       \$1.004       87.255       225         85.6       88.7	SS6.2	88.600	1.074	Open	Manhole	1200	S1.002	87.526	225	S1.001	87.526	21	25
88.50       88.500       0.725       Open Manhole       1200       \$3.000       87.775       225       \$3.000       87.600       225         88.80       1.200       open Manhole       1200       \$3.001       87.600       225       \$3.000       87.455       225         88.80       1.200       1.545       Open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         88.00       1.125       Open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         88.70       1.429       Open Manhole       1200       \$1.004       87.327       225       \$1.003       87.327       225         88.75       1.429       Open Manhole       1200       \$1.005       87.255       225       \$1.000       87.321       225         88.75       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.004       87.255       225         88.6       88.750       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.005       87.199       225         88.750       1.551       Open Manhole										\$2.000	87.546		
88.8.0       1.2.0       open Manhole       1200       \$3.001       87.600       225       \$3.000       87.600       225         88.8.2       89.000       1.545       open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         89.000       1.125       open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         86.7       1.429       open Manhole       1200       \$1.004       87.327       225       \$1.003       87.327       225         \$3.65.5       88.750       1.496       open Manhole       1200       \$1.005       87.255       225       \$1.000       87.761       225         \$86.6       88.750       1.496       open Manhole       1200       \$1.005       87.255       225       \$1.006       87.199       225         \$86.7       88.750       1.551       open Manhole       1200       \$1.007       86.766       225       \$1.006       87.199       225         \$86.7       88.750       1.992       open Manhole       1200       \$1.007       86.766       225       \$1.006       87.168       225       40         \$85				Open	Manhole	1200	S1.003	87.424	225	S1.002	87.424	21	25
88.2       89.000       1.545       open Manhole       1200       \$3.002       87.455       225       \$3.001       87.455       225         89.000       1.125       open Manhole       1200       \$4.000       87.875       225       \$1.003       87.327       225         86.4       88.750       1.429       open Manhole       1200       \$1.004       87.327       225       \$1.003       87.327       225         86.5       88.750       1.496       open Manhole       1200       \$1.005       87.255       225       \$1.000       87.761       225         86.6       88.750       1.551       open Manhole       1200       \$1.005       87.255       225       \$1.006       87.195       225         86.7       88.750       1.551       open Manhole       1200       \$1.007       86.768       225       \$1.005       87.199       225         86.75       1.982       open Manhole       1200       \$1.007       86.766       225       \$1.006       87.168       225         85.4       88.750       1.992       open Manhole       1350       \$1.008       86.706       375       \$1.007       86.706       225       40 <td></td> <td></td> <td></td> <td>-</td> <td></td> <td>1200</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				-		1200							
89.000       1.125       open Manhole       1200       \$4.000       87.875       225       \$1.003       87.327       225         \$36.4       88.750       1.429       open Manhole       1200       \$1.004       87.327       225       \$1.003       87.327       225         \$3.002       87.321       225       \$3.002       87.321       225       \$43         \$36.5       88.750       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.004       87.255       225         \$36.6       88.750       1.551       Open Manhole       1200       \$1.006       87.199       225       \$1.005       87.199       225         \$36.7       88.750       1.592       Open Manhole       1200       \$1.007       86.768       225       \$1.006       87.168       225         \$36.7       88.750       1.992       Open Manhole       1200       \$1.007       86.766       225       \$1.006       87.168       225       \$40         \$35.4       88.750       2.044       Open Manhole       1350       \$1.008       86.706       375       \$1.007       86.706       225				Open	Manhole	1200	S3.001	87.600	225	s3.000	87.600	23	25
SS6.4       88.750       1.429       Open Manhole       1200       \$1.004       87.327       225       \$1.003       87.327       225         \$3.002       87.321       225       \$3.002       87.321       225         \$3.65       88.750       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.004       67.255       225         \$3.66       88.750       1.551       Open Manhole       1200       \$1.006       87.199       225       \$1.005       87.199       225         \$3.67       88.750       1.982       Open Manhole       1200       \$1.007       86.768       225       \$1.006       87.199       225         \$3.67       88.750       1.982       Open Manhole       1200       \$1.007       86.768       225       \$1.006       87.168       225         \$3.68       88.750       2.044       Open Manhole       1350       \$1.008       86.706       375       \$1.007       86.706       225	SS8.2	89.000	1.545	Open	Manhole	1200	\$3.002	87.455	225	S3.001	87.455	23	25
state       state <td< td=""><td>SS9.0</td><td>89.000</td><td>1.125</td><td>Open</td><td>Manhole</td><td>1200</td><td>S4.000</td><td>87.875</td><td>225</td><td></td><td></td><td></td><td></td></td<>	SS9.0	89.000	1.125	Open	Manhole	1200	S4.000	87.875	225				
S86.5         88.750         1.496         Open Manhole         1200         \$1.005         87.255         225         \$1.004         87.255         225           \$36.7         88.750         1.551         Open Manhole         1200         \$1.005         87.255         225         \$1.004         87.255         225           \$36.7         88.750         1.551         Open Manhole         1200         \$1.006         87.199         225         \$1.005         87.199         225           \$36.7         88.750         1.982         Open Manhole         1200         \$1.007         86.766         225         \$1.006         87.168         225         400           \$35.4         88.750         2.044         Open Manhole         1350         \$1.008         86.706         375         \$1.007         86.706         225	SS6.4	88.750	1.429	Open	Manhole	1200	S1.004	87.327	225	S1.003	87.327		
88.55       88.750       1.496       Open Manhole       1200       \$1.005       87.255       225       \$1.004       87.255       225         83.6.6       88.750       1.551       Open Manhole       1200       \$1.006       87.199       225       \$1.005       87.199       225         85.7       88.750       1.982       Open Manhole       1200       \$1.007       86.768       225       \$1.006       87.168       225         85.7       88.750       2.044       Open Manhole       1350       \$1.008       86.706       375       \$1.007       86.706       225													
SS6.6         88.750         1.551         Open Manhole         1200         \$1.006         87.199         225         \$1.005         87.199         225           \$86.7         88.750         1.982         open Manhole         1200         \$1.007         86.768         225         \$1.006         87.199         225           \$85.7         88.750         1.982         open Manhole         1200         \$1.007         86.768         225         \$1.006         87.168         225         40           \$85.7         88.750         2.044         open Manhole         1350         \$1.008         86.706         375         \$1.007         86.706         225										S4.000	87.761	2:	25 43
SS.7         88.750         1.982         Open Manhole         1200         \$1.007         86.768         225         \$1.006         \$7.168         225         40           SS.4         88.750         2.044         Open Manhole         1350         \$1.008         86.706         375         \$1.007         86.706         225         40	SS6.5	88.750	1.496	Open	Manhole	1200	S1.005	87.255	225	S1.004	87.255	23	25
S5.4 88.750 2.044 Open Manhole 1350 S1.008 86.706 375 S1.007 86.706 225	SS6.6	88.750	1.551	Open	Manhole		1	87.199	225	S1.005	87.199	23	25
	SS6.7	88.750	1.982	Open	Manhole	1200	S1.007	86.768	225	S1.006	87.168	2:	25 40
S 88.000 1.344 Open Manhole 0 OUTFALL S1.008 86.656 375	SS5.4	88.750	2.044	Open	Manhole	1350	S1.008	86.706	375	S1.007	86.706	2:	25
	S	88.000	1.344	Open	Manhole	0		OUTFALL		S1.008	86.656	31	75

Barrett Mahony Consulting Eng		Page 4
12 Mill Street		
London		
SE1 2AY		Micco
Date 16/01/2020 16:38	Designed by Tmachale	Drainage
File Surface C2.mdx	Checked by	uramaye
XP Solutions	Network 2018.1	

#### PIPELINE SCHEDULES for Storm

#### <u>Upstream Manhole</u>

PN		Diam (mm)			I.Level I (m)	D.Depth (m)		H Nection	H DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Conne	ection	(mm)
S1.000	) 0	225	SS6.0	88.500	87.775	0.500	Open M	Ianhole	1200
S1.001	. 0	225	SS6.1	89.000	87.712	1.063	Open M	Ianhole	1200
S2.000	) o	225	SS7.0	88.750	87.625	0.900	Open M	íanhole	1200
s1.002	2 0	225	SS6.2	88.600	87.526	0.849	Open M	Ianhole	1200
S1.003	8 0	225	SS6.3	88.750	87.424	1.101	Open M	íanhole	1200
S3.000	) 0	225	SS8.0	88.500	87.775	0.500			1200
S3.001	. 0	225	SS8.1	88.800	87.600				1200
S3.002	2 0	225	SS8.2	89.000	87.455	1.320	Open M	Ianhole	1200
S4.000	) 0	225	SS9.0	89.000	87.875	0.900	Open M	<i>ianhole</i>	1200
S1.004	0	225	SS6.4	88.750	87.327	1.198	Open M	ianhole	1200
S1.005	i o	225	SS6.5	88.750	87.255	1.270	Open M	Ianhole	1200
S1.006	6 o	225	SS6.6	88.750	87.199	1.326	Open M	íanhole	1200
S1.007	' o	225	SS6.7	88.750	86.768	1.757	Open M	íanhole	1200
S1.008	8 0	375	SS5.4	88.750	86.706	1.669	Open M	íanhole	1350
				Downs	stream M	lanhole			
PN	Length (m)	Slope			stream M . I.Level (m)		n	MH	MH DIAM., L*W (mm)
	(m)	(1:X)	Name	C.Level (m)	. I.Level (m)	D.Deptl (m)	n Coni	nection	(mm)
51.000	(m) 15.871	(1:X)	Name SS6.1	C.Level (m) 89.000	. I.Level (m) 87.712	D.Deptl (m)	n Coni 3 Open	<b>nection</b> Manhole	(mm) 1200
s1.000	(m) 15.871	(1:X)	Name SS6.1	C.Level (m) 89.000	. I.Level (m) 87.712	D.Deptl (m)	n Coni 3 Open	nection	(mm) 1200
s1.000 s1.001	(m) 15.871 25.105	(1:X) 250.0 135.5	Name SS6.1 SS6.2	C.Level (m) 89.000 88.600	(m) 87.712 87.526	D.Deptl (m) 1.063	n Coni 3 Open 9 Open	<b>nection</b> Manhole	(mm) 1200 1200
PN \$1.000 \$1.001 \$2.000 \$1.002	(m) 15.871 25.105 19.747	(1:X) 250.0 135.5 250.0	Name 5 SS6.1 5 SS6.2 5 SS6.2	C.Level (m) 89.000 88.600 88.600	<ul> <li>I.Level         <ul> <li>(m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> </ul> </li> </ul>	D.Deptl (m) 1.063 0.849	n Coni 3 Open 9 Open 9 Open	<b>Manhole</b> Manhole Manhole	(mm) 1200 1200 1200
s1.000 s1.001 s2.000 s1.002	(m) 15.871 25.105 19.747 25.568	(1:X) 250.0 135.5 250.0 250.0	Name 5 SS6.1 5 SS6.2 5 SS6.2 5 SS6.2 5 SS6.3	C.Level (m) 89.000 88.600 88.600 88.600	. I.Level (m) 87.712 87.526 87.546 87.546	D.Deptl (m) 1.063 0.842 0.823	n Coni 3 Open 9 Open 9 Open 1 Open	Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200
s1.000 s1.001 s2.000 s1.002 s1.003	(m) 15.871 25.105 19.747 25.568 24.233	(1:X) 250.0 135.5 250.0 250.0 250.0	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.3</li> <li>SS6.4</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> </ul>	D.Deptl (m) 1.063 0.849 0.829 1.109	Coni 3 Open 9 Open 9 Open 1 Open 3 Open	Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200
51.000 51.001 52.000 51.002 51.003 53.000 53.001	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.750 88.800 89.000	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> <li>87.600</li> <li>87.455</li> </ul>	D.DeptJ (m) 1.063 0.842 1.103 1.103 1.103 1.103 1.324	Coni 3 Open 9 Open 9 Open 1 Open 3 Open 5 Open 0 Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200
51.000 51.001 52.000 51.002 51.003 53.000 53.001	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.750 88.800 89.000	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> <li>87.600</li> <li>87.455</li> </ul>	D.DeptJ (m) 1.063 0.842 1.103 1.103 1.103 1.103 1.324	Coni 3 Open 9 Open 9 Open 1 Open 3 Open 5 Open 0 Open	Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200
S1.000 S1.001 S2.000 S1.002 S1.003 S3.000 S3.001 S3.002	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067 30.147	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0 225.0	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> <li>SS6.4</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.800 89.000 88.750	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> <li>87.600</li> <li>87.455</li> <li>87.321</li> </ul>	D.Deptl (m) 1.066 0.84 1.100 1.199 0.979 1.320	n Conn 3 Open 9 Open 9 Open 1 Open 3 Open 5 Open 0 Open 4 Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 120
S1.000 S1.001 S2.000 S1.002 S1.003 S3.000 S3.001 S3.002 S4.000	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067 30.147 22.744	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0 225.0 199.5	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.800 89.000 88.750	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.424</li> <li>87.420</li> <li>87.600</li> <li>87.600</li> <li>87.455</li> <li>87.321</li> <li>87.761</li> </ul>	D.Deptl (m) 1.063 0.842 1.103 1.199 0.977 1.329 1.200 0.765	Coni 3 Open 9 Open 9 Open 1 Open 3 Open 5 Open 0 Open 4 Open 4 Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
s1.000 s1.001 s2.000	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067 30.147 22.744 18.125	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0 225.0 199.5 250.0	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> <li>SS6.4</li> <li>SS8.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.750 88.750 88.750 88.750	<ul> <li>I.Level (m)</li> <li>87.712</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> <li>87.600</li> <li>87.455</li> <li>87.321</li> <li>87.321</li> <li>87.761</li> <li>87.255</li> </ul>	D.Deptl (m) 1.06 0.84 1.10 1.19 0.97 1.32 1.20 0.76 1.27	Com Com Open Open Open Open Open Open Open Open Open Open Open Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200
51.000 51.001 52.000 51.002 51.003 53.000 53.001 53.002 54.000 51.004	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067 30.147 22.744 18.125 13.959	(1:X) 250.0 135.5 250.0 250.0 250.0 200.0 200.0 200.0 200.0 200.0 250.0 200.0 25	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> <li>SS6.4</li> <li>SS8.4</li> <li>SS8.2</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.5</li> <li>SS6.6</li> </ul>	C.Level (m) 89.000 88.600 88.600 88.750 88.750 88.800 89.000 89.000 88.750 88.750 88.750	I.Level (m)           87.712           87.526           87.546           87.546           87.546           87.546           87.546           87.546           87.546           87.546           87.546           87.546           87.547           87.600           87.424           87.761           87.761           87.255           87.199	D.Deptl (m) 1.063 0.84 1.100 1.109 1.200 0.979 1.320 0.760 1.277 1.329	Coni Coni Open Open Open Open Open Open Open Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200
51.000 51.001 52.000 51.002 51.003 53.000 53.002 54.000 51.004 51.005	(m) 15.871 25.105 19.747 25.568 24.233 34.941 29.067 30.147 22.744 18.125 13.959 7.633 15.533	(1:X) 250.0 135.5 250.0 250.0 250.0 20	<ul> <li>Name</li> <li>SS6.1</li> <li>SS6.2</li> <li>SS6.3</li> <li>SS6.4</li> <li>SS8.1</li> <li>SS8.2</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.4</li> <li>SS6.5</li> <li>SS6.6</li> <li>SS6.6</li> <li>SS6.4</li> </ul>	C.Level (m) 89.000 88.600 88.750 88.750 88.800 88.750 88.750 88.750 88.750 88.750	<ul> <li>I.Level (m)</li> <li>87.512</li> <li>87.526</li> <li>87.546</li> <li>87.424</li> <li>87.327</li> <li>87.600</li> <li>87.455</li> <li>87.321</li> <li>87.321</li> <li>87.761</li> <li>87.255</li> <li>87.168</li> <li>86.706</li> </ul>	D.Deptl (m) 1.063 0.844 0.824 1.103 1.197 0.979 1.322 1.200 0.766 1.277 1.324 1.324 1.325 1.815	Con Con Open Open Open Copen Copen Open Open Open Copen Copen Open Open Open Open Open	Manhole Manhole Manhole Manhole Manhole Manhole Manhole Manhole Manhole	(mm) 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200

12 Mill Street London SE1 2AY Micro Date 16/01/2020 16:38 Designed by Tmachale Drainage File Surface C2.mdx Checked by Network 2018.1 Area Summary for Storm Pipe PIMP PIMP PIMP Gross Imp. Pipe Total Number Type Name (%) Area (ha) Area (ha) (ha) 1.000 - - 100 0.070 1.001 - - 100 0.000 0.000 0.000 2.000 - - 100 1.002 - - 100 0.106 0.106 0.106 0.044 0.044 0.044 1.003 - - 100 0.058 0.058 0.159 0.159 0.000 0.000 0.000 0.000 0.000 0.000 4.000 - - 100 0.202 0.202 0.000 0.000 0.100 0.100 1.006 - - 100 0.065 1.007 - - 100 0.033 0.033 0.033 1.008 - - 100 0.000 0.000 0.000 Total Total Total 0.837 0.837 0.837

Barrett Mahony Consulting Eng

Barrett Mahony Consulting Eng Page 6 12 Mill Street London SE1 2AY Date 16/01/2020 16:38 Designed by Tmachale Checked by XP Solutions Network 2018.1  Network Classifications for Storm  Nume Dia Depth Depth (mm) (m) (m) (m) (m) (m) (m) (m) (m) S1.000 S66.0 225 0.500 1.063 Unclassified 1200 0 0.500 Unclassified S1.001 S86.1 225 0.549 1.063 Unclassified 1200 0 0.0600 Unclassified S1.001 S86.2 225 0.649 1.061 Unclassified 1200 0 0.0600 Unclassified S1.001 S86.2 225 0.649 1.010 Unclassified 1200 0 0.0600 Unclassified S1.003 S86.3 225 1.101 1.198 Unclassified 1200 0 0.0600 Unclassified S3.001 S86.2 225 0.649 1.101 Unclassified 1200 0 0.0600 Unclassified S3.001 S86.2 225 0.649 1.101 Unclassified 1200 0 0.0900 Unclassified S3.001 S86.2 225 0.500 0.975 Unclassified 1200 0 0.975 Unclassified S3.001 S86.2 225 0.764 0.900 Unclassified 1200 0 0.101 Unclassified S3.001 S86.2 225 0.764 0.900 Unclassified 1200 0 0.101 Unclassified S3.001 S86.2 225 0.764 0.900 Unclassified 1200 0 0.975 Unclassified S3.001 S86.2 225 0.764 0.900 Unclassified 1200 0 0.900 Unclassified S3.001 S86.2 225 1.201 1.320 Unclassified 1200 0 0.900 Unclassified S3.001 S86.4 275 1.109 1.270 Unclassified 1200 0 1.270 Unclassified S3.001 S86.4 275 1.126 1.326 Unclassified 1200 0 1.270 Unclassified S3.001 S86.4 275 1.276 1.326 Unclassified 1200 0 1.320 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.001 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.000 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.000 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.000 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.000 S86.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S3.000 S86.4 375 0.969 1.669	
London SE1 2AY         Designed by Tmachale Checked by         Designed by Tmachale Checked by           XP Solutions         Network 2018.1           Determined for the second by Network 2018.1           Network 2018.1           Determined for the second by Name Dia Depth Depth (mm) (mm) (mm) (mm) (mm)           Not Wild Pipe Min Cover Max Cover Pipe Type Min Mit Mit Mit Mit Ring Mit Type Dia Wildt Depth (mm) (mm) (mm) (mm) (mm) (mm) (mm) (mm	
SE1 2AY         Designed by Tmachale Checked by         Designed by Tmachale Checked by           YP Solutions         Network 2018.1           Deteigned by Tmachale Checked by           Network 2018.1           Deteigned by Tmachale Checked by           Network 2018.1           Deteigned by Tmachale Checked by           Network 2018.1           Stonom 200 molassified 1200         0           Network 2018.1           Network 2018.1           Network 2018.1           Network 2018.1           Network 2018.1           Network 200 <th cols<="" td=""></th>	
Date 16/01/2020 16:38       Designed by Tmachale Checked by         File Surface C2.mdx       Network 2018.1         Designed by Tmachale Checked by         Network 2018.1         Network 2018.1         Network Classifications for Storm         FN USME Pipe Min Cover Max Cover Pipe Type Min	
File Surface C2.mdx       Checked by         XP Solutions       Network 2018.1         Detwork Classifications for Storm         Metwork Classifications for Storm         Physical Depth Min Cover Max Cover Pipe Type Mi MH MH MH Ring MH Type Dia Wicht Depth (mm) (m) (m) (m) (m) (m)         Signal Depth Depth (mm) (mm) (mm) (mm) (m)         Signal Depth (mm) (m) (m) (m)         Signal Depth (mm) (m) (m)         Signal Depth (mm) (m) (m)         Signal Depth (mm) (mm) (mm) (mm)         Signal Depth (mm) (m) (mm)         Signal Depth (mm) (mm) (mm)         Signal Depth (mm) (mm) (mm)         Signal Depth (mm) (mm)<	
XP Solutions         Network 2018.1           Network Classifications for Storm           FN USMH Pipe Min Gover Max Cover Pipe Type MH MH MH MH Ring MH Type Dia Width Depth (mm) (m) (m) (m) (m) (m) (m) (m) (m) (m	
Network Classifications for Storm           PN         USHH         Pipe Min Cover Max Cover Pipe Type Dia Width Depth (mm) (mm) (m)         MH MH MH Ring MH Type Dia Width Depth (mm) (mm) (m)           \$1.000 S56.0 225 0.500 1.063 Unclassified 1200 0 0.500 Unclassified \$2.000 S7.0 225 0.849 1.063 Unclassified 1200 0 0.960 Unclassified \$2.000 S86.2 225 0.849 1.010 Unclassified 1200 0 0.960 Unclassified \$3.001 S86.3 225 1.101 1.198 Unclassified 1200 0 0.960 Unclassified \$3.001 S88.1 225 0.975 1.320 Unclassified 1200 0 0.970 Unclassified \$3.001 S88.1 225 0.975 1.320 Unclassified 1200 0 0.970 Unclassified \$3.002 S88.2 225 1.204 1.320 Unclassified 1200 0 0.970 Unclassified \$3.003 S85.1 225 0.764 0.900 Unclassified 1200 0 1.320 Unclassified \$3.003 S85.6 225 1.204 1.320 Unclassified 1200 0 1.320 Unclassified \$3.005 S95.0 225 0.764 0.900 Unclassified 1200 0 1.320 Unclassified \$3.005 S85.5 225 1.270 1.326 Unclassified 1200 0 1.320 Unclassified \$3.007 S85.7 225 1.777 Unclassified 1200 0 1.320 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S85.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified \$3.008 S80 S00 S00 S00 S00 S00 S00 S	
PN         USHH         Pipe         Max         Cover         Max         <	
Name         Dia (m)         Depth (m)         Depth (m)         Dia (m)         Width (m)         Depth (m)           S1.000         SS6.1         225         0.500         1.063         Unclassified         1200         0         0.500         Unclassified           S1.000         SS6.1         225         0.849         1.063         Unclassified         1200         0         0.900         Unclassified           S2.002         SS6.2         225         0.849         1.011         Unclassified         1200         0         0.900         Unclassified           S3.002         SS8.2         225         0.501         0.975         Unclassified         1200         0         0.975         Unclassified           S3.002         SS8.2         225         1.204         1.320         Unclassified         1200         0         0.975         Unclassified           S4.002         SS6.5         225         1.274         Unclassified         1200         0         1.320         Unclassified           S1.005         SS6.5         225         1.326         Unclassified         1200         0         1.270         Unclassified           S1.006         S56.5         225         1.7	
(mm)         (m)         (mm)	
<pre>S1.000 SS6.0 225 0.500 1.063 Unclassified 1200 0 1.063 Unclassified S1.001 SS6.1 225 0.849 1.063 Unclassified 1200 0 0.900 Unclassified S2.000 SS7.0 225 0.829 0.900 Unclassified 1200 0 0.900 Unclassified S1.003 SS6.3 225 0.849 1.101 Unclassified 1200 0 0.849 Unclassified S1.003 SS6.3 225 1.101 1.199 Unclassified 1200 0 0.101 Unclassified S3.000 SS8.0 225 0.500 0.975 Unclassified 1200 0 0.500 Unclassified S3.001 SS8.1 225 0.975 1.320 Unclassified 1200 0 0.975 Unclassified S3.002 SS8.2 225 1.204 1.320 Unclassified 1200 0 1.320 Unclassified S4.000 SS9.0 225 0.764 0.900 Unclassified 1200 0 1.320 Unclassified S1.004 SS6.4 225 1.198 1.271 Unclassified 1200 0 1.270 Unclassified S1.005 SS6.5 225 1.270 1.326 Unclassified 1200 0 1.270 Unclassified S1.006 SS6.6 225 1.326 1.357 Unclassified 1200 0 1.270 Unclassified S1.006 SS6.7 225 1.757 1.819 Unclassified 1200 0 1.326 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Unclassified S1.008 SS 5.4 375 0.969 1.669 Unclassified 1350 0 1.669 Uncla</pre>	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe Number       Name       (m)       (m)       I. Level (mmn) (mmn) (m)         S1.008       S       88.000       86.656       86.700       0       0         Simulation       Criteria       for       Storm         Volumetric       Runoff Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal       Reduction       Factor       1.000       MADD Factor       10m²/ha       Storage       2.000         Hot       Start       (mm)       0       Flow       Person per Day       0.800         Manhole       Headloss       Coeff (Global)       0.500       Run Time (mins)       60         Foul       Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of       Input Hydrographs       0       Number of Storage       Structures 1         Number of       Online       Controls       1       Number of       Time/Area       Diagrams	
Outfall       Outfall C. Level I. Level       Min       D,L       W         Pipe       Number       Name       (m)       I. Level       (mm)       (mm)         S1.008       S       88.000       86.656       86.700       0       0         S1.008       S       88.000       86.656       86.700       0       0         Volumetric Runoff       Coeff       0.750       Additional Flow       % of Total Flow       0.000         Areal Reduction Factor 1.000       MADD Factor * 10m*/ha Storage 2.000       Number Start (mins)       0       Inlet Coefficient 0.800         Hot Start (mins)       0       Inlet Coefficient 0.800       Run Time (mins)       60         Foul Sewage per hectare (1/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0 Number of Storage Structures 1       Number of Online Controls 1       Number of Time/Area Diagrams 7	
Pipe Number Name       (m)       (m)       I. Level (mm)       (mm)         S1.008       S       88.000       86.656       86.700       0       0         S1.008       S       88.000       86.656       86.700       0       0         S1.008       S       88.000       86.656       86.700       0       0         Simulation Criteria for Storm       Simulation Criteria for Storm       0       0       0         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow 0.000       0.000         Areal Reduction Factor 1.000       MADD Factor * 10m³/ha Storage 2.000       0.000         Hot Start (mins)       0       Inlet Coefficcient 0.800         Hot Start (mins)       0       Inlet Coefficcient 0.800         Hot Start Level (mm)       0 Flow per Person per Day (1/per/day) 0.000         Manhole Headloss Coeff (Global) 0.500       Run Time (mins)       60         Foul Sewage per hectare (1/s) 0.000       Output Interval (mins)       1         Number of Input Hydrographs 0 Number of Storage Structures 1       Number of Online Controls 1       Number of Time/Area Diagrams 7	
(m) S1.008 S 88.000 86.656 86.700 0 0 <u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m <sup>3</sup> /ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
S1.008 S 88.000 86.656 86.700 0 0 Simulation Criteria for Storm Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
Simulation Criteria for Storm         Volumetric Runoff Coeff 0.750       Additional Flow - % of Total Flow 0.000         Areal Reduction Factor 1.000       MADD Factor * 10m*/ha Storage 2.000         Hot Start (mins)       0         Inlet Coefficient 0.800         Hot Start Level (mm)       0 Flow per Person per Day (1/per/day) 0.000         Manhole Headloss Coeff (Global) 0.500       Run Time (mins)       60         Foul Sewage per hectare (1/s) 0.000       Output Interval (mins)       1         Number of Input Hydrographs 0 Number of Storage Structures 1       Number of Online Controls 1 Number of Time/Area Diagrams 7	
Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
Areal Reduction Factor 1.000       MADD Factor * 10m³/ha Storage 2.000         Hot Start (mins)       0       Inlet Coefficient 0.800         Hot Start Level (mm)       0 Flow per Person per Day (1/per/day) 0.000         Manhole Headloss Coeff (Global) 0.500       Run Time (mins)       60         Foul Sewage per hectare (1/s) 0.000       Output Interval (mins)       1         Number of Input Hydrographs 0 Number of Storage Structures 1       Number of Online Controls 1 Number of Time/Area Diagrams 7	
Areal Reduction Factor 1.000       MADD Factor * 10m³/ha Storage 2.000         Hot Start (mins)       0       Inlet Coefficient 0.800         Hot Start Level (mm)       0 Flow per Person per Day (1/per/day) 0.000         Manhole Headloss Coeff (Global) 0.500       Run Time (mins)       60         Foul Sewage per hectare (1/s) 0.000       Output Interval (mins)       1         Number of Input Hydrographs 0 Number of Storage Structures 1       Number of Online Controls 1 Number of Time/Area Diagrams 7	
Hot Start (mins)       0       Inlet Coefficient 0.800         Hot Start Level (mm)       0 Flow per Person per Day (1/per/day) 0.000         Manhole Headloss Coeff (Global) 0.500       Run Time (mins)       60         Foul Sewage per hectare (1/s) 0.000       Output Interval (mins)       1         Number of Input Hydrographs 0 Number of Storage Structures 1       Number of Online Controls 1 Number of Time/Area Diagrams 7	
Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 7	
Number of Online Controls 1 Number of Time/Area Diagrams 7	
Number of Offline Controls 0 Number of Real Time Controls 0	
Synthetic Rainfall Details	
Rainfall Model FSR Profile Type Summer Return Period (years) 100 Cv (Summer) 0.750	
Region England and Wales Cv (Winter) 0.840	
M5-60 (mm) 14.000 Storm Duration (mins) 30	
Ratio R 0.300	
©1982-2018 Innovyze	

12 Mill St: London SE1 2AY Date 16/01, File Surfac XP Solution	/2020 16:3 ce C2.mdx						
SE1 2AY Date 16/01, File Surfac	ce C2.mdx						-
Date 16/01, File Surfa	ce C2.mdx						and the second
File Surfa	ce C2.mdx	0	Destaura	1 1. m 1	1 .		Micro
		8	-	l by Tmach	nale		Drain
XP Solution	1.5		Checked				
			Network	2018.1			
Hvdro-H	Brake® Opt		ne Controls			lume (m	<sup>3</sup> ): 2.5
ROBRAKE		/ U1	nit Reference	MD-SHE-00	75-2500-10	0 <b>-</b> 2500	
FED TO 2.5		De	sign Head (m)			1.000	
120102.3	L/3	Desid	gn Flow (l/s) Flush-Flo™		Cal	2.5 culated	
				Minimise			
			Application			Surface	
			ump Available			Yes	
			Diameter (mm) ert Level (m)			75 86.768	
	Minimum (		Diameter (mm)			100	
	Suggest	ted Manhole I	Diameter (mm)			1200	
		Control	Points	Head (m) H	flow (l/s)		
	D	esign Point	(Calculated)	1.000	2.5		
			Flush-Flo <sup>TH</sup> Kick-Flo®		2.5		
	М	ean Flow ove	r Head Range		2.0		
Hydro-Brak	e® Optimum a	as specified	e been based . Should ano	ther type	of control	device of	her tha
Hydro-Brak	e® Optimum : e Optimum®	as specified		ther type	of control	device of	ther that
Hydro-Brak Hydro-Brak invalidate	e® Optimum e Optimum® 1 d	as specified be utilised	. Should ano	ther type orage rout	of control ing calcula	device ot ations wil	ther that the
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100	e® Optimum a e Optimum® d d Flow (l/s) 2.1	Depth (m) F	. Should ano then these st Clow (1/s) Dep 2.7	orage rout orage rout orth (m) Flo 3.000	of control ing calcula ow (l/s) De 4.1	device ot ations wil epth (m) 1 7.000	ther tha 11 be Flow (1,
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100 0.200	e® Optimum A e Optimum® 1 d Flow (1/s) 2.1 2.4	Depth (m) F	. Should ano then these st Clow (1/s) Dep 2.7 2.9	orage rout orage rout orth (m) Flo 3.000 3.500	of control ing calcula ow (1/s) De 4.1 4.5	device ot ations wil epth (m) 1 7.000 7.500	ther tha .1 be Flow (1,
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100 0.200 0.300	<pre>e® Optimum . e Optimum 1 d  Flow (1/s) 2.1 2.4 2.5</pre>	Depth (m) F 1.200 1.400 1.600	. Should ano then these st 'low (1/s) Der 2.7 2.9 3.1	ther type orage rout (m) Flo 3.000 3.500 4.000	of control ing calcula ow (1/s) De 4.1 4.5 4.7	device ot ations wil epth (m) 1 7.000 7.500 8.000	ther tha .1 be Flow (1, ( (
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100 0.200	<pre>e® Optimum { e Optimum { f e f e f e f e f e f e f e f e f e f</pre>	as specified be utilised 1.200 1.400 1.600 1.800	. Should ano then these st low (1/s) Deg 2.7 2.9 3.1 3.3	orage rout orage rout orth (m) Flo 3.000 3.500	of control ing calcula ow (1/s) De 4.1 4.5	device ot ations wil epth (m) 1 7.000 7.500	ther that 1 be Flow (1,
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100 0.200 0.300 0.400 0.500 0.600	e® Optimum 1 e Optimum 1 d Flow (1/s) 2.1 2.4 2.5 2.5 2.5 2.4 2.1	<pre>as specified be utilised Depth (m) F 1.200 1.400 1.600 1.800 2.000 2.200</pre>	. Should ano then these st low (1/s) Deg 2.7 2.9 3.1 3.3 3.4 3.6	ther type orage rout oth (m) Flo 3.000 3.500 4.000 4.500 5.000 5.500	of control ing calcula ow (1/s) De 4.1 4.5 4.7 5.0 5.3 5.5	device ot ations wil epth (m) 1 7.000 7.500 8.000 8.500	ther that I be Flow (1,
Hydro-Brak Hydro-Brak invalidate Depth (m) 0.100 0.200 0.300 0.400 0.500	e® Optimum a e Optimum 1 d Flow (1/s) 2.1 2.4 2.5 2.5 2.5 2.4 2.1 2.4 2.1 2.3	as specified be utilised 1.200 1.400 1.600 1.600 2.000 2.200 2.400	. Should ano then these st low (1/s) Deg 2.7 2.9 3.1 3.3 3.4 3.6	ther type orage rout orage rout 3.000 3.500 4.000 4.500 5.000	of control ing calcula ow (1/s) De 4.1 4.5 4.7 5.0 5.0 5.3	device ot ations wil epth (m) 1 7.000 7.500 8.000 8.500 9.000	ther that 1 be Flow (1,

		ony Cons	ultin	g Eng	1					Pag	te 8
12 Mi	ll Str	eet								1 Sec.	
Londo										1	-
SE1 22										M	rin
Date 3	16/01/	2020 16:	38		Desig	ned b	/ Tmac	hale		in the	ainage
File :	Surfac	e C2.mdx			Check	ed by				EII.	amaye
XP So	lution	s			Netwo	rk 201	18.1				
				Storage	e Struct	ures	<u>tor St</u>	orm			
		Ta	nk or	Pond 1	Manhole:	SS6.	7, DS/	PN: S1.C	07		
				In	vert Leve	L (m) 8	86.768				
		Depth (	m) Are	a (m²)   I	Depth (m)	Area	(m²) Dej	pth (m) A:	rea (m²	)	
LL TA 00m <sup>2</sup>	NK	0.0	00	400.0	0.400	4(	0.0	0.401	0.	0	
	<u>Time</u>	Area Di	agram	for G	reen Roc	<u>f at</u>	Pipe N	umber Sl	.000	(Storm	<u>)</u>
		Depre	ession		(m³) 390 (mm) 10			(mm/day) fficient	3 0.050		
Time From:	(mins) To:	Area (ha)		(mins) To:	Area (ha)		(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.007087	32	36	0.001431	64	68	0.000289	96	100	0.000058
4		0.005802		4.0	0 001171	68	72	0.000237			0.000048
8		0.004751		44	0.000959	72	76	0.000194			0.000039
12		0.003889		48	0.000959 0.000785 0.000643	76	80	0.000159			0.000032
16		0.003184		52	0.000643	80	84	0.000130			0.000026
20		0.002607			0.000526			0.000106	116	120	0.000021
24		0.002133			0.000353			0.0000071			
	Time	Area Di	I			I		umber S2	000	(Storm	)
	11110	IILOG DI	<u>agran</u>		(m³) 106				3	100011	<u>_</u>
		Depre	ssion					efficient			
Time From:	(mins) To:	Area (ha)		(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.019262	32	36	0.003889	64	68	0.000785	96	100	0.000159
4	8	0.015771	36	4.0	0 003184	68	72	0 000643	100	104	0.000130
8		0.012912	40	44	0.002607	72	76	0.000526	104	108	0.000106
12		0.010571	44	48	0.002134	76	80	0.000352	108	112	0.000087
20		0.008655	48 52	52 56	0.001431	84	84 88	0.000526 0.000431 0.000353 0.000289	116	120	0.0000058
2.0		0.005802	56	60	0.001171	88	92	0.000236		120	
	32	0.004750	60	64	0.000959	92	96	0.000194			
28				for G:	reen Roc	fat	Pipe N	umber S3	.000	<u>(Storm</u>	<u>)</u>
28	<u>Time</u>	Area Di	agram								
28	<u>Time</u>				(m <sup>3</sup> ) 542				3		
28	<u>Time</u>							(mm/day) fficient			
28	<u>Time</u>										

barre	tt Mah	ony Cons	ultin	g Eng						Pag	je 9
12 Mi	ll Str	eet									
Londoi	n										
SE1 2/										100	the second
										Mi	011
Date :	16/01/	2020 16:	38		Desig	ned by	y Tmach	nale		10.0	ainadi
File :	Surfac	e C2.mdx			Check	ed by				DI	an iayi
XP So	lution	s			Netwo	rk 201	18.1				
	LUCION					276 200.					
	<u>Time</u>	Area Di	agram	for Gi	reen Roc	fat	Pipe N	umber S3	.000	(Storm	)
Time	(mins)	Area	Time	(mins)	Area		(mins)	Area		(mins)	Area
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.009849	32	36	0.001989	64	68	0.000401	96	100	0.00008
4	8	0.008064	36	40	0.001628	68	72	0.000329	100	104	0.00006
8	12	0.006602	40	44	0.001333	72	76	0.000269	104	108	0.00005
12		0.005405	44		0.001091	76		0.000220	108		0.00004
16		0.004426	48		0.000893	80		0.000180			0.00003
20		0.003623	52		0.000732	84		0.000148			0.00003
24		0.002967	56		0.000599			0.000140		120	5.00000
24		0.002967			0.000399			0.0000121			
			1			1			I		
	<u>Time</u>	Area Di	agram	for Gi	reen Roc	of at	Pipe N	umber S4	.000	(Storm	<u>)</u>
				Area	(m <sup>3</sup> ) 201	7 Evapo	pration	(mm/day)	3		
		Depre	ssion :	Storage	(mm) 1	0 De	ecay Coe	fficient	0.050		
Time From:	(mins) To:	Area	Time From:	(mins) To:	Area	Time From:	(mins) To:	Area	Time From:	(mins) To:	Area
From:	10:	(ha)	From:	10:	(ha)	From:	10:	(ha)	From:	10:	(ha)
0		0.036653	32		0.007400	64		0.001494	96		0.00030
4	8	0.030009	36	40	0.006059	68	72	0.001223	100	104	0.00024
8	12	0.024569	40	44	0.004960	72	76	0.001001	104	108	0.00020
12	16	0.020116	44	48	0.004061	76	80	0.000820	108	112	0.00016
16	20	0.016469	48	52	0.003325	80	84	0.000671	112	116	0.00013
20	24	0.013484	52	56	0.002722	84	88	0.000550	116	120	0.00011
24		0.011040	56		0.002229	88		0.000450			
28		0.009038			0.001825			0.000368			
	Time	Area Di	agram	for Gi	reen Roc	of at	Pipe N	umber S1	.005	(Storm	)
				Drop.	(m³) 100	0 Errono	ration	(mm (day)	3		_
		Depre	ssion :	Storage				fficient			
Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
					. ,			. ,			
0		0.018172	32		0.003669	64		0.000741	96		0.00015
4		0.014878	36		0.003004	68		0.000606	100		0.00012
8		0.012181	40		0.002459	72		0.000497	104		0.00010
12		0.009973	44		0.002014	76		0.000407	108		0.00008
	20	0.008165	48	52	0.001649	80	84	0.000333	112	116	0.00006
16	24	0.006685	52	56	0.001350	84	88	0.000272	116	120	0.00005
16 20		0.005473	56	60	0.001105	88	92	0.000223			
	28	0.0034/3			0.000905	92		0.000183			
20		0.003473	60	64							
20 24	32	0.004481	I			fat	Pipe N	umber Sl	.006	(Storm	)
20 24	32	0.004481	I	for Gi	reen Roc					<u>(Storm</u>	<u>)</u>
20 24	32	0.004481 <u>Area Di</u>	agram	for Gi	<u>reen Roc</u> (m³) 570	- Evapo	ration		3	<u>(Storm</u>	<u>)</u>
20 24	32	0.004481 <u>Area Di</u>	agram	<u>for G</u> i Area	<u>reen Roc</u> (m³) 570	- Evapo	ration	(mm/day)	3	<u>(Storm</u>	<u>)</u>

Barret	t Mah	ony Cons	ultin	g Eng						Pag	re 10
12 Mil	ll Str	eet									
Londor	1										
SE1 27											the start
		2020 16:	38		Desig	ned by	y Tmacl	hale		MI	uu
		e C2.mdx			Check		,			En C	ainage
XP Sol						rk 201	18 1				
AF 501	LUCION:	5			Netwo	IK ZU.	10.1				
	Time	Area Di	agram	for Gi	een Roo	fat	Pipe N	umber Sl	.006	(Storm	<u>)</u>
Time	(mins)	Area									
From:	To:	(ha)									
0	4	0.010358	32	36	0.002091	64	68	0.000422	96	100	0.000085
4		0.008480			0.001712	68		0.000346			0.000070
8		0.006943	40		0.001402			0.000283			0.000057
12		0.005685	44		0.001148			0.000232	108		0.000047
16		0.004654	48		0.000940			0.000190			0.000038
20		0.003811	52		0.000769			0.000155			0.000031
2.0		0.003120			0.000630			0.000133	1 110	120	5.0000J1
24		0.002554			0.000516			0.00012/			
			I			I			1		
	<u>Time</u>	Area Di	agram	for Gi	reen Roo	fat	Pipe N	umber Sl	.007	(Storm	<u>)</u>
					(m³) 330				3		
		Depre	ession	Storage	(mm) 10	De	cay Coe	fficient	0.050		
Time From:	(mins) To:	Area (ha)									
0	4	0.005997	32	26	0.001211	64	6.0	0.000244	96	1.0.0	0.000049
4		0.003997	36		0.0001211	68		0.000244			0.000049
		0.004910	40		0.000991				100		0.000033
12		0.004020	40		0.000612	72		0.000164			0.000033
16		0.003291	49		0.000544			0.000134			
20		0.002895			0.000344			0.0000110	116	120	0.000022
20		0.001806			0.000365			0.000074	110	120	0.000018
24		0.001808			0.000365			0.000060			
20	52	0.0014/5	00	04	0.000233	1 22	50	0.000000	I		
				∩1	982-2018	R Three	111170				
				OT.	202-2010	> TUUC	.vyze				

12 Mil		ony Consult	LING EI.	ig			Page 11
London							- Con-
							and the second second
SE1 2A							Micro
		2020 16:38			signed by Tm	lachale	Drainac
File S	urface	e C2.mdx		Ch	lecked by		Diamag
KP Sol	utions	3		Ne	etwork 2018.1	-	
1 vea	r Reti	urn Period	Summar	v of Ci	ritical Resul	lts bv Maximu	m Level (Rank 1
					or Storm		
					ation Criteria		
							otal Flow 0.000
		Hot Start	Level (	(mm)	0	Inlet Coe	a Storage 2.000 ffiecient 0.800
Ma			ff (Glok	oal) 0.50	00 Flow per Per		/per/day) 0.000
						Storage Structu	mag 1
		Number of	Online	Control	s 1 Number of	Time/Area Diagr	ams 7
		Number of	Offline	Control	s 0 Number of	Real Time Contr	ols O
		Delet 1	<u>S</u> 1 Model		: Rainfall Deta		
						Ratio R 0.3 Cv (Summer) 0.7	
			60 (mm)	DOOCLAIM		Cv (Winter) 0.8	
	Ma	argin for Flo	ood Risk	Warning	(mm)		100.0
		-	Anal			nd Increment (E	
					tatus		OFF
			-	DVD S nertia S	tatus		ON
			T	Hertia S	latus		ON
		P	rofile(s				and Winter
		Duration(	s) (mins			180, 240, 360, , 2160, 2880, 4	
						7200, 8	640, 10080
	Ret	urn Period(s					1, 30, 100
		Climate C	hange (%	:)			20, 20, 20
	US/MH		Return	Climate	First (X)	First (Y)	First (Z) Overflo
PN	Name				Surcharge	Flood	Overflow Act.
		240 Winter				100/240 Winter	
S1.001	SS6.1	240 Winter 240 Winter	1	+20%	30/600 Winter		
	SS7.0 SS6.2		1	+20%	30/480 Winter	100/240 Winter	
	SS6.2 SS6.3		1	+20% +20%	30/120 Winter		
		240 Winter	1	+20%	30/600 Winter	100/240 Winter	
		240 Winter	1	+20%	30/480 Winter	,	
S3.002	SS8.2	240 Winter	1	+20%	30/480 Winter		
		240 Winter			30/720 Winter		
S1.004	SS6.4	15 Winter	1		30/60 Winter		
S1.005	SS6.5	240 Winter	1		30/60 Summer 30/60 Winter		
ST.000	330.0 336 7	1440 Winter	1		30/60 Winter 30/120 Summer		
S1.007	SS5.4	240 Winter 240 Winter 1440 Winter 1440 Winter	1				
S1.007 S1.008							
S1.007 S1.008							
s1.007 s1.008					2018 Innovyz		

# RESULTS FOR 1-in-1 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

エンエエエ ひしし	ceet	OHSUIC	ing Eng						Page 12
ndon									
L 2AY									THE A
te 16/01/	2020	16:38		Design	ned by	Tmachal	2		MILLIO
le Surfac				Checke	-		-		Drainage
Solution		1110423			ck 2018	2 1			
50140101	13			NECMOI	. K ZUIC	).1			
vear Ret	urn P	eriod :	Summarv of	Critic	cal Re:	sults bv	Maxi	mum Lev	vel (Rank 1)
				for S					
			Gumahamaa d	Tleaded			Dime		
	US/MH	Level	Surcharged Depth		Flow /	Overflow	Pipe Flow		Level
PN	Name		(m)	(m <sup>3</sup> )	Cap.			Status	Exceeded
			0.001						
		87.799 87.730		0.000			0.8	OK OK	18
		87.664		0.000			2.0	OK	
		87.583		0.000			4.3	OK	
		87.513					9.8	OK	
		87.801	-0.199	0.000	0.03		1.0		18
		87.626	-0.199	0.000	0.03		1.0		
		87.481		0.000			1.0		
		87.926		0.000			3.9		
		87.416		0.000			9.7		
S1.005	SS6.5	87.350		0.000			10.6	OK	
S1.006	SS6.6	87.304		0.000			11.6	OK	
S1.007	SS6.7	86.922	-0.071	0.000	0.08		2.3	OK	
S1.008	SS5.4	86.745	-0.336	0.000	0.02		2.3	OK	
								1	
			NF	TWOR		s			
				TWOR					
			NC	OT FLO	OD OF				
			NC		OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				
			NC	OT FLO	OD OF				

			Consult	ing En	g			Pa	ge 13
	l Stre	et							
london									-
SE1 2A	Y							8.4	icin
ate 1	6/01/2	2020	16:38		De	signed by Tr	machale		
'ile S	urface	e C2.	mdx		Ch	ecked by		-01	anay
P Sol	utions	3			Ne	twork 2018.	1		
<u>30 yea</u>	ar Ret	urn H	Period	Summai	ry of C	ritical Resu	ults by Maxi	mum Level	(Rank 1
					f	<u>or Storm</u>			
					Simul	ation Criteria			
		Area	1 Reduct	cion Fac		0 Additiona		Total Flow (	.000
			Hot St	art (mi	ns)	0 MADD 0	Factor * 10m³/	ha Storage 2	.000
					oal) 0.50 ./s) 0.00	00 Flow per Pe	rson per Day (	1/per/day) (	.000
	LOUT D	oraye	Net Her	Scare (1	.,., 0.00				
						s 0 Number of			
						s 1 Number of			
		Num	iber of	Offline	Control	s 0 Number of	Real Time Con	trols U	
				S	vnthetic	Rainfall Deta	ails		
		1	Rainfal	l Model		FSR		300	
					Scotland	d and Ireland			
			M5-4	50 (mm)		14.000	Cv (Winter) 0.	840	
	Ma	argin	for Flo	od Risk	Warning	(mm)		100.0	
						estep 2.5 Seco	ond Increment		
						tatus		OFF	
				т	DVD S nertia S	tatus		ON ON	
				T	nertia S	latus		ON	
				ofile(s		20 60 100		and Winter	
		Dui	ration(s	s) (mins		, 30, 60, 120, 720, 960, 1440			
						120/ 000/ 2110		8640, 10080	
	Retu			(years				1, 30, 100	
		Cli	imate Ch	nange (%	)			20, 20, 20	
	US/MH					First (X)		First (Z)	
PN	Name	S	torm	reriod	Change	Surcharge	Flood	Overflow	Act.
s1.000	SS6.0	1440	Winter	30	+20%	30/600 Winter	100/240 Winte	er	
S1.001	SS6.1	1440	Winter Winter	30		30/600 Winter			
			Winter Winter			30/480 Winter 30/480 Winter			
			Winter			30/480 Winter 30/120 Winter			
	SS8.0	1440	Winter	30	+20%	30/600 Winter	100/240 Winte	er	
	SS8.1	1440	Winter	30	+20%	30/480 Winter			
	SS8.2	1440	Winter	30	+20%	30/480 Winter			
		1440	Winter	30	+20%	30/60 Winter			
	SS9.0	7230	Winter	30	+20%	30/60 Summer			
	SS9.0 SS6.4 SS6.5	1440			+20%	30/60 Winter			
	SS9.0 SS6.4 SS6.5 SS6.6	1440 1440	Winter	30					
	SS9.0 SS6.4 SS6.5 SS6.6 SS6.7	1440 1440 1440	Winter Winter	30 30	+20%	30/120 Summer			
	SS9.0 SS6.4 SS6.5 SS6.6 SS6.7 SS5.4	1440 1440 1440 1440	Winter Winter Winter	30 30 30	+20% +20%	30/120 Summer			
	SS9.0 SS6.4 SS6.5 SS6.6 SS6.6 SS6.7 SS5.4	1440 1440 1440 1440	Winter Winter Winter	30 30 30	+20% +20%	30/120 Summer			
	SS9.0 SS6.4 SS6.5 SS6.6 SS6.6 SS6.7 SS5.4	1440 1440 1440 1440	Winter Winter Winter	30 30 30	+20% +20%	30/120 Summer			

# RESULTS FOR 1-in-30 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

Mill St	root								Page 14
ndon									
1 2AY									and an
te 16/01	/2020	1 16.3	8	Deci	anod b	y Tmacha	10		Micro
le Surfa			5		ked by	-	тe		Drainago
		2.IIIUX			-				
Solutio	ons			Netw	ork 20	10.1			
l voar Ro	sturn	Perio	d Summary	of Cri	tical :	Regults	hv Ma	vimum Lou	el (Rank 1)
Year No	SCULII	I GI IO	a Summary		Storm	Nesurus	by Ma	AIMUM DEV	er (Rank r)
				<u></u>	000210				
		Water Level	Surcharged Depth		TT1 /	Overflow	Pipe		Level
	Name		Deptn (m)	(m <sup>3</sup> )	Cap.			Status	Exceeded
					-				1
S1.000				0.000				FLOOD RISK	18
S1.001				0.000				SURCHARGED	
S2.000				0.000				SURCHARGED	
S1.002 S1.003				0.000				SURCHARGED SURCHARGED	
SI.003 S3.000								SURCHARGED FLOOD RISK	18
S3.000 S3.001								SURCHARGED	10
S3.001 S3.002				0.000 0.000				SURCHARGED	
S4.0002				0.000				SURCHARGED	
S1.004				0.000				SURCHARGED	
S1.005				0.000				SURCHARGED	
S1.006								SURCHARGED	
S1.007				0.000	0.11			SURCHARGED	
S1.008			-0.331	0.000	0.03		3.1	OK	
							L		1
								1	
								7	
				VETWO		)FS			
				NOT FL					
				SURCH					
			F	PERMIS	SIBLE	IN			
			1	THIS ST	ORM				
				SIMULA	TION				
			Ľ						

Barret			onsult	ing Er	ıg				Pa	ge 15
12 Mil:	l Stre	eet								
London										-
SE1 2A	Y								N	irm
Date 1	6/01/2	2020	16:38		De	signed b	oy Tn	lachale		
File Su	irface	e C2.:	mdx		Ch	ecked by	7		D	i all iay
XP Solu	ations	3			Ne	twork 20	)18.1			
<u>100 y</u>	ear R	eturn	Perio	od Sumi		Critica for Stor		sults by Max	imum Leve	el (Ran)
		Hot Headlc ewage Numb Numb	Hot Start Start per heo er of I mber of	art (mi Level ) f (Glok ctare (] nput Hy Online	ctor 1.00 .ns) (mm) oal) 0.50 ./s) 0.00 drograph Control	0 M 00 Flow pe 00 s 0 Numbe s 1 Numbe	ional MADD H er Per r of r of	L Flow - % of ' Factor * 10m³/I Inlet Co rson per Day ( Storage Struct Time/Area Diag Real Time Cont	ha Storage : effiecient   l/per/day)   ures 1 rams 7	2.000 0.800
		Num	ber of						rols O	
		P		L Model	Scotland	d and Irel	FSR and C		750	
	Ma	argin	for Flc	Anal	Warning ysis Tim DTS S DVD S nertia S	estep 2.5 tatus tatus	Seco	nd Increment (	100.0 Extended) OFF ON ON	
		Dur		ofile(s ;) (mins	) 15			180, 240, 360 , 2160, 2880,		
	Ret			(years ange (%					1, 30, 100 20, 20, 20	
PN	US/MH Name					First ( Surchar		First (Y) Flood	First (Z) Overflow	
s1.000	SS6.0	1440	Winter	100	+20%	30/600 Wi	inter	100/240 Winte	r	
S1.001	SS6.1	1440	Winter	100	+20%	30/600 Wi	inter			
S2.000	SS7.0	600	Winter	100	+20%	30/480 Wi	Inter			
S1.002	SS6.2	600	Winter	100	+20%	30/480 Wi	Inter			
S1.003	556.3 SS8 0	600 1440	Winter	100	+20%	30/600 ₩3	inter	100/240 Winto	r	
S3.001	SS8.1	1440	Winter	100	+20%	30/480 Wi	inter	100/240 Wille	-	
s3.002	SS8.2	480	Winter	100	+20%	30/480 Wi	inter			
S4.000	SS9.0	480	Winter	100	+20%	30/720 Wi	inter			
	SS6.4	480	Winter	100	+20%	30/60 Wi	inter			
S1.004	SS6.5	480	Winter	100	+20%	30/60 St	ummer			
s1.004	555.6	480	Winter	100	+20%	30/60 Wi 30/120 St	Immer			
s1.004 s1.005 s1.006 s1.007	SS6 7			T 0 0	1200	20,220 00				
\$1.001 \$2.000 \$1.002 \$1.003 \$3.000 \$3.001 \$3.002 \$4.000 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008	SS6.7 SS5.4	480	Winter	100	+20%					
s1.004 s1.005 s1.006 s1.007 s1.008	SS6.7 SS5.4	480	Winter	100	+20%					
s1.004 s1.005 s1.006 s1.007 s1.008	SS6.7 SS5.4	480	Winter	100	+20%					

# RESULTS FOR 1-in-100 YEAR STORM +20% CLIMATE CHANGE ALLOWANCE

Barrett M	ahony	Consu	lting Eng						Page 16
12 Mill S	treet								
London									
SE1 2AY									Micco
Date 16/0	1/2020	0 16:38	3	Desi	gned b	y Tmacha	le		Drainage
File Surf	ace C2	2.mdx		Chec	ked by				Drainage
XP Soluti	ons			Netw	ork 20	18.1			
<u>100 year</u>	: Retu	rn Per	iod Summa:	-			s by	Maximum L	evel (Rank
				<u>1) fc</u>	or Stor	<u>.m</u>			
		Water	Surcharged	Flooded			Pipe		
	US/MH		Depth		Flow /	Overflow	-		Level
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
\$1.000	SS6.0	88.537	0.537	37.266	0.10		2.9	FLOOD	18
		88.538						SURCHARGED	10
		88.559					4.0	SURCHARGED	
S1.002	SS6.2	88.553	0.802	0.000	0.24		7.1	FLOOD RISK	
		88.566		0.000				SURCHARGED	
		88.532		32.340			1.6		18
		88.533	0.707	0.000	0.05			SURCHARGED	
		88.549		0.000				SURCHARGED	
		88.586 88.574		0.000				SURCHARGED	
		88.581		0.000				SURCHARGED SURCHARGED	
		88.579		0.000				SURCHARGED	
		88.577		0.000				SURCHARGED	
		86.750		0.000			3.3		
l l	N ST OVER RETE	ORMS RFLOV	OCCURS OF DUF VOLUM NBASIN. REMAINS	RATION E TO E	N GRE	ATER T	HAN D ON	240min. SITE IN	₹K
			A.	1982-20	18 Tnn	0.00.02.0			
			U.	1 702 - 20	TO THU	ovyze			

# 9 CLIMATE AIR QUALITY - APPENDICES

# 9.1 AMBIENT AIR QUALITY STANDARDS

# **Ambient Air Quality Standards**

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002) and has set limit values which came into operation on 17<sup>th</sup> June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM<sub>10</sub>, 40% for the hourly and annual limit value for NO<sub>2</sub> and 26% for hourly SO<sub>2</sub> limit values. The margin of tolerance commenced from June 2002 and started to reduce from 1<sup>st</sup> January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to  $PM_{2.5}$ . The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regard to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for  $PM_{2.5}$  are included in Directive 2008/50/EC. The approach for  $PM_{2.5}$  was to establish a target value of 25 µg/m<sup>3</sup>, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m<sup>3</sup>, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m<sup>3</sup>, as an annual average exposure reduction target will range from 0% (for  $PM_{2.5}$  concentrations of less than 8.5 µg/m<sup>3</sup> to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m<sup>3</sup>). Where the AEI is currently greater than 22 µg/m<sup>3</sup> all appropriate measures should be employed to reduce this level to 18 µg/m<sup>3</sup> by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m<sup>3</sup> was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as

"a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both  $NO_X$  (NO and  $NO_2$ ) is applicable for the protection of vegetation in highly rural areas away from major sources of  $NO_X$  such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NOX limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway
- 5 km from the nearest major industrial installation
- 20 km from a major urban conurbation

As a guideline, a monitoring station should be indicative of approximately 1000 km<sup>2</sup> of surrounding area. Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

# **Air Dispersion Modelling**

The inputs to the DMRB model consist of information on road layouts, receptor locations, annual average daily traffic movements, annual average traffic speeds and background concentrations. Using this input data the model predicts ambient ground level concentrations at the worst-case sensitive receptor using generic meteorological data. The DMR B has recently undergone an extensive validation exercise as part of the UK's Review and Assessment Process to designate areas as Air Quality Management Areas (AQMAs). The validation exercise was carried out at 12 monitoring sites within the UK DEFRAs national air quality monitoring network. The validation exercise was carried out for NO<sub>X</sub>, NO<sub>2</sub> and PM<sub>10</sub>, and included urban background and kerbside/roadside locations, "open" and "confined" settings and a variety of geographical locations.

In relation to NO<sub>2</sub>, the model generally over-predicts concentrations, with a greater degree of over-prediction at "open" site locations. The performance of the model with respect to NO<sub>2</sub> mirrors that of NO<sub>x</sub> showing that the over-prediction is due to NO<sub>x</sub> calculations rather than the NO<sub>x</sub>:NO<sub>2</sub> conversion. Within most urban situations, the model overestimates annual mean NO<sub>2</sub> concentrations by between 0 to 40% at confined locations and by 20 to



60% at open locations. The performance is considered comparable with that of sophisticated dispersion models when applied to situations where specific local validation corrections have not been carried out.

The model also tends to over-predict  $PM_{10}$ . Within most urban situations, the model will over-estimate annual mean  $PM_{10}$  concentrations by between 20 to 40%. The performance is comparable to more sophisticated models, which, if not validated locally, can be expected to predict concentrations within the range of 50%. Thus, the validation exercise has confirmed that the model is a useful screening tool for the Second Stage Review and Assessment, for which a conservative approach is applicable.

# 9.2 TRANSPORT INFRASTRUCTURE IRELAND SIGNIFICANCE CRITERIA

Magnitude of	Annual Mean $NO_2$ /	Annual Mean PM <sub>2.5</sub>	
Change	PM <sub>10</sub>		
Large	Increase / decrease ≥4 μg/m <sup>3</sup>	Increase / decrease ≥2.5 µg/m <sup>3</sup>	
Medium	Increase / decrease 2 - <4 μg/m <sup>3</sup>	Increase / decrease 1.25 - <2.5 $\mu\text{g}/\text{m}^3$	
Small	Increase / decrease 0.4 - <2 μg/m <sup>3</sup>	Increase / decrease 0.25 - <1.25 $\mu\text{g}/\text{m}^3$	
Imperceptible	Increase / decrease <0.4 μg/m <sup>3</sup>	Increase / decrease <0.25	

Table A1: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Absolute Concentration in Relation to	Change in Concentration Note 1				
Objective/Limit Value	Small	Medium	Large		
Increase with Scheme					
Above Objective/Limit Value With	Slight Adverse	Moderate	Substantial		
Scheme ( $\geq$ 40 µg/m <sup>3</sup> of NO <sub>2</sub> or PM <sub>10</sub> )		Adverse	Adverse		
(≥25 μg/m <sup>3</sup> of PM <sub>2.5</sub> )					
Just Below Objective/Limit Value With	Slight Adverse	Moderate	Moderate		
Scheme (36 - <40 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or		Adverse	Adverse		
PM <sub>10</sub> ) (22.5 - <25 μg/m3 of PM <sub>2.5</sub> )					
Below Objective/Limit Value With	Negligible	Slight Adverse	Slight Adverse		
Scheme (30 - <36 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or					
PM <sub>10</sub> ) (18.75 - <22.5 µg/m <sup>3</sup> of PM <sub>2.5</sub> )					
Well Below Objective/Limit Value	Negligible	Negligible	Slight Adverse		
With Scheme (<30 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or					
PM <sub>10</sub> ) (<18.75 μg/m <sup>3</sup> of PM <sub>2.5</sub> )					
De	crease with Scheme	2			
Above Objective/Limit Value With	Slight Beneficial	Moderate	Substantial		
Scheme ( $\geq$ 40 µg/m <sup>3</sup> of NO <sub>2</sub> or PM <sub>10</sub> )		Beneficial	Beneficial		
(≥25 µg/m³ of PM <sub>2.5</sub> )					
Just Below Objective/Limit Value With	Slight Beneficial	Moderate	Moderate		
Scheme (36 - <40 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or		Beneficial	Beneficial		
PM <sub>10</sub> ) (22.5 - <25 μg/m <sup>3</sup> of PM <sub>2.5</sub> )					

Below Objective/Limit Value With	Negligible	Slight Beneficial	Slight Beneficial
Scheme (30 - <36 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or			
PM <sub>10</sub> ) (18.75 - <22.5 μg/m <sup>3</sup> of PM <sub>2.5</sub> )			
Well Below Objective/Limit Value	Negligible	Negligible	Slight Beneficial
With Scheme (<30 $\mu$ g/m <sup>3</sup> of NO <sub>2</sub> or			
PM <sub>10</sub> ) (<18.75 μg/m <sup>3</sup> of PM <sub>2.5</sub> )			

*Note 1* Well Below Standard = <75% of limit value.

Table A2: Air Quality Impact Significance Criteria For Annual Mean NO2 and PM10 and PM2.5 Concentrations at a Receptor

Absolute Concentration in Relation to	Change in Concentration Note 1			
Objective/Limit Value	Small	Medium	Large	
In	crease with Scheme			
Above Objective/Limit Value With	Slight Adverse	Moderate	Substantial	
Scheme (≥35 days)		Adverse	Adverse	
Just Below Objective/Limit Value With	Slight Adverse	Moderate	Moderate	
Scheme (32 - <35 days)		Adverse	Adverse	
Below Objective/Limit Value With	Negligible	Slight Adverse	Slight Adverse	
Scheme (26 - <32 days)				
Well Below Objective/Limit Value	Negligible	Negligible	Slight Adverse	
With Scheme (<26 days)				
De	crease with Scheme	2		
Above Objective/Limit Value With	Slight Beneficial	Moderate	Substantial	
Scheme (≥35 days)		Beneficial	Beneficial	
Just Below Objective/Limit Value With	Slight Beneficial	Moderate	Moderate	
Scheme (32 - <35 days)		Beneficial	Beneficial	
Below Objective/Limit Value With	Negligible	Slight Beneficial	Slight Beneficial	
Scheme (26 - <32 days)				
Well Below Objective/Limit Value	Negligible	Negligible	Slight Beneficial	
With Scheme (<26 days)				

**Note 1** Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible Table A3: Air Quality Impact Significance Criteria For Changes to Number of Days with  $PM_{10}$  Concentration Greater than 50  $\mu g/m^3$  at a Receptor

# 9.3 DUST MINIMISATION PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland and the United Kingdom.

# Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction/demolition planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly southwesterly, locating construction/demolition compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.



Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed. The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials. Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur.

The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing • meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

# Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%.

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction/demolition period. Research has found that watering can reduce dust emissions by 50%. Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

# Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

# **Storage Piles**

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency;
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

# Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

# Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

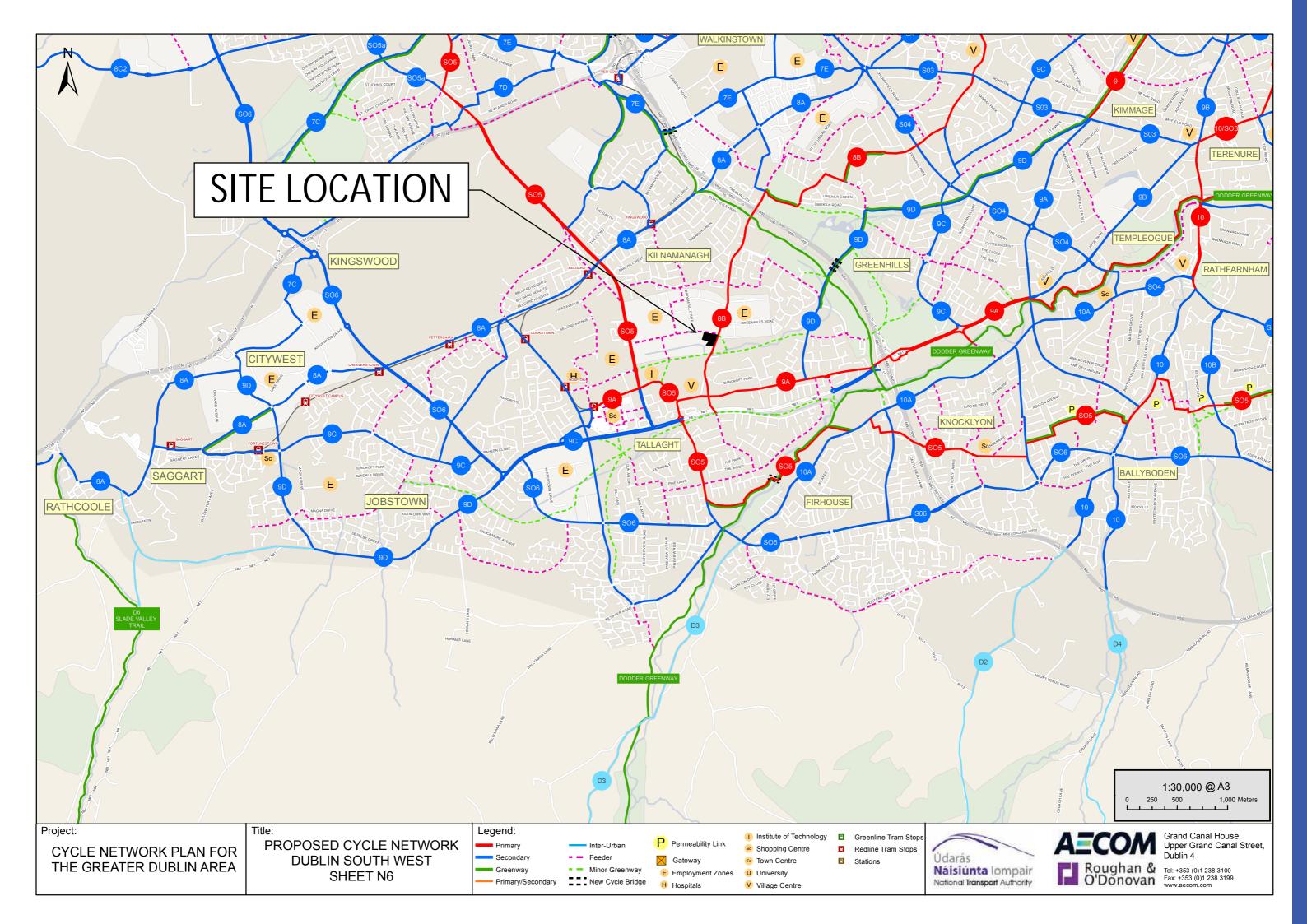
- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.



# 11 TRAFFIC & TRANSPORTATION - APPENDICES

# 11.1CYCLE NETWORK PLAN





# **11.2BUS CONNECTS PROPOSAL**

# Greenhills > City Centre Core Bus Corridor (bus & cycle infrastructure)

# **Key Facts**

- Route length 11kms
- O Current bus journey time up to 80mins
- BusConnects journey time 35-40mins
- Future bus journey time without BusConnects 100mins+

# Potential Impacts

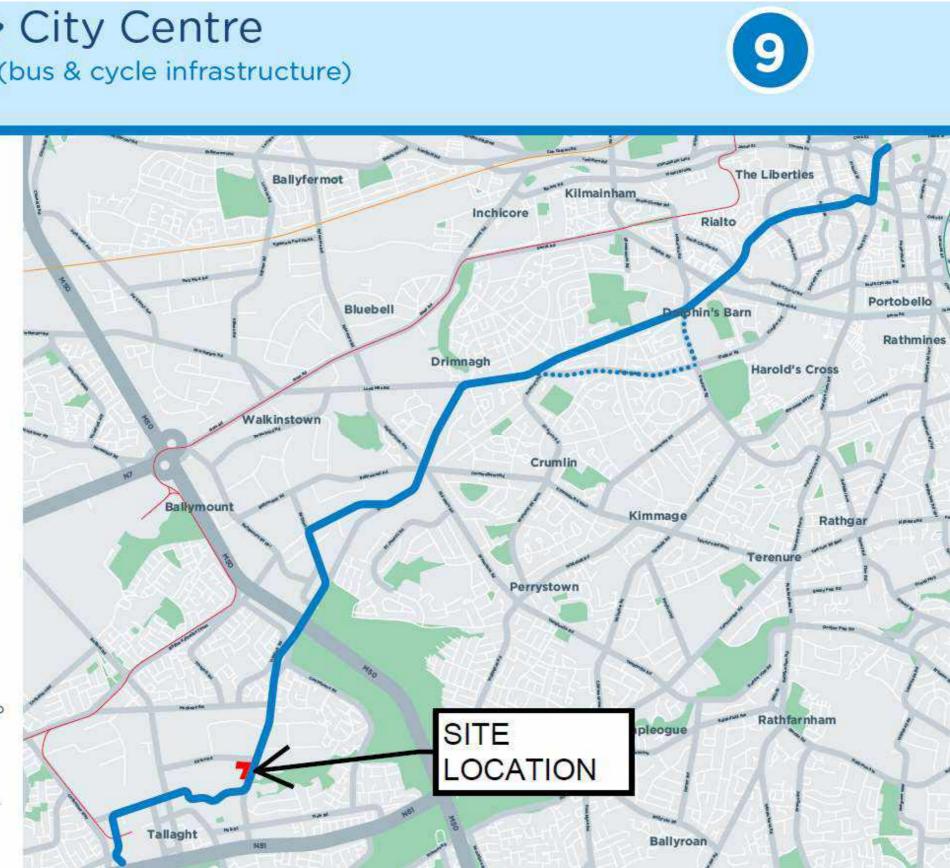
- Parts of front gardens removed
- Loss of parking spaces
- O Changes to traffic movements
- Loss of trees

# Additional Specific Challenges on Route

- Restricted width on many roads along this route requiring road widening.
- Walkinstown Roundabout is challenging for both bus and cycle movements.
- A proposal is to construct new link roads to divert all traffic via Calmount Avenue and Calmount Road while still maintaining access to the old section of Greenhills Road.
- A proposal is to realign a section of the Greenhills Road adjoining Castletymon Road junction.

**Bus Route** 

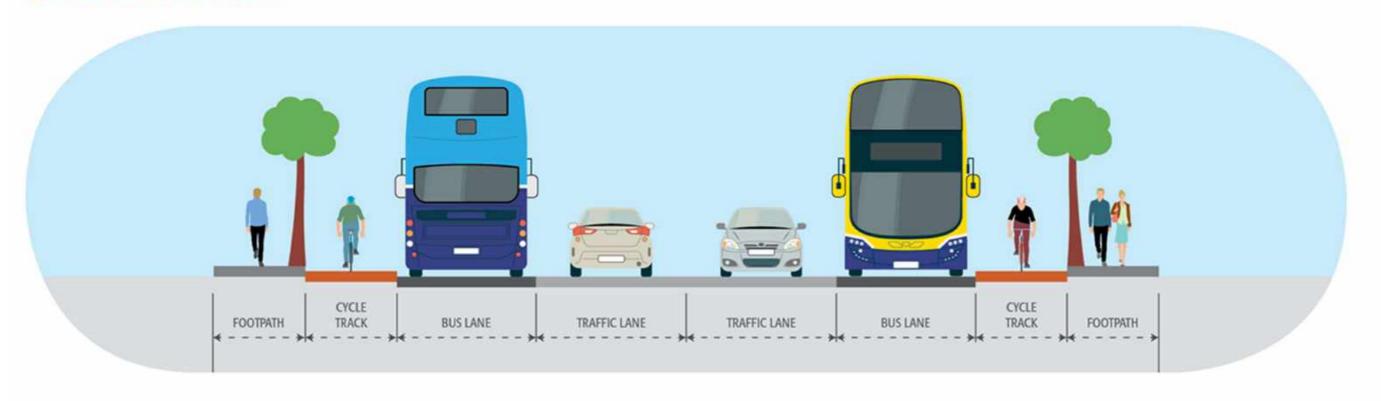
Alternative Cycle Route .....





# **11.3 BUS CONNECTS ROAD LAYOUT**

# **Optimum Road Layout**





FORMER GALLAHER'S SITE, AIRTON

# 13 WASTE MANAGEMENT - APPENDICES

# 13.1 OPERATIONAL WASTE AND RECYCLING MANAGEMENT PLAN





#### Prepared for

Greenleaf Homes Ltd.

Prepared by

Traynor Environmental Ltd

Reference Number

19.270 TE

Date of Issue

13<sup>th</sup> February 2020

Belturbet Business Park,
Creeny.
Belturbet,
Co Cavan
T: + 353 49 9522236
E: nevin@traynorenv.com
www.traynorenvironmental.ie

# Operational Waste & Recycling Management Plan Client: Greenleaf Homes Ltd Traynor Env Ref: 19.270 TE Status: Final Report Date: 13<sup>th</sup> February 2020

Report Title:	Operational Waste & Recycling Management Plan
Doc Reference:	19.270
Client:	Greenleaf Homes Ltd
Authorised By:	Nos Teaple
	Nevin Traynor BSc. Env, H.Dip I.T, Cert SHWW, EPA/FAS Cert. Environmental Consultant

Rev No	Status	Date	Writer	Reviewer
1.	Final	13 <sup>th</sup> February 2020	Angela Kelly	Nevin Traynor

This report refers, within the limitations stated, to the condition of the site at the time of the report. No warranty is given as to the possibility of future changes in the condition of the site. The report as presented is based on the information sources as detailed in this report, and hence maybe subject to review in the future if more information is obtained or scientific understanding changes.

© This Report is the copyright of Traynor Environmental Ltd. Any unauthorized reproduction or usage by any person other than the addressee is strictly prohibited

Airton Road, Tallaght, Dublin 24

Operati	ional Was	ste & Recycling Management Plan	Traynor International Int.,
	EXEC	UTIVE SUMMARY	4
1.0	INTRO	DDUCTION	5
2.0	LEGIS	LATION PLANNING POLICY	7
	2.1	National Legislation	7
	2.2	Regional Level	8
	2.3	Legislative Requirements	10
	2.4	Responsibility of the Waste Producer	11
	2.5	South Dublin County Council Be-Laws 2018	11
	2.6	Regional Waste Management Service Providers & Facilities	12
	2.7	Policy Context	13
3.0	DESC	RIPTION OF THE PROJECT	14
	3.1	Location, Size and Scale of the Development	14
	3.2	Typical Waste Categories	15
	3.3	European Waste Codes	15
	3.4	Methodology	17
4.0	ESTIN	IATED WASTE ARISING	18
	4.1	Waste Storage & Collection	19
	4.2	Waste Storage – Residential	20
	4.3	Waste Collection	27
	4.4	Unique Waste	27
	4.5	Waste Storage Area Design	28
5.0	WAST	TE COLLECTION REQUIREMENTS	29
	5.1	South Dublin County Council Bye Laws 2018	29
	5.2	BS 5906:2005	29
6.0	CONC	LUSION	31
Airton R	oad, Tallaį	ght, Dublin 24	3



#### EXECUTIVE SUMMARY

Traynor Environmental Ltd has been appointed by Greenleaf Homes Ltd. (hereafter referred to as the 'Applicant') to prepare an Operational Waste and Recycling Management Plan (OWRMP) (hereafter referred to as the 'Strategy') in support of the proposed development at Airton Road, Tallaght, Dublin 24 (hereafter referred to as the 'Proposed Development') located within the administrative boundary of South Dublin County Council.

#### The proposed Development consists of:

The proposed mixed-use residential development will consist of 502 No. residential apartment units in 6 no. multistorey blocks. Parking is provided at under croft level within blocks A/B/C and at basement level in blocks E/F.

The principal aim of this Strategy is to demonstrate how the Proposed Development has taken into account sustainable methods for waste and recycling management during its operation. Furthermore, with regards to waste and recycling management within the Proposed Development, this Strategy has the following aims:

- To contribute towards achieving current and long-term government targets, Eastern Midlands Region (EMR), South Dublin County Council for waste minimisation, recycling and re-use;
- To comply with all applicable legal requirements for handling, storage and collection of operational waste;
- To achieve high standards of waste management performance, through giving (and continuing to give) due consideration to the waste generated by the Proposed Development during its operation; and
- To provide the Proposed Development with a convenient, clean and efficient waste management strategy that enhances the operation of the Proposed Development and promotes recycling.

Once operational, the Proposed Development is anticipated to produce approximately 90,222L of waste from all land uses per week. Of this total, 81,136L will be generated by the residential elements and 9,086L will be generated by the commercial/communal/creche elements. Residential waste storage allows for a weekly (seven day) storage capacity for MDR, food, glass and residual (i.e. nonrecyclable). Residential bins will be provided within dedicated storage rooms within the core of each residential block. On the day of collection, bins from the waste storage areas will be brought to the collection point where all bins will be emptied by the approved waste collector. Once emptied the bins will be returned back to the appropriate waste storage areas.

In particular this OWRMP aims to provide a robust strategy for storing, handling, collection and transport of the wastes generated at site. Additionally, all waste infrastructure introduced to the Development will comply with South Dublin County Council's requirements, British Standard 5906:2005 (Waste Management in Buildings Code of Practice) and DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).

Airton Road, Tallaght, Dublin 24



#### 1.0 INTRODUCTION

This Operational Waste and Recycling Management Plan (the 'Strategy') has been prepared by Nevin Traynor BSc.Env, HDIP IT, Cert SHWW, IAH of Traynor Environmental Ltd on behalf of Greenleaf Homes Ltd ('The Applicant') in support of the proposed mixed-use residential development at Airton Road, Tallaght, Dublin 24 (hereafter referred to as the 'Proposed Development') within the South Dublin County Council responsibility.

The principal aim of this Strategy is to demonstrate how the Proposed Development has taken into account sustainable methods for waste and recycling management during its operation. Furthermore, with regards to waste and recycling management within the Proposed Development, this Strategy has the following aims:

- To contribute towards achieving current and long-term government, Eastern Midlands Region (EMR) and South Dublin County Council targets for waste minimisation, recycling and re-use;
- To comply with all legal requirements for handling operational waste;
- To achieve high standards of waste management performance, through giving (and continuing to give) due consideration to the waste generated by the Proposed Development during its operation; and
- To provide the Proposed Development with a convenient, clean and efficient waste management strategy that enhances the operation of the Proposed Development and promotes recycling.

South Dublin County Council is part of the Eastern Midlands Waste Management Region. The Eastern Midlands Waste Management Region comprises of Dublin City Council, Dun Laoghaire – Rathdown, Fingal, South Dublin, Kildare, Louth, Laois, Longford, Meath, Offaly, Westmeath and Wicklow County Council.

This Strategy provides a review of the requirements placed upon the Proposed Development under national legislation and implemented policy at all levels of government (i.e. national (Ireland), regional (EMR), district and local (South Dublin County Council). Consideration has also been given to requirements included in local standards and guidance documents (i.e. DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018) in line with the Regional Waste Management Plan and British Standard Waste Management in Buildings, Code of Practice (BS 5906:2005) so as to comply with relevant objectives and targets.

Estimate volumes of waste generated during operation of the Proposed Development have been provided in the report which also includes a breakdown of the waste management process, which details waste handling, storage area provision, and collection arrangements. All waste reduction measures are compliant with BS 5906:2005, Eastern Midlands Region (EMR) and Sustainable Urban Housing: Design Standards for New Apartments which are also discussed in this strategy.

#### Operational Waste & Recycling Management Plan



Figure No. 1 Site Layout



7

#### 2.0 LEGISLATION/ PLANNING POLICY

A summary of national regional and local planning policy relevant to the Proposed Development is outlined in section 2.1 below. It should be noted that this summary identifies those elements of the policy or guidance applicable to waste management within the Proposed Development.

#### 2.1 National Legislation

The Government issued a policy statement in September 1998 titled as 'Changing Our Ways' which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document 'Preventing and Recycling Waste – Delivering Change' was published in 2002. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

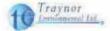
This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled 'Making Irelands Development Sustainable – Review, Assessment and Future Action'. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'*. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services. The most recent policy document was published in July 2012 titled '*A Resource Opportunity*. The policy document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out several actions, including the following:

- A move away from landfill and replacement through prevention, reuse, recycling and recovery.
- A Brown Bin roll-out diverting 'organic waste' towards more productive uses.

#### **Operational Waste & Recycling Management Plan**



- Introducing a new regulatory regime for the existing side-by-side competition model within the household waste collection market;
- New Service Standards to ensure that consumers receive higher customer service standards from their operator:
- Placing responsibility on householders to prove they use an authorised waste collection service.
- The establishment of a team of Waste Enforcement Officers for cases relating to serious criminal activity will be prioritised;
- A review of the producer responsibility model will be initiated to assess and evaluate the operation of the model in Ireland;
- Significant reduction of Waste Management Planning Regions from ten to three.

While a *resource opportunity* covers the period to 2020, it is subject to a mid-term review in 2016 to ensure that the measures are set out properly and to provide an opportunity for additional measures to be adopted in the event of inadequate performance. Since 1998, the Environmental Protection Agency (EPA) has produced periodic '*National Waste (Database) Reports*' detailing among other things estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2018 National Waste Statistics, which is the most recent study published, reported the following key statistics for 2016:

- 2,763 kilotonnes of municipal waste was managed in 2016 (6% increase compared to 2014).
- 74% of managed municipal waste was recovered (79% in 2014). Recovery includes treatment processes such as recycling, use as a fuel (incineration and co-incineration) and backfilling.
- 41% of managed municipal waste was recycled (41% in 2014). Recycling includes reprocessing of waste materials into products, composting and anaerobic digestion.
- 26% of managed municipal waste was landfilled in 2016.

#### 2.2 Regional Level

The proposed development is located in the Local Authority area of South Dublin County Council. The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the SDCC area which was published in May 2015. This plan replaces the previous Dublin region plan due to changing National policy as set out in *A Resource Opportunity: Waste Management Policy in Ireland* and changes being enacted by the *Waste Framework Directive* (2008/98/EC).

The regional plan sets out the following strategic targets for waste management in the region:

• A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;

Airton Road, Tallaght, Dublin 24



9

- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately  $\leq 130 - \leq 150$  per tonne of waste which includes a  $\leq 75$  per tonne landfill levy. The *South Dublin County Council Development Plan 2016 – 2022* sets out a number of objectives and actions for the South Dublin area in line with the objectives of the waste management plan.

Waste objectives and actions with a particular relevance to this development are:

- IES Objective 1: To support the implementation of the Eastern–Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy actions.
- IES Objective 2: To support waste prevention through behavioural change activities to de-couple economic growth and resource use.
- IES Objective 3: To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the vale recovery and recirculation of resources.
- IES Objective 4: To provide, promote and facilitate high quality sustainable waste recovery and disposal
  infrastructure / technology in keeping with the EU waste hierarchy and to adequately cater for a growing
  residential population and business sector.
- IES Objective 5: To provide and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the county to facilitate the recycling and recovery of hazardous and non – hazardous municipal wastes.
- *IES Objective 6:* To seek the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use / extensions of existing commercial developments where appropriate.
- IE5 Objective 7: To develop a countrywide network of green waste centres in suitable locations to expand the collection system for compostable waste.
- IES Objective 8: To secure appropriate provision for the sustainable management of waste within
  developments, including the provision of facilities for the storage, separation and collection of such waste.

#### Actions:

Support and facilitate the separation of waste at source into organic and non-organic streams or other waste
management systems that divert waste from landfill and maximise the potential for each waste type to be reused and recycled or composted and divert organic waste from landfill, in accordance with the National Strategy
on Biodegradable Waste (2006).

#### Operational Waste & Recycling Management Plan



- Implement the objectives of the National Waste Prevention Programme at a local level with businesses, schools, householders, community groups and within the Council's own activities.
- Promote an increase in the amount of waste re-used and recycled consistent with the Regional Waste Management Plan

and Waste Hierarchy and facilitate recycling of waste through adequate provision of facilities and good design in new developments.

Implement the South Dublin Litter Management Plan 2015 – 2019.

#### 2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

Waste Management Act 1996 (No. 10 of 1996) as amended and associated legislation includes:

- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended by the Protection of the Environment Act 2003 (S.I. No. 27 and S.I. No. 413 of 2003) and amended by the Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended by the Litter Pollution Regulations 1999 (S.I. No. 359 of 1999) and Protection of the Environment Act 2003;
- European Communities (Transfrontier Shipment of Waste) Regulations, 1994 (S.I. No. 221 of 1994);
- European Union (Properties of Waste Which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015);
- Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended 2004 (S.I. No. 395 of 2004) and 2010 (S.I. No. 350 of 2010);
- European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014);
- Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997);
- Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015);
- European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
- European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended 2011 and 2016 (S.I. No. 323 of 2011);
- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended 2008 (S.I. No 87 of 2008) and 2016 (S.I. 24 of 2016);
- Waste Management (Facility Permit and Registration) Regulation 2007 (S.I No. 821 of 2007) as amended 2008 (S.I No. 86 of 2008), 2014 (S.I. No. 310 and S.I. No. 546 of 2014) and 2015 (S.I. No. 198 of 2015);



- Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended 2014 (S.I. No. 349 of 2014) and 2015 (S.I. No. 347 of 2015);
- Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended 2015 (S.I. No. 190 of 2015);
- European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015);
- Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended 2000 (S.I. No. 73 of 2000); and
- Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended by European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)

#### 2.4 Responsibilities of the Waste Producer.

The waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal.) Waste contractors will be employed to physically transport waste to the final waste disposal / recovery site. It is therefore critical that the residents and the proposed management company undertake on-site management of waste in accordance with all legal requirements and employ suitably permitted/licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse/recover/recycle/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities. A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended or a waste or IED (Industrial Emissions Directive) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

#### 2.5 South Dublin County Council Bye-Laws 2018

These Bye-Laws for the Segregation, Storage and Presentation of Household and Commercial Waste were designed to repeal South Dublin County Council Household Waste Bye-Laws 2012 and South Dublin County Council (Storage, separation at source, presentation and collection of commercial waste) Bye-Laws 2007. The Bye-Laws commenced on the 3<sup>rd</sup> December 2018 and place legal obligations on the waste producer in terms of the way waste is stored and managed on a site/premises. Dry recyclables must be segregated at source, and bio-waste (organic) must be segregated if a collection service is available. Waste must be presented in approved containers that are kept in a reasonable state and only presented for collection in approved areas and times by the Council. Key requirements under these bye-laws are:

- Kerbside waste presented for collection shall not be presented for collection earlier than 8.00pm on the day Airton Road, Tallaght, Dublin 24  $$1\!\!1$ 

#### **Operational Waste & Recycling Management Plan**



immediately preceding the designated waste collection day;

- All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8:00am on the day following the designated waste collection day;
- Neither recyclable household kerbside waste nor food waste arising from households shall be contaminated with any other type of waste before or after it has been segregated; and
- A management company, or another person if there is no such company, who exercises control and supervision
  of residential and/or commercial activities in multi-unit developments, mixed-use developments, flats or
  apartment blocks, combined living/working spaces or other similar complexes shall ensure that: o separate
  receptacles of adequate size and number are provided for the proper segregation, storage and collection of
  recyclable household kerbside waste and residual household kerbside waste;
- additional receptacles are provided for the segregation, storage and collection of food waste where this
  practice is a requirement of the national legislation on food waste;
- the receptacles referred to in paragraphs (a) and (b) are located both within any individual apartment and at the place where waste is stored prior to its collection;
- any place where waste is to be stored prior to collection is secure, accessible at all times by tenants and other occupiers and is not accessible by any other person other than an authorised waste collector,
- written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection;
- an authorised waste collector is engaged to service the receptacles referred to in this section of these byelaws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by South Dublin County Council; and
- receptacles for kerbside waste are presented for collection on the designated waste collection day.

#### 2.6 Regional Waste Management Service Providers & Facilities

Various contractors offer waste collection services for the residential sector in the South Dublin County Council. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin. A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all waste/IED licenses issued are available from the EPA.

### Traynor Inchangement List

#### 2.7 Policy Context

Development Plan Policy generally sets out guidelines for waste management which conform to the European Union and National Waste Management Hierarchy as follows:

dis-ups

- Waste Prevention
- Minimisation
- Re-use
- Waste Recycling
- Energy Recovery
- Disposal

This guidance is subject to economic and technical feasibility. Council's Waste Management Strategy is firmly grounded in EU and National policy and can be summarised by the waste hierarchy of prevention, recycling, energy recovery and disposal.

Operational Waste & Recycling Management Plan



#### 3.0 DESCRIPTION OF THE PROJECT

#### 3.1 Location, Size and Scale of the Development

The proposed site is located at the corner of Airton road and Greenhills road, Tallaght, Dublin 24. The proposed mixeduse residential development will consist of 502 No. residential apartment units in 6no. multi-storey blocks. Parking is provided at under croft level within blocks A/B/C and at basement level in blocks E/F. The total number of car parking spaces provided is 202. At ground floor level of Blocks C and D, there are 3 no. retail units with a combined area of 482sq.m.

		Total		
Block	1-Bed	2-Bed	3-Bed	Units
А	38	49	1	88
в	53	36	5	94
с	39	47	7	93
D	36	56	15	107
E-F	31	69	20	120
Total	197	257	48	502

Table 1.0 Mixed Use Residential Development

Non-Residential Floor Areas	Location	Area (sq.m)
Communal Facilities	Block C	465
Communal Facilities	Block D	93
Communal Facilities	Block E-F	146
Creche (44 Children)	Block C	329
Retail Unit	Block C	187
Retail Unit	Block D	161
Retail Unit	Block D	134
Total		1,515

Table 2.0 Mixed Development Details Non-Residential Floor Areas



#### 3.2 Typical Waste Categories

The predicted waste types that will be generated at the proposed development include the following:

- Dry Mixed Recyclables (DMR) includes Newspaper / General paper Magazines, Cardboard Packaging, Drink (Aluminum) Cans, Washed Food (Steel/Tin) Cans, Washed Tetra Pak Milk & Juice Cartons, Plastic Bottles (Mineral/Milk/Juice/Shampoo/Detergents), Rigid Plastics. (Pots/Tubs/Trays\*)
- Mixed Non-Recyclables (MNR) / All General Waste Nappies, soiled food, packaging, old candles, plasters, vacuum cleaner contents, broken delph, contaminated plastics
- Organic (food) Waste Leaves, weeds and mosses (not sprayed with weed killer), Dead plants and flowers, Grass and hedge cuttings (finger sized twigs), Bread, pasta and rice, Meat, fish, poultry bones, Out of date food (no plastic packaging), Tea Bags, Coffee grounds and paper filters. Fruit and vegetables (cooked and uncooked).
   Food soiled cardboard or paper (no coated paper) Eggs and dairy products (no plastic packaging) Paper napkin and paper towels
- Glass

In addition to the typical waste materials that will be generated on a daily basis, there will be some additional waste types generated in small quantities that will need to be managed separately including:

- Textiles;
- Batteries;
- Waste electrical and electronic equipment (WEEE);
- Chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.);
- Fluorescent tubes and other mercury containing waste;
- Furniture (and from time to time other bulky wastes).

Wastes should be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

#### 3.3 European Waste Codes

In 1994, the European Waste Catalogue and Hazardous Waste List were published by the European Commission. In 2002, the EPA published a document titled the European Waste Catalogue and Hazardous Waste List, which was a condensed version of the original two documents and their subsequent amendments. This document has been replaced by the EPA 'Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous' which became valid from the 1st June 2015. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, COR's, permits and licences and EPA National Waste Database.

#### Operational Waste & Recycling Management Plan



Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code or EWC) for typical waste materials expected to be generated during the operation of the proposed development is provided in the Table below.

Waste Material	LoW Code
Paper and Cardboard	20 01 01
Plastic	20 01 39
Metals	20 01 40
Mixed Municipal Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Biodegradable garden and park waste	20 02 01
Textiles	20 01 11
Batteries and accumulators*	20 01 33-34
Waste electrical and electronic equipment*	20 01 35-36
Chemicals (solvents, pesticides, paints & adhesives, detergents etc) $^{st}$	20 01 13 / 20 0119 / 20 0127 /
	20 01 28 /20 01 29 / 20 01 30
Fluorescent tubes and other mercury containing waste $^{*}$	20 01 21
Bulky wastes	20 03 07

Table 3.0 Typical Waste Types Generated and LoW Codes



#### 3.4 Methodology

#### 3.4.1 Residential Calculation Methodology

Waste arisings were calculated in accordance with BS 5906:2005 and included a provision of 5 litres (L) of food waste per residential unit per week. These guidelines determine the minimum capacity for waste storage space to be allocated and are as follows:

- 30 litres (L) per unit + 70L per bedroom (see Table 4 for further details);
- Split 50:50 between
- MDR and residual waste; and
- 5L per residential unit for food waste.

Number of	Weekly Waste Arisings per Unit (L)					
Bedrooms	MDR	Food Waste	Residual Waste	Total		
1 Bedroom	50	5	50	105		
2 Bedrooms	85	5	85	175		
3 Bedrooms	120	5	120	245		

Table 4.0 Weekly Waste Arisings Methodology

#### 3.4.2 Commercial Calculation Methodology

BS 5906:2005 provides a methodology for the calculation of waste arisings from creches, communal areas and retail. These calculation methodologies are outlined within Table 5 of this Strategy. A 50:50 split between MDR and residual waste has been assumed for the creche, retail land uses and community space.

Land Use Class	Waste Storage Requirements	Waste Stream Ratios
A: Retail	10L per m <sup>2</sup> Sales Floor Area (SFA)	MDR: Residual Waste
A. Netali	TOE PET ITT Sales FIOOF AFEA (SFA)	50: 50
D: Creche	10L per m <sup>2</sup> NIA	50: 50
D. Creche		MDR: Residual
D, E-F – Communal Facility	5L per m <sup>2</sup> NIA	50: 50
D, E-F – Communal Facility	SE per mi MIA	MDR: Residual

 Table 5.0
 Commercial Waste Arising Calculations (Weekly)

#### Operational Waste & Recycling Management Plan



#### 4.0 ESTIMATED WASTE ARISINGS

The estimated quantum/volume of waste that will be generated from the units has been determined based on the predicted occupancy of the units and is presented in Table 6 and Table 7 below.

	Waste Volume (L/week)					
Waste type	Block A	Block B	Block C	Block D	Block E-F	Totals
Organic Waste	440	470	465	535	600	2,510
Mixed Dry Recyclables	6920	6870	6785	8465	10025	39,065
Mixed Municipal Waste	6920	6870	6785	8465	10025	39,065
Glass	85	95	92	105	119	496
Total	14,365	14,305	14,127	17,570	20,769	81,136

Table 6 Residential Waste Prediction (L/per week)

Non- Residential Floor Areas	Location	Area (sq.)	Area (NIA)	MDR	Food Waste	Residual Waste	Glass	Total
Communal Facilities	Block C	465	357.28	893.2	10	893.2	5	1801.4
Communal Facilities	Block D	93	70.84	177.1	5	177.1	5	364.2
Communal Facilities	Block E-F	146	111.65	279.1	8	279.1	5	571.2
Creche (44 Children)	Block C	329	254.1	1,270.5	50	1,270.5	10	2601
Retail Unit	Block C	187	143.99	719.95	10	719.95	5	1454.9
Retail Unit	Block D	161	123.97	619.85	10	619.85	5	1254.7
Retail Unit	Block D	134	102.41	512.05	10	512.05	5	1039.1
Total		1,515	1,164.24	4,471.75	103	4,471.75	40	9,086.5

Table 7 Commercial/Creche/Communal Waste Predictions (L/per week) Airton Road, Tallaght, Dublin 24



#### 4.1 Waste Storage and Collection

This section provides information on how waste generated within the development will be stored and how the waste will be collected from the development. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management requirements including those of SDCC. In particular, consideration has been given to the following documents:

- BS 5906:2005 Waste Management in Buildings Code of Practice;
- EMR Waste Management Plan 2015 2021;
- South Dublin County Council, Bye-Laws 2018;
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).

It is required that space be provided for recycling bins to accommodate 50% of the total weekly volume. This is in line with the BS5906:2005 requirements. Residual waste (MNR) is required for 87.5% of the total weekly arising. For the purpose of the strategy Glass and Organic Waste is required for 87.5% of the total weekly arising.

Block	Number of Bins Required for a Weekly Collection				
DIOCK	MNR	Organic	DMR	Glass	
A	6 x 1100L	2 x 240L	3 x 1100L	2 x 240L	
В	6 x 1100L	2 x 240L	4 x 1100L	2 x 240L	
С	5 x 1100L	2 x 240L	3 x 1100L	2 x 240L	
D	7 x 1100L	2 x 240L	4 x 1100L	2 x 240L	
E & F	10 x 1100L	2 x 240L	6 x 1100L	2 x 240L	
Total	34 x 1100L	10 x 240L	20 x 1100L	10 x 240L	

 Table 8: Total Bins Required for the Proposed Development.

Block	Number of Bins Required for a Weekly Collection					
	MNR	Organic	DMR	Glass		
Retail (Block C)	1 x 1100L	1 x 240L	1 x 1100L	1 x 240L		
Retail Unit 1 (Block D)	1 x 1100L	1 x 240L	1 x 1100L	1 x 240L		
Retail Unit 2 (Block D)	1 x 1100L	1 x 240L	1 x 1100L	1 x 240L		
Total	3 x 1100L	3 x 240L	3 x 1100L	3 x 240L		

Table 9: Total Bins Required for Retail

#### Operational Waste & Recycling Management Plan



Block	Number of Bins Required for a Weekly Collection			
	MNR	Organic	DMR	Glass
Creche (Block C)	2 x 1100L	2 x 240L	1 x 1100L	1 x 240L

Table 10: Total Bins Required for Creche

Block	Number of Bins Required for a Weekly Collection				
	MNR	Organic	DMR	Glass	
Communal Facilities Block C	1 x 1100L	1 x 240L	1 x 1100L	1 x 240L	
Communal Facilities Block D	1 x 240L	1 x 240L	1 x 240L	1 x 240L	
Communal Facilities Block E-F	1 x 1100L	1 x 240L	1 x 1100L	1 x 240L	

 Table 11:
 Total Bins Required for Communal



21

#### 4.2 Waste Storage Residential Units

#### 4.2.1 Block A

Residents will be expected to take all waste arisings from their units to the appropriate residential waste storage area. Residents will be required to segregate their waste into the following waste categories within their own apartment units:

- DMR;
- MNR;
- Organic waste; and
- Glass.

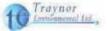
The proposed Waste Storage Areas for Block A are located on the northern and southern wing as per Figure 1.0. Each WSA is titled "Bin Store". It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block A.

#### Figure 1.0 Waste Storage Area (Block A)



Airton Road, Tallaght, Dublin 24

#### Operational Waste & Recycling Management Plan



#### 4.2.2 Block B

Residents will be expected to take all waste arisings from their units to the appropriate residential waste storage area. Residents will be required to segregate their waste into the following waste categories within their own apartment units:

- DMR;
- MNR;
- Organic waste; and
- Glass.

The proposed Waste Storage Areas are located on the northern wing of the main Block B as per Figure 2.0. It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block B.

#### Figure 2.0 Waste Storage Block B





#### 4.2.3 Block C

Residents will be expected to take all waste arisings from their units to the appropriate residential waste storage area. Residents will be required to segregate their waste into the following waste categories within their own apartment units:

- DMR;
- MNR;
- Organic waste; and
- Glass.

The proposed Waste Storage Area is located as per Figure 3.0. It is recommended that all WSA should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block C.

### Figure 3.0 Waste Storage Block C



#### Operational Waste & Recycling Management Plan



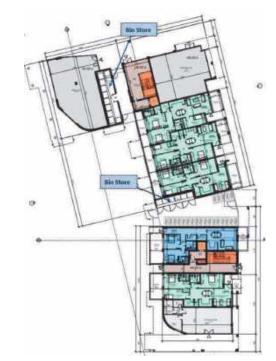
#### 4.2.4 Block D

Residents will be expected to take all waste arisings from their units to the appropriate residential waste storage area. Residents will be required to segregate their waste into the following waste categories within their own apartment units:

- DMR;
- MNR;
- Organic waste; and
- Glass.

The proposed Waste Storage Areas are located as per Figure 4.0. It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block D. It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block D.

Figure 4.0 Waste Storage Block D



Airton Road, Tallaght, Dublin 24

23



#### 4.2.5 Block E & F

Residents will be expected to take all waste arisings from their units to the appropriate residential waste storage area. Residents will be required to segregate their waste into the following waste categories within their own apartment units:

- DMR;
- MNR;
- Organic waste; and
- Glass.

The proposed Waste Storage Areas are located in the basement level in Block E & F as per Figure 5.0. Residents will use the stairs/lift to access the basement level. It is recommended that all WSAs should have secure access with either key or fob to ensure only residents may place waste in the respective WSA in Block E & F.

#### Figure 5.0 Waste Storage Block E & F



#### Operational Waste & Recycling Management Plan



#### 4.2.6 Waste Storage – Creche/Retail Units/Communal Spaces

The creche/Retail units/communal spaces will be required to segregate their waste into the following waste categories within their own unit:

- DMR;
- MNR;
- Organic waste; and
- Glass

As required, the staff will need to bring segregated DMR, MNR, Organic and Glass waste to the dedicated WSA.

Bins will be strategically located throughout the retail units. It is proposed that each retail unit will have separate waste storage for each unit. As required, the tenants will segregate DMR, MNR, Glass and Organic waste within their own unit. If there is a café/restaurant tenant, organic waste from kitchen areas should be collected in bins as close to food preparation as possible.

All bin/containers should will be clearly labelled, and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin. Suppliers for the retail/non-retail/commercial units should be requested by the tenants to make deliveries in reusable containers, minimize packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development.

Waste materials such as batteries, WEEE and printer toner/cartridges may be generated within the units, but it is anticipated that they will be generated infrequently (if they do arise). Temporary storage areas may be identified within the units for these items pending collection by an authorised waste contractor.

Airton Road, Tallaght, Dublin 24



#### 4.3 Waste Collection

There are numerous private contractors that provide waste collection services in the Airton road area who hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered/permitted/licensed facilities only.

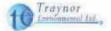
All waste requiring collection by the appointed waste contractor will be collected from the WSAs by nominated waste contractors or facilities management depending on the agreement and will be brought to the temporary waste collection area located on North East Road. The empty bins will be promptly returned to the appropriate WSAs.

All waste receptacles presented for collection will be clearly identified as required by waste legislation and the requirements of the SDCC Waste Byelaws. Also, waste will be presented for collection in a manner that will not endanger health, create a risk to traffic, harm the environment or create a nuisance through odours or litter.

#### 4.4 Unique Waste

There is likely to be a small component of the overall waste arisings from the Proposed Development that will comprise other waste streams, such as WEEE, printer and toner cartridges, and fluorescent light tubes. Building maintenance will also give rise to materials such as paints and waste lubricating oils, which will require separate storage in dedicated sealed containers. This type of waste is termed "unique" as it will not be produced on a regular basis and therefore its management will be on special arrangement with a registered waste handler for the specific waste that is produced. However, separate space will be provided within the Proposed Development to handle and manage this waste, through battery recycling boxes, fluorescent lighting tube 'coffins', and other applicable storage containers (e.g. if a liquid is to be stored, even within its own container, this will need to be stored within a second container which holds 110% capacity of the volume of the liquid being stored). Separate arrangements will be made for the storage and safe disposal of these waste streams, as covered by the Hazardous Waste Regulations. It is envisioned that unique waste arisings generated by the Proposed Development will be minimal.

#### Operational Waste & Recycling Management Plan



#### 4.5 Waste Storage Area Design

In accordance with BS 5906:2005 all waste containers will be stored under cover in specially designed waste storage rooms, or stores, which will be built to the same general standard for both domestic and commercial premises. The walls and roofs of these stores will be formed of non-combustible, robust, secure and impervious material, and have a fire resistance of one hour.

- All containers for waste, including recyclable material, will be easily accessible to both the occupier and waste collector;
- Waste stores will be designed and located in such a way as to limit potential noise disturbance to residents;
- Storage areas for waste and MDR will be clearly designated for this use only, by a suitable door or wall sign and, where appropriate, with floor markings;
- Waste storage sites will include areas for instructional signage detailing correct use of the facilities;
- The entrance of the waste storage room will be free from steps and projections;
- Where the area is to be enclosed in a roofed building, adequate ventilation will be provided. Permanent
  ventilators will be provided giving a total ventilation area of not less than 0.2m<sup>2</sup>;
- Contain electrical lighting by means of sealed bulkhead fittings (housings rated to IP65 in BS EN 60529:199 for the purpose of cleaning down with hoses and inevitable splashing. Luminaires will be low energy light fittings or low energy lamp bulbs, controlled by proximity detection or a time delay button to prevent lights being left on; and
- Gullies for wash down facilities will be positioned so as not to be in the track of container trolley wheels.

In addition to the above requirements, past experience and best practice for the storage of waste materials will include the following provisions:

- Waste storage facilities will not block any utility service points;
- Waste storage areas will not obstruct sight lines for pedestrians, drivers and cyclists, if doors open outwards they will not open onto a road or highway;
- Waste containers will be inside or at least enclosed. If bins are outside, they will be secured in a compound;
- Information packs will be provided to residents to include full information on available recycling facilities;
- Colour coding will be used for bins of different streams; and Any internal storage areas adjacent to a fire escape route will be fitted with fire doors, automatic fire detection and a sprinkler system and comply with the Building Regs.
- The facilities management company will be required to maintain the bins and their WSAs in good condition. All
  residents should be made aware of the waste segregation requirements and waste storage arrangements.



#### 5.0. Waste Collection Requirements

In line with BS 5906:2005 and South Dublin Bye Laws 2018 guidance, the following collection requirements have been designed into the Proposed Development in order to comply with all mandatory waste storage requirements:

#### 5.1 South Dublin County Council Bye Laws 2018

- separate receptacles of adequate size and number are provided for the proper segregation, storage and collection of recyclable household kerbside waste and residual household kerbside waste
- additional receptacles are provided for the segregation, storage and collection of food waste where this practice is a requirement of the national legislation on food waste,
- the receptacles referred to in paragraphs (a) and (b) are located both within any individual apartment and at the place where waste is stored prior to its collection,
- any place where waste is to be stored prior to collection is secure, accessible at all times by tenants and other occupiers and is not accessible by any other person other than an authorised waste collector,
- written information is provided to each resident or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection,
- an authorised waste collector is engaged to service the receptacles referred to in this section of these byelaws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by South Dublin County Council,
- receptacles for kerbside waste are presented for collection on the designated waste collection day,
- · adequate access and egress onto and from the premises by waste collection vehicles is maintained.

#### 5.2 BS 5906:2005

• All paths used to transport bins from the storage area to the collection point will have a minimum width of 2m, be free from kerbs or steps, have a solid foundation and be finished with a smooth, continuous finish. Based on the clearance height and tonnage specified by the dimensions of a standard refuse vehicle have been used to undertake the swept path analysis.

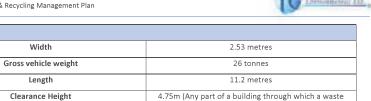
#### Operational Waste & Recycling Management Plan

Width

Length

**Clearance Height** 

Dimensions



	collection vehicle passes must have a minimum clear
	height of 4.75 m, to allow for overhead fixtures and
	fittings)
Turning Circle (diameter)	9.5 metres

Table 12 Collection Vehicle Dimensions: Waste/Recycling Collection Vehicle



#### 6.0 CONCLUSION

The Proposed Development will be sustainable with high standards of waste management performance. As such, due consideration has been given to waste generated by the Proposed Development during its operation. Waste management within the Proposed Development has the following aims:

- To contribute towards achieving current and long-term government, South Dublin County Council and EMR targets for waste minimisation, recycling and reuse;
- To allow that all legal requirements for the handling and management of waste during the operation of the Proposed Development are complied with; and
- To provide residents and commercial users with convenient, clean and efficient waste management systems that enhance the operation of the buildings and promote high levels of recycling.

Once operational, the Proposed Development is anticipated to produce approximately 90,222L of waste from all land uses per week. Of this total, 81,136L will be generated by the residential elements and 9,086L will be generated by the commercial/communal/creche elements. Residential waste storage allows for a weekly (seven day) storage capacity for MDR, food, glass and residual (i.e. nonrecyclable). Residential bins will be provided within dedicated storage rooms within the core of each residential block. On the day of collection, the waste collection company will be able to access the Site and collect refuse from dedicated collection areas.

Separate storage will be provided for commercial MDR, glass, food waste (if applicable to final land use) and residual waste within the curtilage of each unit and within dedicated combined bin stores. Additional capacity will also be provided to take into account missed collections due to bank holidays, industrial action, vehicle failure and adverse weather conditions. All waste arisings will be stored in bins proportionate to the volume of waste produced. Furthermore, the commercial waste management element of this Strategy has been developed to allow for a degree of flexibility to address any alterations in future waste arisings as a result of commercial land use changes. These provisions will result in the handling of waste produced by the Proposed Development once it is complete and operational in accordance with SDCC Waste Bye-Laws 2018, *Waste Management (Food Waste) Amendment Regulations 2015 (S.I. No. 190 of 2015)* and the *European Union (Household Food Waste and Bio-Waste) Regulations 2015 (S.I. No. 191 of 2015)*.

In summary, this OWRMP presents a waste strategy that complies with all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the development.

# 14 ARCHAEOLOGY AND CULTURAL HERITAGE - APPENDICES

## 14.1 SMR/RMP SITES WITHIN THE SURROUNDING AREA

DU021-037
SMR
Tallaght
Tallaght
Uppercross
Various
Historic town of Tallaght
c. 120m south
In the twelfth century Tallaght formed part of the See lands of the Archbishop of Dublin and is listed among the lands confirmed to Archbishop Laurence O'Toole by Pope Alexander III in 1179 (Sheehy 1962, I, 27). The archbishops founded a borough here and an extent of 1326 mentions that there were then 15 burgesses rendering 15 shillings per annum (Mc Neill 1950, 181). Apart from the burgesses there were also free tenants, eighteen cottiers and four betaghs residing at Tallaght. It was one of the most important ecclesiastical manors in County Dublin throughout the Middle Ages. By the Sixteenth century it was the Archbishop's principal residence outside the city (Handcock 1899, 11). The street pattern of the medieval borough was linear and appears to have consisted simply of main street which expanded at its west end to form the market place, where the road forked N past St Mael Ruains church and south towards Oldbawn. The archbishop's palace lay on the N side of the road and the long plots on the S side are probably the remains of the medieval burgage plot pattern.
www.archaeology.ie/ SMR file

DU022-018001
RMP
Tallaght
Tallaght
Uppercross
709486/727859
Castle - tower house

Dist. From Development	c. 235m south
Description	This small tower house was located on the former entrance to the village of Tallaght from Dublin. It was demolished in 1952. In 1898 the lower half of the tower was still standing (L 4.1m; Wth 3.6m; T 1.05m). The entrance in the SE led into a partly vaulted ground floor (Mc Dix 1898, 40, 157). The base of the tower was all that remained in 1905 (Ball 1905, 3). There are no visible remains at ground level.
Reference	www.archaeology.ie/ SMR file
SMR No.	DU021-037010/20
<b>RMP Status</b>	RMP
Townland	Tallaght
Parish	Tallaght
Barony	Uppercross
I.T.M.	709261/727754
Classification	Gatehouse/Castle - unclassified
Dist. From Development	c. 405m south-southwest
Description	Gatehouse – Incorporated into the present Dominican Priory, all that survives of the Archbishop's palace of the later medieval period is this gate house (Handcock, 1991, 32, 3rd ed). It is rectangular in plan, rising to four storeys with a stair turret in NW angle and an external base batter visible on the E side. It is built of coursed limestone blocks with hammer dressing on the quoins and windows and was considerably altered in the 19th and 20th centuries. There is a vault over the ground floor, which has been converted into a chapel with Gothic windows inserted. Access to upper floors is from a stair turret, which is entered at ground level on S side and is lit by single slit opes. A fireplace has been inserted into N wall of the first floor. The interior is lit by round- headed windows in the four walls, that in the W serves as a doorway. The third floor has a vaulted roof running on an E-W axis, which is probably modern (Ball 1899, 100; Price 1942, 39- 41). A stone head was found reused in one of the walls of the stone stair by Sir John Lentaigne (O'Curry 1837, 31; Ball 1899, 101). The tooling evidence helps assign a sixteenth century date



### ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOL 2

FORMER GALLAHER'S SITE, AIRTON

	to the tower (Bradley & King 1988, 332), although this may just be
	evidence of later insertions into an earlier building.
	Castle – The square tower (DU021-037010-) was probably a gate
	tower to a much larger building (Bradley and King 1988, 320).
	Monk Mason's (1818) drawing shows a much more extensive
	castle complex. Handcock states that the parts of this more
	extensive castle's foundations have been found on occasion, and
	that there appears to have been an enclosing fosse (Handcock
	1899, 29, 35; Bradley & King 1988, 331; O'Curry 1837, 32-3). The
	original castle was constructed in the first half of the early
	fourteenth century. Ball states that the castle was used as a
	garrison in the time of the Geraldine Rebellion (1905, 8).
Reference	www.archaeology.ie/ SMR file

SMR No.	DU021-037007/12
RMP Status	RMP
Townland	Tallaght
Parish	Tallaght
Barony	Uppercross
I.T.M.	709238/727649
Classification	Mill – unclassified/Ritual site - holy tree/bush
Dist. From Development	c. 500m south-southwest
	Mill – No information available.
	Ritual site – There is a mature walnut tree on the grounds of the
Description	present Dominican Priory in Tallaght village on the site of the
	Archbishop's palace. It is associated with St. Maelruain (Handcock
	1991, 34-5).
Reference	www.archaeology.ie/ SMR file



FORMER GALLAHER'S SITE, AIRTON

## 14.2 STRAY FINDS WITHIN THE SURROUNDING AREA

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A review of the topographical files for the study area of the proposed development revealed that no stray finds have been recovered.



FORMER GALLAHER'S SITE, AIRTON

## 14.3 LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE

### **Protection of Cultural Heritage**

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997.

## The ARCHAEOLOGICAL RESOURCE

The National Monuments Act 1930 to 2014 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all manmade structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

### **Ownership and Guardianship of National Monuments**

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

### **Register of Historic Monuments**

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

## **Preservation Orders and Temporary Preservation Orders**

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

### **Record of Monuments and Places**

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Culture, Heritage and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding  $\leq$ 3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding  $\leq$ 10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989,* Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

### The Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

### South Dublin County Development Plan, 2016-2022

South County Dublin contains a large number of buildings, structures and sites of architectural, historic and/or artistic importance, in addition to numerous archaeological sites. This significant archaeological and architectural heritage is a valuable resource adding to the historical and cultural character of the County. The Development Plan contains policies which are intended to ensure the protection of this heritage. Village Design Statements can be utilised as a tool to guide development in smaller centres. It should be noted that archaeological sites and archaeological zones of interest are identified by a recorded monument reference number on the land use zoning maps. The recorded monument reference numbers are taken from the *Record of Monuments and Places for Dublin*, published by Department of the Environment, Heritage and Local Government.

### HCL1 Objective 1:

To protect, conserve and enhance natural, built and cultural heritage features and restrict development that would have a significant negative impact on these assets.

### HCL2 Objective 1:

To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.

### HCL2 Objective 2:

To ensure that development is designed to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.

HCL2 Objective 3:



### ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOL 2

FORMER GALLAHER'S SITE, AIRTON

To protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately.

### HCL2 Objective 4:

To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.

### HCL2 Objective 5:

To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.



### ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOL 2

FORMER GALLAHER'S SITE, AIRTON

## 14.4 IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE

### **Potential Impacts on Archaeological and Historical Remains**

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2017). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

### **Predicted Impacts**

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity
  value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.



FORMER GALLAHER'S SITE, AIRTON

## 14.5 MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE

### Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

### **Definition of Mitigation Strategies**

### **Archaeological Resource**

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIFA 2014a).

*Full Archaeological Excavation* can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIFA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIFA 2014c).

*Underwater Archaeological Assessment* consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

