Appendix A – Baseline Containment Data

ALcontrol Technichem

Heron Drive,
Langley,
Slough SL3 8XP
tel: 01753 212500
fax: 01753 212501
email: langley@alcontrol.co.uk

Paul Gribble
WSP Environmental Limited
Unit 5 Centurion Business Centre
Dabell Avenue
Blenheim Industrial Estate
Bulwell, Nottingham
NG6 8WA

23rd October 2003

TEST REPORT

Our Report No: B03023142

Your Order No: 5999

6 no. water samples submitted for analysis on 09.10.2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

Results enclosed: Pages 2-7

Laboratory analysis started on 09.10.2003
All laboratory analysis completed by 23rd October 2003

Jodie Bettis
Senior Project Co-ordinator
ALCONTROL TECHNICHEM

Leigh Burton
Project Co-ordinator
ALCONTROL TECHNICHEM

Test Methods are Documented In House Procedures or where appropriate Standard Methods.
Non accredited tests (if applicable) are identified on each page. Procedures for sampling are outside the scope of the laboratory UKAS accreditation. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
All samples connected with this report, including any 'on hold', will be stored and disposed of according to Company policy. A copy of this policy is available on request.

TEST REPORT

WATER ANALYTICAL RESULTS

Our Report No: B03023142

Your Order No: 5999

CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003

DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

Lab Ref No:	S03024442	S03024443	S03024444	S03024445	S03024446	S03024447				
Sample Ref :	**BH01**	**BH02**	**BH03**	**BH04**	**BH06**	**BH15**				
Depth(m)	-	-	-	-	-	-				
009 pH	6.8	6.8	6.9	7.4	6.7	6.5				
033 Electrical Conductivity (µS/cm)	1090	740	940	690	540	910				
016 Sulphate as SO_4	140	76	95	54	34	120				
061 Total Cyanide	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				
014 Monohydric Phenol	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				
054 COD	22	12	26	23	<10	<10				
057 Ammonia as N	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
016 Arsenic	0.017	0.013	0.014	0.011	0.011	0.015				
016 Cadmium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
016 Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
016 Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
028 Mercury	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				
016 Selenium	0.011	<0.01	<0.01	<0.01	<0.01	<0.01				
016 Copper	0.009	<0.005	0.012	0.008	0.006	0.008				
016 Nickel	0.010	0.006	0.008	<0.005	<0.005	<0.005				
016 Zinc	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				

All results expressed in mg/l except for pH, unless stated

ALcontrol Technichem

TEST REPORT

WATER ANALYTICAL RESULTS - 040 VOC BY HEAD SPACE GC-MS Results in µg/l

Our Report No: B03023142

Your Order No: 5999

CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003

DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

Lab Ref No:	S03024442	S03024443	S03024444	S03024445	S03024446	S03024447				
Sample Ref :	BH01	BH02	BH03	BH04	BH06	BH15				
Depth(m)	-	-	-	-	-	-				
Vinyl chloride	<10	<10	<10	<10	<10	<10				
Chloroethane	<1	<1	<1	<1	<1	<1				
Trichlorofluoromethane	<1	<1	<1	<1	<1	<1				
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1				
1,1,2-trichloro-1,2,2-trifluoroethane	<25	<25	<25	<25	<25	<25				
Dichloromethane	<25	<25	<25	<25	<25	<25				
trans-1,2 Dichloroethene	<1	<1	<1	<1	<1	<1				
MTBE	<1	<1	<1	<1	<1	<1				
1,1 -Dichloroethane	<1	<1	<1	<1	<1	<1				
cis-1,2 dichloroethene	<1	<1	<1	<1	<1	<1				
Chloroform	<1	<1	<1	<1	<1	<1				
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1				
1,2-Dichloroethane	<1	<1	<1	<1	<1	<1				
Benzene	<1	<1	<1	<1	<1	<1				
Carbon tetrachloride	<1	<1	<1	<1	<1	<1				
Trichloroethene	<1	<1	<1	<1	<1	<1				
Bromodichloromethane	<1	<1	<1	<1	<1	<1				
cis-1,3 Dichloropropene	<1	<1	<1	<1	<1	<1				
Toluene	<1	<1	<1	<1	<1	<1				
trans-1,3 dichloropropene	<1	<1	<1	<1	<1	<1				
1,1,2-Trichloroethane	<1	<1	<1	<1	<1	<1				
Dibromochloromethane	<1	<1	<1	<1	<1	<1				
Tetrachloroethene	<1	<1	<1	<1	<1	<1				
Chlorobenzene	<1	<1	<1	<1	<1	<1				
Ethyl benzene	<1	<1	<1	<1	<1	<1				
m,p-Xylenes	<1	<1	<1	<1	<1	<1				
Bromoform	<1	<1	<1	<1	<1	<1				
o-Xylene	<1	<1	<1	<1	<1	<1				
1,1,2,2 Tetrachloroethane	<1	<1	<1	<1	<1	<1				
1,3,5 Trimethylbenzene	<1	<1	<1	<1	<1	<1				
1,2,4 Trimethylbenzene	<1	<1	<1	<1	<1	<1				
1,3 Dichlorobenzene	<1	<1	<1	<1	<1	<1				
1,4 Dichlorobenzene	<1	<1	<1	<1	<1	<1				
1,2 Dichlorobenzene	<1	<1	<1	<1	<1	<1				

TEST REPORT

WATER ANALYTICAL RESULTS - 053 SVOC BY GC-MS Results in µg/l

Our Report No: B03023142 — Page 4 of 7 pages

Your Order No: 5999 — CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003 — DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue — Project Code: 12170423 (E17/DC826)

Lab Ref No:		S03024442	S03024443	S03024444	S03024445	S03024446
Sample Ref :		BH01	BH02	BH03	BH04	BH06
Depth(m)		-	-	-	-	-
PAH	naphthalene	<20	<20	<20	<20	<20
	2-chloronaphthalene	<20	<20	<20	<20	<20
	acenaphthylene	<30	<30	<30	<30	<30
	acenaphthene	<20	<20	<20	<20	<20
	fluorene	<30	<30	<30	<30	<30
	phenanthrene	<20	<20	<20	<20	<20
	anthracene	<20	<20	<20	<20	<20
	fluoranthene	<20	<20	<20	<20	<20
	pyrene	<20	<20	<20	<20	<20
	benz(a)anthracene	<20	<20	<20	<20	<20
	chrysene	<20	<20	<20	<20	<20
	benzo(b)fluoranthene	<25	<25	<25	<25	<25
	benzo(k)fluoranthene	<20	<20	<20	<20	<20
	benzo(a)pyrene	<25	<25	<25	<25	<25
	indeno(123-cd)pyrene	<40	<40	<40	<40	<40
	dibenzo(ah)anthracene	<40	<40	<40	<40	<40
	benzo(ghi)perylene	<40	<40	<40	<40	<40
PHENOLS	phenol	<20	<20	<20	<20	<20
	2-chlorophenol	<20	<20	<20	<20	<20
	2-methylphenol	<20	<20	<20	<20	<20
	4-methylphenol	<20	<20	<20	<20	<20
	2-nitrophenol	<20	<20	<20	<20	<20
	2,4-dimethylphenol	<20	<20	<20	<20	<20
	2,4-dichlorophenol	<20	<20	<20	<20	<20
	2,6-dichlorophenol	<20	<20	<20	<20	<20
	4-chloro-3-methyl phenol	<20	<20	<20	<20	<20
	2,4,6-trichlorophenol	<20	<20	<20	<20	<20
	2,4,5-trichlorophenol	<20	<20	<20	<20	<20
	4-nitrophenol	<50	<50	<50	<50	<50
	2,3,4,6-tetrachlorophenol	<30	<30	<30	<30	<30
	pentachlorophenol	<60	<60	<60	<60	<60
PHTHALATES	dimethylphthalate	<20	<20	<20	<20	<20
	diethyl phthalate	<20	<20	<20	<20	<20
	di-n-butyl phthalate	<30	<30	<30	<30	<30
	butyl benzyl phthalate	<60	<60	<60	<60	<60
ETHERS	bis(2-chloroethyl)ether	<15	<15	<15	<15	<15
	bis(2-chloroisopropyl)ether	<10	<10	<10	<10	<10
	4-chlorophenyl phenyl ether	<15	<15	<15	<15	<15
	bromo phenyl phenyl ether	<30	<30	<30	<30	<30
BENZENES	1,3-dichlorobenzene	<15	<15	<15	<15	<15
	1,2-dichlorobenzene	<10	<10	<10	<10	<10
	1,4-dichlorobenzene	<10	<10	<10	<10	<10
	nitrobenzene	<20	<20	<20	<20	<20
	1,2,4-trichlorobenzene	<10	<10	<10	<10	<10
	2,6-dinitrotoluene	<20	<20	<20	<20	<20
	2,4-dinitrotoluene	<20	<20	<20	<20	<20
	azobenzene	<30	<30	<30	<30	<30
	hexachlorobenzene	<20	<20	<20	<20	<20
OTHERS	hexachloroethane	<15	<15	<15	<15	<15
	n-nitroso-di-n-propyl-1-propanamine	<40	<40	<40	<40	<40
	isophorone	<20	<20	<20	<20	<20
	bis(2-chloroethoxy)methane	<15	<15	<15	<15	<15
	hexachlorobutadiene	<10	<10	<10	<10	<10
	anthraquinone	<30	<30	<30	<30	<30
	aniline	<40	<40	<40	<40	<40

TEST REPORT

WATER ANALYTICAL RESULTS - 053 SVOC BY GC-MS Results in µg/l

Our Report No: B03023142

Page 5 of 7 pages

Our Order No: 5999

CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003

DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

Lab Ref No:		**S03024447**				
Sample Ref :		**BH15**				
Depth(m)		**-**				
PAH	naphthalene	<20				
	2-chloronaphthalene	<20				
	acenaphthylene	<30				
	acenaphthene	<20				
	fluorene	<30				
	phenanthrene	<20				
	anthracene	<20				
	fluoranthene	<20				
	pyrene	<20				
	benz(a)anthracene	<20				
	chrysene	<20				
	benzo(b)fluoranthene	<25				
	benzo(k)fluoranthene	<20				
	benzo(a)pyrene	<25				
	indeno(123-cd)pyrene	<40				
	dibenzo(ah)anthracene	<40				
	benzo(ghi)perylene	<40				
PHENOLS	phenol	<20				
	2-chlorophenol	<20				
	2-methylphenol	<20				
	4-methylphenol	<20				
	2-nitrophenol	<20				
	2,4-dimethylphenol	<20				
	2,4-dichlorophenol	<20				
	2,6-dichlorophenol	<20				
	4-chloro-3-methyl phenol	<20				
	2,4,6-trichlorophenol	<20				
	2,4,5-trichlorophenol	<20				
	4-nitrophenol	<50				
	2,3,4,6-tetrachlorophenol	<30				
	pentachlorophenol	<60				
PHTHALATES	dimethylphthalate	<20				
	diethyl phthalate	<20				
	di-n-butyl phthalate	<30				
	butyl benzyl phthalate	<60				
ETHERS	bis(2-chloroethyl)ether	<15				
	bis(2-chloroisopropyl)ether	<10				
	4-chlorophenyl phenyl ether	<15				
	bromo phenyl phenyl ether	<30				
BENZENES	1,3-dichlorobenzene	<15				
	1,2-dichlorobenzene	<10				
	1,4-dichlorobenzene	<10				
	nitrobenzene	<20				
	1,2,4-trichlorobenzene	<10				
	2,6-dinitrotoluene	<20				
	2,4-dinitrotoluene	<20				
	azobenzene	<30				
	hexachlorobenzene	<20				
OTHERS	hexachloroethane	<15				
	n-nitroso-di-n-propyl-1-propanamine	<40				
	isophorone	<20				
	bis(2-chloroethoxy)methane	<15				
	hexachlorobutadiene	<10				
	anthraquinone	<30				
	aniline	<40				

TEST REPORT

Our Report No: B03023142

Your Order No: 5999

CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003

DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

WATER - RESULTS

Lab Ref No:	Sample Ref:	Depth(m)	*PRO by GC-MS (C_6-C_{10})	†*Hydrocarbon Broadscan DRO (C_{10}-C_{24})	Mineral Oils (C_{24}-C_{40})	Description
S03024442	BH01	-	<1	<0.1	<0.1	The sample chromatogram exhibits too little GC-FID amenable material to provide qualitative analysis.
S03024443	BH02	-	<1	‡	‡	‡
S03024444	BH03	-	<1	<0.1	<0.1	The sample chromatogram exhibits too little GC-FID amenable material to provide qualitative analysis.
S03024445	BH04	-	<1	<0.1	<0.1	The sample chromatogram exhibits too little GC-FID amenable material to provide qualitative analysis.

NOTE:

(i) †This method provides information only on Gas Chromatograph (GC) amenable material with elutions ranging between 40°C and 325°C.

(ii) The results are expressed as mg/l.

‡denotes insufficient sample available for analysis.

*Denotes analysis outside the scope of our UKAS accreditation.

TEST REPORT

Our Report No: B03023142

Your Order No: 5999

CLIENT: WSP Environmental Limited

6 no. water samples submitted for analysis on 09.10.2003

DATE OF ISSUE: 23rd October 2003

Project Name: MOD Records Office, Bourne Avenue

Project Code: 12170423 (E17/DC826)

WATER - RESULTS

Lab Ref No:	Sample Ref:	Depth(m)	*PRO by GC-MS (C_6-C_{10})	†*Hydrocarbon Broadscan DRO (C_{10}-C_{24})	Mineral Oils (C_{24}-C_{40})	Description
S03024446	BH06	-	<1	<0.1	<0.1	The sample chromatogram exhibits too little GC-FID amenable material to provide qualitative analysis.
S03024447	BH15	-	<1	<0.1	<0.1	The sample chromatogram exhibits too little GC-FID amenable material to provide qualitative analysis.

NOTE:

(i) †This method provides information only on Gas Chromatograph (GC) amenable material with elutions ranging between 40°C and 325°C.

(ii) The results are expressed as mg/l.

‡denotes insufficient sample available for analysis.

*Denotes analysis outside the scope of our UKAS accreditation.

WSP Environmental Birmingham
One Queens Drive
Birmingham
West Midlands
UK
B5 4PJ

Certificate of Analysis

Job Number 10-17929

Report Date	25 October 2010
Project Number	12171311 001
Customer	Prologis
Site Address	Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF□□
Date of Sampling	06/10/2010
Date of Analysis	12 October 2010 - 25 October 2010

Dear Kerry Murray

Please find attached your results for the above project.
This report includes the samples we received at WSP Environmental Laboratories on 12 October 2010.

Your feedback is critical to the evolution and improvement of our business, so please feel free to email us your comments to: ideas_lab@wspgroup.com.

Results authorised by

Piers Taverner
Extractions Manager

Chemical Analysis is undertaken in accordance with in-house technical procedures and is subject to quality control procedures. Results are expressed on a dry weight basis (dried at below 30˚C) for all soil analyses. Any opinions or interpretations indicated are outside the scope of our UKAS accreditation.

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF

Report Date: 25/10/2010

NOTE ON 2023 SCR:

Results applicable to the Virtus London 14 site are highlighted in yellow

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Solid Description			101	Clay with Stone	Sandy Clay	Loam	Sandy Clay	Clay and Granular	---	Clay and stone	Clay and stone	Clay	Sand with stones
Moisture	0.1	%	101	13	9.8	12	11	10	8.0	11	12	15	6.5
pH		pH units	206*	8.4	---	8.6	---	8.8	---	8.6	9.4	7.9	8.1
Selenium, total, as Se	0.3	mg/kg	412*	< 0.3	---	0.5	---	< 0.3	---	< 0.3	< 0.3	< 0.3	< 0.3
Mercury, total, as Hg	0.1	mg/kg	405*	0.1	---	0.1	---	< 0.1	---	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic, total, as As	2.5	mg/kg	406*	< 2.5	---	7.5	---	< 2.5	---	4.1	3.5	< 2.5	4.2
Cadmium, total, as Cd	0.25	mg/kg	406*	0.31	---	0.52	---	0.46	---	< 0.25	< 0.25	< 0.25	< 0.25
Chromium, total, as Cr	1	mg/kg	406*	47	---	53	---	63	---	56	28	13	23
Copper, total, as Cu	2.5	mg/kg	406*	36	---	41	---	16	---	17	14	20	6.5
Nickel, total, as Ni	2.5	mg/kg	406 M*	43	---	100	---	14	---	35	28	40	17
Lead, total, as Pb	2.5	mg/kg	406 M*	49	---	61	---	86	---	< 2.5	3.8	< 2.5	2.6
Zinc, total, as Zn	5	mg/kg	406	170	---	200	---	220	---	72	58	81	35
Naphthalene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	0.2	1.1	---	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	408*	< 0.1	< 0.1	---	0.9	1.1	---	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	1.6	7.0	---	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	1.1	8.5	---	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	408 M*	0.4	0.2	---	3.9	77	---	0.3	0.2	< 0.1	0.1
Anthracene	0.1	mg/kg	408 M*	0.1	< 0.1	---	0.3	21	---	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	0.1	mg/kg	408 M*	0.8	< 0.1	---	0.7	130	---	< 0.1	< 0.1	0.1	0.2
Pyrene	0.1	mg/kg	408 M*	0.7	0.3	---	0.5	97	---	0.6	0.3	0.1	0.2
Benzo(a)anthracene	0.1	mg/kg	408 M*	0.4	0.2	---	0.1	49	---	0.4	0.1	< 0.1	< 0.1
Chrysene	0.1	mg/kg	408 M*	0.4	0.2	---	0.2	49	---	0.3	0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	408 M*	0.2	< 0.1	---	< 0.1	22	---	0.2	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	408 M*	0.3	0.2	---	< 0.1	42	---	0.3	0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	mg/kg	408 M*	0.4	0.2	---	< 0.1	48	---	0.4	0.1	< 0.1	< 0.1

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929
Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Indeno(1,2,3-c,d)pyrene	0.1	mg/kg	408 M*	0.3	0.1	---	< 0.1	23	---	0.3	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	< 0.1	6.4	---	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	0.1	mg/kg	408 M*	0.3	0.2	---	< 0.1	26	---	0.2	< 0.1	< 0.1	< 0.1
PAH Total (EPA 16)	1	mg/kg	408*	4.4	1.4	---	9.6	610	---	3.0	< 1.0	< 1.0	< 1.0
Catechol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Naphthol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Phenol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Resorcinol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Total Cresols	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Total Phenols	0.8	mg/kg	410 M*	< 0.8	< 0.8	---	---	---	---	---	---	---	---
Total Xylenols	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Trimethylphenol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Benzene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
TAME	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
PRO (>C5-C6)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C6-C8)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C8-C10)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C5-C10)	30	mg/kg	401	< 30	< 30	---	< 30	< 30	---	< 30	< 30	< 30	< 30
PRO (>C6-C10)	20	mg/kg	401	< 20	< 20	---	< 20	< 20	---	< 20	< 20	< 20	< 20
EPH (>C6-C8)	2	mg/kg	420 M*	---	---	---	---	---	< 2.0	---	---	---	---

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	LOD	Units	Method										
EPH (>C8-C12)	4	mg/kg	420 M*	---	---	---	---	---	< 4.0	---	---	---	---
EPH (>C12-C16)	2	mg/kg	420 M*	---	---	---	---	---	< 2.0	---	---	---	---
EPH (>C16-C21)	2	mg/kg	420 M*	---	---	---	---	---	2.8	---	---	---	---
EPH (>C21-C40)	15	mg/kg	420 M*	---	---	---	---	---	< 15	---	---	---	---
Total EPH (>C6-C40)	20	mg/kg	420 M*	---	---	---	---	---	< 20	---	---	---	---
Aliphatic (>C5-C6)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C6-C8)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C8-C10)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C10-C12)	2	mg/kg	419	< 2.0	< 2.0	---	160	< 2.0	---	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic (>C12-C16)	2	mg/kg	419	< 2.0	< 2.0	---	560	< 2.0	---	< 2.0	3.7	< 2.0	< 2.0
Aliphatic (>C16-C21)	5	mg/kg	419	9.8	< 5.0	---	690	< 5.0	---	< 5.0	18	< 5.0	< 5.0
Aliphatic (>C21-C35)	5	mg/kg	419	49	17	---	190	29	---	7.0	68	< 5.0	6.2
Aliphatic (>C35-C40)	2	mg/kg	419	11	5.9	---	< 2.0	9.5	---	< 2.0	22	< 2.0	< 2.0
Aliphatic (>C40-C44)	2	mg/kg	419	9.4	5.7	---	< 2.0	9.8	---	< 2.0	26	< 2.0	< 2.0
Total Aliphatics (>C6-C44)	20	mg/kg	419	80	33	---	1600	56	---	< 20	140	< 20	< 20
Aromatic (>C6-C7)	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C7-C8)	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C8-C10)	0.01	mg/kg	401	< 0.01	< 0.01	---	0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C10-C12)	2	mg/kg	419	3.2	3.2	---	100	2.7	---	2.6	< 2.0	2.9	< 2.0
Aromatic (>C12-C16)	2	mg/kg	419	3.6	4.3	---	400	5.0	---	2.8	2.7	3.6	3.2
Aromatic (>C16-C21)	5	mg/kg	419	7.8	9.7	---	460	37	---	8.3	11	6.0	5.7
Aromatic (>C21-C35)	5	mg/kg	419	57	23	---	150	160	---	9.4	53	11	8.9
Aromatic (>C35-C40)	2	mg/kg	419	28	15	---	< 2.0	60	---	< 2.0	34	< 2.0	< 2.0
Aromatic (>C40-C44)	2	mg/kg	419	23	13	---	< 2.0	42	---	< 2.0	35	< 2.0	< 2.0
Total Aromatics (>C6-C44)	20	mg/kg	419	120	68	---	1100	310	---	26	140	27	22

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Total TPH (>C6-C44)	40	mg/kg	419	200	100	---	2700	370	---	< 40	270	< 40	< 40

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Solid Description			101	Clay	Clay	Clay with Loam
Moisture	0.1	%	101	13	14	14
pH		pH units	206*	5.4	11	9.7
Selenium, total, as Se	0.3	mg/kg	412*	< 0.3	< 0.3	< 0.3
Mercury, total, as Hg	0.1	mg/kg	405*	< 0.1	< 0.1	0.2
Arsenic, total, as As	2.5	mg/kg	406*	< 2.5	3.3	5.1
Cadmium, total, as Cd	0.25	mg/kg	406*	< 0.25	0.32	0.34
Chromium, total, as Cr	1	mg/kg	406*	50	59	43
Copper, total, as Cu	2.5	mg/kg	406*	9.0	27	45
Nickel, total, as Ni	2.5	mg/kg	406 M*	21	33	44
Lead, total, as Pb	2.5	mg/kg	406 M*	< 2.5	29	71
Zinc, total, as Zn	5	mg/kg	406	48	120	150
Naphthalene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	408*	< 0.1	< 0.1	< 0.1
Acenaphthene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	408 M*	< 0.1	0.8	0.9
Anthracene	0.1	mg/kg	408 M*	< 0.1	0.2	0.3
Fluoranthene	0.1	mg/kg	408 M*	0.1	< 0.1	2.3
Pyrene	0.1	mg/kg	408 M*	0.1	1.5	2.0
Benzo(a)anthracene	0.1	mg/kg	408 M*	< 0.1	0.6	1.0
Chrysene	0.1	mg/kg	408 M*	< 0.1	0.7	1.1
Benzo(k)fluoranthene	0.1	mg/kg	408 M*	< 0.1	0.3	0.5
Benzo(b)fluoranthene	0.1	mg/kg	408 M*	< 0.1	0.5	0.9
Benzo(a)pyrene	0.1	mg/kg	408 M*	< 0.1	0.6	1.1

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Indeno(1,2,3-c,d)pyrene	0.1	mg/kg	408 M*	< 0.1	0.4	0.7
Dibenzo(a,h)anthracene	0.1	mg/kg	408 M*	< 0.1	0.1	0.2
Benzo(g,h,i)perylene	0.1	mg/kg	408 M*	< 0.1	0.5	0.8
PAH Total (EPA 16)	1	mg/kg	408*	< 1.0	6.0	12
Catechol	0.1	mg/kg	410 M*	---	---	---
Naphthol	0.1	mg/kg	410 M*	---	---	---
Phenol	0.1	mg/kg	410 M*	---	---	---
Resorcinol	0.1	mg/kg	410 M*	---	---	---
Total Cresols	0.1	mg/kg	410 M*	---	---	---
Total Phenols	0.8	mg/kg	410 M*	---	---	---
Total Xylenols	0.1	mg/kg	410 M*	---	---	---
Trimethylphenol	0.1	mg/kg	410 M*	---	---	---
Benzene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Ethylbenzene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
o-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
MTBE	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
m+p-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
TAME	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Toluene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
PRO (>C5-C6)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C6-C8)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C8-C10)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C5-C10)	30	mg/kg	401	< 30	< 30	< 30
PRO (>C6-C10)	20	mg/kg	401	< 20	< 20	< 20
EPH (>C6-C8)	2	mg/kg	420 M*	---	---	---

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	LOD	Units	Method			
EPH (>C8-C12)	4	mg/kg	420 M*	---	---	---
EPH (>C12-C16)	2	mg/kg	420 M*	---	---	---
EPH (>C16-C21)	2	mg/kg	420 M*	---	---	---
EPH (>C21-C40)	15	mg/kg	420 M*	---	---	---
Total EPH (>C6-C40)	20	mg/kg	420 M*	---	---	---
Aliphatic (>C5-C6)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C6-C8)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C8-C10)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C10-C12)	2	mg/kg	419	< 2.0	< 2.0	< 2.0
Aliphatic (>C12-C16)	2	mg/kg	419	< 2.0	3.3	2.7
Aliphatic (>C16-C21)	5	mg/kg	419	< 5.0	16	14
Aliphatic (>C21-C35)	5	mg/kg	419	< 5.0	59	71
Aliphatic (>C35-C40)	2	mg/kg	419	< 2.0	15	16
Aliphatic (>C40-C44)	2	mg/kg	419	< 2.0	14	14
Total Aliphatics (>C6-C44)	20	mg/kg	419	< 20	110	120
Aromatic (>C6-C7)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C7-C8)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C8-C10)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C10-C12)	2	mg/kg	419	2.7	2.3	< 2.0
Aromatic (>C12-C16)	2	mg/kg	419	3.1	5.2	3.9
Aromatic (>C16-C21)	5	mg/kg	419	< 5.0	34	18
Aromatic (>C21-C35)	5	mg/kg	419	6.0	84	110
Aromatic (>C35-C40)	2	mg/kg	419	< 2.0	34	44
Aromatic (>C40-C44)	2	mg/kg	419	< 2.0	27	34
Total Aromatics (>C6-C44)	20	mg/kg	419	< 20	190	210

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Total TPH (>C6-C44)	40	mg/kg	419	< 40	290	330

Certificate of Bulk Sample Asbestos Identification

WSP
The Laboratory
Lakeview Drive
Sherwood
Nottingham NG15 0ED

t: +44 (0)1623 886 800

Project No. 12171311/001
Job No. 10-17929
Location Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF
Customer Prologis
Contact Kerry Murray
Date sampled 06/10/2010
Date of receipt 12/10/2010
Date of analysis 18/10/2010 - 21/10/2010

Lab Reference	Sample Location	Sample Description	Asbestos Identification	Comments
197845	TP1 0.4	Soil	Chrysotile	Insulation
197847	TP2 0.1	Soil	No Asbestos Detected	None
197850	TP3 0.3	Soil	No Asbestos Detected	None
197853	TP4 0.1	Soil	No Asbestos Detected	None
197855	TP5 0.5	Soil	No Asbestos Detected	None
197856	TP6 0.5	Soil	No Asbestos Detected	None
197858	TP7 0.2	Soil	No Asbestos Detected	None
197860	TP8 0.4	Soil	No Asbestos Detected	None
197862	TP9 0.3	Soil	Chrysotile	Bituminous
197864	TP10 0.5	Soil	No Asbestos Detected	None

Authorised by Joanne O'Sullivan
Signature

Analyst Adam Taylor Nina Harriman
Signature

UKAS TESTING 2538N

Position Analysis Manager
Date of issue 21 October 2010

The above samples were submitted by WSP Environmental.

Analysis is in accordance with in-house technical procedures - AID, based upon HSE guidance note HSG 248 "Asbestos: The Analysts' Guide For Sampling, Analysis and Clearance Procedures". Sampling by WSP RMS is in accordance with in - house technical procedures - SSA. Where the sample was not taken by WSP RMS, the information above is that which is supplied by the client. WSP are not responsible for sampling errors where the sample is taken by others. Sample/material descriptions, opinions, comments and interpretation expressed herein are outside the scope of UKAS accreditation. Information supplied by e-mail may be subject to error during transfer.

WSP Environmental Risk Management Services Division

Registered Office:
WSP House
70 Chancery Lane
London
WC2A 1AF

Registered Number
1152332 England

Certificate of Bulk Sample Asbestos Identification

WSP
The Laboratory
Lakeview Drive
Sherwood
Nottingham NG15 0ED

t: +44 (0)1623 886 800

Project No. 12171311/001
Job No. 10-17929
Location Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF
Customer Prologis
Contact Kerry Murray
Date sampled 06/10/2010
Date of receipt 12/10/2010
Date of analysis 18/10/2010 - 21/10/2010

Lab Reference	Sample Location	Sample Description	Asbestos Identification	Comments
197865	TP10 1.4	Cement	Chrysotile	None
197866	SH3A 0.1-0	Soil	No Asbestos Detected	None
197867	SH3B1 0.1-0	Soil	No Asbestos Detected	None
197868	SH3B2 0.1-0	Soil	No Asbestos Detected	None

Authorised by Joanne O'Sullivan
Signature

Position Analysis Manager
Date of issue 21 October 2010

Analyst Adam Taylor Nina Harriman
Signature

UKAS TESTING 2538N

WSP Environmental Risk Management Services Division

Registered Office:
WSP House
70 Chancery Lane
London
WC2A 1AF

Registered Number
1152332 England

The above samples were submitted by WSP Environmental.

Appendix D Notes on Limitations

GENERAL

WSP Environmental Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from WSP Environmental Limited; a charge may be levied against such approval.

WSP Environmental Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) this document to any third party with whom an agreement has not been executed.

PHASE I ENVIRONMENTAL AUDITS

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP Environmental Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

PHASE II ENVIRONMENTAL AUDITS

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

GEO-ENVIRONMENTAL INVESTIGATIONS

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to site remediation these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Appendix B – Remediation Completion Report

HILLINGDON
LONDON

TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)

APPROVAL OF DETAILS

Mr Paul Wahba
Michael Sparks Associates
Unit 11 Plato Place
St Dionis Road
London
SW64TU

Ref: 18399/APP/2015/4257

The Council of the London Borough of Hillingdon as the Local Planning Authority within the meaning of the above-mentioned Act and Orders made thereunder hereby **GRANT APPROVAL of** the following received on 18 November 2015:-

Details pursuant to condition 6(iii) (remediation scheme verification report) of Planning Permission Ref: 18399/APP/2013/1019 (Erection of distribution warehouse units (use class B8) with ancillary offices, associated car parking, access and associated landscape works within the existing Prologis Park development)

Drawing/Plan Nos: **See Attached Schedule of Plans**

At: PROLOGIS PARK, STOCKLEY ROAD, WEST DRAYTON,

James Rodger

Head of Planning and Enforcement

Date: 13 January 2016

NOTE: This notice does NOT relate to any approvals, which may be required under any conditions of the notice of planning permission except the condition(s) referred to herein.

INFORMATIVES

END OF SCHEDULE

Address:

Residents Services
London Borough of Hillingdon
3 North Civic Centre, High Street, Uxbridge UB8 1UW
Tel: 01895 250230
www.hillingdon.gov.uk

SCHEDULE OF PLANS

Remediation Completion Report (Ref: BGCL-C14023/001/V1) - received 18 Nov 2015

RIGHTS OF APPLICANTS AGGRIEVED BY DECISION OF LOCAL PLANNING AUTHORITY TOWN & COUNTRY PLANNING ACT 1990

Appeals to the Secretary of State.

If you are aggrieved by the decision of your Local Planning Authority to refuse permission for the proposed development or to grant it subject to conditions, then you can appeal to the Secretary of State for Transport, Local Government and The Regions under Section 78 of the Town and Country Planning Act 1990.

If you want to appeal, then you must do so within six months of the date of this notice, using a form which you can get from The Planning Inspectorate, 3/02 Kite Wing, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6PN (Tel. 0117 372 8428). Appeal forms can be downloaded from the Planning Inspectorate's website at http://www.planning-inspectorate.gov.uk.

The Secretary of State can allow a longer period for giving notice of an appeal, but he will not normally be prepared to use this power unless there are special circumstance which excuse the delay in giving notice of appeal.

The Secretary of State need not consider an appeal if it seems to him that the Local Planning Authority could not have granted planning permission for the proposed development or could not have granted it without the conditions they imposed, having regard to the statutory requirements, to the provisions of any development order and to any directions given under a development order.

In practice, the Secretary of State does not refuse to consider appeals solely because the Local Planning Authority based their decision on a direction given by him.

Purchase Notices.

If either the Local Planning Authority or the Secretary of State refuses permission to develop land or grants it subject to conditions, the owner may claim that he can neither put the land to a reasonably beneficial use in its existing state nor render the land capable of a reasonably beneficial use by carrying out of any development which has been or would be permitted.

In these circumstances, the owner may serve a purchase notice on the Council (District Council, London Borough Council or Common Council of the City of London) in whose area the land is situated. This notice will require the Council to purchase his interest in the land in accordance with the provisions of Part VI of the Town and Country Planning Act 1990.

Address:
Residents Services
London Borough of Hillingdon
3 North Civic Centre, High Street, Uxbridge UB8 1UW
Tel: 01895 250400 / 250401
www.hillingdon.gov.uk

PROLOGIS UK LTD

PHASE 3 PROLOGIS PARK, HAYES

REMEDIATION COMPLETION REPORT

Buckingham Group Contracting Limited
Silverstone Road
Stowe
Buckingham
MK18 5LJ

Report Reference: BGCL-C14023/001/v1

October 2015

DOCUMENT CONTROL

Report title:	Phase 3 Prologis Park, Hayes Remediation Completion Report
Report reference:	BGCL-C14023/001/v1
Revision number:	001
Issue Date:	9 October 2015
Author:	

M I Cliff BSc MSc CGeol MCIWEM CEnv SiLC

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds
LS8 4HT
Telephone: 0113 235 0001

Client:	Prologis UK 1 Monkspath Hall Road Solihull West Midlands B90 4FY UK Contact: Simon Cox Telephone: 0121 224 8904
Contractor:	Buckingham Group Contracting Limited Blackpit Farm Silverstone Road Stowe Buckinghamshire MK18 5LJ Contact: Clive Bailie Telephone: 01280 823355
Site Address:	Units 5, 6A and 6B Phase 3 Prologis Park Stockley Road Hayes Middlesex UB3 1QF

CONTENTS

TABLES

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APPENDICES

1.0 Introduction

1.1 Background

Buckingham Group Contracting Limited (BGCL) was commissioned by Prologis UK Ltd to construct Units 5, 6A and 6B at Phase 3 Prologis Park, Hayes. Phase 3 was known as Phase 3B in earlier investigations. The site had formerly been a munitions factory and more recently the MoD Records Office. Buildings had been demolished before the start of BGCL project. The development is in accordance with the London Borough of Hillingdon Council Planning Permission referenced 18399/APP/2013/1019. The site is centred on National Grid Reference (NGR) 507850E 179580N.

The land was assessed against remediation criteria before the start of the contract and the works reported in the WSP Environment and Energy report:

- Validation Report Phase 3B ProLogis Park, Hayes reference 12171314-001, dated November 2010

A Land Quality Statement was produced by WSP and following correspondence with the regulators on some outstanding issues a remediation proposal was prepared. The relevant documents are:

- Land Quality Statement: Phase 3 Prologis Park, Hayes Prologis, dated 17/04/2013
- Remediation Method Statement Phase 3, Prologis Park, Hayes, dated 29 October 2013

Correspondence with the Environment Agency is included as Appendix A of the Remediation Method Statement.

1.2 Purpose of the Report

The purpose of this report is to present evidence that remediation of the site was completed by Buckingham Group Contracting Limited to achieve the requirements of the remediation strategy including:

- Advance characterisation of the soils below the trial pit locations
- Watching brief during soakaway construction
- Observations of exposed ground and recording of any previously unrecorded contamination
- Method of dealing with any unexpected contamination

Evidence is presented from a range of sources including additional trial pits, photographs, site manager's observations, testing of excavated spoil and the geo-environmental specialist's observations. Risks to groundwater are addressed through a quantitative risk assessment. The methods used for minimising risks from contamination are subject to Conditions 16 and 17 of the Planning Permission.

2.0 Summary of Site and Environmental Setting

2.1 Location and Description

The location of the site is shown on **Figure 1**. It is approximately 2 km north of Heathrow Airport and 25 km west of the City of London. The site area is 3.1 hectares and mostly lies at an elevation between 31m and 32m AOD.

2.2 Geology, Groundwater and Surface Water

A site investigation was carried out in 2003 across the whole of the MoD site. Additional ground investigation data is available from the 2010 Phase 3B validation report and work carried out by BGCL in 2014. The locations of the 2010 and 2014 trial pits are shown on **Figure 2**.

Investigations have shown that the site is on Made Ground underlain by Langley Silt and the Lynch Hill Gravel. The Langley Silt is classified as Unproductive Strata with respect to groundwater. The underlying Lynch Hill Gravel is mostly sandy gravel but in places has a moderately high silt content. It is designated a Principal Aquifer. The top of the Lynch Hill Gravel has been found at depths from 0.0m to a maximum of 2.8m in or close to Phase 3 and the top of the underlying London Clay has been proved between 2.4m and 7.5m below ground level. The geology in the 2003 boreholes is summarized in **Table 1**.

Table 1 Summary of Geology

Borehole no.	Ground level	Top of Gravel	Thickness of Gravel	Top of London Clay		Water level, Sept 2003	Saturated thickness of Gravel
	m AOD	m bgl	m	m bgl	m AOD	m AOD	m
BH04	31.276	1.0	2.7	3.7	27.58	28.28	0.70
BH07	31.778	0.0	5.0	5.0	26.78	29.78	3.00
BH08	31.651	2.5	5.0	7.5	24.15	28.65	4.50
BH09	30.918	0.8	2.7	3.5	28.08	29.12	1.04

In September 2003 the groundwater level was generally 2m to 3m below ground level (bgl). The recorded levels are shown on **Figure 3**. During excavation of trial pits on 1 April 2014, however, the level was approximately 1.5m bgl. From interpretation of limited groundwater data it is inferred that water in the Lynch Hill Gravel flows towards the north east. The hydraulic gradient deduced from **Figure 3** is 0.0077 or 1 in 130.

Infiltration tests carried out in the April 2014 trial pits by Construction Testing Solutions Ltd, gave a result of 4.2×10^{-6} m/sec, which is 0.36 m/day.

There are various surface water features in the vicinity of the site. The Grand Union Canal is approximately 100m to the north and the watercourse leading to Stockley Park Lake is approximately 40m to the north west. It is not know whether they are in hydraulic continuity with groundwater or whether they are groundwater fed. Historically there was a pond in the south east corner of Phase 3 and water flowed from it to a stream flowing south.

Landfills are present to the north, west and south of the site and the materials received include domestic and industrial waste. No evidence of groundwater contamination on the site resulting from the presence of the landfills has been reported.

2.3 Validation

Remediation of land to the west and south of Phase 3 has been carried out. This includes an area of former hydrocarbon contamination from heating oil tanks in Phase 3A around trial pit TP2. It is understood that no active remediation has been carried out in Phase 3, although investigations and validation have been completed. The maximum total petroleum hydrocarbon contamination found within the Phase 3 site during validation was 370 mg/kg at trial pit TP3. A higher concentration of 2700 mg/kg was found at TP2 which is in Phase 3A to the west of the current Phase 3 site.

3.0 Remediation

3.1 Strategy

The Remediation Method Statement prepared by WSP in October 2013 was accepted by the regulators after incorporation of some additional requests from the Environment Agency. The actions that were to be taken were:

- Pre-start trial pits and contamination testing to be completed at the proposed soakaway locations
- Watching brief by geo-environmental consultant during soakaway construction
- Watching brief by geo-environmental consultant throughout works in the ground

3.2 Pre-Start Investigation

Trial pits were constructed at the approximate positions of the soakaways on 1 April 2014. A hydrogeologist from Roundhay Environmental Consulting Ltd (Roundhay ECL) was present to log trial pits TH4 to TH11. Logs and photographs are presented in **Appendix B** and the positions are shown on **Figure 2**.

No contamination was observed in the trial pits other than a hydrocarbon odour and sheen in TH11.

Groundwater levels in the trial pits were high and the planned infiltration tests could not be completed.

Infiltration tests were completed by Construction Testing Solutions Ltd on 23 April 2014 as shown in the records in **Appendix C**.

The positions of the proposed soakaways were adjusted as a result of the investigations. The area round TH11 where hydrocarbon contamination was noted is not within any of the final soakaway areas.

3.3 Watching Brief during Soakaway Construction

During soakaway construction the site manager observed the excavations. No contaminated materials were noted at the base of the excavations. Excavated soils were placed in a stockpile in the north west of the site.

Two soil samples were taken from the stockpile and sent to the laboratory for Waste Acceptance Criteria (WAC) analysis. The soils are described as light or dark brown sandy silty clay with frequent gravel fragments including flint and brick. Spots of black are also mentioned. The results of analyses are attached in **Appendix D**.

From the results of the WAC analysis the soils are classified as inert for waste disposal purposes.

3.4 Watching Brief during Earthworks

During earthworks other than soakaway construction the soil conditions were observed by the site manager. No unexpected contamination was recorded.

4.0 Assessment of Residual Risks

A number of activities were specified in the Remediation Method Statement and some of them were not completed. As the purpose of remediation is to ensure that there are no unacceptable risks to human health or the environment an assessment of risks has been completed.

4.1 Risks to Human health

Post construction the site is covered with buildings and hardstanding. Earlier assessments concluded that there would be no significant risks to human health in the proposed commercial development post construction. It is concluded that there are no residual unacceptable risks to human health from contamination.

4.2 Risks to Groundwater

There are potential risks to groundwater from infiltration of water via soakaways into the Lynch Hill Gravel and subsequently after flow through the gravels to surface water, if the soils at the soakaway locations are contaminated. Some hydrocarbon contamination is present at low levels. The risks from the hydrocarbons have been assessed using the Environment Agency P20 methodology and worksheets.

4.2.1 Target Concentration

Groundwater contamination is assessed relative to environmental quality standards (EQS) set by the Environment Agency. The target concentration for hydrocarbons is the EQS of 0.1 mg/l. The assessment is made initially for the >EC10-EC12 fraction therefore some allowance must be made for other fractions that might be present.

Aliphatic hydrocarbons have relatively low solubility, for example the solubility of the >EC10-EC12 aliphatic fraction is 0.03 mg/l, and heavier fractions are less soluble. Aliphatic hydrocarbons are therefore unlikely to contribute significantly to the mass of dissolved hydrocarbons.

Aromatic hydrocarbons in the >EC10 up to the EC21 have solubilities greater than 0.1 mg/l. To allow for the presence of these hydrocarbons 20% of the EQS has been used as the target concentration in the P20 calculations. In reality the heavier hydrocarbons are unlikely to contribute as much as 80% of the dissolved phase as their solubilities are much lower than the solubility of the >EC10-EC12 fraction. Use of the 20% value for each of the fraction >EC10-EC12 and >EC12-EC16 is therefore conservative.

4.2.2 Contaminant Source

The potential contaminant source is hydrocarbons in soils below the soakaways. Analytical results for soils from the 2010 validation trial pits are attached in **Appendix D**. Of the hydrocarbon fractions the most mobile and most persistent are the lighter aromatic fraction therefore these present the greatest risk. There are no recorded <EC10 hydrocarbons other than 0.01 mg/kg of aromatic >EC8-EC10 at trial pit TP2 which is outside the soakaway area.

Aromatic >EC10-EC12 hydrocarbons and heavier fractions are present at most locations. The concentrations of the >EC10-EC12 and >EC12-EC16 fractions are shown on **Figure 2**. These concentrations are compared with the targets derived through the P20 calculations in Section 4.3.

The size of the contaminant source is based on the maximum length and width of soakaways in the direction of and perpendicular to the direction of groundwater flow, respectively. In the northern part of the site this includes the small rectangular soakaway plus the northern boundary soakaway, amounting to a length of 50m. The width of 30m is the greatest width perpendicular to the direction of flow.

4.2.3 Groundwater Flowpath

Data from the 2003 investigation on **Figure 3** is interpreted to show the groundwater level and flow direction. It is assumed that flow is in the Lynch Hill Gravel. The sources of the hydraulic characteristics used in the P20 calculations are shown on the worksheets and include site derived values where possible, such as the saturated thickness, hydraulic gradient and hydraulic conductivity, and reference values where there are no site values.

The rate of infiltration is taken as the whole of the annual average rainfall, adjusted to an equivalent daily rate, as there is no soft cover where plants would take up moisture to reduce infiltration to less than precipitation.

The compliance point is groundwater in the Lynch Hill Gravel 20m from the northern boundary soakaway. The point is within the railway land to the north east.

4.2.4 Rates of degradation

The rate of degradation of >EC10-EC12 aromatic hydrocarbons has been taken as the rate for naphthalene which has an EC of 11.69. The rate of degradation of >EC12-EC16 aromatic hydrocarbons has been taken as the rate for acenaphthene which has an EC of 15.50. The middle of the range of half life presented in Howard et al has been used. The actual rate will depend on a number of factors including the availability of oxygen and nutrients in the aquifer for microbial activity to thrive.

4.3 Results of Groundwater Risk Assessment

A selection of the P20 worksheets is presented in **Appendix E**. The results show that in the modeled conditions unacceptable risks would not arise unless the >EC10-EC12 fraction were to exceed the remedial target 2.75×10^{10} mg/kg. This concentration is more than 100% and therefore indicates that free phase could be present and the risk would be negligible.

As there are a number of unknowns, sensitivity analysis has been carried out for the rate of degradation of hydrocarbon, which makes a major difference to the derived remedial targets, using 50% and 10% of the chosen value. The derived remedial targets are shown in **Table 2**.

Table 2 Calculated Remedial Targets

	Using preferred degradation value, mg/kg	**Using 50% value, mg/kg**	**Using 10% value, mg/kg**
>EC10-EC12			
Half life, days	130	260	1300
Remedial target, mg/kg	2.75×10^{10}	3.99×10^{6}	56.9
>EC12-EC16			
Half life, days	112	224	1300
Remedial target, mg/kg	4.56×10^{17}	5.37×10^{11}	10500

The highest concentration of >EC10-EC12 hydrocarbons recorded is 2.9 mg/kg. From **Table 2**, the remedial target remains higher than the highest of the analytical results even if the slowest rate of degradation is used in the P20 calculation.

The P20 process has been repeated for the >EC12-EC16 fraction. As with the lighter fraction the remedial targets indicate that for the most likely situation free phase could be present without presenting a risk to groundwater quality. Even for the slowest degradation rate modeled the maximum recorded concentration of >EC12-EC16 of 5.0 mg/kg is well below the remedial target.

5.0 Conclusions

Construction of Units 5, 6A and 6B at Phase 3 Prologis Park, Hayes has been completed. The external works included installation of soakaways to discharge rainwater to the Lynch Hill Gravels.

Before the start of site works trial pits were constructed to inspect the ground that would be used to receive infiltration from soakaways. During site works staff observed ground conditions and no unexpected contamination was seen. Soils that were disposed of from the soakaway excavations met inert waste chemical criteria.

To address any residual risks from potential contamination in the ground a groundwater risk assessment has been completed using the Environment Agency P20 methodology and worksheets for the fraction of hydrocarbons that has most potential to present a risk. The results of the assessment show that the concentrations of hydrocarbons are well below the concentrations that would present an unacceptable risk.

From the available data and the assessment carried out it is concluded that any residual risks associated with contamination at the site are low and no further action is needed.

It is recommended that this Completion Report is presented to the Planning Authority for discharge of Conditions 6c(ii), 16 and 17 of Planning Permission reference 18399/APP/2013/1019 and is kept with the site Health and Safety File.

BUCKINGHAM

References

1. Model Procedures for the Management of Land Contamination, CLR11, Environment Agency, 2004

2. Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources, Environment Agency R&D Publication 20, 1999

3. Selection of Representative TPH Fractions based on Fate and Transport Considerations, Total Petroleum Hydrocarbons Criteria Working Group Series, Volume 3, JB Gustafson, JG Tell and D Orem, 1997

4. Handbook of Environmental Degradation Rates, PH Howard et al, 1991

5. Environment Agency website www.enviroment-agency.gov.uk

FIGURES

BUCKINGHAM
Group Contracting

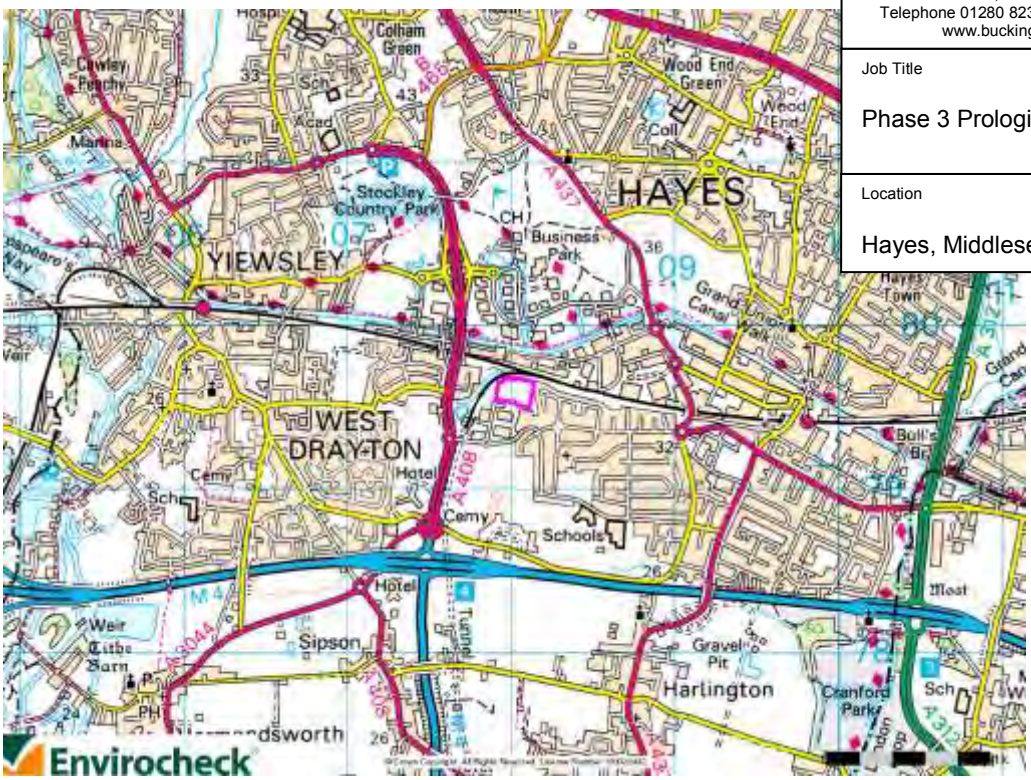
Silverstone Road, Stowe, Buckingham MK18 5LJ
Telephone 01280 823355 Fax 01280 812830
www.buckinghamgroup.co.uk

Job Title

Phase 3 Prologis Park, Hayes

Location

Hayes, Middlesex



Drawing Title

Figure 1

Site Location

Buckingham Project Code

C14023

Scale	NTS
Date drawn	9 Oct 2015
Drawn by	MIC
Original size	A4

Drawing no. Rev

C14023/HP/RM01

BUCKINGHAM
Group Contracting

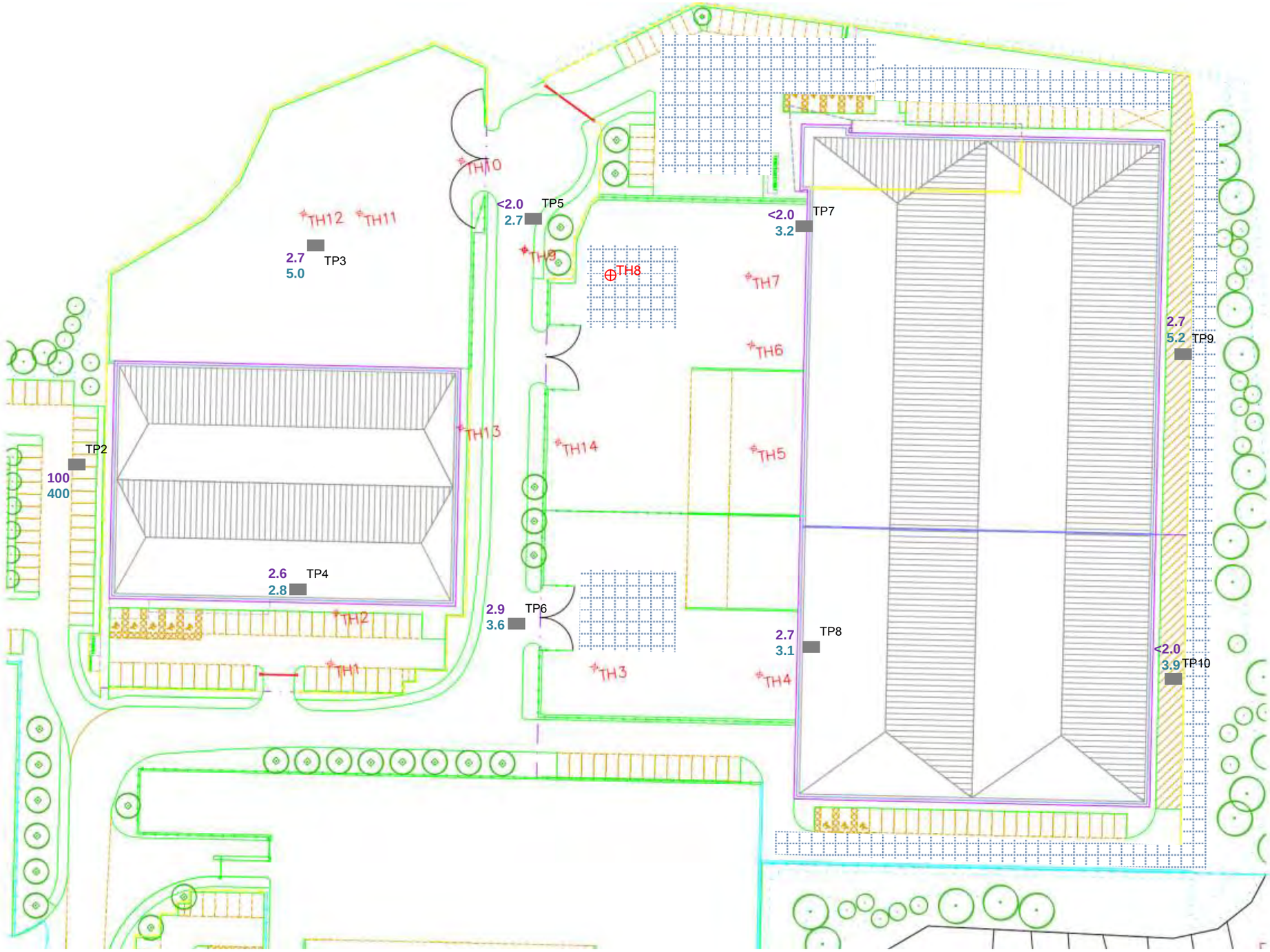
Silverstone Road, Stowe, Buckingham MK18 5LJ
Telephone 01280 823355 Fax 01280 812830
www.buckinghamgroup.co.uk

Job Title

Phase 3 Prologis Park, Hayes

Location

Hayes, Middlesex



KEY

Area of soakaway

TH6 Trial pit location, April 2014

TP5 Trial pit location, October 2010

20 Concentration of >EC10 - EC12 aromatic hydrocarbons, mg/kg

20 Concentration of >EC12 - EC16 aromatic hydrocarbons, mg/kg

Drawing Title

Figure 2 Locations of October 2010 and April 2014 Trial Pits and Completed Soakaways

Buckingham Project Code

C14023

Scale NTS
Date drawn 21 September 2015
Drawn by MIC
Original size A3

Drawing no. C14023/HP/RM02

Rev 1

BUCKINGHAM
Group Contracting

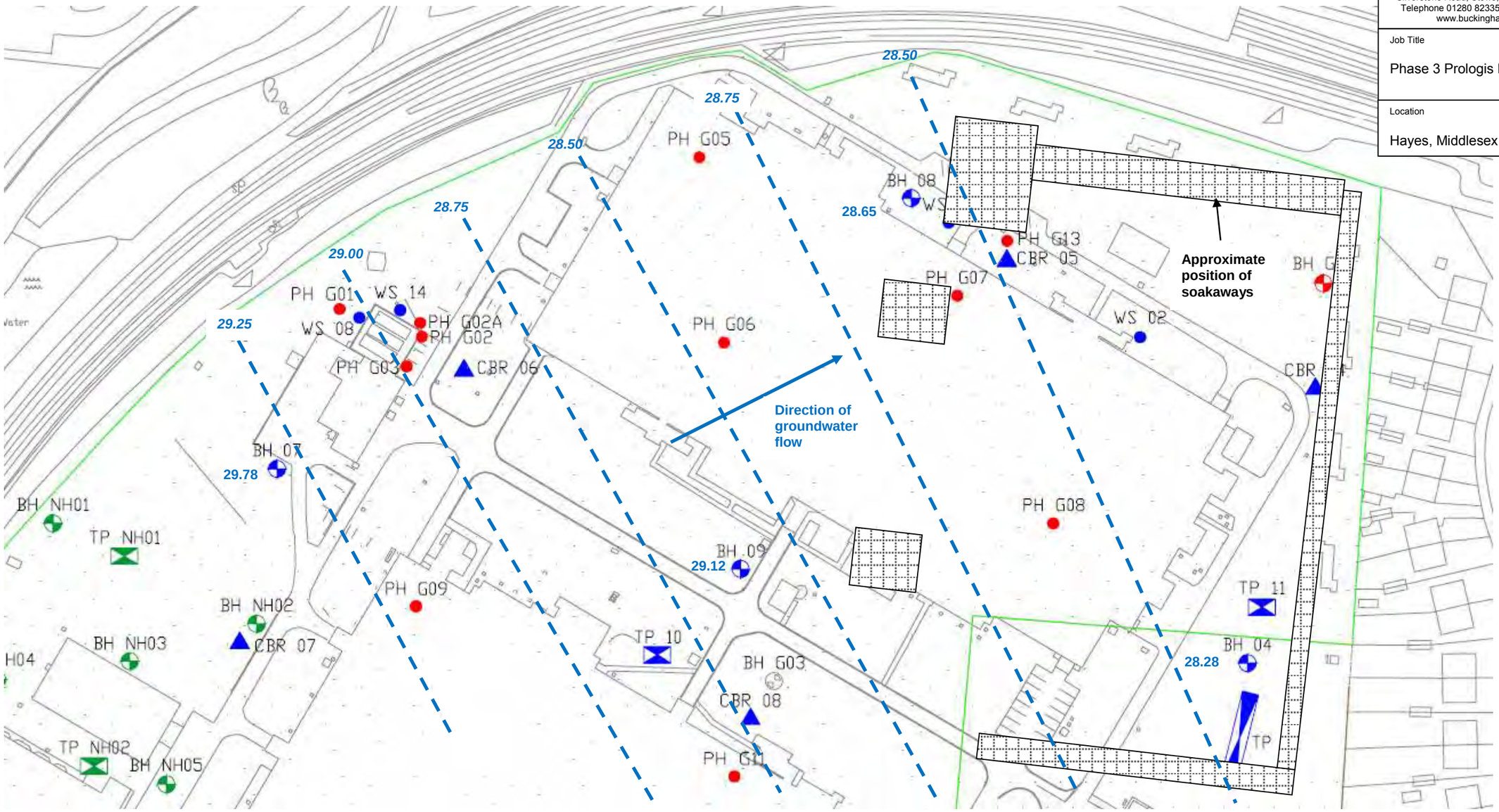
Silverstone Road, Stowe, Buckingham MK18 5LJ
Telephone 01280 823355 Fax 01280 812830
www.buckinghamgroup.co.uk

Job Title

Phase 3 Prologis Park, Hayes

Location

Hayes, Middlesex



WSP BOREHOLE
WSP TRIAL PIT
WSP WINDOW SAMPLE HOLE
WSP CBR TEST LOCATION
GIBB ENVIRONMENTAL BOREHOLE
GIBB ENVIRONMENTAL WINDOW SAMPLE HOLE

28.65 Groundwater level in borehole, mAOD

28.75 Inferred contour of groundwater level with level, mAOD

Base plan extracted from WSP Phase II Geo-environmental Assessment Figure 4

Scale

50 m

Drawing Title

Figure 3

Groundwater Levels, September 2003

Buckingham Project Code

C14023

Scale NTS
Date drawn 8 October 2015
Drawn by MIC
Original size A3

Drawing no. Rev

C14023/HP/RM03

APPENDIX A

DRAWINGS

1. Phase 3 Prologis Park, Hayes Drainage Layout Units 5, 6A & 6B As Built Drawing no TRC-2607-51 AB, T R Collier and Associates, 08.12.14

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE ADDITIONAL RISKS...

CONSTRUCTION

IT IS CONSIDERED THAT THE PROPOSED WORKS ARE WITHIN THE SCOPE OF A COMPETENT CONTRACTOR AND AS SUCH NO UNUSUAL HAZARDS HAVE BEEN IDENTIFIED, WITH THE EXCEPTION OF THE FOLLOWING:-

THE CONTRACTOR TO PROVIDE METHOD STATEMENTS TO HIGHLIGHT & MINIMISE RISKS FOR ELEMENTS OF WORK INDICATED ON THIS DRAWING MAINLY WORKING AT DEPTH & THE REQUIRED TEMPORARY SUPPORT FOR EARTHWORKS

MAINTENANCE/CLEANING/OPERATION

JETTING OF PIPEWORK/MANHOLES TO BE BY UNDERTAKEN AT REGULAR INTERVALS (APPROX 6 MONTHS) BY SPECIALIST

DECOMMISSIONING/DEMOLITION

NO SPECIAL REQUIREMENTS

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

NOTE:
ALL SOAKAWAY TANKS TO BE FOUNDED AT INVERT LEVEL 30.300

DRAINAGE NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
2. ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH BS 8301, BS 8005 AND THE BUILDING REGULATIONS.
3. ALL PIPES ARE TO HAVE SURROUND IN ACCORDANCE DRAINAGE DETAILS, UNLESS NOTED OTHERWISE.
4. FOR EXACT LOCATION OF RAIN WATER AND FOUL WATER OUTLETS, REFER TO ARCHITECTS DRAWINGS.
5. SURFACE WATER DRAINS SHALL BE EITHER
H.D.P.E. RIDGIDRAIN TWINWALL CARRIER PIPE BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S EN 1401–1
OR P.C.C. PIPES TO B.S 5911 (PART 100)
OR VITRIFIED CLAY TO B.S 65
6. FOUL WATER DRAINS SHALL BE EITHER
P.V.C. PIPEWORK BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S. EN 1401–01
OR VITRIFIED CLAY TO B.S. EN 295
7. ALL GRP UNDERGROUND TANKS ARE TO BE BEDDED ON AND ENCASED IN 250mm GEN 3 20mm AGG. CONCRETE STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.
8. ROAD GULLY OUTLET & KERBDRAIN PIPE INVERT LEVELS TO BE 600mm BELOW TOP OF GRATING LEVEL.
9. ALL MANHOLE AND INSPECTION CHAMBER COVERS, FRAMES AND SLOT TYPE DRAINS IN TRAFFICKED AREAS SHALL COMPLY TO EITHER B.S. 497 : PART 1 HEAVY DUTY COVERS TO MA60. OR B.S. EN 124 GRADE D400 (11.5 TONNE WHEEL LOADING)
SYPHONIC DRAINAGE TO HAVE VENTED COVERS
10. FOR DRAINAGE CONSTRUCTION AND PIPE BED DETAILS REFER TO DRAWING No.
11. ALL DRAINAGE BRANCHES TO BE 100mm FOR FOUL WATER & 150mm FOR SURFACE WATER UNLESS MARKED OTHERWISE.
12. ALL SOIL & VENT STACKS TO HAVE RODDABLE ACCESS 150mm ABOVE GROUND FLOOR SLAB LEVEL WITH REMOVABLE ACCESS PLATES.
13. ALL DRAINAGE CHANNELS TO HAVE ACCESS CHAMBER AT ENDS OF RUNS & EVERY 30m THEREAFTER.
14. ALL KERB DRAINAGE TO HAVE SUMP UNITS AT OUTLETS OF RUNS & HAVE RODDING ACCESS POINTS EVERY 30m THEREAFTER.
15. ALL SHALLOW DRAINAGE (<900mm COVER) AND DRAINAGE BELOW SLAB TO BE ENCASED IN MIN 150mm CONCRETE SURROUND.
16. ALL CONCRETE SURROUNDS FOR THE DRAINAGE TO BE CLASS DC4Z (SULPHATE RESISTING)

LEGEND.

- 1200mmØ MANHOLE & DRAIN RUN — FOUL WATER – RED, CLEAN SURFACE WATER – BLUE, DIRTY SURFACE WATER – GREEN
- 1500mmØ MANHOLE & DRAIN RUN — CLEAN SURFACE WATER – BLUE, DIRTY SURFACE WATER – GREEN
- 1800mmØ MANHOLE & DRAIN RUN — CLEAN SURFACE WATER – BLUE, DIRTY SURFACE WATER – GREEN
- EXISTING FOUL WATER DRAINAGE RUN & MANHOLE
- EXISTING CLEAN SURFACE WATER DRAINAGE RUN & MANHOLE
- HIGH LEVEL SYPHONIC DRAINAGE PRIMARY/SECONDARY SYSTEM
- PACKAGED PUMP STATION WITH RISING MAIN
- GATIC SLOTDRAIN D400 OR SIMILAR (200mm C40 CONCRETE SURROUND)
- ACCESS CHAMBER/OUTLET
- BEANY TYPE KERB DRAIN (150mm C20 BED & HAUNCH)
- RODDABLE TRAPPED FLOOR GULLY (RTG)
- SOIL & VENT PIPE (SVP)
- SOIL STUB STACK INCL AAV (SS)
- PRESSURISED SYPHONIC DOWNPIPE (SYP)
- GRAVITY RAINWATER DOWNPIPE (RWP)
- CONDER CLASS 1 BY-PASS PETROL INTERCEPTOR
- +32.000 PROPOSED NEW SURFACE LEVELS
- +31.300 EXISTING SURFACE LEVELS

PROLOGIS

AS BUILT

REV	DATE	DESCRIPTION	CHK	DRN
AB	08.12.14	AS BUILT ISSUE.	TC	JC
J	13.10.14	REVISED TO SUIT LATEST ARCHITECTS SITE PLAN.	TC	DOB
H	08.09.14	SPRINKLER TANKS DELETED	TC	KD
G	01.08.14	R.W.H.T DETAIL UPDATED. COVER LEVELS TO INTERCEPTORS & PUMP STATIONS AMENDED.	TC	DOB
F	28.07.14	MANHOLES SW6 + PSW10 REV'D	TC	DOB
E	18.07.14	ATTENUATION TANKS 3 + 6 MOVED WITH MH's TO SUIT. MANHOLES MOVED TO SUIT TREE LOCATIONS.	TC	DOB
D	02.07.14	MANHOLE REFERENCES ADDED.	TC	DOB
C	09.06.14	UPDATED LAYOUT/SOAKAWAYS	TC	CE
B	06.06.14	ISSUED FOR CONSTRUCTION	TC	CE
A	13.05.14	DRAINAGE AMENDED TO SUIT SPRINKLER TANKS AND VEHICLE WASH AREAS.	TC	DOB
T3	10.12.13	UNIT C REVISED	TC	DOB
T2	31.10.13	ISSUED FOR TENDER	TC	DOB
T1	28.10.13	FOUL DRAINAGE AMENDED TO SUIT OFFICE LAYOUT.	TC	MD
P2	02.09.13	PRELIMINARY ISSUE	TC	CE
P1	18.12.12			

NOTE: Where a "P" revision applies, this drawing is NOT to be used for construction

T. R. COLLIER & ASSOCIATES.
CONSULTING ENGINEERS
Rochester House 275 Baddow Road
Chelmsford Essex CM2 7QA
Telephone 01245 500360
Facsimile 01245 500390
Email admin@collier-associates.co.uk

PROJECT
PHASE 3
PROLOGIS PARK, HAYES

TITLE
DRAINAGE LAYOUT
UNITS 5, 6A & 6B

ARCHITECT
MICHAEL SPARKS Associates

DRAWN	DESIGNED	CHECKED
CE	TC	TC

DATE	SCALE	STATUS
Mar 2010	1:300	AS BUILT

TRC - 2607 - 51 AB

CIVQS — ISO 9001 REGISTERED FIRM — Certificate No. GB08/08800
IAB — INTERNATIONAL ACCREDITATION BOARD — Registration No. 0066/1

SURFACE WATER DESIGN CRITERIA

On - Site Soakaways
designed for 1:100 year returns storm
+ 20% climate change
using an Infiltration Rate of 4.2×10^{-6}

NOTE:
ALL SOAKAWAY TANKS TO BE FOUNDED AT INVERT LEVEL 30.300

DRAIANAGE LAYOUT

Scale 1:300

1:300 0 3m 6m 9m 12m 15m 18m 21m 24m 27m 30m
1:1 0 10mm 20mm 30mm 40mm 50mm 60mm 70mm 80mm 90mm 100mm

AO SHEET

APPENDIX B

TRIAL PIT LOGS AND PHOTOGRAPHS

1. Roundhay Environmental Logs for TH4 to TH11
2. Photographs from Buckingham Group Contracting Ltd for TH1 to TH12

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH4
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 508031.70 - 179547.60 Level: 31.24	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.30	Scale 1:25
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Light grey clay sand and gravel MADE GROUND. Fragment and whole bricks, concrete, metal reinforcing bar, broken clay pipe, brick and concrete up to 500mm
				0.80	30.44		Soft light brown slightly sandy CLAY
				1.10	30.14		Stiff dark grey CLAY
				1.30	29.94		End of pit at 1.30 m

Remarks:

Stability:

Roundhay Environmental
Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH5
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 508037.40 - 179591.70 Level: 31.07	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.60	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	30.67		Grey brown soft sandy CLAY
				0.90	30.17		Grey loose sandy medium GRAVEL, predominantly flint
				1.30	29.77		Firm grey CLAY
				1.60	29.47		Grey sandy coarse GRAVEL
							End of pit at 1.60 m

Remarks:

Stability:

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH6
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 508040.10 - 179611.90 Level: 31.26	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.40	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	31.06		Clay sand and gravel MADE GROUND. Fragments of brick, concrete and clinker. Laterally discontinuous black organic rich layer up to 10mm thick
							Light brown very sandy medium to coarse GRAVEL
				0.90	30.36		Stiff light grey CLAY with frequent lenses of light brown medium sand
				1.20	30.06		Dark brown sandy well sorted coarse GRAVEL
				1.40	29.86		End of pit at 1.40 m

1
2
3
4

Remarks:

Stability:

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH7
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 508041.60 - 179625.40 Level: 31.39	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.50	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Light brown very sandy coarse GRAVEL with laterally discontinuous lenses of firm light grey clay up to 50mm thick. Gravel is fine to coarse with frequent flint. Sand is medium to coarse
				1.30	30.09		Soft brown very sandy CLAY
				1.50	29.89		End of pit at 1.50 m

1
2
3
4

Remarks: Water inflow from base of gravel at 1.2m

Stability:

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH8
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 508013.20 - 179629.80 Level: 31.25	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.30	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Very sandy gravelly clay MADE GROUND
				0.40	30.85		Firm grey brown slightly sand CLAY
				0.50	30.75		Loose brown sandy poorly sorted coarse GRAVEL. Gravel is rounded to subrounded up to 40mm with frequent flint
				1.30	29.95		End of pit at 1.30 m

1
2
3
4

Remarks: Groundwater ingress from gravel at 0.9m

Stability:

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH9
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 507999.10 - 179637.20 Level: 31.17	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 1.70	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Brown sandy gravelly clay MADE GROUND. Frequent fragments of brick, concrete ond occasional metal reinforcing bar
				0.35	30.82		Firm light brown slightly sandy CLAY with occasional medium gravel lenses
				0.75	30.42		Soft orange brown very sandy CLAY
				1.10	30.07		Firm dark grey CLAY with coarse gravel and cobbles including flint up to 200mm. Increasing gravel with depth
				1.50	29.67		Light brown very sandy angular GRAVEL
				1.70	29.47		End of pit at 1.70 m

1
2
3
4

Remarks: Water ingress from gravel at 0.4m

Stability:

Roundhay Environmental Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH10
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords: 507989.50 - 179656.40 Level: 31.15	Date 01/04/2014
Location:	Hayes		Dimensions (m): Depth 2.10	Scale 1:20
Client:	Prologis UK Ltd			Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	30.95		Light grey brown sandy gravelly clay MADE GROUND with fragments of brick and concrete up to 500mm. Gravel is fine to coarse, predominantly rounded flint
							Firm light brown sandy CLAY with minor amounts of gravel. Increasing sand and gravel content with depth
				1.20	29.95		Stiff dark grey CLAY with occasional lenses of softbrown sandy clay.
				1.30	29.85		Grey brown clay sand and GRAVEL. Gravel is medium to coarse, predominantly coarse, of rounded flint.
				2.10	29.05		End of pit at 2.10 m

1
2
3
4

Remarks: Slow minor groundwater inflow at 2m

Stability:

Roundhay Environmental
Consulting Limited
327 Roundhay Road
Leeds, LS8 4HT

Trial Pit Log

Trialpit No
TH11
Sheet 1 of 1

Project Name:	Phase 3 Prologis Park, Heathrow	Project No. HP1	Co-ords:	507968.20 - 179649.30	Date 01/04/2014
Location:	Hayes		Level:	31.27	Scale 1:20
Client:	Prologis UK Ltd		Dimensions (m): Depth 1.60		Logged ASC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Light brown clay sand and gravel MADE GROUND. Frequent brick and concrete up to 500mm
				0.30	30.97		Light brown sandy gravelly CLAY. Gravel is predominantly flint
				0.60	30.67		Dark grey/ black sand and GRAVEL. Laterally variable in thickness with slight hydrocarbon odour. Samll amounts of water present with an oily sheen
				0.70	30.57		Brown soft sandy very gravelly CLAY. Gravel is predominantly medium grained of flint fragments
				1.50	29.77		Firm dark grey CLAY
				1.60	29.67		End of pit at 1.60 m

Remarks: Slow water inflow 0.7m - 1.5m. Sides of pit unstable

Stability:

Trial Pit TH1

Trial Pit TH2

Trial Pit TH3

Trial Pit TH4

Trial Pit TH5

Trial Pit TH7

Trial Pit TH6

Trial Pit TH8

Trial Pit TH9

Trial Pit TH11

Trial Pit TH10

Trial Pit TH12

APPENDIX C

RESULTS OF INFILTRATION TESTS

Construction Testing Solutions Ltd

Cts Reference			REF C2716/3
Client			Buckinghams
Site			Prologis Park
Date			23/04/2014

Material

Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 1.77 (m)
Width: 1.20 (m)
Depth: 1.28 (m)

Effective Storage Depth 0.63 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = **0.669 m3**

the effective storage volume of water between 75%-25%

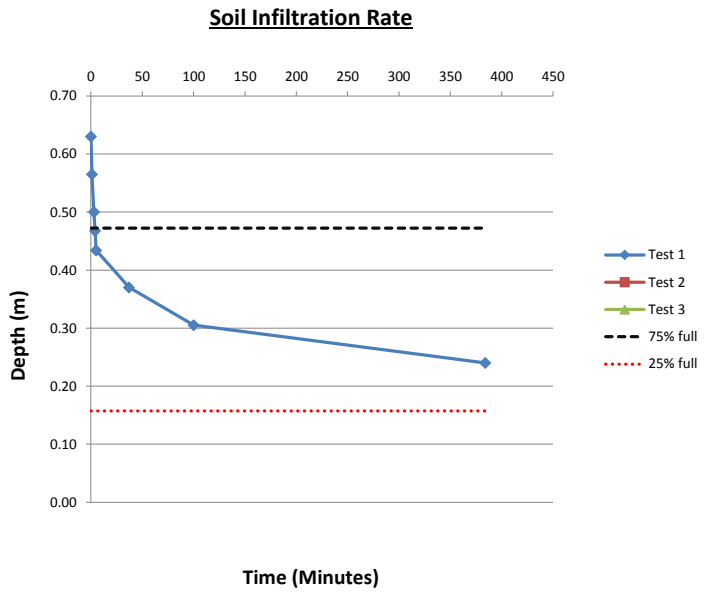
A_{p50} = **3.9951 m2**

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.65	0		
90	0.72	1		
79	0.78	3		
74	0.81	4		
69	0.85	5		
59	0.91	37		
48	0.98	100		
38	1.04	384		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



***Soil Infiltration Rate (f) = 0.0000068 m/s**

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

***Inconclusive test.**
Single test carried out due to insufficient drainage. Soil Infiltration Rate calculated using total volume and surface area of water drained during time specified.

Construction Testing Solutions Ltd

Cts Reference			REF C2716/4
Client			Buckinghams
Site			Prologis Park
Date			23/04/2014

Material

Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 3.30 (m)
Width: 1.00 (m)
Depth: 1.21 (m)

Effective Storage Depth 0.52 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = **0.858 m3**

the effective storage volume of water between 75%-25%

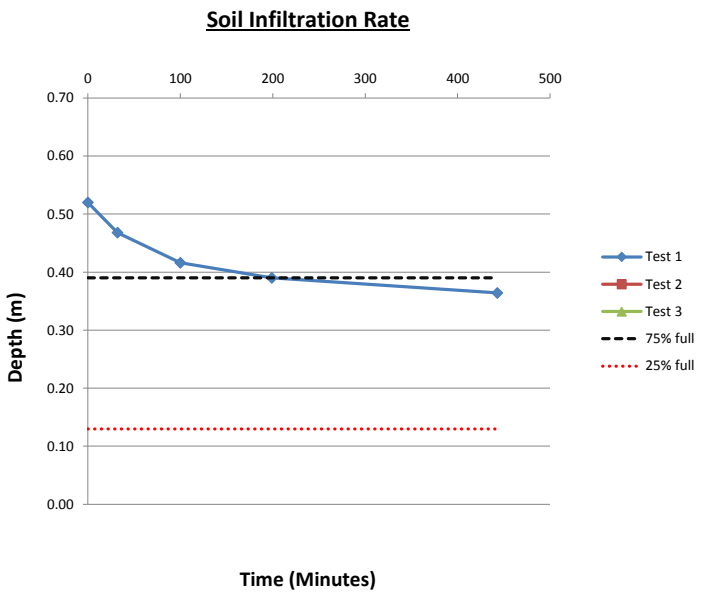
A_{p50} = **5.536 m2**

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.69	0		
90	0.74	32		
80	0.79	100		
75	0.82	199		
70	0.85	443		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



Soil Infiltration Rate (f) = 0.0000042 m/s

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

Inconclusive test.
Single test carried out due to insufficient drainage. Soil Infiltration Rate calculated using total volume and surface area of water drained during time specified.

Construction Testing Solutions Ltd

Cts Reference			REF C2716/5
Client			Buckinghams
Site			Prologis Park
Date			23/04/2014

Material

Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 3.93 (m)
Width: 1.06 (m)
Depth: 1.57 (m)

Effective Storage Depth 0.66 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = **1.375 m3**

the effective storage volume of water between 75%-25%

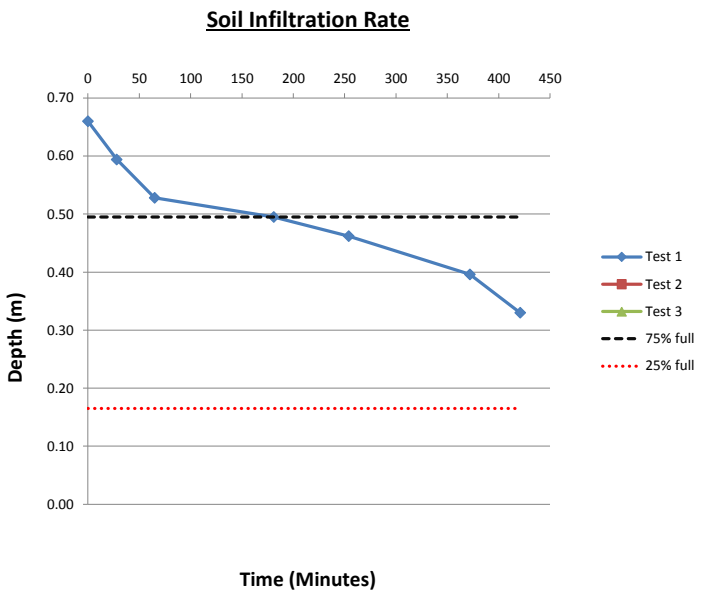
A_{p50} = **7.4592 m2**

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.91	0		
90	0.98	28		
80	1.04	65		
75	1.08	181		
70	1.11	254		
60	1.17	372		
50	1.24	421		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



***Soil Infiltration Rate (f) =** **0.0000073 m/s**

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

***Inconclusive test.**

Single test carried out due to insufficient drainage. Soil Infiltration Rate calculated using total volume and surface area of water drained during time specified.

Construction Testing Solutions Ltd

Cts Reference			REF C2716/6
Client			Buckinghams
Site			Prologis Park
Date			23/04/2014

Material

Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 2.40 (m)
Width: 1.07 (m)
Depth: 1.50 (m)

Effective Storage Depth 0.59 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = 0.758 m3

the effective storage volume of water between 75%-25%

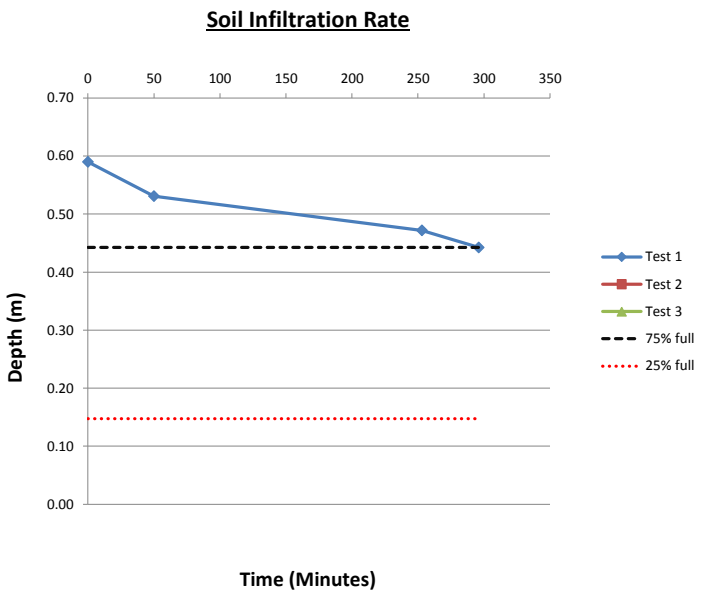
A_{p50} = 4.6153 m2

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.91	0		
90	0.97	50		
80	1.03	253		
75	1.06	296		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



***Soil Infiltration Rate (f) = 0.0000060 m/s**

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

***Inconclusive test.**
Single test carried out due to insufficient drainage. Soil Infiltration Rate calculated using total volume and surface area of water drained during time specified.

Construction Testing Solutions Ltd

Cts Reference	REF C2716/7
Client	Buckinghams
Site	Prologis Park
Date	23/04/2014

Material
Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 2.83 (m)
Width: 1.01 (m)
Depth: 0.94 (m)

Effective Storage Depth 0.50 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = **0.715 m3**

the effective storage volume of water between 75%-25%

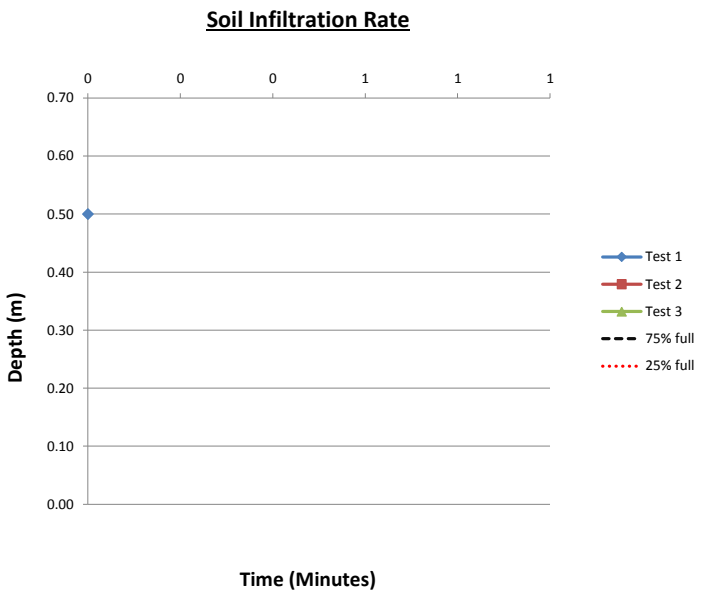
A_{p50} = **4.7783 m2**

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.44	0		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



***Soil Infiltration Rate (f) = n/a m/s**

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

***Inconclusive test.**
Unable to calculate Soil Infiltration Rate due to no drainage evident

Construction Testing Solutions Ltd

Cts Reference			REF C2716/8
Client			Buckinghams
Site			Prologis Park
Date			23/04/2014

Material

Brown clay with very stoney gravel.

Trial Pit Dimensions - Length: 2.90 (m)
Width: 1.00 (m)
Depth: 0.85 (m)

Effective Storage Depth 0.50 (m)

Soil Infiltration Rate f = $\frac{V_{p75-25}}{A_{p50} \times t_{p75-25}}$

where

V_{p75-25} = **0.725 m3**

the effective storage volume of water between 75%-25%

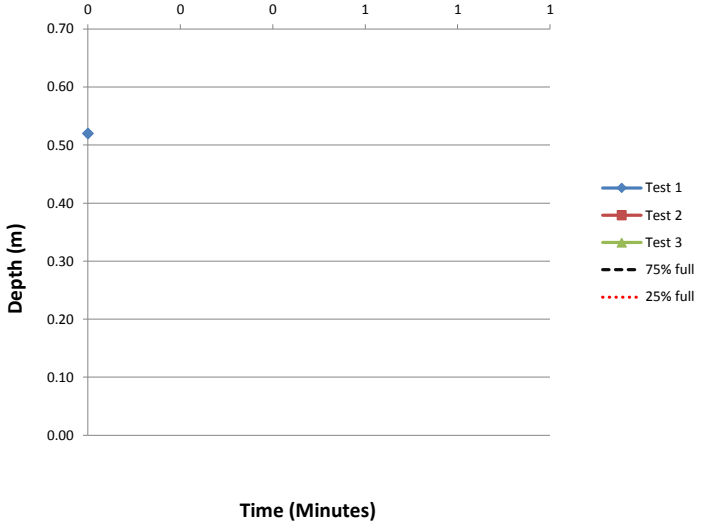
A_{p50} = **4.85 m2**

the internal surface area of trial pit up to 50% effective depth + base area

t_{p75-25}

the time for water level to fall from 75%-25%

Test Data		Test 1	Test 2	Test 3
Effective Depth %	Depth below ground surface (m)	Time (min)		
100	0.33	0		
	t_{p75-25} =	n/a	n/a	n/a
	f=	n/a	n/a	n/a



***Soil Infiltration Rate (f) =** **n/a** **m/s**

Notes:

Soil Infiltration Rate Test carried out in general accordance with BRE Digest 365

***Inconclusive test.**
Unable to calculate Soil Infiltration Rate due to no drainage evident

APPENDIX D

RESULTS OF CHEMICAL ANALYSIS

1. Construction Testing Solutions Ltd report ETS/107775-107776B with Chemtest report 14-05547
2. WSP Certificate of Analysis Job no. 10-17929. Extract from WSP Validation report November 2010

Laboratory Report	ETS/107775-107776B	Contract Sample No	C2716/3-4
Report Date	21 July 2014	Clients Reference	C2716/3-4

Buckingham Group Contracting Ltd Silverstone Road Stowe Bucks MK18 5LJ	Material Description	See Below
	Source	Ex Site
	Supplier	Ex Site
	Date Sampled	06/05/2014
	Date Received	06/05/2014
Prologis Park	Date Completed	18/07/2014
	Sample Location	See Below

Construction Testing Solutions Ltd
Bootham Lane Industrial Estate
Dunscroft I Doncaster I DN7 4JU
T I (01302) 352652
E I enquiries@constructiontesting.co.uk
W I www.constructiontesting.co.uk

PCB & WAC Analysis

Please find enclosed test certificate **(14-05547)** supplied by our approved Sub-contract Laboratory, Chemtest Ltd.

ETS Number	Contract Sample No	Chemtest ID	Location	Description
ETS/107775	C2716/3	28364	Stockpile 1	Light/Dark Brown Sandy/Silty Clay freq FMC Flint Brick Rubble Spots of Black
ETS/107776	C2716/4	28365	Stockpile 2	Light Brown Sandy/Silty Clay freq FMC Flint Brick + Rubble

Authorised Signatory

J A Hardcastle - Managing Director

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	14-05547 Issue-1
Initial Date of Issue:	18-Jul-14
Client:	Construction Testing Solutions Ltd
Client Address:	Units 8 & 9 Bootham Lane Industrial Estate Dunscroft South Yorkshire DN7 4JU
Contact(s):	Jon Hardcastle
Client Reference:	C2716 Buckingham Heathrow

Quotation No.:		**Date Received:**	10-Jul-14
Order No.:	3306	**Date Instructed:**	10-Jul-14
No. of Samples:	2	**Results Due:**	21-Jul-14
Turnaround: (Weekdays)	8		
Date Approved:	18-Jul-14		
Approved By:			
Details:	Keith Jones, Technical Manager		

Results Summary - Soil

Report No.: 14-05547 Issue-1
Project: C2716 Buckingham Heathrow

Client: Construction Testing Solutions Ltd			**Chemtest Sample ID.:**		28364	28365
Quote:			Client Sample Ref.:			
Order No.: 3306			**Client Sample ID.:**		C2716/3	C2716/4
			Sample Type:		SOIL	SOIL
			Top Depth (m):			
			Bottom Depth(m):			
			Date Sampled:		23-Apr-14	23-Apr-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Moisture	N	2030	%	0.02	14	12
PCB 28	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 52	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 101	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 118	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 153	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 138	M	2810	mg/kg	0.01	< 0.010	< 0.010
PCB 180	M	2810	mg/kg	0.01	< 0.010	< 0.010

Chemtest
The right chemistry to deliver results

Results Summary - 2 Stage WAC

Report No.: 14-05547 Issue-1

Project: C2716 Buckingham Heathrow

Chemtest Sample ID: 28364 **Sample Ref:** **Sample ID: C2716/3** **Top Depth(m):** **Bottom Depth(m):** **Sampling Date: 23-Apr-2014**							**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable Non-reactive Hazardous waste in non-hazardous**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.91	3	5	6
Loss on Ignition	2610	M	%			3.7	--	--	10
Total BTEX	2760	M	mg/kg			B < 0.001	6	--	--
Total PCBs (7 congeners)	2815	M	mg/kg			< 0.010	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			B < 10	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			4.0	100	--	--
pH	2010	M				9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.068	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.014	0.011	< 0.050	0.11	0.5	2	25
Barium	1450	U	0.033	0.015	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.0001	< 0.0001	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.004	< 0.001	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.011	0.005	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.0005	< 0.0005	< 0.010	< 0.010	0.01	0.2	2
Molybdenum	1450	U	0.054	0.007	0.11	0.13	0.5	10	30
Nickel	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.001	0.001	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.004	0.003	< 0.010	0.027	0.06	0.7	5
Selenium	1450	U	0.005	0.002	< 0.010	0.025	0.1	0.5	7
Zinc	1450	U	0.019	0.004	< 0.50	< 0.50	4	50	200
Chloride	1220	U	9.1	1.4	18	24	800	15000	25000
Fluoride	1220	U	0.64	0.34	1.3	3.8	10	150	500
Sulphate	1220	U	410	52	810	1000	1000	20000	50000
Total Dissolved Solids	1020	N	540	160	1100	2100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	N	5.9	< 2.5	< 50	< 50	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	14

Leachate Test Information	
Leachant volume 1st extract/l	0.322
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.239

Chemtest
The right chemistry to deliver results

Results Summary - 2 Stage WAC

Report No.: 14-05547 Issue-1

Project: C2716 Buckingham Heathrow

Chemtest Sample ID: 28365 **Sample Ref:** **Sample ID: C2716/4** **Top Depth(m):** **Bottom Depth(m):** **Sampling Date: 23-Apr-2014**							**Landfill Waste Acceptance Criteria Limits**		
							Inert Waste Landfill	**Stable Non-reactive Hazardous waste in non-hazardous**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.71	3	5	6
Loss on Ignition	2610	M	%			4.8	--	--	10
Total BTEX	2760	M	mg/kg			B < 0.001	6	--	--
Total PCBs (7 congeners)	2815	M	mg/kg			< 0.010	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			B < 10	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				9.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.092	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.007	0.008	< 0.050	0.080	0.5	2	25
Barium	1450	U	0.019	0.009	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.0001	< 0.0001	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.005	0.004	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.0005	< 0.0005	< 0.010	< 0.010	0.01	0.2	2
Molybdenum	1450	U	0.031	0.007	0.062	0.094	0.5	10	30
Nickel	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.001	0.002	< 0.010	0.019	0.5	10	50
Antimony	1450	U	0.002	0.002	< 0.010	0.017	0.06	0.7	5
Selenium	1450	U	0.002	0.001	< 0.010	0.012	0.1	0.5	7
Zinc	1450	U	0.004	0.005	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.3	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	1.2	0.58	2.4	6.4	10	150	500
Sulphate	1220	U	74	17	150	230	1000	20000	50000
Total Dissolved Solids	1020	N	200	79	400	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	N	28	6.6	56	88	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	12

Leachate Test Information	
Leachant volume 1st extract/l	0.327
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.181

Chemtest
The right chemistry to deliver results

Deviations

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

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
28364		C2716/3	23-Apr-2014	Amber Glass 250ml	B
28364		C2716/3	23-Apr-2014	Amber Glass 60ml	B
28364		C2716/3	23-Apr-2014	Miscellaneous	B
28364		C2716/3	23-Apr-2014	Plastic Tub 500g	B
28365		C2716/4	23-Apr-2014	Amber Glass 250ml	B
28365		C2716/4	23-Apr-2014	Amber Glass 60ml	B
28365		C2716/4	23-Apr-2014	Miscellaneous	B
28365		C2716/4	23-Apr-2014	Plastic Tub 500g	B

Chemtest
The right chemistry to deliver results

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, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry 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

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

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

WSP Environmental Birmingham
One Queens Drive
Birmingham
West Midlands
UK
B5 4PJ

Certificate of Analysis

Job Number 10-17929

Report Date	25 October 2010
Project Number	12171311 001
Customer	Prologis
Site Address	Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF□□
Date of Sampling	06/10/2010
Date of Analysis	12 October 2010 - 25 October 2010

Dear Kerry Murray

Please find attached your results for the above project.
This report includes the samples we received at WSP Environmental Laboratories on 12 October 2010.

Your feedback is critical to the evolution and improvement of our business, so please feel free to email us your comments to: ideas_lab@wspgroup.com.

Results authorised by

Piers Taverner
Extractions Manager

Chemical Analysis is undertaken in accordance with in-house technical procedures and is subject to quality control procedures. Results are expressed on a dry weight basis (dried at below 30˚C) for all soil analyses. Any opinions or interpretations indicated are outside the scope of our UKAS accreditation.

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Solid Description			101	Clay with Stone	Sandy Clay	Loam	Sandy Clay	Clay and Granular	---	Clay and stone	Clay and stone	Clay	Sand with stones
Moisture	0.1	%	101	13	9.8	12	11	10	8.0	11	12	15	6.5
pH		pH units	206*	8.4	---	8.6	---	8.8	---	8.6	9.4	7.9	8.1
Selenium, total, as Se	0.3	mg/kg	412*	< 0.3	---	0.5	---	< 0.3	---	< 0.3	< 0.3	< 0.3	< 0.3
Mercury, total, as Hg	0.1	mg/kg	405*	0.1	---	0.1	---	< 0.1	---	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic, total, as As	2.5	mg/kg	406*	< 2.5	---	7.5	---	< 2.5	---	4.1	3.5	< 2.5	4.2
Cadmium, total, as Cd	0.25	mg/kg	406*	0.31	---	0.52	---	0.46	---	< 0.25	< 0.25	< 0.25	< 0.25
Chromium, total, as Cr	1	mg/kg	406*	47	---	53	---	63	---	56	28	13	23
Copper, total, as Cu	2.5	mg/kg	406*	36	---	41	---	16	---	17	14	20	6.5
Nickel, total, as Ni	2.5	mg/kg	406 M*	43	---	100	---	14	---	35	28	40	17
Lead, total, as Pb	2.5	mg/kg	406 M*	49	---	61	---	86	---	< 2.5	3.8	< 2.5	2.6
Zinc, total, as Zn	5	mg/kg	406	170	---	200	---	220	---	72	58	81	35
Naphthalene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	0.2	1.1	---	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	408*	< 0.1	< 0.1	---	0.9	1.1	---	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	1.6	7.0	---	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	1.1	8.5	---	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	408 M*	0.4	0.2	---	3.9	77	---	0.3	0.2	< 0.1	0.1
Anthracene	0.1	mg/kg	408 M*	0.1	< 0.1	---	0.3	21	---	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	0.1	mg/kg	408 M*	0.8	< 0.1	---	0.7	130	---	< 0.1	< 0.1	0.1	0.2
Pyrene	0.1	mg/kg	408 M*	0.7	0.3	---	0.5	97	---	0.6	0.3	0.1	0.2
Benzo(a)anthracene	0.1	mg/kg	408 M*	0.4	0.2	---	0.1	49	---	0.4	0.1	< 0.1	< 0.1
Chrysene	0.1	mg/kg	408 M*	0.4	0.2	---	0.2	49	---	0.3	0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	408 M*	0.2	< 0.1	---	< 0.1	22	---	0.2	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	408 M*	0.3	0.2	---	< 0.1	42	---	0.3	0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	mg/kg	408 M*	0.4	0.2	---	< 0.1	48	---	0.4	0.1	< 0.1	< 0.1

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Indeno(1,2,3-c,d)pyrene	0.1	mg/kg	408 M*	0.3	0.1	---	< 0.1	23	---	0.3	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	0.1	mg/kg	408 M*	< 0.1	< 0.1	---	< 0.1	6.4	---	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	0.1	mg/kg	408 M*	0.3	0.2	---	< 0.1	26	---	0.2	< 0.1	< 0.1	< 0.1
PAH Total (EPA 16)	1	mg/kg	408*	4.4	1.4	---	9.6	610	---	3.0	< 1.0	< 1.0	< 1.0
Catechol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Naphthol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Phenol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Resorcinol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Total Cresols	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Total Phenols	0.8	mg/kg	410 M*	< 0.8	< 0.8	---	---	---	---	---	---	---	---
Total Xylenols	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Trimethylphenol	0.1	mg/kg	410 M*	< 0.1	< 0.1	---	---	---	---	---	---	---	---
Benzene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
TAME	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
PRO (>C5-C6)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C6-C8)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C8-C10)	10	mg/kg	401	< 10.0	< 10.0	---	< 10.0	< 10.0	---	< 10.0	< 10.0	< 10.0	< 10.0
PRO (>C5-C10)	30	mg/kg	401	< 30	< 30	---	< 30	< 30	---	< 30	< 30	< 30	< 30
PRO (>C6-C10)	20	mg/kg	401	< 20	< 20	---	< 20	< 20	---	< 20	< 20	< 20	< 20
EPH (>C6-C8)	2	mg/kg	420 M*	---	---	---	---	---	< 2.0	---	---	---	---

Solid Samples

Job No. 10-17929
Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
EPH (>C8-C12)	4	mg/kg	420 M*	---	---	---	---	---	< 4.0	---	---	---	---
EPH (>C12-C16)	2	mg/kg	420 M*	---	---	---	---	---	< 2.0	---	---	---	---
EPH (>C16-C21)	2	mg/kg	420 M*	---	---	---	---	---	2.8	---	---	---	---
EPH (>C21-C40)	15	mg/kg	420 M*	---	---	---	---	---	< 15	---	---	---	---
Total EPH (>C6-C40)	20	mg/kg	420 M*	---	---	---	---	---	< 20	---	---	---	---
Aliphatic (>C5-C6)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C6-C8)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C8-C10)	0.2	mg/kg	401	< 0.2	< 0.2	---	< 0.2	< 0.2	---	< 0.2	< 0.2	< 0.2	< 0.2
Aliphatic (>C10-C12)	2	mg/kg	419	< 2.0	< 2.0	---	160	< 2.0	---	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic (>C12-C16)	2	mg/kg	419	< 2.0	< 2.0	---	560	< 2.0	---	< 2.0	3.7	< 2.0	< 2.0
Aliphatic (>C16-C21)	5	mg/kg	419	9.8	< 5.0	---	690	< 5.0	---	< 5.0	18	< 5.0	< 5.0
Aliphatic (>C21-C35)	5	mg/kg	419	49	17	---	190	29	---	7.0	68	< 5.0	6.2
Aliphatic (>C35-C40)	2	mg/kg	419	11	5.9	---	< 2.0	9.5	---	< 2.0	22	< 2.0	< 2.0
Aliphatic (>C40-C44)	2	mg/kg	419	9.4	5.7	---	< 2.0	9.8	---	< 2.0	26	< 2.0	< 2.0
Total Aliphatics (>C6-C44)	20	mg/kg	419	80	33	---	1600	56	---	< 20	140	< 20	< 20
Aromatic (>C6-C7)	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C7-C8)	0.01	mg/kg	401	< 0.01	< 0.01	---	< 0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C8-C10)	0.01	mg/kg	401	< 0.01	< 0.01	---	0.01	< 0.01	---	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic (>C10-C12)	2	mg/kg	419	3.2	3.2	---	100	2.7	---	2.6	< 2.0	2.9	< 2.0
Aromatic (>C12-C16)	2	mg/kg	419	3.6	4.3	---	400	5.0	---	2.8	2.7	3.6	3.2
Aromatic (>C16-C21)	5	mg/kg	419	7.8	9.7	---	460	37	---	8.3	11	6.0	5.7
Aromatic (>C21-C35)	5	mg/kg	419	57	23	---	150	160	---	9.4	53	11	8.9
Aromatic (>C35-C40)	2	mg/kg	419	28	15	---	< 2.0	60	---	< 2.0	34	< 2.0	< 2.0
Aromatic (>C40-C44)	2	mg/kg	419	23	13	---	< 2.0	42	---	< 2.0	35	< 2.0	< 2.0
Total Aromatics (>C6-C44)	20	mg/kg	419	120	68	---	1100	310	---	26	140	27	22

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197845	197846	197847	197849	197850	197852	197853	197855	197856	197858
			Sample Date	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP5	TP6	TP7
			Other ID										
			Depth (m)	0.4	2.2	0.1	1.5	0.3	1.5	0.1	0.5	0.5	0.2
Determination	**LOD**	**Units**	**Method**										
Total TPH (>C6-C44)	40	mg/kg	419	200	100	---	2700	370	---	< 40	270	< 40	< 40

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Solid Description			101	Clay	Clay	Clay with Loam
Moisture	0.1	%	101	13	14	14
pH		pH units	206*	5.4	11	9.7
Selenium, total, as Se	0.3	mg/kg	412*	< 0.3	< 0.3	< 0.3
Mercury, total, as Hg	0.1	mg/kg	405*	< 0.1	< 0.1	0.2
Arsenic, total, as As	2.5	mg/kg	406*	< 2.5	3.3	5.1
Cadmium, total, as Cd	0.25	mg/kg	406*	< 0.25	0.32	0.34
Chromium, total, as Cr	1	mg/kg	406*	50	59	43
Copper, total, as Cu	2.5	mg/kg	406*	9.0	27	45
Nickel, total, as Ni	2.5	mg/kg	406 M*	21	33	44
Lead, total, as Pb	2.5	mg/kg	406 M*	< 2.5	29	71
Zinc, total, as Zn	5	mg/kg	406	48	120	150
Naphthalene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	408*	< 0.1	< 0.1	< 0.1
Acenaphthene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	408 M*	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	408 M*	< 0.1	0.8	0.9
Anthracene	0.1	mg/kg	408 M*	< 0.1	0.2	0.3
Fluoranthene	0.1	mg/kg	408 M*	0.1	< 0.1	2.3
Pyrene	0.1	mg/kg	408 M*	0.1	1.5	2.0
Benzo(a)anthracene	0.1	mg/kg	408 M*	< 0.1	0.6	1.0
Chrysene	0.1	mg/kg	408 M*	< 0.1	0.7	1.1
Benzo(k)fluoranthene	0.1	mg/kg	408 M*	< 0.1	0.3	0.5
Benzo(b)fluoranthene	0.1	mg/kg	408 M*	< 0.1	0.5	0.9
Benzo(a)pyrene	0.1	mg/kg	408 M*	< 0.1	0.6	1.1

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Indeno(1,2,3-c,d)pyrene	0.1	mg/kg	408 M*	< 0.1	0.4	0.7
Dibenzo(a,h)anthracene	0.1	mg/kg	408 M*	< 0.1	0.1	0.2
Benzo(g,h,i)perylene	0.1	mg/kg	408 M*	< 0.1	0.5	0.8
PAH Total (EPA 16)	1	mg/kg	408*	< 1.0	6.0	12
Catechol	0.1	mg/kg	410 M*	---	---	---
Naphthol	0.1	mg/kg	410 M*	---	---	---
Phenol	0.1	mg/kg	410 M*	---	---	---
Resorcinol	0.1	mg/kg	410 M*	---	---	---
Total Cresols	0.1	mg/kg	410 M*	---	---	---
Total Phenols	0.8	mg/kg	410 M*	---	---	---
Total Xylenols	0.1	mg/kg	410 M*	---	---	---
Trimethylphenol	0.1	mg/kg	410 M*	---	---	---
Benzene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Ethylbenzene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
o-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
MTBE	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
m+p-Xylene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
TAME	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Toluene	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
PRO (>C5-C6)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C6-C8)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C8-C10)	10	mg/kg	401	< 10.0	< 10.0	< 10.0
PRO (>C5-C10)	30	mg/kg	401	< 30	< 30	< 30
PRO (>C6-C10)	20	mg/kg	401	< 20	< 20	< 20
EPH (>C6-C8)	2	mg/kg	420 M*	---	---	---

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
EPH (>C8-C12)	4	mg/kg	420 M*	---	---	---
EPH (>C12-C16)	2	mg/kg	420 M*	---	---	---
EPH (>C16-C21)	2	mg/kg	420 M*	---	---	---
EPH (>C21-C40)	15	mg/kg	420 M*	---	---	---
Total EPH (>C6-C40)	20	mg/kg	420 M*	---	---	---
Aliphatic (>C5-C6)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C6-C8)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C8-C10)	0.2	mg/kg	401	< 0.2	< 0.2	< 0.2
Aliphatic (>C10-C12)	2	mg/kg	419	< 2.0	< 2.0	< 2.0
Aliphatic (>C12-C16)	2	mg/kg	419	< 2.0	3.3	2.7
Aliphatic (>C16-C21)	5	mg/kg	419	< 5.0	16	14
Aliphatic (>C21-C35)	5	mg/kg	419	< 5.0	59	71
Aliphatic (>C35-C40)	2	mg/kg	419	< 2.0	15	16
Aliphatic (>C40-C44)	2	mg/kg	419	< 2.0	14	14
Total Aliphatics (>C6-C44)	20	mg/kg	419	< 20	110	120
Aromatic (>C6-C7)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C7-C8)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C8-C10)	0.01	mg/kg	401	< 0.01	< 0.01	< 0.01
Aromatic (>C10-C12)	2	mg/kg	419	2.7	2.3	< 2.0
Aromatic (>C12-C16)	2	mg/kg	419	3.1	5.2	3.9
Aromatic (>C16-C21)	5	mg/kg	419	< 5.0	34	18
Aromatic (>C21-C35)	5	mg/kg	419	6.0	84	110
Aromatic (>C35-C40)	2	mg/kg	419	< 2.0	34	44
Aromatic (>C40-C44)	2	mg/kg	419	< 2.0	27	34
Total Aromatics (>C6-C44)	20	mg/kg	419	< 20	190	210

Accreditation: * ISO17025, M MCerts

Solid Samples

Job No. 10-17929

Site: Prologis Park, Hayes, Stockley Road,
Middlesex, UB3 1QF

Report Date: 25/10/2010

			Lab No.	197860	197862	197864
			Sample Date	06/10/2010	06/10/2010	06/10/2010
			Sample Id	TP8	TP9	TP10
			Other ID			
			Depth (m)	0.4	0.3	0.5
Determination	**LOD**	**Units**	**Method**			
Total TPH (>C6-C44)	40	mg/kg	419	< 40	290	330

Certificate of Bulk Sample Asbestos Identification

WSP
The Laboratory
Lakeview Drive
Sherwood
Nottingham NG15 0ED

t: +44 (0)1623 886 800

Project No. 12171311/001
Job No. 10-17929
Location Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF
Customer Prologis
Contact Kerry Murray
Date sampled 06/10/2010
Date of receipt 12/10/2010
Date of analysis 18/10/2010 - 21/10/2010

Lab Reference	Sample Location	Sample Description	Asbestos Identification	Comments
197845	TP1 0.4	Soil	Chrysotile	Insulation
197847	TP2 0.1	Soil	No Asbestos Detected	None
197850	TP3 0.3	Soil	No Asbestos Detected	None
197853	TP4 0.1	Soil	No Asbestos Detected	None
197855	TP5 0.5	Soil	No Asbestos Detected	None
197856	TP6 0.5	Soil	No Asbestos Detected	None
197858	TP7 0.2	Soil	No Asbestos Detected	None
197860	TP8 0.4	Soil	No Asbestos Detected	None
197862	TP9 0.3	Soil	Chrysotile	Bituminous
197864	TP10 0.5	Soil	No Asbestos Detected	None

Authorised by Joanne O'Sullivan
Signature

Analyst Adam Taylor Nina Harriman
Signature

UKAS TESTING 2538N

Position Analysis Manager
Date of issue 21 October 2010

WSP Environmental Risk Management Services Division

Registered Office:
WSP House
70 Chancery Lane
London
WC2A 1AF

Registered Number
1152332 England

The above samples were submitted by WSP Environmental.

Certificate of Bulk Sample Asbestos Identification

WSP
The Laboratory
Lakeview Drive
Sherwood
Nottingham NG15 0ED

t: +44 (0)1623 886 800

Project No. 12171311/001
Job No. 10-17929
Location Prologis Park, Hayes, Stockley Road, Middlesex, UB3 1QF
Customer Prologis
Contact Kerry Murray
Date sampled 06/10/2010
Date of receipt 12/10/2010
Date of analysis 18/10/2010 - 21/10/2010

Lab Reference	Sample Location	Sample Description	Asbestos Identification	Comments
197865	TP10 1.4	Cement	Chrysotile	None
197866	SH3A 0.1-0	Soil	No Asbestos Detected	None
197867	SH3B1 0.1-0	Soil	No Asbestos Detected	None
197868	SH3B2 0.1-0	Soil	No Asbestos Detected	None

Authorised by Joanne O'Sullivan
Signature

Position Analysis Manager
Date of issue 21 October 2010

Analyst Adam Taylor Nina Harriman
Signature

UKAS TESTING
2538N

WSP Environmental
Risk Management Services
Division

Registered Office:
WSP House
70 Chancery Lane
London
WC2A 1AF

Registered Number
1152332 England

The above samples were submitted by WSP Environmental.

Appendix D Notes on Limitations

GENERAL

WSP Environmental Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from WSP Environmental Limited; a charge may be levied against such approval.

WSP Environmental Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) this document to any third party with whom an agreement has not been executed.

PHASE I ENVIRONMENTAL AUDITS

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP Environmental Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

PHASE II ENVIRONMENTAL AUDITS

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

GEO-ENVIRONMENTAL INVESTIGATIONS

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to site remediation these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

APPENDIX E

QUANTITATIVE RISK ASSESSMENT FOR GROUNDWATER

1. P20 spreadsheets for >EC10-EC12
2. P20 spreadsheets for >EC12-EC16

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions).

Details to be completed for each assessment				
Site Name:	Heathrow DC5 and 6			
Site Address:	Prologis Park Heathrow			
Completed by:	M I Cliff			
Date:	08-Oct-15		Version:	1.1
Contaminant	TPH EC10-12			
Target Concentration (C_T)	0.02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Remedial Targets Worksheet , Release 3.2

Level 1 - Soil

Select the method of calculating the soil water Partition Co-efficient by using the pull down menu below

Calculate for non-polar organic chemicals

Contaminant		**TPH EC10-12**		
Target concentration	C_T	**0.02**	**mg/l**	

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**
Standard entry				
Water filled soil porosity	θ_W	3.00E-02	fraction	Consim help files and EA guidance
Air filled soil porosity	θa	8.00E-03	fraction	Consim help files and EA guidance
Bulk density of soil zone material	ρ	1.70E+00	g/cm^3	Consim help files and EA guidance
Henry's Law constant	H	1.40E-01	dimensionless	*Table 8 of TPH CWG Vol3*
Entry if specify partition coefficient (option)				
Soil water partition coefficient	Kd		l/kg	
Entry for non-polar organic chemicals (option)				
Fraction of organic carbon (in soil)	foc	5.00E-03	fraction	Low end of range in Consim guidance
Organic carbon partition coefficient	Koc	2.50E+03	l/kg	*Table 8 of TPH CWG Vol3*
Entry for ionic organic chemicals (option)				
Sorption coefficient for neutral species	$K_{oc,n}$		l/kg	
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg	
pH value	pH		pH units	
Acid dissociation constant	pKa			
Fraction of organic carbon (in soil)	foc		fraction	
Soil water partition coefficient used in Level Assessment	**Kd**	**1.25E+01**	**l/kg**	*Calculated value*

This sheet calculates the Level 1 remedial target for soils(mg/kg) based on a selected target concentration and theoretical calculation of soil water partitioning. Three options are included for determining the partition coefficient.

The measured soil concentration as mg/kg should be compared with the Level 1 remedial target to determine the need for further action.

Level 1 Remedial Target

Level 1 Remedial Target	**2.50E-01**	**mg/kg**	**(for comparison with soil analyses)**
	or		
	0.02	**mg/l**	**(for comparison with leachate test results)**

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	08-Oct-15
Version:	1.1

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**TPH EC10-12**	from Level 1	This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).
Target concentration	**C_T**	**0.02** **mg/l**	from Level 1	

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	1.65E-03	m/d	**Met office 1981-2010 average**	
Area of contaminant source	A	1.50E+03	m^2	**50m x 30m**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	5.00E+01	m	**Northern soakaways**	
Saturated aquifer thickness	da	3.00E+00	m	**From Site boreholes, 2003 investigation**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	3.60E-01	m/d	**From infiltration tests at the site**	
Hydraulic gradient of water table	i	7.70E-03	fraction	**From Site boreholes, 2003 investigation**	
Width of contaminant source perpendicular to groundwater flow	w	3.00E+01	m	**From Figures 2 and 3**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	0.00E+00	mg/l	**Assume no background contamination**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m	Saturated thickness	
Calculated mixing zone thickness	Mz	3.00E+00	m		

Calculated Parameters

Dilution Factor	**DF**	**1.10E+00**		
Level 2 Remedial Target		**2.20E-02**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentra**
		or		
		2.76E-01	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	08-Oct-15
Version:	1.1

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Environment Agency

Input Parameters

	Variable	Value	Unit	Source
Contaminant		TPH EC10-12		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.10E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, la

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		3	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.30E+02	days	*Naphthalene, middle of range. Howard et al*
Calculated decay rate	λ	5.33E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.00E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+00	m	from Level 2
Bulk density of aquifer materials	ρ	1.70E+00	g/cm^3	
Effective porosity of aquifer	n	2.00E-01	fraction	
Hydraulic gradient	i	8.41E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	3.60E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+01	m	*20m from source for Principal Aquifer, close to site boundary*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.25E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.567	m	*see options*
Transverse dispersivity	az	0.157	m	*see options*
Vertical dispersivity	ay	0.016	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.51E-01	m/d
Retardation factor	Rf	1.07E+02	fraction
Decay rate used	λ	5.33E-03	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	8.41E-02	fraction
Rate of contaminant flow due to retardation	u	1.41E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.00E-11	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**9.96E+10**	**fraction**
Calculated soil leachate concentration	Co	2.40E-01	mg/l

Remedial Targets

Level 3 Remedial Target	**2.19E+09**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks	**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
	2.75E+10	**mg/kg**	For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Distance to compliance point	**20**	**m**	
Ratio of Compliance Point to Source Concentration C_{ED}/C_0	**1.00E-11**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	5.00E-03	fraction
Organic carbon partition coefficient	Koc	2.50E+03	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.25E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

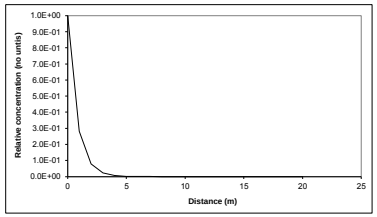
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.00E+00	1.57E+00	m
Transverse dispersivity	**az**	0.00E+00	2.00E-01	1.57E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.00E-02	1.57E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	########
Version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	2.18E-01
1.0	2.82E-01	6.14E-02
2.0	7.95E-02	1.73E-02
3.0	2.24E-02	4.88E-03
4.0	6.31E-03	1.37E-03
5.0	1.78E-03	3.88E-04
6.0	5.02E-04	1.09E-04
7.0	1.41E-04	3.08E-05
8.0	3.99E-05	8.68E-06
9.0	1.12E-05	2.45E-06
10.0	3.17E-06	6.90E-07
11.0	8.93E-07	1.94E-07
12.0	2.52E-07	5.48E-08
13.0	7.10E-08	1.55E-08
14.0	2.00E-08	4.36E-09
15.0	5.64E-09	1.23E-09
16.0	1.59E-09	3.46E-10
17.0	4.48E-10	9.76E-11
18.0	1.26E-10	2.75E-11
19.0	3.56E-11	7.75E-12
20.0	1.00E-11	2.19E-12

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions).

Details to be completed for each assessment				
Site Name:	Heathrow DC5 and 6			
Site Address:	Prologis Park Heathrow			
Completed by:	M I Cliff			
Date:	09-Oct-15		Version:	1.2
Contaminant	TPH EC12-16			
Target Concentration (C_T)	0.02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Remedial Targets Worksheet , Release 3.2

Level 1 - Soil

Select the method of calculating the soil water Partition Co-efficient by using the pull down menu below

Calculate for non-polar organic chemicals

Contaminant		**TPH EC12-16**		
Target concentration	C_T	**0.02**	**mg/l**	

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**
Standard entry				
Water filled soil porosity	θ_W	3.00E-02	fraction	Consim help files and EA guidance
Air filled soil porosity	θa	8.00E-03	fraction	Consim help files and EA guidance
Bulk density of soil zone material	ρ	1.70E+00	g/cm^3	Consim help files and EA guidance
Henry's Law constant	H	5.30E-02	dimensionless	*Table 8 of TPH CWG Vol3*
Entry if specify partition coefficient (option)				
Soil water partition coefficient	Kd		l/kg	
Entry for non-polar organic chemicals (option)				
Fraction of organic carbon (in soil)	foc	5.00E-03	fraction	Low end of range in Consim guidance
Organic carbon partition coefficient	Koc	5.00E+03	l/kg	*Table 8 of TPH CWG Vol3*
Entry for ionic organic chemicals (option)				
Sorption coefficient for neutral species	$K_{oc,n}$		l/kg	
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg	
pH value	pH		pH units	
Acid dissociation constant	pKa			
Fraction of organic carbon (in soil)	foc		fraction	
Soil water partition coefficient used in Level Assessment	**Kd**	**2.50E+01**	**l/kg**	*Calculated value*

This sheet calculates the Level 1 remedial target for soils(mg/kg) based on a selected target concentration and theoretical calculation of soil water partitioning. Three options are included for determining the partition coefficient.

The measured soil concentration as mg/kg should be compared with the Level 1 remedial target to determine the need for further action.

Level 1 Remedial Target

Level 1 Remedial Target	**5.00E-01**	**mg/kg**	**(for comparison with soil analyses)**
	or		
	0.02	**mg/l**	**(for comparison with leachate test results)**

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	09-Oct-15
Version:	1.2

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**TPH EC12-16**	from Level 1	This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).
Target concentration	**C_T**	**0.02** **mg/l**	from Level 1	

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	1.65E-03	m/d	**Met office 1981-2010 average**	
Area of contaminant source	A	1.50E+03	m^2	**50m x 30m**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	5.00E+01	m	**Northern soakaways**	
Saturated aquifer thickness	da	3.00E+00	m	**From Site boreholes, 2003 investigation**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	3.60E-01	m/d	**From infiltration tests at the site**	
Hydraulic gradient of water table	i	7.70E-03	fraction	**From Site boreholes, 2003 investigation**	
Width of contaminant source perpendicular to groundwater flow	w	3.00E+01	m	**From Figures 2 and 3**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	0.00E+00	mg/l	**Assume no background contamination**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m	Saturated thickness	
Calculated mixing zone thickness	Mz	3.00E+00	m		

Calculated Parameters

Dilution Factor	**DF**	**1.10E+00**		
Level 2 Remedial Target		**2.20E-02**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentra**
		or		
		5.51E-01	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	09-Oct-15
Version:	1.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Environment Agency

Input Parameters

	Variable	Value	Unit	Source
Contaminant		TPH EC12-16		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.10E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, la

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		3	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.12E+02	days	*Acenapthene middle of range Howard et al*
Calculated decay rate	λ	6.19E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	3.00E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+00	m	from Level 2
Bulk density of aquifer materials	ρ	1.70E+00	g/cm^3	
Effective porosity of aquifer	n	2.00E-01	fraction	
Hydraulic gradient	i	8.41E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	3.60E-01	m/d	from Level 2
Distance to compliance point	x	2.00E+01	m	*20m from source for Principal Aquifer, close to site boundary*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.50E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.567	m	*see options*
Transverse dispersivity	az	0.157	m	*see options*
Vertical dispersivity	ay	0.016	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.51E-01	m/d
Retardation factor	Rf	2.14E+02	fraction
Decay rate used	λ	6.19E-03	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	8.41E-02	fraction
Rate of contaminant flow due to retardation	u	7.09E-04	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.21E-18	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**8.28E+17**	**fraction**
Calculated soil leachate concentration	Co	1.20E-01	mg/l

Remedial Targets

Level 3 Remedial Target	**1.82E+16**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks	**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
	4.56E+17	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point	**20**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration C_{ED}/C_0	**1.21E-18**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd		l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	5.00E-03	fraction
Organic carbon partition coefficient	Koc	5.00E+03	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.50E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

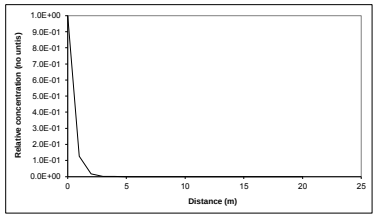
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	ax	0.00E+00	2.00E+00	1.57E+00	m
Transverse dispersivity	az	0.00E+00	2.00E-01	1.57E-01	m
Vertical dispersivity	ay	0.00E+00	2.00E-02	1.57E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Heathrow DC5 and 6
Completed by:	M I Cliff
Date:	########
Version:	1.2

Calculated (relative) concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Relative concentration	Concentration
	(No units)	mg/l
0	1.0E+00	1.09E-01
1.0	1.27E-01	1.38E-02
2.0	1.62E-02	1.76E-03
3.0	2.05E-03	2.24E-04
4.0	2.61E-04	2.84E-05
5.0	3.32E-05	3.61E-06
6.0	4.21E-06	4.59E-07
7.0	5.35E-07	5.83E-08
8.0	6.81E-08	7.41E-09
9.0	8.65E-09	9.42E-10
10.0	1.10E-09	1.20E-10
11.0	1.40E-10	1.52E-11
12.0	1.78E-11	1.93E-12
13.0	2.26E-12	2.46E-13
14.0	2.87E-13	3.12E-14
15.0	3.64E-14	3.97E-15
16.0	4.63E-15	5.04E-16
17.0	5.89E-16	6.41E-17
18.0	7.48E-17	8.15E-18
19.0	9.51E-18	1.04E-18
20.0	1.21E-18	1.32E-19