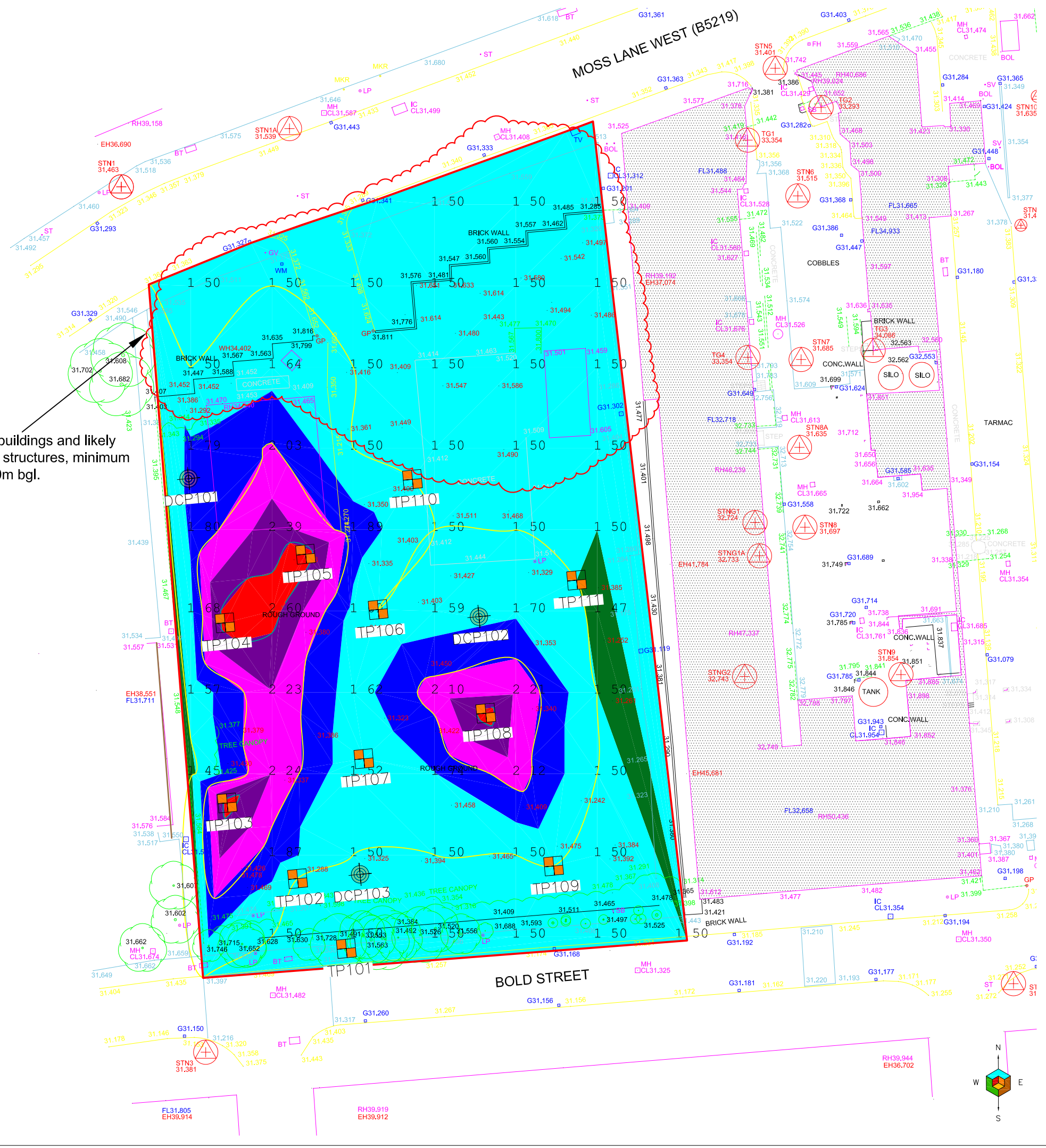

MOSS LANE WEST (B5219)
BOLD STREET
TP101
TP102
TP103
TP104
TP105
TP106
TP107
TP108
TP109
TP110
TP111
DCP101
DCP102
DCP103
1 50
1 64
1 79
2 03
1 80
2 39
1 89
1 68
2 60
1 59
1 70
1 47
1 57
2 23
1 62
2 10
2 21
1 55
1 45
2 24
1 52
2 12
1 50
1 87
1 50
1 50
1 50



Previous Investigation

WS01 — Approximate Window Sample Probehole Location (GeoCon July 2015)

Remediation Issues

Elevated non-volatile PAHs - Proposed garden areas will be Installed with 600mm chemically suitable cover system to mitigate exposure to these elevated contaminants.

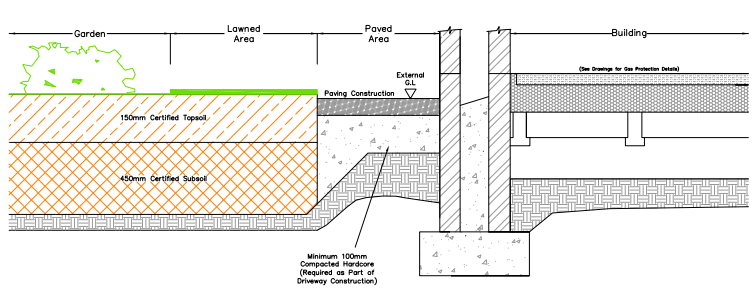
Elevated Heavy Metals - Proposed garden areas will be Installed with 600mm chemically suitable cover system to mitigate exposure to these elevated contaminants.

Build Phase Items

METHANE & CO_2 Resistant Membrane. Required to achieve CS2/Amber one with 3.5 points as required by BS8485

600mm chemically suitable cover system required within all garden areas comprising 450mm subsoil and 150mm topsoil. All materials will be imported and chemically validated.

Indicative Construction for Garden Area (Residential)



Remediation Issues

Item	*Plot Number*	*Active*
Garden Cover System	All	-
Hotspot Treatment	-	-
CO_2 Membrane	-	-
CH_4 Membrane	-	-
Hydrocarbon Membrane	-	-
Hazardous Material Storage	-	-

Notes:

N.B: *All areas of identified contamination impact to soil and groundwater are estimated using best endeavors from historic and current intrusive investigation. However, the contractor must satisfy themselves of the potential extent of remediation works. The identified impact must be spatially delineated in accordance with the E3P Remediation strategy. The entire development site will require a 600mm chemically suitable cover system comprising of 150mm topsoil & 450mm subsoil installed in all proposed residential garden areas to mitigate the elevated contaminant concentrations.*

Phase	Revision	Date	Issue	Drawn	Authorised
P1	-	05-12-2016	DRAFT	CB	MD

Client: Alan Johnston Partnership

Job No: 11-416

Date: 05-12-2016

Drawing No: 007

Scale: NTS @ A3

Job Title: Barrel Yard, Manchester

Drawing Title: Remediation Issues Plan

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APPENDIX IV
E3P REMEDIATION
&
VALIDATION CRITERIA



Human Health Remediation Targets – Low Rise Residential End Use

Determinand	Units	Within 600mm Cover System (Garden)	Hard Standing and >600mm of cover system	Public Open Space 300mm Cover	Public Open Space >300mm	Pathway
Arsenic	mg/kg	37(i)	40(ii)	79(iii)	640(iv)	1
Cadmium	mg/kg	11(i)	85(ii)	120(iii)	532(iv)	1
Chromium (Hexavalent)	mg/kg	6(i)	6(ii)	7.7(iii)	220(iv)	1
Lead	mg/kg	210(vi)	330(vii)	760(viii)	760(viii)	1
Elemental Mercury	mg/kg	1.2(i)	1.2(ii)	16(iii)	30(iv)	2
Nickel	mg/kg	180(i)	180(ii)	230(iii)	3400(iv)	1
Selenium	mg/kg	250(i)	430(ii)	1100(iii)	1800(iv)	1
Copper	mg/kg	2400(i)	7100(ii)	12000(iii)	44000(iv)	1
Zinc	mg/kg	3700(i)	40000(ii)	81000(iii)	170000(iv)	1
Phenol	mg/kg	280(i)(xi)	280(xiv)(xi)	760(iii)(xi)	760(iv)(xi)	2
Naphthalene	mg/kg	2.3(i)(xi)	2.3(xiv)(xi)	1200(iv)(xi)	1200(iv)(xi)	2
Acenaphthylene	mg/kg	170(i)(xi)	500(v)	15000(iii)(xi)	29000(iv)(xi)	3
Acenaphthene	mg/kg	210(i)(xi)	500(v)	15000(iii)(xi)	29000(iv)(xi)	1
Fluorene	mg/kg	170(i)(xi)	500(v)	9900(iii)(xi)	20000(iv)(xi)	1
Phenanthrene	mg/kg	95(i)(xi)	500(v)	3100(iii)(xi)	6200(iv)(xi)	3
Anthracene	mg/kg	500(i)(xi)	500(v)	74000(iii)(xi)	150000(iv)(xi)	3
Fluoranthene	mg/kg	280(i)(xi)	500(v)	3100(iii)(xi)	6300(iv)(xi)	3
Pyrene	mg/kg	500(i)(xi)	500(v)	7400(iii)(xi)	15000(iv)(xi)	3
Benzo(a)Anthracene(	mg/kg	7.2(i)(xi)	11(ii)(xi)	29(iii)(xi)	49(iv)(xi)	3
Chrysene	mg/kg	15(i)(xi)	30(ii)(xi)	57(iii)(xi)	93(iv)(xi)	3
Benzo(b)Fluoranthene (iii)	mg/kg	2.6(i)(xi)	3.9(ii)(xi)	7.1(iii)(xi)	13(iv)(xi)	3
Benzo(k)Fluoranthene (iii	mg/kg	77(i)(xi)	110(ii)(xi)	190(iii)(xi)	370(iv)(xi)	3
Benzo(a)Pyrene (vii)	mg/kg	2.2(i)(xi)	3.2(ii)(xi)	5.7(iii)(xi)	11(iv)(xi)	3
Indeno(123-cd)Pyrene	mg/kg	27(i)(xi)	45(ii)(xi)	82(iii)(xi)	150(iv)(xi)	3
Dibenzo(a,h)Anthracene	mg/kg	0.24(i)(xi)	0.31(ii)(xi)	0.57(iii)(xi)	1.1(iv)(xi)	3
Benzo(ghi)Perylene	mg/kg	320(i)(xi)	360(ii)(xi)	640(iii)(xi)	1400(iv)(xi)	3
TPH C_5-C_6 (aliphatic)	mg/kg	42(i)(xi)	42(ii)(xi)	42(ii)(xi)	10000(xiv)(xi)	2
TPH C_6-C_8 (aliphatic)	mg/kg	100(i)(xi)	100(ii)(xi)	100(ii)(xi)	10000(xiv)(xi)	2
TPH C_8-C_{10} (aliphatic)	mg/kg	27(i)(xi)	27(ii)(xi)	27(ii)(xi)	10000(xiv)(xi)	2
TPH C_{10}-C_{12} (aliphatic)	mg/kg	130(i)(xi)	130(ii)(xi)	130(ii)(xi)	10000(xiv)(xi)	2
TPH C_{12}-C_{16} (aliphatic)	mg/kg	1000(xiv)(xi)	1000(xiv)(xi)	1000(xiv)(xi)	10000(xiv)(xi)	1
TPH C_{16}-C_{21} (aliphatic)	mg/kg	500(xiv)(xi)	500(xiv)(xi)	500(xiv)(xi)	10000(xiv)(xi)	1
TPH C_{21}-C_{35} (aliphatic)	mg/kg					1
TPH C_5-C_7 (aromatic)	mg/kg	70(i)(xi)	70(xiii)(xi)	70(xiii)(xi)	10000(xiv)(xi)	2
TPH C_7-C_8 (aromatic)	mg/kg	130(i)(xi)	130(xiii)(xi)	130(xiii)(xi)	10000(xiv)(xi)	2
TPH C_8-C_{10} (aromatic)	mg/kg	34(i)(xi)	34(xiii)(xi)	34(xiii)(xi)	10000(xiv)(xi)	2
TPH C_{10}-C_{12} (aromatic)	mg/kg	74(i)(xi)	74(xiii)(xi)	74(xiii)(xi)	10000(xiv)(xi)	2
TPH C_{12}-C_{16} (aromatic)	mg/kg	140(i)(xi)	140(xiii)(xi)	140(xiii)(xi)	10000(xiv)(xi)	1
TPH C_{16}-C_{21} (aromatic)	mg/kg	260(i)(xi)	260(xiii)(xi)	260(xiii)(xi)	10000(xiv)(xi)	1
TPH C_{21}-C_{35} (aromatic)	mg/kg	1000(xiv)(xi)	1000(xiv)(xi)	1000(xiv)(xi)	10000(xiv)(xi)	1

Notes 1

Asbestos will be screened visually on-site by a qualified environmental consultant and where potential ACM is identified representative samples will be subject to quantitative analysis of 5&volume by weight. Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).

Notes 2

Excludes matrices where free product is observed;
Commercial Tier 1 GAC modelled to assume no exposure pathway; and,
No viable exposure pathway beneath hard standing and cover system.

Notes 3

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.
Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; NA – Not Applicable (no exceedance of assessment criteria); Loc of MC = Location of Exceedances

(i) Value derived from LQM Suitable 4 Use Levels (S4ULs) for residential end use **with** plant uptake.
(ii) Value derived from LQM Suitable 4 Use Levels (S4ULs) for residential end use **without** plant uptake – these levels used below 600mm cover system within residential gardens as soils will be present within a residential setting yet soils will not be disturbed and garden plants will not reach these soils.
(iii) Value derived from LQM Suitable 4 Use Levels (S4ULs) for Public open Space (POS) residential.
(iv) Value derived from LQM Suitable 4 Use Levels (S4ULs) for Public Open Space (POS) park – these levels used below 300mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
(v) Value derived from LQM Suitable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on site do not exceed the WM3 toxicity criteria for hazardous waste.
(vi) Value derived from Category 4 Screening Levels (C4SL) for residential land use **with** homegrown produce.
(vii) Value derived from Category 4 Screening Levels (C4SL) for residential land use **without** homegrown produce.
(viii) Value derived from Category 4 Screening Levels (C4SL) for Public open Space (POS) residential.
(ix) Value derived from Category 4 Screening Levels (C4SL) for Public Open Space (POS) park.
(x) Mercury – Based on elemental Mercury.
(xi) PAH and TPH levels used are for 1% SOM.
(xii) Xylenes based on p-xylene (o-xylene 2600mg/kg, m-xylene 3500mg/kg) and is capped by its solubility.
(xiii) Value derived from LQM Suitable 4 Use Levels (S4ULs) for residential end use **with** plant uptake due to the volatilisation risk.
(xiv) BTEX is not SOM related due to inhalation pathway.

Remediation Targets – Comparison of Leachate Analysis with Tier 1 Screening Levels

DETERMINAND	UNITS	SCREENING VALUE
Arsenic	µg/l	50[1]
Cadmium	µg/l	5[2]
Chromium	µg/l	2[1]
Copper	µg/l	5[1,3]
Total Cyanide	µg/l	1[1]
Lead	µg/l	4[1]
Mercury	µg/l	1[2]
Nickel	µg/l	50[1]
Selenium	µg/l	100[4]
Zinc	µg/l	10[5]
pH	-	6-9
Naphthalene	µg/l	10[1]
Benzo(a)pyrene	µg/l	0.05[7]
benzo[b/k]fluoranthene benzo[g,h,i]perylene & indeno(1,2,3-cd]pyrene	µg/l	0.10[6]
TPH C5-C6 (benzene)	µg/l	30[1]
TPH C6-C8 (toluene)	µg/l	50[1]
TPH C8-C10 (ethyl Benzene)	µg/l	20[1]
TPH C10-C12 (xylene)	µg/l	30[1]
TPH C12-C16 (naphthalene)	µg/l	10#[1]
TPH C16-C35	µg/l	50#

Notes

Solubility <0.01µg/l

1. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
2. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List I substances
3. Surface Waters (River Ecosystem) (Classification) Regulations 1994
4. WHO Guidelines for Drinking Water Quality. Third edition (2004)
5. Council Directive on the quality of fresh waters needing protection or improvement in order to support fish life (Freshwater Fish Directive)
6. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
7. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)