Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 1/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL 9.45 **m AOD**

CO-ORDINATES **E** 509579.00 **N** 167572.00

DATE DRILLED **START** : 15/2/00 **FINISH** :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	9.35		0.10			
Dark brown FILL (Clay & rubble)	9.15		0.30			
Stiff brown silty CLAY			(1.45)		1 1.40	
	7.70		1.75	1.75 B1		
Brown/Grey	7.25		2.20	2.20		
Silty Grey SAND & GRAVEL			(1.03)	B2		
	6.22		3.23	3.23		
Firm Grey Silty CLAY			(0.77)			
	5.45		4.00	4.00		
Silty grey sandy CLAY with silty grey SAND & GRAVEL			(1.30)	B3		
	4.15		5.30	5.00 B4		
Stiff grey CLAY			(0.70)	5.30		
	3.45		6.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 10/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.32 **m AOD**

CO-ORDINATES
E 509079.00 **N** 167699.00

DATE DRILLED
START : 17/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Dark brown silty CLAY with some stone	9.77		(0.55) 0.55			
Light brown silty CLAY	8.82		(0.95) 1.50	1.50 B1	1 1.38	
Brown SAND & GRAVEL	7.67		(1.15) 2.65	2.65 B2		
Grey flinty SAND & GRAVEL	5.64		(2.03) 4.68	3.65 B3		
Stiff grey CLAY	5.32		5.00	4.68		

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 11/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.62 **m AOD**

CO-ORDINATES
E 509194.00 **N** 167692.00

DATE DRILLED
START : 18/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & Rubble)	10.47		0.15			
Dark brown silty stoney CLAY	10.35		0.27 (0.81)			
Firm brown silty CLAY with some stone	9.54		1.08	1.08 B1		
Brown stained SAND & GRAVEL				2.08 B2	1 2.10	
			(4.34)	3.08 B3		
				4.08 B4		
				5.08 B5		
	5.20		5.42	5.42		
Stiff grey CLAY	4.62		(0.58) 6.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 12/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.74 **m AOD**

CO-ORDINATES
E 509229.00 **N** 167515.00

DATE DRILLED
START : 18/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & Rubble)	10.07		(0.67) 0.67			
Firm brown silty CLAY	9.59		1.15	1.15 B1		
Brown SAND & GRAVEL with thin brown clay bands	8.51		(1.08) 2.23	2.23 B2	1 2.35	
Brown stained SAND & GRAVEL	5.44		(3.07) 5.30	3.23 B3 4.23 B4 5.30		
Firm grey silty stoney CLAY	5.04		5.70			
Stiff grey CLAY	4.24		(0.80) 6.50			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 13/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.83 **m AOD**

CO-ORDINATES
E 509308.00 **N** 167444.00

DATE DRILLED
START : 21/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	10.58		0.25	0.25 B1		
Light brown sandy silty CLAY with brown sand & gravel bands	9.43		(1.15) 1.40	1.40 B2		
Brown SAND & GRAVEL				2.40 B3	2.75	
				3.40 B4		
			(6.10)	4.40 4.50 B5		
				5.50 B6		
				6.50 B7		
	3.33		7.50	7.50 B8		
Thin brown clay bands in brown SAND &GRAVEL	2.91		7.92	7.92		
Stiff brown CLAY	2.63		8.20			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 8.20 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 14/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.83 **m AOD**

CO-ORDINATES
E 509217.00 **N** 167516.00

DATE DRILLED
START : 21/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clays & Rubble)	10.40		0.43			
Brown firm silty CLAY			(1.09)			
	9.31		1.52	1.52		
Brown SAND & GRAVEL				B1	2.41	
				2.52		
				B2		
			(4.08)	3.52		
				B3		
				4.52		
				B4		
	5.23		5.60	5.60		
Stiff grey CLAY	4.83		6.00			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 15/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.42 **m AOD**

CO-ORDINATES
E 509131.00 **N** 167488.00

DATE DRILLED
START : 21/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & Rubble)			(0.78)			
	9.64		0.78			
Firm brown silty CLAY	9.31		1.11	1.11 B		
Brown SAND & GRAVEL			(0.89)		1 1.80	
	8.42		2.00	2.00 B		
Dark stained brown SAND & GRAVEL				3.00 B		
			(3.90)	4.00 B		
				5.00 B		
	4.52		5.90	5.90		
Stiff brown CLAY	4.42		6.00			
			(0.50)			
Stiff grey CLAY	3.92		6.50			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 16/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.25 **m AOD**

CO-ORDINATES
E 509052.00 **N** 167459.00

DATE DRILLED
START : 22/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clays & rubble)	9.65		(0.60) 0.60			
Stiff brown silty CLAY	9.25		1.00	1.00 B1	1 1.25	
Brown SAND & GRAVEL			(3.35)	2.00 B2 3.00 B3		
Stiff brown CLAY	5.90 5.85		4.35 4.40	4.35		
Stiff grey CLAY	4.75		(1.10) 5.50			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 17/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
9.83 **m AOD**

CO-ORDINATES
E 509274.00 **N** 167689.00

DATE DRILLED
START : 22/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & rubble)	9.68		0.15	0.15 B1		
Brown sandy stoney CLAY	9.63		0.20			
Flinty brown SAND & GRAVEL				1.15 B2	1 1.38	
			(3.92)	2.15 B3		
				3.19 B4		
	5.71		4.12	4.12 B5		
Brown clay bands in brown SAND & GRAVEL			(0.68)			
	5.03		4.80	4.80		
Stiff brown CLAY	4.83		5.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES
LOGGED BY JCR
DATE LOGGED
SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 18/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.81 **m AOD**

CO-ORDINATES
E 509405.00 **N** 167439.00

DATE DRILLED
START : 22/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	10.71	0.10			
Dark brown silty CLAY	10.51	0.30			
Light brown silty CLAY		(1.30)			
	9.21	1.60	1.60 B1	1 1.90	
Flinty GRAVEL with some coarse sand		(0.88)			
	8.33	2.48	2.48 B2		
Brown SAND & GRAVEL			3.48 B3		
		(2.52)	4.48 B4		
	5.81	5.00	5.00 B5		
Dark stained brown SAND & GRAVEL		(0.90)			
	4.91	5.90	5.90 B6		
Large cobbles in dark stained brown SAND & GRAVEL			6.90 B7		
		(3.92)	7.90 B8		
			8.90 B9		
	0.99	9.82	9.82		
Stiff brown CLAY	0.61	10.20			
Stiff grey CLAY	0.31	10.50			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 10.50 METRES
LOGGED BY JCR
DATE LOGGED
SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 19/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
9.40 **m AOD**

CO-ORDINATES
E 509802.00 **N** 167590.00

DATE DRILLED
START : 23/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	9.25		0.15			
Dark brown silty CLAY	8.93		0.47			
Light brown silty CLAY	8.60		0.80	0.80 B1		
Brown SAND & GRAVEL (CLAYBOUND)	7.78		(0.82) 1.62	1.62 B2	1 1.95	
Brown SAND & GRAVEL			(2.14)	2.62 B3		
	5.64		3.76	3.76		
Stiff brown CLAY	5.30		4.10			
Stiff grey CLAY	4.90		4.50			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 4.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 2/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.31 **m AOD**

CO-ORDINATES
E 509472.00 **N** 167445.00

DATE DRILLED
START : 15/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	10.16	0.15			
Light brown silty CLAY	9.64	(0.52) 0.67	0.67 B1		
Brown sandy stoney CLAY		(1.03)			
	8.61	1.70	1.70 B2	1 2.23	
Silty brown SAND & GRAVEL			2.70 B3		
		(3.30)	3.70 B4		
	5.31	5.00	5.00 B5		
Dark stained brown SAND & GRAVEL		(1.00)			
	4.31	6.00	6.00 B6		
Large cobbles in brown SAND & GRAVEL		(1.54)	7.00 B7		
	2.77	7.54	7.54		
Stiff brown CLAY	2.66	7.65			
Stiff grey CLAY	2.31	8.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 8.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 20/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.25 **m AOD**

CO-ORDINATES
E 509735.00 **N** 167657.00

DATE DRILLED
START : 23/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	10.10		0.15			
Dark brown stoney CLAY	9.78		0.47 (0.51)			
Light brown silty CLAY	9.27		0.98	0.98 B1		
Brown SAND & GRAVEL				1.98 B2	1 2.00	
			(2.82)	2.98 B3		
	6.45		3.80	3.80		
Stiff brown CLAY	5.95		(0.50) 4.30			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 4.30 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 21/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.47 **m AOD**

CO-ORDINATES
E 509662.00 **N** 167733.00

DATE DRILLED
START : 23/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	10.32		0.15			
Dark brown stoney CLAY	9.97		0.50			
Light brown silty CLAY	9.37		(0.60) 1.10	1.10		
Brown SAND & GRAVEL				B1	1 1.80	
				2.10		
			(2.90)	B2		
				3.10		
				B3		
	6.47		4.00	4.00		
Stiff grey CLAY	5.97		(0.50) 4.50			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 4.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 22/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
8.90 **m AOD**

CO-ORDINATES
E 509533.00 **N** 167657.00

DATE DRILLED
START : 23/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	8.75		0.15			
Firm brown silty CLAY			(0.80)		1 0.80	
	7.95		0.95			
Soft grey silty CLAY	7.70		1.20			
Firm grey organic CLAY			(0.80)			
	6.90		2.00	2.00 B1		
Very silty brown/grey SAND & GRAVEL			(1.05)			
	5.85		3.05	3.05 B2		
Brown SAND & GRAVEL	5.60		3.30	3.30		
Stiff brown CLAY	5.48		3.42			
			(0.58)			
Stiff Grey CLAY	4.90		4.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 4.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 23/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.26 **m AOD**

CO-ORDINATES
E 509505.00 **N** 167745.00

DATE DRILLED
START : 23/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	10.11		0.15			
Light brown silty CLAY			(0.67)			
	9.44		0.82	0.82 B1		
Brown SAND & GRAVEL with thin clay bands			(2.18)	1.82 B2	1 2.48	
	7.26		3.00	3.00 B3		
Brown SAND & GRAVEL			(2.38)	4.00 B4		
				5.00 B5		
	4.88		5.38	5.38		
Stiff brown CLAY	4.76		5.50			
Stiff grey CLAY	4.26		(0.50) 6.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 24/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
11.22 **m AOD**

CO-ORDINATES
E 509470.00 **N** 167827.00

DATE DRILLED
START : 24/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	11.07		0.15			
Dark brown stoney CLAY	10.80		0.42	0.42 B1		
Very silty brown SAND & GRAVEL	10.69		0.53	0.53 B2		
Brown SAND & GRAVEL			(2.87)	1.50 B3	1.80	
				2.50 B4		
	7.82		3.40	3.40 B5		
Large cobbles in brown SAND & GRAVEL			(1.25)			
	6.57		4.65	4.65		
Stiff brown CLAY	6.07		(0.50) 5.15			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.15 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 25/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
9.56 **m AOD**

CO-ORDINATES
E 509753.00 **N** 167523.00

DATE DRILLED
START : 24/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOP SOIL	9.46		0.10	0.35 B1		
Dark brown stoney CLAY	9.21		0.35 (1.05)			
Light brown sandy CLAY	8.16		1.40	1.40 B2	1 2.10	
Brown SAND & gravel with large cobbles				2.40 B2		
				3.40 B4		
			(6.10)	4.40 B5		
				5.40 B6		
				6.40 B7		
	2.06		7.50	7.50		
Stiff grey CLAY	1.56		(0.50) 8.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 8.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 3/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.56 **m AOD**

CO-ORDINATES
E 509253.00 **N** 167294.00

DATE DRILLED
START : 16/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & rubble)	9.96		(0.60) 0.60			
Firm brown silty CLAY			(2.98)		2.56	
	6.98		3.58	3.60 B1		
Firm grey organic CLAY	6.96		3.60			
Flinty brown SAND & GRAVEL	6.56		4.00	4.00		
Stiff brown CLAY			(1.50)			
	5.06		5.50			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 4/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.66 **m AOD**

CO-ORDINATES
E 509142.00 **N** 167215.00

DATE DRILLED
START : 16/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay & Rubble)	10.24		0.42			
Firm brown silty CLAY			(2.28)		1 2.15	
	7.96		2.70			
Brown sandy stoney CLAY	7.66		3.00	2.70 B1		
Brown flinty SAND & GRAVEL			(1.80)	3.00 B2 4.00 B3		
	5.86		4.80	4.80		
Stiff brown CLAY	5.66		5.00			
Stiff grey CLAY	5.16		(0.50) 5.50			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 5/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.40 **m AOD**

CO-ORDINATES
E 509030.00 **N** 167136.00

DATE DRILLED
START : 16/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
FILL (Clay with rubble pieces)	10.10		0.30			
Firm brown silty CLAY			(0.80)			
	9.30		1.10	1.10 B1	▼1 1.80	
Brown SAND & GRAVEL				2.10 B2		
			(3.90)	3.10 B3		
				4.10 B4		
	5.40		5.00	5.00		
Stiff brown CLAY	5.25		5.15			
Stiff grey CLAY			(0.85)			
	4.40		6.00			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- ▼1 - Water strike 1
- ▽1 - Standing water 1
- ▼2 - Water strike 2
- ▽2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 6/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.88 **m AOD**

CO-ORDINATES
E 508921.00 **N** 167214.00

DATE DRILLED
START : 16/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Brown sandy stoney CLAY	10.28		(0.60) 0.60	B1 0.60		
Brown flinty SAND & GRAVEL			(4.82)	B2 1.60 B3 2.60 B4 3.60 B5 4.60 B6	1.87	
	5.46		5.42	5.42		
Stiff brown CLAY	5.28		5.60			
Stiff grey CLAY	4.88		6.00			

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 7/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
11.68 **m AOD**

CO-ORDINATES
E 508933.00 **N** 167315.00

DATE DRILLED
START : 17/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Dark brown silty CLAY with some stone	11.28		0.40	B1 0.40		
Light brown silty CLAY			(0.98)	B2	1.30	
	10.30		1.38	1.38		
Brown SAND & GRAVEL with large flints			(4.22)	B3		
	6.08		5.60	5.60 B4		
Stiff brown CLAY	5.96		5.72	5.72 B5		
Stiff grey CLAY	5.68		6.00	6.00		

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 8/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
9.80 **m AOD**

CO-ORDINATES
E 508990.00 **N** 167469.00

DATE DRILLED
START : 17/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Dark brown silty CLAY with some stone	9.65		0.15			
Light brown silty CLAY	9.33		0.47 (0.53)	0.47 B1	1 0.70	
Silty brown SAND & GRAVEL	8.80		1.00	1.00		
Brown SAND & GRAVEL			(0.93)	B2		
	7.87		1.93	1.93		
Brown stained SAND & GRAVEL with large cobbles			(1.96)	B3 3.00 B4		
	5.91		3.89	3.89		
Stiff grey CLAY			(1.11)			
	4.80		5.00			

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

1 - Water strike 1
1 - Standing water 1
2 - Water strike 2
2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. 9/00

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD:

GROUND LEVEL
10.00 **m AOD**

CO-ORDINATES
E 509020.00 **N** 167547.00

DATE DRILLED
START : 17/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Dark brown silty stoney CLAY	9.40		(0.60) 0.60	0.60 B1	1 0.96	
Dark stained SAND & GRAVEL			(4.50)	1.50 B2 2.50 B3 3.50 B4 4.50 B		
Stiff brown CLAY	4.90 4.50		5.10 5.50	5.10		

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. **WM01**

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
10.87 **m AOD**

CO-ORDINATES
E 509573.00 **N** 167827.00

DATE DRILLED
START : 24/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	10.72	0.15			Bentonite Seal
Dark brown CLAY with occasional gravel.	10.35	0.52 (0.53)			
Light brown silty SAND and GRAVEL.	9.82	1.05			0.80 Sand Filter - Plain HDPE 50mm ID Pipe
Brown SAND and GRAVEL with large cobbles.		(3.55)			1.60 Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	6.27	4.60			4.60
Stiff brown CLAY.	5.87	5.00			5.00

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. WM02

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL 10.74 **m AOD**

CO-ORDINATES **E** 509507.00 **N** 167510.00

DATE DRILLED **START** : 25/2/00 **FINISH** :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
Dark brown CLAY. (MADE GROUND)	10.26	0.48			
Firm light brown silty CLAY.		(1.34)			Bentonite Seal
	8.92	1.82			1.80
Light brown silty SAND.		(1.18)			Sand Filter - Plain HDPE 50mm ID Pipe
	7.74	3.00			2.85
Brown silty SAND with occasional gravel.		(1.90)			Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	5.84	4.90			
Brown SAND and GRAVEL with large cobbles.		(0.95)			
	4.89	5.85			5.85
Stiff brown CLAY.	4.74	6.00			Arisings Back Fill
Stiff grey CLAY.	4.24	(0.50) 6.50			6.50

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 6.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. **WM03**

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
10.46 **m AOD**

CO-ORDINATES
E 509343.00 **N** 167348.00

DATE DRILLED
START : 25/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
CLAY with abundant rubble. (MADE GROUND)	10.03	0.43			
Light brown silty CLAY.		(2.57)			Bentonite Seal
	7.46	3.00			1.60 Sand Filter - Plain HDPE 50mm ID Pipe 2.60
Brown SAND and GRAVEL.		(1.98)			Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	5.48	4.98			
Stiff brown CLAY.	4.86	(0.62) 5.60			5.60

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.60 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. WM04

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
10.71 **m AOD**

CO-ORDINATES
E 508956.00 **N** 167139.00

DATE DRILLED
START : 28/2/00
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION	
TOPSOIL.	10.36		0.35				Bentonite Seal
Brown sandy gravelly CLAY.	10.01		0.70				0.80
Brown SAND and GRAVEL.			(4.60)				Sand Filter - Plain HDPE 50mm ID Pipe 2.40 Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	5.41		5.30				
Stiff brown CLAY.	5.35		5.36				5.50
Stiff grey CLAY.	5.21		5.50				

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. **WM05**

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
10.57 **m AOD**

CO-ORDINATES
E 508968.00 **N** 167406.00

DATE DRILLED
START : 28/2/06
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	10.39	0.18			Bentonite Seal
Dark brown silty CLAY.	10.01	0.56			
Light brown silty CLAY.	9.37	(0.64) 1.20			1.00 Sand Filter - Plain HDPE 50mm ID Pipe
Brown SAND and GRAVEL.		(3.32)			1.55 Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	6.05	4.52			4.55
Stiff brown CLAY.	5.87	4.70			Arisings Back Fill
Stiff grey CLAY.	5.07	(0.80) 5.50			5.50

KEY
B - Bulk distrubed sample
D - Small distrubed sample
U - Undistrubed sample
W - Water sample
X - Cuttings sample
c - Coarse grained
m - Medium grained
f - Fine grained

- Water strike 1
- Standing water 1
- Water strike 2
- Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.50 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. **WM06**

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
10.05 **m AOD**

CO-ORDINATES
E 509049.00 **N** 167628.00

DATE DRILLED
START : 28/2/06
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
TOPSOIL	9.90	0.15			Bentonite Seal 0.50
Dark brown silty CLAY.	9.57	0.48			
Stained brown SAND and GRAVEL.		(1.82)			Sand Filter - Plain HDPE 50mm ID Pipe 1.50
	7.75	2.30			
Brown SAND and GRAVEL.		(2.15)			Sand Filter - 0.5mm Slotted HDPE 50mm ID Pipe
	5.60	4.45			4.50
Stiff grey CLAY.	5.05	(0.55) 5.00			Arisings Back Fill 5.00

KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- ▼ - Water strike 1
- ▽ - Standing water 1
- ▼ - Water strike 2
- ▽ - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

Geological Services Department
CEMEX UK Operations Ltd

BOREHOLE No. **WM07**

SHEET 1 OF 1

SITE NAME
Watersplash Farm
Shepperton, Middlesex

SITE REF.

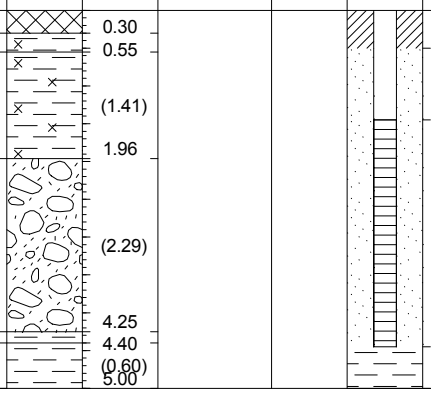
DRILLING CONTRACTOR: DRILLING & SERVICING
EQUIPMENT AND METHOD: Shell & Auger 6"

GROUND LEVEL
9.29 **m AOD**

CO-ORDINATES
E 509472.00 **N** 167682.00

DATE DRILLED
START : 6/2/29
FINISH :

DESCRIPTION	REDUCED LEVEL (m AOD)	LEGEND	DEPTH & (THICKNESS) (m)	SAMPLE DEPTH (m) & TYPE	WATER STRIKE	MONITOR INSTALL-ATION
CLAY with abundant rubble. (MADE GROUND).	8.99		0.30			
Brown silty CLAY.	8.74		0.55			
Soft brown / grey silty CLAY with organic matter.			(1.41)			
	7.33		1.96			
Brown SAND and GRAVEL.			(2.29)			
	5.04		4.25			
Stiff brown CLAY.	4.89		4.40			
Stiff grey CLAY.	4.29		(0.60) 5.00			



KEY
- B - Bulk distrubed sample
- D - Small distrubed sample
- U - Undistrubed sample
- W - Water sample
- X - Cuttings sample
- c - Coarse grained
- m - Medium grained
- f - Fine grained

- 1 - Water strike 1
- 1 - Standing water 1
- 2 - Water strike 2
- 2 - Standing water 2

NOTES

MONITORING POINT ELEVATION & ID
Ref. Elev. mAOD

TOTAL DEPTH 5.00 METRES

LOGGED BY JCR

DATE LOGGED

SCALE 1 : 100

centremapslive.com
the mapping portal from Laser Surveys

CENTREMAPS
Brockamin House, Leigh,
WR6 5JU

Report Reference:	CMAPS-314144
Your Reference:	60084 : Watersplash Farm
Report Date	Jan 5, 2009
Report Delivery Method:	Email - pdf

GroundSure GeoInsight

Address: **Watersplash Farm**

Dear Sir/Madam,

Thank you for placing your order with GroundSure. Please find enclosed the **GroundSure GeoInsight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

CENTREMAPS

Enc.
GroundSure GeoInsight

centremapslive.com
the mapping portal from Laser Surveys

GroundSure

GroundSure GeoInsight

Address: Watersplash Farm

Date: Jan 5, 2009

Report Reference: CMAPS-314144

Your Reference: 60084 : Watersplash Farm

Brought to you by CENTREMAPS

If you would like any further assistance regarding this report then please contact
CENTREMAPS on (T) 01886 832972, (F) 01883 833485, email: groundsure@centremaps.co.uk

Aerial Photograph of Study Site

NW ▲ N NE

◄W

E►

SW S ▼ SE

Site Name: Watersplash Farm
Grid Reference: 509730,167519

Overview of Findings

The GroundSure GeoInsight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database and GroundSure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	**Number of records found within (X) m of the study site boundary**
1. Geology	Description
1.1 Artificial Ground,	
1.1.1 Is there any Artificial Ground /Made Ground present beneath the study site? *	Yes
1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	Yes
1.2 Superficial Geology & Landslips	
1.2.1 Is there any Superficial Ground /Drift Geology present beneath the study site? *	Yes
1.2.2 Are there any records relating to permeability of superficial geology within the study site* boundary?	Yes
1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
1.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No
1.3 Bedrock, Solid Geology & Faults	
1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
1.3.2 Are there any records relating to permeability of bedrock within the study site* boundary?	Yes
1.3.3 Are there any records of faults within 500m of the study site boundary?	No
1.3.4 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a radon Affected Area, as less than 1% of properties are above the Action Level
1.3.5 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Resea rch Establishment?	No radon protective measures are necessary

*** This includes an automatically generated 50m buffer zone around the site**

Source:Scale 1:50,000 BGS Sheet No:269

2. Ground Workings	on-site	0-50	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	1	7	9	-	-
2.2 Historical Underground Workings Features from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	0	1	3	5

3. Mining, Extraction & Natural Cavities	on-site	0-50	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Shallow Mining*	2	-	-	-	-
3.4 Non – Coal Mining Cavities	0	0	0	0	0
3.5 Natural Cavities	0	0	0	0	0
3.6 Brine Extraction	0	0	0	0	0
3.7 Gypsum Extraction	0	0	0	0	0
3.8 Tin Mining	0	0	0	0	0
3.9 Clay Mining	0	0	0	0	0

*This includes an automatically generated 150m buffer zone around the site

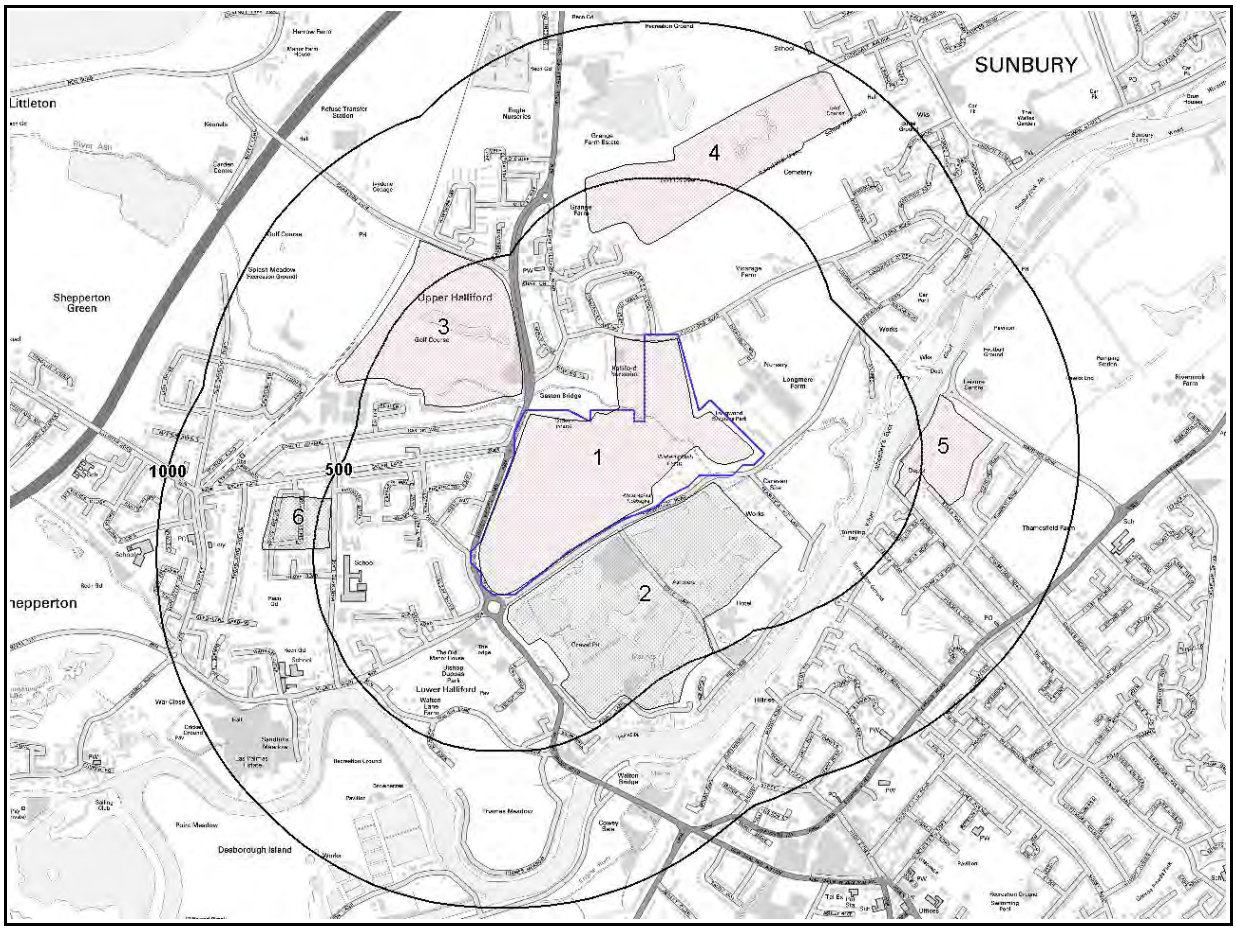
4. Natural Ground Subsidence	on-site*	0-50	51-250	251-500	501-1000
4.1 Shrink-Swell Clay	Very Low	-	-	-	-
4.2 Landslides	Very Low	-	-	-	-
4.3 Ground Dissolution of Soluble Rocks	Negligible	-	-	-	-
4.4 Compressible Deposits	Moderate	-	-	-	-
4.5 Collapsible Deposits	Moderate	-	-	-	-
4.6 Running Sand	Low	-	-	-	-

* This includes an automatically generated 50m buffer zone around the site

5. Borehole Records	on-site	0-50	51-250	251-500	501-1000
5.1 BGS Recorded Boreholes	16	1	10	-	-

1.1 Artificial Ground Map

NW ▲ N NE



◄W E►

SW S ▼ SE

Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:269

1.1.1 Artificial/Made Ground

Are there any records of Artificial/Made Ground within 500m of the study site boundary: **Yes**

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	WMGR-MGRD	Infilled Ground	Artificial Deposit
2	13.0	S	WGR-VOID	Worked Ground (undivided)	Void
3	57.0	N	WMGR-MGRD	Infilled Ground	Artificial Deposit
4	290.0	N	WMGR-MGRD	Infilled Ground	Artificial Deposit
5	426.0	E	WMGR-MGRD	Infilled Ground	Artificial Deposit
6	451.0	W	WGR-VOID	Worked Ground (undivided)	Void

1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site* boundary: **Yes**

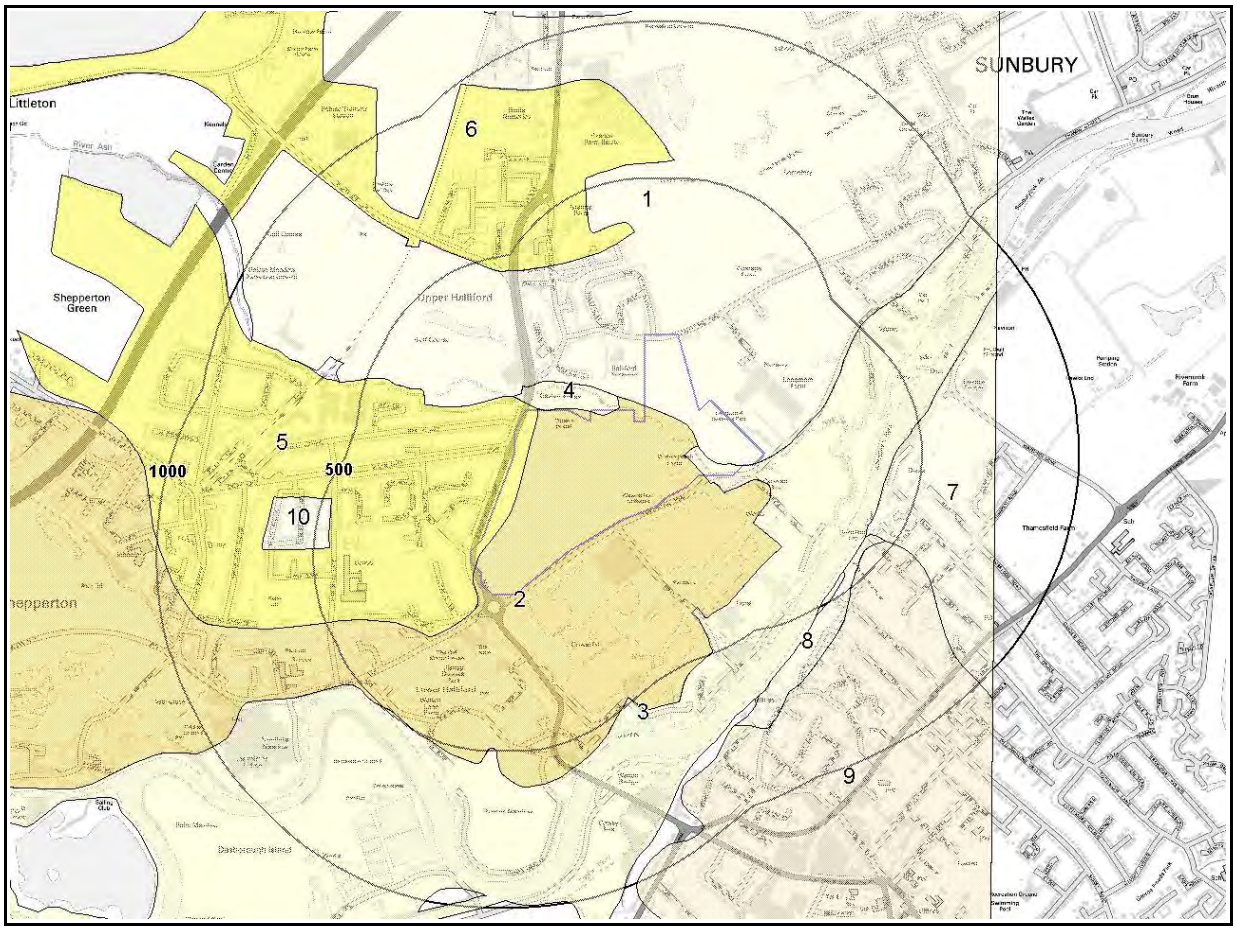
Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	Very Low

* This includes an automatically generated 50m buffer zone around the site.

1.2 Superficial Deposits and Landslips Map

NW ▲ N NE

◄W



E►

SW S ▼ SE

Superficial and Landslips Legend

Site Outline

500
1000
Search Buffers (m)

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/Drift Geology

Are there any records of Superficial Deposits/Drift Geology within 500m of the study site boundary: Yes

ID	Distance (m)	Direction	Lex Code	Description	Rock Description
1	0.0	On Site	KPGR-SAGR	Kempton Park Gravel Formation	Sand and Gravel
2	0.0	On Site	SHGR-SAGR	Shepperton Gravel Member	Sand and Gravel
3	0.0	On Site	ALV-CSSG	Alluvium	Clay, Silt, Sand and Gravel
4	0.0	On Site	ALV-CSSG	Alluvium	Clay, Silt, Sand and Gravel
5	0.0	On Site	LASI-CLSI	Langley Silt Member	Clay and Silt
6	300.0	NW	LASI-CLSI	Langley Silt Member	Clay and Silt
7	388.0	E	KPGR-SAGR	Kempton Park Gravel Formation	Sand and Gravel
8	415.0	SE	KPGR-SAGR	Kempton Park Gravel Formation	Sand and Gravel
9	442.0	SE	TPGR-SAGR	Taplow Gravel Formation	Sand and Gravel
10	451.0	W	KPGR-SAGR	Kempton Park Gravel Formation	Sand and Gravel

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site* boundary: Yes

Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Mixed	Low	Very Low
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Intergranular	High	Very Low
0.0	On Site	Intergranular	High	Very Low

1.2.3 Landslip

Database searched and no data found.

Are there any records of Landslip within 500m of the study site boundary? No

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.
This Geology shows the main components as discreet layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.2.4 Landslip Permeability

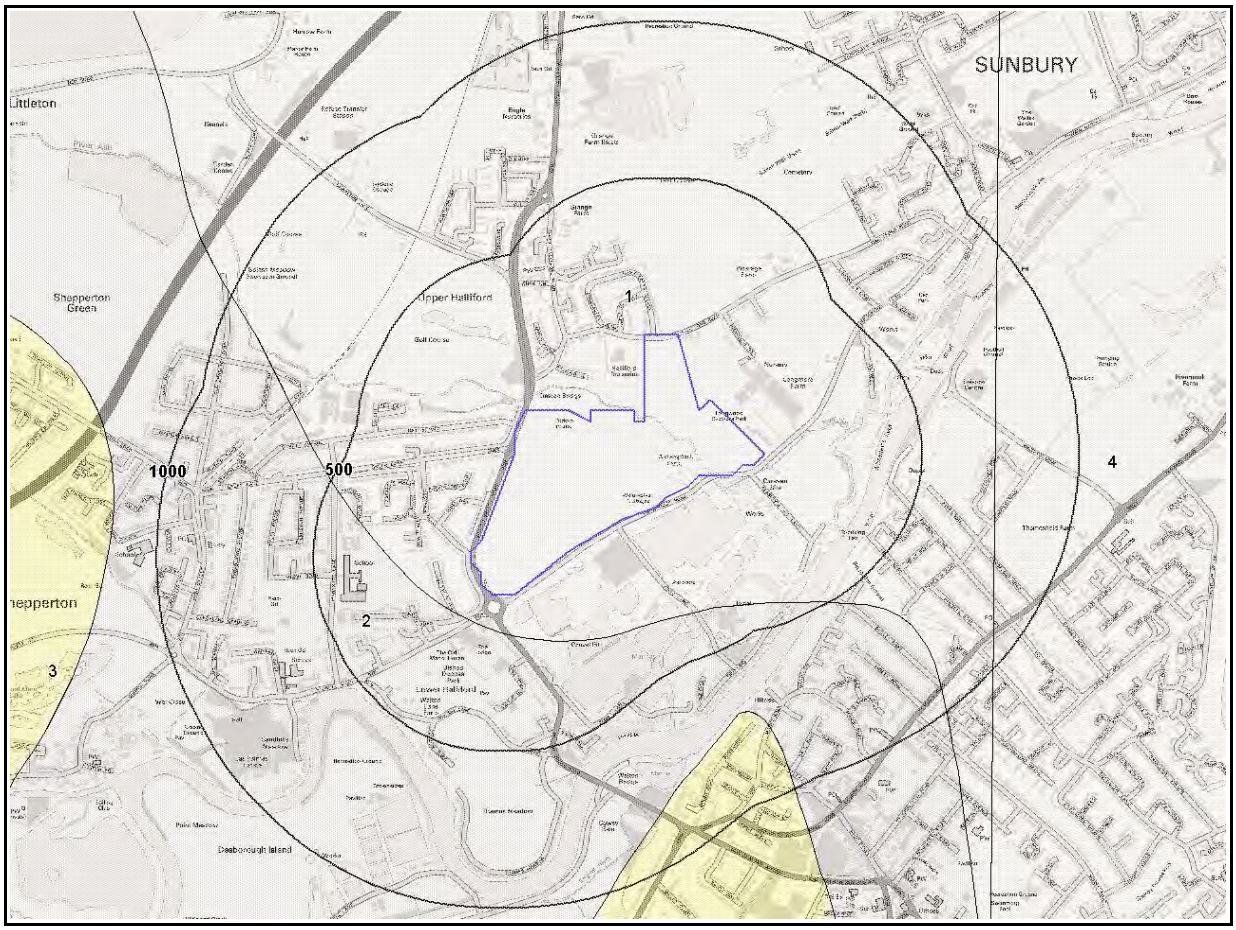
Are there any records relating to permeability of landslips within the study site* boundary: No

Database searched and no data found.

* This includes an automatically generated 50m buffer zone around the site.

1.3 Bedrock and Faults Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Bedrock & Faults Deposits Legend

Site Outline

500
1000
Search Buffers (m)

Geological information represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:269

1.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	LC-CLSS	London Clay Formation - Clay, Silt and Sand	Eocene
2	104.0	S	CLGB-SSCL	Claygate Member - Sand, Silt and Clay	Eocene

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary: **Yes**

Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Moderate	Very Low

1.3.3 Faults

Database searched and no data found.

Are there any records of Faults within 500m of the study site boundary? **No**

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discreet layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3.4 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a radon Affected Area, as less than 1% of properties are above the Action Level

1.3.5 Radon Protection

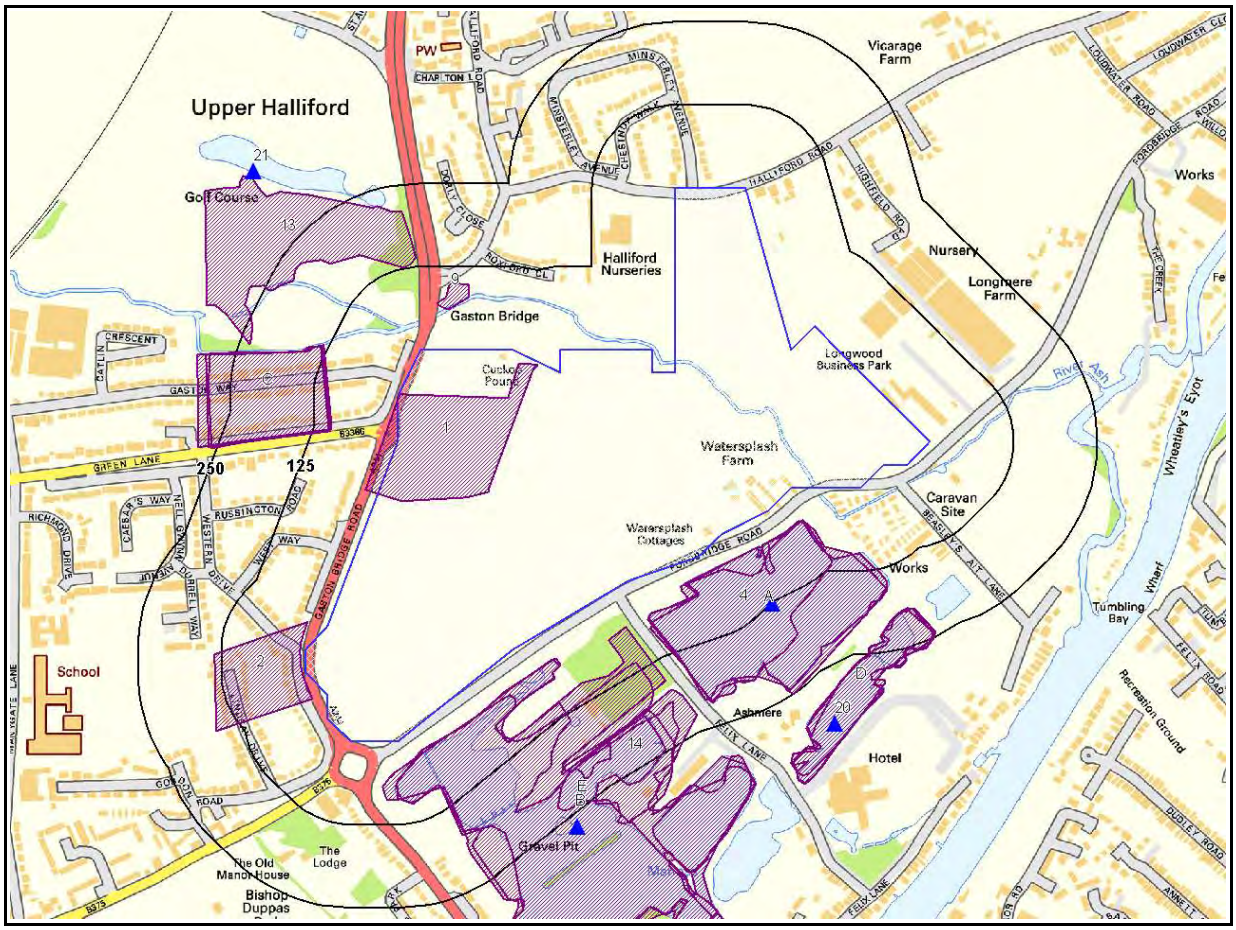
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?

No radon protective measures are necessary

* This includes an automatically generated 50m buffer zone around the site.

2. Ground Workings Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Ground Workings Legend

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

2. Ground Workings

2.1 Historical Surface Ground Working Features derived from the Historical Mapping

This dataset is based on GroundSure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? **Yes**

The following Historical Surface Ground Working Features are provided by GroundSure:

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	509106,167588	Brick Field	1865
2	4.0	W	508830,167222	Brick Field	1865
3A	27.0	SE	509579,167319	Pond	1990
4	27.0	SE	509539,167319	Gravel Pit	1973
5A	32.0	S	509580,167321	Pond	1955
6B	32.0	SE	509367,167001	Gravel Pit	1990
7E	33.0	SE	509292,167023	Gravel Pit	1973
8B	37.0	SE	509280,166984	Water Body	1955
9	61.0	N	509110,167792	Pond	1865
10C	99.0	W	508835,167641	Brick Works	1913
11C	99.0	W	508827,167643	Brick Works	1912
12C	102.0	W	508832,167641	Brick Works	1912
13	126.0	N	508896,167847	Sand and Ballast Pit	1938
14	175.0	SE	509370,167102	Sand and Ballast Pit	1938
15D	193.0	S	509724,167193	Pond	1973
16D	194.0	S	509722,167191	Pond	1990
17D	196.0	S	509721,167196	Pond	1955

2.2 Historical Underground Workings Features derived from the Historical Mapping

This data is derived from the GroundSure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? **No**

Database searched and no data found.

2.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? **Yes**

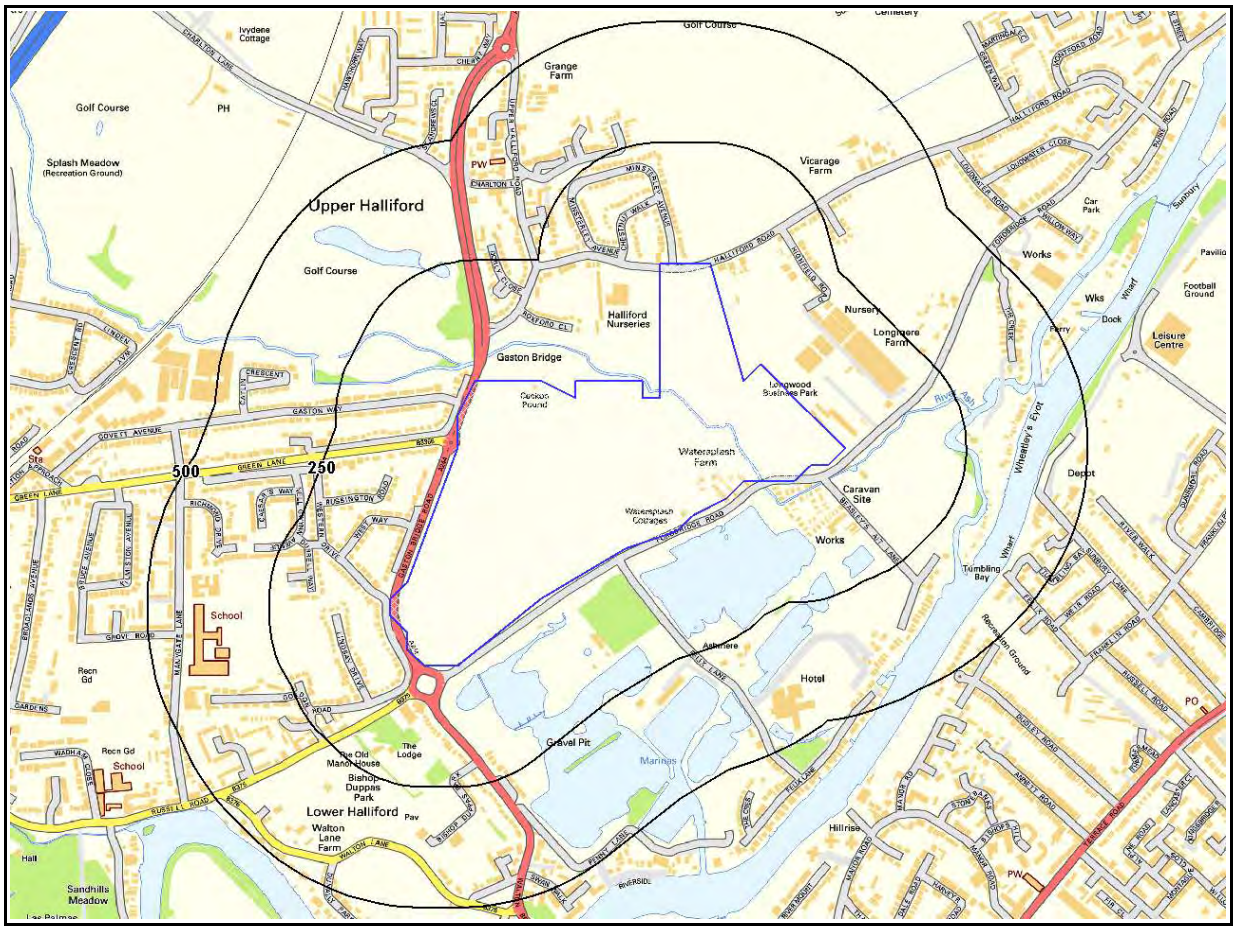
The following Current Ground Workings information is provided by British Geological Society:

ID	Distance (m)	Direction	NGR	Use	Date Updated
18A	127.0	SE	509585.0,167330.0	Sand & Gravel	02-Jan-2008
19E	269.0	SE	509295.0,166995.0	Sand & Gravel	02-Jan-2008
20	323.0	SE	509680.0,167150.0	Sand & Gravel	16-Jul-2007
21	367.0	NW	508810.0,167980.0	Sand & Gravel	02-Jan-2008
Not shown	567.0	N	509720.0,168495.0	Sand & Gravel	

Not shown	871.0	N	509710.0,168810.0	Sand & Gravel
Not shown	885.0	NW	508340.0,168225.0	Sand & Gravel
Not shown	912.0	E	510695.0,167840.0	Sand & Gravel
Not shown	989.0	NW	509000.0,168840.0	Sand & Gravel

3. Mining, Extraction & Natural Cavities Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Mining, Extraction & Natural Cavities Legend

Site Outline

250
500
Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

3. Mining, Extraction & Natural Cavities

3.1 Historical Mining

This dataset is derived from GroundSure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.3 Shallow Mining

This dataset refers to the (largely very old) extraction of mineral deposits by means of near surface underground workings.

What is the maximum hazard rating of subsidence relating to shallow mining within the study site* boundary? **Negligible**

*This includes an automatically generated 150m buffer zone around the study site boundary

The following Shallow Mining information provided by the British Geological Survey is not represented on Mapping:

Distance (m)	Direction	Hazard Rating	Details
0.0	On Site	Negligible	Where negligible potential is indicated, this means that the rocks underlying the area are not likely to have been mined at shallow depth. However, you should still find out whether or not a Coal Authority mining search is required in the area, for example, to check for deeper mining.
0.0	On Site	Negligible	Where negligible potential is indicated, this means that the rocks underlying the area are not likely to have been mined at shallow depth. However, you should still find out whether or not a Coal Authority mining search is required in the area, for example, to check for deeper mining.

3.4 Non – Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? **No**

Database searched and no data found.

3.5 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? **No**

Database searched and no data found.

3.6 Brine Extraction

This dataset provides information from the Brine compensation board which has been discontinued and is now covered by the Coal Authority.

Are there any Brine Extraction areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.7 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.8 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records.

Are there any Tin Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

3.9 Clay Mining

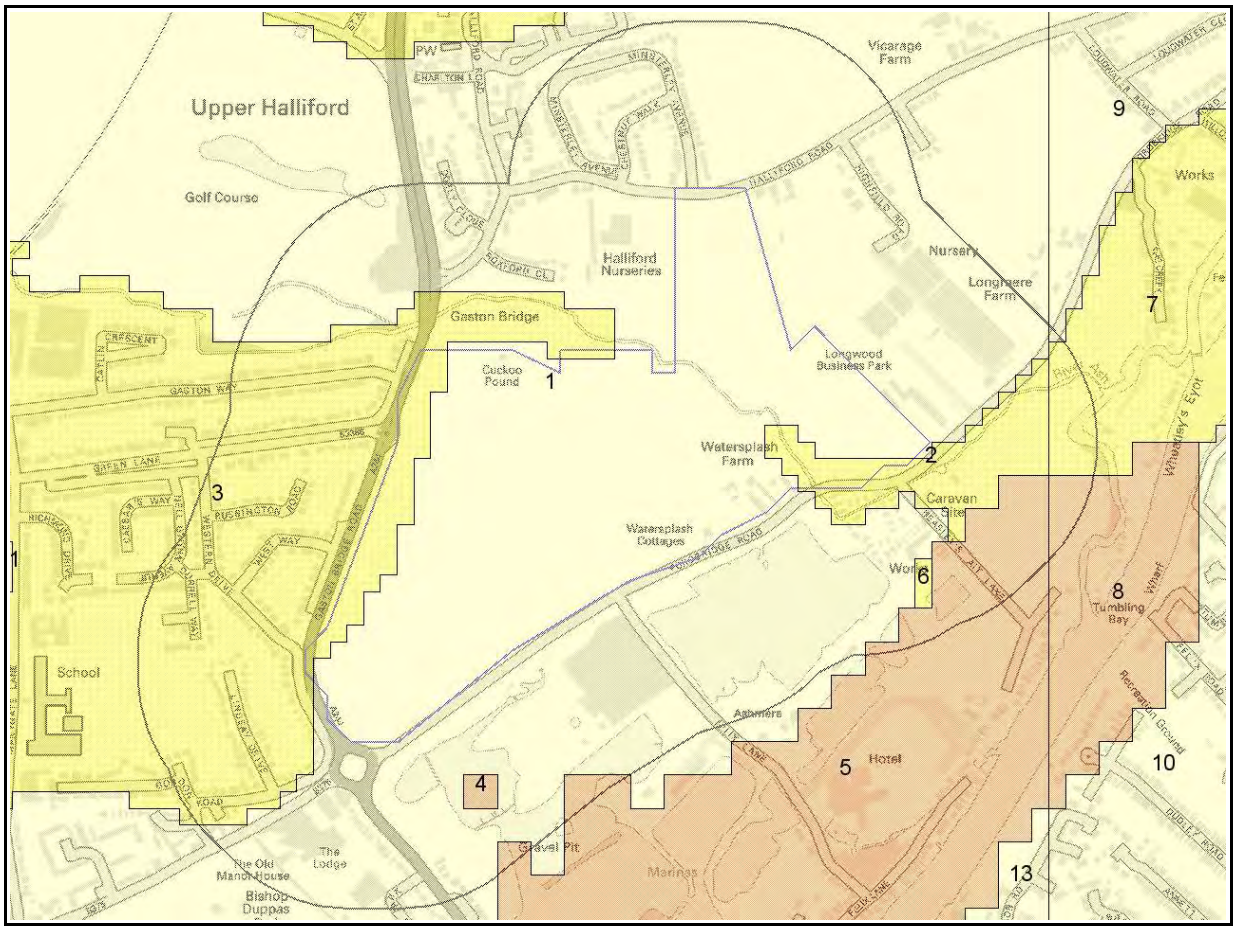
This dataset provides information on Kalin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? **No**

Database searched and no data found.

4. Natural Ground Subsidence
4.1 Shrink-Swell Clay Map

NW N NE



W E

SW S SE

Shrink-Swell Clay Legend

Site Outline

125
250
Search Buffers (m)

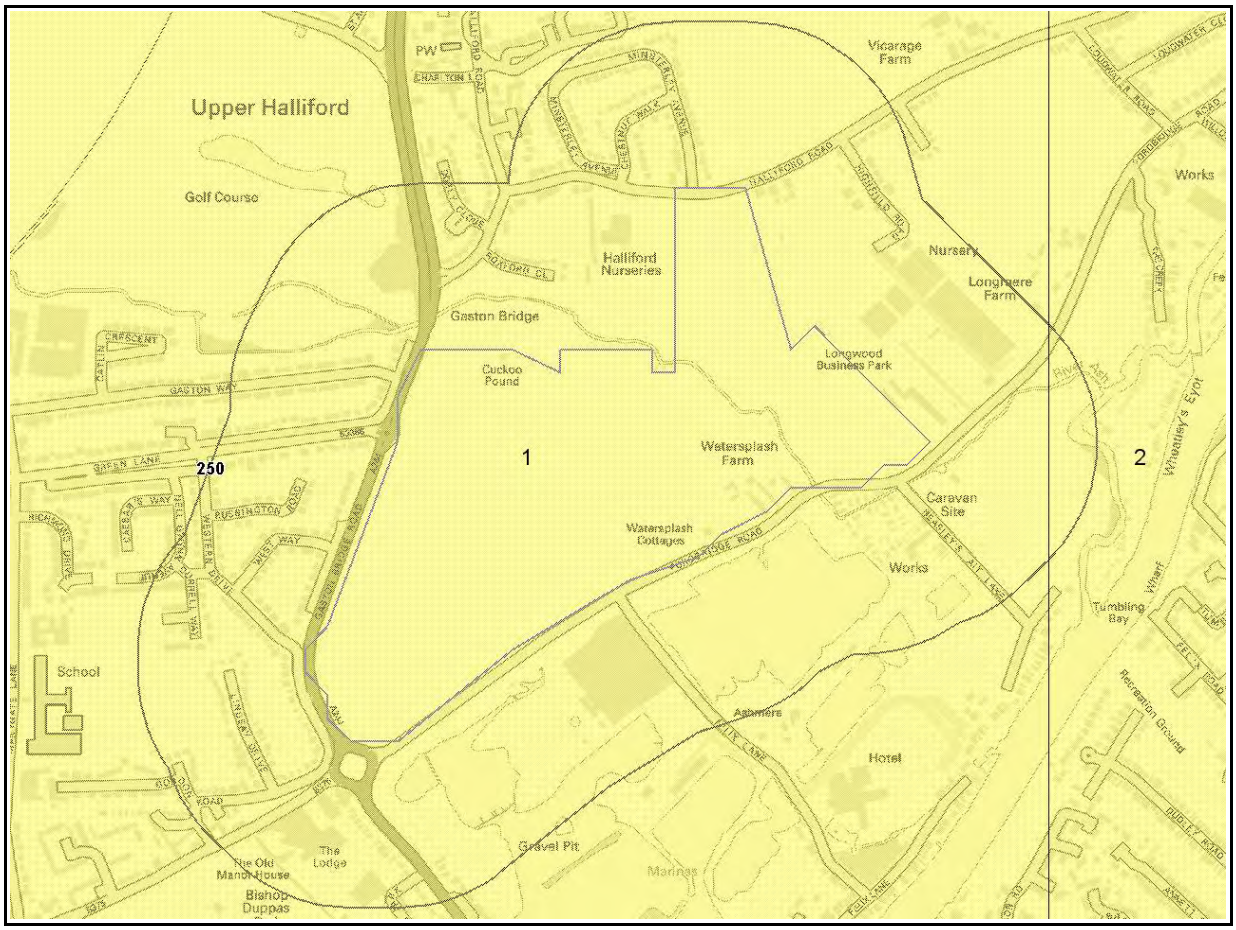
No Data / Null
Negligible
Very Low

Low
Moderate
High

4.2 Landslides Map

NW ▲ N NE

◄W



E►

SW ▼ S SE

Landslides Legend

Site Outline

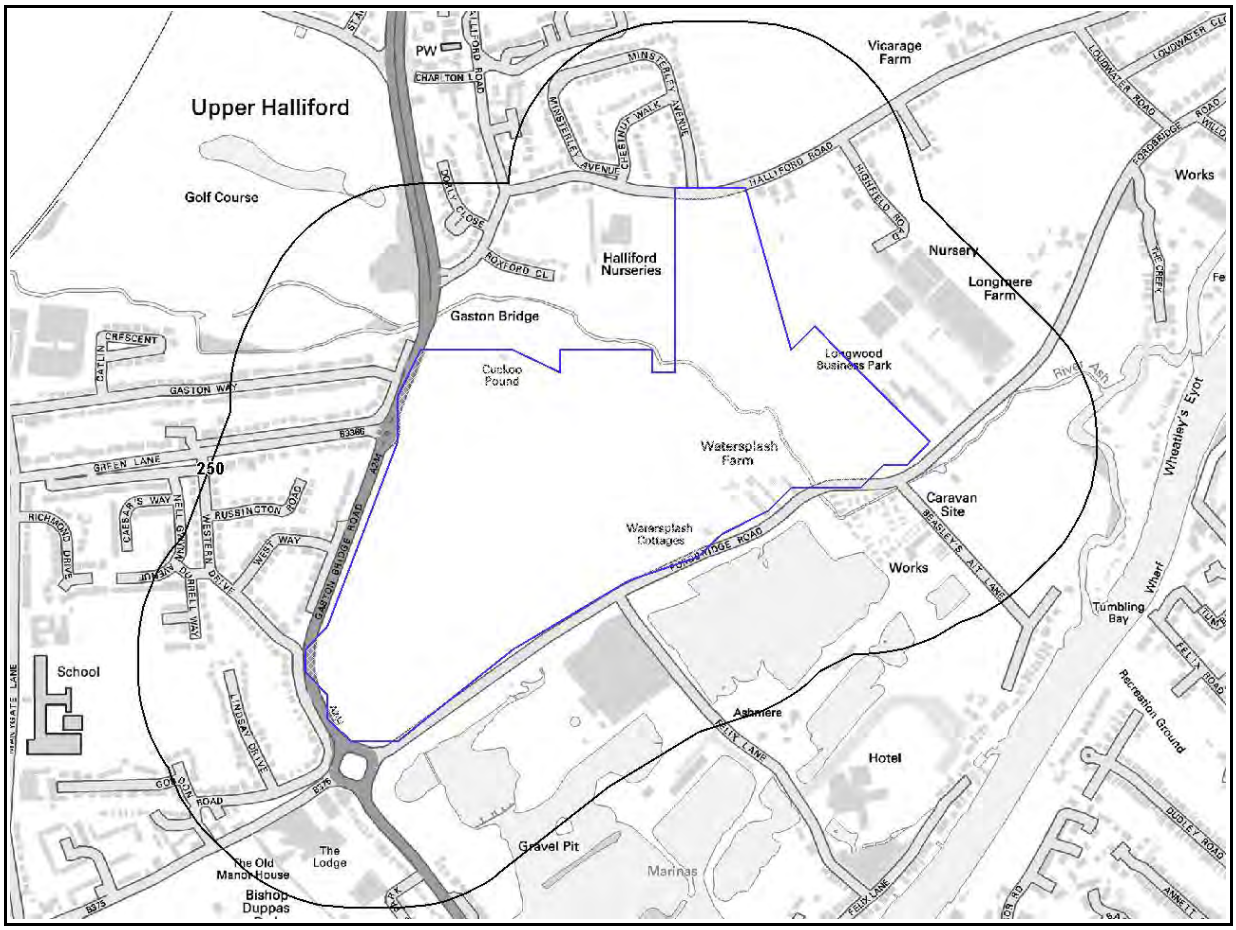
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.3 Ground Dissolution Soluble Rocks Map

NW ▲ N NE



◄W E► SW S ▼ SE

Ground Dissolution Soluble Rocks Legend

Site Outline

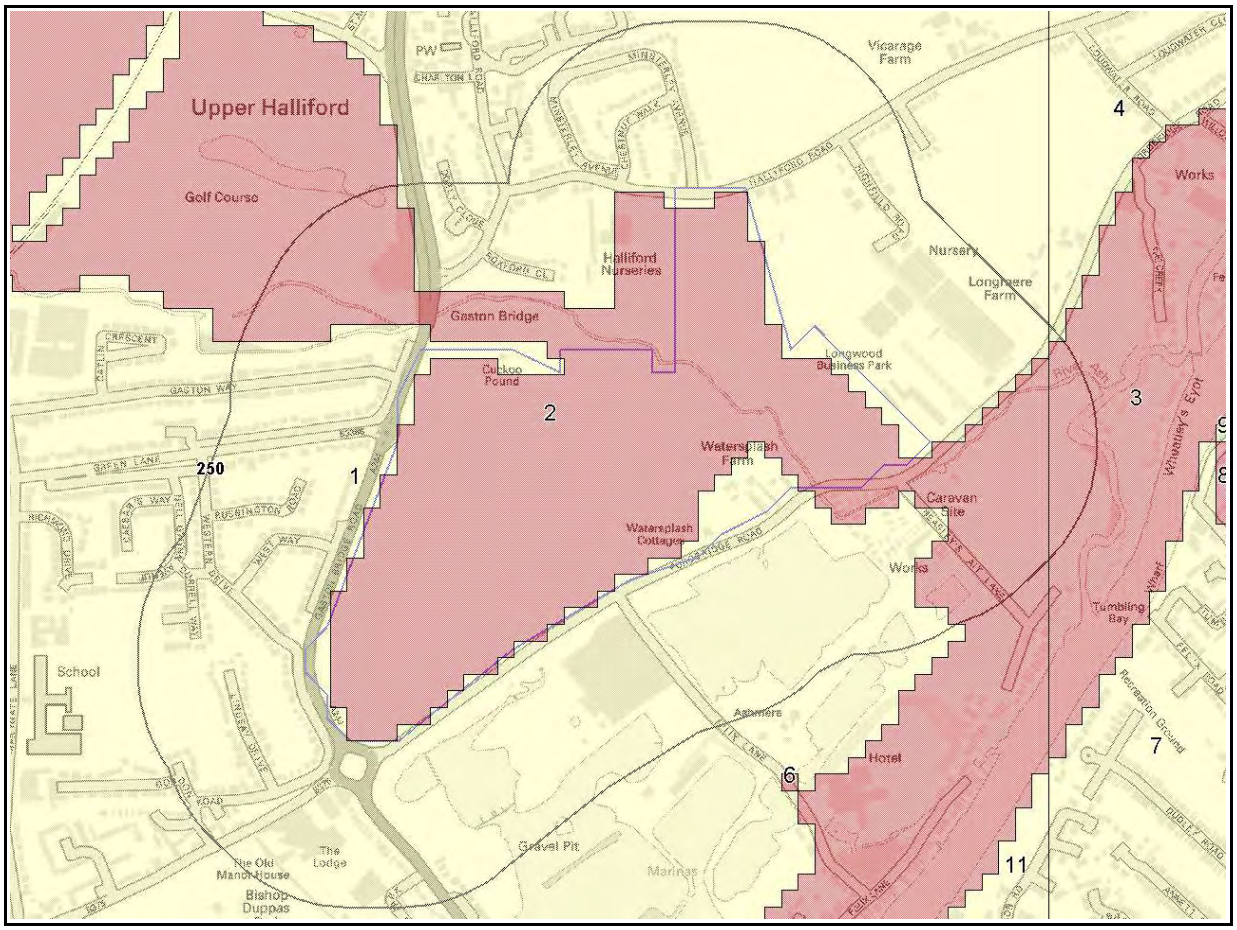
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.4 Compressible Deposits Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Compressible Deposits Legend

Site Outline

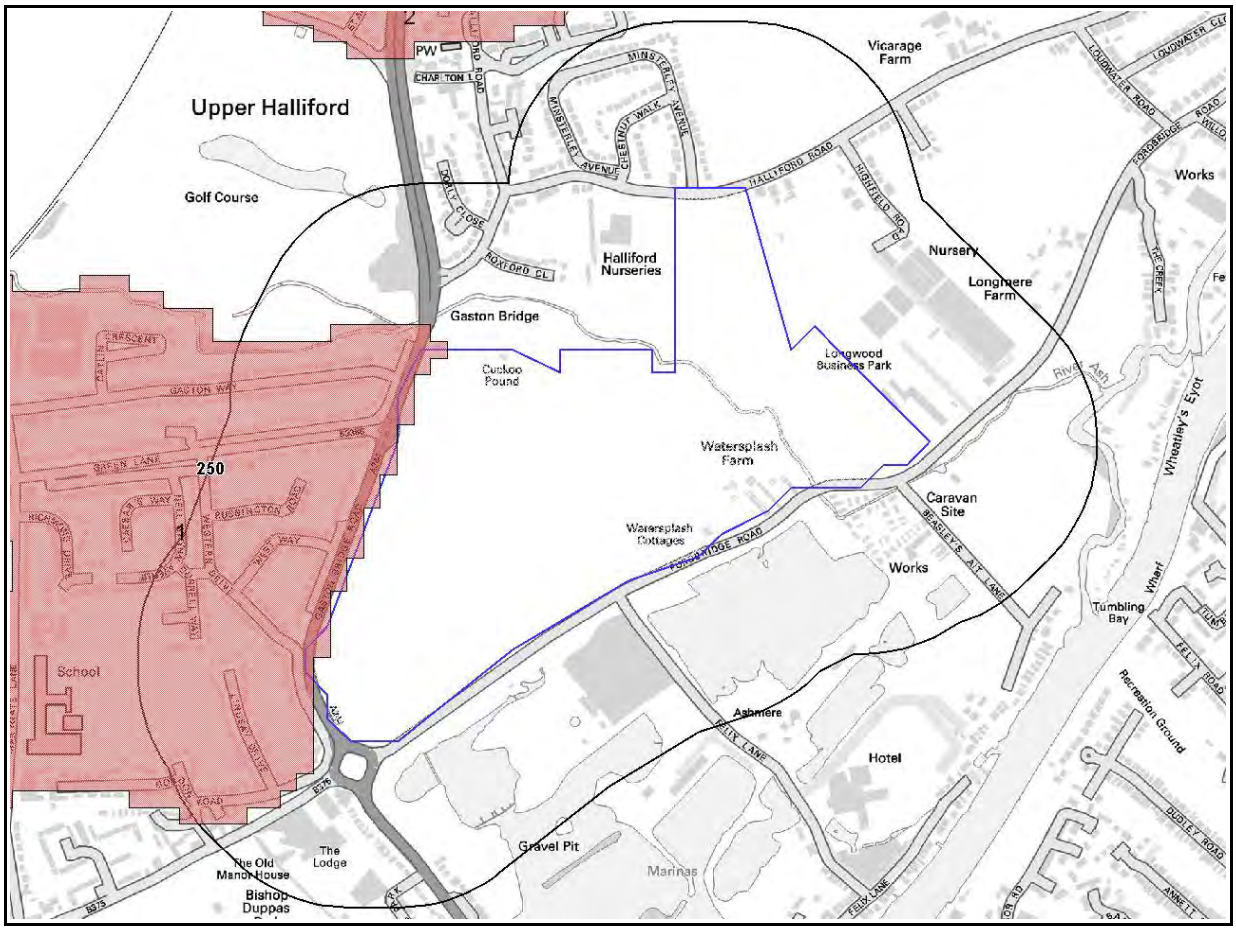
125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.5 Collapsible Deposits Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Collapsible Deposits Legend

Site Outline

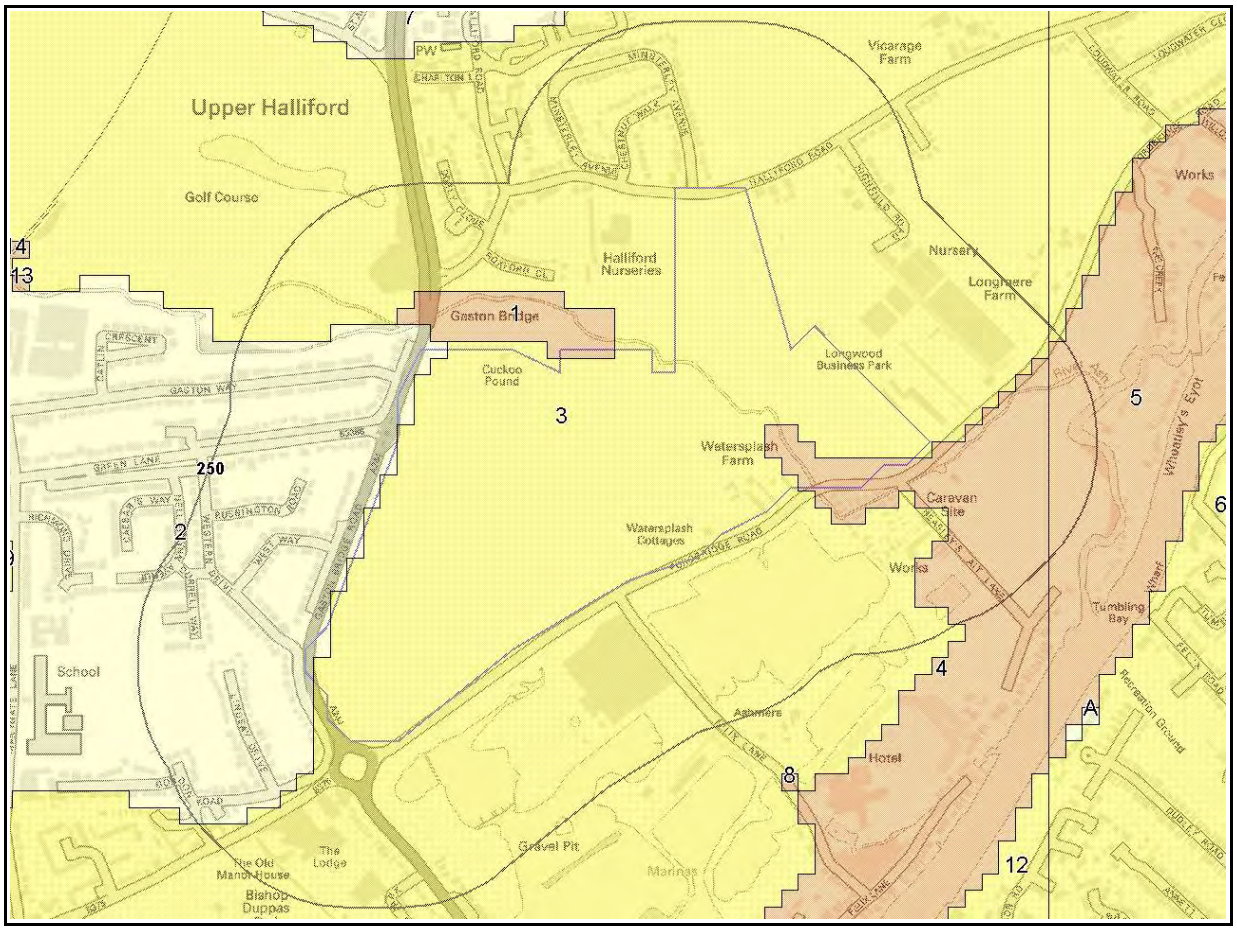
No Data / Null

125
250
Search Buffers (m)

Significant

4.6 Running Sand Map

NW N NE



W E

SW S SE

Running Sand Legend

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4. Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS)
The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? **Moderate**

*This includes an automatically generated 50m buffer zone around the study site boundary.

4.1 Shrink – Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
3	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

4.3 Ground Dissolution of Soluble Rocks

The following Soluble Rocks information provided by the British Geological Survey:

Distance (m)*	Direction	Hazard Rating	Details
0	On site	Null-Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

4.4 Compressible Deposits

The following Compressible Ground information provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

2	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build – consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property –possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

4.5 Collapsible Deposits

The following Collapsible Rocks information is provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Significant potential for collapsible deposit problems with changes in loading or groundwater conditions. Avoid large amounts of water entering the ground, for instance through pipe leakage or soak-aways. Do not increase loading on existing foundations without technical advice. For new build – consider the possibility of collapsible deposits in ground investigation, design, construction and maintenance. For existing property – possible increase in insurance risk if collapsible deposits are present and if the loading or water conditions are changed, for instance by construction or flooding.

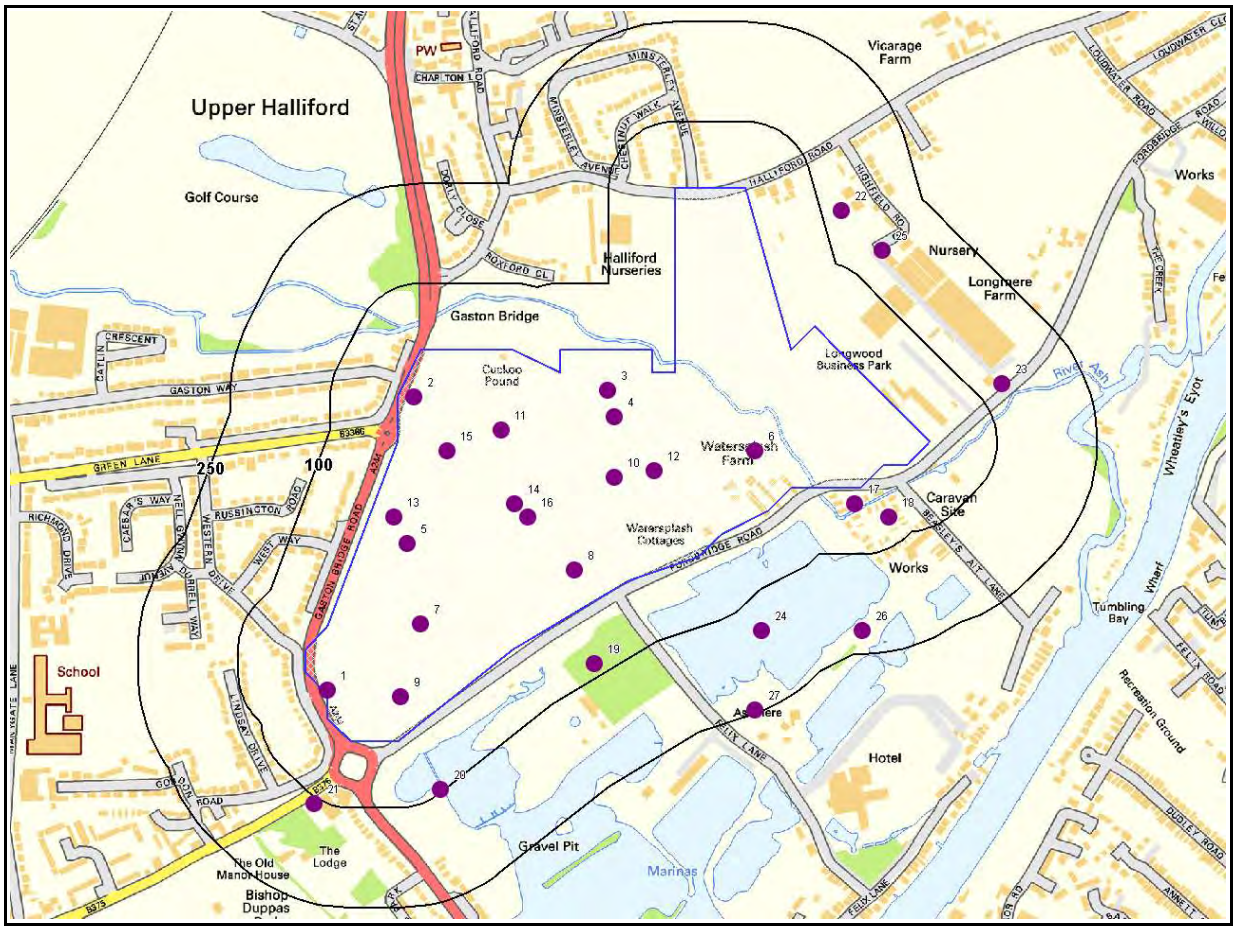
4.6 Running Sands

The following Running Sands information is provided by the British Geological Survey:

ID	Distance (m)*	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build – consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property – no significant increase in insurance risk due to running sand problems is likely.
2	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
4	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build – consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property – no significant increase in insurance risk due to running sand problems is likely.

5. Borehole Records Map

NW ▲ N NE



◄W E►

SW ▼ S SE

Borehole Records Legend

Site Outline

Borehole Locations

125
250
Search Buffers (m)

5. Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: **27**

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length (m)	Borehole Name
1	0.0	On Site	508920,0167200	TQ06NE247	6.4	Watersplash Fm Shepperton B
2	0.0	On Site	509050,0167640	TQ06NE246	4.57	Watersplash Fm Shepperton A
3	0.0	On Site	509340,0167650	TQ06NE242	5.79	Watersplash Fm Shepperton 3
4	0.0	On Site	509350,0167610	TQ06NE206	6.1	Watersplash Fm 3
5	0.0	On Site	509040,0167420	TQ06NE204	4.57	Watersplash Fm 5
6	0.0	On Site	509560,0167560	TQ06NE249	4.14	Watersplash Fm Shepperton D
7	0.0	On Site	509060,0167300	TQ06NE205	7.32	Watersplash Fm 6
8	0.0	On Site	509290,0167380	TQ06NE248	5.48	Watersplash Fm Shepperton C
9	0.0	On Site	509030,0167190	TQ06NE245	6.88	Watersplash Fm Shepperton 6
10	0.0	On Site	509350,0167520	TQ06NE241	6.27	Watersplash Fm Shepperton 2
11	0.0	On Site	509180,0167590	TQ06NE243	4.14	Watersplash Fm Shepperton 4
12	0.0	On Site	509410,0167530	TQ06NE203	6.71	Watersplash Fm 2
13	0.0	On Site	509020,0167460	TQ06NE244	4.26	Watersplash Fm Shepperton 5
14	0.0	On Site	509200,0167480	TQ06NE202	6.71	Watersplash Fm 1
15	0.0	On Site	509100,0167560	TQ06NE207	4.57	Watersplash Fm 4
16	0.0	On Site	509220,0167460	TQ06NE240	6.49	Watersplash Fm Shepperton 1
17	25.0	S	509710,0167480	TQ06NE463	2.44	Fordbridge Road, Shepperton
18	61.0	SE	509760,0167460	TQ06NE464	6.1	Fordbridge Road, Shepperton
19	81.0	SE	509320,0167240	TQ06NE482	8.38	Thames Sand & Ballast, Shepperton
20	98.0	SE	509090,0167050	TQ06NE483	8.23	Thames Sand & Ballast, Shepperton
21	110.0	SW	508900,0167030	TQ06NE175	7.5	Shepperton 1
22	129.0	E	509690,0167920	TQ06NE467	6.1	Highfield Nurseries Ltd
23	137.0	NE	509930,0167660	TQ06NE465	3.28	Highfield Nurseries Ltd
24	145.0	SE	509570,0167290	TQ06NE480	6.71	Thames Sand & Ballast, Shepperton
25	151.0	NE	509750,0167860	TQ06NE466	3.81	Highfield Nurseries Ltd
26	215.0	S	509720,0167290	TQ06NE479	7.01	Thames Sand & Ballast, Shepperton
27	246.0	S	509560,0167170	TQ06NE481	8.08	Thames Sand & Ballast, Shepperton

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pba

Acknowledgements

GroundSure Limited – Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

"Beneficiary" means the Customer or the client of the Customer for whom the Customer has procured the Services.

"Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, site investigation, site monitoring and related items.

"Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.

"Contract" means the contract between GroundSure and the Customer for the performance of the Services which shall incorporate these conditions, the relevant GroundSure user guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with condition 12.

"Customer" means the party that submits an Order or commissions GroundSure further to a written proposal for environmental consultancy services.

"Data Provider" means any third party providing Content to GroundSure.

"Data Report" means reports comprising factual data with no professional interpretation in respect of the level of likely risk and/or liability available from GroundSure.

"GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.

"Intellectual Property" means any patent, copyright, registered design rights, service marks, moral rights, data protection rights, know-how, trade mark or other intellectual property rights.

"Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure;

"Order" means an order form submitted by or for the Beneficiary requiring Services from GroundSure in respect of a specified site.

"Report" means a Risk Screening or Data Report for commercial or residential property available from GroundSure relating to a site identified in the Order prepared in accordance with the specifications set out in the relevant user guide.

"Risk Screening" means one of GroundSure's risk screening reports such as GroundSure Homebuyers; GroundSure Home Environmental GroundSure SiteGuard, GroundSure Screening, GroundSure Review, GroundSure Developer Review, or any other risk screening report available from GroundSure.

"Services" means the provision of any Report, Mapping and Consultancy Services which GroundSure has agreed to carry out for the Customer/Beneficiary on these terms and conditions in respect of a site detailed in the Order.

2Scope of Services

2.1GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.

2.2GroundSure shall exercise all reasonable skill, care and diligence in the performance of the Services.

2.3The Customer acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.

2.4Terms and conditions appearing on a Customer's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives shall be of no effect and these terms and conditions shall prevail over all others.

2.5In the event that a Customer/Beneficiary opts to take out insurance in conjunction with or as a result of the Services, such insurance shall be subject solely to the terms of any policy issued to it in that respect and GroundSure will have no liability therefore.

3The Customer's obligations

3.1The Customer shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.

3.2The Customer shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the site known to the Customer/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a site, facilities and equipment as agreed in the Contract).

3.3Where Customer/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.

3.4The Customer shall not and shall procure that the Beneficiary shall not, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping,or in respect of any service or information given by GroundSure. For the avoidance of doubt, the Customer and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party, but such third party cannot rely on the same unless expressly permitted under condition 4.

3.5The Customer is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.

4Reliance

4.1Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Customer and Beneficiary are granted an irrevocable royalty-free licence to use the information contained in the Report, Mapping or in a report prepared by GroundSure in respect of or arising out of the Consultancy Services. The Services may only be used for the benefit of the Customer and those persons listed in conditions 4.2 and 4.3.

4.2 In relation to Data Reports, Mapping and Risk Screening, reliance shall be limited to the Customer, Beneficiary and subsequent first purchaser or first tenant of the site including the professional advisers and lenders of each. For the avoidance of doubt, such persons shall include any entity necessary under the Housing Act 2004 or as legally required because of the Home Information Pack.

4.3 In relation to Consultancy Services, reliance shall be limited to the Customer, Beneficiary and named parties on the GroundSure proposal and subsequent report.

4.4 No party referred to in conditions 4.2 and 4.3 shall assign any rights or obligations under these terms and conditions without the prior written consent of GroundSure. GroundSure reserves the right to charge an assignment fee which will be no higher than 15% of the original fee or £250 whichever is the highest. GroundSure may assign its rights and obligations under these terms.

4.5Save as set out in conditions 4.2 and 4.3, unless otherwise agreed in writing with GroundSure, any other party considering the information within a Report, Mapping or proposal and subsequent report in respect of Consultancy Services, including insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.

4.6The Customer shall not and shall procure that any person (including the Beneficiary) who is provided with a copy of any Report shall not: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping save to the extent that the Customer is adding its assessment to the Report or Mapping solely for the purposes of providing its services to the Beneficiary.

4.7Without prejudice to any other right or remedy available to GroundSure including without limitation any claim for infringement of copyright, breach of confidence or contract or otherwise howsoever arising if the Customer or a person to whom a Report or Mapping is provided, breaches any of the provisions of this condition 4, the Customer shall fully and effectually indemnify GroundSure and hold it harmless against any claim by any third party who may claim to have sustained injury loss or damage by reason of their reliance upon any report or document which GroundSure may have prepared for the Customer or upon the contents thereof.

5Fees and Disbursements

5.1GroundSure shall charge the Customer fees at the rate and frequency specified in the Contract together with all proper disbursements made in performing the Services. The Customer shall in addition pay all value added tax or other tax payable on such fees and disbursements in the country concerned in relation to the provision of the Services.

5.2Unless GroundSure requires prepayment, the Customer shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such Value Added Tax or equivalent local tax as may be required within 30 days from the date of GroundSure's invoice. GroundSure reserves the right to charge interest which shall accrue on a daily basis from the date of invoice until the date of payment (whether before or after judgment) at the rate of two per cent per month.

5.3In the event that the Customer disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Customer shall be deemed to have agreed the amount thereof which shall thereupon be due and payable. As soon as reasonably practicable following receipt of any disputed invoice, a member of the management team at GroundSure shall contact the Customer and the parties shall use all reasonable endeavours to resolve the dispute.

6 Intellectual Property

6.1Unless expressly agreed in writing to the contrary GroundSure and its Data Providers (where relevant) retain all Intellectual Property rights and proprietary rights in all information, Content and data reproduced in a Report or as part of the Consultancy Services.

6.2Data Providers may enforce any breach of condition 6.1 against the Customer or Beneficiary.

7 Liability

7.1GroundSure shall not be liable to pay compensation to the Customer or any person to whom the Customer provides a copy of the Report, Mapping or results of the Consultancy Services in any circumstances whatsoever unless arising out of a breach on its part of the obligations set out in the Contract.

7.2GroundSure shall not be liable if the Services are used otherwise than as provided or referred to in these conditions

7.3Where any person is engaged whether by the Customer or by GroundSure on the Customer or Beneficiary's behalf in the performance of the Services or any part thereof GroundSure shall not be liable for acts of negligence, default or omission by such person.

7.4GroundSure makes no representation, warranties, express or implied, as to the accuracy, reliability, completeness, validity or fitness for purpose of the Content shall not be liable for any omission, error or inaccuracy in relation thereto.

7.5GroundSure shall not be liable for any inaccurate statement or risk rating in a Report which resulted from a reasonable interpretation of the Content.

7.6GroundSure shall not be liable for any indirect losses, loss of profit nor consequential loss caused by the suspension or reduction of activity on the site.

7.7 Notwithstanding anything to the contrary contained elsewhere in the Contract, and irrespective of whether multiple parties make use of the same Services, the total liability of GroundSure under or in connection with the Contract, whether in contract in tort for breach of statutory duty or otherwise shall not exceed the amount of GroundSure's insurance as provided for below.

7.8GroundSure shall maintain professional indemnity insurance in respect of its liabilities in respect of the Services (provided it is available at reasonable commercial rates) giving cover of not less than £5 million in the aggregate which amount shall first include the whole of any sum payable for death or personal injury. GroundSure shall produce evidence of such insurance if requested by the Customer. A greater level of cover may be available upon request and agreement with the Customer.

7.9The Customer shall be liable to indemnify GroundSure where any loss arises as a result of any breach on the part of the Customer of its obligations under these terms and conditions.

7.10GroundSure's liability under the Contract shall cease upon the expiry of six years from the date when the Customer/Beneficiary became aware that it may have a claim against GroundSure in respect of the Services provided always that there shall be no liability at the expiration of twelve years from the completion of the Contract.

7.11Whilst GroundSure will use all reasonable endeavours to maintain operability of its internet ordering service it will not be liable for any loss or damages caused by a delay or loss of use of such service. The Customer shall use GroundSure's internet ordering service at its own risk. GroundSure shall not be responsible for any damage to a Customer or permitted assignee's computer, software, modem, telephone or other property resulting from the use of GroundSure's internet ordering service.

7.12The Customer accepts, and shall procure that anyone who is provided with a copy of the Report accepts, that it has no claim or recourse to any Data Provider or to GroundSure in respect of the acts or omissions of such Data Providers including Content supplied by them.

7.13Nothing in these terms and conditions shall limit GroundSure's liability for causing death or personal injury through negligence or wilful default.

7.14GroundSure accepts no liability for use of any residential Reports or any data or information contained therein for development or other commercial property purposes in respect of which a commercial Report should have been obtained.

8 Remediation

8.1 For the purpose of this condition 8, 'Claimant' shall mean one of: (a) the Beneficiary, (b) the purchaser of the site from the Beneficiary or (c) the funder of (a) or (b) as applicable.

8.2 This condition 8 shall apply solely to GroundSure Homebuyers and GroundSure Home Environmental with passed rather than failed status.

8.3 GroundSure may, at its sole discretion without any admission of liability, make a contribution to the Claimant towards the costs of any clean up works required to be carried out under a notice served on a Claimant in respect of a site under Part II (A) Environmental protection Act 1990 ("Remediation Notice") on the terms of this condition 8 ("Clean up Award").

8.4 The Clean up Award:

(a) is only available once in respect of a site and to one Claimant only;(b) shall only apply where the site is a single residential dwelling house or a single residential flat within a block of flats. For the avoidance of doubt, a Clean up Award will not be considered in respect of commercial property or to any site being developed or redeveloped whether for residential purposes or otherwise; and (c) shall only apply to contamination or a pollution occurring as at or prior to the date of GroundSure Homebuyers.

8.5 The Clean up Award will not be paid in respect of any of the following, including without limitation:

(a) asbestos; (b) radioactive contamination arising directly or indirectly from or in connection with ionising radiations or contamination by radioactivity from any nuclear waste or fuel; from the combustion of nuclear fuel or the radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof; (c) naturally occurring materials or their removal except where such materials are present in excess of their natural concentration; (d) any condition caused by acts of war or an act of terrorism;(e) any condition which is known or ought reasonably to have been known to the Claimant prior to the purchase of GroundSure Homebuyers; (f) non-compliance by the Claimant or any other person with respect to the site with any statute, regulation, byelaws complaint, or notice from any regulatory authority; (g) any property belonging to or in the custody or control of the Claimant which does not form a fixed part of the site or the structure; (h)any losses incurred following a material change in use of, alteration or development of the site; or (i) financial loss in respect of loss of rental, profit, revenue, savings, business or any consequential, indirect or economic loss, damages or expenses, including the cost of temporary accommodation or business interruption.

8.6 In the event the Claimant wishes to apply for a Clean up Award, it shall notify GroundSure in writing within 3 months of the date of the Remediation Notice. The Claimant shall comply with all reasonable requirements of GroundSure with regard to the commission and conduct of the clean up works to be carried out under the Remediation Notice. In the event that the Claimant breaches this provision including, without limitation, failing to obtain GroundSure's prior written consent in respect of estimates for such works GroundSure shall not be required to pay a Clean up Award.

8.7 GroundSure shall only pay a Clean up Award where a Remediation Notice is served within 36 months of the date of GroundSure Homebuyers.

8.8 The maximum sum of any Clean up Award shall be £60,000 and shall be paid subject to the Claimant having paid to GroundSure an excess in respect of its claim of £5,000.

8.9 GroundSure reserves the right at any time to withdraw the offer of payment of a Clean up Award.

8.10 The Claimant shall take all reasonable steps to appeal such Remediation Notice and mitigate any costs incurred in connection with the remediation works required under the terms of any Remediation Notice. GroundSure reserves the right to withhold or reduce the amount of its Clean up Award in the event of a breach of this condition or an appeal is still active.

9 GroundSure right to suspend or terminate

9.1In the event that GroundSure reasonably believes that the Customer or Beneficiary as applicable has not provided the information or assistance required to enable the proper performance of the Services, GroundSure shall be entitled on fourteen days written notice to suspend all further performance of the Services until such time as any such deficiency has been made good.

9.2 GroundSure may additionally terminate the Contract immediately on written notice in the event that:

(i)the Customer shall fail to pay any sum due to GroundSure within 28 days of the due date for payment; or (ii) the Customer (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an Administration Order made against it or if a Receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Customer is struck off the Register of Companies or dissolved; or(iii) the Customer being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Customer shall enter into a composition or arrangement with the Customer's creditors or shall suffer distress or execution to be levied on his goods; or (iv)the Customer breaches any material term of the Contract (including, but not limited to, the obligations in condition 4) incapable of remedy then and in any such case GroundSure shall be entitled to a fair and reasonable amount on account of the fees due commensurate with the services performed to the date of such termination and any outstanding expenses or other disbursements that it may have incurred in respect of the Contract including without limitation equipment hire costs for the remainder of any lease, storage costs, transportation costs, labour costs or sub-contractor fees.

10 Customer's Right to Terminate and Suspend

10.1Subject to condition 11.2, the Customer may at any time after commencement of the Services by notice in writing to GroundSure require GroundSure to terminate or suspend immediately performance of all or any of the Services.

10.2 The Customer waives all and any right of cancellation it may have under the Consumer Protection (Distance Selling) Regulations 2000 (as amended) in respect of the Order of a Report/Mapping.

11 Consequences of Withdrawal, Termination or Suspension

11.1 Upon termination or any suspension of the Services, GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any site with all reasonable speed and shall deliver to the Customer/Beneficiary any property of the Customer/Beneficiary in GroundSure's possession or control.

11.2 The Customer shall pay to GroundSure all and any fees as are due in respect of the Services performed up to or in respect of such termination or suspension.

12General

12.1GroundSure and the Customer agree not to rescind or vary these terms and conditions to Ordnance Survey's or its successor's detriment without obtaining Ordnance Survey's or its successor's prior written consent.

12.2Subject to condition 12.1, GroundSure reserves the right to amend these terms and conditions. No variation to these terms shall be valid unless signed by GroundSure or made in accordance with condition 12.1.

12.3No failure on the part of GroundSure to exercise and no delay in exercising, any right, power or provision under these terms and conditions shall operate as a waiver thereof.

12.4 Save as expressly provided in conditions 6.2 and 12.5, no person other than the Customer, Beneficiary and GroundSure shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of these terms and conditions.

12.5 The Secretary of State for Communities and Local Government acting through Ordnance Survey, may enforce breach of conditions 6.1 or 12.1 of these terms and conditions against the Customer in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.6 GroundSure shall not be liable to the Customer if the provision of the Services is delayed or prevented by any circumstance which is beyond GroundSure's reasonable control including without limitation one or more of the following circumstances:

(i) the Customer or Beneficiary's failure to provide facilities, access or information; (ii)fire, storm, flood, tempest or epidemic; (iii)process shutdown; (iv) Acts of God or the public enemy; (v)riot, civil commotion or war; (vi)strikes, labour disputes or industrial action; (vii) acts or regulations of any governmental or other agency; (viii)suspension or delay of services at public registries by Data Providers; or (ix) changes in law.

12.7Any notice provided for shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.8Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email and on the second working day after the day of posting if sent by first class post.

12.9The Contract constitutes the entire contract between the parties and shall supersede all previous arrangements between the parties.

12.10Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.11 These terms and conditions shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with these terms and conditions shall be subject to the exclusive jurisdiction of the English courts.

12.12These terms and conditions were produced on 28 May 2008.

Watersplash Farm

Environmental Permit Application

Environmental Setting and Site Design

September 2017

Prepared on behalf of CEMEX UK Materials Limited

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Contents

Drawings

Appendices

Appendix F - Flowchart for the selection of suitable material for the construction of a geological barrier

1.0 Introduction

1.1 Report Context

1.1.1 This section of the Environmental Permit application corresponds to Question 1, Appendix 4 of Part B4 of the application forms, which requires the provision of an Environmental Setting and Site Design (ESSD) report.

1.1.2 The aim of this report is to describe the regulated facility in relation to the environmental setting, identifying the source terms, pathways and receptors that will be used as the basis for the risk assessments, including;

- Hydrogeological Risk Assessment (HRA);
- Landfill Gas Screen Report; and
- Environmental Risk Assessment (ERA).

1.1.3 These risk assessments will include more specific conceptual models.

1.1.4 This Environmental Permit application has been prepared on behalf of the operator, CEMEX UK Materials Limited (CEMEX) by WYG and ESI.

1.2 Regulated Facility Details

Site Location

1.2.1 The application site is located approximately 1.2km north east from Shepperton in Surrey and is centred on approximate National Grid Reference (NGR) TQ 09303 67529. The application site is detailed in Drawing Number CEM/A104530/LOC/01.

1.2.2 Access to the site is achieved from an access road off Fordbridge Road, located to the south of the site.

Landfill Classification

1.2.3 The regulated facility is an inert landfill.

Application Boundary and Site Security

1.2.4 The proposed application boundary is shown on Drawing Number CEM/A104530/LOC/01. The western boundary is formed by the Gaston Bridge Road (A244), the south by the Fordbridge Road (B375) and the north east by Halliford Road. Strips of vegetation are situated along the west and eastern boundaries and the River Ash runs through the site from the north west to the south east. These features will act as a barrier to prevent unauthorised access to the site.

1.2.5 Access to the proposed development will be achieved via a new access road that will be constructed to the west of the site off Gaston Bridge Road, as proposed under planning application reference SP12/01487 to Surrey County Council.

1.2.6 The site will be secure from public access by lockable gates at the site entrance. Security lights and CCTV cameras will also be installed.

Former Waste Management Activity Boundaries

1.2.7 With reference to the EA's mapping website 'What's in my backyard', there have been two historic landfill sites that are located adjacent to the site.

1.2.8 The Fordbridge Road Landfill site is located to the south west of the site. There is no record of the site operator however, the site first received waste in July 1976 and last received waste in February 1993.

1.2.9 The Upper Halliford Golf Course is located to the north west of the site adjacent to the Upper Halliford Bypass. There is no record of the site operator or when waste was first and last received on site.

1.2.10 As detailed within the Hydrogeological Risk Assessment, a key consideration in the design of the facility and the mineral extraction activities is the location of these former landfill sites in addition to other potential sources of historic contamination in the vicinity of the site. Through the preparation of the Hydrogeological Risk Assessment, it is considered that dewatering of the site in order to construct a geological barrier is not feasible as this has the potential to draw contamination into the site from the wider area. This is explained further within the HRA.

Site Context

1.2.11 The site is divided in two by the River Ash which enters the site at the north west under the Upper Halliford Bypass and runs in a south-east direction towards Fordbridge Road. The river then joins the River Thames which is located approximately 400m south at its closest point.

1.2.12 The western boundary is formed by the Gaston Bridge Road (A244), the south by the Fordbridge Road (B375) and the north east by Halliford Road. To the south of the site beyond Forbridge Road is a marina, fishing lake and swan sanctuary.

1.2.13 Residential properties are located to the west, north and south east of the site and the nearest residential property is a detached residential property know as Cuckoo Pound. The property is located along the northern boundary of the western half of the site. Commercial units are located to the south east of the eastern half of the site.

Compliance with Environment Agency Position Statement on Location of Landfills

1.2.14 With reference to the EA's mapping website 'What's in my backyard', the site is not situated within a Groundwater Source Protection Zone (GSPZ). As such, in accordance with the EA's approach to groundwater protection guidance (published March 2017), the site is considered to meet the requirements of the landfill location criteria subject to planning considerations.

1.2.15 The Environmental Risk Assessment also demonstrates that long-term site management will not be required due to the environmental protection measures and waste acceptance procedures protocols proposed for the development.

2.0 Source Term Characterisation

2.1 Development of the Installation

Historical Development

2.1.1 With reference to historic maps dated from the 1860s to present, the site has largely comprised open agricultural land. In 1970, the farm was purchased by the operator's predecessors RMC and it has been leased to tenant farmers ever since.

2.1.2 With regards to planning applications, two applications were submitted in 1958 and 1962 to undertake mineral extraction in the western part of the application site. Both applications were refused and in both cases, subsequent appeals were unsuccessful.

2.1.3 In 2011, the site was allocated as a Preferred Area for concreting aggregates in the Primary Aggregates Development Plan Document that forms part of the Surrey County Council's Minerals Local Plan. Within the Primary Aggregates Development Plan, the development requirements for the site provide that the site must be restored back to existing levels for agricultural use and provide enhancements to the River Ash corridor.

2.1.4 In September 2012, a planning application (reference SP12/01487) was submitted to Surrey County Council to allow the extraction of minerals at the site. Following mineral extraction, the application proposes to restore the site back to original levels for agricultural purposes as required in the Primary Aggregates Development Plan.

Proposed Development

2.1.5 The proposal development entails the importation of inert waste for infilling of the quarry void that will be created following mineral extraction activities. Works will be completed in accordance with the final ground contours and restoration scheme (Drawing Number P3/648/9) that was provided in the aforementioned planning application.

Waste Types and Quantities

2.1.6 It is proposed that Watersplash Farm will accept only inert waste.

2.1.7 Permitted wastes accepted at the site will be strictly inert as classified under the Landfill Directive (1999/31/EC) and Council Decision (2003/33/EC) of 19 December 2002 'establishing criteria and procedures for the acceptance of waste landfills'.

2.1.8 Details regarding the proposed waste types including restrictions are provided in the Operating Techniques (Appendix B of the Environmental Permit Application).

2.1.9 The restoration of the site will require approximately 680,000m^3 of inert material.

Proposed Operational Phasing

2.1.10 The proposed phasing plan is detailed in Drawing Numbers P3/648/8a-h. As detailed in the phasing plan, the site will comprise four working phases. Mineral will be extracted from all four phases however, infilling using imported waste will only take place in Phases 2, 3 and 4. Phase 1 will be restored with the use of silt from the mineral washing process and on- site overburden and soils.

2.1.11 Mineral extraction will commence in Phase 1A located to the south east of the site where four lagoons will be constructed; two for freshwater and two for the settlement of silt following the washing and screening of material.

2.1.12 Following the completion of Phase 1, extraction will proceed in Phase 2, located to the south west of the site and will progress north east in to Phase 3. As shown on Drawing Number P3/648/8e, Phase 3 will be divided in two by the new access road and as such extraction and restoration of Phase 3 will be undertaken in two phases as described below.

2.1.13 Mineral extraction activities will commence in the southern section of Phase 3. At the same time, the construction of the side wall geological barrier will commence in Phase 2 as shown in Appendix A. Once the geological barrier is constructed in Phase 2 infilling and subsequent restoration will commence in Phase 2. Drawing Number P3/648/8e shows the proposed sequence of the scheme in this area whereby the mineral is extracted and the geological barrier is constructed in the preceding phase, followed by restoration with inert fill.

2.1.14 Once restoration in the southern end of Phase 3 is complete, a similar sequence of extraction and restoration will commence in the northern section of Phase 3. Operations will commence to the west and will progress eastwards as shown on Drawing Number P3/648/8g.

2.1.15 Once the mineral has been worked on both sides of the proposed access road, the only mineral remaining will be that underlying the processing plant located in Phase 4 and the access road. At this stage, the processing plant that will be situated in Phase 4 will be taken off site to allow mineral extraction and subsequent restoration to commence. Extraction and restoration in Phase 4 will start at the east and will progress west as shown on Drawing Number P3/648/8h.

Final Landform and After Use

2.1.16 The restoration landform for the site is detailed in Drawing Number P3/648/9 which proposes to reinstate a substantial area of agricultural land to original ground levels, and to create an area of lower level wetland which will comprise wet woodland, reedbed and aquatic margins around the former silt ponds.

3.0 Pathway and Receptor

3.1 Climate

Rainfall

3.1.1 Long term average rainfall data (1971 to 2000) was obtained from MORECS and is presented in Table 1.

Table 1: Long term average hydrometric data for MORECS Square 161

Month	Average rainfall (mm)	Average PE (mm)	Average HER (mm)
Jan	54.80	19.49	22.92
Feb	35.46	22.88	13.24
Mar	42.86	42.85	7.83
Apr	45.46	65.34	6.41
May	52.56	97.11	2.55
Jun	54.66	100.99	1.70
Jul	42.29	110.03	0.00
Aug	48.53	96.55	0.00
Sep	55.95	64.49	0.00
Oct	67.22	41.69	4.23
Nov	55.38	24.01	12.25
Dec	58.33	18.39	14.10
Yearly total	613.49	703.82	85.23

PE = Potential Evapotranspiration; HER = Hydrologically Effective Rainfall

3.1.2 The MORECS data shows the long-term average rainfall to be 613 mm per year and the long-term average potential evapotranspiration to be 704 mm per year.

3.1.3 Effective precipitation was estimated from Centre of Ecology and Hydrology (CEH 2007) using catchment area and mean flow data from three gauging stations:

- On the Thames at Walton adjacent to the site to the west
- On the River Wey at Weybridge about 3km to the south west of the site
- On the Thames at Staines about 7km to the north west of the Application Area

3.1.4 Effective precipitation estimates are shown in Table 2.

Table 2: Estimated effective precipitation

Flow gauge location	Catchment area at flow gauge (km^2)	Mean flow at gauge (m^3/s)	Estimated effective precipitation (mm/a)
Thames at Walton	9,292	52.78	179.1
River Wey at Weybridge	1,008	6.93	216.8
Thames at Staines	8,120	52.48	203.8

3.1.5 The estimated average effective precipitation ranges from 179 to 217 mm/y. However, this only provides an approximation of the recharge rate as the calculation of effective precipitation assumes that there is no net anthropogenic influence on the flows.

3.1.6 Environment Agency (2004) reports that the Thames region receives an average rainfall of 690 mm/a and an average effective rainfall of 250 mm/a.

3.1.7 The reason for the much lower MORECS effective precipitation value of 85.23 mm/a compared with the values derived from CEH (2007) and Environment Agency (2004) is unclear.

Wind

3.1.8 The prevailing wind is from the south-west and a wind rose from the nearest weather station, Heathrow (10km to the north) is presented in Appendix B.

3.2 Geology

Regional Geology

3.2.1 The geology of the site and its surrounding area is shown in the 1:50,000 scale geological maps 269 and 270 (BGS, 1998 and BGS, 1999) as presented on Drawing Number DESID 9. A geological report was also obtained from Centremaps (Appendix C). A summary of the geology as taken from these sources is summarised in Table 3.

Table 3 Regional geology

Stratigraphy	Unit	Lithology	Estimated thickness
Quaternary	Alluvium	Mainly sand, silty and clay	
Pleistocene and Holocene River Terrace Deposits	River Terrace Deposits	Sands and Gravels	0 to 10 m
Eocene Thames Group	Bagshot Formation	Fine to medium sand	20 to 42 m

	Claygate Beds	Silty and clayey sand	0 to 10 m
	London Clay	Brown to dark grey clay with fine grained sands and pebbles beds in places	87 to 111 m
Lambeth Group	Harwich Fm, Reading Fm and Upnor Fm	Clay, mottled in part with beds of sand and shelly clay.	30 m
	Thanet Sand Formation	Sand fine grained	15 m
Upper Cretaceous Chalk	Upper Chalk	Chalk, white, with flints; nodular chalk at base.	200 m

3.2.2 The geological maps show that the site is underlain by substantial London Clay deposits, above the Lambeth Group. The Upper Chalk underlies the Thanet Sand formation, which is stratigraphically separated from it by an unconformity. The site is located near the top of the London Clay and a large thickness (up to 111m) of London Clay can be interpreted to be present below the site. The London Clay is described as a brown to dark grey clay with fine-grained sands and pebble beds in places (BGS, 1999).

3.2.3 The younger Claygate Member (fine-grained silty and clayey sand) and Bagshot Formation (fine to medium grained sands with thinly laminated clays and silts in places) are found beneath the superficial deposits to the south and west.

3.2.4 The River Terrace Deposits below the site belong to the Shepperton Gravel Member (first terrace). The Kempton Park Gravels (second terrace), Taplow Gravels (third terrace) and the Langley Silt Member are also present close to the site as shown on Drawing Number DESID 9.

3.2.5 Alluvium (sand, silt and clay associated with the River Ash and River Thames) is also present adjacent to the rivers.

3.2.6 It is also noted that the proposed Watersplash Farm quarry area is shown on the BGS geological map and Centremaps data to be in an area of "infilled ground".

Local Geology - Site Investigations

3.2.7 Local geological information is available from a mineral reserve estimate carried out for the site (RMC Aggregates (UK) Ltd., 2000).

3.2.8 A total of 25 mineral assessment boreholes (BH1/00 to BH25/00) were drilled and a further seven groundwater monitoring points (WM1 to WM7) were installed. Borehole locations are shown on Drawing Number DESID 11. Borehole logs are shown in Appendix D. Borehole logs and a summary of borehole details, drawn from RMC (2000), are presented in

3.2.9 Table 4.

Table 4: Borehole summary

Borehole	Elevation (mAOD)	Hole Depth (m)	Easting	Northing	Overburden thickness (m)	Mineral thickness (m)	London Clay surface (mAOD)
WM 1	10.87	5	509573	167827	0.52	4.08	6.28
WM 2	10.74	6.5	509507	167510	1.82	4.03	4.90
WM 3	10.46	5.6	509343	167348	3.0	1.98	5.48
WM 4	10.71	5.5	508956	167139	0.7	4.6	5.41
WM 5	10.57	5.5	508968	167406	1.2	3.32	6.06
WM 6	10.05	5	509049	167628	0.48	3.97	5.60
WM 7	9.29	5	509472	167682	1.96	2.29	5.05
BH1/00	9.45	6	509579	167572	2.2	3.1	4.15
BH2/00	10.31	8	509472	167445	1.7	5.84	2.77
BH3/00	10.56	5.5	509253	167294	3.6	0.4	6.56
BH4/00	10.66	5.5	509142	167215	3.0	1.8	5.86
BH5/00	10.40	6	509030	167136	1.1	3.9	5.41
BH6/00	10.88	6	508921	167214	0.6	4.82	5.46
BH7/00	11.68	6	508933	167315	1.38	4.22	6.08
BH8/00	9.8	5	508990	167469	0.47	3.42	5.91
BH9/00	10.00	5.5	509020	167547	0.6	4.5	4.89
BH10/00	10.32	5	509079	167699	1.5	3.18	5.64
BH11/00	10.62	6	509194	167692	1.08	4.34	5.20
BH12/00	10.74	6.5	509229	167515	1.15	4.15	5.44
BH13/00	10.83	8.2	509308	167444	1.4	6.52	2.91
BH14/00	10.83	6	509217	167516	1.52	4.08	5.23

Borehole	Elevation (mAOD)	Hole Depth (m)	Easting	Northing	Overburden thickness (m)	Mineral thickness (m)	London Clay surface (mAOD)
BH15/00	10.42	6.5	509131	167488	1.11	4.79	4.51
BH16/00	10.25	5.5	509052	167459	1.0	3.35	5.90
BH17/00	9.83	5	509274	167689	0.2	4.6	5.03
BH18/00	10.81	10.5	509405	167439	1.6	8.22	0.99
BH19/00	9.40	4.5	509802	167590	0.8	2.96	5.63
BH20/00	10.25	4.3	509735	167657	0.98	2.82	6.45
BH21/00	10.47	4.5	509662	167733	1.1	2.9	6.47
BH22/00	8.9	4	509533	167657	2.0	1.3	5.60
BH23/00	10.26	6	509505	167745	3.0	2.38	4.88
BH24/00	11.22	5.15	509470	167827	0.42	4.23	6.57
BH25/00	9.56	8	509753	167523	1.4	6.1	2.06

3.2.10 The borehole logs generally show that the overburden comprises topsoil and sandy silt and clay with an average thickness of about 1.4 m. This is consistent with RMC (2000), which gives an average of 1.5m.

3.2.11 RMC (2000) reported that several of the boreholes exposed fill material consisting of mainly rubble and clay within the top 1m. The rubble may correspond with the "infilled ground" shown on the BGS geological map and Centremaps data at the site, or may have been placed by the farmer to prevent deterioration of the access roads.

3.2.12 The River Terrace Gravels consist of brown / orange fine to coarse sands with sub-rounded to sub-angular pebbles and cobbles predominantly composed of flint. Clay and silt lenses are also present with localised areas where clay material dominates.

3.2.13 RMC (2000) reports that the mineral thickness varies between 0.4m and 8.22m with an average thickness of 3.8m.

3.2.14 The River Terrace Gravels consistently rest on stiff grey / brown clay which is interpreted to be the London Clay.

3.3 Hydrology

Surface Water features

3.3.1 Local surface water features are shown on Drawing Number DESID 11.

3.3.2 The principal surface water feature in the area is the River Thames, which is located about 400m to the south of the site and flows to the east towards Central London.

3.3.3 The River Ash, a tributary of the Thames, runs through the site from the north west towards the south east where it joins the River Thames about 400m from the site.

3.3.4 Groundwater level information shows that groundwater flows towards the River Thames, and is likely to provide baseflow to the River Thames and the River Ash.

3.3.5 The area between the site and the River Thames consists of a marina and fisheries which were developed in the lakes formed by historical mineral workings. The marina is fed by the River Thames.

3.3.6 A large number of other open water bodies are located in the wider area, also principally in historical sand and gravel workings.

3.3.7 The Queen Elizabeth II Storage Reservoir, Knight Reservoir, Molesey Reservoirs and Bessborough Reservoir are all located about 1.4km to the south east of the site and the Queen Mary Reservoir is located about 1.5km to the north west. These reservoirs are believed not to be connected to the sand and gravel aquifer.

Surface Water Flow

3.3.8 CEH (2007) reports that the average flow in the River Thames upstream of the site at Staines is 52.48 m^3/s and at Walton downstream of the site is 52.78 m^3/s. This is consistent with data which was provided by the Environment Agency for flow at Walton.

3.3.9 CEMEX carried out spot flow gauging at two locations on the River Ash on 3 March 2009. The two locations were north of BH11/00 (upstream) and south of BH22/00 (downstream). (See Drawing Number DESID 11 for borehole locations.) Calculated stream flows were 562 l/s (upstream) and 882 l/s downstream – an augmentation of 57% between the locations.

Surface Water Abstractions

3.3.10 Surface water abstractions in the vicinity of the site include the following, which are shown in

on Drawing Number DESID 11.

- Two on-site abstractions from the River Ash for spray irrigation (Ref: 28/39/31/0010 and 28/39/31/0132).
- 18m to the south of the site from the River Thames (from the marina pool) (Ref: 28/39/31/0186).
- Three other abstractions from the River Thames between 500 and 1000m from the site.

Discharge Consents

3.3.11 There are three consented discharges to surface water within 500m of the site. Details are summarised in Table 5 and the locations are shown on Drawing Number DESID 11.

Table 5: Discharge consents within 500m of Watersplash Farm

Licence No.	National Grid Reference	Distance, direction	Location	Purpose	Receiving Water
CNTM.1688	509100, 167700	0m	On site	Mine/groundwater as raised	River Ash
TEMP.2170	508900, 167000	136m, SW	Walton Cross	Sewage discharge – pumping station	River Thames
CASM.0097	510180, 167620	360m, E	Wheatley's Eyot	Sewage discharge – final/ treated effluent	River Thames
CASM.0197	510180, 167620	360m, E	Wheatley's Eyot	Sewage discharge – final/ treated effluent	River Thames

Flood Risk

3.3.12 According to the maps provided by the Environment Agency, most of the site lies within an area of high flood risk Zone 2. The margins of the River Ash are classified as high risk Zone 3. A flood risk assessment was undertaken for the planning application and a summary of this can be found in ESI (2017).

3.3.13 Due to planning authority concerns regarding groundwater flood risk, CEMEX has undertaken to install five additional groundwater level monitoring wells around the perimeter of the Site as detailed in ESI (2016) and shown on DESID 11.

Surface Water Quality

3.3.14 The Environment Agency website has water quality data for the stretch of the River Thames between Windsor Sewage Treatment Works and Wey. The chemical and biological grade determined by data obtained from the site is A, meaning of 'Very Good' quality (most recent data from 2008, Environment Agency website, 2010). CEMEX has carried out surface water monitoring at two locations on the River Ash. These are marked as SW1 and SW2 on Drawing Number DESID 11 and details are provided on Table 6.

Table 6: Summary of surface water monitoring locations

Location	X	Y	Description
SW1	509085	167764	Upstream
SW2	509644	167512	Downstream

3.3.15 There are no systematic differences in the chemistry of the two monitoring points. The combined results of the surface water monitoring for selected determinands are presented in Table 7. This table includes all determinands for which there was at least one detection. Graphs of surface water concentrations of ammoniacal nitrogen, electrical conductivity, chloride and iron are included in Appendix E, which also contains a comprehensive summary of the monitoring results for all regularly analysed determinands.

3.3.16 The results show that the quality of water in the River Ash by Watersplash Farm is relatively high. Electrical conductivity is relatively moderate for surface water and this is reflected in moderate concentrations for major ions. COD is mostly low, with occasional higher spikes, particularly at SW2 (see time series data in Appendix E). BOD is also low. Metal concentrations are generally low with occasional concentrations above EQS values. Although cadmium is shown as having 89% higher than EQS this is a reflection of the very low EQS compared to the detection limit for this determinand. Ammoniacal nitrogen concentrations are mostly low with a mean concentration of 0.28mg/l and a 95th percentile concentration of 0.89mg/l.

Table 7: Surface water quality in monitoring points around Watersplash Farm

Determinand	No. of Results	Unit	Min	Max	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	# > LOD	% > LOD	No. Exceeding	% Exceeding	EQS FW Action Level
Field / lab parameters														
Conductivity- Electrical (Field)	180	µS/cm	134	1050	588	628	169	202	800	180	100	0	0	-
Conductivity- Electrical 20deg	389	µS/cm	402	4530	651	633	214	563	720	389	100	0	0	-
D.O. concentration	372	mg/l	<0.5	14.4	6.38	6.4	3.07	1.5	11.6	364	98	0	0	-
pH	389	pH units	7	8.8	8.07	8.1	0.256	7.7	8.5	389	100	0	0	-
pH (Field)	265	pH units	0.14	760	10.7	7.99	46.2	6.78	8.82	265	100	0	0	-
Temperature (Field)	268	DegC	1.4	25	12.1	11.6	5.23	5.24	20.1	268	100	0	0	-
Major ions														
Alkalinity as CaCO3	389	mg/l	27	378	208	207	18.6	188	228	389	100	0	0	-
Calcium	389	mg/l	32	305	109	107	15.7	94	129	389	100	0	0	-
Chloride	389	mg/l	36	137	54.6	54.2	10.2	41	70	389	100	0	0	250
Magnesium	389	mg/l	3.7	28	5.34	5	1.55	4.11	7	389	100	0	0	-
Nitrate as N	389	mg/l	0.7	13.4	5.8	5.7	1.21	4.2	7.9	389	100	0	0	-
Nitrogen (total oxidised) as N	32	mg/l	4.37	8.61	6.19	5.63	1.4	4.41	8.51	32	100	0	0	-
Potassium	389	mg/l	<1	18	6.13	6	1.41	4.6	8.04	385	99	0	0	-
Sodium	389	mg/l	9	86	33.9	33	8.1	23	47	389	100	0	0	170
Sulphate as SO4	389	mg/l	6	130	51.3	50	10.9	40.9	65	389	100	0	0	400
Metals														
Cadmium	129	mg/l	<0.0006	0.0018	n.d.	n.d.	n.d.	n.d.	0.001	15	12	115	89	0.00025

Chromium	127	mg/l	<0.002	<0.002	n.d.	n.d.	n.d.	n.d.	n.d.	0	0	0	0	0.005
Copper	129	mg/l	<0.009	0.044	0.00689	n.d.	0.00597	n.d.	0.018	45	35	13	10	0.01
Iron	131	mg/l	<0.23	1.57	n.d.	n.d.	n.d.	n.d.	0.361	16	12	1	1	1
Lead	129	mg/l	<0.006	0.02	0.00436	n.d.	0.00304	n.d.	0.01	23	18	10	8	0.0072
Manganese	129	mg/l	<0.007	89	0.753	0.049	7.83	n.d.	0.192	121	94	0	0	-
Mercury	29	mg/l	<0.0001	<0.0001	n.d.	n.d.	n.d.	n.d.	n.d.	0	0	0	0	0.001
Nickel	127	mg/l	<0.003	0.036	0.00353	n.d.	0.00393	n.d.	0.00794	38	30	17	13	0.004
Zinc	129	mg/l	<0.018	0.14	0.0143	n.d.	0.017	n.d.	0.035	55	43	2	2	0.075
Nitrogen species														
Ammoniacal Nitrogen as N	389	mg/l	<0.06	8.88	0.282	0.14	0.65	n.d.	0.892	344	88	0	0	-
Nitrite as N	389	mg/l	<0.0009	0.515	0.0965	0.07	0.0873	0.023	0.286	387	100	0	0	-
Other parameters														
Azinphos-methyl	27	µg/l	<0.002	0.014	n.d.	n.d.	n.d.	n.d.	n.d.	1	4	0	0	-
BOD + ATU (5 day)	109	mg/l	<1	20	1.53	1	2.26	n.d.	3	58	53	0	0	-
Chloroform	29	µg/l	<1	9	1.14	n.d.	2.37	n.d.	7.4	6	21	0	0	-
COD (Total)	387	mg/l	<11	232	16.2	n.d.	16.6	n.d.	35.7	189	49	0	0	-
Dichlobenil	29	µg/l	<0.002	0.004	n.d.	n.d.	n.d.	n.d.	0.005	3	10	0	0	-
Mecoprop	25	µg/l	<0.04	0.04	n.d.	n.d.	n.d.	n.d.	n.d.	1	4	0	0	-
Simazine	29	µg/l	<0.02	0.035	2.6	n.d.	7.83	n.d.	21	5	17	0	0	-
TOC (filtered)	278	mg/l	1.29	12.9	4.16	4.03	1.26	2.58	5.92	278	100	0	0	-

Note: if significant number of results exceed action limit row is coloured as follows: 10 - 25% pale red, 25 - 50% darker red, >50% dark red. n.d. statistic not determinable. Mean statistics for non-detects are calculated at half the limit of detection.

3.3.17 A small number of organic chemicals have been detected, although none has been found above its EQS. No TCE has been detected within the River Ash in any of the 14 samples analysed at SW1 and SW2.

3.3.18 No strong trends are observed over time, except that a number of the major ions (sodium, chloride and sulphate) and electrical conductivity fell in early 2006 before rising back gradually to a lower peak in early 2012. Since then concentrations have fluctuated with season (Appendix E). These fluctuations are probably related to seasonal and longer term changes in flow volume in the River resulting in variations in dilution of determinands.

3.4 Hydrogeology

Aquifer Classification

3.4.1 The Sand and Gravel in the area is classified as a "significant Drift aquifer" (Environment Agency, 2008) (previously a major aquifer). A significant Drift aquifer is defined as being an aquifer in superficial deposits, overlying unproductive strata, which contains important groundwater resources.

3.4.2 The London Clay bedrock is classified among the "unproductive strata". These are defined as being generally unable to support abstractions greater than $10m^3/d$ and unlikely to provide significant baseflow or wetland discharges.

3.4.3 The Chalk beneath the London Clay is classified as a Principal Aquifer (Environment Agency, 2008) (previously a major aquifer).

Aquifer Properties

3.4.4 It is believed that the hydraulic conductivity of the London Clay is very low and is estimated to be in the order of 10^{-9} m/s.

3.4.5 Fetter (1994) gives hydraulic conductivity values for well sorted sands ranging from about 0.86 m/d to 86m/d and gives a range of 8.64 to 864m/d for gravel.

3.4.6 Hydraulic conductivity values for the Sand and Gravel beneath the site are estimated here from grain size analysis data. CEMEX took 34 samples for laboratory grading analysis testing during the site investigation in 2000. Grading analysis of these samples suggested a mean composition of the economic reserve of 53% gravel, 46% sand and 1% fines (RMC, 2000).

3.4.7 Hazen (1911) demonstrated that hydraulic conductivity could be related to the square of a characteristic dimension of a sediment. Hazen's Rule (Fetter, 1994) was used to relate a grain size parameter to hydraulic conductivity using the following equation:

Hydraulic conductivity, k = C x (d10)2

Where C is a coefficient based on grain size and sorting and

d10 is the effective grain size, or grain size at 10% passing.

3.4.8 The average d10 was about 2.3mm. A range of C values ranging from those assigned to a medium to a coarse sand were applied. This gave a range of hydraulic conductivity of 4,000 to 7,500m/d. This is much higher than the ranges given in Fetter (1994) above. It is noted that this method is considered to be applicable for an effective grain size of approximately 0.1 to 3mm. The d10 above is close to the upper end of this range. Although the hydraulic conductivity of the sand and gravel is likely to be high the values above are considered to be unrealistically high.

3.4.9 CEMEX carried out a number of slug tests on monitoring boreholes WM1 – WM7 in March 2009. These tests provided a permeability range of between 13 and 39 m/d.

3.4.10 Variable head permeability tests carried out in boreholes in the same Gravel formation on the nearby site of Kingsmead resulted in permeabilities between 3.4x10-7m/s (0.03m/d) and 1.6x10 4m/s (13.8m/d)

3.4.11 Fetter (1994) gives a specific yield range of 20 to 35% for a gravelly sand with a suggested average of 25%.

Source Protection Zones

3.4.12 The site is not located within a source protection zone.

3.4.13 There are no designated source protection zones within 500m of the site.

Groundwater Levels and Flow

3.4.14 A total of seven piezometers (WM01 to WM07) were installed in 2000 to allow for the collection of groundwater level and groundwater quality data (locations shown in Drawing Number DESID 11 and borehole logs are shown in Appendix D). Groundwater level data is available from the monitoring piezometers at monthly intervals between June 2000 and July 2017. Groundwater level statistics are presented in Table 8 below. Groundwater level hydrographs

are presented in DESID 12B.

Table 8 Groundwater level statistics

Location	Average		Minimum		Maximum		Range
	mbgl	mAOD	mbgl	mAOD	mbgl	mAOD	m
WM1	2.30	8.57	0.62	7.73	3.14	10.25	2.52
WM2	2.66	8.08	1.81	7.67	3.07	8.93	1.27
WM3	2.36	8.10	1.48	7.66	2.80	8.98	1.32
WM4	2.20	8.51	1.27	8.17	2.54	9.44	1.27
WM5	1.66	8.91	0.79	8.40	2.17	9.78	1.38
WM6	0.93	9.12	0.38	8.15	1.90	9.67	1.52
WM7	0.95	8.34	0.38	7.85	1.44	8.91	1.06

3.4.15 Groundwater is generally present at 0.4 to 3.0mbgl with the level falling towards the River Ash and the River Thames. This is consistent with water strike observations during drilling which generally encountered groundwater strikes between 0.7 and 2.75m below ground level (average of 1.8mbgl.). Water strikes for each of the boreholes are shown on the borehole logs within Appendix D.

3.4.16 A spatial plot of groundwater levels on 18 August 2008 is shown in DESID 12B. This indicates that groundwater levels flow to the south and south east towards the River Thames and River Ash. The hydraulic gradient is relatively shallow at approximately 0.002. (Calculation using the average water levels from Table 8 suggests gradients of up to 0.002 in the west and perhaps 0.0014 in the east.)

3.4.17 Groundwater level ranges during the monitoring period are considered to be small (1.0 to 2.5m, although the higher end of this range is only experienced very occasionally). This is presumed to be due to high storage within the sand and gravel, and the ease of discharge to the rivers as soon as water levels rise.

3.4.18 Spot flow gauging carried out on the River Ash on 3rd March 2009 suggests that the site contributes significant baseflow to the river.

3.4.19 The average saturated thickness of mineral deposit is approximately 3.98m (RMC, 2000).

Licensed Groundwater Abstractions

3.4.20 The site is located within the Thames Lower Corridor CAMS area (Environment Agency, 2004) which has an "over abstracted" status.

3.4.21 Drawing Number DESID 11 shows the inner catchment of a source protection zone (SPZ) associated with a water abstraction to be present approximately 550m to the south west of the site. The SPZ is associated with Walton pumping station, which is located about 860m from the site. However, there is no risk of impact from activities at Watersplash Farm as the SPZ is located on Desborough Island, on the opposite side of the River Thames to the site.

3.4.22 Licensed groundwater and surface water abstractions within 500m of the site boundary were provided by Centremaps and the Environment Agency. A map of locations is shown in Drawing Number DESID 11 and Appendix C.

3.4.23 Groundwater abstractions in the vicinity of the site include the following:

Table 9: Groundwater abstraction licences within 1km of Watersplash Farm

Licence No	National Grid Reference	Point	Distance and direction	Purpose
28/39/31/0009	509220,167500	Watersplash Farm	On site	Spray irrigation
28/39/31/0096	509700,167500	Fordbridge Road, Sunbury	5m S	General use (holiday camp)
28/39/31/0158	509400,167000	Felix Lane, Shepperton	328m SE	General use
28/39/31/0175	510200,167500	BP Oil Terminal, Walton (line of well points)	384m to 577m E	General use
28/39/31/0056	508400,167100	Shepperton Old Allotments	504m W	General farming & domestic
28/39/31/0046	509200,168400	Upper Halliford	507m NW	Spray irrigation
28/39/31/0134	508500,166380	Walton Bridge pumping station	873m SW	Potable water supply
28/39/31/0167	510100,168700	Hazelwood Golf Club (two boreholes)	928m & 955m NE	Spray irrigation

Groundwater Quality

3.4.24 Groundwater quality monitoring data is available from the seven monitoring boreholes (WM01 to WM07) between October 2000 and July 2017, with monitoring frequencies ranging between monthly and annually for different parameters.

3.4.25 Summary statistics for groundwater quality are presented in Table 10. A suite of hazardous substances is undertaken on an annual basis and only those determinands for which there is at least one detection are included in this table. The results show that groundwater quality

water in the Watersplash Farm area is generally good. Nitrogen species (ammoniacal nitrogen and nitrate) and manganese are the only ions species showing regular exceedances of the drinking water standard (DWS). A small number of organic chemicals have been detected, and of these 1,2 dichloroethane and trichloroethene have regularly exceeded the DWS. However, it is noted that the detection limit for dichloroethane is occasionally higher than the DWS and there have not actually been any exceedances.

Table 10: Groundwater quality in monitoring points in and around Watersplash Farm

Determinand	No. of Results	Unit	Min	Max	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	# > LOD	% > LOD	No. Exceeding UKDWS	% Exceeding UKDWS	Action Level
Field / lab parameters														
Conductivity- Electrical (Field)	620	µS/cm	40.1	1520	742	777	264	134	1094	620	100	0	0	0
Conductivity- Electrical 20deg	1344	µS/cm	184	44600	915	834	1282	634	1150	1344	100	0	0	0
D.O. concentration	1308	mg/l	<0.5	13.7	3.15	2.7	1.89	1	6.77	1278	98	0	0	-
Dissolved Oxygen Field (%)	168	%	8.6	79.7	38.8	38.1	16.9	14.6	69.9	168	100	0	0	0
pH	1343	pH units	5.8	9.3	7.62	7.6	0.326	7.2	8.2	1343	100	0	0	-
pH (Field)	911	pH units	0.08	780	10.9	7.65	49.8	6.43	8.67	911	100	0	0	-
Temperature (Field)	925	deg c	6.1	20.9	12.4	12.2	2.34	9.2	16	925	100	0	0	-
Major ions														
Alkalinity as CaCO3	1344	mg/l	33.2	1020	270	257	63.7	204	407	1344	100	0	0	-
Calcium	1344	mg/l	1	286	157	150	35.5	111	224	1344	100	11	1	250
Chloride	1344	mg/l	13	223	54.3	52	20.2	29.6	87.3	1344	100	0	0	250
Magnesium	1344	mg/l	<0.1	21	9.06	8.31	3.14	5.4	16	1343	100	0	0	50
Nitrate as N	1344	mg/l	<0.3	207	20.1	9.9	20.5	n.d.	54.6	1216	91	634	47	11
Nitrogen (total oxidised) as N	106	mg/l	<0.42	119	19.8	8.9	21.3	n.d.	51.8	95	90	0	0	-
Potassium	1343	mg/l	<1	27	6.07	5.6	3.37	1.8	12	1321	98	0	0	-
Sodium	1343	mg/l	3.6	97	35.3	31	13.1	21.2	64	1343	100	0	0	200
Sulphate as SO4	1343	mg/l	9	222	69.4	62	25.8	40.5	123	1343	100	0	0	250
Metals														
Arsenic	106	mg/l	<0.001	0.006	0.000921	0.0005	0.00108	0.000175	0.0036	21	20	0	0	0.01
Cadmium	453	mg/l	<0.0006	0.004	n.d.	n.d.	n.d.	n.d.	0.0009	46	10	0	0	0.005

Determinand	No. of Results	Unit	Min	Max	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	# > LOD	% > LOD	No. Exceeding	% Exceeding	UKDWS Action Level
Chromium	439	mg/l	<0.002	0.0402	n.d.	n.d.	n.d.	n.d.	n.d.	9	2	0	0	0.05
Copper	446	mg/l	<0.009	0.05	0.00589	n.d.	0.00554	n.d.	0.01	124	28	0	0	2
Iron	453	mg/l	<0.23	5.75	n.d.	n.d.	n.d.	n.d.	0.27	54	12	26	6	0.2
Lead	446	mg/l	<0.006	0.041	0.00449	n.d.	0.0037	n.d.	0.01	80	18	2	0	0.025
Manganese	446	mg/l	<0.007	0.6	0.0995	0.05	0.117	n.d.	0.36	409	92	215	48	0.05
Mercury	106	mg/l	<0.0001	0.0019	0.000127	n.d.	0.000273	n.d.	0.0005	22	21	2	2	0.001
Nickel	432	mg/l	<0.003	0.16	0.00404	n.d.	0.00981	n.d.	0.008	144	33	6	1	0.02
Zinc	445	mg/l	<0.018	0.2	0.0136	n.d.	0.0189	n.d.	0.03	135	30	0	0	5
Nitrogen species														
Ammoniacal Nitrogen as N	1344	mg/l	<0.04	7.09	0.611	n.d.	1.4	n.d.	4.18	448	33	218	16	0.39
Nitrite as N	1344	mg/l	<0.003	0.607	0.0163	n.d.	0.0406	n.d.	0.0808	563	42	190	14	0.03
Other parameters														
COD (Total)	1337	mg/l	<11	1510	17	n.d.	46.7	n.d.	36	574	43	0	0	-
TOC (filtered)	1342	mg/l	<0.7	27.5	3.58	3.2	2	1.21	7.5	1332	99.3	0	0	-
1,2-Dichloroethane	106	µg/l	<1	0.1	n.d.	n.d.	n.d.	n.d.	n.d.	1	1	26	25	3
Atrazine	106	µg/l	<0.02	0.27	n.d.	n.d.	n.d.	n.d.	7.5	10	9	9	8	0.1
Azinphos-methyl	99	µg/l	<0.002	0.007	n.d.	n.d.	n.d.	n.d.	n.d.	2	2	0	0	0.1
Chloroform	106	µg/l	<1	1.6	n.d.	n.d.	n.d.	n.d.	n.d.	4	4	0	0	100
Dichlobenil	106	µg/l	<0.002	0.2	n.d.	n.d.	n.d.	n.d.	0.0098	6	6	0	0	-
Diuron	85	µg/l	<0.05	0.98	n.d.	n.d.	n.d.	n.d.	0.098	7	8	0	0	-
HCH - alpha	99	µg/l	<0.003	0.001	n.d.	n.d.	n.d.	n.d.	n.d.	1	1	0	0	-
HCH - gamma	99	µg/l	<0.0015	0.002	n.d.	n.d.	n.d.	n.d.	n.d.	1	1	0	0	-

Determinand	No. of Results	Unit	Min	Max	Mean	Median	Standard Deviation	5th Percentile	95th Percentile	# > LOD	% > LOD	No. Exceeding	% Exceeding	UKDWS Action Level
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	106	µg/l	<0.002	0.002	n.d.	n.d.	n.d.	n.d.	n.d.	2	2	0	0	-
Simazine	105	µg/l	<0.02	0.08	0.587	n.d.	3.24	n.d.	0.08	24	23	1	1	10
Terbutryn	98	µg/l	<0.02	0.013	n.d.	n.d.	n.d.	n.d.	n.d.	1	1	0	0	-
Tetrachloroethene	105	µg/l	<0.1	1	n.d.	n.d.	n.d.	n.d.	0.5	10	10	0	0	-
Trichloroethene	105	µg/l	<1	325	17.6	n.d.	61.1	n.d.	166	42	40	11	10	10
Trifluralin	105	µg/l	<0.03	0.011	n.d.	n.d.	n.d.	n.d.	n.d.	3	3	0	0	0.1

Note: if significant number of results exceed action limit row is coloured as follows: 10 - 25% pale red, 25 - 50% darker red, >50% dark red. n.d. statistic not determinable. Mean statistics for non-detects are calculated at half the limit of detection.

3.4.26 Graphs of groundwater concentrations against time are presented in Appendix E for a list of chemical parameters. Key observations are discussed here.

Trichloroethene (TCE)

3.4.27 TCE concentrations in surface water and groundwater have been recorded annually and are presented in Appendix E. Elevated concentrations were evident in 2000 in piezometer WM05 and WM06 to the west of the site. Subsequent monitoring has shown that concentrations have fallen such that by 2009 they have been below the DWS. Concentrations at WM5 and WM6 fell from 315 to 5.9µg/l at WM5 and from 325 to 5µg/l at WM6 between 2000 and 2009. WM5 has shown a slight increase to 17.1µg/l in the latest sampling round undertaken in October 2016.

3.4.28 WM3 (southwest corner of site) and occasionally WM4 (southern edge of site) have also produced positive results, but below the DWS.

3.4.29 Trichloroethene (TCE) is a hazardous substance under the Dangerous Substances Directive. The Water Supply (Water Quality) Regulations 2000 have a maximum concentration of TCE of 10µg/l (WHO 20µg/l). The environmental quality standard (EQS) is 10 µg/l and the drinking water standard (DWS) is 10 µg/l (with tetrachloroethene).

3.4.30 It is noted that the volatile organic compound suite which has been analysed is limited and that possible breakdown products of TCE such as vinyl chloride have not been analysed.

Ammoniacal nitrogen

3.4.31 Elevated ammoniacal nitrogen concentrations are observed at piezometer WM06 with concentrations generally having fallen from about 6mg/l to 4mg/l between October 2000 and May 2009 (Appendix E). Since then concentrations have continued to fall at a lower rate and are currently around 3mg/l. This location is in the west of the site.

3.4.32 The proportion of the ammoniacal nitrogen that is present as free is temperature and pH dependent. It is likely that the free ammonia concentrations at WM6 would be above the EQS based on the pH values observed at the site but concentrations elsewhere across the site are generally likely to pass the EQS. The ammoniacal nitrogen concentrations are also well above the UK Drinking Water Standard for ammonium.

Other determinands

3.4.33 Trace concentrations of some herbicides such as dichlobenil, atrazine, diuron, and simazine were detected at some locations.

3.4.34 Levels of nitrate above the drinking water standard of 11.3mg/l as N have been encountered in all boreholes, although rarely in WM4, and WM6, and most frequently at WM2 and WM3. The high nitrate may be due to the current agricultural use of Watersplash Farm. There is no EQS for nitrate.

3.4.35 Electrical conductivity, calcium and sulphate concentrations are consistently higher at WM2, WM3 and WM6 than other boreholes.

3.4.36 Levels of manganese above the drinking water standard of 50 µg/l have been encountered in all boreholes. There is no EQS for manganese.

3.4.37 One or two groundwater samples from most boreholes failed the EQS for iron of 1mg/l.

3.4.38 It is noted that no information is available for hydrocarbons. Possible sources of hydrocarbon contamination are historical landfills discussed above.

3.5 Receptors and Compliance Points

Groundwater

3.5.1 The nature of the waste to be deposited on the site will ensure that no discernible concentrations of hazardous substances will enter the groundwater.

3.5.2 On completion of landfilling at the facility, the local flow regime is expected to be similar to the current pattern. The sand and gravel at the site will have been replaced by lower permeability materials, which will tend to increase the hydraulic gradient. The direction of flow will remain southerly to south westerly, towards the rivers. For non-hazardous pollutants, the primary receptors are taken to be groundwater on the southern and eastern (downstream) site ownership boundaries. The risk of impact on groundwater is further investigated in the Hydrogeological Risk Assessment.

Surface Water

3.5.3 Runoff from the surface of the landfill will discharge to perimeter swales which will encourage infiltration to groundwater. Some runoff will occur into the River Ash which runs through the site. The River Ash will also receive direct discharge from groundwater, given that the site lies on both banks.

3.5.4 The risk of impact on the river is further investigated in the Hydrogeological Risk Assessment.

Landfill Gas Risk Assessment

3.5.5 A Landfill Gas Risk Assessment has not been prepared for Watersplash Farm, as the Landfill Technical Guidance Note LFTGN03 indicates that new inert landfills do not pose a landfill gas hazard. Nevertheless, a Landfill Gas Risk Assessment Screening exercise has been undertaken to assess the potential risks associated with Landfill Gas migration from the site and is provided within this Environmental Permit application as Appendix G.

Amenity

3.5.6 The receptors identified in Table 2 of the Environmental Risk Assessment (Appendix D of the main application), have been considered in the Environmental Risk Assessment.

4.0 Pollution Control Measures

4.1 Site Engineering

Groundwater Management

4.1.1 As a function of the planning permission, and to ensure that contamination from surrounding historical land uses is not drawn into the site, no dewatering of the site is permitted. Due to the inert nature of the wastes deposited, no groundwater management system will be employed at the site.

Geological Barrier

4.1.2 The site will benefit from a natural geological barrier at the base of the sand and gravel excavation which is underlain by London Clay. It is considered that this natural barrier provides the requisite depth and impermeable characteristics in order to satisfy the requirements of the Landfill Directive.

4.1.3 An artificial sidewall geological barrier will be provided around the perimeter of the site in each phase, working in a west to east direction, with construction at least 25m ahead of landfilling. Consideration has been given to the excavation of the underlying London Clay in order to form the geological barrier, however, to utilise the London Clay at the base of the site would require dewatering which will not be permitted under the planning permission and as such it is anticipated that there will be isolated pockets of standing groundwater within the excavation void.

4.1.4 The sidewall geological barrier will be constructed from selected imported wastes, which will have sufficient clay content capable of achieving the required properties for the geological barrier. The physical suitability of the material will be assessed by the Site Manager in accordance with the flow chart provided in the Environment Agency's 'Standards and Measures for the Deposit of Inert Waste on Land'.

4.1.5 Materials selected for incorporation in the geological barrier above water will be capable of being spread in thin layers using earthmoving plant and tracked in, without heavy compaction, to form a barrier at least 15m wide with a permeability of 1 x 10^{-6}m/s or less to achieve equivalence with the Landfill Directive requirements.

4.1.6 Barrier material for disposal below water will initially be deposited on a plateau at approximately the original ground level to allow inspection, and will then be bulldozed over an

advancing face into the water. If any unacceptable barrier material is discovered, and is suitable as inert fill, it would be stockpiled or placed in accordance with waste placement procedures. Barrier slopes below the water table will form at a natural angle of repose and will be allowed to consolidate under gravity alone. Vehicles delivering material to the site will not be permitted to travel within 10m of the face to ensure that the slope is not surcharged.

4.1.7 Once the level of the barrier is above groundwater level, the material can be compacted by multiple passes of earthmoving equipment.

4.1.8 The geological barrier will be a minimum of 20m wide at the base and will sit directly on top of the London Clay (as the gravel reserve will have been fully excavated). At CEMEX's Coldharbour Lane landfill, the Environment Agency has accepted a 20-40m wide overburden mound as a geological barrier which had been placed directly on top of London Clay. The overburden separated the landfill waste from the adjacent natural ground (principal aquifer).

4.1.9 The geological barrier deposited below the water table will be compacted under self-weight and as additional waste is placed on top. An estimate of the time for 90% consolidation has been made assuming that the Coefficient of Consolidation (cv) of the waste is equivalent to 25m2/year. This is a typical value adopted for London Clay (from which it is likely much of the barrier will be derived). The assumption is therefore considered to be very conservative as the permeability of the waste will be higher than undisturbed London Clay allowing more rapid consolidation. The calculation indicates that 90% settlement will occur within 1 year of completion, which is within the aftercare period for the landfill. Any settlement hollows that appear as a result of consolidation of the waste mass can therefore be remediated by local filling and/or grading during the aftercare period.

4.1.10 CQA of the barrier will be achieved through a combination of the following:

- Chemical suitability - review of site investigation information and Waste Information Form provided by the customer;
- Physical suitability (prior to import) using Chart 1 (Appendix F) - review of site investigation information and Waste Information Form provided by the customer;
- Physical suitability (on arrival at site) using Chart 1 (Appendix F)- visual inspection including a field strength and plasticity test as per Chart 1;
- Visual inspection of each load on tipping, prior to incorporation into the geological barrier;
- Area completed each week recorded via a GPS coordinate and source of material

identified and mapped on a barrier location plan;

- Topographic surveys in accordance with the environmental permit;
- Periodic independent CQA visual inspection and site record check throughout construction period;
- In-situ permeability testing to demonstrate equivalence;
- Identification of works or procedures that do not comply with the requirements of the CQA Plan – 'Non-Conformances';
- Recording of remedial works undertaken to rectify 'Non-Conformances'; and
- Provision of CQA Completion Reports including full records of all inspections, checks and testing carried out including records demonstrating the compliance of the works and records of any or outstanding 'non-conformances' as appropriate.

4.1.11 It is considered that the CQA method described above in combination with the following processes is sufficient for CQA of the geological barrier, above and below the water table:

- Minimum 15m thickness of the geological barrier;
- Source evaluation;
- Waste acceptance procedures;
- Duty of care testing; and
- HRA (modelled without a barrier).

Capping

4.1.12 In accordance with the requirements of the Landfill Directive, an engineered cap (clay or plastic) is not required. On completion of filling to final levels, the agricultural areas proposed in the restoration plan will be capped with 1m of restoration soils comprising not less than 0.3m of topsoil.

4.2 Restoration

4.2.1 The application site is presently in agricultural use and it is the intention of CEMEX to restore the site back to agricultural use as detailed in the restoration scheme (Drawing Number P3/648/9).

4.2.2 The restoration scheme has been designed to reinstate the majority of the site to original ground levels for agricultural use and to create an area of lower level wetland to the south

east of the site. The wetland will comprise wet woodland, reedbed and aquatic margins around the silt ponds that have been proposed as part of the planning application (reference SP12/01487).

4.2.3 During the site's operational phase, the silt pond area will have bays and promontories as well as graded wet silt to encourage diverse aquatic vegetation with submerged, emergent and marginal species.

4.2.4 In order to achieve optimum levels of self-sustainability it is intended the habitat creation will involve an element of natural colonisation from local sources. However, for the wetland areas, aquatic species will be planted in the initial stages of the site aftercare period around the southern edge of the proposed lake area to accelerate the integration of the restoration into the surrounding area.

4.2.5 Where possible, existing landscape and ecological features will be retained to maximise the biodiversity value of the site and for rapid integration of the restored site into its surroundings.

4.2.6 As mentioned in Section 4.1.12, the site will be restored with 1m of restoration soils comprising not less than 0.3m of topsoil material which is equivalent to approximately 75,100m^3. The waste codes that will be used for the restoration of the site are provided in Table 11 below.

Table 11: Proposed Waste Codes for Final Restoration

EWC Code	Description
17	Construction and Demolition Wastes (Including excavated soil from contaminated sites)
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 04	Soil and stones other than those mentioned in 17 05 03
19	Wastes from Waste Management Facilities, Off-site Waste Water Treatment Plants and the Preparation of Water Intended for Human Consumption and Water for Industrial Use
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 09	Minerals (for example sand, stones)
20	Municipal Wastes (Household Waste and Similar Commercial, Industrial and Institutional Wastes) Including Separately Collected Fractions
20 02	Garden and park wastes
20 02 02	Soil and stones

4.2.7 Details of the final post settlement restoration contours are provided in Drawing Number P3/648/9.

4.3 Surface Water Management

4.3.1 The surface water management strategy for the site is divided into three stages as summarised below.

4.3.2 Whilst the mineral is being dug, incident rainfall will drain to ground. Noise bunds will be constructed around the perimeter of the Site and runoff from these on the external face will be directed to swales. The swales are designed to store excess water and allow infiltration to ground.

4.3.3 Once the geological barrier has been constructed for a phase, incident rainfall may no longer be able to drain to ground. CEMEX will pump surface water and discharge into an adjacent phase that does not have the geological barrier constructed. Water quality testing will be undertaken to ensure it is suitable for discharge.

4.3.4 After restoration, surface water drainage across the facility will be controlled by the gradient of the final landform. Surface water will drain naturally to the perimeter of the Site where it will be directed to perimeter swales and infiltrate to groundwater.

4.3.5 The River Ash will be monitored during the operational and aftercare phases. The locations of proposed surface water monitoring points for the facility are shown in Drawing Number DESID 11.

4.4 Post Closure Controls (Aftercare)

4.4.1 Aftercare would be carried out for a period of 5 years following the completion of restoration of any phase and will provide for the management of the soil resources to establish sustainable agricultural use. Details of the aftercare scheme are provided below and have been provided as part of the planning application (reference SP12/01487).

4.4.2 An annual site meeting between CEMEX, the Mineral Planning Authority and the Department for Environment, Food & Rural Affairs (DEFRA) will be held in November of each year of the aftercare period, or at a time to be agreed. The performance of the previous year's aftercare will be reviewed and the detailed programme will be agreed for the following year.

4.4.3 Detailed site records of the aftercare programme will be kept and made available to the Mineral Planning Authority two months in advance of the annual aftercare site meeting.

4.4.4 Any amendments to the aftercare steps will be agreed in writing between CEMEX and the

Mineral Planning Authority.

5.0 Monitoring

5.1 Weather

5.1.1 Details regarding meteorological monitoring are provided in the Environmental Management and Monitoring Plan (Appendix H of the main application).

5.2 Gas Monitoring Infrastructure

5.2.1 In waste gas monitoring infrastructure will be installed following the completion of each landfill cell in order to monitor the levels of gas produced by waste mass in accordance with the requirements of Environment Agency's Technical Guidance Note LFTGN03 and the Landfill Directive.

5.3 Gas Monitoring

5.3.1 The boreholes will be monitored monthly throughout the operational phase of the landfill and every six months during the aftercare period.

5.3.2 Further details regarding the monitoring of landfill gas is provided in the Landfill Gas is provided in the Environmental Management and Monitoring Plan (Appendix H of the main application).

6.0 Site Condition Report

6.0.1 The Environmental Permitting Regulations – Site Condition Report (H5) guidance states that a Site Condition Report (SCR) is 'not applicable to those parts of a permitted landfill that have permanent deposits of wastes'. However, in accordance with the EA's Regulatory Guidance Note RGN 9 – Surrender, a SCR is required for areas within a permitted facility that will not be used for the permanent deposit of waste.

6.0.2 As such, a SCR has been prepared in relation to these areas using the EA's H5 SCR Template. A copy of the SCR is provided as Appendix K of the main application.

References

British Geological Survey (BGS) (1998), South London. England and Wales Sheet 270, Solid and Drift Edition, 1:50 000. (Keyworth, Nottingham: BGS).

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Fetter C.V. (1994), Applied Hydrogeology, Prentice Hall, ISBN 0-13-066239-9 Third Edition.

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ESI (2017), Watersplash Farm Quarry: Flood Risk Assessments and Surface Water Management Plan. 60084R8Rev4. February 2017.

RMC Aggregates (UK) Ltd. (2000), Mineral Reserve Assessment, Watersplash Farm, Shepperton, Middlesex.

Drawings

CEM/A104530/LOC/01 – Site Location

P3/648/9 – Final Restoration

P3/648/8a-h – Method of Working Phases (8 Drawings)

DESID 9 – Regional Geology

DESID 11 – Local Hydrogeology and Hydrology

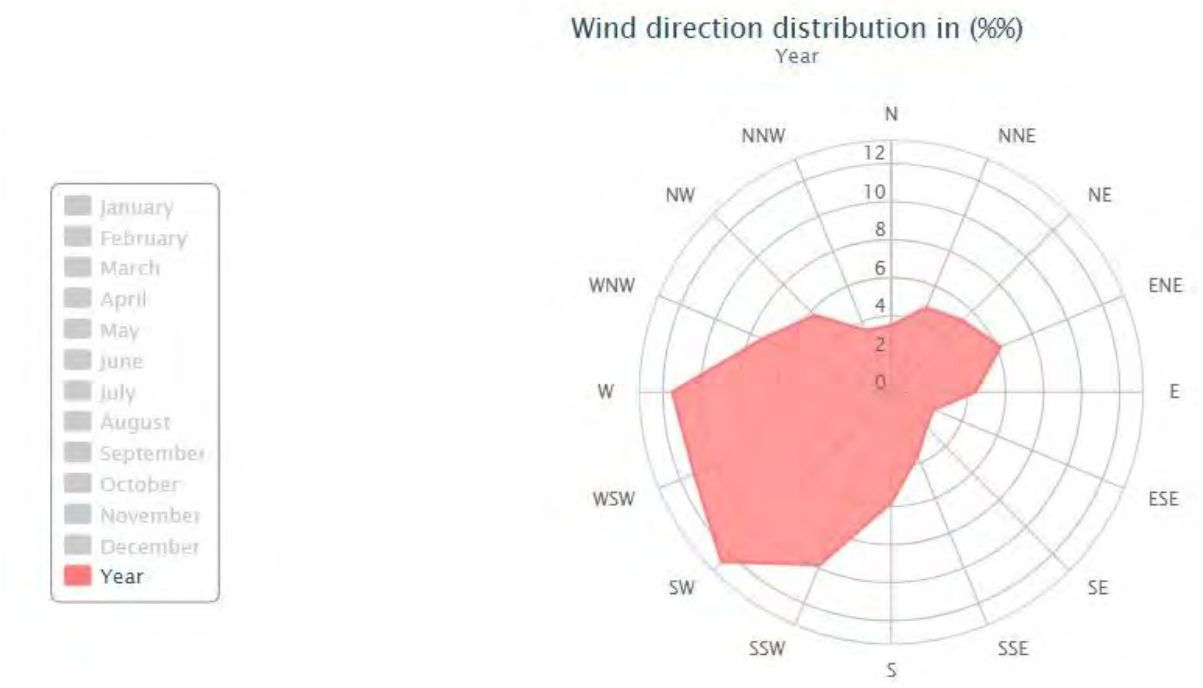
DESID 12A – Groundwater Levels Hydrographs

DESID 12B – Groundwater Contours for May 2016

Appendices

Appendix A – Working Plans (Geological Barrier)

Appendix B – Wind Rose for Heathrow


January
February
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October
November
December
Year
Wind direction distribution in (%%)
Year
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ESE
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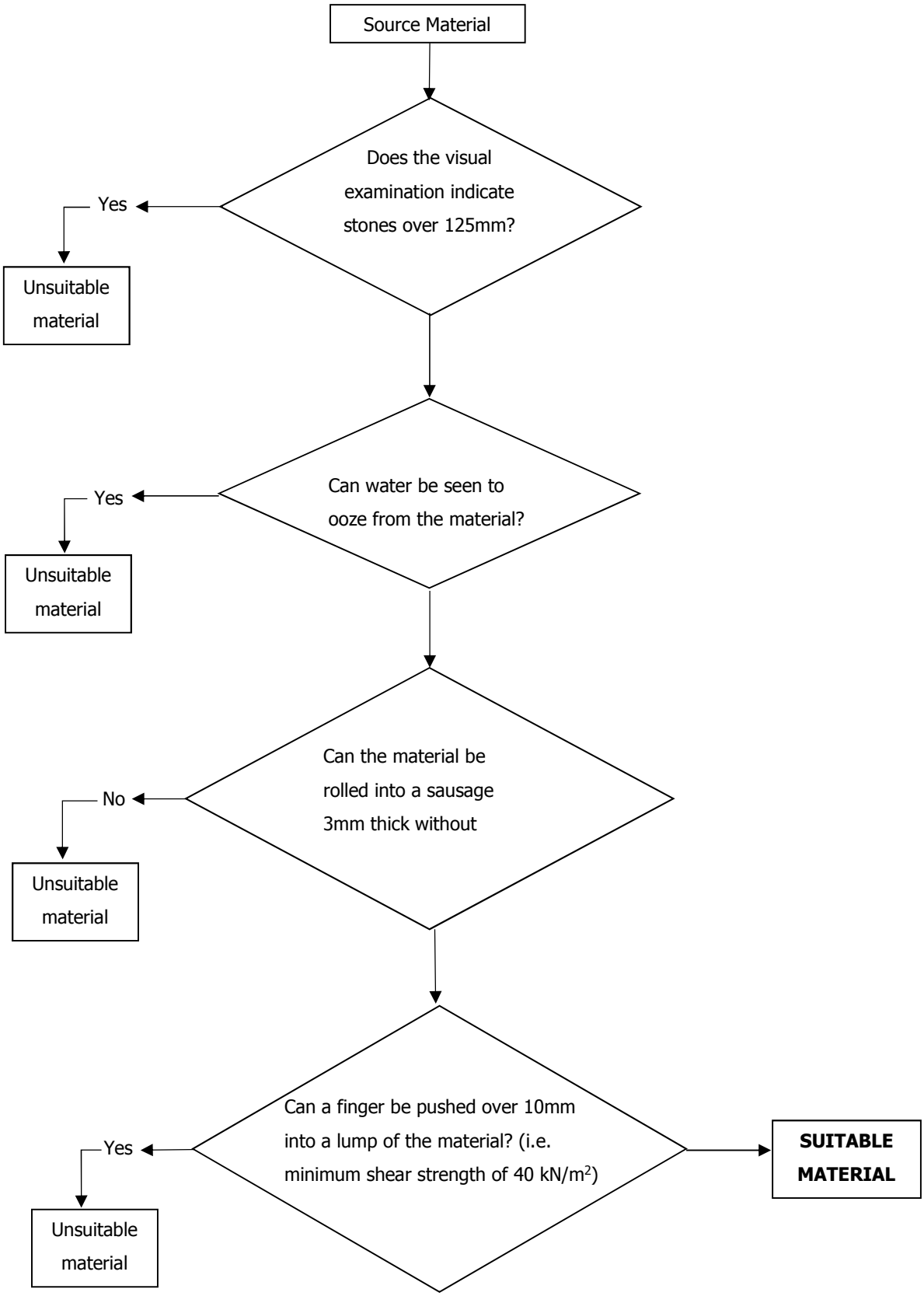
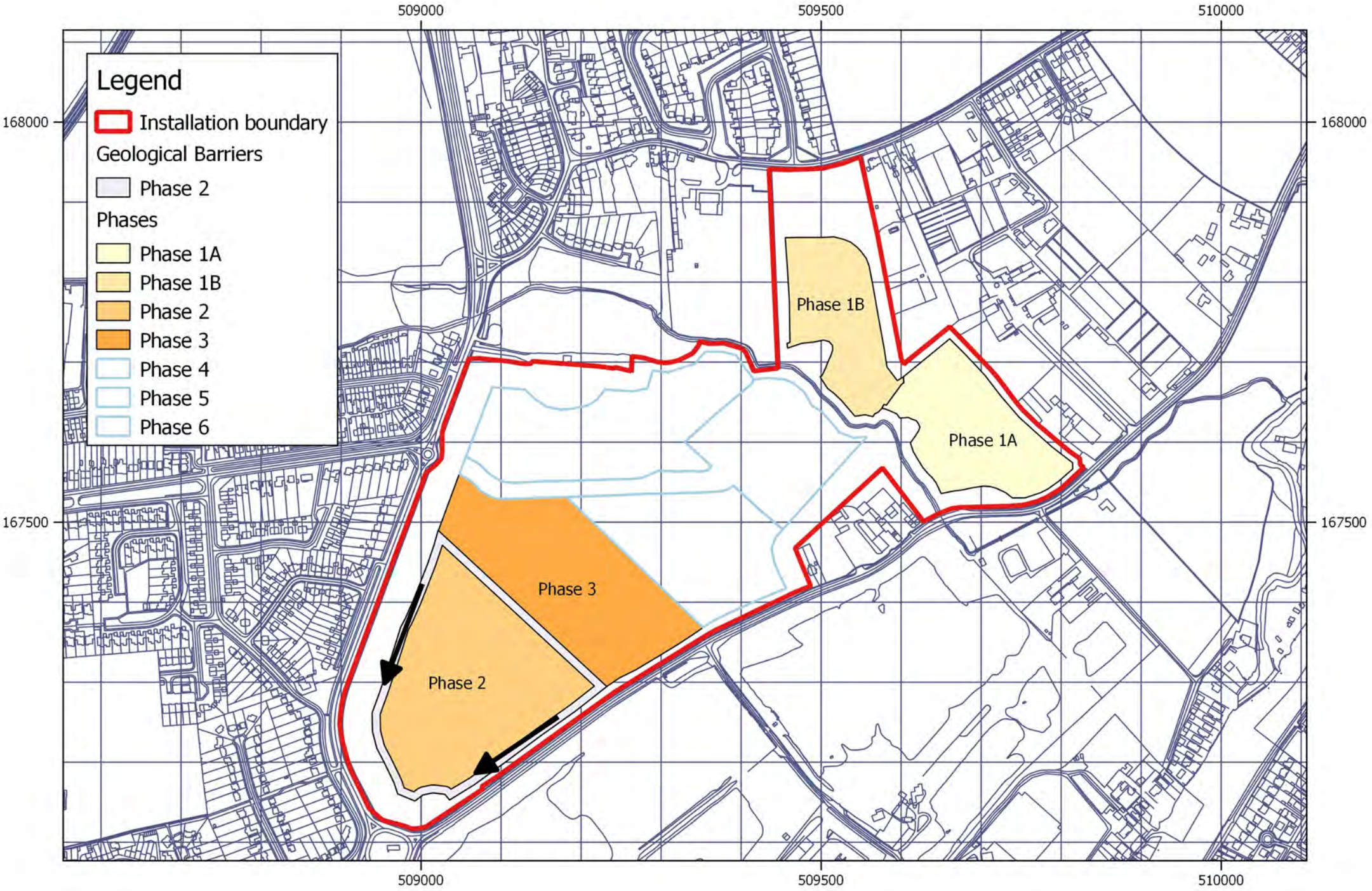
Appendix C – Centremaps Geology Report

Appendix D – Borehole Logs

Appendix E - Groundwater Concentrations (January 2000 – January 2017)

Appendix F - Flowchart for the selection of suitable material for the construction of a geological barrier


Source Material
Does the visual examination indicate stones over 125mm?
Yes
Unsuitable material
Can water be seen to ooze from the material?
Yes
Unsuitable material
Can the material be rolled into a sausage 3mm thick without
No
Unsuitable material
Can a finger be pushed over 10mm into a lump of the material? (i.e. minimum shear strength of 40 kN/m2)
Yes
Unsuitable material
SUITABLE MATERIAL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Phase 1B
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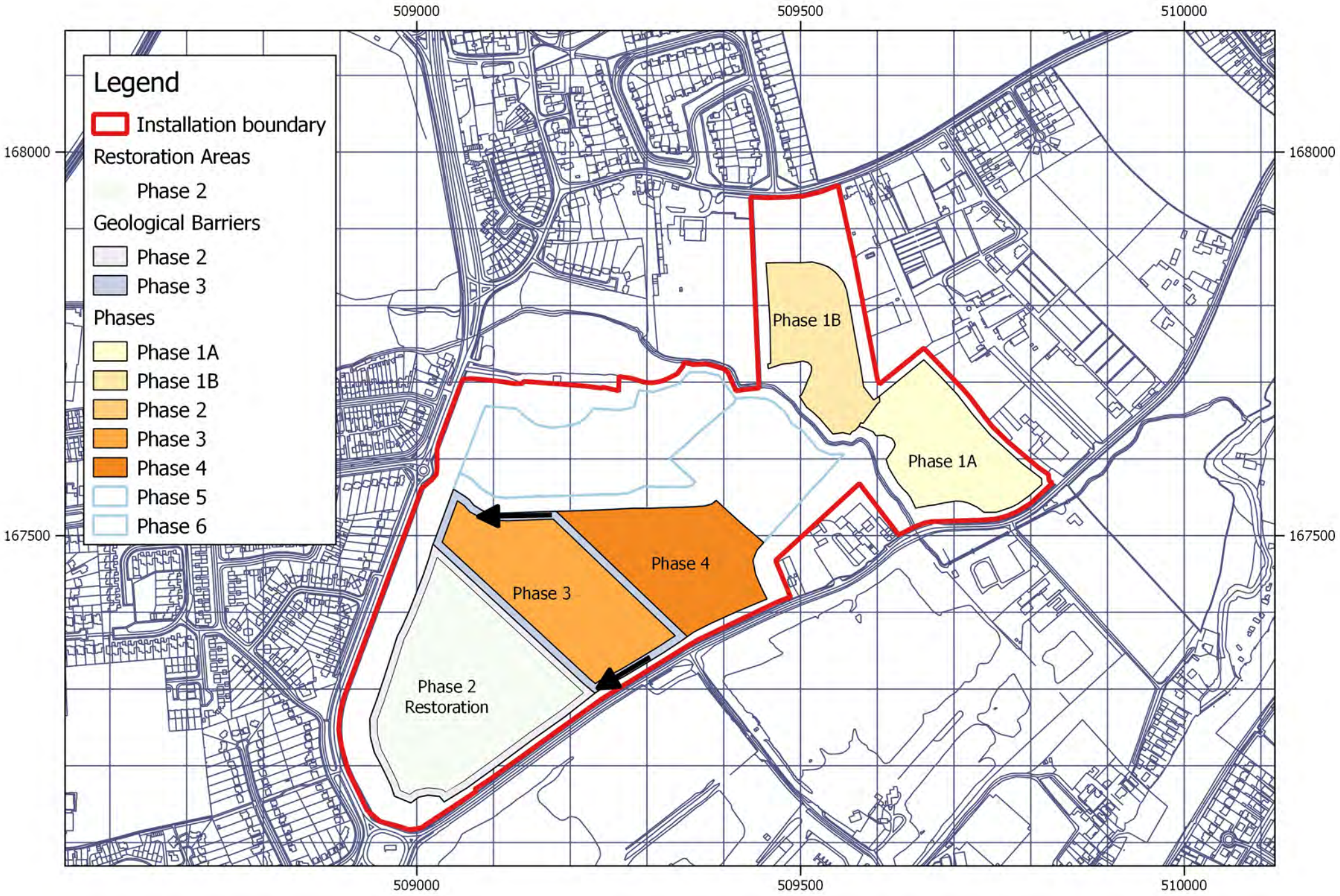
Phase 3
Phase 4
Phase 5
Phase 6
Phase 1B
Phase 1A
Phase 3
Phase 2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Phase 2
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Phase 1B
Phase 2
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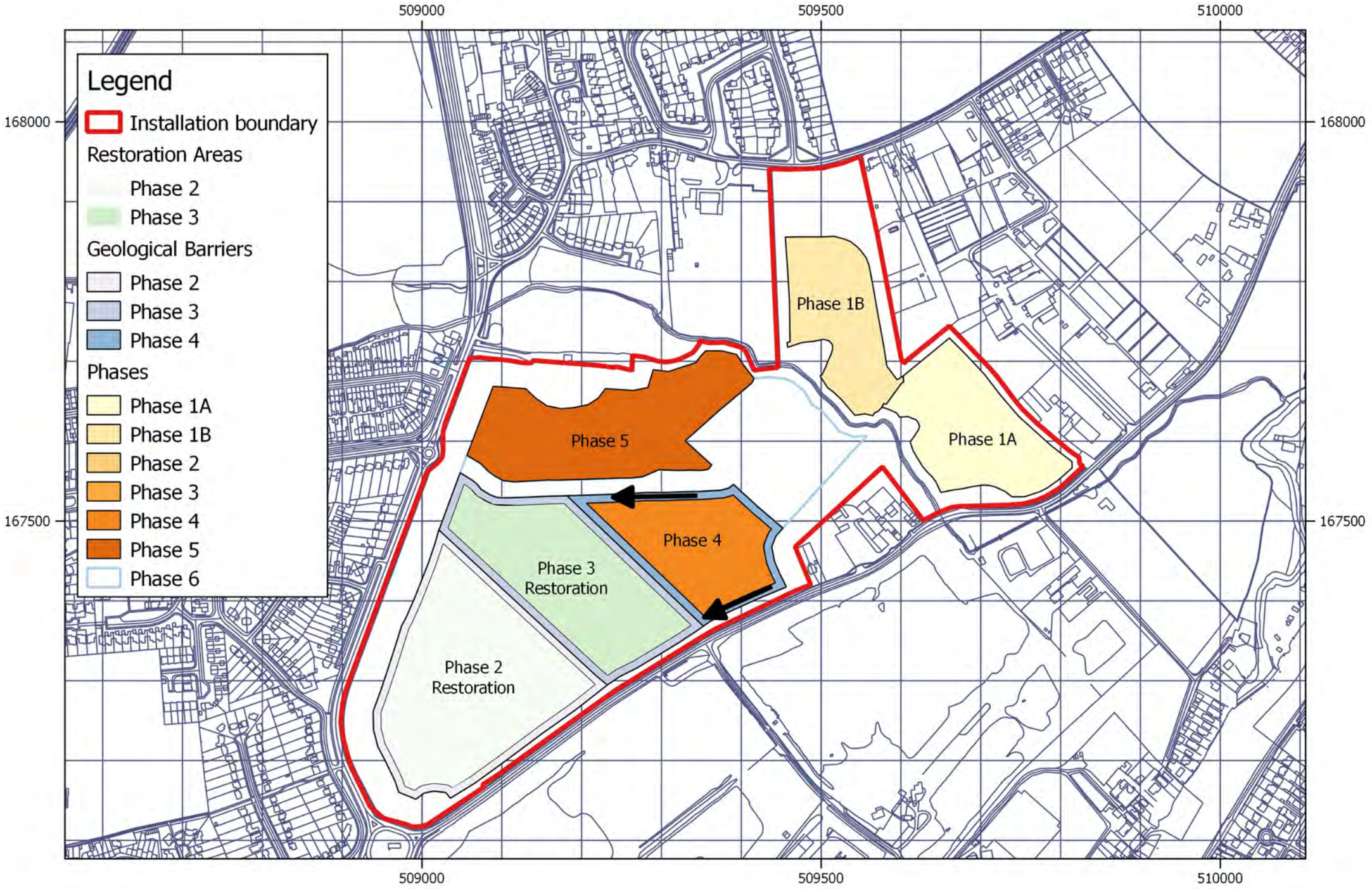
Phase 5
Phase 6
Phase 1B
Phase 1A
Phase 4
Phase 3
Phase 2
Restoration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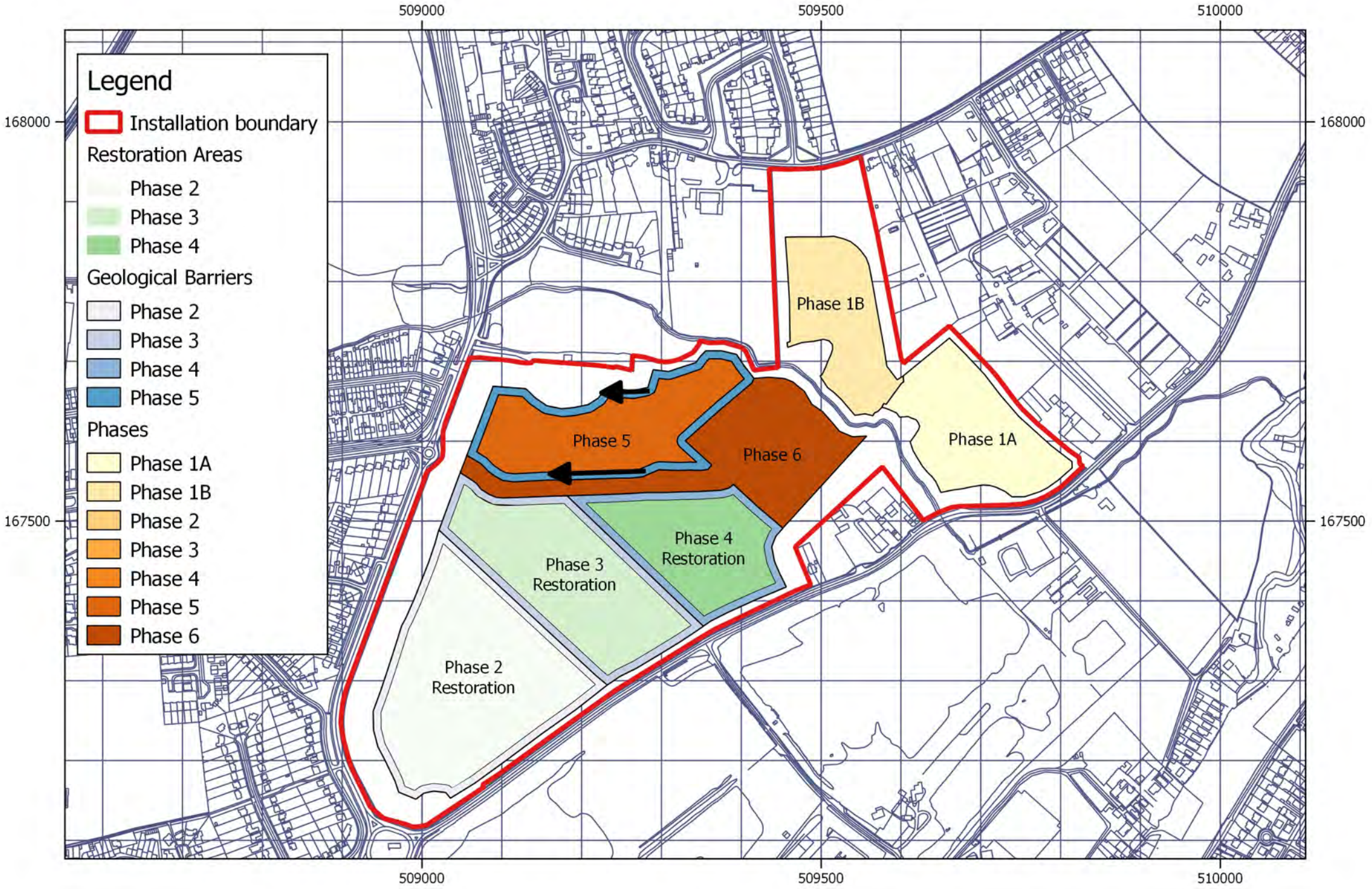
Restoration
Phase 2
Restoration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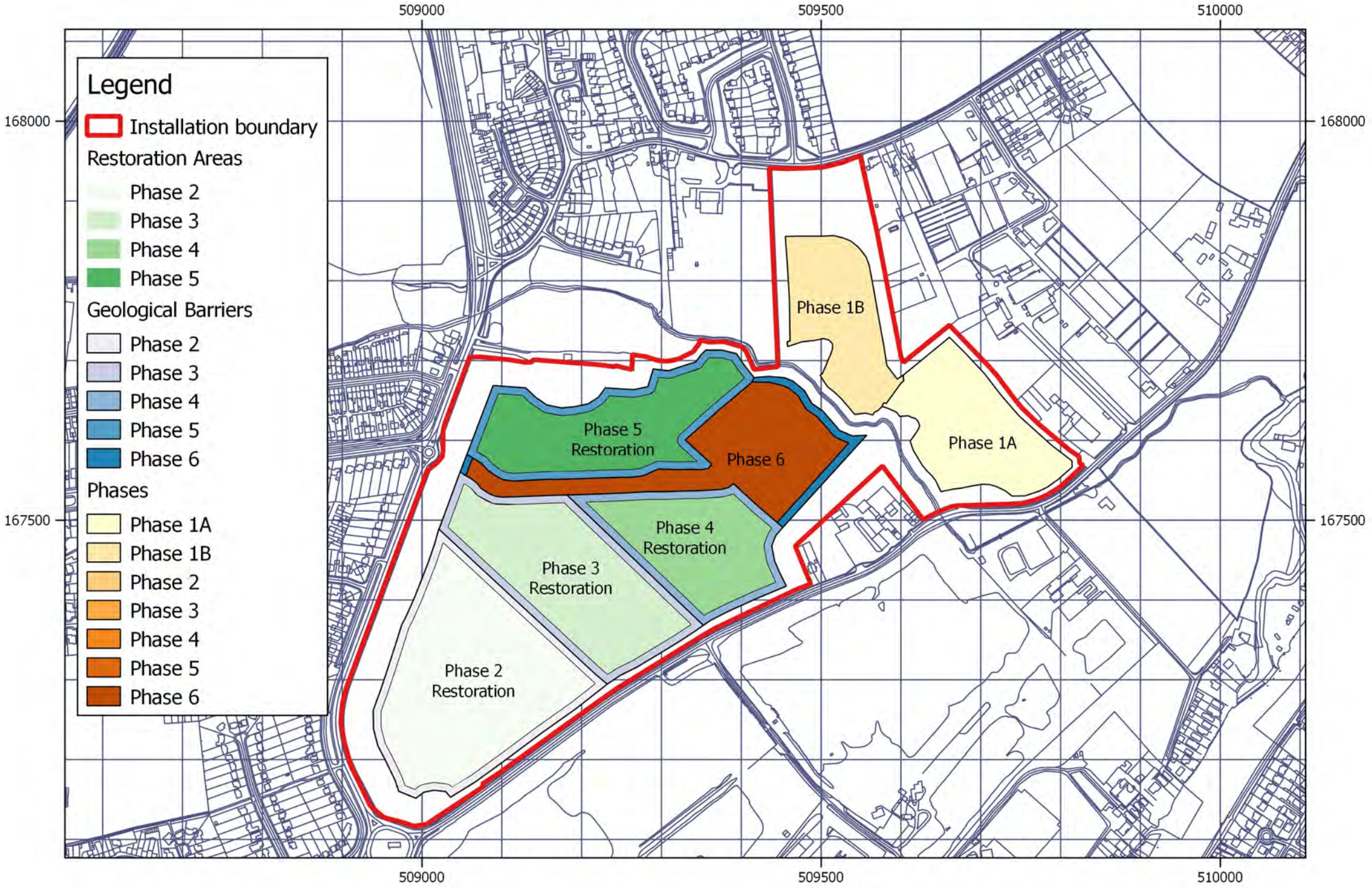
Phase 1A
Phase 5
Phase 6
Phase 4 Restoration
Phase 3 Restoration
Phase 2 Restoration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Phase 5 Restoration
Phase 6
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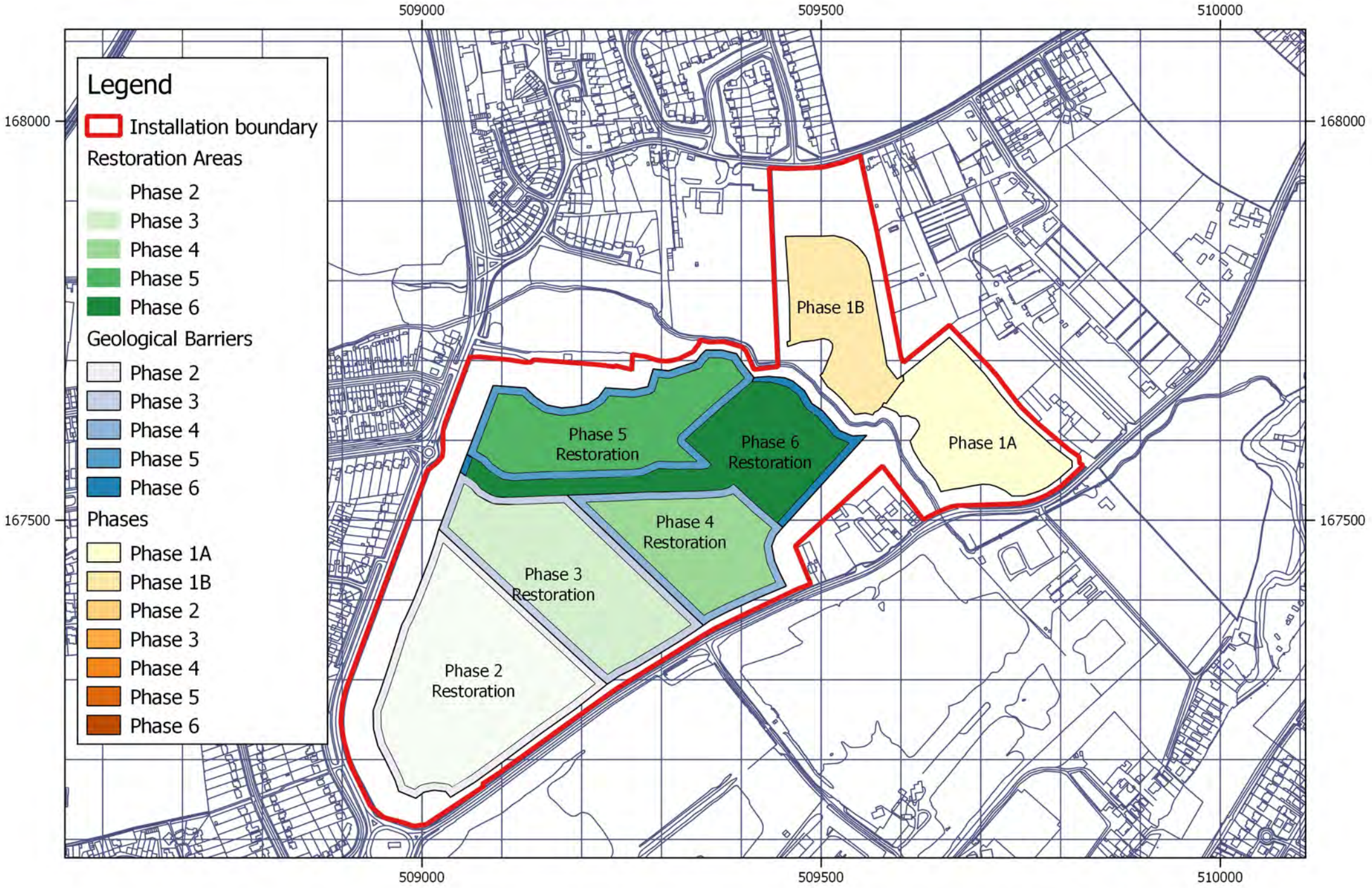
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Phase 5 Restoration
Phase 6 Restoration
Phase 4 Restoration
Phase 3 Restoration
Phase 2 Restoration