



AQUIND Limited

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Environmental Statement – Volume 3 – Appendix 19.2 Groundwater Resources Baseline

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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APPENDIX 19.2 GROUNDWATER RESOURCES BASELINE

1.1.1.1 This Appendix provides the supporting baseline environment data for Chapter 19 (Groundwater) of the ES Volume 1 (document reference 6.1.19).

Table 1 - Tracer Testing in the Bedhampton and Havant Catchment (defined by the British Geological Survey)

Injection Site and Number	Detection Site	Distance (km)	Velocity (km/day)
Hazleton Wood/Hordean #32	Bedhampton Spring	5.8	2.6
	Havant Spring	6.0	2.1
Lovedean #26	Bedhampton Spring	6.3	2.7
	Havant Spring	6.6	3.2
Rowlands Castle #39	Bedhampton Spring	4.8	10.5
	Havant Spring	4.6	12.3
Hordean #41	Bedhampton Spring	5.8	9.1
	Havant Spring	5.7	4.0

Table 2 - Main Geological and Hydrogeological Units

Geological Time	Geological Formation	Aquifer	EA Aquifer Classification	Cable Route Section Reference
Quaternary	Head Deposits	Superficial Aquifer	Secondary (Undifferentiated)	Section 2 to Section 5
	River Terrace Deposits		Secondary A Aquifer	Section 5, Section 6 and Section 9
	Raised Marine Deposits		Secondary (Undifferentiated)	Section 7 and Section 8
Palaeogene	Wittering Formation	Bedrock Aquifer	Secondary A Aquifer	Section 9 and Section 4
	London Clay Formation (Portsmouth Sand Member and Whitecliff Sand Member)			Section 9
	London Clay Formation		Unproductive Strata	Section 9, Section 8, Section 4 and Section 3
	London Clay Formation (Bognor Sands Member)		Secondary A Aquifer	Section 8 and Section 4,
	Lambeth Group		Secondary A Aquifer	Section 8, Section 7, Section 4 and Section 3

Geological Time	Geological Formation	Aquifer	EA Aquifer Classification	Cable Route Section Reference
Cretaceous	White Chalk Subgroup	Bedrock Aquifer	Principal Aquifer	Section 7, Section 6, Section 5, Section 4 and Section 2

Table notes: Secondary A aquifers are capable of supporting water supplies and/or river base flow at a local rather than strategic scale.

Secondary (Undifferentiated) aquifers are designated as both minor and non-aquifer due to the variable characteristics of the rock type.

Principal aquifers are defined as having high intergranular and/or fracture permeability and usually provide a high level of water storage, capable of supporting water supplies and/or river baseflow at a regional or strategic scale.

Table 3 - Ground Investigation Observation Installation Summary

Borehole ID	Easting	Northing	Ground Level (m)	Total Depth (m)	Response Zone (mBGL)	Formation	Cable Route Section Reference
BH15A	467608	104896	1.22	20.0	2.0 – 6.0	Raised Marine Deposits/White Chalk Subgroup	Section 6
BH16	467647	104822	0.75	20.25	2.0 – 10.0	White Chalk Subgroup	Section 7
BH18	467642	104637	1.74	18.50	1.0 – 4.5	Raised Marine Deposits	Section 7
BH19	467321	103857	1.71	38.05	1.0 – 5.0	Raised Marine Deposits/White Chalk Subgroup	Section 7
BH25	467856	099099	.44	31.40	2.0 – 5.6	Storm Beach Deposits	Section 10
BH26	467856	099099	4.39	32.75	4.0 – 8.5	Storm Beach Deposits	Section 10

Borehole ID	Easting	Northing	Ground Level (m)	Total Depth (m)	Response Zone (mBGL)	Formation	Cable Route Section Reference
BH33 s	467569	099675	4.02	30.0	1.0 – 8.0	River Terrace Deposits	Section 9
BH33 d					10.0 – 20.0	Wittering Formation	Section 9
BH34	467449	099459	4.09	16.80	1.0 – 3.0	Tidal Flat Deposits	Section 9
BH35	467437	103238	3.07	35.0	3.0 – 15.50	Beach Tidal Flat Deposits/White Chalk Subgroup	Section 7
BH36	467290	103633	2.41	30.0	1.0 – 4.5	Raised Marine Deposits	Section 7
BH39	467706	099811	3.90	16.50	1.0 – 5.0	River Terrace Deposits	Section 9

Table notes: comprehensive details of the ground investigation are provided in Chapter 18: Ground Conditions.

Table 4 - Records of Manual Dip Groundwater Level Monitoring for the Cable Route (Section 2 to Section 9)

Borehole ID	Elevation (mOD)	Rest Water Level (mOD)		
		27/11/2018	28/11/2018	30/11/2018
BH15A	1.22	0.42	0.55	NR
BH16	0.75	0.33	0.47	NR
BH18	1.74	0.35	0.62	NR
BH19	1.71	0.92	1.15	NR
BH25	3.44	0.85	0.95	NR
BH26	4.39	NR	1.02	NR
BH33 s	4.02	2.93	3.14	NR
BH33 d		2.74	2.52	NR
BH34	4.09	1.64	1.61	1.62
BH35	3.07	1.17	1.24	NR
BH36	2.41	0.92	1.09	NR
BH39	3.90	1.60	1.60	NR

Borehole ID	Elevation (mOD)	Rest Water Level (mOD)		
		27/11/2018	28/11/2018	30/11/2018

Table notes: NR denotes no record of groundwater level.

Table 5 - Records of Continuous Groundwater Level Monitoring for the Cable Route (Section 2 to Section 9)

Borehole	Elevation (mOD)	Data Logger Maximum mAOD	Data Logger mAOD Min
BH15A	1.22	0.72	0.22
BH16	0.75	0.73	0.12
BH18	1.74	1.41	0.09
BH19	1.71	1.51	0.50
BH25	3.44	1.21	0.38

Borehole	Elevation (mOD)	Data Logger Maximum mAOD	Data Logger mAOD Min
BH33S	4.02	3.26	2.45
BH33D	4.02	3.70	2.59
BH34	4.09	1.70	0.68
BH35	3.07	1.70	0.96
BH36	2.41	1.77	0.64
BH39	3.9	1.98	1.45

Note: Monitoring record 27th November 2018 to 29th May 2019

Table 6 - Groundwater Water Quality Results

Parameter	Minimum	Maximum	UK Drinking Water Standards	Unit
pH	6.7	7.8	<6.5 to >9.5	
Conductivity	14800.0	35600.0		µS/cm
Total Cyanide	40.0	40.0	50.0	µg/L
Ammoniacal Nitrogen	0.03	19.0	0.39	mg/L
Nitrate as NO3	1.6	31.0	50.0	mg/L
Nitrite as NO2	0.1	0.1	0.5	mg/L
Chloride	37.0	11000.0	250.0	mg/L
Sulphate as SO4	5.3	1700.0	250.0	mg/L
Arsenic*	0.4	8.9	10.0	µg/L
Cadmium*	0.03	0.1	5.0	µg/L
Chromium*	0.3	1.2	50.0	µg/L
Copper*	1.1	14.0	2000.0	µg/L
Lead*	0.09	2.1	10.0	µg/L
Mercury*	0.01	0.02	1.0	µg/L
Nickel*	1.3	16.0	20.0	µg/L
Zinc*	7.4	44.0	5000.0	µg/L

Table notes: * dissolved concentration.

Table 7 - Aquifer unit sensitivities

Geological Formation	EA Aquifer Classification	Cable Route Section Reference	Sensitivity
Head Deposits	Secondary (Undifferentiated)	Section 2 to Section 5	Low
River Terrace Deposits	Secondary A aquifer	Section 5, Section 6 and Section 9	Medium
Raised Marine Deposits	Secondary (Undifferentiated)	Section 7 and Section 8	Low
Wittering Formation	Secondary A aquifer	Section 9 and Section 4	Medium
London Clay Formation (Portsmouth Sand Member and Whitecliff Sand Member)		Section 9	Medium
London Clay Formation (Bognor Sands Member)	Secondary A aquifer	Section 8 and Section 4,	Medium
Lambeth Group	Secondary A aquifer	Section 8, Section 7, Section 4 and Section 3	Medium
White Chalk Subgroup	Principal aquifer	Section 7, Section 6, Section 5, Section 4 and Section 2	High

REFERENCES

WSP (2018) Initial Ground Investigation Findings, Milton Common, October 2018

WSP (2019) UK Converter Station Ground Investigation – Geotechnical Interpretative Design Development Report dated May 2019

WSP (2019) UK Route, HDD and Landfall Ground Investigation – Geotechnical Interpretative Design Development Report dated May 2019

