



NORTH FALLS

Offshore Wind Farm

Groundwater Risk Assessment and Monitoring Plan - Private Water Supplies and Licenced Abstractions (Part 4 of 4)

Document Reference: 9.66
Volume: 9
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Revision: 0



NORTH FALLS

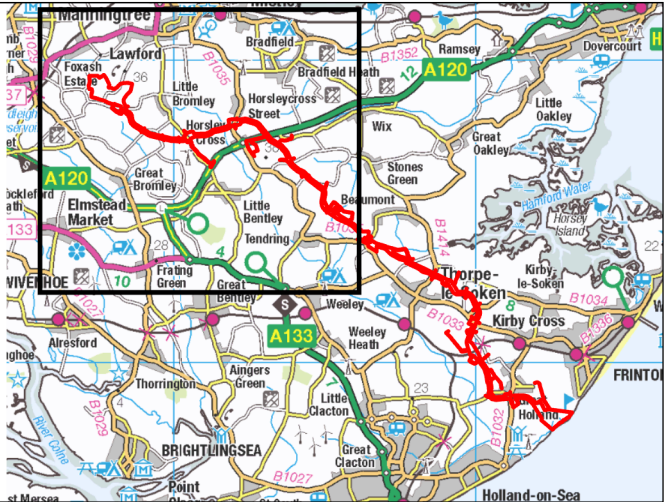
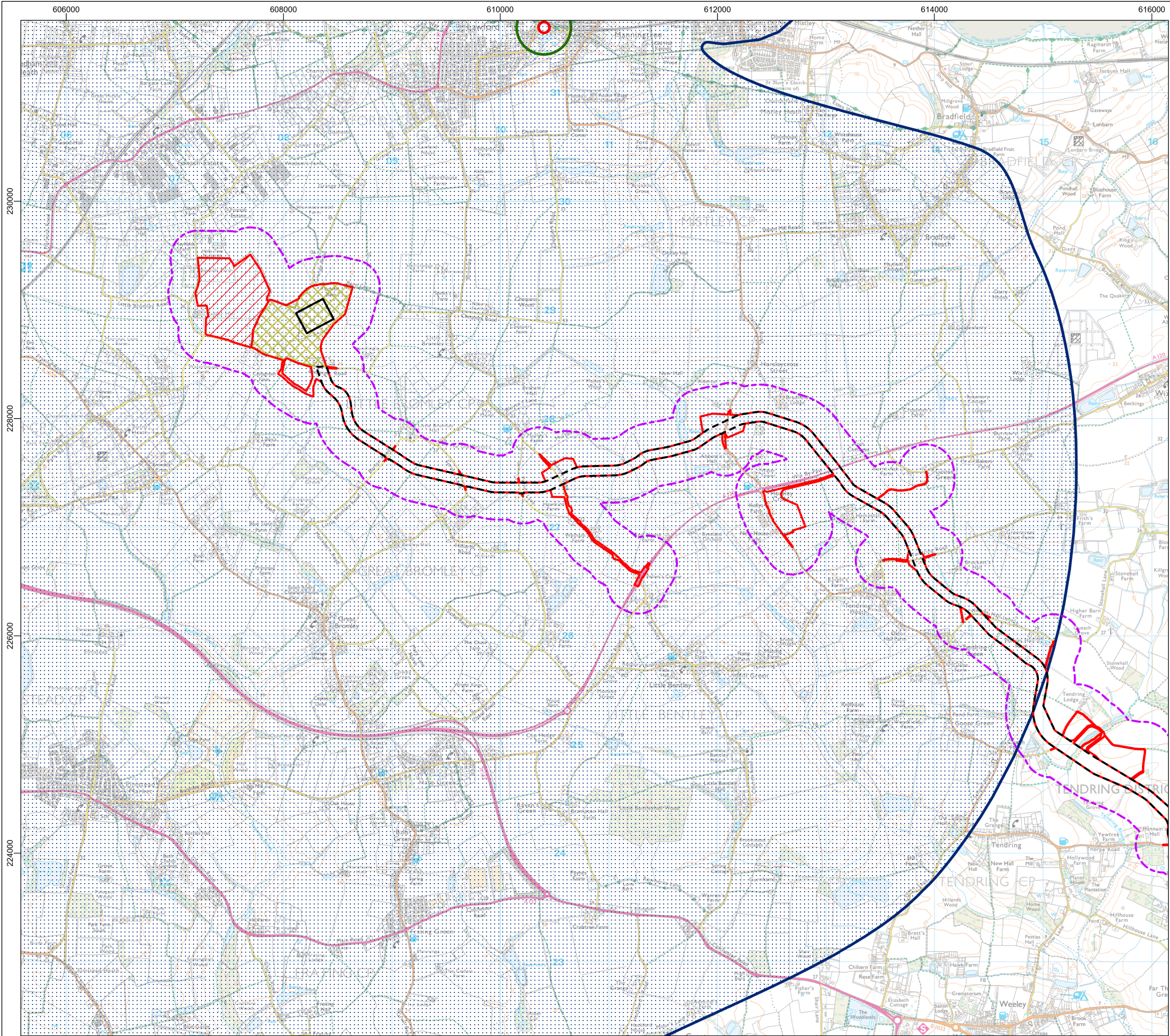
Offshore Wind Farm

Project Reference: EN010119

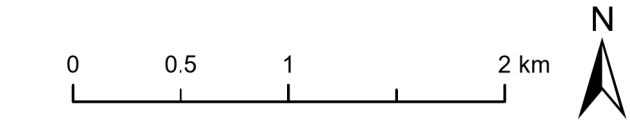
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| Project | North Falls Offshore Wind Farm |
| Document Title | Groundwater Risk Assessment and Monitoring Plan - Private Water Supplies and Licenced Abstractions (Part 4 of 4) |
| Document Reference | 9.66 |
| Supplier | Royal HaskoningDHV |
| Supplier Document ID | PB9244-RHD-ZZ-ON-RP-ON-0384 |

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| Revision | Date | Status/Reason for Issue | Originator | Checked | Approved |
|-----------------|-------------|------------------------------------|-------------------|----------------|-----------------|
| 0 | May 2025 | Deadline 5 | RHDHV | NFOW | NFOW |
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- Legend**
- Onshore Project Area
 - Onshore Substation
 - East Anglia Connection Node (EACN)
 - Onshore Cable Route
 - Substation Works Area
 - Onshore Project Area Buffer**
 - 250m
 - Source Protection Zones**
 - Zone I - Inner Protection Zone
 - Zone II - Outer Protection Zone
 - Zone III - Total Catchment



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Drawing Title

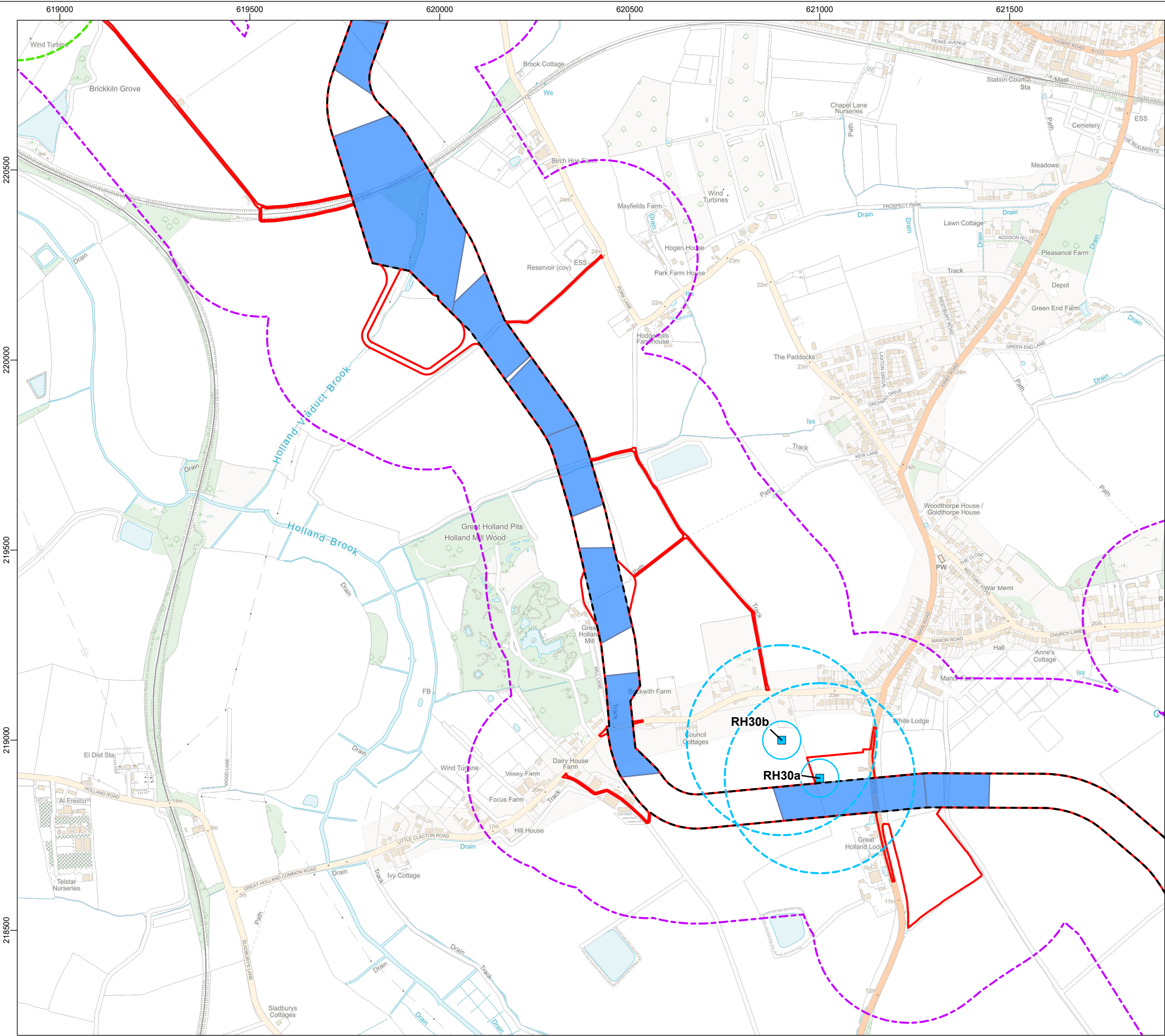
Source Protection Zones

| Rev | Date | Remarks | Drwn | Chkd |
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| 01 | 11/04/2025 | First issue | FC | AW |
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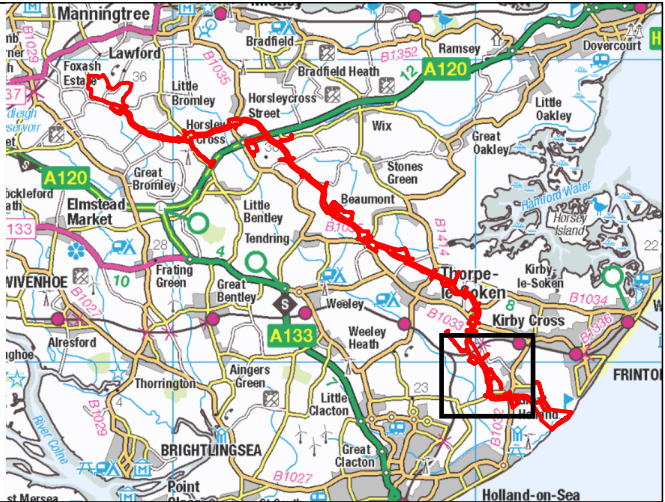
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| Scale | Plot Size | Datum | Projection |
| 1:35,000 | A3 | OSGB36 | BNG |





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Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

- 250m

Groundwater Abstractions

- Spray Irrigation from a Groundwater Source
- Local Authority Regulated 250m Buffer
- Spray Irrigation from a Groundwater Source 50m Buffer
- Spray Irrigation from a Groundwater Source 250m Buffer

0 100 200 400 Metres



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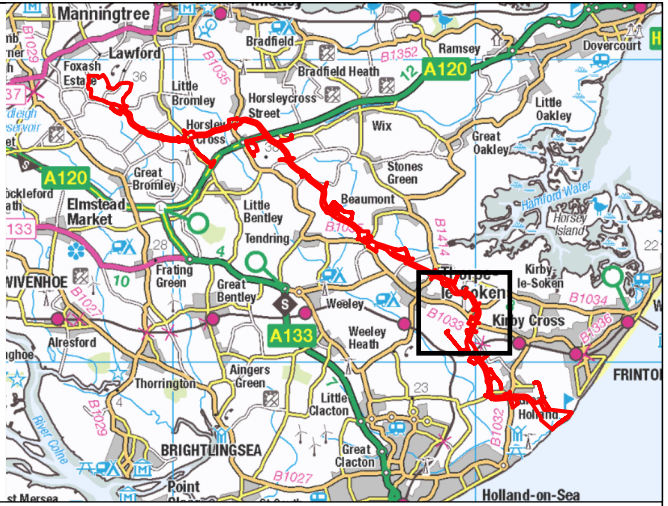
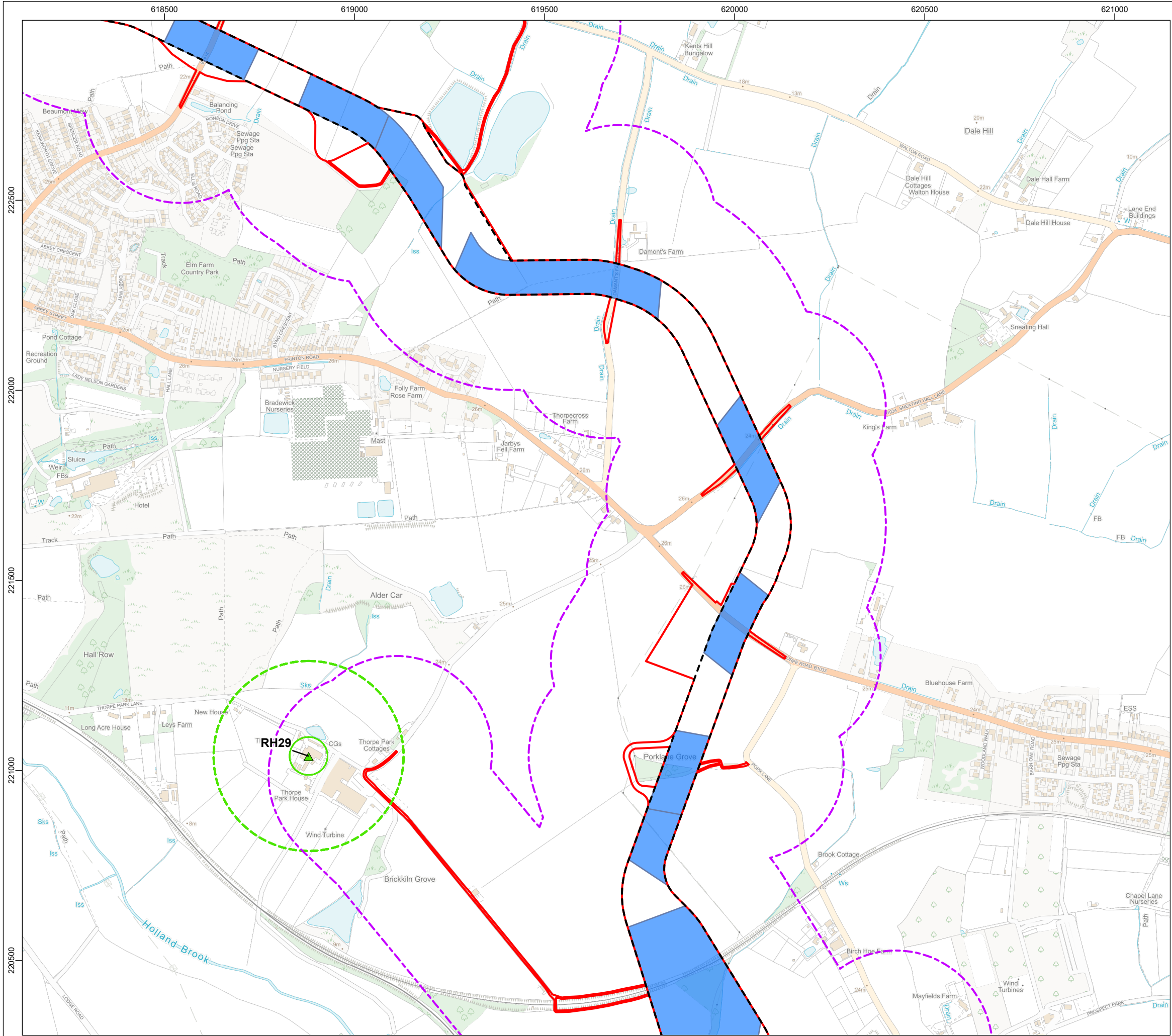
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| Rev | Date | Remarks | Drwn | Chkd |
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| Drawing Number | Figure Number |
| PB9244-RHD-ZZ-ON-DR-GS-0667 | 7a |

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| Scale | Plot Size | Datum | Projection |
| 1:10,000 | A3 | OSGB36 | BNG |





Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

- 250m

Groundwater Abstractions

- Local Authority Regulated
- Local Authority Regulated 50m Buffer
- Local Authority Regulated 250m Buffer

0 100 200 400 Metres



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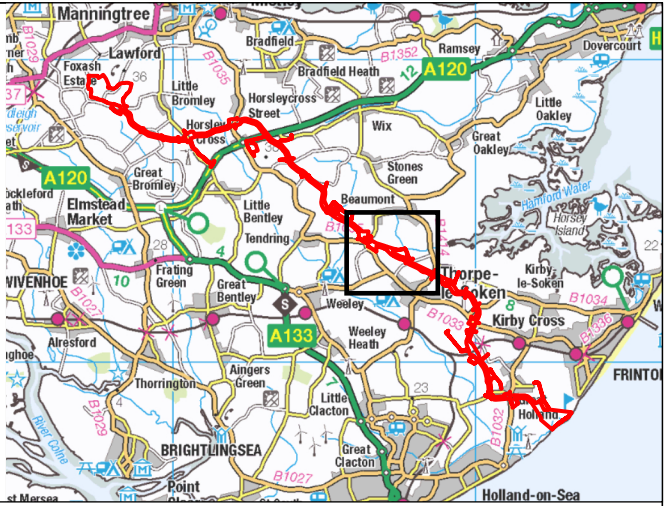
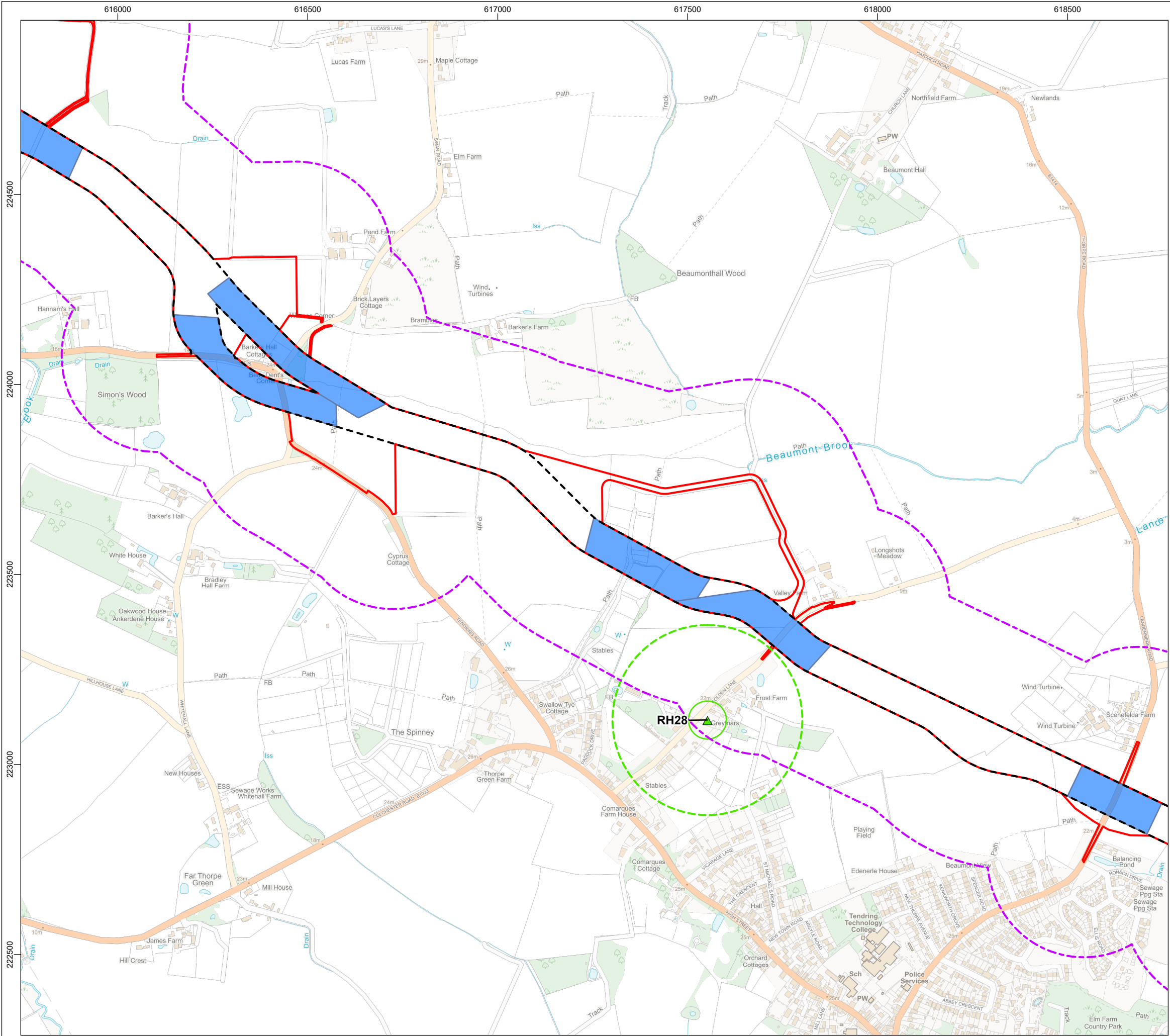
Groundwater Abstractions Risk Assessment

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| 01 | 11/04/2025 | First issue | FC | AW |
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| Drawing Number | Figure Number |
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|----------|-----------|--------|------------|
| Scale | Plot Size | Datum | Projection |
| 1:10,000 | A3 | OSGB36 | BNG |





Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

- 250m

Groundwater Abstractions

- Local Authority Regulated
- Local Authority Regulated 50m Buffer
- Local Authority Regulated 250m Buffer

0 100 200 400 Metres



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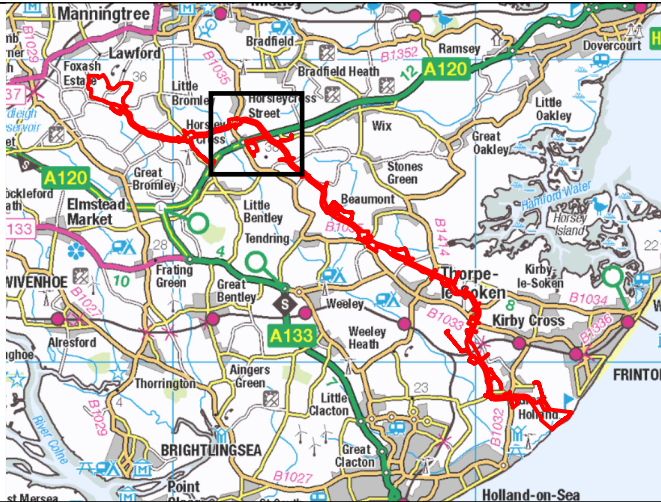
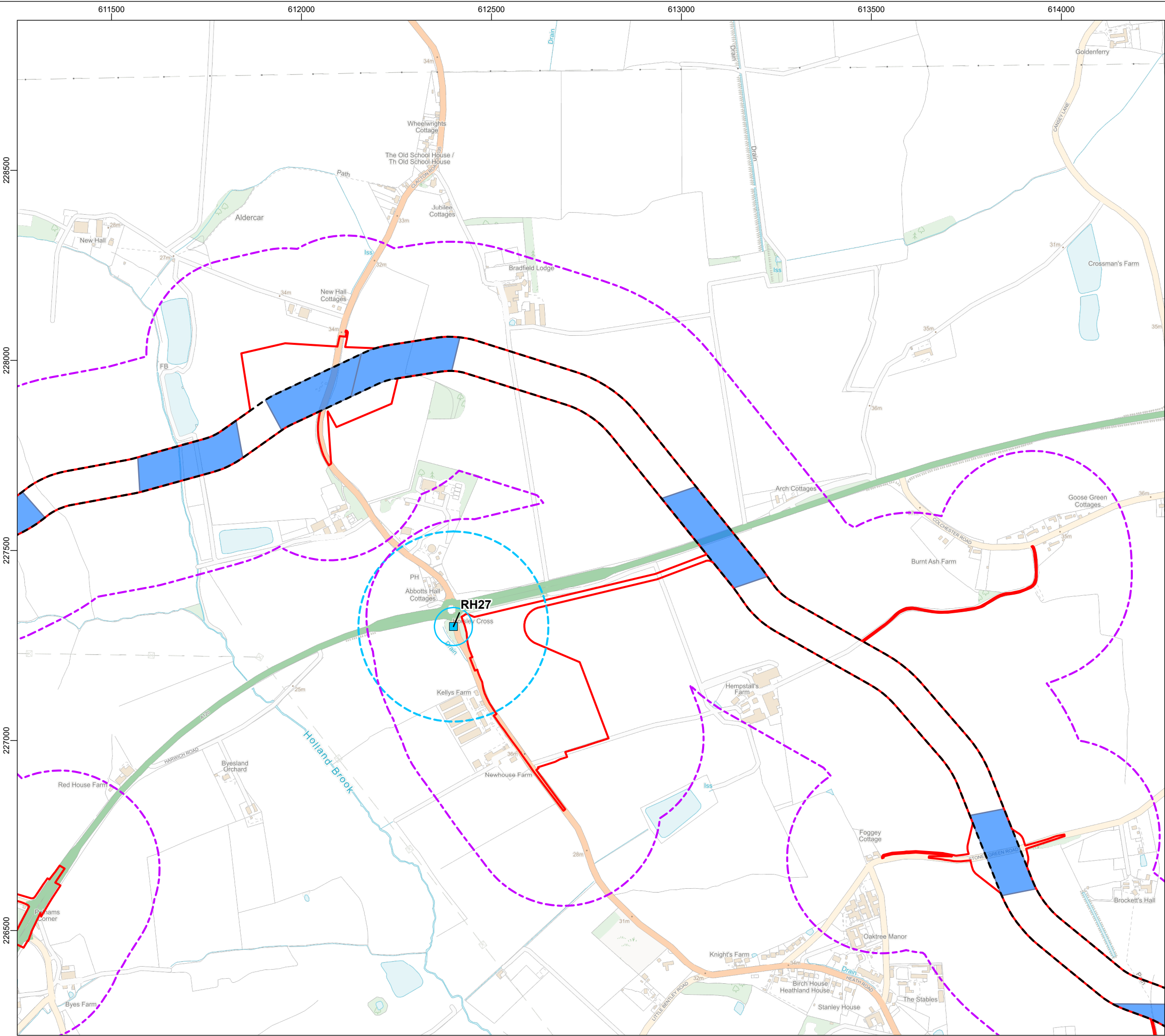
Groundwater Abstractions Risk Assessment

| Rev | Date | Remarks | Drwn | Chkd |
|-----|------------|-------------|------|------|
| 01 | 11/04/2025 | First issue | FC | AW |
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| Scale | Plot Size | Datum | Projection |
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Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

- 250m

Groundwater Abstractions

- Spray Irrigation from a Groundwater Source
- Spray Irrigation from a Groundwater Source 50m Buffer
- Spray Irrigation from a Groundwater Source 250m Buffer

0 100 200 400 Metres



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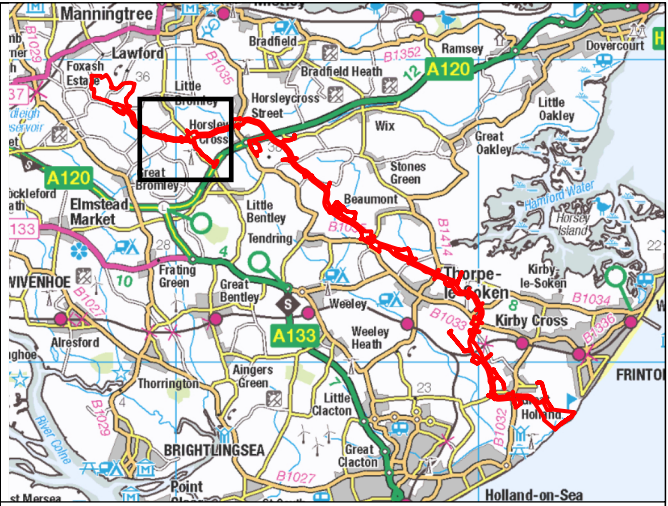
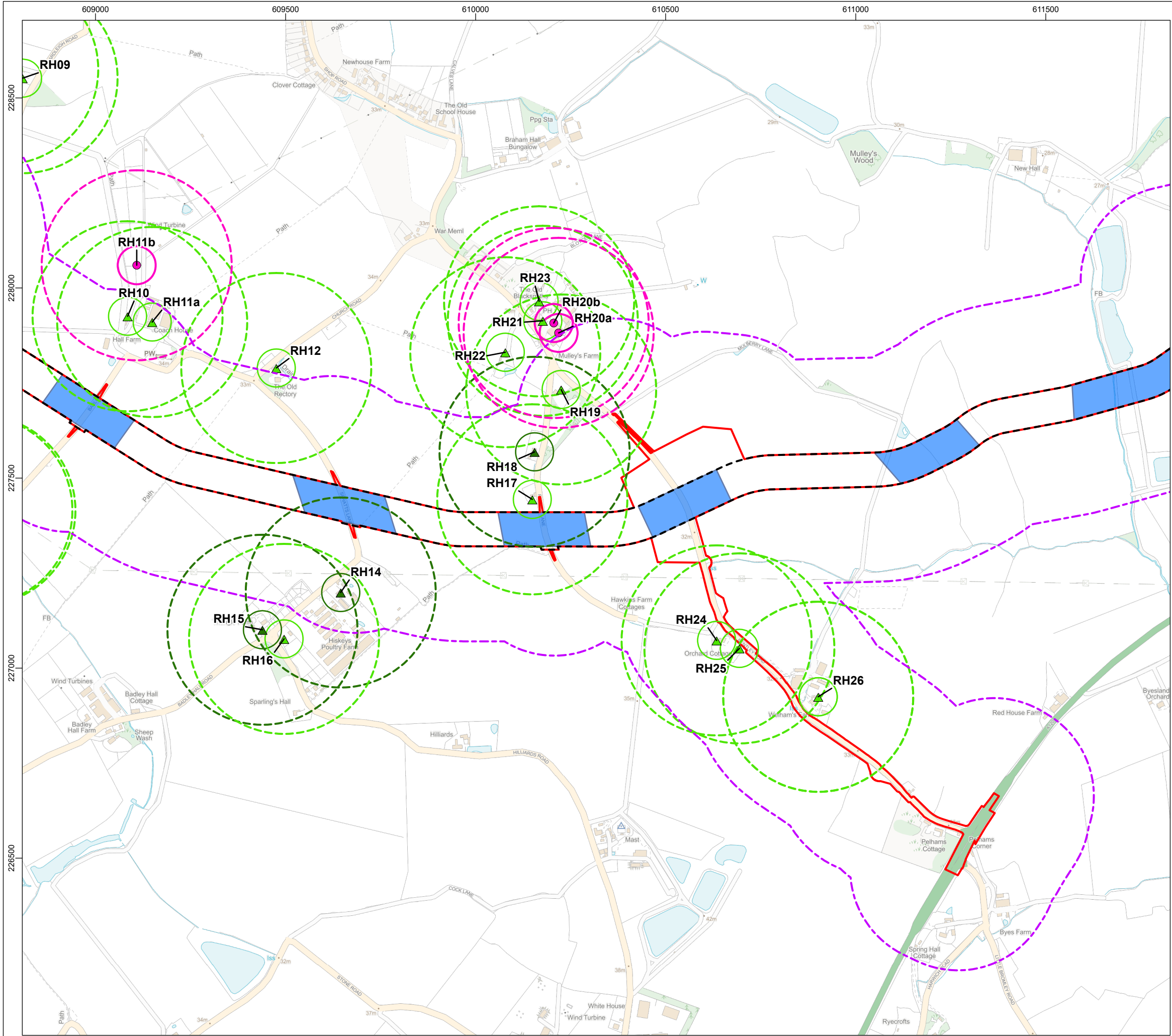
Groundwater Abstractions Risk Assessment

| Rev | Date | Remarks | Drwn | Chkd |
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| Drawing Number | Figure Number |
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| Scale | Plot Size | Datum | Projection |
| 1:10,000 | A3 | OSGB36 | BNG |





Legend

Onshore Project Area

Onshore Cable Route

Trenchless Crossing Zone

Land Agent Identified 250m Buffer

0100200400

Metres

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Figure Number

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1:10,000

Plot Size

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Datum

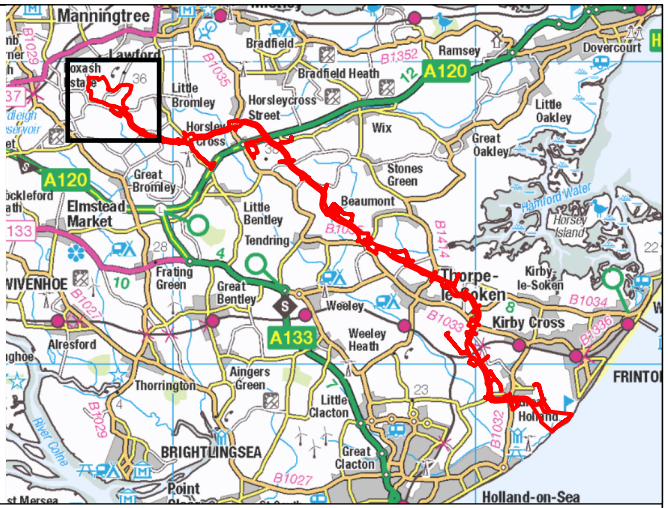
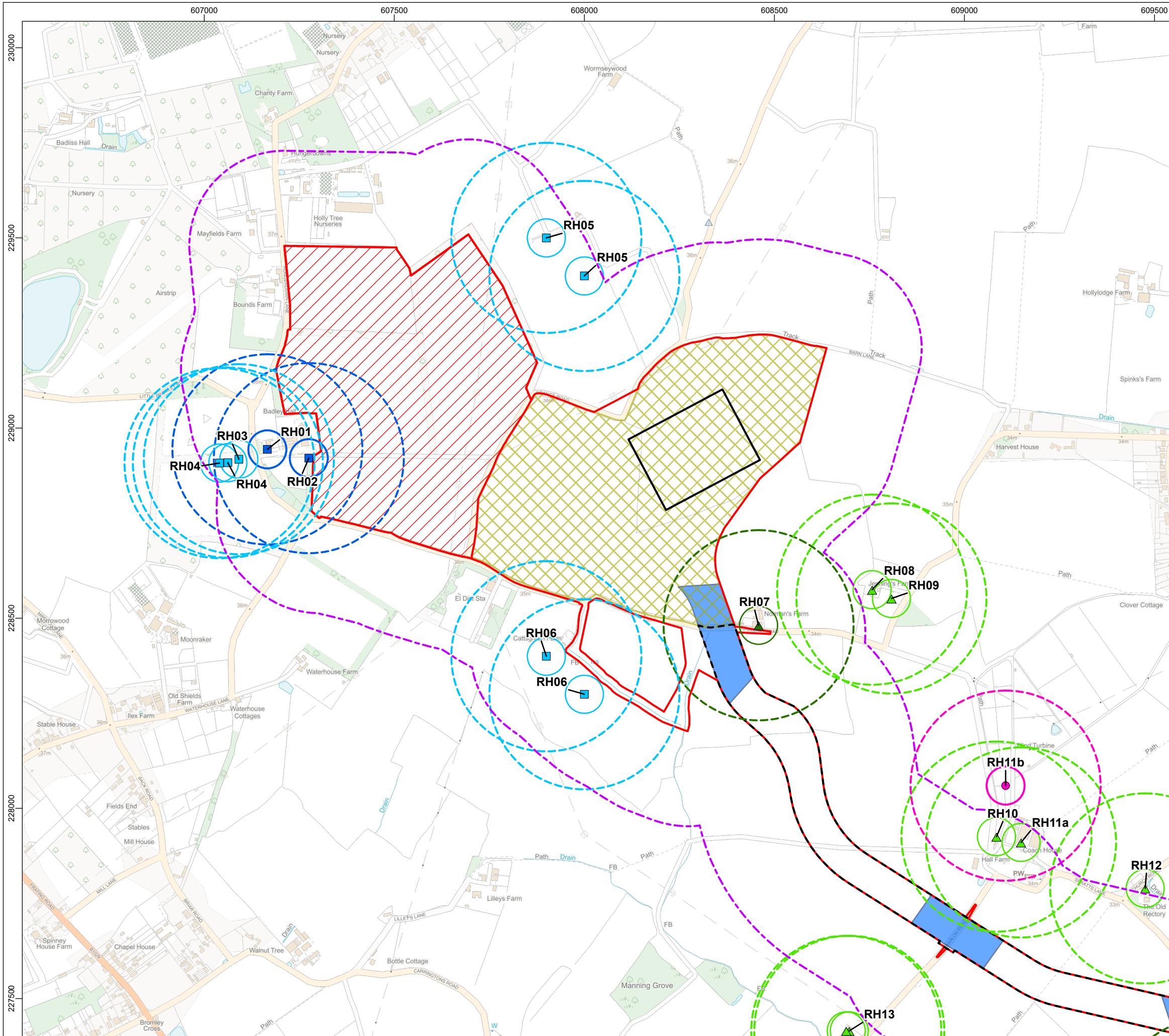
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Projection

BNG

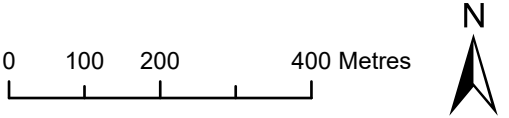
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NORTH FALLS
Offshore Wind Farm



Legend

| | |
|---|---|
| Onshore Project Area | Land Agent Identified 250m Buffer |
| Onshore Substation | Local Authority Regulated 50m Buffer |
| East Anglia Connection Node (EACN) | Local Authority Regulated 250m Buffer |
| Onshore Cable Route | Potable Supply from a Groundwater Source 50m Buffer |
| Trenchless Crossing Zone | Potable Supply from a Groundwater Source 250m Buffer |
| Substation Works Area | Spray Irrigation from a Groundwater Source 50m Buffer |
| Onshore Project Area Buffer 250m | Spray Irrigation from a Groundwater Source 250m Buffer |
| Land Agent Identified | Identified during Wardell Armstrong July/August 2024 PWS Survey 50m Buffer |
| Local Authority Regulated | Identified during Wardell Armstrong July/August 2024 PWS Survey 250m Buffer |
| Potable Supply from a Groundwater Source | |
| Spray Irrigation from a Groundwater Source | |
| Identified during Wardell Armstrong July/August 2024 PWS Survey | |
| Land Agent Identified 50m Buffer | |



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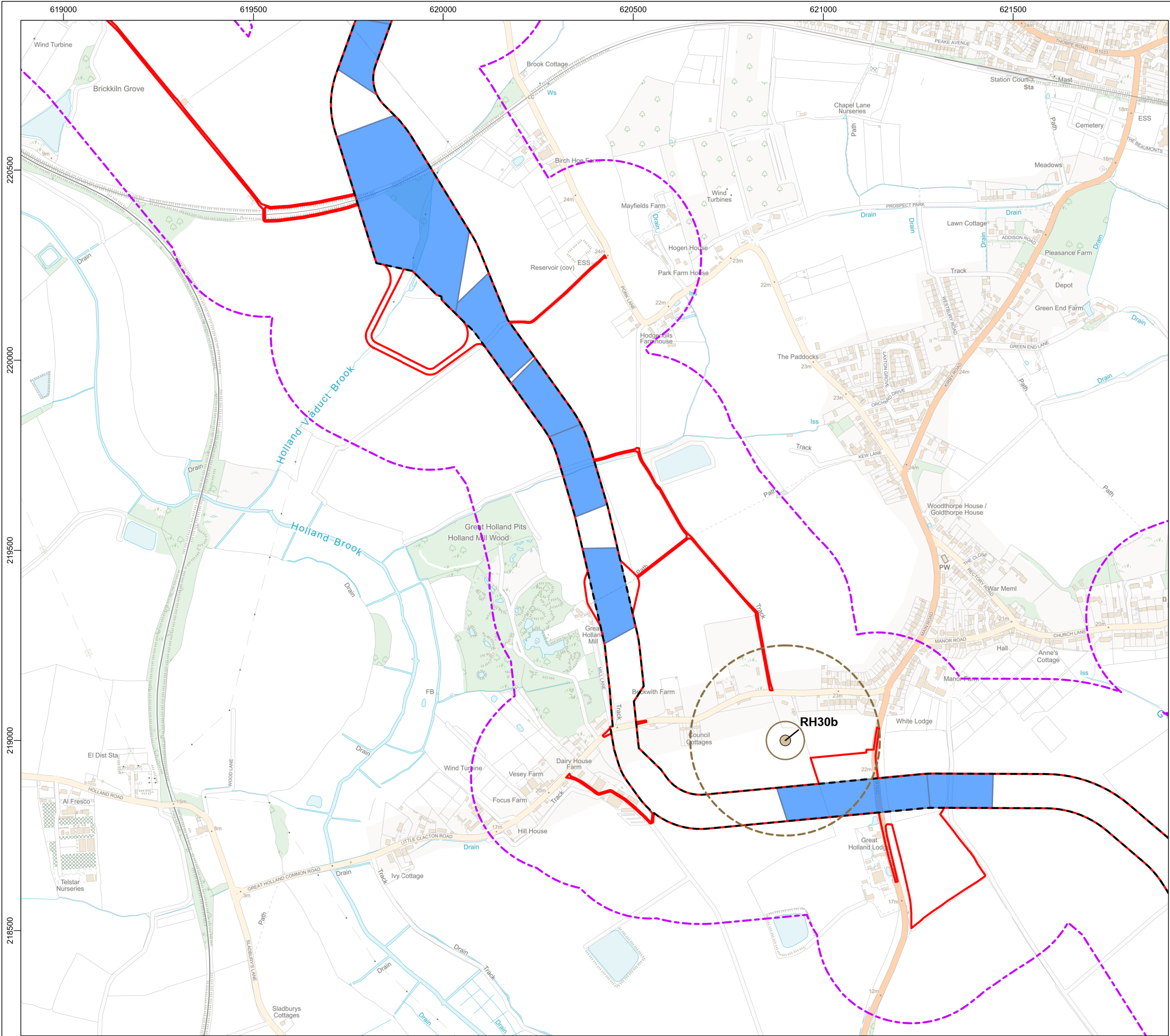
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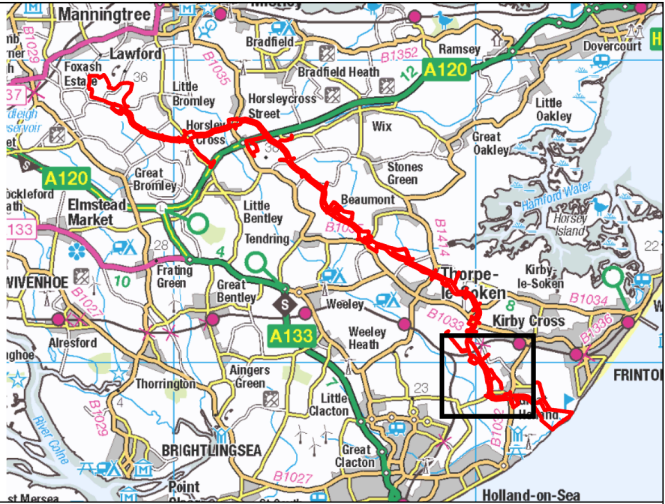
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Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

- 250m

**Potential Risk of Adverse Water Quality/
Dewatering Impacts**

- Abstraction Location
- 50m Buffer
- 250m Buffer

0 100 200 400 Metres



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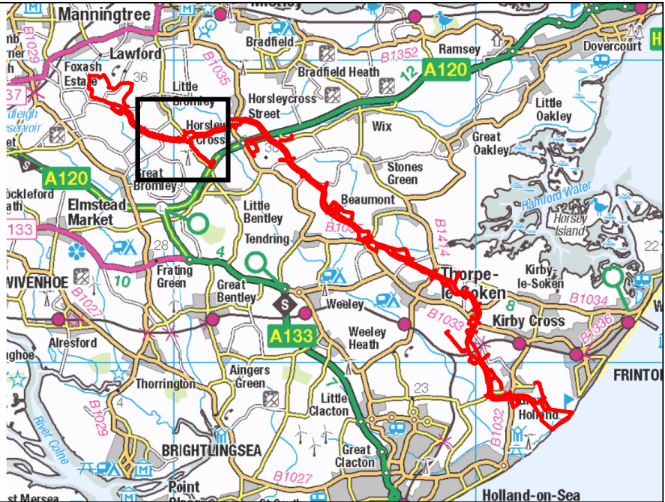
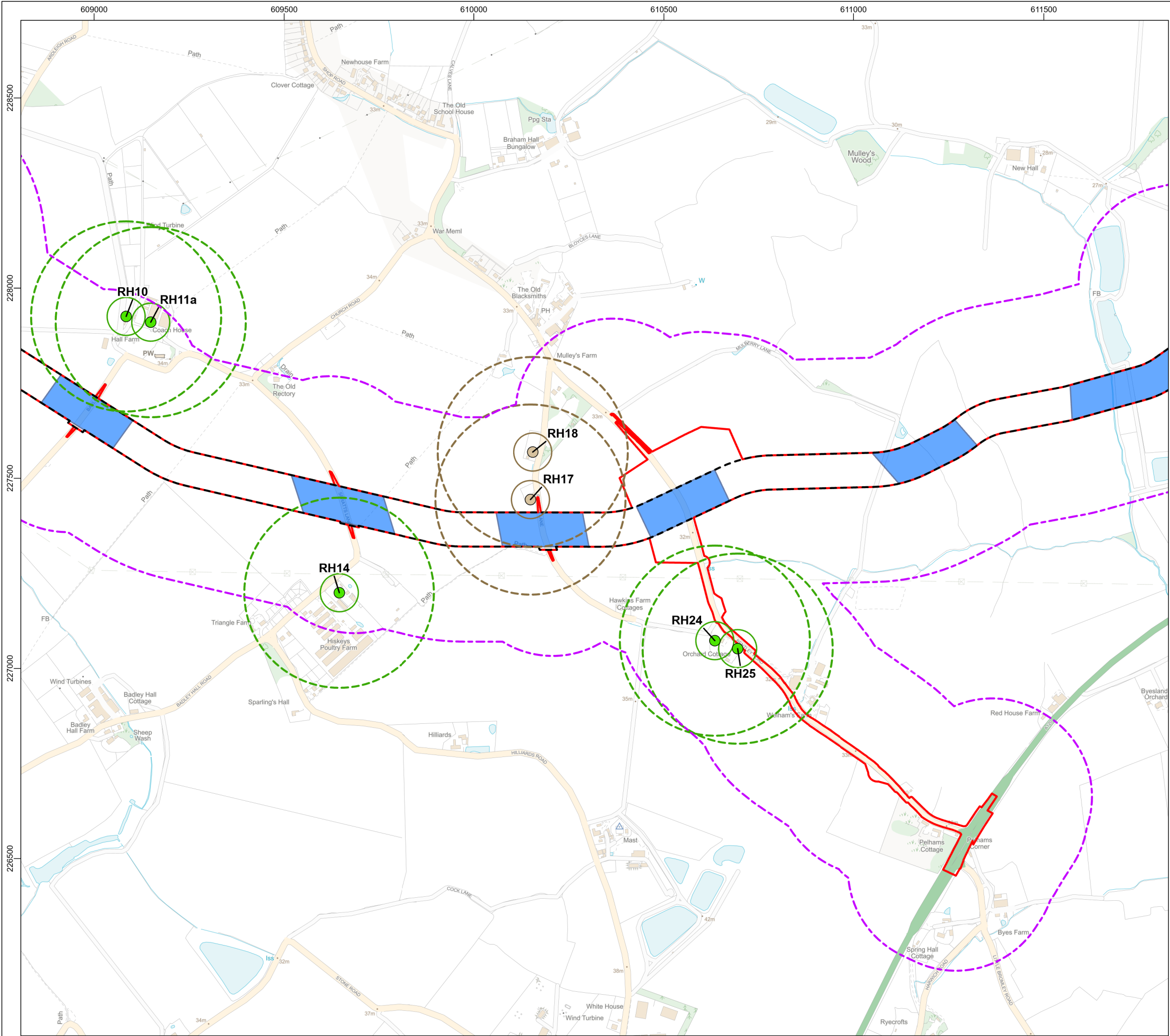
Monitoring Locations

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Legend

- Onshore Project Area
- Onshore Cable Route
- Trenchless Crossing Zone

Onshore Project Area Buffer

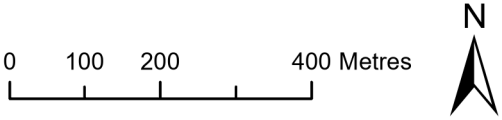
- 250m

Potential Risk from Adverse Impacts on Water Quality

- Abstraction Location
- 50m Buffer
- 250m Buffer

Potential Risk of Adverse Water Quality/ Dewatering Impacts

- Abstraction Location
- 50m Buffer
- 250m Buffer



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Drawing Title

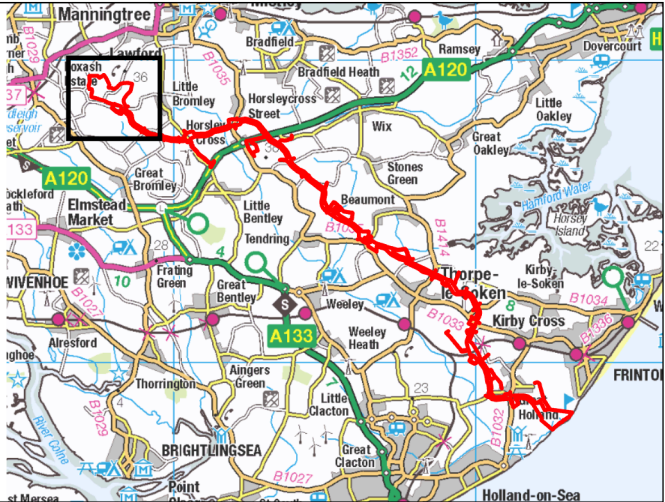
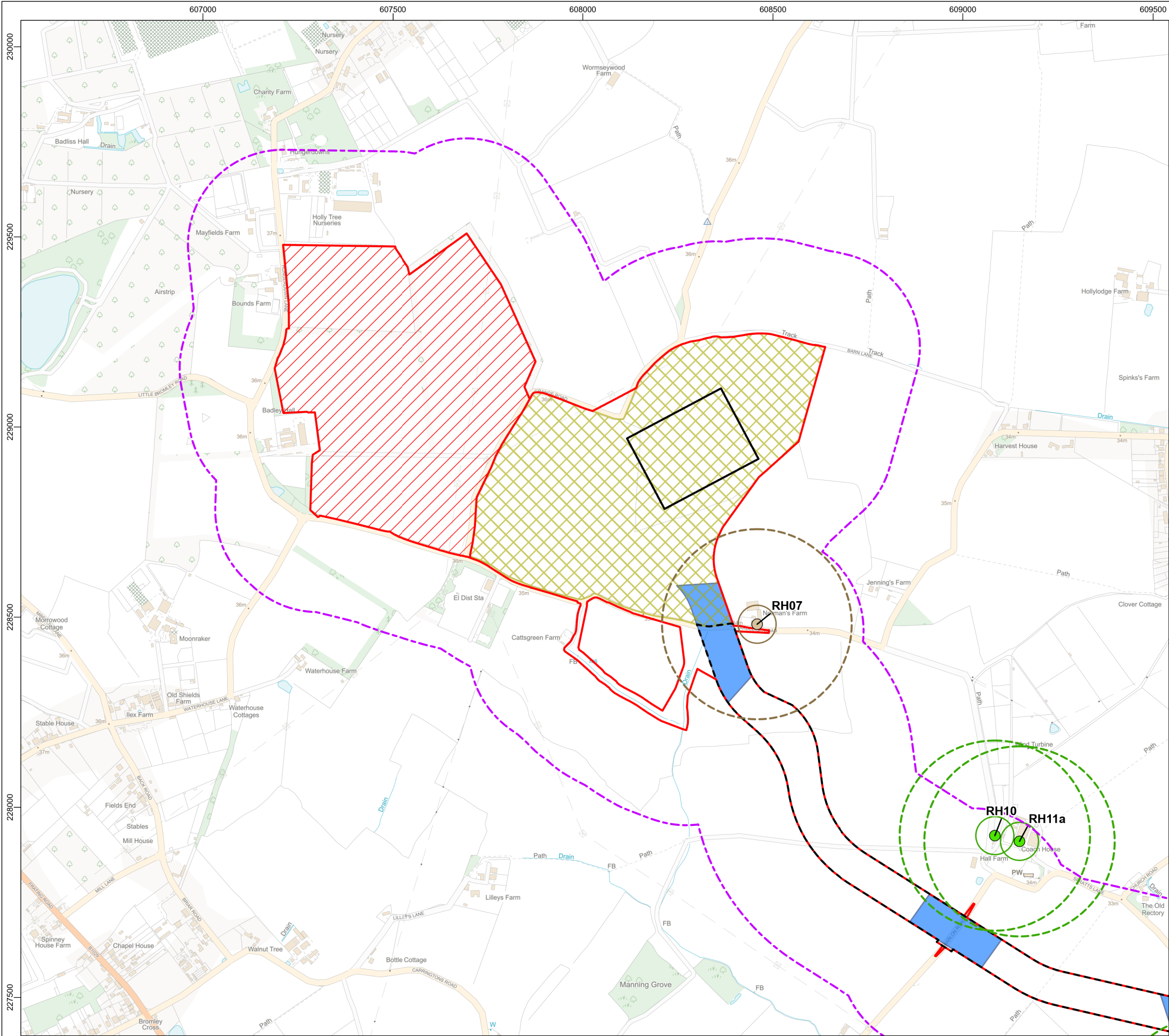
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| Drawing Number | Figure Number |
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| Scale | Plot Size | Datum | Projection |
| 1:10,000 | A3 | OSGB36 | BNG |





Legend

- Onshore Project Area
- Onshore Substation
- East Anglia Connection Node (EACN)
- Onshore Cable Route
- Substation Works Area
- Trenchless Crossing Zone

Onshore Project Area Buffer

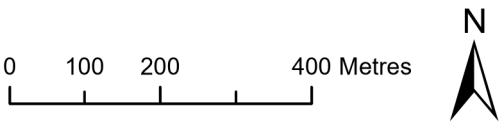
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Potential Risk from Adverse Impacts on Water Quality

- Abstraction Location
- 50m Buffer
- 250m Buffer

Potential Risk of Adverse Water Quality/Dewatering Impacts

- Abstraction Location
- 50m Buffer
- 250m Buffer



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| Monitoring Locations | | | | |
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| Rev | Date | Remarks | Drwn | Chkd |
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| Scale | Plot Size | Datum | Projection | |
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Appendix A. Report Limitations

Limitations

This report has been prepared by Royal HaskoningDHV with reasonable skill and care, within the terms of the contract with NFOW. The direct assessments and judgements given in this report are limited by both the finite data on which they are based and the proposed works to which they are addressed. The report has utilised a variety of publicly available data sources therefore the study is limited by the age and limitations inherent in the data. The acquisition of data is also constrained by both physical and economic factors and by definition is subject to the limitations imposed by the methods of investigations employed. In this instance the data has been obtained from samples and tests from mechanically excavated trial pits which by their nature only provide information about small discrete volumes of soil. They cannot provide data on every section of the ground beneath the site but the data are taken to be spatially representative of the zones of material between exploratory hole locations.

Conditions at the site will change over time due to natural variations and may be affected by human activities. In particular, groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations. Soil and water chemistry may change due to the actions of groundwater flows and microbiological activity etc. The likely variations in the data with time can be assessed following extended periods of measurement and statistical analyses. Unless specifically discussed in the text such extended measurement and analysis have not been carried out and the data collected are taken to be representative.

Appendix B. Borehole Summary

Table 1.1 Details of boreholes showing pertinent information within 100m of the Onshore Project Area

| Borehole reference and Location | Details | Thicknesses |
|---|--|--|
| Landfall | | |
| BH203 Maximum depth: 22.45mbgl (-21.54mOD) Centred on grid reference: 622684 218040 | Topsoil: maximum depth: 0.10mbgl (0.81mOD) Alluvium (including peat): maximum depth 9.50mbgl (-8.59mOD) Possible Alluvium: maximum depth 11.20mbgl (-10.29mOD) London Clay Formation: maximum depth 22.45mbgl (-21.54mOD) | Topsoil:0.10m Possible/ Alluvium: 11.10m London Clay Formation:>11.25m |
| BH202 Maximum depth: 19.50mbgl (-18.36mOD) Centred on grid reference:622611 218103 | Topsoil: maximum depth: 0.20mbgl (0.94mOD) Made ground: maximum depth 1.70mbgl (-0.56mOD) Alluvium (including peat): maximum depth 7.50mbgl (-6.36mOD) London Clay Formation: maximum depth 19.50mbgl (-18.36mOD) | Topsoil:0.20m Made Ground:0.30m Alluvium:4.80m London Clay Formation:>12.00m |
| BH201A Maximum depth: 20.20 mbgl (-19.23mOD) Centred on grid reference: 622509 218181 | Alluvium: maximum depth: 7.20 mbgl (-6.23mOD) London Clay Formation: maximum depth 20.20 (-19.23mOD) | Alluvium:7.20m London Clay Formation:>13.00m |
| ECC | | |
| BHLC-3 Maximum depth: 20.00mbgl (4.93mOD) Centred on grid reference:620659 219066 | Topsoil: maximum depth: 0.20mbgl (24.73mOD) Possible Head: maximum depth 1.20mbgl (23.03mOD) Possible/ Cover Sands: maximum depth 5.60mbgl (19.33mOD) London Clay Formation: maximum depth 20.00mbgl (4.93mOD) | Topsoil:0.20m Possible Head:1.00m Possible/ Cover Sands:4.40m London Clay Formation:>14.40m |
| BHLC-1 Maximum depth: 20.00mbgl (3.40mOD) Centred on grid reference:620464 218963 | Made ground: maximum depth: 2.00mbgl (21.40mOD) Kesgrave Catchment Subgroup: maximum depth 4.50mbgl (18.20mOD) London Clay Formation: maximum depth 20.00mbgl (3.40mOD) | Made Ground: 2.00m Kesgrave Catchment Subgroup:2.50m London Clay Formation:>15.50m |
| TM22SW14 and TM22SW18 to 21 | Topsoil: Max depth 0.45mbgl | Topsoil:0.45m |

| Borehole reference and Location | Details | Thicknesses |
|--|---|---|
| Maximum depth: 12.19mbgl (mOD unknown) Centred on grid reference: 620310 220230 | Sandy Clay (Cover Sand?): Max depth 0.91mbgl Sand and Gravel (Kesgrave Catchment Subgroup?): Max depth: 3.66mbgl Stiff fissured Clay (London Clay Formation?): Max depth 12.19mbgl | Possible Cover Sand:0.46m Possible Kesgrave Catchment Subgroup:3.20m Possible London Clay Formation:>8.53 |
| BHR-S Maximum depth: 25.45mbgl (-9.79mOD) Centred on grid reference: 619909 220374 | Topsoil: maximum depth: 0.50mbgl (15.16mOD) Possible Head: maximum depth 4.50mbgl (11.16mOD) London Clay Formation: maximum depth 25.45mbgl (-9.79mOD) | Topsoil:0.50m Possible Head:4.00m London Clay Formation:>20.95m |
| BHR-N Maximum depth: 25.00mbgl (-2.02mOD) Centred on grid reference: 619734 220458 | Topsoil: maximum depth: 0.30mbgl (22.68mOD) Possible Head: maximum depth 0.50mbgl (22.48mOD) Possible Cover Sands: maximum depth 3.20mbgl (19.77mOD) London Clay Formation: maximum depth 25.00mbgl (-2.02mOD) | Topsoil:0.30m Possible Head:0.20m Possible Cover Sands:2.70m London Clay Formation:>21.80m |
| BHSR-4 Maximum depth: 20.00mbgl (7.22mOD) Centred on grid reference: 616454 223967 | Made ground: maximum depth: 2.00mbgl (25.22mOD) Kesgrave Catchment Subgroup: maximum depth 2.90mbgl (24.32mOD) London Clay Formation: maximum depth 20.00mbgl (7.22mOD) | Made Ground: 2.00m Kesgrave Catchment Subgroup:0.90m London Clay Formation:>17.10m |
| BHSR-3 Maximum depth: 20.00mbgl (4.93mOD) Centred on grid reference: 616440 224087 | Topsoil: maximum depth: 0.20mbgl (26.42mOD) Possible/ Cover Sands: maximum depth 4.10mbgl (22.52mOD) London Clay Formation: maximum depth 20.00mbgl (4.93mOD) | Topsoil:0.20m Possible Cover Sands:3.90m London Clay Formation:>15.90m |
| BHSR-1 Maximum depth: 20.00mbgl (1.33mOD) Centred on grid reference: 616209 224098 | Topsoil: maximum depth: 0.30mbgl (21.03mOD) Made Ground maximum depth: 2.40mbgl (18.93mOD) London Clay Formation: maximum depth 20.00mbgl (6.62mOD) | Topsoil:0.30m Made Ground:2.10m London Clay Formation:>17.6m |
| TM12NW54 Maximum depth: 20.11mbgl (mOD unknown) Centred on grid reference: 613050 227500 | Possible Cover Sand (Sand and Gravel): maximum depth:15.24m London Clay Formation: Max depth 20.11mbgl. | Possible Cover Sands:15.24m London Clay Formation:>4.87m |

| Borehole reference and Location | Details | Thicknesses |
|---|--|---|
| OnSS | | |
| TM02NE15 Maximum depth: 10.10mbgl (24.3mOD) Centred on grid reference: 608430 22855 | Cover Sand: maximum depth: 2.70mbgl (31.70mOD) Glacial Sandy Gravel: maximum depth 9.10mbgl (25.30mOD) London Clay Formation: maximum depth 10.10mbgl (24.3mOD) | Cover Sands:2.70m Glacial Sandy Gravel:3.40m London Clay Formation:>1.00m |
| TM02NE14/A Maximum depth: 17.37mbgl (18.03mOD) Centred on grid reference: 608360 229220 | Topsoil/ Made Ground: maximum depth 0.70mbgl (34.70mOD) Cover Sands: maximum depth 11.89mbgl (23.51mOD) Glacial Sand and Gravel: maximum depth 16.46mbgl (18.94mOD) London Clay Formation: maximum depth 17.37mbgl (18.03mOD) | Topsoil/ Made Ground:0.70m Cover Sands:11.20m Glacial Sand and Gravel:4.57m London Clay Formation:>0.90m |
| TM02NE9 Maximum depth: 9.09mbgl (26.10mOD) Centred on grid reference: 607250 228790 | Topsoil and Made Ground: Max depth 1.10mbgl (34.90mOD) Glacial Sand and Gravel: 9.10mbgl (26.90mOD) London Clay Formation: Max depth: 9.90mbgl (26.10mOD) | Topsoil and Made Ground:1.10m Glacial Sand and Gravel:8.00m London Clay Formation:>0.80m |

Note: All boreholes terminate in the London Clay Formation and therefore the strata thickness is likely an underestimate.

Appendix C. BGS Borehole Logs



BGS ID: 563838 : BGS Reference: TM22SW17
British National Grid (27700) : 620220,220140

TH 22 SW 17
2022 2014

HOLST & CO. LTD.
SITE INVESTIGATION DEPT.
5-7, NEW YORK ROAD
LEEDS. 2

Contract No. 19495/B697

Borehole No. 6

Location Great Holland Water Tower,

Ground Level.....

Client.....Tendering Hundred Waterworks Co.

Date May 1967

BOREHOLE LOG

[illegible]

Water Struck at 3100'

Maximum Observed Water Level 2'6"



BGS ID: 563833 : BGS Reference: TM22SW12
British National Grid (27700) : 620200,220160

TM 22 SW 12
2020 2016

HOLST & CO. LTD.
SITE INVESTIGATION DEPT.
5-7, NEW YORK ROAD
LEEDS, 2

Contract No. 19495/B697

Borehole No......1.....

Location Great Holland Water Tower


Ground Level.....

Client.....Tendering Hundred Water Works.....

Date May 1967

BOREHOLE LOG

[illegible]

Water Struck at  4' 0"

Maximum Observed Water Level 3'0"



TM 02 NW/13a-e
1342.2653
1375.2646
1342.2653
1351.2641
1352.2635

224/88 Heath Hospital, Tendring

- (a) (Filled in). Surface +116. Shaft 106%; rest bore. Lining tubes: 68 x 8 1/4 in from 94% down (perforated 140% to 160%). Ck -103%. R.W.L. +25. LeGrand, 1903.
(b) (? Filled in). Surface +c.110. Bore 340. Lining tubes: 16 1/4 x 8 in; 120 x 6 in. 1 in 224.
Ck -c.106. R.W.L. -c.2. Yield 300 g.p.h. Saline. Richards, 1925.

| | | | |
|-----------------------|-----|------|------|
| (a) Sand and Gravel) | ... | 160% | 160% |
| LC) | ... | | |
| WRB | ... | 59 | 219% |
| UCK | ... | 280% | 500 |

(a)

| (For Survey use only). GEOLOGICAL CLASSIFICATION. | NATURE OF STRATA (and any additional remarks). | THICKNESS | | DEPTH | |
|---|---|-----------|---------|-------|---------|
| | | Feet. | Inches. | Feet. | Inches. |
| Drift also harder clay 160 1/2 | Dug well | | | 106 | 6 |
| | Rubbish | 1 | | 107 | 6 |
| | Blue clay | 42 | | 149 | 6 |
| | Pebbles, sand & water | 6 | | 155 | 6 |
| Woolwich Reading Beds 59' | Longlensate | 5 | | 160 | 6 |
| | Mottled clay | 17 | 6 | 178 | |
| | " " sandy | 12 | | 190 | |
| | Hard sandy clay | 11 | | 201 | |
| | Dark green sandy clay | 8 | | 209 | |
| | " " hard | 10 | 6 | 219 | 6 |
| | Chalk & flints | 108 | | 327 | 6 |
| Upper Chalk 280 1/2 | Sticky chalk | 3 | | 330 | 6 |
| | Chalk marl | 10 | | 340 | 6 |
| | Soft sticky chalk | 14 | | 354 | 6 |
| | Sticky chalk & few flints | 145 | 6 | 500 | |

88 (b)

| | | |
|-------|-----|------|
| Drift | 60 | 60 |
| LC | 91 | 15.1 |
| WRB | 65 | 21.6 |
| UCK | 124 | 340 |

pp LPT 11/11/69.

(c) Drift 16 16

(d) Drift 16 16

(e) Drift 16 16 pp LPT 11/11/69.

For details of (b), (c), (d), (e) see Additional Information Sheet.

224/88 Heath Hospital, Tendring

TM12/16A+B

- (a) (Filled in). Surface +116. Shaft 106%; rest bore. Lining tubes: 68 x 8 1/4 in from 94% down (perforated 140% to 160%). Ck -103%. R.W.L. +25. LeGrand, 1903.
(b) (? Filled in). Surface +c.110. Bore 340. Lining tubes: 16 1/4 x 8 in; 120 x 6 in. Ck -c.106. R.W.L. -c.2. Yield 300 g.p.h. Saline. Richards, 1925.

| | | | | |
|-----------------------|-----|-----|------|------|
| (a) Sand and Gravel) | ... | ... | 160% | 160% |
| LC | ... | ... | 59 | 219% |
| WRB | ... | ... | 280% | 500 |
| Uck | ... | ... | | |

| (For Survey use only). GEOLOGICAL CLASSIFICATION. | NATURE OF STRATA (and any additional remarks). | THICKNESS | | DEPTH | |
|---|---|-----------|---------|-------|---------|
| | | Feet. | Inches. | Feet. | Inches. |
| Drift also London Clay 160 1/2 | Dug well | | | 106 | 6 |
| | Rubbish | 1 | | 107 | 6 |
| | Blue clay | 42 | | 149 | 6 |
| | Pebbles, sand & water | 6 | | 155 | 6 |
| Woolwich Reading Bees 59 7/8 | Conglomerate | 5 | | 160 | 6 |
| | Mottled clay | 17 | 6 | 178 | |
| | " " sandy | 12 | | 190 | |
| | Hard sandy clay | 11 | | 201 | |
| | Dark green sandy clay | 8 | | 209 | |
| | " " hard | 10 | 6 | 219 | 6 |
| | Chalk & flints | 108 | | 327 | 6 |
| Upper Chalk 280 1/2 | Sticky chalk | 3 | | 330 | 6 |
| | Chalk marl | 10 | | 340 | 6 |
| | Soft sticky chalk | 14 | | 354 | 6 |
| | Sticky chalk & few flints | 145 | 6 | 500 | |

88 (b)

| | | |
|-------|-----|-----|
| Drift | 60 | 60 |
| LC | 91 | 151 |
| WRB | 65 | 216 |
| Uck | 124 | 340 |

pp LPT 11/4/69.

(c) Drift 16 16

(d) Drift 16 16

(e) Drift 16 16

pp LPT 11/4/69.

For details of (b), (c), (d), (e) see Additional Information Sheet



WELL BORING at *Tendring* County *Essex*
Geol. map *2* 1 in. map New Series *224* 6 in. map *TA 12 NW 8*
Made by *2* Date *25/4*
Sunk *224* feet. Bored *224* feet.
Communicated by *2*
Height above Ordnance Datum *224* Rest level of water *224*
Yield *224*
Quality (with copy of analysis on separate sheet) *224*

| GEOLOGICAL FORMATION. | NATURE OF STRATA. | THICKNESS. | | DEPTH. |
|-----------------------|-------------------|------------|---------|--------|
| | | Feet. | Inches. | |

TM 1374 2645

Artesian Well put down for The Tendring Board
of Guardians, Tendring Institution, Tendring,
ESSEX.

Bored by Messrs R. Richards & Co. 1925.

| STRATA. | THICKNESS. | DEPTH. |
|--|------------|-----------|
| <i>Drift</i> Sump hole. | 4 | 4 |
| <i>Drift</i> Sand & Ballast. | 56 | 60 |
| <i>Drift</i> Blue Clay. | 34 | 94 |
| <i>Drift</i> Sandy Clay. | 16 | 110 |
| <i>London clay</i> Hard brown clay. | 30 | 140 (120) |
| <i>London clay</i> Dark sandy clay. | 31 | 171 |
| <i>Woolwich Bed</i> Thanet Sand. | 2 | 173 |
| <i>Woolwich Bed</i> Blue & mottled Clay. | 21 | 194 |
| <i>Thames Valley</i> Grey Sandy Clay. | 29 | 223 |
| <i>Thames Valley</i> Dark Grey Sandy Clay. | 11 | 234 |
| <i>Thames Valley</i> Thanet Sand. | 1 | 235 |
| <i>Upper chalk</i> Gummy Chalk. | 124 | 359 feet. |

*Design by
H. Dewey*

Lined with 16 $\frac{1}{2}$ feet of 8" Tubes
and 120 feet of 6" Tubes.

WATER LEVEL:- 112 feet.

SUPPLY:- 250/300 g.p.h.

Water tested, and found too salt for domestic use.

*M. of H
notified
1/11/27*



ADDITIONAL INFORMATION SHEET

Licence No.

TM 12/16 B-E

224/88

Date of completion
of well catalogue

March 1967

Date of publication

Additional Sheet No. 1

| DATE | * | ADDITIONAL INFORMATION | INIT. |
|------|-----|------------------------|-------|
| | A.B | | |

224 88(b) STRATA.

THICKNESS. DEPTH.

| | | | |
|-------------------------------|-----------------------|--------|-----------|
| Drift 60 ft | Sump hole. | 4 | 4 |
| | Sand & Ballast. | 58 | 60 |
| | Blue clay. | 34 | 94 |
| | Sandy clay. | 16 | 110 |
| London Clay 91 ft | Hard brown clay. | 10 | 120 (120) |
| | Dark Sandy clay. | 31 | 151 |
| | Thanet Sand. | 2 | 153 |
| Woolwich + Reading Beds 65 ft | Blue & mottled clay. | 21 | 174 |
| | Grey Sandy clay. | 29 | 203 |
| | Dark Grey Sandy Clay. | 11 1/2 | 214 1/2 |
| | Thanet Sand. | 1 1/2 | 216 |
| Upper chalk 124' | Gummy chalk. | 124 | 340 feet. |

Checked by
✓ H.P.T.
11/11/69

224/88
C. Drift 16'
D. Drift 16'
E. Drift 16'

H.P.T. 11/11/69

DATA Back

FILMED

* INSERT WELL REFERENCE LETTER, IF MORE THAN ONE WELL AT SITE

P.T.O.

Section 6

Pumping test

Observ. well

Recorder

E.R. log

GEOLOGICAL SURVEY,
WATER DEPARTMENT
SOUTH KENSINGTON,
LONDON, S.W.7.



NGRC
BOREHOLE RECORDS
ADJUSTMENT FORM

QUARTER SHEET Tm 12 NW

BH REGISTRATION NUMBER 52 - 55

RECORDS ENTERED AND HELD BY WALLINGFORD

BH REGISTRATION NUMBER(S)



RECORD OF WELL (SHAFT OR BORE)

At Tending Hundred Water Co.
Town or Village Horsley Cross
County Essex Six-inch quarter sheet N29SE7E
For Mr. _____

N2760
TM12/8A+C
A&C

Exact site of well _____
(Attach a tracing from a map, or a sketch-map, if possible.)

Level of ground surface above sea-level (O.D.) _____ feet.

Is well-top at ground level? _____ If not, state how far above ; _____ feet.
below ; _____

Shaft _____ ft., diameter _____ ft. Details of headings _____

Bore _____ ft. ; diameter of bore : at top _____ ins. ; at bottom _____ ins.

Lengths, diameters, perforations, etc., of lining tubes _____

Water struck at depths, below well-top, of (feet) _____

TEST DETAILS { Rest-level of water _____ ft. above well-top. Suction at _____ ft. Yield on _____ hours' days'
Month _____ pumping _____ gallons per _____ (max. capacity of pump _____ g.p.h.),
Year _____ with depression of _____ feet. Recovery to _____ in _____ mins. hours.

WORKING CONDITIONS { Rest-level of water in _____ (month), _____ (year), _____ ft. above well-top.
Highest „ in _____ (month), _____ (year), _____ ft. below „
Lowest „ in _____ (month), _____ (year), _____ ft. above „ below „
Suction at _____ ft. Rate of pumping _____ galls. per _____ for _____ hours per day.
with average depression of _____ ft. Recovery to _____ in _____ mins. hours

Quality of water (attach copy of analysis if available) _____

Well made by _____ Date of well _____

Information from _____

Trial borings for construction of reservoir.
ADBC
ADDITIONAL NOTES.

No. 1. 28 ft deep. — no trace. OD + C. 120.

No. 2. Record received. — no trace OD + C 120 — see over,

No. 3. 66 ft deep. — no trace. OD + C. 123.

Visited 10/6/60 BN.

"(a) (b) and (c) were sunk to obtain the depth of the London Clay before construction started on the water tower and have been subsequently filled in." Ref. in letter of 10.3.65 from _____

LOG OF STRATA OVERLEAF.

| Date received. | G.S.M. Office File No. | 1" N.S. Map No. | 1" O.S. Map No. | Site marked (use symbol) on 1" Map. | on 6" Map. |
|----------------|------------------------|-----------------|-----------------|-------------------------------------|------------|
| 28.8.84. | | | | | |



(For Survey use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

If measurements start below
ground surface, state how far... ..

THICKNESS

Feet Inches

DEPTH

Feet Inches

2
Sand + Gravel
?LL

A

No 1

Gravel Sand & Clay

28

0

Sand + Gravel
16
LC 50
✓ RA
EAE.
8/2/65

C

No 3

Gravel
Blue Clay

16

0

16

0

50

0

66

0

TM 02 NE 15

TM 02 NE 15

0843 2855

Opposite Rudkin's Farm

Block C

Surface level (+34.4 m) +113 ft*
Water struck at (+31.7 m) +104 ft
Wirth B0, 8 inch diameter
November 1969

Overburden (2.7 m) 9 ft
Mineral (6.4 m) 21 ft
Bedrock (0.9 m+) 3 ft+

| | | Thickness (m) | ft | Depth (m) | ft |
|----------------------------|---|------------------|----|--------------|----|
| Loam | Soil and brown, sandy clay. | (2.7) | 9 | (2.7) | 9 |
| Glacial Sand and Gravel | Sandy gravel. Very sandy near top and gravelly between 24 ft (7.3 m) and 27 ft (8.2 m). Gravel: fine subangular flint and quartz, with coarse, subangular to subrounded flint the latter approaching cobble size between 24 ft (7.3 m) and 27 ft (8.2 m), where coarse gravel is predominant. Sand: reddish-brown; medium, with some coarse. | (6.4) | 21 | (9.1) | 30 |
| London Clay | Brown, weathered clay, passing down into fresh blue clay. | (0.9+) | 3+ | (10.1) | 33 |

| | % | mm | % | Depth below surface (ft) | Fines | Percentages Sand | Gravel |
|-----------|-----------|----|----|-----------------------------|-------|---------------------|--------|
| Gravel 40 | +16 | : | 18 | 9 - 12 | 8 | 75 | 17 |
| | -16+4 | : | 22 | 12 - 15 | 2 | 53 | 45 |
| | | | | 15 - 18 | 0 | 67 | 33 |
| Sand 57 | -4+1 | : | 12 | 18 - 21 | 4 | 57 | 39 |
| | -1+1/4 | : | 40 | 21 - 24 | 0 | 63 | 37 |
| | -1/4+1/16 | : | 5 | 24 - 27 | 0 | 33 | 67 |
| | | | | 27 - 30 | 4 | 58 | 38 |
| Fines 3 | -1/16 | : | 3 | | | | |



TM 02 NE 14
IMAU Database no TM02NE14R2

TM 02 NE 14

0835 2922

Lower Barn

Block C

Surface level (+35.4 m) +116 ft
Water struck at +32.6 m (+107 ft)
Pitcon Shell, 6 inch diameter
December 1970

Overburden 1.6 m (5 ft)
Mineral 8.5 m (28 ft)
Bedrock 0.5 m+ (1.5 ft+)

| | | Thickness (m) | ft | Depth (m) | ft |
|----------------------------|--|------------------|--------|--------------|-------|
| Topsoil and made ground. | | 0.7 | (2.5) | 0.7 | (2.5) |
| Loam | Silty and clayey sand with some gravel. Sand orange-brown in colour; mainly medium; rounded to subangular quartz. Gravel composed of fine grade, rounded to subangular flint and quartz. | 0.9 | (3) | 1.6 | (5) |
| Glacial Sand and Gravel | Sandy gravel. Gravelly down to 6.6 m (21.5 ft), becoming very sandy below. Gravel: mainly fine with some coarse and a few cobbles down to 6.6 m (21.5 ft), traces only of fine to coarse below; rounded, subrounded and subangular flint with subordinate quartz and quartzite. Sand: medium with coarse to 6.6 m (21.5 ft), becoming fine with medium below; brown to orange-brown colour; thin, pale grey, clay band at about 8.5 m (28 ft). | 8.5 | (28) | 10.1 | (33) |
| London Clay | Blue-grey, stiff, clay. | 0.5+ | (1.5+) | 10.6 | (35) |

| | | | Depth below surface (m) | Percentages | | |
|-----------|-----------------------|------|----------------------------|-------------|------|--------|
| % | mm | % | | Fines | Sand | Gravel |
| Gravel 30 | +64 | : 1 | 1.6 - 2.6 | 4 | 60 | 36 |
| | -64+16 | : 10 | 2.6 - 3.6 | 1 | 63 | 36 |
| | -16+4 | : 19 | 3.6 - 4.6 | 0 | 56 | 44 |
| | | | 4.6 - 5.6 | 1 | 37 | 62 |
| Sand 68 | +4+1 | : 10 | 5.6 - 6.6 | 2 | 54 | 44 |
| | -1+ $\frac{1}{2}$ | : 33 | 6.6 - 7.6 | 3 | 96 | 1 |
| | - $\frac{1}{4}$ +1/16 | : 25 | 7.6 - 8.6 | 1 | 95 | 4 |
| | | | 8.6 - 9.6 | 2 | 76 | 22 |
| Fines 2 | -1/16 | : 2 | 9.6 - 10.1 | 2 | 93 | 5 |

Institute of Geological Sciences

Mineral Assessment Unit

Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TM 02 N.E. 14B (rebone)

Nat. Grid Ref.: 0835, 2922

Locality: Lower Barn, Barn Lane, Lt. Bromley

Date: 18th to 20th May 1970

Recorded by: [REDACTED]

Drilled by: Fitzpatrick

Drill Type: With B1.

Hole diameter: 8"

Ground level (O.D.):

Water struck at (20 ft): 5' b.s.
standing at 2' b.s.

Summary of
ground
penetrated

Thickn.
m ft

Nature

5 (Top Soil +) Brown Clay
20+ Sand with gravel.

Remarks Although the hole was drilled to 25 ft (not bottomed at that depth) there was no sample recovery over the last 5 feet.

Depth
bailed: c. 5 foot or so.

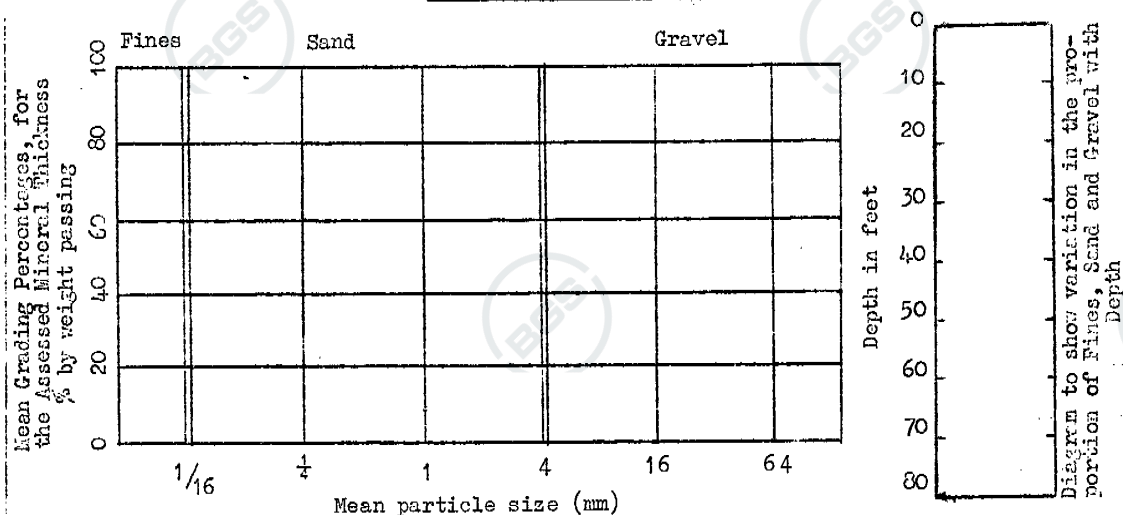
Grading Record

Mean
Grading
percentages:

Fines

Sand

Gravel



| Description of Strata | Depth to base ft. | Thickn. ft. | Sample Nos. |
|--|-------------------|-------------|---|
| Top Soil | 1.0 | 1.0 | — |
| Brown Clay — soft clay; sandy; fr. of chalk. | 5.0 | 4.0 | — |
| Sand with gravel:— Sand: med to co; brown; mainly S.A. qtz. Gravel: fine to med; A-S.A. flint (black + brown); with R-S.A. quartz (smaller) L.P.S. 30 mm. Gravel percentage increases with depth and L.P.S. also increases up to 40-50 mm. | 20.0 | 15.0 | CH 1400 CH 1401 CH 1402 CH 1403 CH 1404 |
| Sand and gravel?? (Terminated due to rising sand + gravel, acc. driller's log, r.s.) | 25.0+ | 5.0 | NO RECOVERY |



TM 02 NE 9

TM 02 NE 9

0725 2879

Near Badley Hall

Block C

Surface level (+36.0 m) +118 ft
Water struck at +32.0 m (+105 ft)
Shell and Auger, 6 inch diameter
December 1970

Overburden 1.1 m (3.5 ft)
Mineral 3.4 m (11 ft)
Waste 3.2 m (10.5 ft)
Mineral 1.4 m (4.5 ft)
Bedrock 0.8 m+ (2.5 ft+)

Topsoil and made ground.

Glacial Sand and Gravel

(a) Sandy gravel.

Gravel: mainly fine; subangular to sub-rounded brown and red flints, with rounded quartzites.

Sand: medium with coarse; brown.

Yellow-brown, laminated, silty sand, becoming blue-grey with carbonaceous material, and then dark brown with occasional flints and quartzite below 6.9 m (22.5 ft).

| Thickness m | (ft) | Depth m | (ft) |
|----------------|-------|------------|-------|
| 1.1 | (3.5) | 1.1 | (3.5) |
| 3.4 | (11) | 4.5 | (15) |

(b) Sandy gravel. Becoming increasingly gravelly downwards.

Gravel: fine with some coarse; subrounded to rounded; flints and quartzite with a few jasper pebbles.

Sand: medium and coarse, becoming mainly medium towards base; grey-brown.

| | | | |
|-----|-------|-----|------|
| 1.4 | (4.5) | 9.1 | (30) |
|-----|-------|-----|------|

London Clay

Blue clay, weathered brown in top 0.6 m (2 ft).

| | | | |
|------|--------|-----|--------|
| 0.8+ | (2.5+) | 9.9 | (32.5) |
|------|--------|-----|--------|

Mean (a) + (b)

| | | | Depth below surface (ft) | | Percentages | | |
|-----------|-----------|------|--------------------------|-----------|-------------|------|--------|
| % | mm | % | | | Fines | Sand | Gravel |
| Gravel 41 | +16 | : 13 | (a) | 1.1 - 2.1 | 2 | 51 | 47 |
| | -16+4 | : 28 | | 2.1 - 3.1 | 1 | 67 | 32 |
| | | | | 3.1 - 4.1 | 2 | 56 | 42 |
| | | | | 4.1 - 4.5 | 2 | 65 | 33 |
| Sand 57 | -4+1 | : 19 | | Mean | 2 | 59 | 39 |
| | -1+1/4 | : 33 | | | | | |
| | -1/4+1/16 | : 5 | | | | | |
| | | | (b) | 7.7 - 8.7 | 2 | 53 | 45 |
| Fines 2 | -1/16 | : 2 | | 8.7 - 9.1 | 1 | 49 | 50 |
| | | | | Mean | 2 | 52 | 46 |
| | | | | | | | |

Appendix D. Outline Groundwater Monitoring and Mitigation Plan

D.1 Background

1. Based on the findings of the Groundwater Risk Assessment (GwRA) for the North Falls Offshore Wind Farm ('North Falls' or 'the Project') including the proposed landfall, onshore cable route and onshore substation works area a groundwater monitoring and mitigation plan (GwMP) is recommended to ensure that there are no adverse impacts from the construction phase on surrounding private water supplies (PWS) and the licenced abstraction.

D.2 Summary

2. Locations have been identified whereby either one or a combination of surveys / assessments are required including:
 - Topographical survey.
 - Baseline data collection to include groundwater level monitoring, a landowner discussion and an assessment of the abstraction.
 - Extended groundwater level monitoring
 - Water quality monitoring.
3. These recommendations are summarised in Table D1.

Table D1 Summary of Locations Whereby Further Work and Monitoring is Recommended

| RH Location ID | Location Address | National Grid Reference | Distance from Potential Onshore Cable Route Dewatering Activities (direction) or feature that has triggered further assessment type and feature | Topographical Survey | Initial baseline Monitoring and Abstraction Assessment Visit Required | Extended Groundwater Level Monitoring Due to the Risk of Dewatering Activities | Water Quality Monitoring and routine groundwater levels obtained during sampling | |
|----------------|-----------------------|-------------------------|---|----------------------|---|--|--|---|
| | | | | | | | Extended Groundwater Monitoring Suite Table D2 | Reduced Groundwater Monitoring Suite Table D3 |
| RH07 | Normans Farm | 608458E 228481N | 10m (north) Construction / Access Road and 60m (east) from Onshore Cable Corridor / TCZ | ✓ | N/A | ✓ | ✓ | N/A |
| RH10 | The Coach House | 609084E 227925N | 185m (northeast) from Access / Construction Road and 220m (northeast) from Onshore CC / TCZ | ✓ | N/A | N/A | N/A | ✓ |
| RH11a | Little Bromley Hall | 609149E 227910N | 205m (northeast) from Construction / Access Road and 245m (northeast) from Onshore CC / TCZ | ✓ | N/A | N/A | N/A | ✓ |
| RH14 | Hiskleys Farm Kennels | 609645E 227199N | 150m (south) from Access / Construction Road and 180m (south) from Onshore CC / TCZ | ✓ | ✓ | N/A | N/A | ✓ |
| RH17 | Paynes Cottage | 610149E 227444N | 20m (west) from the Construction / Access Road and 35m (north) from Onshore CC / TCZ | ✓ | N/A | ✓ | ✓ | N/A |
| RH18 | Richmond Cottage | 610155E 227569N | 120m (north) from the Construction / Access Road and | ✓ | ✓ | ✓ | N/A | ✓ |

| RH Location ID | Location Address | National Grid Reference | Distance from Potential Onshore Cable Route Dewatering Activities (direction) or feature that has triggered further assessment type and feature | Topographical Survey | Initial baseline Monitoring and Abstraction Assessment Visit Required | Extended Groundwater Level Monitoring Due to the Risk of Dewatering Activities | Water Quality Monitoring and routine groundwater levels obtained during sampling | |
|----------------|-----------------------------|-------------------------|---|----------------------|---|--|--|---|
| | | | | | | | Extended Groundwater Monitoring Suite Table D2 | Reduced Groundwater Monitoring Suite Table D3 |
| | | | 160m (north) from Onshore CC / TCZ | | | | | |
| RH24 | Oakwood | 610634E 227073N | 35m (southwest) from Construction / Access Road | ✓ | N/A | N/A | N/A | ✓ |
| RH25 | Orchard Cottage | 610694E 227052N | 10m (southwest) from Construction / Access Road | ✓ | ✓ | N/A | N/A | ✓ |
| RH30b | A H Brown Farms Dairy House | 620900E 219000N | 80m (north) from the Construction / Access Road and 120m (north) from Onshore CC / TCZ | ✓ | ✓ | ✓ | ✓ | N/A |

4. This outline GwMP will be updated and confirmed following finalised design, survey works, location of construction techniques, micro-siting of the cable within the onshore cable route and confirmation of groundwater needs during the construction phase from the land owners. The final GwMP, produced in accordance with this outline, will be submitted for approval to the relevant authorities and secured through a DCO requirement.
5. Monitoring will be completed from the PWS and the licenced abstraction outlined in Table D1, unless agreed with the landowner that monitoring is not required for instance if the abstraction(s) are no longer in use or if the actual surveyed location is further from the onshore project area than initially thought. Locations are presented on Figure 8.

D.3 Surveying, Monitoring and Sampling Plan

6. This section summarises how data gaps are to be filled, what baseline data is required and outlines details of each element of monitoring set out in Table D1.

D.3.1 Topographical Survey

7. All of the locations listed in Table D1 require a topographical survey to confirm the coordinates of the abstraction supply and the ground level of the abstraction so groundwater level can be adequately assessed in relation to its proximity and elevation in comparison with the onshore project area.

D.3.2 Baseline Data Collection to Include Groundwater Level Monitoring, A Landowner Discussion and an Assessment of the Abstraction

8. There are locations where the baseline groundwater level survey has not been completed or the source of information is uncertain, including RH14, RH18, RH25 and RH30b. Information pertaining to treatment and details around the abstraction i.e. depth, type, casing type, size etc needs to be completed.

D.3.3 Groundwater level monitoring

9. For the PWS and the licenced abstraction which could potentially be impacted by the dewatering activities and adverse groundwater quality along the onshore cable route, including RH07, RH17, RH18 and RH30b, new boreholes could potentially be sunk into the shallow superficial deposits and installed with continuous shallow groundwater level logger monitoring equipment. If this option is undertaken, these should be located between the abstraction and the onshore cable route subject to landowner agreement. This first line of defence should identify an issue prior to impacting the abstraction point. The level logger data should be collected a month before the dewatering activities start, during and post dewatering activities finishing. This is to allow for natural variations to be monitored that may occur in the groundwater table due to other external factors such as dry spells or heavy rain. A barometric logger must be installed to allow for compensation due to atmospheric pressures.

10. It may be deemed appropriate to install a level logger within the actual abstraction, however, this would be subject to agreement with the landowner / tenant.
11. In order to monitor in real time, a telemetry system could be considered to be used, so impact of the dewatering can be assessed in real time.
12. PWS beyond the risk of being impacted by dewatering but may be subject to water quality impacts, monitoring will require groundwater level monitoring to be undertaken routinely when the samples are obtained for laboratory testing.

D.3.4 Water Quality Requirements

13. The following outline water quality monitoring plan is based on the findings of the PWS and the licenced abstraction assessment and water quality testing requirements for private water supplies as outlined within The Private Water Supplies (England) Regulations 2016 (as amended) (Regulations) and will be completed throughout the proposed construction phase. There are two monitoring suites proposed:
 - Suite 1: PWS and the licenced abstraction within 100m of dewatering activities will be monitored for all parameters outlined in Part I and Part II of Schedule 1 of the Regulations. In addition, groundwater level monitoring will be undertaken.
 - Suite 2: PWS in excess of 100m from dewatering activities but in close proximity to construction activity which have the potential to impact water quality will be monitored for a reduced suite, as outlined by Part II of Schedule 1 of the Regulations. In addition, groundwater level monitoring will be undertaken.

D.3.5 Monitoring Methodology and Procedure

14. To confirm the requirement for monitoring at each PWS and the licenced abstraction listed in Table D1 a licenced abstraction agreement will be made with the landowner / tenant prior to the construction works along the onshore cable route. If there is no requirement for the groundwater supply during the construction phase (i.e. due to the availability of alternate supply or lack of need), the pre-commencement and post-development confirmatory monitoring only will be required. If a groundwater supply is required during construction, there will be a requirement for the required monitoring suite to be tested for summarised in Table D2 and D3.
15. Monitoring would be undertaken prior to, during and after the construction phase at a timing a frequency summarised in Table D2 and D3.

D.4 Sample Collection Procedure

16. The sampling method used will be at the discretion of the contractor depending on the nature of the water supply. The groundwater sample should be taken

prior to any local treatment (i.e. from the well rather than the tap). Where the well has not been in regular use samples should be taken using the most appropriate equipment e.g. a pump or a bailer. Prior to the sampling the borehole should be purged using either a surface mounted or a submersible pump. Where possible, three well volumes should be purged to allow removal of stagnant water from the borehole and allow fresh water to be sampled. The well volume should be calculated using the following formula:

$$V = \frac{\pi}{4} \times (d)^2 \times (h - \text{Static water depth})$$

V = Well volume (m³)

π = 3.14159

d = Well diameter (m)

h = Total well depth (m)

Static water depth (m)

D.5 Sample Preparation, Preservation and Transport

17. In accordance with accredited laboratory best practice filtration should take place in the field for dissolved heavy metals using a 0.45µm in-line filter, in order to prevent precipitation of metal species during transportation. The filtered water should be placed in a 150ml plastic bottle containing nitric acid, however this will need to be confirmed with the chosen laboratory and what their accreditation requirements are. Additionally, Samples should be filled to the top of the bottle neck until a meniscus forms. This ensures that all air has been excluded from the samples, which helps to prevent oxidation of the sample. It can also prevent removal of other dissolved gases from solution. Samples should be delivered to the selected ISO/17025 accredited laboratory with the relevant chain of custody form completed within 24 hours of sampling.

D.6 Proposed Monitoring Schedule

18. The proposed monitoring schedule for PWS and the licenced abstraction at risk of dewatering impacts and groundwater quality impacts listed in Table D1 is detailed in D2 and D3 respectively.

Table D2 Extended Groundwater Level Monitoring and Laboratory Testing Schedule

| RH Location ID | Monitoring Parameter | Frequency | Data collected | Further Information |
|-------------------------------|--|--------------------------------|--|--|
| RH07 RH17 RH18 RH30b | Groundwater Level monitoring | Continuous using Level Loggers | Groundwater level (m bgl) to be corrected using the barometric logger. | To be undertaken during periods of dewatering with commencement 1 month prior of dewatering and continual monitoring until 1 month after the dewatering has stopped. |
| | Field Measurements and Field Groundwater Level monitoring | Weekly | pH, oxidation redox potential, dissolved oxygen, electrical conductivity, resistivity, salinity, total dissolved solids and turbidity. | To be completed a month before, during and a month post dewatering. |
| | Laboratory Measurements and Field Groundwater Level monitoring | Monthly | Wholesome Test: See Schedule 1: The Private Water Supply Regulations (England) 2016. Schedule 1 Part I and II. | Sampling to be undertaken three months before the dewatering works starts, monthly during and for three months after the dewatering has stopped. |

Table D3 Groundwater Level Monitoring and Reduced Laboratory Suite Water Quality Monitoring Schedule

| RH Location ID | Monitoring Parameter | Frequency | Data collected | Further Information |
|---------------------------------------|------------------------------|-----------|--|---|
| RH10 RH11a RH14 RH24 RH25 | Groundwater Level monitoring | Monthly | Groundwater level (m bgl) Depth to base of the well | Monitoring to start 1 month prior to the construction works, monthly during and monthly monitoring for a period of three months after the construction works has stopped. |
| | Field Measurements | | pH, oxidation redox potential, dissolved oxygen, electrical conductivity, resistivity, salinity, total dissolved solids and turbidity. | |
| | Laboratory Measurements | | Reduced Suite: See Schedule 1 Part II: : The Private Water Supply Regulations (England) 2016. | |

D.6.1 Data Keeping and Reporting

19. The following should be recorded during all relevant monitoring:

- Date and time at which water level was recorded and accurate sample reference.
- Sampling equipment, serial number and method.
- Volume of groundwater purged, prior to sampling.
- Response to pumping (pump rate, drawdown at end of pumping).
- Observations of any potential contamination or movement including water colour, turbidity, odour.
- Observations of damage to installations.
- Name of sampling personnel.
- Weather condition during the monitoring.

D.6.2 Data Format

20. Collected data from each monitoring visit should be inputted into a digital format e.g. Microsoft Excel.

D.6.3 Quality Control and Assurance

21. Monitoring and sampling should be undertaken by a suitably qualified engineer in accordance with the proposed monitoring procedures. Monitoring equipment and instrumentation should be serviced and maintained in accordance with the manufacturers' recommendations. Calibration records should be kept and filed accordingly. A suitably accredited laboratory should carry out analysis of groundwater samples which are to be tested for drinking water parameters.

D.7 Mitigation Planning

D.7.1 Water Quality

22. The data should be assessed against baseline data and relevant UK Drinking Water Standards (DWS), as outlined in The Water Supply (Water Quality) Regulations 2016 (as amended) to ensure no adverse impact on the PWS and the licenced abstraction. The water quality data should be reviewed following each monitoring round and in the event of an exceedance of DWS or the baseline data the following measures would be undertaken:

- Request a re-test of the sample from the lab to ensure the result is correct.
- Review the latest monitoring against the baseline water quality data collected prior to commencement of working to determine if the exceedance is consistent with baseline data.

- If the monitoring indicates a deterioration in water quality since baseline monitoring temporarily increased to weekly to allow for further review.
- Provide a provision for temporary alternate supply.
- An assessment of potential sources that could impact the water quality, located within the onshore cable route, should be undertaken and if required, appropriate mitigation should be applied.

D.7.2 Water Levels

23. The baseline assessment identified that natural seasonal variation will potentially result in water levels dropping below the base of proposed excavations (2m bgl) and therefore it is not proposed to stipulate trigger levels for level monitoring.

24. Also, it is possible for shallow wells to run dry and therefore an alternative water supply would be provided to the landowner and the following measures should be undertaken:

- Temporarily cease dewatering to review monitoring data and determine the cause of the interruption in supply.
- Review level monitoring and logger data to assess whether there has been a notable change in water levels since the commencement of dewatering activities.
- If the review indicates that the dewatering is the cause then activities would cease until appropriate mitigation can be put into place.
- If the monitoring indicates natural seasonal trends or alternate cause for loss of supply then dewatering would recommence as it was not the cause.

D.8 Enhanced Mitigation/ Control Measures

25. A number of pre-construction mitigation proposals are being explored by North Falls with landowners / tenant farmers, these include but are not limited to:

- Offering a permanent mains connection to the property either in lieu of or to complement their existing supply.
- The advancement of further well supplies either; further away from the potential dewatering activities or to a deeper depth below the cable excavation depth.

26. If during construction an unlikely event of an adverse impact on water quantity or quality occurs, appropriate mitigation should be put into place to provide either a temporary or permanent replacement to supply.

27. In the case that construction / dewatering activities causes a short term impact a temporary water supply (such as tankering / water bowser) will be provided once agreed with the PWS and the licenced abstraction owner. In the unlikely

event that the impact is assessed as longer term, a replacement well will be drilled away from the current location to remove any impact on water quality or availability of supply.



NORTH FALLS

Offshore Wind Farm



RWE

HARNESSING THE POWER OF NORTH SEA WIND

North Falls Offshore Wind Farm Limited

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To contact please email contact@northfallsoffshore.com

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Registered in England and Wales Company Number: 12435947