

High Speed Rail (West Midlands - Crewe) Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement

Volume 5: Technical appendices

Habitats Regulations Assessment screening report
for Pasturefields Salt Marsh Special Area of
Conservation Addendum 2 (EC-017-004)

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Supplementary Environmental Statement 2 and
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Habitats Regulations Assessment screening report
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Conservation Addendum 2 (EC-017-004)

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1 Introduction

1.1 Background

- 1.1.1 This document is an appendix which forms part of Volume 5 of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES).
- 1.1.2 This appendix is a second addendum to provide an update to the Habitats Regulations Assessment (HRA) screening report for the Pasturefields Salt Marsh Special Area of Conservation (SAC)¹ undertaken for the HS2 Phase 2 Appraisal of Sustainability (2013)², which was republished alongside the High Speed Two (HS2) Phase 2a (West Midlands - Crewe) Environmental Statement (ES)³, in July 2017 (the main ES). A first addendum to the HRA screening report for the Pasturefields Salt Marsh SAC, which considered the potential for air quality effects on the SAC due to the use of the A51 Lichfield Road as a construction route⁴ was also published in July 2017.
- 1.1.3 In this addendum, the scheme is referred to as the AP2 revised scheme, which is the SES2 scheme (i.e. the SES1 scheme as submitted to Parliament in March 2018, with the changes described in the SES2) as amended by the AP2 amendments.
- 1.1.4 This addendum to the HRA screening report for the Pasturefields Salt Marsh Special Area of Conservation (SAC) considers the potential for the reconfiguration of Ingestre Park Golf Club to have significant hydrogeological effects on the internationally important interest features of the site alone, and in combination with other plans and projects.
- 1.1.5 The HRA screening undertaken in 2013 for the HS2 Phase 2 Appraisal of Sustainability considered the potential construction effects from the chosen route option for the Proposed Scheme on the SAC due to hydrological effects. It concluded that the chosen route option would have no likely significant effect, and this conclusion has been agreed with Natural England. The route of the Proposed Scheme would not intersect with the surface water catchment or groundwater of the SAC and thus an appropriate assessment was not required. The HRA screening report has been reviewed and all of the other conclusions in that original HRA screening report are still relevant.

¹ High Speed 2 Ltd (2017) *Habitats Regulations Assessment screening report for Pasturefields Salt Marsh Special Area of Conservation*, Volume 5: Appendix EC-017-003, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627063/E54_EC-017-003_WEB.pdf

² High Speed 2 Ltd, (2013), *High Speed Rail: Consultation on the route from the West Midlands to Manchester, Leeds and beyond, Sustainability Statement*, Volume 1: Appendix E4 Biodiversity

³ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*, <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

⁴ HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement, Habitats Regulations Assessment screening report for Pasturefields Salt Marsh Special Area of Conservation Addendum*, Volume 5, Appendix EC-017-004, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627065/E55_EC-017-004_WEB.pdf

2 Context

2.1 Pasturefields Salt Marsh SAC

2.1.1 Pasturefields Salt Marsh SAC is located approximately 7km to the east of Stafford, close to the Grand Trunk Canal in the West Midlands. Pasturefields Salt Marsh SAC is 7.8 ha and is the only significant remaining example in the UK of a natural salt spring with inland saltmarsh vegetation, located in Staffordshire. The primary reason for the designation of the SAC is the presence of inland salt meadows, a priority habitat which is listed in Annex I of the Habitats Directive⁵.

2.1.2 The saline water is considered to arise from dissolution of halite deposits within the Mercia Mudstone that underlies the SAC. It supports an unusual variety of halophytic plants, including common saltmarsh grass *Puccinellia maritima*, lesser sea-spurrey *Spergularia marina*, saltmarsh rush *Juncus gerardii* and sea arrowgrass *Triglochin maritimum*.

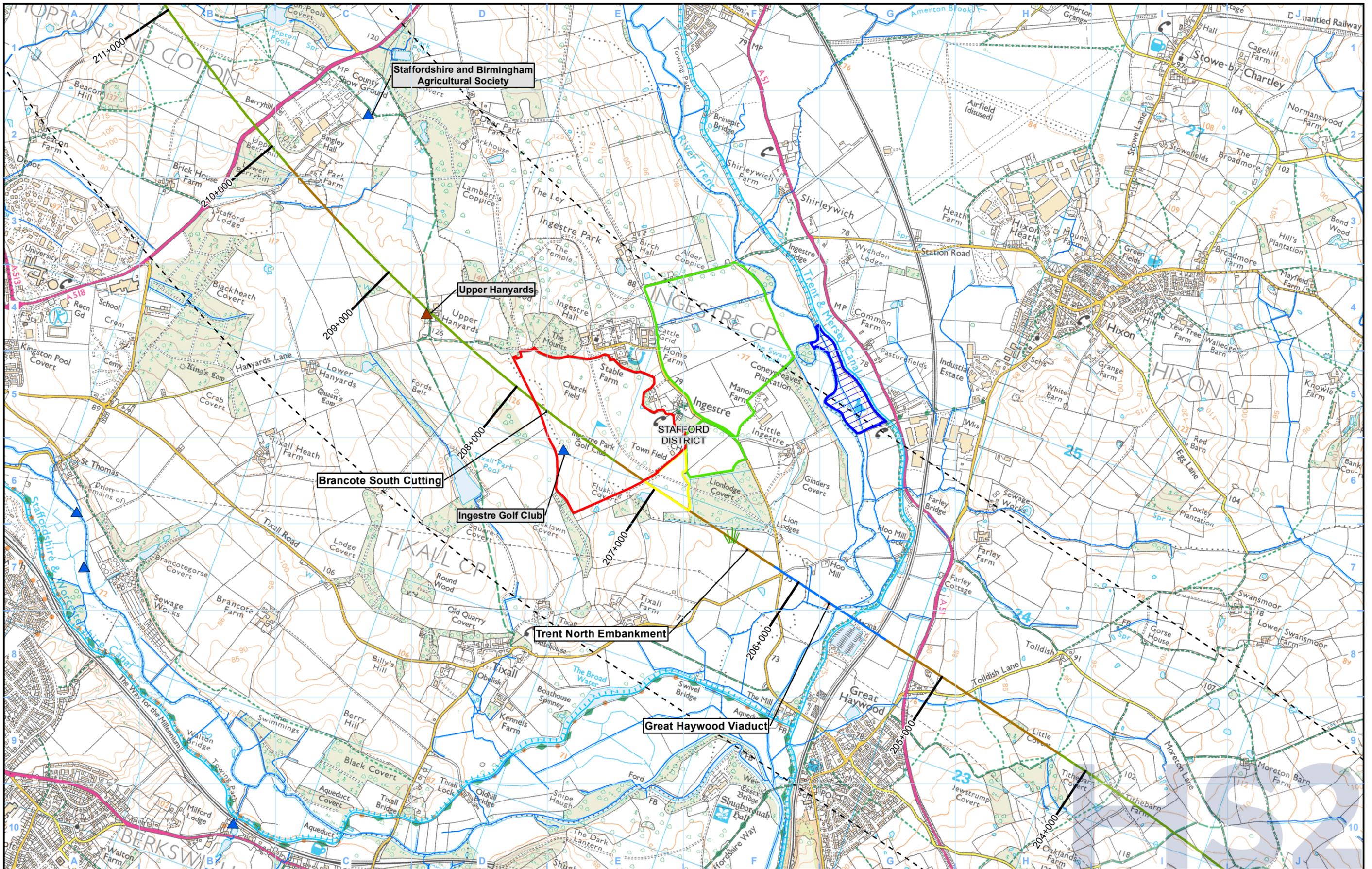
2.2 Land required to reconfigure Ingestre Park Golf Club

2.2.1 The HS2 Phase 2a hybrid Bill provides for the HS2 route to pass through Ingestre Park Golf Club along a section of Trent North embankment, 1.1km in total length, and continue into the Brancote South cutting, 1.6km in total length. Construction of the scheme, in this location, would require a total of approximately 24.5ha (approximately 47%) of Ingestre Park Golf Club to be either lost or severed from the club house. This would result in the facility being unable to function in its current arrangement.

2.2.2 An amendment to the hybrid Bill, as part of the AP2 revised scheme, will provide additional land for the reconfiguration of Ingestre Park Golf Club, to replace the holes lost or severed by the scheme. 61ha of additional land, currently in arable agricultural use, mainly between Ingestre village and the River Trent meadows has been identified for the reconfiguration. Figure 1 shows the location of the SAC, the existing Ingestre Park Golf Club (outlined in red) and the additional land required to reconfigure the Ingestre Park Golf Club (outlined in green). The area within the yellow outline is land within the existing hybrid Bill limits, part of which is to be used for the golf course reconfiguration.

2.2.3 The boundary of the SAC, which is to the north of the River Trent, will be approximately 200m from the nearest part of the reconfigured golf course, as shown on Figure 1.

⁵ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Strasbourg, European Parliament and European Council, http://jncc.defra.gov.uk/Publications/JNCC312/UK_habitat_list.asp



| Legend | |
|--------|--|
| | Cutting |
| | Embankment |
| | Viaduct |
| | HS2 Centreline 1km Buffer |
| | Watercourse |
| | Canal |
| | Pasturefields SSSI/SAC |
| | Ingestre Park Golf Club |
| | Land within existing Bill limits/part to be used for golf course reconfiguration |
| | Additional land required as AP2 amendment for golf course reconfiguration |
| | Licensed Groundwater Abstraction |
| | Unlicensed Groundwater Abstraction |
| | Area of saltmarsh adjacent to Lionlodge Covert |

Map Number: Figure 1
 Map Name: Site Location Plan of Ingestre Park Golf Club

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2.3 Description of works to reconfigure Ingestre Park Golf Club

- 2.3.1 An indicative layout design has been prepared for the reconfigured golf course, retaining the clubhouse and six of the existing holes to the north of the railway. The extension will provide 12 new holes. This layout, together with information on environmental and conservation constraints, has been used as the basis for the assessment in the AP2 ES and has informed the screening assessment of the effect of changes to the hydrological regime on the internationally important interest features of the SAC, alone and in combination with other plans and projects.
- 2.3.2 The environmental assumptions that have been applied, which will need to be reflected in any future detailed design, include:
- any earthworks to create the playing areas and other elements, such as water features, will be no more than 5 metres above or below existing ground levels, with any surplus excavated materials from the reconfiguration of the golf course reused in landscaping the course;
 - changes in ground levels within the Trent valley floodplain area will be avoided, or, if required will aim for a net increase in flood storage. Surface water drainage will be designed to ensure no increase in peak flood levels at the SAC or any other flood sensitive local receptors;
 - the extended part of the course will be designed with a 'woodland/parkland' feel that complements the historic landscape context of the existing course;
 - existing mature trees and hedgerows and any other features of ecological importance or historic value will be incorporated into the design. The maintained playing area is likely to occupy no more than 30% of the additional land, allowing for substantial woodland planting and habitat creation; and
 - the course design and any woodland planting will take account of the key views into and out of Ingestre Conservation Area, to maintain its character and the settings of listed buildings.
- 2.3.3 It is anticipated that any water required for irrigation of the reconfigured course can be provided from the Ingestre Park Golf Club's existing licensed abstraction from the Sherwood Sandstone Group Principal aquifer. Any new abstraction would require an application to be submitted to the Environment Agency, together with an assessment of any impacts on the wider environment, including the SAC. The hydrogeology and hydrology of the area is discussed further in Section 3 of this report and in Annex A.
- 2.3.4 Detailed design of the reconfigured course will be progressed in due course. This may be by the use of the powers in the hybrid Bill, once enacted, or by a separate planning application, by others, under the Town and Country Planning Act 1990.
- 2.3.5 The proposed operations are not directly connected with or necessary to the conservation management of the site features as set out in the conservation

objectives (2014)⁶ and Supplementary advice on conserving and restoring site features (2018)⁷ for this site. These have both been considered as part of this screening report.

⁶ European Site Conservation Objectives for Pasturefields Salt Marsh Special Area of Conservation 2014

⁷ European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Pasturefields Salt Marsh Special Area of Conservation (SAC) Site Code: UK0012789

3 Potential impacts on the SAC

- 3.1.1 The potential risks to the SAC that have been examined are:
- the potential for any interference with the water levels within the SAC, in particular, the quantity and salinity of the groundwater sources that support the saltmarsh habitat; and
 - the potential for any surface water from the reconfigured golf course to affect the hydrology of the SAC, either during construction or when completed.
- 3.1.2 Annex A to this screening report summarises the geology, hydrogeology and hydrology of the reconfigured golf course site.
- 3.1.3 The bedrock geology of this area is shown in Annex A Figure A1 and the superficial geology in Annex A Figure A2. The additional land for the golf course is on River Terrace Deposits, which overlie the Mercia Mudstone, above the Sherwood Sandstone Group, both of which extend beneath the golf course site and the Pasturefields SAC.
- 3.1.4 There are no surface or groundwater links between the reconfigured golf course on the River Terrace Deposits and Pasturefields SAC, which lies to the north of the River Trent. The geological and hydrogeological conceptual cross-section between Ingestre Park Golf Course and Pasturefields SAC is presented in Annex A as Figure A3. This shows that the assumed source of saline water at Pasturefields SAC is from saliferous beds (halite) within the underlying Mercia Mudstone that are not connected to the reconfigured golf course.
- 3.1.5 The potential future requirement for irrigation of the Ingestre Park Golf Club has been considered. The Ingestre Park Golf Club already has a licensed private abstraction, which draws water from the Sherwood Sandstone Group, which underlies the Mercia Mudstone. This is situated to the south of the HS2 route and the borehole itself is unlikely to be adversely affected by HS2 construction. There is an existing irrigation pipe network, which serves all holes of the existing course, which may need to be re-provided beneath the railway.
- 3.1.6 The existing licence allows for annual abstraction of 4,536m³. Abstractions, apart from two dry years in the available records from 1999 to 2015, have not exceeded 50% of the licensed amount. Based on the available information, it is likely that this existing licensed abstraction will be capable of supplying any water required for the reconfigured golf course.
- 3.1.7 If any additional shallow groundwater abstractions are needed, for example from the River Terrace Deposits, these would require new licences if they exceed the normal Environment Agency abstraction threshold and would need to be subject to a separate HRA screening. No new or varied abstraction from the Sherwood Sandstone Group will need to be sought.
- 3.1.8 The surface water bodies in the area and flood risk are shown on Annex A Figure A6. Surface water drainage from the golf course site joins the River Trent which forms an effective barrier to any change in water levels in the SAC. The drainage from the reconfigured course will remain the same.

- 3.1.9 The reconfigured course will be designed to avoid changes in ground levels within the Trent valley floodplain area, or, if changes are required, these will aim for a net increase in flood storage. Surface water drainage will be designed to ensure that there is no likelihood of an increase in peak flood levels at the SAC.
- 3.1.10 The conclusion from this assessment is that the reconfiguration of the Ingestre Park Golf Club presents no risk to the hydrological regime of the SAC, in particular the water levels or the quantity and salinity of the groundwater sources that support the saltmarsh habitat.
- 3.1.11 As with other works forming part of the scheme, the HS2 Phase 2a draft Code of Construction Practice (CoCP) will be in force during construction. This includes requirements to use lagoons to prevent silt from entering watercourses leaving the site and measures to control fugitive dust emissions from haul roads, stockpiles and other earthworks.
- 3.1.12 There will be no likely significant effects on the Pasturefields SAC or its qualifying features, when considered alone.

4 In-combination effects

4.1.1

An in-combination assessment has been undertaken. This has considered the reconfiguration of the golf course in-combination with all of the other components of the AP2 revised scheme and in combination with other plans and projects. The reconfiguration of the golf course as proposed will not have any likely significant direct or indirect effects on this European Protected Site alone, and in combination with other plans and projects.

5 Conclusion

- 5.1.1 This second addendum to the HRA screening report for the Pasturefields Salt Marsh Special Area of Conservation (SAC) undertaken for the HS2 Phase 2 Appraisal of Sustainability (2013) has considered the potential for the reconfiguration of Ingestre Park Golf Club to have any hydrogeological or hydrological effects on the Pasturefields Salt Marsh SAC.
- 5.1.2 It has been established that the reconfiguration of the Ingestre Park Golf Club presents no risk to the hydrological regime of the SAC, in particular the water levels or the quantity and salinity of the groundwater sources that support the saltmarsh habitat.
- 5.1.3 It will not have any likely significant direct or indirect effects on this European Protected Site either alone or as part of the HS2 scheme as a whole or in combination with other projects. It will not undermine the conservation objectives for the site. Therefore, an Appropriate Assessment is not required.
- 5.1.4 HS2 Ltd will continue to consult Natural England and the Environment Agency (and other key stakeholders) as the design develops to ensure that any detailed design that is submitted under the Phase 2a Act powers complies with the Habitats Regulations 2017.

6 References

European Parliament and European Council (1992), *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Strasbourg, European Parliament and European Council (the Habitats Directive)*. Available online at:

http://jncc.defra.gov.uk/Publications/JNCC312/UK_habitat_list.asp

European Parliament and European Council (2000), *Directive 2000/60/ec of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy*.

Natural England (2018), *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Pasturefields Salt Marsh Special Area of Conservation (SAC) Site Code: UK0012789*.

Natural England (2014), *European Site Conservation Objectives for Pasturefields Salt Marsh SAC, (UK0012789)*.

HS2 Ltd (2017), *High Speed Two (HS2) Phase 2a (West Midlands - Crewe), Environmental Statement*. Available online at: <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

High Speed 2 Ltd (2017) *High Speed Rail (West Midlands - Crewe) Environmental Statement High Speed Rail (West Midlands - Crewe) Environmental Statement Volume 5: Technical appendices Ecology and biodiversity Habitats Regulations Assessment screening report for Pasturefields Salt Marsh Special Area of Conservation addendum (EC-017-004)*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627065/E55_EC-017-004_WEB.pdf

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High Speed 2 Ltd (2013), *High Speed Rail: Consultation on the route from the West Midlands to Manchester, Leeds and beyond. Sustainability Statement. Volume 1 Appendix E4 Biodiversity*.

Annex A: Geology, Hydrogeology and Hydrology in the vicinity of Ingestre Park Golf Club

A1 Geology and Hydrogeology

A1.1 Geology and hydrogeology

- 1.1.1 The bedrock geology is shown in Figure A1, the superficial geology is shown in Figure A2 and a conceptual geological cross section of the area in Figure A3.
- 1.1.2 The bedrock geology underlying the current Ingestre Park Golf Club and the additional land permanently required for the Ingestre Park Golf Club is the Mercia Mudstone Group that extends to the north under Pasturefields Salt Marsh SAC. This comprises mudstone and siltstone with some halite bearing units and presence of sandstone. The Mercia Mudstone Group is underlain in turn by the Sherwood Sandstone Group, which outcrops immediately west of the current Ingestre Park Golf Club. The Mercia Mudstone Group has been classified as a Secondary B aquifer, whilst the Sherwood Sandstone Group has been classified as a Principal aquifer.
- 1.1.3 The Superficial geology underlying the additional land is River Terrace Deposits, extending northwards towards the River Trent. The River Trent and adjacent land, including the majority of the Pasturefields Salt Marsh SAC is underlain by Alluvium. Both the River Terrace Deposits and the Alluvium have been classified as Secondary A aquifers.

A1.2 Water abstraction

- 1.2.1 Licensed and unlicensed groundwater abstractions are show on Figure A1 and A2. There is a licensed groundwater abstraction borehole registered to Kingston Hill Golf Club within the current land boundary of Ingestre Park Golf Club. The borehole log for this supply is presented as Figure A4 and the geology recorded at the borehole in Table A1. This abstraction, registered for spray irrigation, has a daily licensed volume of 73m³ and an annual limit quantity of 4,536m³. It is recorded as abstracting from the F46 Hopton Unit, assumed to be the Sherwood Sandstone Group.

Table A1: Geology recorded at Ingestre Park Golf Club borehole

| Borehole log description | Current BGS terminology | Depth |
|--------------------------|--|-----------------------------|
| Red marl | Mercia Mudstone Group (MMG) | 0 - 3m |
| Hard red marl | Mercia Mudstone Group (MMG) | 3 - 35m (water strike 29m) |
| Red marly sandstone | Tarporley Siltstone Formation - transition MMG to Sherwood Sandstone Group | 35 - 62m (water strike 39m) |

A1.3 Water dependent habitats

- 1.3.1 Pasturefields Salt Marsh SAC is located approximately 7km to the east of Stafford, close to the Grand Trunk Canal in the West Midlands as shown on Figure A5. It is the only significant remaining example in the UK of a natural salt spring with inland saltmarsh vegetation. The primary reason for the designation of the SAC is the

presence of inland salt meadows, a priority habitat which is listed in Annex I of the Habitats Directive⁸.

- 1.3.2 As shown in Figure A3, the saline water is considered to arise from dissolution of halite deposits within the Mercia Mudstone that underlies the SAC. It supports an unusual variety of halophytic plants, including common saltmarsh grass *Puccinellia maritima*, lesser sea-spurrey *Spergularia marina*, saltmarsh rush *Juncus gerardii* and sea arrowgrass *Triglochin maritimum*.
- 1.3.3 Lionlodge Covert Local Wildlife Site (LWS) is located to the north-west of Great Haywood as shown on Figure A5 and contains an inland salt meadow reportedly supported from brine springs.

A2 Hydrology

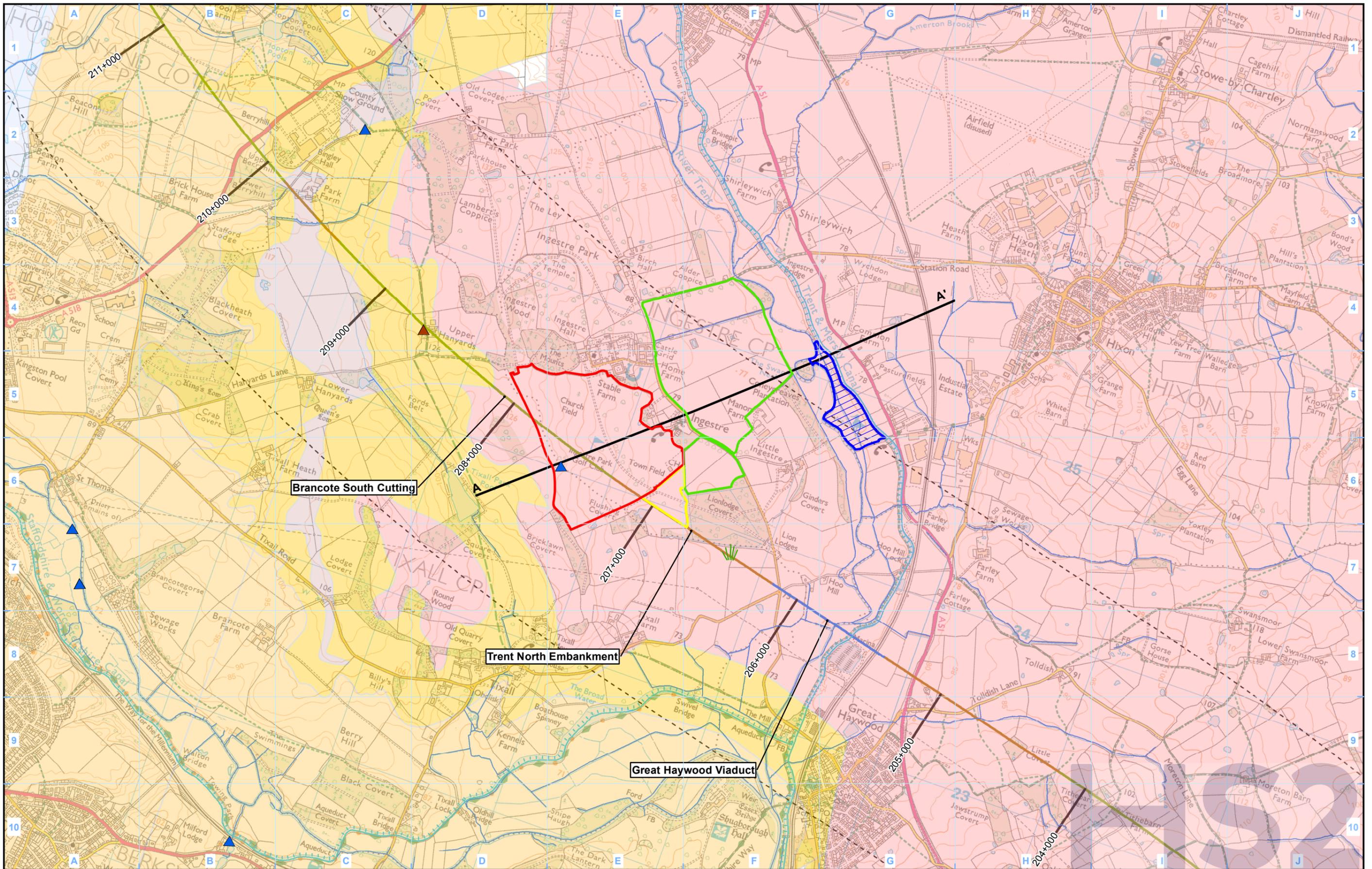
- 2.1.1 Figure A5 shows the surface watercourses in the vicinity of Ingestre Park Golf Club. Figure A6 presents the river and surface water flood zones in the area.
- 2.1.2 All surface water bodies in the vicinity of Ingestre Park Golf Club fall within the Staffordshire Trent Valley Catchment of the Humber river district basin (RBD).
- 2.1.3 Summary information relating to the surface water bodies in the vicinity of Ingestre Golf Club is provided in Table A2.
- 2.1.4 Table A2 also identifies the receptor values attributed to each individual watercourse based on the methodologies set out in the SMR, the SMR Addendum, and as applied in the WFD compliance assessment (Volume 5: Appendix WR-001-000) of the main ES.

Table A2: Key surface water bodies and their WFD status

| Water body name and identification number | Current WFD status | WFD status objective | Watercourse classification | Crossing location (National Grid Reference) | Receptor value |
|---|--------------------|----------------------|----------------------------|---|----------------|
| Trent from Tittensor to River Sow GB10408053272 | Bad | Poor by 2027 | Main river | River Trent at Great Haywood (from NGR 399805, 323614 to NGR 399107, 323783) | Very high |
| Trent and Mersey Canal, summit to Alrewas GB70410142 | Good | Good by 2015 | Main river | Trent and Mersey Canal, Great Haywood (from NGR 399805, 323614 to NGR 399107, 323783) | Very high |

⁸ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, Strasbourg, European Parliament and European Council, http://jncc.defra.gov.uk/Publications/JNCC312/UK_habitat_list.asp

Figures



- Legend**
- Cutting
 - Embankment
 - Viaduct
 - HS2 Centreline 1km Buffer
 - Watercourse
 - Canal
 - Line of cross section
 - Pasturefields SSSI/SAC
 - Ingestre Park Golf Club
 - Land within existing Bill limits/part to be used for golf course reconfiguration
 - Additional land required as AP2 amendment for golf course reconfiguration
 - ▲ Licensed Groundwater Abstraction
 - ▲ Unlicensed Groundwater Abstraction
 - Area of saltmarsh adjacent to Lionlodge Covert
 - Bromsgrove Sandstone Formation (mudstone)
 - Bromsgrove Sandstone Formation (sandstone)
 - Kidderminster Formation (Conglomerate)
 - Stafford Halite Formation
 - Mercia Mudstone Group (mudstone)

Map Number: Figure A1

Map Name: Bedrock Geology at Ingestre Park Golf Club

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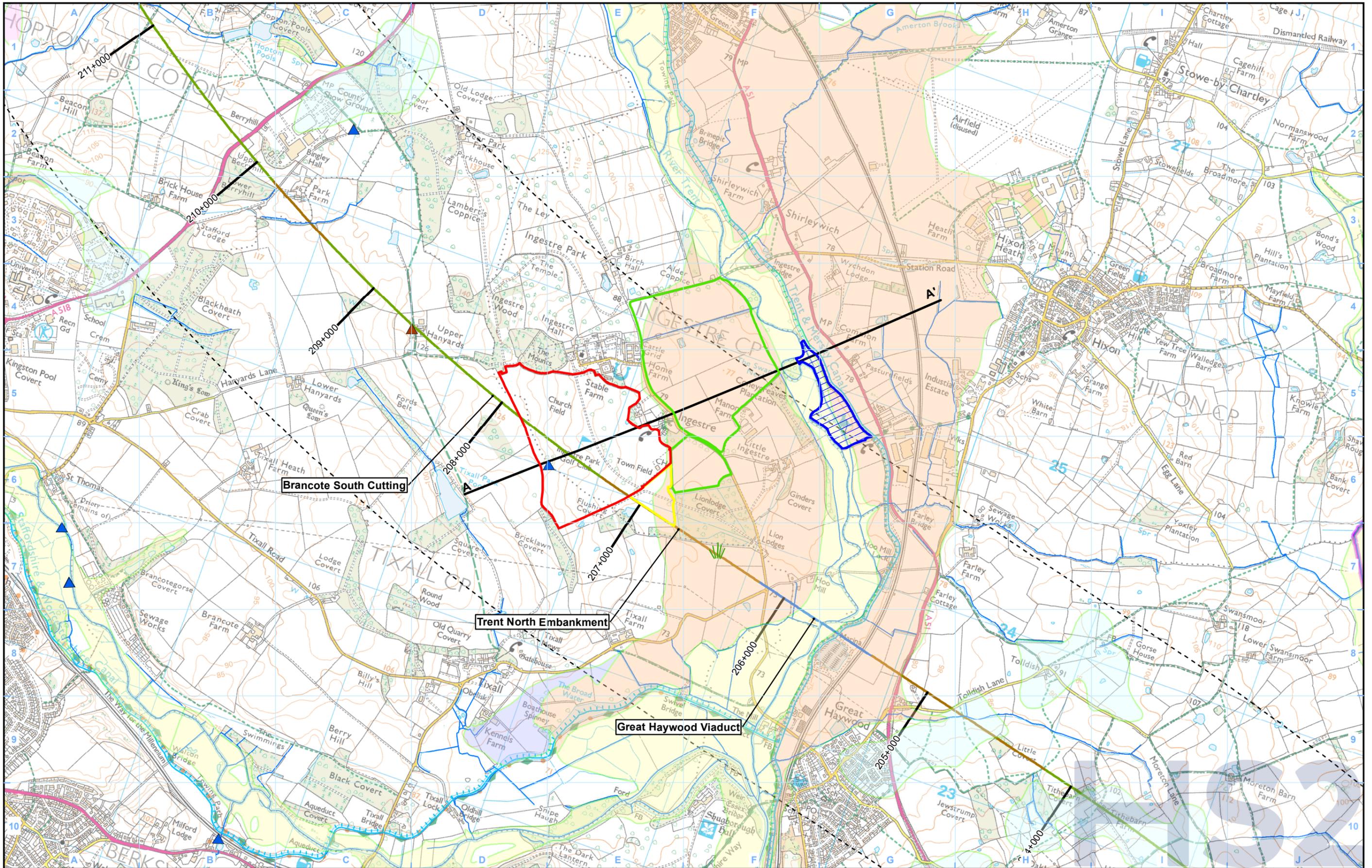
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Legend

- Cutting
- Embankment
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- ▲ Licensed Groundwater Abstraction
- ▲ Unlicensed Groundwater Abstraction
- ▲ Area of saltmarsh adjacent to Lionlodge Covert

- Additional land required as AP2 amendment for golf course reconfiguration
- ▲ Licensed Groundwater Abstraction
- ▲ Unlicensed Groundwater Abstraction
- ▲ Area of saltmarsh adjacent to Lionlodge Covert
- Alluvium
- Glaciofluvial Deposits
- Glaciofluvial Sheet Deposits
- Till, Devensian
- Till, Mid Pleistocene
- Peat
- River Terrace Deposits

Map Number **Figure A2**

Map Name **Superficial Geology at Ingestre Park Golf Club**

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Figure A3: Conceptual geological and hydrogeological cross section Ingestre Park Golf Club and Pasturefields Salt Marsh SAC

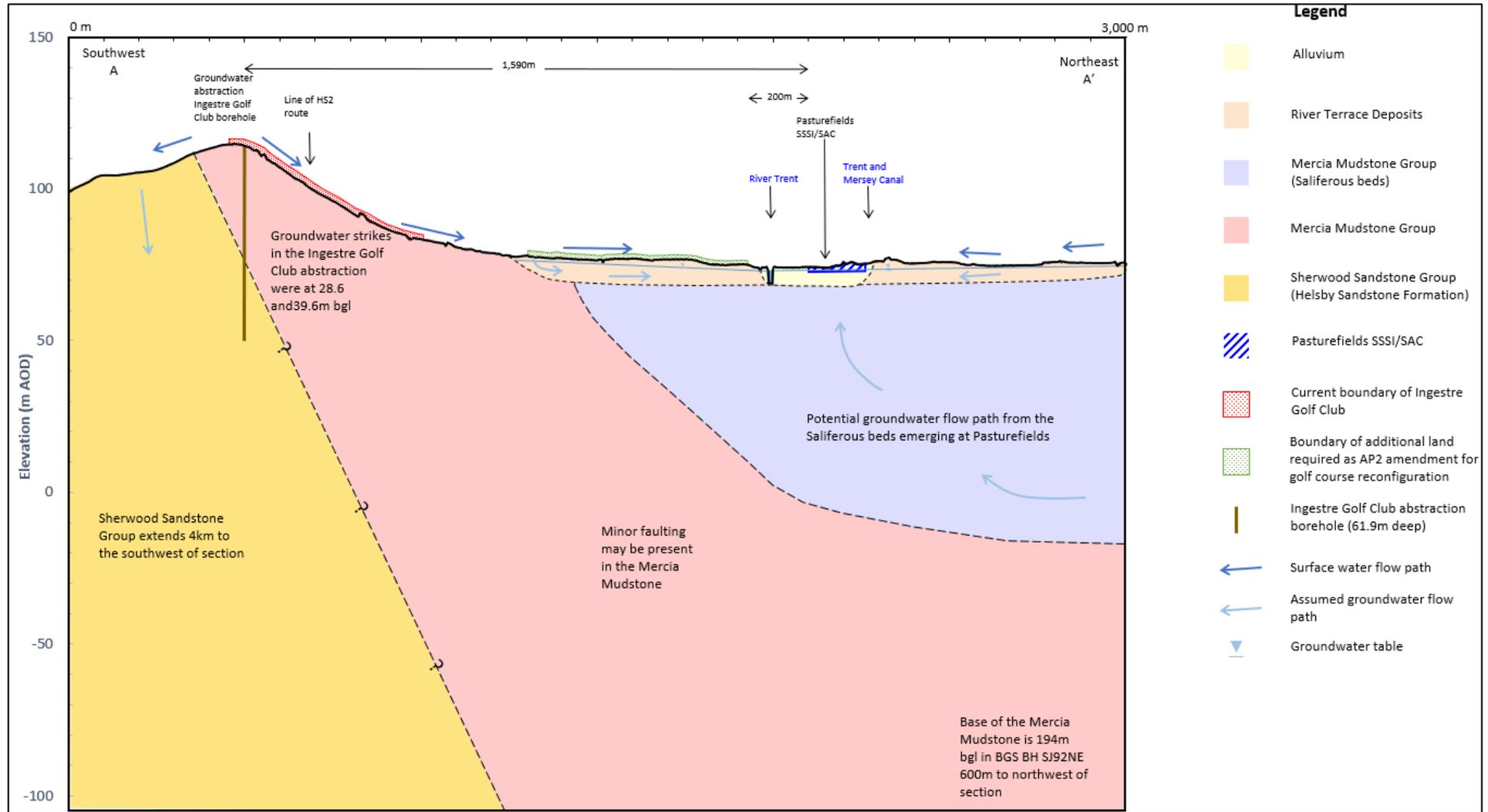
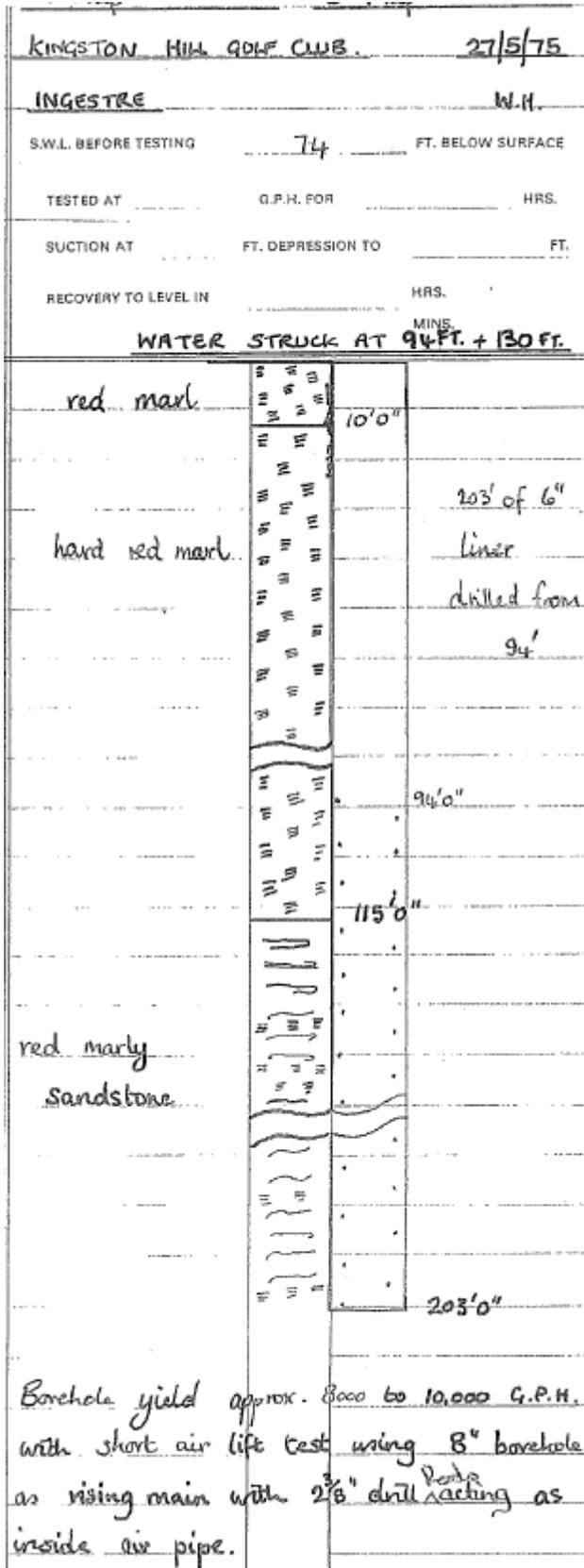
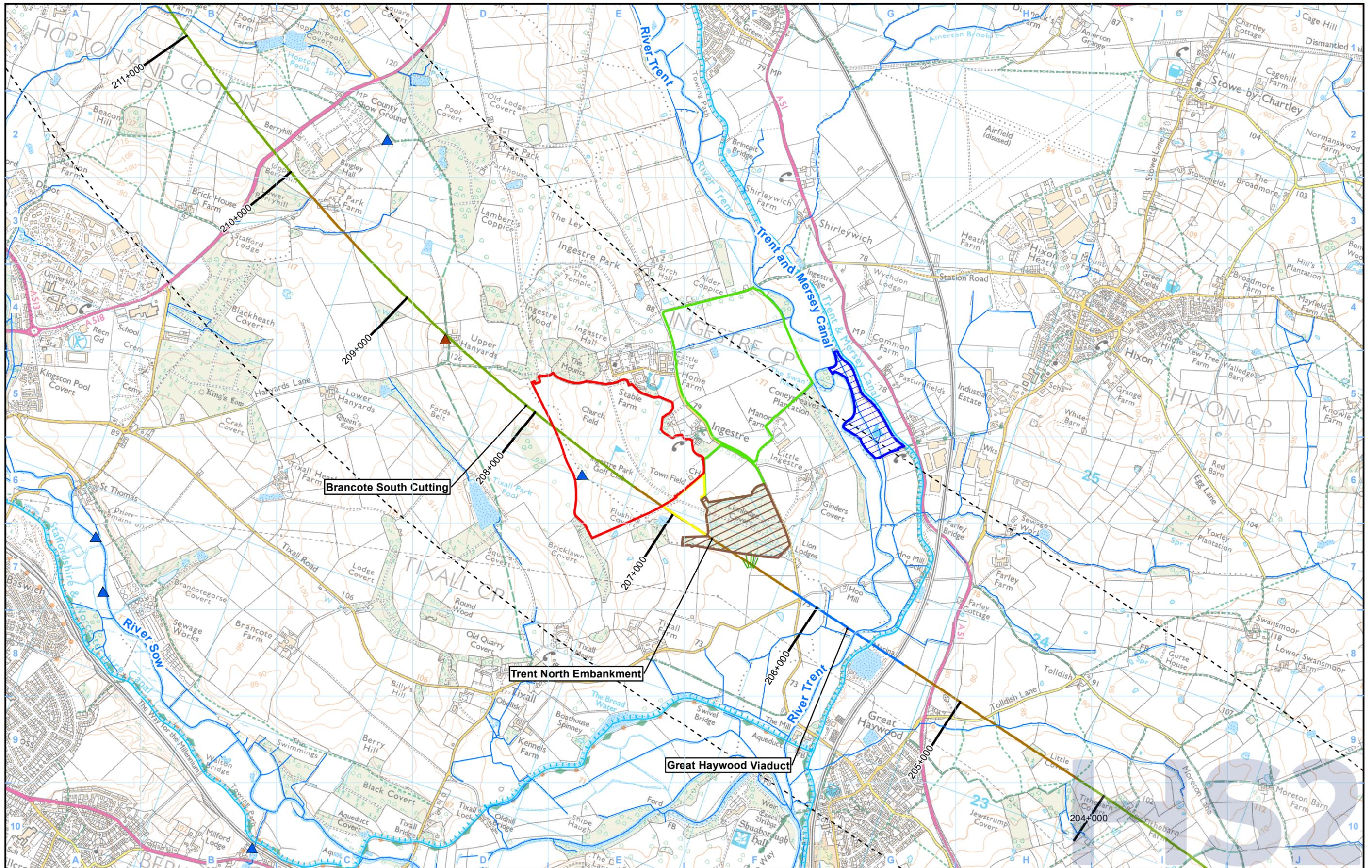


Figure A4: Borehole log for Ingestre Park Golf Club groundwater abstraction



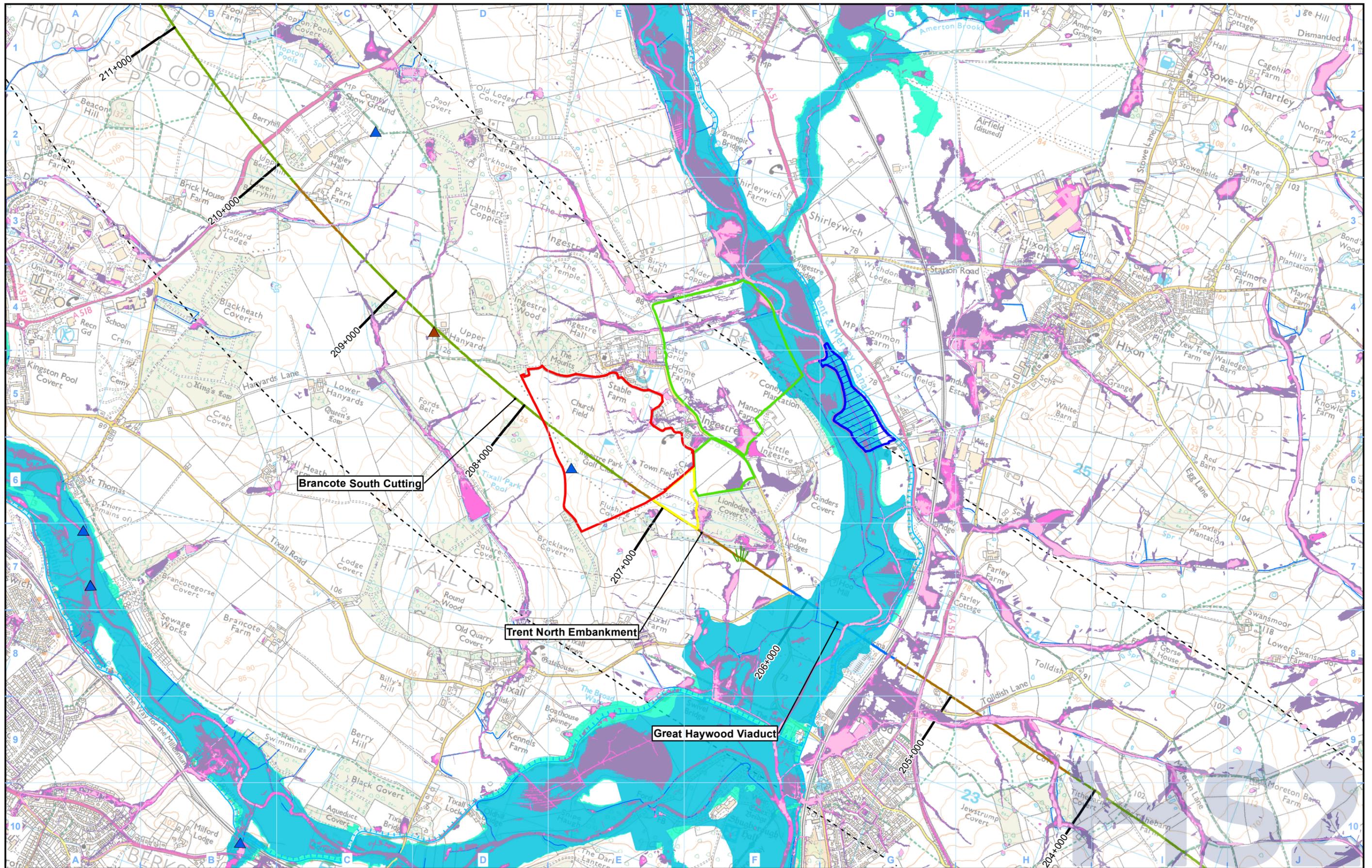


| Legend | |
|--------|--|
| | Cutting |
| | Lionlodge Covert LWS |
| | Embankment |
| | Ingestre Park Golf Club |
| | Pasturefields SSSI/SAC |
| | Viaduct |
| | Land within existing Bill limits/part to be used for golf course reconfiguration |
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| | Additional land required as AP2 amendment for golf course reconfiguration |
| | Licensed Groundwater Abstraction |
| | Unlicensed Groundwater Abstraction |
| | Area of saltmarsh adjacent to Lionlodge Covert |

| | |
|------------|---|
| Map Number | Figure A5 |
| Map Name | Surface watercourses at Ingestre Park Golf Club |

| | |
|---|-----------------------|
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Legend

- | | | | | |
|-----------------------------|--|--|-----------------------|---|
| Cutting | Pasturefields SSSI/SAC | Licensed Groundwater Abstraction | River flooding | High - chance of flooding greater than 1 in 30 (3.33%) |
| Embankment | Ingestre Park Golf Club | Unlicensed Groundwater Abstraction | Flood Zone 2 | Medium - chance of flooding between 1 in 100 (1%) and 1 in 30 (3.33%) |
| Viaduct | Land within existing Bill limits/part to be used for golf course reconfiguration | Area of saltmarsh adjacent to Lionlodge Covert | Flood Zone 3 | Low - chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%) |
| 1 HS2 Centreline 1km Buffer | Additional land required as AP2 amendment for golf course reconfiguration | | | |
| Watercourse | | | | |
| Canal | | | | |

Map Number **Figure A6**
 Map Name **Flood Zones at Ingestre Park Golf Club**

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