

APPENDIX 2 – BRE 365 Soakaway Tests

KRS Environmental Ltd		Page 1
3 Princes Square, Princes St... Montgomery SY15 6PZ		
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Innovyze		Source Control 2020.1.3
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.450 Area (ha) 0.423 Urban 0.000 SAAR (mm) 883 Region Number Region 4 Results 1/s QBAR Rural 2.4 QBAR Urban 2.4 Q100 years 6.3 Q1 year 2.0 Q30 years 4.8 Q100 years 6.3		
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APPENDIX 3 – IoH 124 Method Calculations

Infiltration testing: Newfields Farm, Rownall Road, Wetley Rocks

Prepared for: RE Projects Development Ltd.
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Infiltration testing: Newfields Farm, Rownall Road, Wetley Rocks

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CONTENTS

1	INTRODUCTION	2
1.1	Background.....	2
1.2	Instruction	2
1.3	Objectives	2
1.4	This report.....	2
2	SITE SETTING AND HISTORY	5
2.1	Basic site information.....	5
2.2	Site history	5
2.3	Geological setting	5
2.4	Hydrological setting	6
3	SITE INVESTIGATION WORKS.....	7
3.1	Site investigation programme	7
4	SITE INVESTIGATION RESULTS.....	9
4.1	Encountered ground conditions	9
4.2	Infiltration test results	9
4.3	Other site observations	9
5	REFERENCES	10

FIGURES

Figure 1.1	Site location plan	3
Figure 1.2	Development plan.....	4
Figure 3.1	Site investigation location plan	8

TABLES

Table 2.1	Site details	5
Table 3.1	Site investigation activities.....	7

APPENDICES

Appendix A	Site photographs
Appendix B	Trial pit soil descriptions
Appendix C	Infiltration test results

1 INTRODUCTION

1.1 Background

Planning permission is being sought from Staffordshire Moorlands District Council (application ref: SMD/2022/0180) for the '*development of a Battery Energy Storage System (BESS) with ancillary infrastructure, security fence, access, landscaping and biodiversity enhancements*' at Newfields Farm near Wetley Rocks in Staffordshire (herein referred to as the 'Site'). The Site location is shown on Figure 1.1. The proposed development plan is shown on Figure 1.2.

In support of the planning process KRS Environmental Ltd prepared a flood risk and surface water drainage assessment report for the study Site in March 2022. The KRS report identified two drainage options; discharge to ground is the preferred approach (option 1), although discharge to an adjacent water course (option 2) may be required, should infiltration to ground be unfeasible.

A consultation response provided by the Lead Local Flood Authority (Staffordshire County Council) on 16th May 2022 provided the following recommendations:

- *Infiltration testing to BRE 365 standards should be undertaken to confirm the suitability of the ground conditions for infiltration methods for surface water drainage option 1.*
- *The results from the infiltration testing shall determine the confirmation of the final drainage option in line with the hierarchy of surface water disposal as described in Part H of the Building Regulations.*

1.2 Instruction

Ground First was instructed by Third Revolution Projects Ltd., on behalf of RE Project Developments Ltd., on 24th June 2022 to undertake infiltration testing as outlined in proposal reference 4272P1.

1.3 Objectives

The objective of the work was to undertake appropriate site investigations designed to determine representative soil infiltration rates in line with the requirements of BRE Digest 365 (Soakaway Design).

It is understood that the infiltration rate information will be used by a third-party consultant to further inform a suitable drainage design in line with the requirements of the Lead Local Flood Authority.

1.4 This report

This report provides factual records of all relevant fieldwork observations and test results as well as indicative soil infiltration rates.

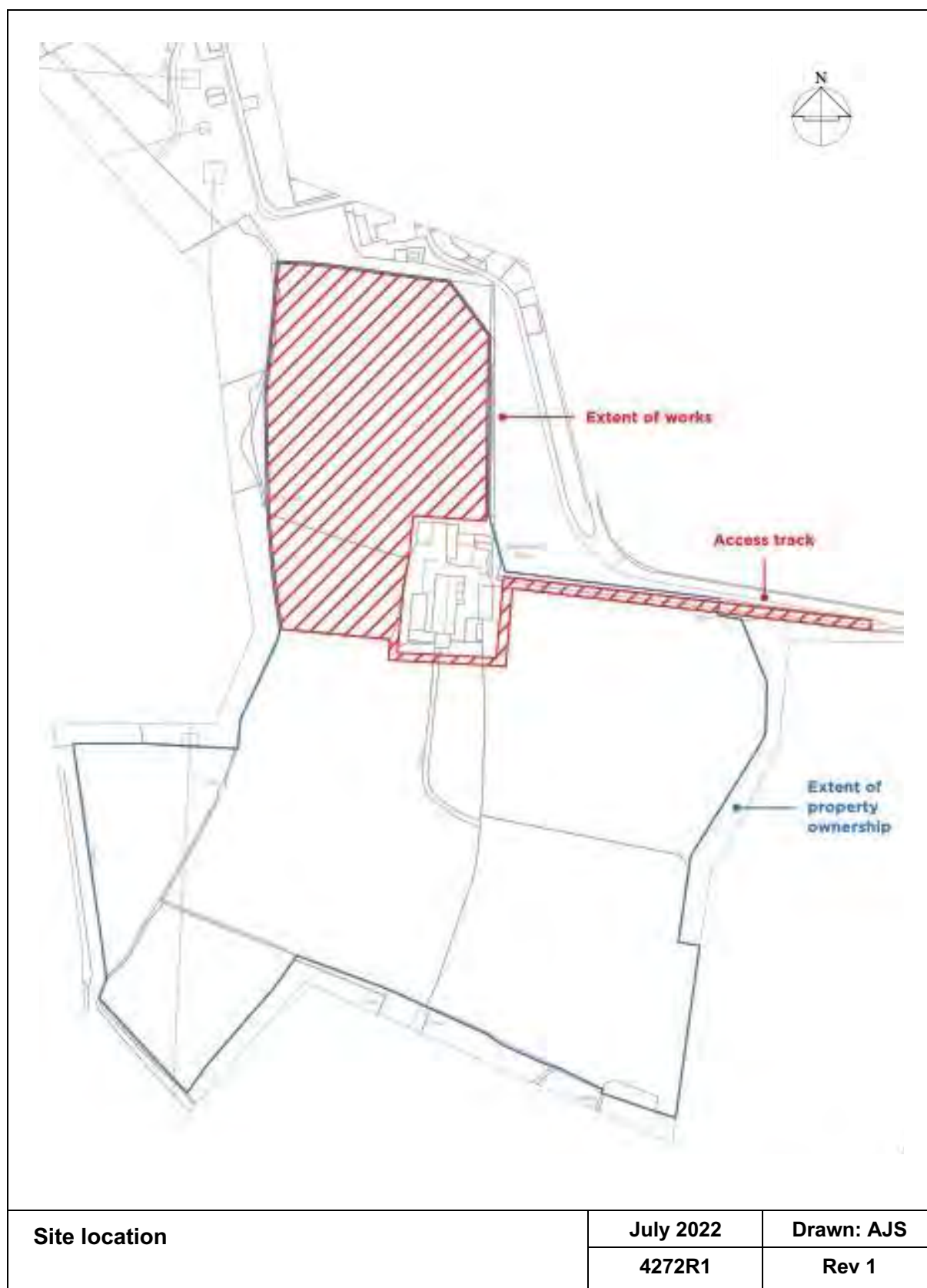
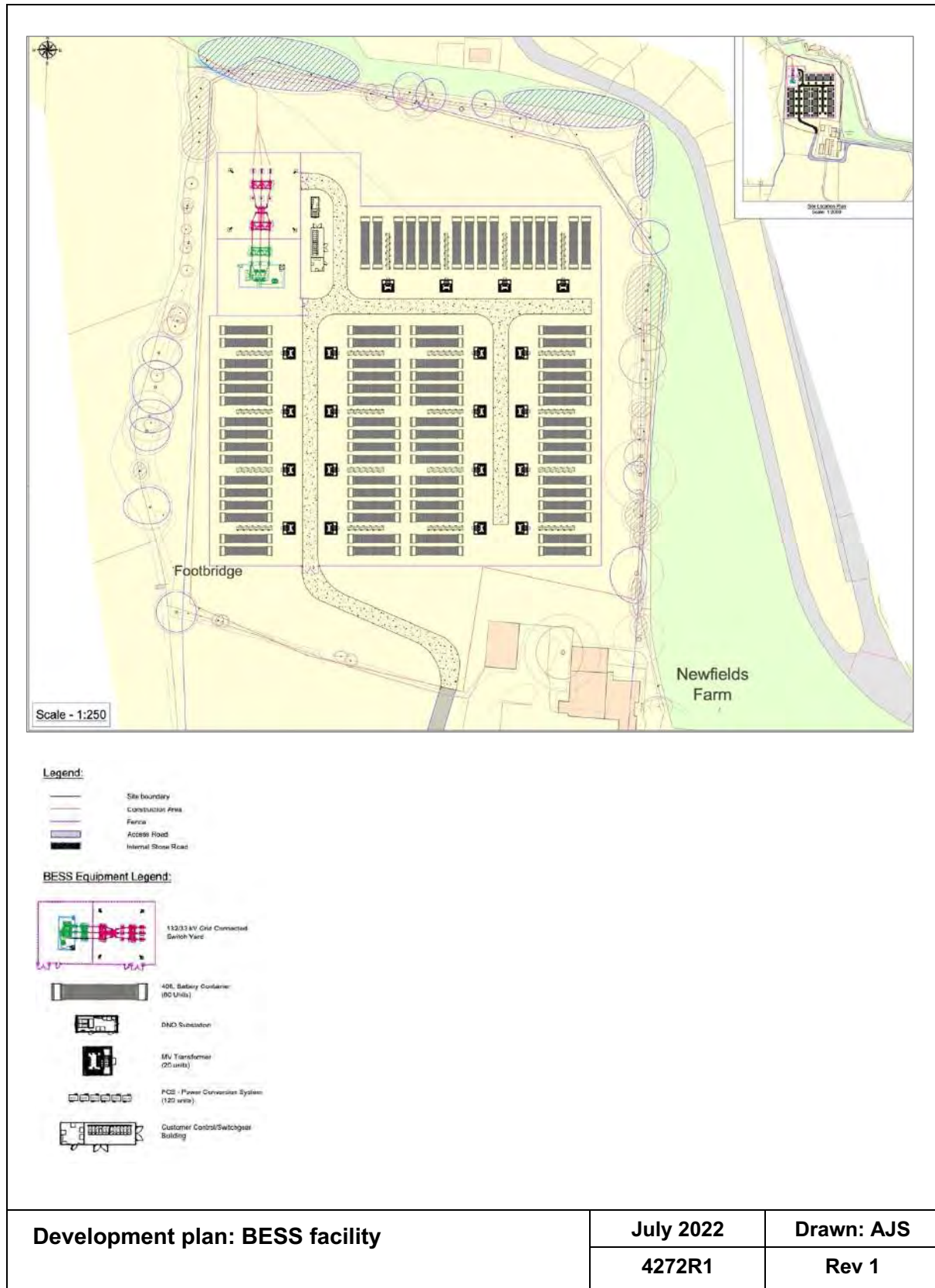
Figure 1.1 Site location plan

Figure 1.2 Development plan

2 SITE SETTING AND HISTORY

The following section provides a summary of the Site setting, land use history and local geological and hydrological conditions.

2.1 Basic site information

Information relating to the Site location is summarised in Table 2.1.

Table 2.1 Site details

Site Address	Newfields Farm BESS, Rownall Road, Wetley Rocks, Stoke on Trent, Staffordshire, ST9 0BS
Site area	c. 2.1 hectares
General setting and ground coverage	The Site is located within a predominantly rural land use setting c. 1.2 km to the north of Werrington. An existing electricity sub-station is positioned to the north and east of the Site. Structures associated with Newfields Farm are positioned directly to the south-east of the Site. The Site topography generally slopes down towards the north-west. The high point of the Site is located in the south-east corner at an elevation of c. 231 m AOD. The ground level in the north-west corner of the Site is c. 223 m AOD. Photographs of the current Site condition are included in Appendix A.

2.2 Site history

Available historical land use maps suggest that the Site has remained undeveloped during the last 100 years. Aerial photography indicates that the Site has been occupied by grassed fields, potentially used for animal pasture, since at least 2003.

Note: no historical landfills are mapped by the Environment Agency at or within 100 m of the Site.

2.3 Geological setting

British Geological Survey mapping (BGS, 2022) indicates that the Site and surrounding land area is underlain by superficial deposits comprising of Till (diamicton). The bedrock deposits comprise predominantly of the Morridge Formation group (mudstone, siltstone and sandstone), with a possible sub crop of Kniveden Sandstone in the south-west corner of the Site.

The nearest available BGS borehole record relates to borehole ref: SJ94NW13 located c. 500 m to the south of the Site (within the boundaries of Newfields Farm). The borehole was drilled to a depth of around 21.9 m in 1961; the encountered geological sequence comprised c. 0.6 m of 'soil', 0.6 m of 'rock', 3.1 m of blue marl and over 17 m of very hard sandstone. The borehole record showed a rest groundwater level of c. 8 m bgl.

Note: several confidential BGS records exist for boreholes previously drilled on the site of the neighbouring electricity sub station. Further to an email enquiry, the BGS has confirmed that these borehole records cannot be supplied without the permission of National Grid.

The following additional information regarding in-situ ground conditions is presented within KRS Environmental's flood and drainage report (KRS, 2022):

- Information from the National Soil Resources Institute details the site area as being situated on slowly permeable, seasonally wet acid loamy and clayey soils with impeded drainage.

- The Wallingford Winter Rain Acceptance Potential (WRAP) map indicates that the site lies within WRAP Class 4: clayey, or loamy over clayey soils with an impermeable layer at shallow depth.
- Site ground conditions suggest a low potential for groundwater flooding.

2.4 Hydrological setting

OS mapping shows the presence of a surface water channel positioned alongside the western Site boundary (see Figure 3.1); this feature ultimately discharges into Stanley Pool, located c. 2.4 km to the north. A potential surface water channel is also mapped in the north-west corner of the Site; this appears to be a perennial water feature which drains into the surface water channel located along the western Site boundary. A recent topographic survey identified further drainage ditches along the southern and eastern Site boundaries (see Figure 3.1).

3 SITE INVESTIGATION WORKS

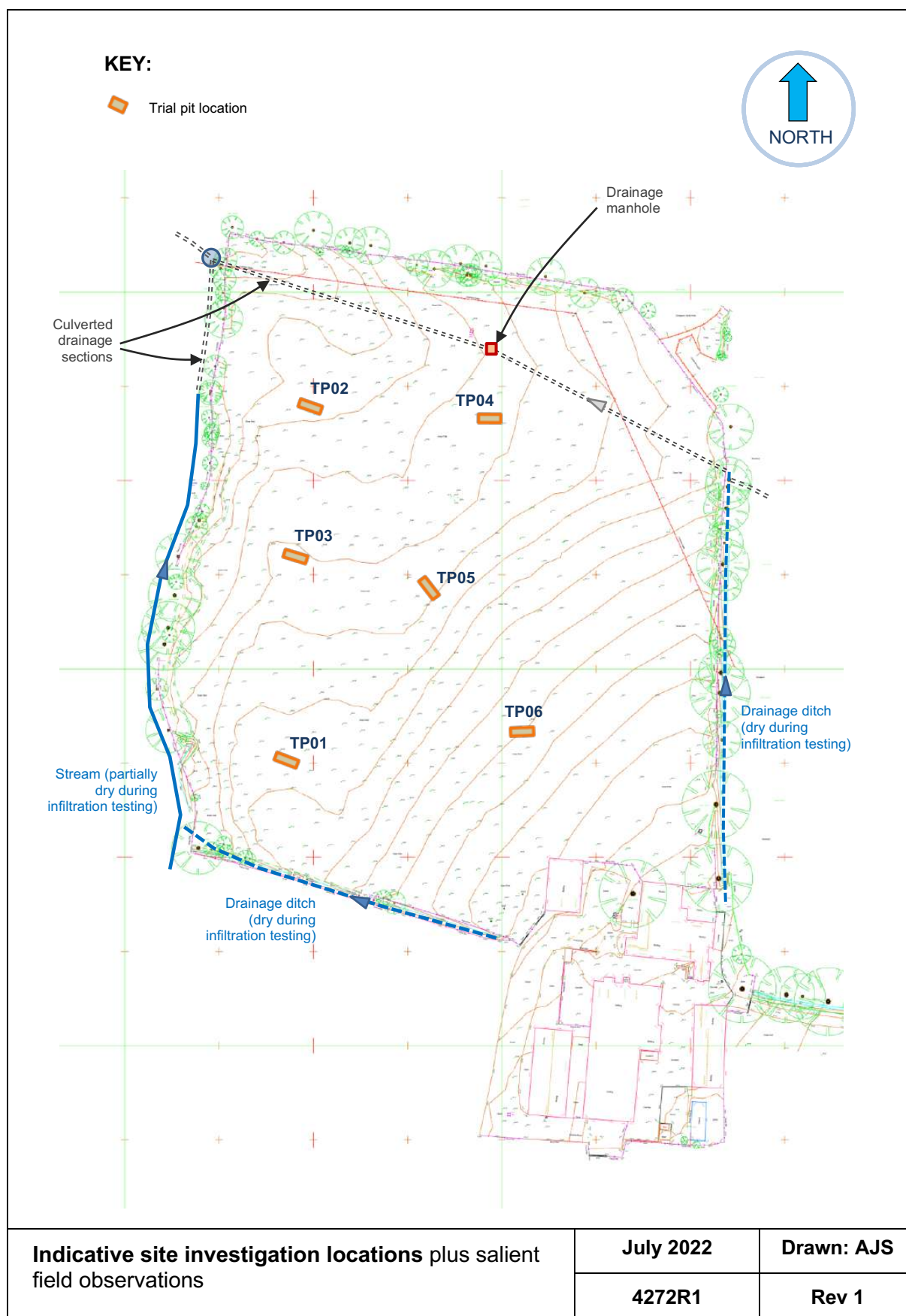
3.1 Site investigation programme

Trial pitting and infiltration testing was coordinated by Ground First at the study site on 20th July 2022. The purpose of the infiltration testing was to characterise the infiltration / drainage capabilities of the shallow sub strata.

A summary of the site investigation activities undertaken is presented in Table 3.1. The site investigation locations are shown on Figure 3.1. A photographic record of the Site works is provided in Appendix A.

Table 3.1 Site investigation activities

Element of investigation	Details	Comments / rationale
Utilities and service avoidance	Prior to undertaking the site investigation works gas and electricity service plans were obtained for the Site; no buried services were mapped on-Site. All exploratory trial pit locations were checked with a CAT scan prior to the intrusive works.	To minimise the potential for encountering buried services during the intrusive site investigation works.
Trial pitting	Six trial pits (TP01 to TP06) were excavated at the study Site using a tracked 3.5 tonne excavator. The sides and bases of each excavation were trimmed to make the pits as rectangular as practically possible. The pits were positioned in order to provide an indication of ground conditions across the Site, including the lower lying areas in the south-west and north-west. The trial pit locations are shown on Figure 3.1. The pits were excavated to depths of between 2.1 m and 2.4 m bgl. Note: all trial pits were observed to be stable; i.e., no collapse was observed within any of the trial excavations. All of the trial pits were backfilled on completion. The excavated spoil was replaced in broadly the same order as it was excavated. The backfilled spoil was compacted with a small mound left at each location. All excavated materials were logged by an experienced site supervisor (see Appendix B).	To assess the extent, thickness and composition of any Made Ground. To assess the composition of the natural superficial geology. To clarify the depth to any shallow groundwater. To make a visual assessment of any ground contamination. To enable infiltration testing.
Infiltration testing	Infiltration testing was carried out in accordance with BRE 365 (2016) at four of the trial pits (TP01, TP02, TP03 and TP04); these locations were all located at relatively low elevations in the north and west of the Site. A 1,300 gallon water bowser was used to discharge water into the pits using a wide diameter hose. The excavations were all filled in less than 60 seconds. Water level measurements were taken within each excavation using a dip tape at regular intervals following the cessation of infilling. Note: the residual water was pumped out of the trial pits prior to backfilling.	To enable representative infiltration rates to be calculated.

Figure 3.1 Site investigation location plan

4 SITE INVESTIGATION RESULTS

4.1 Encountered ground conditions

The sequence of strata encountered within each of the trial pits is described in Appendix B.

In summary, no obvious Made Ground was observed within any of the trial pits. The encountered lithology included an upper topsoil layer comprising a c. 0.3 m thickness of slightly gravelly fine sand with roots, typically underlain by slightly clayey slightly gravelly fine sand to depths of around 1.0 m. The material observed below c. 1.0 m predominantly comprised slightly gravelly sandy silt and slightly gravelly sandy clay. Friable dark grey mudstone was observed at the base of several trial pits.

No shallow groundwater was identified in any of the trial pits.

4.2 Infiltration test results

Four of the trial pits (TP01, TP02, TP03 and TP04) were subjected to infiltration testing.

The infiltration testing results are presented in Appendix C; these results indicate that no appreciable infiltration was observed at any of the trial pits (reflecting the fine grained nature of the encountered soils). As such, no representative infiltration rates have been calculated.

4.3 Other site observations

Salient observations made during the site investigation works included:

- The Site was covered by short grass (see Photographs 1 and 2 in Appendix A).
- No standing water was observed across the Site at the time of the infiltration testing.
- The modest drainage ditch present along the south-western Site boundary (see Figure 3.1) contained appreciable vegetation and was observed to be dry (see Photograph 3 in Appendix A).
- The drainage ditch present along the eastern Site boundary (see Figure 3.1) contained some vegetation and was also observed to be dry (see Photograph 8 in Appendix A).
- The stream channel located adjacent to the western Site boundary (see Figure 3.1) contained variable amounts of vegetation; ponded water was present within the channel to the south-west of the Site whereas the stream section adjacent to the central-western Site area was dry (see Photographs 4 to 6 in Appendix A).
- The stream section adjacent to the north-western part of the Site was culverted (see Figure 3.1).
- The culverted stream section ended in a small depression located close to the north-western corner of the Site (see Figure 3.1 and also Photograph 7 in Appendix A). A second culvert, which passes beneath the northern part of the Site, also discharges into this depression. The outflow from the depression is via a large diameter (c. 0.8 m wide) concrete pipe.

5 REFERENCES

BGS, 2022. Geology of Britain Viewer. <https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/>. Accessed 19th July 2022.

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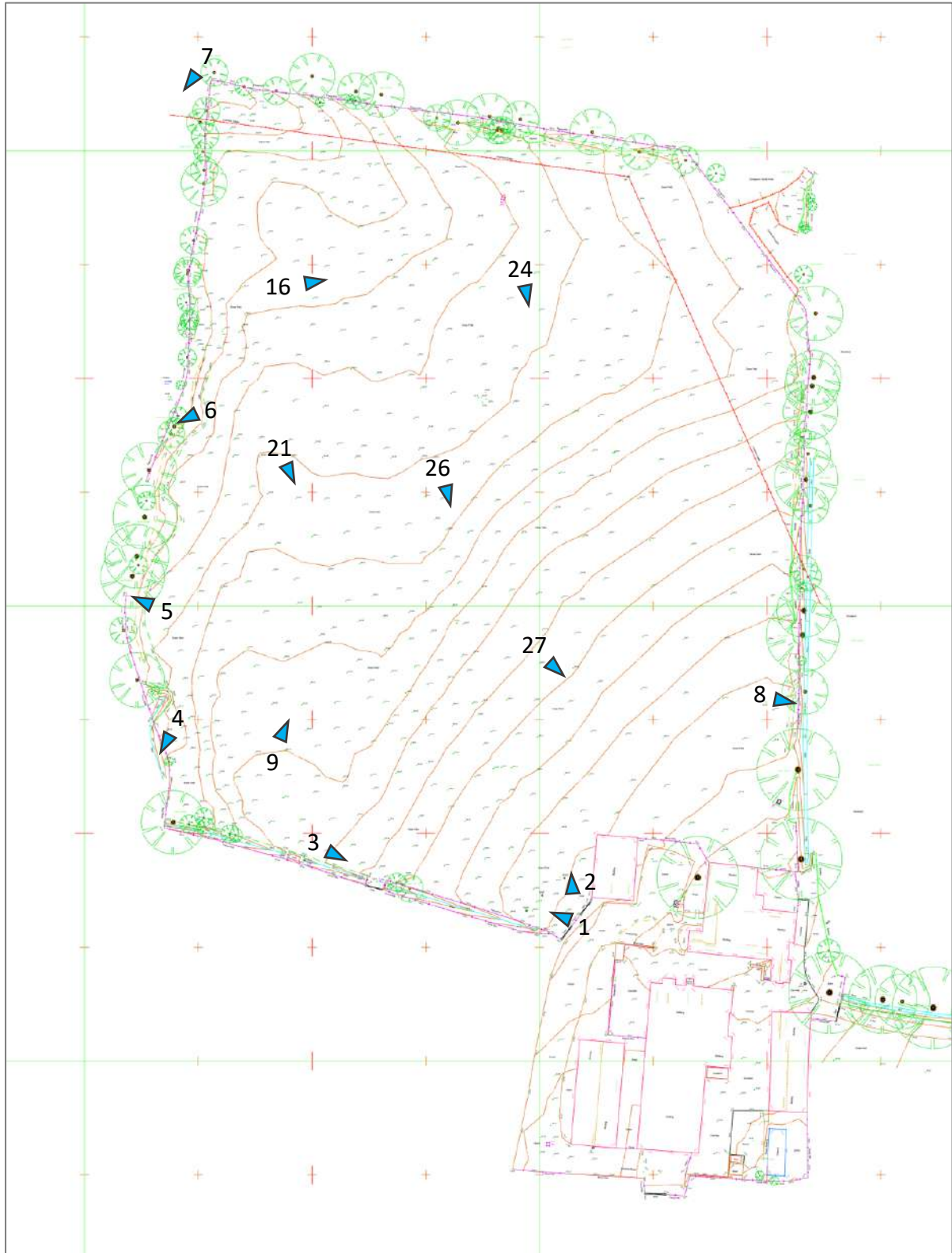
KRS, 2022. Newfields Farm, Wetley Rocks, Stoke on Trent, ST9 9LA. Flood Risk & Surface Water Drainage Assessment. Report ref: KRS.0612.002.R.001.B, dated March 2022.

APPENDICES

APPENDIX A

Site photographs

Selected photograph locations:





Photograph 1

Description: View across the Site from Newfield Farm; looking to the west
Date: 20/07/2022



Photograph 2

Description: View across the Site from Newfield Farm; looking to the north
Date: 20/07/2022



Photograph 3

Description: View of shallow drainage ditch along the south-western Site boundary; looking to the south-east

Date: 20/07/2022



Photograph 4

Description: View of stream directly adjacent to the south-western Site boundary

Date: 20/07/2022