South West Bicester Environmental Statement
Countryside Properties (Bicester) Ltd

Technical Appendix 5 Ground Conditions and Contamination

Contents

South West Bicester Environmental Statement

Technical Appendix: Ground Conditions and Contamination

Countryside Properties (Bicester) Ltd

April 2006

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Contents

Executive Summary

This Technical Appendix to the Environmental Statement has been based on the findings reported in the original Desk Study Report by Pell Frischmann (April 2001) and in the Ground Investigation Factual and Interpretative Report, also by Pell Frischmann, dated October 2001.

Existing ground conditions have been established from boreholes and trial pits during a site investigation survey and the level of contamination on the site has been assessed from the results of laboratory testing.

The implications of all geotechnical and environmental ground conditions on the construction of the proposed mixed use development have been considered in respect of foundation design, road pavement design and re-use of existing material.

1 Introduction

1.1 BACKGROUND

1.1.1 The site is located immediately south west of Bicester in the county of Oxfordshire and is currently a Greenfield agricultural site, the majority of which is Whitelands Farm.

1.1.2 The site is bounded to the north by Middleton Stoney Road (B4030) and to the east by Oxford Road (A41). The site extends westwards and southwards as shown on the Masterplan layout.

1.1.3 This report is based on enquiries and investigations that were carried out in April 2005. It is understood that the site requires an infrastructure to support a mixed residential development of 1585 dwellings together with associated schools and a community centre.

1.1.4 The site's topography slopes gently in an easterly direction. The site is approximately 1600 m long (as measured along Middleton Stoney Road) with the highest point of the site being in the northwest corner at approximately 82.7 m AOD. The lowest point of the site is the southern boundary where the levels are approximately 66.0 m AOD.

2 Methodology

2.1 REFERENCES

2.1.1 The following documents and standards were used in the compilation of the Pell Frischmann Ground Investigation Factual and Interpretative Report:

- Geological Survey of Great Britain 1:10000 Scale Geological Map Sheet No. SP52SE (Solid and Drift Edition).
- Building Research Establishment 1996 Digest 363 – Sulphate and Acid Resistance of Concrete in the Ground.
- BS 5930:1999 Code of Practice for Site Investigation.
- BS 1377:1990 Soils for Engineering Purposes.
- Design Manual for Roads and Bridges HD25/94.
- Specification for Highway Works Series 600.

2.2 FIELDWORK

2.2.1 The ground conditions were determined by drilling cable percussion boreholes and excavating trial pits and, following this, geotechnical and chemical laboratory testing was carried out on a range of samples taken across the site.

2.2.2 A total of 11 No. boreholes and 110 No. trial pits were used in the investigation.

2.2.3 Standard Penetration Tests (SPTs) were carried out in granular soils, cohesive soils and weathered bedrock. These tests were performed in accordance with BS 1377: Part 9 to investigate the relative density and shear strength of the soils tested. CBR and vane shear tests were also carried out on site for selected samples.

2.2.4 All boreholes and trial pits were backfilled using the arisings.

2.3 LABORATORY TESTING

2.3.1 Laboratory testing for engineering conditions was carried out by Thyssen Geotechnical and chemical testing was carried out by ECOS Ltd. Both companies were acting on behalf of Pell Frischmann Consultants.

2.3.2 The following engineering tests were carried out in accordance with BS 1377:1990:-

- Natural moisture content
- Atterberg Limits
- Particle size analysis
- Quick undrained triaxial tests on undisturbed samples
- Quick undrained triaxial tests on remoulded samples
- One dimensional consolidation test
- pH value
- Sulphate content

- 2.5kg and 4.5kg compaction tests (dry density/moisture content relationship)
- California Bearing Ratio tests at natural moisture content
- California Bearing Ratio tests at each compaction point

2.3.3 Chemical tests were carried out on soil samples to detect the presence and concentration of the following:-

Arsenic	Lead	Cyanide
Boron	Mercury	Thiocyanate
Cadmium	Nickel	Selenium
Chromium	DRO	Zinc
Copper	pH	Phenol
Sulphate	Sulphide	Sulphur
PAH	Pesticide Suite	Leachate

2.3.4 Chemical tests were carried out on groundwater samples to detect the presence and concentration of the following:-

Arsenic	Lead	Cyanide
Boron	Mercury	Thiocyanate
Cadmium	Nickel	Selenium
Chromium	DRO	Zinc
Copper	pH	Phenol
Sulphate	Sulphide	Sulphur
PAH	Chloride	PCB
Ammoniacal Nitrogen	Total Organic Carbon	

3 Baseline Conditions

3.1 EXISTING GROUND CONDITIONS

3.1.1 Information obtained from the British Geological Survey 1999 (1:10000 series sheet SP25SE – Solid and Drift Edition) indicates that the site is underlain by rocks of the Jurassic Period with overlying superficial deposits of alluvium along the routes of local streams.

3.1.2 Generally, the strata covering this site consist of alluvial deposits (peat, sand and soft clay), gravel with limestone cobbles, stiff clay (becoming mudstone with depth) or a clay overlying limestone Cornbrash. A strong limestone layer was encountered over much of the site at depths varying between 0.7 m and 1.7 m and at 2.6 m in one isolated area at Trial Pit 23.

3.1.3 There are three areas of made ground - located in the north west of the site, the north east corner and in the central eastern area.

3.1.4 In the north west area, this made ground forms the infill to an historic quarry and consists almost entirely of ash and clinker fill, with glass, metal and pottery fragments to a depth of approximately 2.5 m, under which is gravel or soft clay, becoming stiff clay and mudstone. Adjacent to this localised fill, however, gravel with limestone cobbles were encountered below the topsoil, with strong limestone encountered from 0.6 m to 1.0 m depth.

3.1.5 Trial pits to the north east of the site indicated another quarried area which has become infilled with a layer of peat overlying soft clay with organic deposits to around 0.6 m depth and fine sand with some limestone gravel below this. The topsoil in this area also contains organic material and one of the trial pits (TP84) revealed the presence of plant remains to a depth of 1.3 m. There is some evidence to suggest that lime burning has taken place in this area.

3.1.6 The third area of localised fill occurs centrally along the eastern border of the site and the made ground typically consists of stiff clay with some gravel and cobbles. It is considered possible that this location has also been used as a limestone quarry. Water was encountered seeping into the trial pits in this area at 2.1 m depth.

3.1.7 In another localised area south of Pingle Brook, a layer of fine, clayey sand up to 0.4 m thick was encountered overlying the gravel, cobbles and limestone.

3.1.8 Generally the centre, south and south west of the site is undisturbed ground consisting of stiff "Kellaways Clay" underlain by a weak mudstone or Cornbrash. The Cornbrash was encountered in this area at varying depths, from 0.6 m to 2.5 m. Cornbrash is described as a "predominantly coarse granular material (highly to completely weathered limestone)", being gravel with a high clay or silt content.

3.1.9 The northern and western areas are generally a sandy, clayey gravel with limestone cobbles, overlying a strong limestone layer at around 1.0 m depth.

3.1.10 Loose sand was encountered towards the central southern boundary of the site in layers up to 0.7 m thick between depths of 0.3 m and 1.5 m.

3.1.11 With the exception of seepage into the central eastern quarry area as noted above, the occurrence of groundwater was intermittent across the site, seeping from within the Cornbrash or at the upper levels of the mudstone, wherever this was encountered. In the north east corner of the site, the occurrence of water was considered to be as a result of the proximity of Pingle Brook. All groundwater levels may be seasonal and historically high groundwater levels have occurred during the winter months on this site.

4 Engineering Considerations

4.1 FOUNDATION DESIGN

4.1.1 The use of shallow foundations (concrete strip, trench fill or pad footings) for residential and light industrial structures should be possible over the majority of the site, except in the areas of made ground, where the fill, peat and soft organic clay are unsuitable.

4.1.2 The allowable bearing capacity for each of the formations over the remainder of the site has been calculated to give the following recommendations:

- Kellaways Clay: 180kN/m^2 for a 2m x 2m footing, with settlement less than 25mm.
- Cornbrash (generally)/granular Forest Marble (NE corner): 450kN/m^2 for a 2m x 2m footing, with settlement less than 25mm.
- Unweathered limestone: 600kN/m^2 for a 2m x 2m footing, with settlement less than 25mm.
- Cohesive Forest Marble (NE corner): 240kN/m^2 for a 2m x 2m footing, with settlement less than 25mm.

4.1.3 The made ground containing ash fill encountered in the north west quarried area of the site was shown to be “very loose”. SPT ‘N’ values from samples in this area ranged from 1 to 20, but it is considered that the higher ‘N’ values may be due to obstructions in the fill and should not be taken into account for the purposes of foundation design. This material is unsuitable for building foundations.

4.1.4 Made ground from the north eastern quarried area ranged from very loose granular material to soft organic clay. Individual footings should be founded on the limestone layer beneath the made ground. Ground bearing slabs may be considered provided the made ground is proof rolled with localised soft spots excavated and provided that the specific settlement requirements and slab loads are taken into account.

4.1.5 Further localised areas of made ground found along the eastern boundary of the site revealed clay with a low plasticity (CL on the Casagrande Plasticity Chart). This material can be subject to considerable lateral variations in strength and should be regarded conservatively for design purposes.

4.1.6 The cohesive alluvial deposits (sand in the south eastern part of the site and soft clay/peat in the north eastern area) should be excavated as they are unsuitable for supporting foundation loads. Groundwater control in these areas may be necessary.

4.1.7 Where foundations are to be placed on the cohesive clays and Forest Marble materials, reference should be made to the BRE Digest 298 (Low rise building foundations – the influence of trees in clay soils) and the NHBC Standards Chapter 4.2 (Building Near Trees) should be followed regarding depth of foundations and proximity of trees.

4.1.8 Permeability tests have shown that the Cornbrash material is unsuitable for the use of soakaway drainage on this site – permeability rates are low and there is a high potential for the loss of fines from the material which could lead to silting up and local subsidence.

4.2 CBR VALUES/PAVEMENT DESIGN

4.2.1 As a subgrade, the granular ash fill present in the north western quarried area of the site should provide a CBR value of up to 5% provided that the material is proof rolled and any localised soft spots are excavated. A sub-base thickness of 150mm on a 250mm capping layer, or a sub-base thickness of 250mm, is recommended for road pavements in this area. This recommendation is based on Figure 3.1 of HD25/94 in the Design Manual for Roads and Bridges. During the construction stages, prior to construction of upper pavement layers, this material should not be trafficked as in wet conditions it may degenerate into a slurry. Differential settlement could occur between the sides of the quarry and the fill material and therefore road pavements should incorporate a form of geogrid reinforcement below the sub-base.

4.2.2 Similarly, the made ground present in the north eastern corner of the site should be proof rolled with soft spots removed. It is estimated that a CBR value of 15% should be achieved. According to Figure 3.1 of HD25/94 in the DMRB, a sub-base thickness of 150mm should be used.

4.2.3 The cohesive fill encountered in the central eastern part of the site produces a CBR value of 3%. The DMRB recommends a sub-base thickness of 300mm alone, or a 150mm sub-base on a 350mm capping layer.

4.2.4 Alluvial deposits of soft clay and peat should be excavated and replaced with granular material which is suitable for pavement foundations. These deposits are unlikely to achieve a CBR value of more than 1% if they left in place (150mm thick sub-base on 600mm capping).

4.2.5 Deposits of sand below road pavements, provided they are proof rolled and localised soft spots are excavated, should achieve a CBR of 10%. This should require a sub-base of 175mm alone or a 150mm sub-base on a 190mm capping layer. The frost susceptibility of sand should be taken into account and in these cases the total pavement thickness should not be less than 450mm.

4.2.6 The typical strata over the whole site should be considered as follows with regard to road pavement design:

Kelleway Clay	CBR = 5%
	Sub-base = 225mm or
	Sub-base = 150mm over 250mm capping
Cornbrash	CBR >15%
	Sub-base = 150mm
	Total pavement thickness to be >450mm
Forest Marble (granular)	CBR >15%
	Sub-base = 150mm
	Total pavement thickness to be >450mm

Forest Marble (cohesive)	CBR = 8%
	Sub-base = 190mm or
	Sub-base = 150mm over 210mm capping
	Total pavement thickness to be >450mm

4.2.7 Both the Cornbrash and the Forest Marble have a relatively high fines content and exposure of the material to rainfall and surface water should be minimised as an increase in the moisture content may lead to a decrease in the CBR value. The subgrade should not be trafficked during wet weather and localised soft spots should be removed.

4.3 EXCAVATION AND RE-USE OF EXCAVATED MATERIALS

4.3.1 In most cases the sides of excavations within the soils encountered are likely to be stable, although the depth of earthworks may be limited by the level of the limestone stratum.

4.3.2 Most of the made ground in the three quarried areas will be unsuitable for use as general fill or backfill to drainage trenches and behind structures. The levels of contaminants found in the made ground should also be considered (see following section). The alluvial deposits are also considered to be unsuitable for re-use to backfill excavations. Both the made ground and the alluvial deposits may possibly be considered as Class 4 Landscaping Fill in accordance with the Department of Transport Specification, provided that contamination levels have been taken into account.

4.3.3 Most of the Kelleway Clay may be suitable as Class 2A or 2B general fill, with areas that are too wet being considered unsuitable. The clay should not be worked in, or exposed to wet conditions. The Cornbrash and granular Forest Marble, selected with a low fines content, should generally be suitable for use as a Class 1A or 1B general fill. These materials may potentially be used as a specialist or engineering fill provided they are subject to dry density, moisture content and plate bearing tests. The cohesive Forest Marble materials, subject to plasticity, should be suitable as a Class 2A or 2B general fill.

4.3.4 Total soil sulphate contents are generally below 0.24% SO_4 with the exception of the made ground ash fill material from the north west corner and the samples from one localised area around Trial Pit 68. Groundwater sulphate levels are generally well below 0.4 g/l SO_4.

5 Contamination Issues

5.1 HISTORY

5.1.1 The majority of the site has been used for agriculture and there is no history of contaminative use on or adjacent to the site except for the existence of the ash filled quarry in the north west corner and the proximity of a petrol station along the eastern boundary. The petrol station does not appear to have caused any contamination in the region of TP90. TPs 85 and 86 show no chemical test results and further testing around this area would be advisable. There is no record of any landfill sites within 250m of the site.

5.2 RESULTS OF CHEMICAL TESTING (SOILS)

5.2.1 High arsenic and lead concentrations were found in the made ground in the north west corner of the site, generally within the ash fill. In the samples taken, arsenic levels exceeded 69mg/kg and lead exceeded 701mg/kg, both of which are in excess of the CLEA threshold levels of 20mg/kg and 450mg/kg respectively for residential gardens. Contamination by phytotoxic metals nickel (>50mg/kg) and zinc (>1200mg/kg) was also high in this filled area in the north west. These values are based on the CLEA guidelines and the levels should be taken into consideration if the materials are to be used in landscaping fill.

5.2.2 High arsenic levels (up to 231mg/kg) were also encountered in a localised area centrally along the eastern boundary – this area is considered to consist of made ground which contains some clinker-like material. It appears to represent a “hot spot” also containing a high level of nickel (162mg/kg > 50mg/kg) and an unusually high sulphate result (14027mg/kg, which exceeds the ICRCL Action limit of 10000mg/kg). Further investigation of this area should be carried out in order to determine the extent of this contamination.

5.2.3 Sulphate levels over the ICRCL threshold limit of 2000mg/kg were found in the north east corner of the site.

5.2.4 Generally in the topsoil across the centre of the site and in the northern area there are slightly elevated levels of arsenic (less than 10mg/kg) and nickel (less than 70mg/kg), which are considered to be generally within the acceptable limit for use in domestic gardens, subject to further more detailed testing using the Physiologically Based Extraction Test (PBET) to determine the bioavailability of arsenic.

5.2.5 Leaching tests were carried out on some of the soil samples and the samples then analysed for ammonia, arsenic, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, pH, total phenols, selenium and zinc. No significant concentrations of the contaminants were found in the samples.

5.3 RESULTS OF CHEMICAL TESTING (GROUNDWATER)

5.3.1 There was no significant level of contamination in any of the groundwater samples taken.

5.3.2 This indicates that it is unlikely that any mobile contaminants will be transferred to an off site source and similarly that there is a low risk of contaminants migrating onto the site.

5.4 POTENTIAL FOR CONTAMINATION BY RADON GAS

5.4.1 The Building Research Establishment identifies the limestone within North Oxfordshire to be a potential source of radon gas. Although the initial ground investigation makes no reference to the presence of radon, it is recommended that further testing should be carried out.

5.5 POTENTIAL FOR CONTAMINATION FROM WHITELANDS FARM

5.5.1 The site has been used historically as a mixed use agricultural and dairy farm, based at the Whitelands Farm complex, which is centrally located within the proposed development. Material in the areas around any silage and animal waste storage and around the farm's fuel storage tanks should be considered as hazardous and testing will be required to determine the extent of any contamination. It is possible that some areas of the proposed development adjacent to the retained farm site may have been contaminated. Contaminated material will need to be disposed of to a special waste site.

5.6 POSSIBLE CONTAMINATION BY WEEDS

5.6.1 A small area of Japanese knotweed has been noted to the south of the site. It is possible that it might spread on to the site before construction. This is being contained/eradicated as part of the existing agricultural management of the land. In order to eradicate this plant, the underground rhizomes should be chemically treated. The type of treatment will depend on the risk of run-off to nearby watercourses and advice on the use of herbicides should be sought from the Environment Agency. It should be noted that planting of other species may be adversely affected by the use of persistent herbicides.

5.7 REMOVAL OF CONTAMINATED MATERIAL FROM SITE

5.7.1 According to the "Guidance on the Disposal of Contaminated Soils", published by the Environment Agency, topsoil contaminated by arsenic will have to be transported to a suitably licensed site because of the arsenic levels encountered.

5.7.2 Proposals for access to the development indicate that highway works are to be constructed over the area which at present includes the contaminated quarried area in the north west of the site. Detailed intrusive investigations will be needed to determine whether on-site treatment, capping or removal to a licensed tip is required.

6 Assessments and Residual Effects

6.1 SENSITIVITY AND MAGNITUDE ASSESSMENT

6.1.1 The impacts of the proposed development are assessed in the sensitivity and magnitude table located in Appendix B.

6.2 POTENTIAL EFFECTS

During Construction

6.2.1 There is the potential for the existing contamination at the site to be released by the excavation works and general construction activities. This could potentially affect construction workers on site and mobilise contaminants into the ground and surface water. The construction workers are of high sensitivity. There is the potential for a small change if appropriate controls are not adopted. This will result in an adverse effect of moderate significance.

6.2.2 The mobilisation of contaminants during construction could potentially affect the ground and surface water. These receptors are of medium sensitivity and the magnitude of change is considered to be small. If no mitigation is proposed, there will be an adverse effect of moderate significance.

6.2.3 There is a very small risk that contaminants could be mobilised off site via the soils and groundwater. The adjacent land uses are considered to be of high sensitivity. However, the magnitude of change is negligible and no significant effects have been predicted.

6.2.4 There is also the potential for contamination to be generated during construction as a result of oil spillages and leaks from equipment and vehicles. This could potentially affect construction workers and future residents through direct contact. These receptors are considered to be of high sensitivity and the magnitude of change is small. Without mitigation, the construction work potentially results in an adverse effect of moderate significance.

Post-construction

6.2.5 Without appropriate remediation, the existing contamination could affect the future use of the site. Future residents will be sensitive due to the creation of residential gardens. These receptors are of high sensitivity and the magnitude of change is small. This results in an adverse effect of moderate significance.

6.2.6 The pupils and teachers attending the new schools on site are sensitive with respect to the school playing fields and areas of open space. These receptors are of high sensitivity and the magnitude of change is small. This results in an adverse effect of moderate significance

6.2.7 In addition, the residents, occupiers and site users would be at risk from the open spaces, parks and formal sports provision proposed at the site. These receptors are considered to be of high sensitivity. The magnitude of change is small and this potential adverse effect is of moderate significance.

6.2.8 Contamination could be generated post-construction as a result of the surface water run-off from the new development. This could affect surface and groundwater and potentially the new residents. The magnitude of change is small and this adverse effect is considered to be of moderate significance.

6.2.9 It is possible that the existing area of Japanese knotweed could spread through natural growth if not appropriately treated, possibly affecting adjacent land uses and domestic gardens. This area is outside of the boundary of the development and will not be affected by the development proposals. It is understood that steps are being taken to eradicate the existing area of knotweed. However, as this infestation will not be affected by the proposal, no significant effects have been predicted.

6.3 MITIGATION

Remediation of Existing Contamination

6.3.1 A detailed remediation scheme will be developed for the site. This will involve further soil testing with respect to certain areas of the site.

6.3.2 The areas for detailed testing include:

- the potential contamination areas as shown on Drawing 1546/SI/001. This will determine the extent of the contamination and inform the remediation strategy
- the topsoil across the centre of the site and in the northern area where there are slightly elevated levels of arsenic (>10mg/kg) and nickel (>70mg/kg). These are generally considered to be within the acceptable limit for use in domestic gardens. However, more detailed testing using the Physiologically Based Extraction Test (PBET) to determine the bioavailability of arsenic will be undertaken
- the areas of the site that will be covered by buildings. The Building Research Establishment identifies the limestone within north Oxfordshire to be a potential source of radon gas. Further testing will be undertaken to inform the engineering design and address any significant radon levels.

6.3.3 Remediation options will be identified following analysis of the soil testing results. This will involve an assessment of the proposed end use of each area of the site. This has a bearing on the type of mitigation measures used in respect of contaminated soils. Soft landscaped areas and domestic gardens may require excavation of the contaminated material up to 1.0m depth and replacement with clean cover from an approved source. Contaminated materials in areas that are to be hard landscaped or are to be covered with road pavement construction may possibly be left in place. Consideration will be given to the suitability of on-site remediation measures, as well as the requirement for disposing of contaminated soils off-site.

6.3.4 With respect to the potential extent of contamination in the north-western area of the site, some contamination may be left in-situ if it is covered by the proposed perimeter road and access junction. An alternative strategy will be developed for any areas of landscape planting.

6.3.5 The remediation strategy will consider relevant guidance. For example, according to the ‘Guidance on the Disposal of Contaminated Soils’, published by the EA, topsoil contaminated by arsenic above threshold levels will have to be transported to a suitably licensed site because of the arsenic levels encountered.

Engineering Considerations

6.3.6 Materials noted as unsuitable for foundation loading as noted in Section 4.1 of this report (Foundation Design, under Engineering Considerations) should be removed and replaced with suitable granular material, or the foundations should be taken through the unsuitable soils to a layer with a suitable bearing capacity.

6.3.7

Best Practise Measures

6.3.8 The proposed end use of each area of the site will have a bearing on the type of mitigation measures used in respect of contaminated soils. Soft landscaped areas and domestic gardens may require excavation of the contaminated material up to 1.0m depth and replacement with clean cover from an approved source. Contaminated materials in areas that are to be hard landscaped or are to be covered with road pavement construction may possibly be left in place.

6.3.9 Best practice techniques will be used by all the developers during the construction phase. This will include reference to emergency equipment for use in the event of accidental spillage. Any ground contaminated by spillage of fuel oils and hydraulic oils during construction will be excavated and removed to an appropriately licensed waste disposal site. Personal protective equipment (PPE) will be provided to construction workers where necessary.

6.3.10 Surface water drainage measures will be designed in accordance with best practice with appropriate pollution prevention measures through the incorporation of sustainable drainage systems (SUDS). This will ensure that the runoff from the development will not affect the surface water bodies or groundwater post-construction. Maintenance of the trapped gullies, swales, highway drainage systems, interception facilities and infiltration basins, including the pollution prevention equipment, will ultimately be the responsibility of Cherwell District Council and Oxfordshire County Council. Until adoption, however, the developers will carry out the necessary maintenance of these systems and facilities. Waste water and materials removed during routine maintenance will be disposed of to an appropriately licensed waste disposal site.

6.4 RESIDUAL EFFECTS

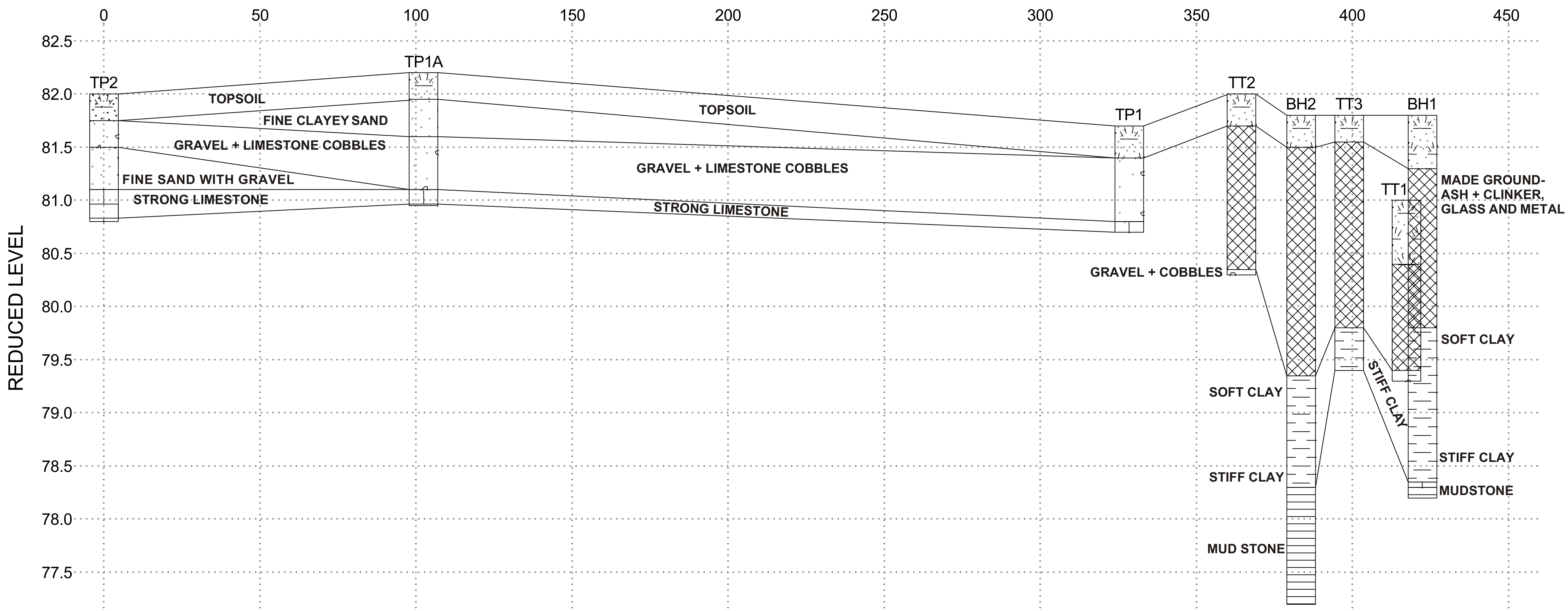
6.4.1 A remediation strategy will be developed to address the areas of potential contamination present on site. This strategy will ensure that site will be properly remediated during the site preparation work, preventing any impacts on future site users. During the remediation work, measures will be taken to ensure no contamination is released to sensitive receptors. These measures will reduce the magnitude of change for all these potential impacts to negligible and no residual effects have been predicted.

6.4.2 The proposed mitigation measures during construction will ensure that no contamination will be generated during this phase and no significant residual effects will result. The design of the surface water drainage scheme will ensure that no residual effects will arise post-construction.

Appendices, Figures & Tables

Appendix A Drawings

List of Drawings



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TITLE:

SOUTH WEST BICESTER
SUBSURFACE SECTION 1

FIGURE No: 1

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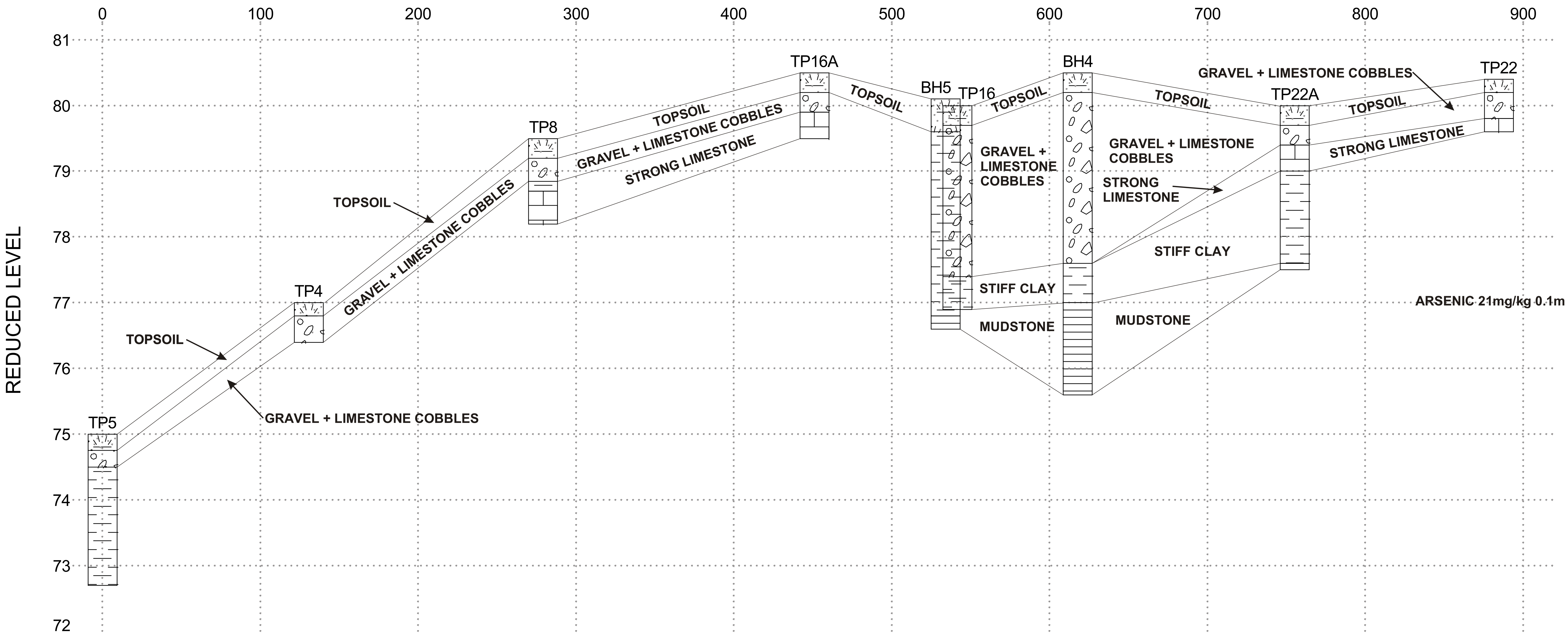

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SOUTH WEST BICESTER
SUBSURFACE SECTION 2

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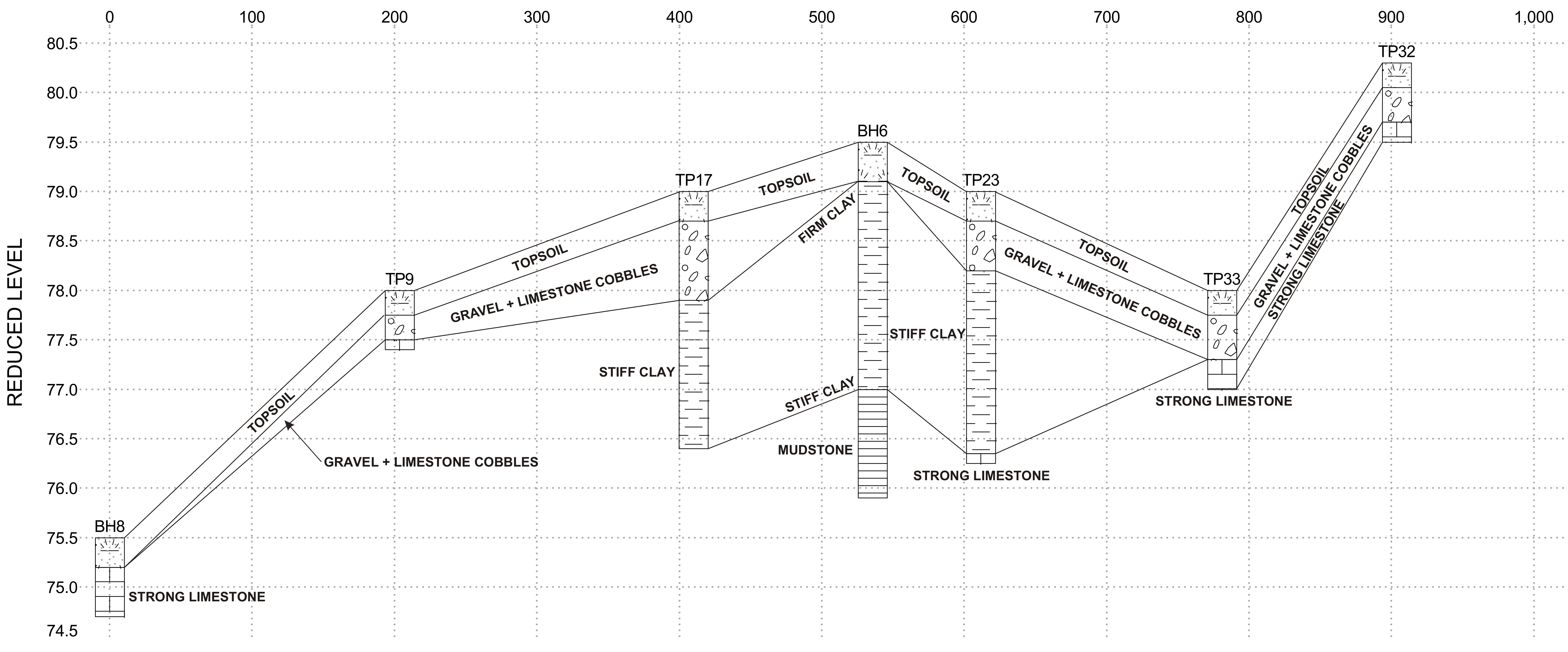

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TITLE: SOUTH WEST BICESTER SUBSURFACE SECTION 3

FIGURE No: 3

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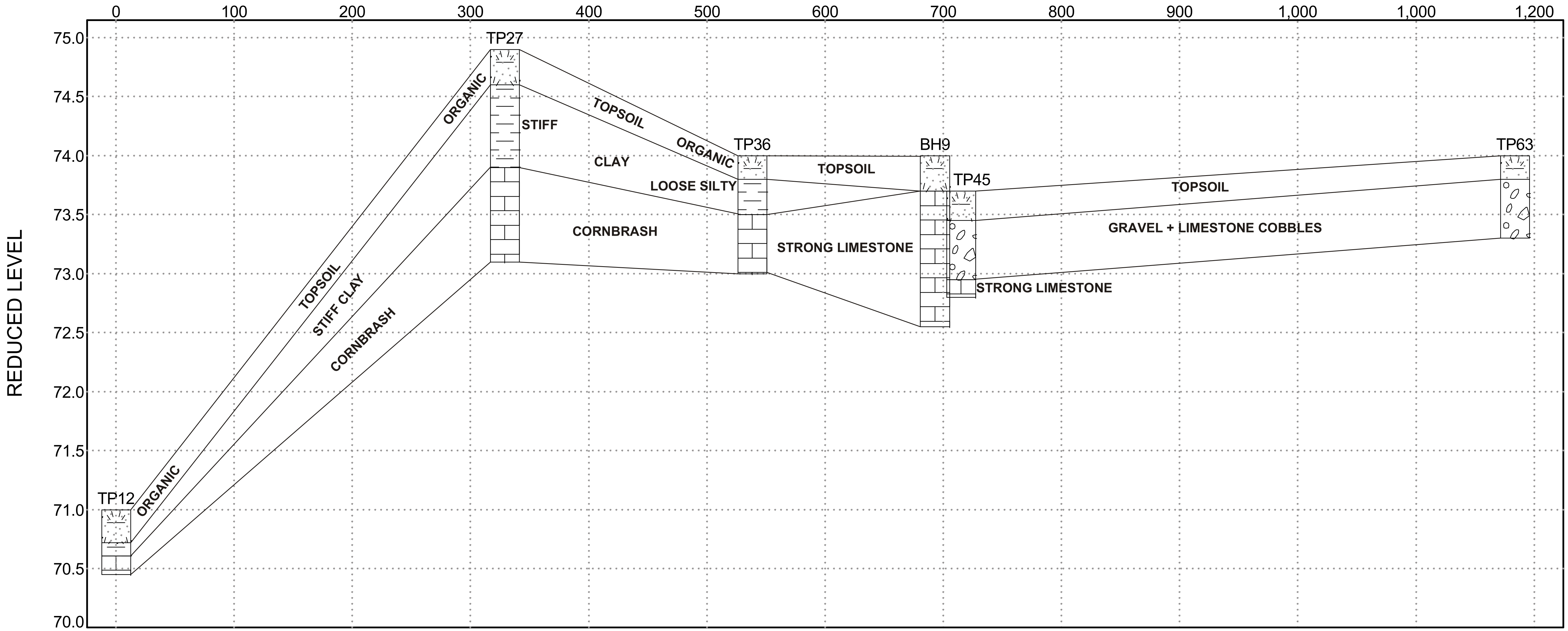

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SOUTH WEST BICESTER
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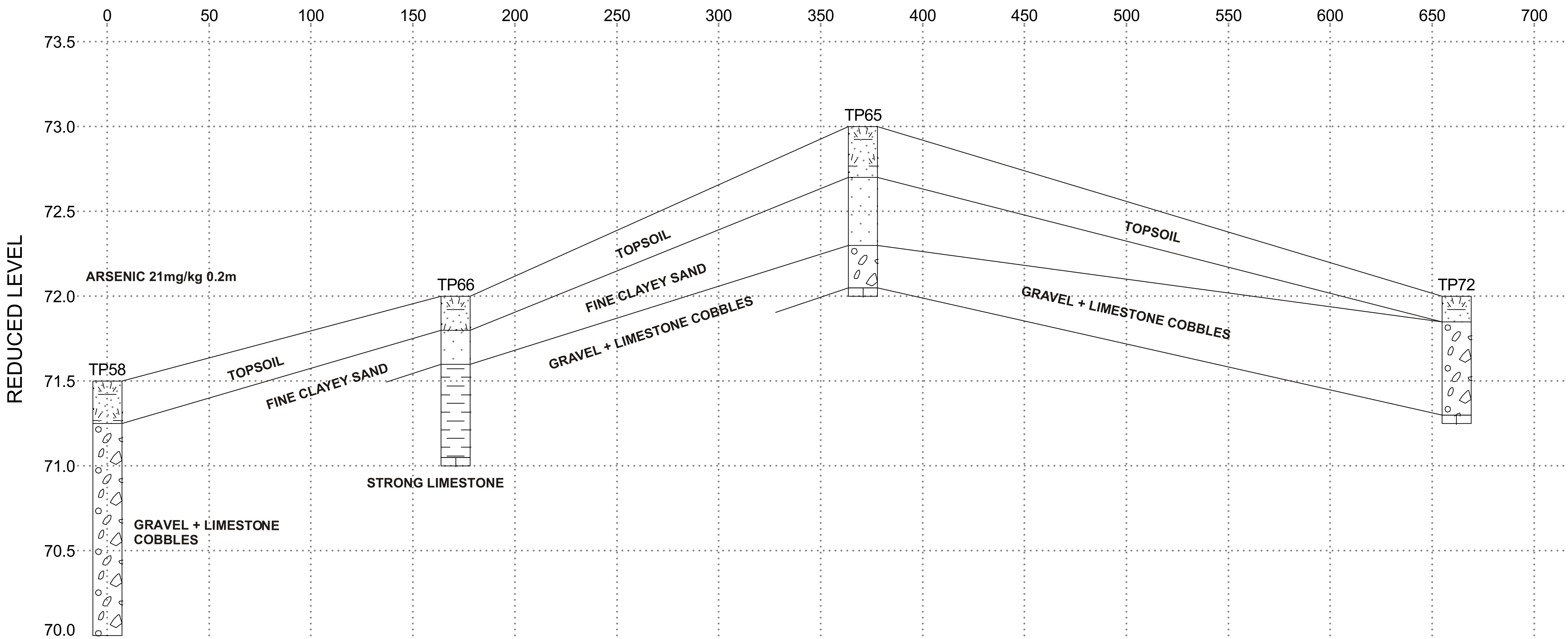

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SOUTH WEST BICESTER
SUBSURFACE SECTION 5

FIGURE No: 5

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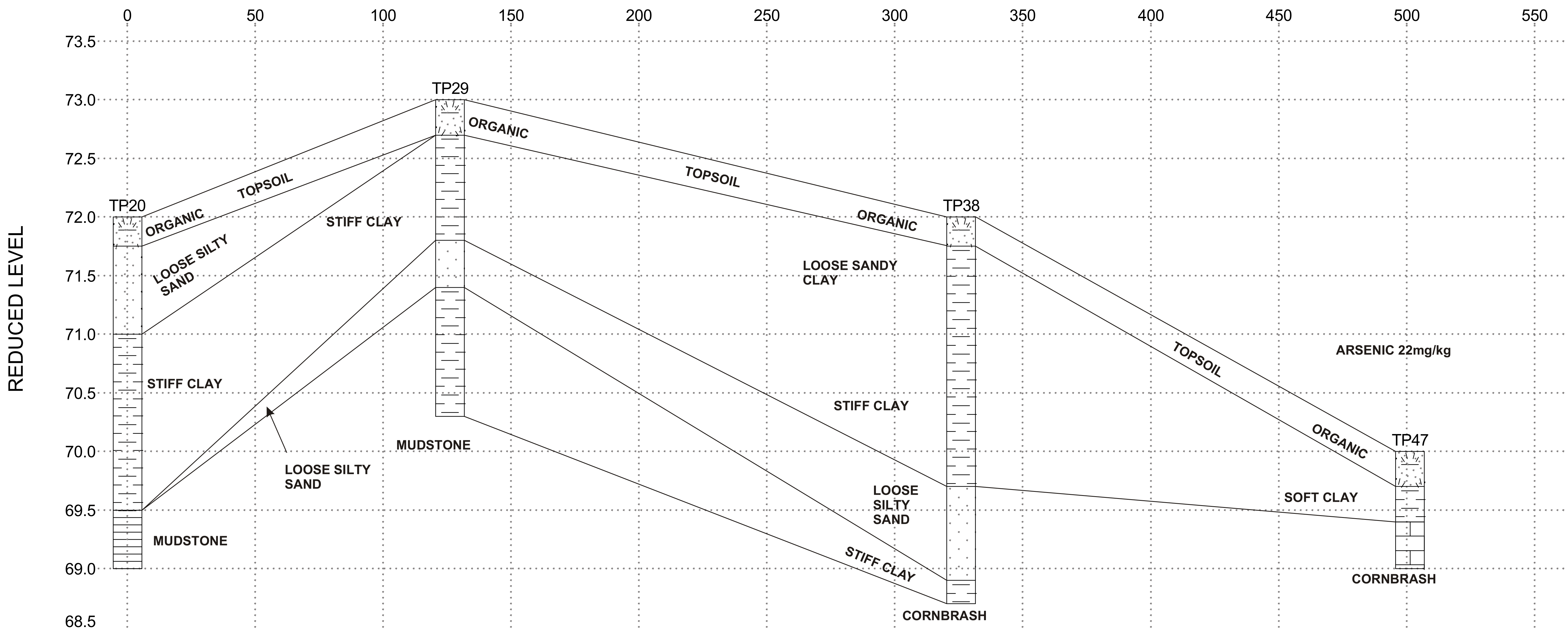

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TITLE: SOUTH WEST BICESTER SUBSURFACE SECTION 5A

FIGURE No: 5A

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