

Salt, Roseanne

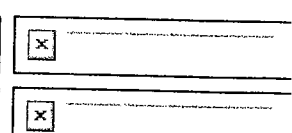
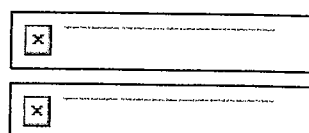
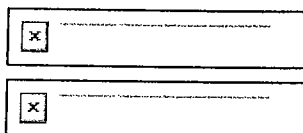
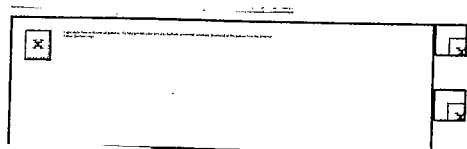
From:
Sent: 21 October 2016 10:12
To: Salt, Roseanne
Subject: IFA2 - Chilling - Borehole Decommissioning
Attachments: Chilling Borehole Decommissioning 2016_Final.pdf

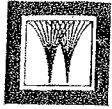
Dear Rosie,

Please find attached a copy of the borehole decommissioning letter report for Chilling, which has been provided by Advisian.

For completeness, I have also supplied a copy to

Kind regards





Advisian

WorleyParsons Group

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21 September 2016

Land Regeneration Adviser
National Grid Property
National Grid House
Warwick Technology Park
Warwick
CV34 6DA

Dear

RE: IFA2 – Chilling Well Decommissioning

As part of the wider IFA2 project, three boreholes were drilled at an agricultural site located off Chilling Lane, near Hook, in January 2016 (Advisian, 2016b). The site location is shown on Figure 1. Boreholes were drilled to obtain land quality and geotechnical information at the site. Each borehole was subsequently installed with a groundwater monitoring well to facilitate a programme of groundwater monitoring at the site.

Boreholes were drilled by the appointed site investigation contractor, CC Ground Investigations, under supervision by Advisian. The borehole locations and installation depths were agreed with Arup, the geotechnical consultant for the project. The borehole identification references are: BHA01, BHA02 and BHA03. The location of each borehole is shown on Figure 2.

Following completion of the groundwater monitoring programme it was considered that the groundwater monitoring wells within the boreholes were no longer required and, therefore, should be decommissioned.

This letter report summarises the well decommissioning work undertaken by CC Ground Investigations, under supervision by Advisian. The decommissioning work was undertaken on 31 August and 1 September 2016.

1 Well Decommissioning Objectives

The principal objectives of well decommissioning at the site are outlined below:

- To ensure that the boreholes were made safe and secure and in particular to remove borehole headworks as they presented a potential constraint to site activities (arable farming use);
- To reduce the future potential of the well installation to act as a preferential pathway to underlying aquifers;



- To protect underlying groundwater resources by preventing leakage of groundwater from one sub-zone to another via the well installation, including subsurface mixing of groundwater of different quality as well as flows and resource loss between sub-zones.
- To adopt a methodology appropriate to the site setting and nature of the borehole, whilst limiting disturbance to site users and environmental receptors. This included undertaking the work following harvest of crops (but before planting new crops), and avoiding the wintering bird season.

The well decommissioning works were designed to facilitate future use of the site as agricultural land. No additional end-uses have been considered.

2 Site Details

The site comprises a large agricultural field adjacent to Southampton Water. The three boreholes are located in the southeast corner of the field (Figure 2). Representative photographs of the site and the monitoring wells prior to decommissioning are provided in Appendix A.

The site is used as agricultural field for arable farming. Following completion of the Advisian ground investigation in January 2016, the field was planted with Spring Barley. The monitoring wells were protected from agricultural activities via an agreed "stand-off" zone and headworks protection. Headworks protection comprised a concrete chamber installed around the monitoring well cover. A metal lid was placed on top of the chamber, and the structure was marked by wooden posts (see Photographs 1 and 2, Appendix A).

Advisian understands that the crop was harvested in mid-August 2016, prior to the decommissioning work. At the time of the decommissioning activities, the site was fallow. Advisian understands that a new crop is to be planted in September 2016.

3 Existing Borehole Summary

Each of the three existing boreholes had been primarily installed into a discrete hydrogeological unit:

- BHA01 was plain cased within the Selsey Sand formation and had a 3 m slotted section installed at depths between 25 – 28 m bgl within the Marsh Farm formation;
- BHA02 had a 14 m slotted section installed in the Selsey Sand formation which terminated at the top of the Marsh Farm formation at 15 m depth and started in the basal section of the River Terrace Deposits;
- BHA03 had a 3.5 m slotted section installed in the Selsey Sand formation to 6.7 m bgl depth.



In each borehole the overall drilling depth exceeded the depth of the slotted screen installations. These basal sections were backfilled with a grout sealant at the time of drilling prior to installation of the monitoring wells. A grout sealant was also emplaced above the slotted screen sections, surrounding the plain cased pipework.

The risk of cross-completion between formations through fluid flow within the installation, including behind-well gravel pack flows was considered insignificant as no confining layers or significant pressure differentials were present between sub-zones. The majority of the slotted sections and associated gravel packs were completed against discrete hydrogeological units. In BHA02 there was an approximate 0.5 m section of screen against the River Terrace Deposits at 1m depth and against the Marsh Farm formation at 14.5 m depth. The other installations had complete zonal isolation.

Original exploratory hole logs from the Advisian 2016 investigation are provided in Appendix B. A full summary of the borehole installations is provided in Appendix D.

4 Well Decommissioning Works Undertaken

4.1 Summary of Works Undertaken

Well decommissioning was undertaken on 31 August 2016 and 1 September 2016.

Advisian were appointed to undertake the role of Principal Designer and Principal Contractor, and provide full time supervision during the site works. Borehole decommissioning works were undertaken by a specialist drilling sub-contractor, CC Ground Investigations, under the supervision of Advisian.

All three boreholes were successfully decommissioned in accordance with the adopted methodology (see Section 4.2). An "as-built" summary of each decommissioned borehole is indicated on Figure 3.

4.2 Well Decommissioning Methodology

The adopted well decommissioning methodology was designed to achieve all project objectives, whilst minimising impact to the site (e.g. to site users, potential ecological receptors).

The following documents were consulted when preparing the decommissioning methodology:

- Environmental Agency, Guidance on the design and installation of groundwater quality monitoring points (Science Report SC020093);
- Advisian Method Statement MS-020 (Rev 4): Borehole Decommissioning – Pressure Grouting.



4.2.1 General Sequence of Works

In light of the site setting, geology and future use (assumed continued agricultural land) and objectives for well decommissioning, the general sequence of work was as follows:

- 1) Assess existing condition of monitoring wells to ensure the proposed methodology was acceptable;
- 2) Removal of headworks;
- 3) Grouting of HDPE installation pipe and addition of concrete “cap”; and,
- 4) Reinstatement of the working location to existing ground level.

4.2.2 Methodology

Prior to commencement of decommissioning works on site, all existing exploratory hole locations (BHA01, BHA02 and BHA03) were dipped using a dip meter to establish the depth to groundwater and the total depth of the monitoring well, presented in Table A below.

Table A: Pre-decommissioning depths to groundwater and installed base

Monitoring Well ID	Depth to Groundwater (m bgl)	Depth to Base (m bgl)
BHA01	4.71	28.04
BHA02	5.13	13.53
BHA03	5.13	6.13

These measurements were checked against the borehole logs and previous monitoring data for any signs of obstruction or silting. Resting groundwater levels were slightly lower than previously recorded at the site (Appendix C). It is considered that this reflects seasonal variance, noting that the previous groundwater monitoring was undertaken during winter months. The recorded base depths represented an acceptable correlation with previous monitoring data. It was therefore considered that the proposed decommissioning methodology was appropriate.

Each borehole location was decommissioned in turn to ensure that only one working area existed at a time. BHA03 was completed first, followed by BHA02 and BHA01. The following steps were undertaken at each borehole location:

- Groundwater monitoring equipment was removed from inside the well (plastic sampling tubing);
- A temporary plug was installed into the top of the HDPE monitoring pipe to stop any debris falling down the well during the initial works;



- Concrete chambers were removed from around the top hat cover;
- Metal "top-hat" covers were removed by breaking-out the concrete surround, whilst ensuring no damage occurred to the plastic HDPE monitoring pipe itself;
- Prior to commencement of hand pitting, a CAT and genny was used to assess the area for below ground services. No below ground services were identified during the works;
- The top 0.3 m of surface topsoil around the HDPE monitoring pipe was removed using hand digging tools. Topsoil was placed on plastic sheeting and kept segregated from all other arisings;
- The hand dug pit was continued to 1.2 m bgl (1.3 m bgl in BHA03) around the HDPE pipe, using hand digging tools. At the base, the width of the pit was approximately 300 mm in diameter (c. 150 mm either side of the installation pipe). Arisings placed on plastic sheeting.
- A grout mix was prepared using the ratio of bentonite grout to cement, shown in Table B below, in a large plastic drum. Water was added using a pump connected to a water bowser. Bentonite powder was slowly added to the water. The grout was mixed, pumped through the Tremie pipe and returned to the plastic drum in order to mix in the bentonite power. The cement was then added in the same manner. This process was continued until the grout mix became a creamy, non-running fluid that still passed through the pump.

Table B: Ratio of Cement, Bentonite and Water in Grout Mix

Material	Cement	Bentonite	Water
Proportion	25kg	25kg	40 litres

- The grout mix was pumped through the Tremie pipe to the base of the borehole in order to ensure complete grouting from the bottom up and to minimise the risk of bridging.
- No groundwater was observed to be displaced up the HDPE pipe by the grout mix.
- The grout mix was allowed to settle within the pipe until it reached a stable level.
- Pumping continued until the grout mix was visible in the top 1.2 m of the installation pipe.
- The pipework was then unscrewed to a minimum depth of 1.2 m bgl. The grout mix within the installation pipe then created a thin layer of grout at the base of the hand dug pit.
- Concrete was added to the pit from 1.2 m bgl to 1.0 m bgl and allowed to set.



- Arisings were used to backfill the hand dug pit from 1.0 m bgl to 0.3m bgl. Imported topsoil was added to fill any voids (e.g. due to the removal of the monitoring pipe). The top 0.3 m of arisings were placed on top, and the location was returned to existing ground level.
- Following the completion of works at each location and prior to departure, a post-works site walkover was completed by the Advisian engineer to ensure no subsidence had occurred. No subsidence was encountered during the post-works walkover.
- Plates 1, 2 and 3, Appendix E, show different stages of the well decommissioning.
- An "as built" summary for each borehole is provided on Figure 3. The final site conditions for each location are shown on Plates 1, 2 and 3, Appendix F.

4.3 Problems Encountered During Decommissioning

No problems were encountered during the decommissioning of any of the boreholes.

4.4 Waste Management

Solid waste was generated during the decommissioning work. Waste materials comprised; concrete chamber rings, concrete surround to top-hat cover, plastic pipework, empty plastic bags, metal top-hat cover and uncontaminated personal protective equipment (e.g. gloves). All waste materials were bagged and placed in the contractor's vehicles, and removed off-site for disposal (via the contractor's appropriate waste carrier's licence). A Site Waste Report is included in Appendix G.

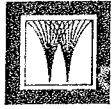
4.5 Incidents and Near Misses

No incidents or near misses occurred on site during works.

5 Closure

We trust that this report meets your requirements. Please do not hesitate in contacting either of the undersigned should you have any further queries.

Yours sincerely,



Advisian

WorleyParsons Group

Reference

- *Advisian, 2016a. Factual Phase 1 Contamination and Environmental Liability Assessment, ref: 305002-00006 / 51829-02*
- *Advisian, 2016b. Factual Geo-Environmental Site Investigation Report. Ref: 305002-00006 / 51829-05*
- *Environmental Agency, 2006. Guidance on the design and installation of groundwater quality monitoring points (Science Report SC020093)*

Figures

- Figure 1: Study Area Location Plan
Figure 2: Exploratory Hole Location Plan
Figure 3: Well Decommissioning Schematic

Appendices

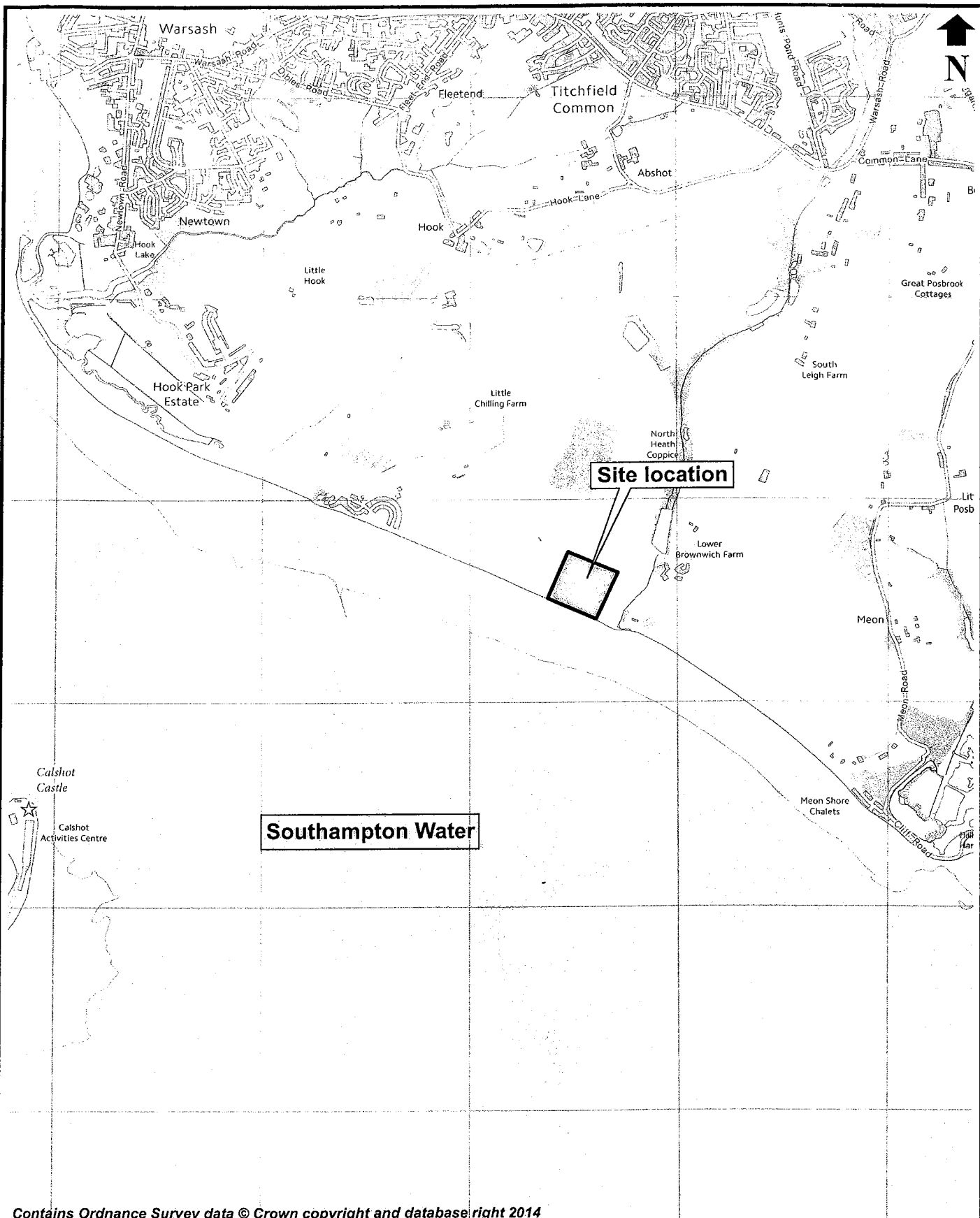
- Appendix A: Pre-Decommissioning Site Photographs
Appendix B: Original Advisian 2016 Exploratory Hole Logs
Appendix C: Groundwater Level Data (January – February 2016)
Appendix D: Borehole Summary
Appendix E: Decommissioning Site Photographs
Appendix F: Post-Decommissioning Site Photographs
Appendix F: Waste Report



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Figures



Contains Ordnance Survey data © Crown copyright and database right 2014

PROJECT: 51829-07
IFA2 - CHILLING HORIZONTAL DIRECTIONAL DRILLING AREA

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STUDY AREA LOCATION PLAN

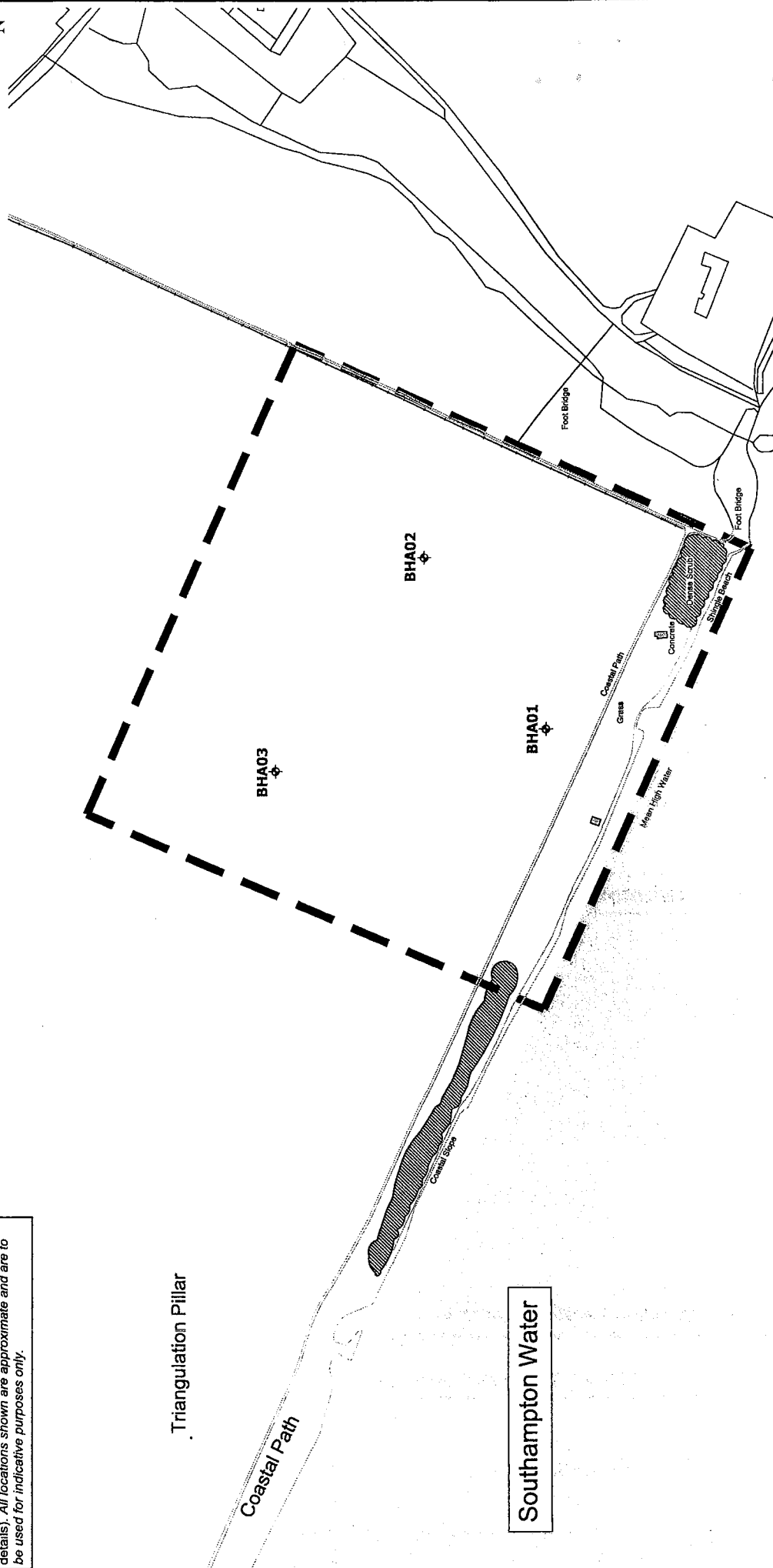


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Note: Locations shown are overlaid from relevant historical maps, site plans and reports (see report text for details). All locations shown are approximate and are to be used for indicative purposes only.



Legend

- Chilling HDD study area
- Current structures
- Overgrown vegetation

Site Investigation Locations (2016)

- Borehole

Approximate Site Centre: (451595, 103560)

Drawing References:

Baseplan detail from Promap OS plan (July 2015)
 Ordnance Survey, (c) Crown Copyright 2015. All rights reserved. Licence number 100022432

PROJECT: 51829-07

IFA 2 - CHILLING HORIZONTAL DIRECTIONAL DRILLING STUDY AREA

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EXPLORATORY HOLE LOCATION PLAN



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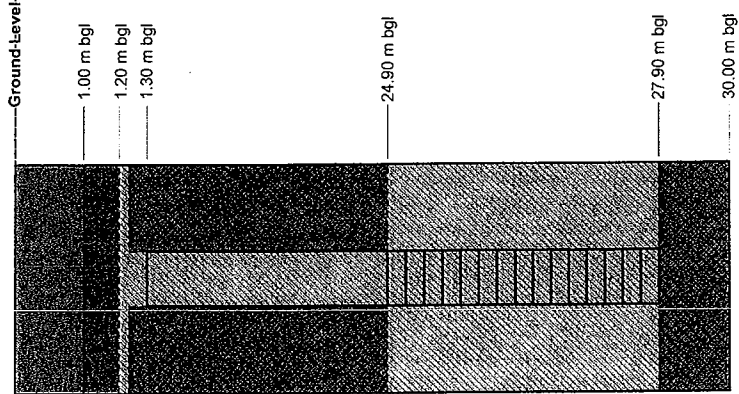
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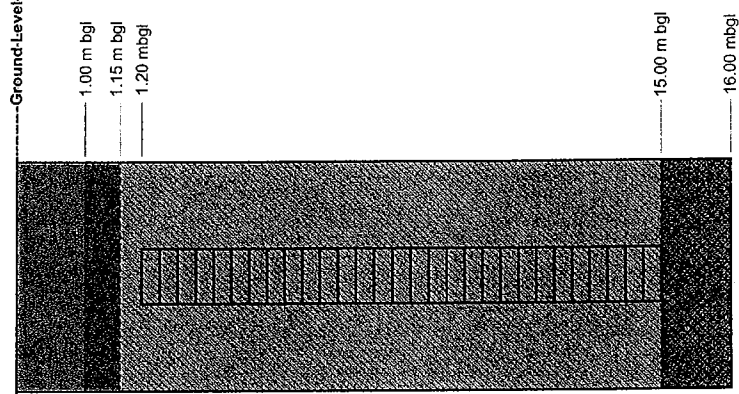
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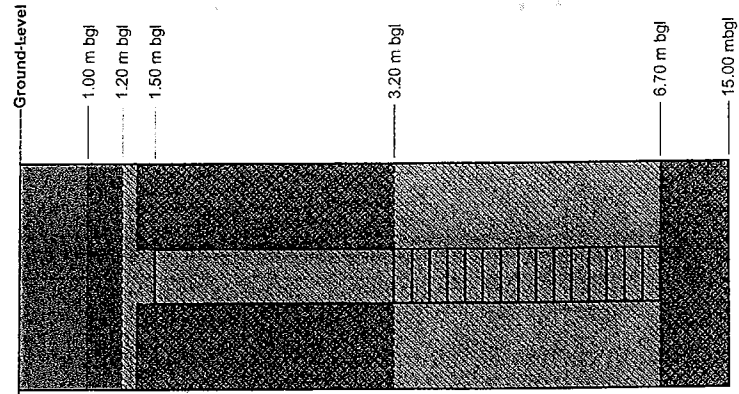
BHA01



BHA02



BHA03



Legend

- Arisings and imported topsoil
- Cement
- Bentonite / cement grout mix
- Bentonite
- Plain 50 mm internal diameter HDPE pipe
- Slotted 50 mm internal diameter HDPE pipe

PROJECT: 51829-07
IFA2 - CHILLING HDD STUDY AREA

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WELL DECOMMISSIONING SCHEMATIC



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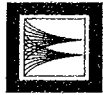
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Appendix A: Pre-decommissioning Photographs



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CHILLING BOREHOLE PRE-DECOMMISSIONING**



Plate 1: BHA01 pre-decommissioning, July 2016.

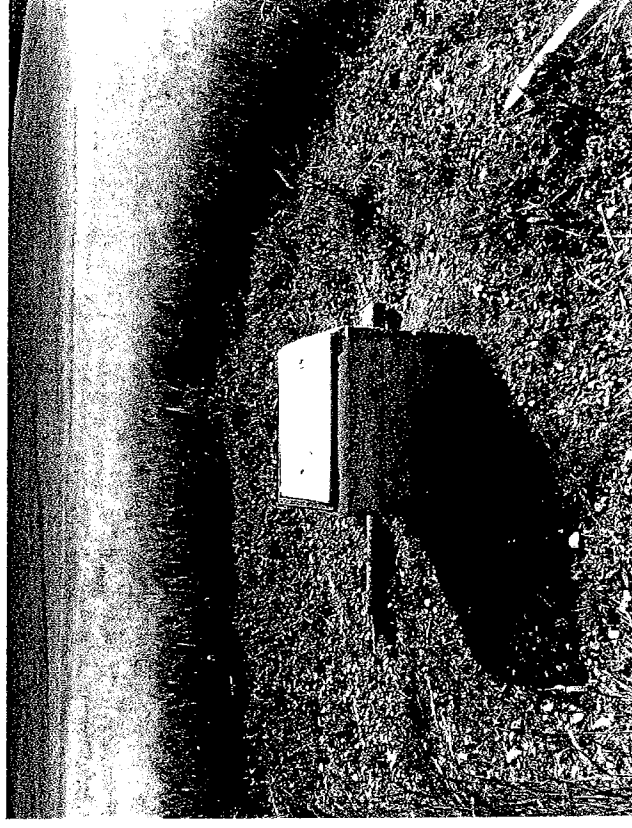


Plate 2: BHA02 pre-decommissioning, July 2016.



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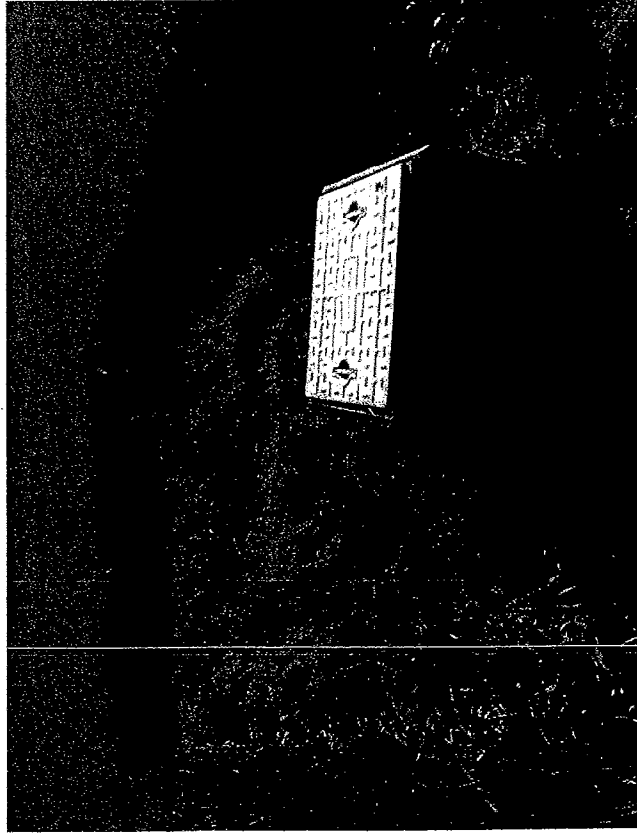


Plate 3: BHA03 pre-decommissioning, July 2016.