Document No. STDC2/4

Localism Act 2011

Acquisition of Land Act 1981

Inquiry into:

THE SOUTH TEES DEVELOPMENT CORPORATION
(LAND AT THE FORMER REDCAR STEELWORKS, REDCAR)
COMPULSORY PURCHASE ORDER 2019

Rebuttal Proof of Evidence

of

John McNicholas

On behalf of the South Tees Development Corporation

In response to the Proofs of Evidence submitted on behalf of:

TISCO Bank Public Company Limited, Krung Thai Bank Public Company Limited and Siam Commercial Bank Public Company Limited (collectively known as "Thai Banks"), and Sahaviriya Steel Industries (SSI)

South Tees Development Corporation

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1. INTRODUCTION

1.1 I am John McNicholas. I am the Engineering & Programme Director at South Tees Development Corporation (**STDC**). Further details of my qualifications and experience are set out in my main Proof of Evidence (Document Ref. STDC2/2).

1.2 This Rebuttal Proof of Evidence ("**Rebuttal**") has been prepared to respond to the evidence submitted on behalf of TISCO Bank pcl, Krung Thai Bank pcl and Siam Commercial Bank pcl (collectively known as the "**Thai Banks**"), and Sahaviriya Steel Industries (**SSI**) in objection to The South Tees Development Corporation (Land at the former Redcar Steelworks, Redcar) Compulsory Purchase Order 2019 ("**the Order**") by the following parties:

(a) Mr Peter Roberts of DWD Property & Planning, and

(b) Mr Simon Melhuish-Hancock, UK General Counsel for SSI.

1.3 This Rebuttal is not intended to be an exhaustive rebuttal of the contentions made in the evidence provided by the parties listed at paragraph 1.2. It only deals with certain points, where it is considered appropriate and helpful to respond in writing. Where specific points have not been dealt with, this does not mean that those points are accepted, and they may be dealt with further at the Inquiry and/or in writing.

1.4 This Rebuttal does not deal with any other objections to the Order and the related Proofs of Evidence supporting those objections. Any rebuttals to these objections are dealt with by other witnesses acting for STDC.

1.5 Where defined terms are used in this Rebuttal, I have adopted the same meaning for those defined terms as used in my Proof of Evidence (Document Ref. STDC2/2).

1.6 Please note that, for ease of reference, I will refer to the Order affected parties referenced in paragraph 1.2, collectively, as "SSI", unless there is a specific need to separately identify the Thai Banks when dealing with a particular matter. Therefore, use of "SSI" shall be deemed to relate to both parties.

1.7 My Rebuttal should be read in conjunction with all of the evidence and rebuttal statements submitted on behalf of STDC. Several issues raised by objectors give rise to related responses from other witnesses acting for STDC. We have endeavoured to avoid duplication, but it may be helpful for this Rebuttal to be read alongside the Rebuttals of those other witnesses acting for STDC.

2. PROOF OF EVIDENCE OF MR PETER ROBERTS

2.1 The Proof of Evidence of Mr Roberts relates to compulsory purchase and valuation related matters, including negotiations and the CPO Guidance. My Rebuttal considers the following contentions within Mr Roberts' Proof:

(a) That limited information has been made available by South Tees Development Corporation to SSI

(b) That STDC does not have sufficient funding to complete the development of the land, and

(c) Linked to the assertion at (b) of a lack of adequacy of funding, that the development costs estimated by STDC may be too low.

2.2 I respond to each of these points, in turn, under the headings below.

2.3 I also note in paragraph 6.17 of Mr Roberts Proof that he references his interpretation of various matters raised and discussed in a 'without prejudice' meeting held with Mr King and myself on 15 November 2019. Out of necessity, in my Rebuttal, I refer to some of the discussion points of this meeting, in order to correct errors appearing in his evidence.

Assertion: Limited information has been made available by STDC

2.4 In paragraph 6.5 of Mr Roberts' Proof, he refers to an inspection of the site undertaken by him and other advisors to SSI across three days in January 2019 *'in order to gain a better understanding as to the site and its surroundings'*. He then goes on to reference in paragraph 6.6 *'the limited information made available by the Development Corporation and Site Company'*, and in paragraph 6.14, '*the lack of basic supporting information from the Development Corporation*'. In my opinion, this is wholly misrepresentative of the actual position on information provision by STDC to SSI.

2.5 The provision of information commenced in September/October 2018, with the issuing of various documents to Duff & Phelps, advisors to the Thai Banks. As part of the January 2019 visit referred to by Mr Roberts, requests were made of STDC for various documentation, much of which related to historic information on existing iron and steel making plant and facilities that, where such information existed, was under the jurisdiction of the Official Receiver (**OR**). South Tees Site Company Ltd (**STSC**), who hosted the site visit, sought the OR's permission to provide the requested information, and where such permission was granted, made said information available via a Cloud-based (**OneDrive**) domain. Included in this information provision were various technical documents owned by STDC that had been requested, e.g., ground investigation reports. Access permissions to the OneDrive were issued by STSC in early February 2019 to various persons attending the site visit. I'm advised by Karl Dickinson (General Manager) and John Stitt (IT Manager) of STSC, that Mr Roberts was included in the people given access to this domain. STSC has confirmed to me that access to the OneDrive domain has remained open ever since. Where STSC was unable to provide various information, this was confirmed to various parties representing SSI, including Mr Roberts, via emails issued in February 2019.

2.6 Numerous information requests were subsequently made by the solicitors acting for the SSI, Mishcon de Reya (MdR), through the course of 2019. In the majority of cases, these requests included a significant amount of documentation that was not within the ownership of STDC, nor did STDC have any rights to issue it. In these instances, MdR was notified of this fact, in writing, by the solicitors acting for STDC, Gowling WLG ("**Gowling**"). Where the information was owned by STDC or was in its possession and STDC had approval to issue it, it was provided. Appendix 1 of Mr King's Appendices to his Proof of Evidence (Document Ref. STDC8/3) contains a schedule of communications entered into with the various objectors to the Order, including those with representatives of SSI. Several of these communications concern the provision of information to MdR.

2.7 At the meeting of 15 November 2019 at DWD's London office, referred to by Mr Roberts at paragraph 6.17 of his Proof, attended by Mr King and me, reference was made by Mr Roberts to the schedule of information issued by MdR in October 2019. I confirmed to Mr Roberts that much of the information contained in this schedule had previously been provided or had been declared as being not within STDC's jurisdiction to issue. He confessed to not necessarily having been party to all of the previous information issued to Duff & Phelps and MdR, which was surprising to hear, and he declared that this schedule was the culmination of his endeavours to ensure that he and his valuation team had all of the information possible. I reinforced the point that STDC was receiving repeated requests from MdR to provide information that it did not possess and/or that was under the jurisdiction of the OR, and that MdR had been made aware of this on more than one occasion.

2.8 At paragraph 6.18 of his Proof, Mr Roberts refers to a request for a meeting with me at the STSC offices on site, by way of a follow up to the meeting at DWD's offices on 15 November 2019, referenced at paragraph 2.7 above. I explained to Mr Roberts in my emails to him dated 22 November and 26 November 2019, that I would need to arrange for STSC personnel to be on hand to assist in this visit, as Mr Roberts wished to use the opportunity as a detailed information gathering exercise with, crucially, attendance by technical advisors to SSI, RVA, who had attended the January 2019 site visit. It was explained that much of the information being sought could only have been provided by STSC personnel who have a detailed knowledge of the plant and facilities on site. I also explained that these are people who are fully engaged in intensive site safety and security management activities further to the closure of the steelworks in 2015, and that they have continued to be involved in assisting the HSE with their urgent, detailed investigation into the fatalities that occurred on the South Bank Coke Ovens complex in September 2019. The relevant personnel remained unavailable to the end of 2019 and into January 2020.

2.9 It was surprising that Mr Roberts and, indeed, RVA, had waited until late November 2019 to request a follow-up visit to their visit of January 2019, and I am firmly of the view that this request was entirely a reaction to the discussions held at the meeting of 15 November, where I was able to robustly counter many of the assumptions, opinions and assertions of Mr Roberts relating to redevelopment of the site, including his understanding of site constraints and conditions, and reinforce the depth of technical due diligence work STDC had undertaken to inform its position in the matter. It was clear to me from these discussions that the SSI valuation team did not have a sufficient

depth of knowledge of the site from which to promote a credible valuation, and that the team was thereby appreciably behind in its work.

2.10 In his follow-up email to me of 25 November 2019, Mr Roberts confirmed that he would not be dealing directly with any further communications on the matter and that all future correspondence was to be with MdR. I consider that all subsequent information requests made by MdR, through Gowling, to have been fully complied with, where STDC was in a position to provide such information. Since 25 November 2019 and Mr Roberts' breaking-off of direct correspondence with STDC, to the best of my knowledge, MdR has not pursued a site visit by DWD and RVA.

2.11 I remain firmly of the view that STDC has cooperated fully in providing all of the requested information it has been able to provide and that it has, through Gowling, made it abundantly clear where information was either not available and/or not within STDC's gift to provide, including the reasons why. The assertions made by Mr Roberts in his Proof present an entirely false impression, which is inconsistent with the facts.

Assertion: STDC does not have sufficient funding to complete the development of the land

2.12 In paragraph 7.33 of his Proof, Mr Roberts states that *'…£134m of the £504m cost is now funded. This means that circa 75% of the identified funding need has yet to be secured, the majority of which will be required to deliver development of the SSI Land'*. In paragraph 7.38, in relation to potential land acquisition costs, he considers that *'…it is clear that, if the Development Corporation is to match the market, it is underfunded.'* and *'Bearing in mind that the Upper Tribunal would assess compensation on the basis of market value it therefore follows that the Development Corporation will still be underfunded…'*. In paragraph 7.39, in relation to the retention of business rates and rental income, Mr Roberts states *'…this revenue, even if secured, would not be received until buildings had been constructed and occupation taken. This would therefore likely only assist in the repayment of loans and would not itself fund the significant upfront costs of site acquisition, demolition, remediation, site preparations, infrastructure and remediation'*. At paragraph 7.40, in connection with major private and public sector investment funds, he puts forward the view that *'…I have seen nothing…to suggest to me that any sum of money can be confidently relied on'*. Finally, in paragraph 7.45, Mr Roberts states that *'…at the date of this evidence it is therefore clear that the Development Corporation does not have sufficient funding to complete the development of the land it already owns….even before it turns to the later phases involving the SSI Land. It is therefore unlikely that the Development Corporation will be able to bring any development forward on the SSI Land for the foreseeable future'*.

2.13 Matters of funding and finance are comprehensively addressed in the Proof of Evidence (Document Ref. STDC3/2) of Gary MacDonald, acting for STDC, and his corresponding Appendices document (Ref. STDC3/3). Of particular relevance is paragraph 3.15 of Mr MacDonald's Proof, where he states *'Turning to the Investment Fund….the Model is predicated on initial remediation/regeneration capital investment to facilitate development activity and a development strategy linked to achieving successful leaseholders (strong covenants), that would generate competitive rental income streams. These strong rental streams secure appropriate finance and funding to ensure*

continuous development and growth. This approach creates what is referred to as the "Investment Fund" in my Proof of Evidence and in the Model'.

2.14 The Proof of Evidence (Document Ref. STDC6/2) of John Knowles, acting for STDC, considers the viability of funding and investment for the Scheme as defined by the Master Plan. Based on his experience and expertise, Mr Knowles comments at paragraph 6.1 *'I have reviewed the financial modelling for the combined scheme undertaken by STDC and reviewed by Vivid Economics and referred to in the respective proofs of Gary MacDonald (STDC3/2) and Dan Aylward Mills (STDC7/2). This shows a likely equity IRR return to private sector investors in a range of 16-22% for the Scheme as described'*, and at paragraph 6.2 he adds *'This range of 16-22% is in line with the anticipated returns of many of the investment funds that I have highlighted earlier in the report and appropriate to the risk and return profile for a scheme of this nature'*.

2.15 Mr Knowles concludes at paragraph 8.1 of his Proof *'The STDC scheme is a major development opportunity and would be highly attractive to equity investors and debt providers…..if public funding were not available or insufficient to deliver the aims and objectives of STDC then in my opinion there would be funding available at rates that make delivery of the scheme viable'* and *'Looking at the STDC financial model and development costs and comparing it to other schemes where substantial recent development has taken place confirms the viability of the scheme…'*.

2.16 Mr Roberts, in making the comments set down in paragraph 2.11 above, lacks awareness and knowledge of the documented funding strategy of STDC and the structuring of the STDC financial model. In suggesting that a far greater proportion, if not all, of the necessary funding is required upfront to make the Scheme viable, he appears to demonstrate a fundamental lack of understanding of how funding and financing of large-scale, long-term redevelopment programmes actually works. Mr Roberts' comments in his Proof are heavily reliant on conjecture and, therefore, lack any real substance or merit.

Assertion: There is a distinct possibility that the estimate of development costs may be too low

2.17 In paragraph 7.44 of his Proof, Mr Roberts comments on the available funding to STDC and states *'….there is still a funding shortfall of £370m in respect of development costs even before account is taken of the distinct possibility that the cost estimate may be too low'.* At the meeting at DWD's London office on 15 November 2019, Mr Roberts advised that SSI's appointed technical advisor, RVA, had expressed the view that the costs allocated by STDC for the redevelopment of the site were significantly overestimated. It is somewhat confusing to hear that Mr Roberts, in leading the valuation team for SSI, is reporting, only two months later, the *'distinct possibility'* that the opposing view may be the case.

2.18 STDC's estimation of costs was prepared by external technical advisors, and it has been informed by extensive technical studies and analysis, including ground investigations, demolition appraisals and infrastructure asset condition surveys, and from a detailed interpretation of the site preparation and infrastructure requirements necessary to deliver the Scheme in line with the Master Plan. Based on discussions with Mr Roberts at the meeting of 15 November, it was apparent that the valuation team for SSI had not

advanced its work sufficiently, to a point where there was a reasonably robust position on the level of costs required to prepare the site for development. Accordingly, I consider there would need to be a high degree of scepticism over any opinion expressed by representatives of SSI on the matter of development costs and the extent to which this brings into question the adequacy of STDC funds to deliver the Scheme.

2.19 I therefore consider that Mr Roberts' attempts to comment on the lack of adequacy of funding, based on the potential for development costs to have been underestimated, to be without foundation.

3. PROOF OF EVIDENCE OF MR SIMON MELHUISH-HANCOCK

3.1 The Proof of Evidence of Mr Simon Melhuish-Hancock deals with matters covering: the history of the site; the liquidation of SSI UK; the relationship between the Thai Banks, SSI UK and SSI; and emerging development opportunities. My Rebuttal considers the following contentions within Mr Melhuish-Hancock's Proof:

(a) That limited information has been made available by STDC to the Thai Banks, resulting in the Banks having difficulty in evaluating their position.

(b) That STDC showed no interest in a development proposal put forward by St Modwen Properties PLC, when this demonstrated clear private sector interest in developing the SSI land.

(c) That there is/was, potentially, a credible development opportunity for Highfield Environmental Limited and SSI to co-join the neighbouring waste disposal sites of Highfield and High Tip to create an enlarged facility.

(d) That the significant deposits of waste material in the SLEMS facility have considerable potential value.

(e) That the existing RBT business could be significantly expanded in operational area to create a much larger port facility.

3.2 I respond to each of these points in turn under the headings below.

Assertion: Limited information has been made available by STDC to the Thai Banks

3.3 At paragraph 7.5 of his Proof, Mr Melhuish-Hancock states *'…there was also little co-operation by or provision of information by either the Development Corporation or the Site Company, which has resulted in the Thai Banks having difficulty in evaluating their position…'*. This assertion repeats that of Mr Roberts, and it is addressed in paragraphs 2.4, 2.5, 2.6 and 2.7 of this Rebuttal. The statement made by Mr Melhuish-Hancock similarly presents a false impression, which is inconsistent with the facts.

Assertion: STDC showed no interest in a development proposal put forward by St Modwen Properties PLC

3.4 At sub-paragraph 7.7.1 of his Proof, Mr Melhuish-Hancock references a meeting in 2017 between St Modwen Properties Ltd and officers of STDC, including myself. He asserts that STDC essentially showed no interest in the proposed St Modwen project. This assertion is without foundation. St Modwen attended the meeting on an exploratory basis. There were no project proposals put forward whatsoever; there *was* no project. St Modwen expressed a desire to acquire land but with no proposals on how it would be developed. Their primary interest appeared to be land at South Bank with water frontage that was largely in the ownership of Tata Steel; any SSI land included in their somewhat vague ask of STDC was incidental to the primary land requirement. The proposition as articulated by St Modwen was, in essence, a land-banking exercise pending further proposals being developed. STDC advised St Modwen that only firm development proposals would be considered by the Board – where matters such as

land parcel size, business typology, timescales, funding, jobs created, etc, have been properly evaluated and determined, and a viable business plan and business model formulated – so that the Board can be assured that the project proposal will deliver on and align with the aspirations of the Master Plan, so contributing to the sustained economic prosperity of the Tees Valley. St Modwen was also advised that STDC's land disposal policy was to not sell the freehold title to land. This is to ensure that STDC retains sufficient control and influence over the long-term development of the STDC Area and that the opportunity exists to maximise the recycling of proceeds from long-term lease agreements into the further site redevelopment. St Modwen showed no further interest in the site beyond this point.

3.5 On a similar point, at paragraph 7.7.2 of his Proof, Mr Melhuish-Hancock references contact being made by Peter Roberts of DWD with Peel Property Group, in November 2018. It is unclear why this is mentioned in his Proof, as it appears the discussions didn't go anywhere; there is no detail provided. But this raises an interesting example, as STDC actually engaged in dialogue with Peel much earlier than this, at the request of Peel. In a similar vein to St Modwen, they wished to acquire a major tract of land, at South Bank, with a view to developing the land out and the river frontage, but with no proposals articulated; a key attraction was the opportunity to establish a new port facility. However, when they were made aware that PD Ports, which owns and operates Teesport within the STDC Area, is the Statutory Harbour Authority for the River Tees, Peel withdrew their interest and ended dialogue with STDC.

Assertion: There is a credible development opportunity for Highfield Environmental Limited and the Thai Banks to co-join the neighbouring waste disposal sites of Highfield and High Tip

3.6 At sub-paragraph 7.7.5 of his Proof, Mr Melhuish-Hancock refers to discussions held between Highfield and SSI regarding the opportunity that he asserts exists between the two parties to join the Highfield and High Tip (CLE3/8) waste disposal facilities to create significant additional value. Critically, he overlooks the fact that STDC owns the land between the two facilities. He also overlooks the extensive restoration work that will be required on High Tip (CLE3/8) before it can be brought back into use, and how this impacts capacity; work that is actually defined in reports produced for SSI in 2014, to satisfy Environment Agency requirements, that Mr Melhuish-Hancock appears to be unaware of. These reports are as follows:

(a) CLE3/8 Landfill Redcar Steelworks – Specification (Report No. 1341r1v1d0814), by Geotechnology Ltd, August 2014, and

(b) CLE3/8 Landfill Redcar Steelworks – Sideslope Capping, Construction Quality Assurance Plan (Report No. 1341r2v2d0914), by Geotechnology Ltd, September 2014.

In 2019, STDC undertook a review of the required restoration work and related costs associated with bringing High Tip back into operation. This was informed by STDC's own supporting surveys and volume calculations, and cost analysis. Copies of the related STDC documentation were provided to SSI, via MdR, in 2019. Surprisingly, two of the information requests we received from MdR for High Tip related to the provision to SSI of its own 2014 reports (referenced at (a) and (b) above), which, I would have

thought, SSI should already have been utilising to inform its own position. The relevant STDC documentation is exhibited at **Appendix A**.

3.7 This is a further example of where Mr Melhuish-Hancock appears to be endeavouring to portray a robust private sector redevelopment opportunity pipeline, obviating the need for public sector intervention, through the use of relatively spurious undeveloped proposals. The reality is that there is not such a robust opportunity and that public sector intervention is required to deliver the important benefits described in STDC's evidence.

Assertion: the significant deposits of waste material in the SLEMS facility have considerable potential value

3.8 At sub-paragraph 7.7.6 of his Proof, Mr Melhuish-Hancock asserts that there is considerable value in the significant stocks of iron oxide material (known as BOS Oxide) that are stored in the former SSI SLEMS facility. This matter is touched on in paragraph 2.32 of my main Proof of Evidence (Document Ref. STDC2/2). STDC has undertaken significant investigation work on this material and the relevant report ('Former SLEMS Landfill Intrusive Investigation Report', Arcadis, 2019) and other supporting information were provided to SSI in 2019, in response to information requests made by MdR. The Arcadis report is exhibited at **Appendix B**. Mr Melhuish-Hancock fails to understand that the market potential for this material is very limited in quantity terms, which is borne out by the very small quantities extracted from the SLEMS each year relative to the approximate 1.0 million tonnes stored in the facility. The more accurate position on the SLEMS is that its removal represents a major cost liability, potentially exceeding £100 million.

3.9 Mr Melhuish-Hancock states in sub-paragraph 7.7.6 that *'…the value is also evidenced from interest shown by Phoenix Services in processing the material in the sinter plant on Plot 1…'*. He also fails to realise that, even before any detailed feasibility and due diligence work had been undertaken for this particular project, the proposition was predicated on the operator being paid in the region of £130 per tonne (minimum) to remove the material from the SLEMS, with a likely resulting outturn cost burden to the owner of the SLEMS of £130million.

Assertion: the existing RBT business could be significantly expanded in operational area to create a much larger port facility

3.10 While countering the assertions made by Mr Melhuish-Hancock, the following paragraphs also counter the related contentions of Mr Roberts across paragraphs 8.1 to 8.16 of his Proof of Evidence, concerning RBT.

3.11 At paragraph 8.8 of his Proof, Mr Melhuish-Hancock asserts that there is a significant opportunity to expand both the operational area of RBT and the port facility as a whole, incorporating the SSI land at Redcar, to *'…develop RBT as a larger, more mixed port, but with approximately 847 acres of port usable land, rather than the current 313 acres that RBT Ltd has…'*. The viability of this proposition is highly questionable from a port operations and capacity perspective, and it does not appear to be informed by any firm, detailed proposals. In lacking any real substance, one could conclude that this is simply an idea borne out of attempts by SSI to potentially undermine STDC's case for acquiring

all of the Order Land. The following paragraphs substantiate why the proposal lacks any apparent credibility.

3.12 During the period of SSI being operational, I understand, from former operatives of SSI who are now employed by STSC, that RBT typically operated at a bulk capacity in the region of 11 to 13 million tonnes per annum. STDC was advised by RBT Ltd in 2018 that, with some modifications, including the re-introduction of the removed third bulk handling crane, the circa 320-metre long berth could realise a greater capacity, between 13 and 15 million tonnes. The recent contract entered into between Sirius and RBT Ltd for the export of polyhalite will see an annual export of 10 million tonnes across the quay, involving Sirius in the installation of new quayside handing equipment to realise this throughput. This represents between 77% and 91% of the berth's capacity (based on the above-referenced 11M to 13M tonnes range), while Sirius will occupy only 40 acres (close to 13%) of the circa 313 acres of RBT hinterland referenced by Mr Melhuish-Hancock. Further, Sirius has advised STDC that, in developing its proposals for the use of RBT, a firm of specialist port engineers (Royal Haskoning DHV) was engaged, who determined that the capacity of RBT is actually closer to 10 million tonnes per annum. It would therefore seem that once the Sirius contract is activated, the terminal would be operating at or near to capacity.

3.13 Even if there is some spare bulk capacity at RBT under the Sirius use scenario, it is relatively small and would not require a significant amount of additional hinterland to support related import and export operations. Under a scenario where alternative cargoes were to be considered, such as containers, again, expansion beyond the current RBT Ltd boundary could not be justified. Indeed, in all cases, it could be considered that RBT presently has a surplus of land. A technical note prepared by Royal Haskoning, on behalf of STDC, is exhibited at **Appendix C**. This considers the existing Sirius contract and the fact that the remaining bulk capacity is very limited. It also considers a scenario where there is a switch from a bulks business to a container port and advises that a land area of only 16 hectares (40 acres) would be required.

3.14 The references by both Mr Melhuish-Hancock and Mr Roberts in their Proofs to the granting of various leases and options for leases on RBT land do not support the case for expansion into SSI land. The lease entered into with Sirius amounts to 40 acres of land, but Sirius will utilise virtually all of the capacity at RBT. It is understood that PMA Consultancy's option for lease is for 25 acres of land, and that the option for lease with DCS Industrial Limited is for 75 acres; a total of 140 acres of allocated/potentially allocated land. Based on Mr Melhuish-Hancock's assessment on land availability at RBT, this leaves 173 acres of residual land. But to restate, the capacity of the berth has already been largely allocated to Sirius. If Sirius built its own berth at Bran Sands, under its DCO permission, the RBT total berth capacity could readily be served by a hinterland of in excess of 170 acres. Therefore, the view that STDC's compulsory acquisition of SSI land at Redcar would reduce the capacity of RBT is simply without foundation.

3.15 There is no evident case supporting an expansion in land area beyond the current RBT Ltd footprint into SSI land at Redcar that is within the Order Land. Mr Melhuish-Hancock's and, indeed, Mr Roberts' statements appear unsupported by any meaningful due diligence or related analysis, suggesting that this proposition is merely an unsubstantiated concept. It therefore presently without any merit.

3.16 In conclusion, I am of the firm view there is no demonstrable case for expanding the current RBT Ltd hinterland to serve the RBT port with its currently assessed capacity. If anything, it could be argued that the operational port land at RBT could be reduced further, to deliver far greater efficiencies and free up land for alternative uses.

3.17 The claim by Mr Melhuish-Hancock at paragraph 11.9 of his Proof that he has *'…great confidence in the ability of the private sector to regenerate the SSI Land….so I conclude that it is not appropriate for the Order to be confirmed and that the private sector, with the assistance of SSI, should be given more time to deliver these projects'* is merely based on embryonic ideas and concepts for RBT and SSI land at Redcar that lack any rigour or substance, and failed, undeveloped project proposals elsewhere across the estate (as outlined in many of his sub-paragraphs to paragraph 7.7 of his Proof). SSI showed no interest in the site when the Master Plan proposals were being developed and launched. Over four years have lapsed since liquidation, with zero interest or inclination previously shown by SSI in bringing forward alternative proposals until now, and all the while the public purse has had to fund an ever-increasing site safety and security management burden running to hundreds of millions of pounds. It is therefore difficult to give any credence to the efforts of the SSI witnesses to now be suggesting there is great potential for the private sector to realise many of the development ambitions of the Master Plan.

APPENDIX A

REPORTS AND DOCUMENTATION RELATING TO THE FORMER SSI HIGH TIP (CLE3/8) RESTORATION

South Tees Regeneration Programme
High Tip and SLEMS Waste Management Facilities

1.0 High Tip

1.1 High Tip is a licenced landfill facility with two licences applicable (ref CLE3 (1975) and CLE8 (1977)), with the last-named operator being 'Sahaviriya Steel Industries' (SSI). It forms part of the asset inventory of SSI (In Liquidation) and is under the control of the Official Receiver (OR).

1.2 The land area occupied by High Tip is in the region of 70 acres. A recent volumetric survey estimated the total volume of material within the facility at some 3.75M cubic metres, of which 0.13M cubic metres is estimated to have (historically) been overfilled beyond the permitted boundary, onto land areas in others' ownership; most notably, former Tata land now owned by South Tees Developments Limited (STDL), a wholly-owned subsidiary of South Tees Development Corporation (STDC).

1.3 The revised permitting of the landfill to receive further volumes was achieved following a lengthy legal appeal between Corus (Tata's predecessor) and the Environment Agency (EA), in the early 2000s. As well as the construction of the existing "operational" Cell J on High Tip, that was borne out of this process, the company (Corus) was committed to remedial works involving reprofiling and capping of the existing waste mass in order to provide stability to both the existing landfill and the proposed/required expansion thereof. This requirement is reflected, as a point of policy, in the Regulatory Position Statement that the Agency produced in 2008 concerning [Quote] 'landfill piggybacking' (building on/expanding existing landfills).

1.4 The landfill permit was transferred from Tata to SSI UK in March 2011, and the following is one of the pre-operational measures within the permit itself, concerning future operations:

'Prior to the commencement of cell engineering, the operator shall submit to the Environment Agency a revised phasing and capping plan for the installation. This shall update the existing proposal to account for the time passed since the proposals were originally submitted.'

1.5 Proposals for this work were originally submitted by Tata in 2010, with an expected completion date being the end of 2014. SSI UK acquired the facility from Tata in 2011. By 2013, no remedial works had taken place and SSI UK was asked to submit a revised plan, which it did so in 2014; but the proposals were not executed. These latest proposals articulate, in some detail, the remedial works to be undertaken, involving significant earthworks operations in connection with landfill reprofiling and the installation of a capping system.

1.6 Post-liquidation, SSI (IL) holds Compliance Assessment Reports from the EA linked to its routine inspections, which note the level of progress of the remedial works project (i.e., no progress). The matter is therefore still on the agenda of the EA's routine meetings with STSC, and while, given that the OR still has control over the assets they aren't pressing for the remedial works to be undertaken, any future operator would be obliged to do so. Consequently, further use of High Tip is presently prohibited.

1.7 Analysis undertaken recently on the impact of executing the required reprofiling of the facility to achieve shallower side slopes (at 1 in 3) demonstrates that, once completed, and with the inclusion of a capping layer, the residual capacity in High Tip will be of the order of 0.9M cubic metres within the licensed boundary. If the aforementioned overfilling onto others land areas needs to be rectified (see 1.2), the residual capacity reduces to some 0.77M cubic metres.

1.8 The cost of the remedial works has been estimated at c.£15M, subject to more detailed analysis being undertaken.

1.9 The reference in some quarters to a residual capacity of 10M cubic metres relates to the scenario whereby High Tip is co-joined with the adjacent, privately-owned hazardous and non-hazardous landfill operated by Highfield Environmental, and the additional capacity from filling in the valley between the two facilities is realised. It is a purely hypothetical scenario, where the volume analysis was undertaken by Highfield; the figure has not been validated by STDC. It should be remembered that STDL/STDC owns a strip of (former Tata) land that separates the two facilities, and so any proposed plans between the owner of High Tip and Highfield to advance such a proposal would require their consent.

1.10 In terms of a market value proposition, the situation with respect to High Tip needs to be assessed in the context of the c.£15M that would need to be expended on remedial works before the value in uptake of the residual capacity of 0.77M cubic metres could be realised. When considering the likely operational costs of running High Tip as a landfill and the gate fees that could be derived, it seems that, at best, the proposition would net off to zero or near-zero. When considering such an analysis, the need to execute extensive restoration works (soil capping, landscaping, etc) upon completion and closure of the landfill, and the significant additional cost this would attract, should not be overlooked.

2.0 SLEMS

2.1 The SLEMS (Solid and Liquid Environmental Management System) is a facility that was operated, under an EA-consented environmental permit, for around 15 years, up to the point of SSI going into liquidation in 2015. It sits above an historic licenced hazardous landfill (ref CLE9 (1977)) that was closed prior to the SLEMS proposition commencing. The last-named operator is 'Sahaviriya Steel Industries', the same as for High Tip.

2.2 The facility was utilised for the receipt of BOS (Basic Oxygen Steelmaking) by-product slurry – BOS Oxide to be more specific. It has been subject to a topographical survey (by drone) and a ground investigation, both commissioned by STDC and executed in 2018. The resulting estimate on the volume of BOS Oxide material within the SLEMS is in the region of 0.4M cubic metres, which converts to around 1.0M tonnes based on assessed material density.

2.3 BOS Oxide is, because of its relatively high metalliferous content, a potentially recyclable material – one such process being to pass it through a Rotary Hearth Furnance (RHF) to extract sponge iron and zinc. In the UK, there is presently no such facility, and current estimates on the construction of an RHF are between £80M and £100M.

2.4 While there are certain other uses for the material, its potential re-use and value are functions of market demand, which is very low. In this connection, Roy Hatfield Ltd (RHL) entered into an arrangement with the OR where they have, from a point in time beyond the October 2015 liquidation of SSI, been permitted to export BOS Oxide from the SLEMS facility at zero cost to the OR; apparently, this follows a similar arrangement that was in place with SSI UK when operational. The reality of the arrangment is that, to make it viable to both parties, and driven by market demand, the run rate on material removal is only 12,000 to 15,000 tonnes per annum; insignifacnt when compared to the whole mass of circa 1.0M tonnes.

2.5 At the current range on export run-rate, it would take between 60 and 85 years to remove the material from the site, which would preclude any development on the associated c.65-acre area until very far into the future. Any move to accelerate removal of the material would change the position to one of signifcant cost to the OR or any successor owner/operator of the SLEMS facility, as the market demand would not exist for large volumes of the material and, consequently, it would need to be moved to licenced landfill.

2.6 Given the typology and chemical composition of the BOS Oxide, and when taking account of gate fees and materials handling and transport costs, it is estimated that it would cost in the region of £130 per tonne to remove the material from the SLEMS into a suitable, appropriately licenced landfill facility. This therefore results in a projected total cost of circa £130M to clear the SLEMS area of BOS Oxide under a land redevelopment scenario.

DO NOT SCALE

SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	0.00	5.00		19052.868m2	93001.752m3
2	5.00	10.00		14922.734m2	866159.823m3
3	10.00	15.00		33449.541m2	743117.637m3
4	15.00	20.00		39290.260m2	562031.866m3
5	20.00	25.00		44987.630m2	363734.116m3
6	25.00	30.00		36620.169m2	123603.107m3
7	30.00	35.00		10076.641m2	22900.557m3
8	35.00	40.00		240.649m2	24.319m3

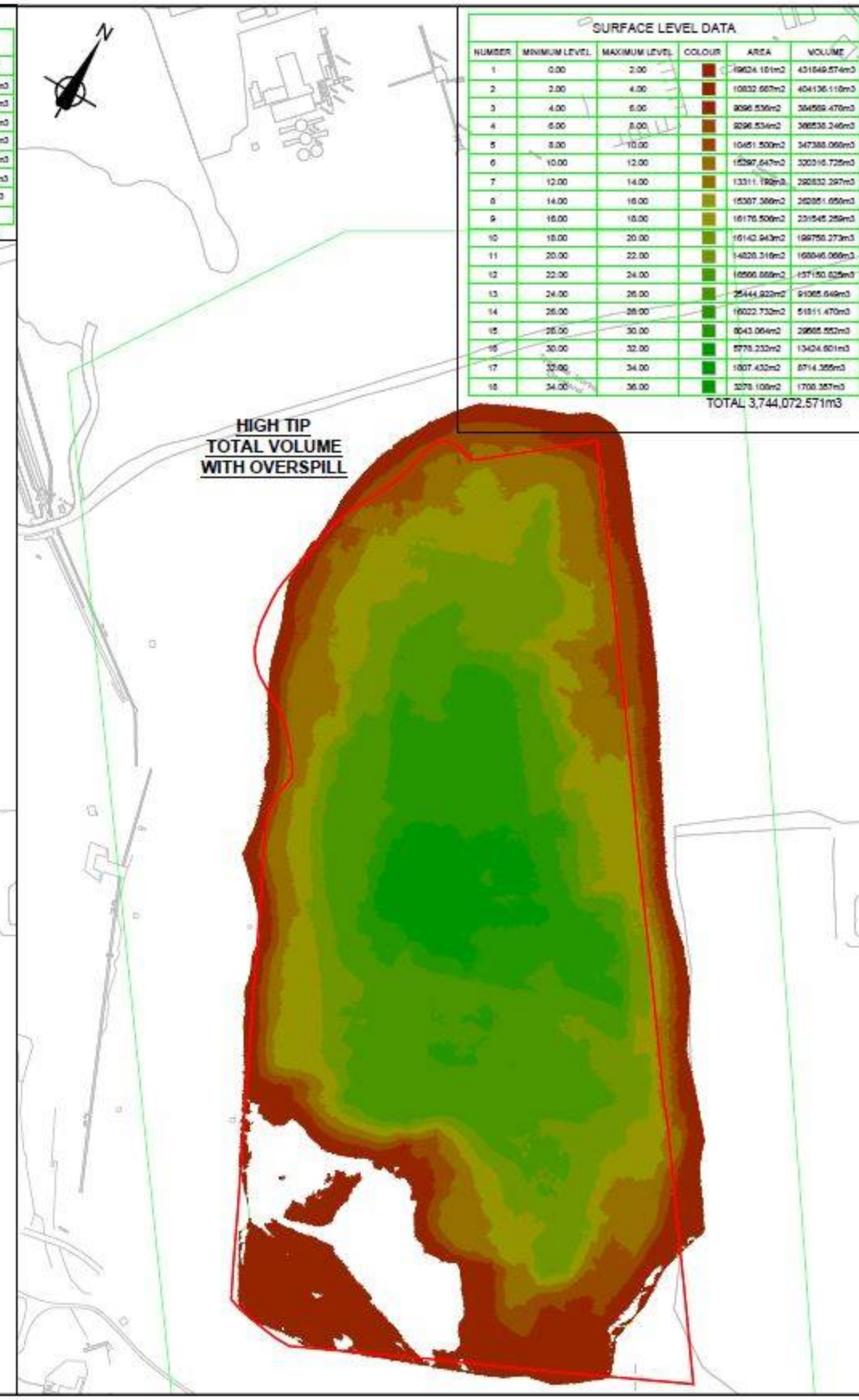
TOTAL 3,614,587.178m3

HIGH TIP
VOLUME WITHIN SSI OWNERSHIP

SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	0.00	2.00		19624.161m2	431649.574m3
2	2.00	4.00		10832.667m2	404136.110m3
3	4.00	6.00		9096.536m2	384569.470m3
4	6.00	8.00		9296.534m2	366536.246m3
5	8.00	10.00		10451.500m2	347388.066m3
6	10.00	12.00		15297.647m2	329316.725m3
7	12.00	14.00		13311.192m2	292832.297m3
8	14.00	16.00		15307.366m2	262851.650m3
9	16.00	18.00		16176.506m2	231545.259m3
10	18.00	20.00		16142.943m2	199758.273m3
11	20.00	22.00		14828.316m2	168046.066m3
12	22.00	24.00		10566.868m2	137150.825m3
13	24.00	26.00		25444.822m2	91065.649m3
14	26.00	28.00		16022.732m2	51811.470m3
15	28.00	30.00		8043.064m2	29666.552m3
16	30.00	32.00		5778.232m2	13424.601m3
17	32.00	34.00		1807.432m2	5714.366m3
18	34.00	36.00		3278.108m2	1706.357m3

TOTAL 3,744,072.571m3

HIGH TIP
TOTAL VOLUME WITH OVERSPILL



KEY

VOLUME OF OVERSPILL
3,744,072.571 - 3,614,587.178= 129,485.393M3

Rev.	Date	Description	By	Chkd	Appd
-	-	-			

STDC
Teesside Management Offices,
Redcar, TS10 5EW
www.southtees.com

South Tees Development Corporation

Project Title:
FORMER STEELWORKS
SOUTH TEES

Drawing Name:
SOUTH INDUSTRIAL ZONE
HIGH TIP
VOLUME COMPARISON

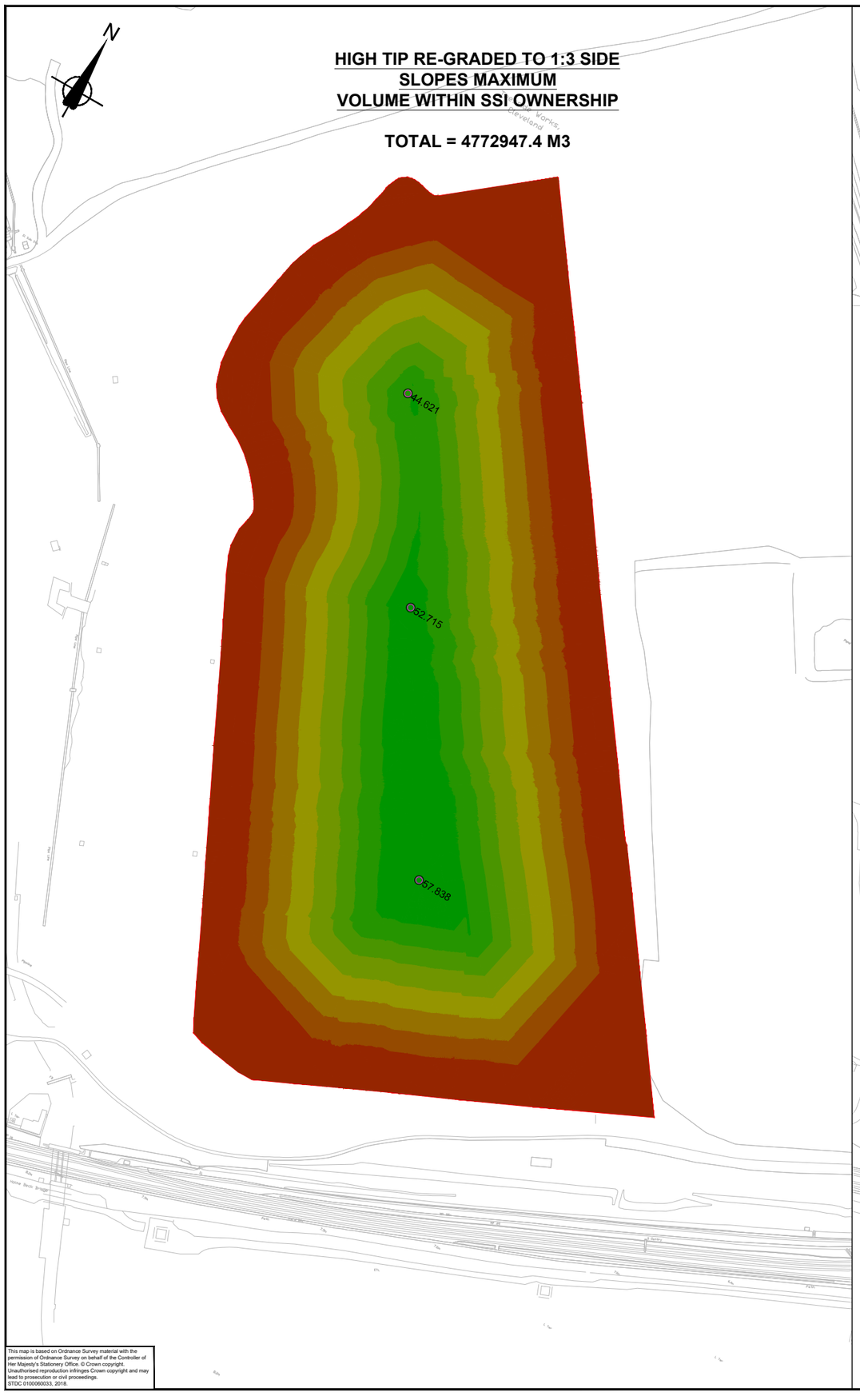
Drawn by: LCD	Date: JUL 14
Checked by: DA	Date: JUL 14
Approved by: RMc	Date: JUL 14
Drawing Number: STDC-SIZ-HT-GEN-0001	Revision: -
Drawing Scale: 1:2,000	Page Size: A1

Millimetres 100 10 0

DO NOT SCALE

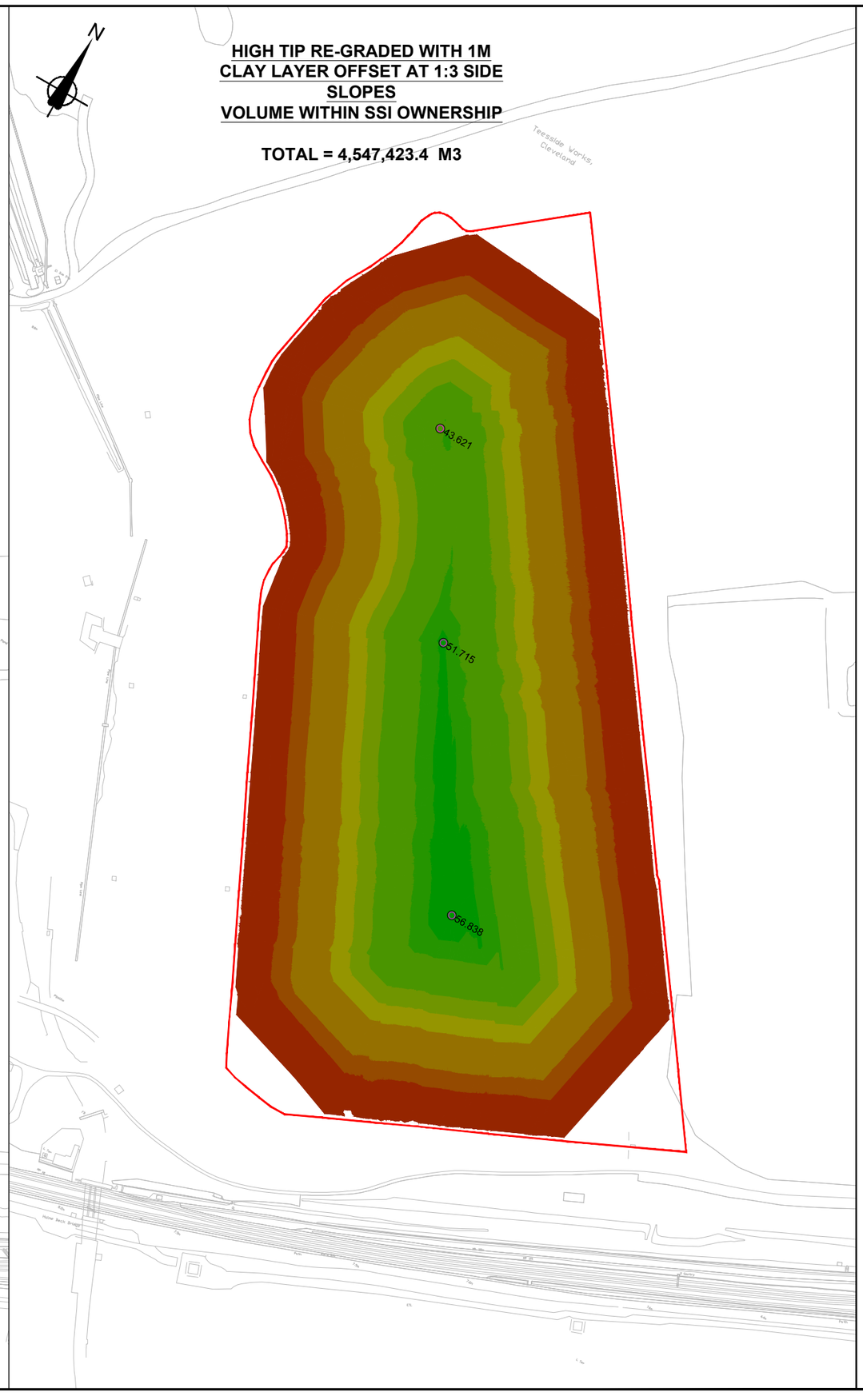
HIGH TIP RE-GRADED TO 1:3 SIDE SLOPES MAXIMUM VOLUME WITHIN SSI OWNERSHIP

TOTAL = 4772947.4 M3



HIGH TIP RE-GRADED WITH 1M CLAY LAYER OFFSET AT 1:3 SIDE SLOPES VOLUME WITHIN SSI OWNERSHIP

TOTAL = 4,547,423.4 M3



KEY

VOLUME OF CLAY CAP
4,772,947.4- 4,547,423.4 = 225,521 M3

Rev.	Date	Description	By	Chk'd	App'd
-	-	-	-	-	-

STDC
Teesside Management Offices,
Redcar, TS10 5QW
www.southteesdc.com

South Tees Development Corporation

Project Title:
FORMER STEELWORKS
SOUTH TEES

Drawing Name:
SOUTH INDUSTRIAL ZONE
HIGH TIP
SSI OWNERSHIP
VOLUME CAPACITY

Drawn by: LCD	Date: JUL 19
Checked by: JA	Date: JUL 19
Approved by: JMc	Date: JUL 19
Drawing Number: STDC-SIZ-HT-GEN-0001	Revision: -
Drawing Scale: 1:2,000	Page Size: A1

High Tip Landfill - Capacity Analysis	Volume (m3)
Current volume of material	3,744,073
Current volume within licensed boundary	3,614,587
Overfilling onto others land areas	**129,486**
Compliance with EA requirements on restoration and remedial works	
Total volume capacity (with 1 in 3 side slopes)	4,772,947
Volume occupied by necessary capping system	225,521
Net total capacity	**4,547,426**
Residual Capacity Assessment	
Residual Capacity (Scenario 1)	
Net total capacity after reprofiling and capping	4,547,426
Existing volume within licenced boundary	3,614,587
Residual Capacity (Scenario 1)	**932,839**
Residual Capacity (Scenario 2)	
Net total capacity after reprofiling and capping	4,547,426
Existing volume including overfilling	3,744,073
Residual Capacity (Scenario 2)	**803,353**

High Tip Remedial and Restoration Works Cost Estimate	Quantity	Rate	Cost (£)
Eathworks reprofiling			
Excavation	220,000 (m3)	5.00 (£/m3)	1,100,000
Load and transport	220,000 (m3)	7.00 (£/m3)	1,540,000
Tipping, placement and compaction	220,000 (m3)	4.00 (£/m3)	880,000
		Earthworks total	**3,520,000**
Capping system			
Surface area	260,000 (m2)		
Provision of regulating layer (500mm thick)	130,000 (m3)	20.00 (£/m3)	2,600,000
Installation of membrane system	260,000 (m2)	13.00 (£/m2)	3,380,000
Geocomposite drainage layer (200mm thick)	52,000 (m3)	35.00 (£/m3)	1,820,000
Provision of final capping layer (300mm thick)	78,000 (m3)	25.00 (£/m3)	1,950,000
		Capping system total	**9,750,000**
Ancilliary works			
Perimeter drainage system		sum	150,000
Pressure relief system		sum	100,000
Making good perimeter areas, etc		sum	50,000
		Ancillary works total	**300,000**

Summary	(£)
Earthworks	3,520,000
Capping system	9,750,000
Ancillary works	300,000
Preliminaries and general items	250,000
Sub-total	**13,820,000**
Surveys and investigations (ground investigation, environmental, topographical, etc)	250,000
Fees (design, project management, licences and consents, etc (8%))	1,105,600
Total	**15,175,600**

South Tees Development Corporation

High Tip Remedial and Restoration Works (prior to further use of the facility) - Cost Estimate	(£)
Earthworks	3,520,000
Capping system	9,750,000
Ancillary works	500,000
Sub-total	**13,770,000**
Surveys and investigations (ground investigation, environmental, topographical, etc)	250,000
Fees (design, project management, licences and consents, etc (8%))	1,101,600
High Tip Remedial and Restoration Works - Cost Estimate	**15,121,600**

High Tip Final Restoration Works Upon Landfill Closure	Quantity	Rate	Cost (£)
Surface area	260,000 (m2)		
Provision of clay capping layer (1,000mm thick)	260,000 (m3)	25.00 (£/m3)	6,500,000
Provision soil growing medium (500mm)	130,000 (m3)	35.00 (£/m3)	4,550,000
Landscaping	260,000 (m2)	10.00 (£/m2)	2,600,000
Ancillary works		sum	500,000
Preliminaries and general items		sum	250,000
		Sub-total	**14,400,000**
Surveys and investigations			100,000
Fees (design, project management, licences and consents, etc (8%))			1,152,000
High Tip Final Restoration Works Upon Closure - Cost Estimate			**15,652,000**

Operation of High Tip as a Landfill Facility	Quantity	Rate	Cost (£)
Residual capacity	800,000 (m3)		
Operational costs of facility	800,000 (m3)	20.00 (£/m3)	16,000,000
Ancillary costs (licencing, insurances, fees, etc) (10%)		sum	1,600,000
Professional services (technical, environmental, etc) (5%)		sum	800,000
		Landfill Operational Costs	**18,400,000**

Total costs associated with re-use of High Tip	**49,173,600**

High Tip Potential Cost Savings through use of Facility	Quantity	Rate	Saving (£)
Residual capacity of High Tip following compliance with initial restoration plan	800,000 (m3) 1,200,000 (t)		
Off-site disposal - gate fee (excl L/F Tax)	1,200,000 (t)	20.00 (£/t)	24,000,000
Off-site disposal - additional haulage costs	1,200,000 (t)	15.00 (£/t)	18,000,000
		High Tip Potential Cost Savings through use of Facility	**42,000,000**

Estimated outturn position on STDC re-use of High Tip as a Landfill Facility	**-7,173,600**

APPENDIX B

FORMER SLEMS LANDFILL, INTRUSIVE INVESTIGATION REPORT, ARCADIS, 2019

ARCADIS Design & Consultancy for natural and built assets

THE FORMER SSI STEELWORKS, REDCAR: FORMER SLEMS LANDFILL

Intrusive Investigation Report

South Tees Site Company Limited

Document Ref: Redcar Steelworks-AUK-XX-XX-RP-GE-0001-P1-SLEMS_BOS_Oxide_Assessment

January 2019

Incorporating

EC HARRIS BUILT ASSET CONSULTANCY

Hyder

CONTACTS

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Leeds
LS1 4BN

The Former SSI Steelworks, Redcar: Former SLEMS Landfill

Intrusive Investigation Report

Author	Jonathan Miles/Ben Le Grice
Checker	Neil Thurston
Approver	Paul Wrigley
Report No	Redcar Steelworks-AUK-XX-XX-RP-GE-0001-P1-SLEMS_BOS_Oxide_Assessment
Date	JANUARY 2019

Version control

Version	Date	Author	Changes
1	January 2019	Ben le Grice, Jonathan Miles	

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1 INTRODUCTION

1.1 Project Background

The former SSI landholdings are made up of eleven discrete, sizeable land parcels situated in the Redcar, Lackenby, Grangetown and South Bank conurbations of the Borough of Redcar & Cleveland, within the industrial area generally known as 'South Tees'.

The South Lackenby Effluent Management System (SLEMS) Landfill represents one of these parcels of land. The landfill was historically used for the deposition of waste materials from the steelmaking process, particularly the disposal of basic oxygen steel oxide (BOS Oxide), also known as Basic Oxygen Furnace (BOF) dust, which has a potential resale value in the manufacture of construction materials.

1.2 Contract Details

Arcadis (UK) Limited (Arcadis) were appointed by South Tees Site Company Limited (STSC) to oversee and manage a ground investigation undertaken by Allied Exploration and Geotechnics Limited (AEG) and to provide consultancy advice with respect to the calculation of the amount of BOS Oxide present within the SLEMS landfill.

1.3 Project Aims and Objectives

The overarching aim of the works was to provide an estimate of the amount of BOS oxide present within the SLEMS landfill. As technical consultant, our specific objectives of this phase of works were to:

- Manage and technically supervise the site works, undertaken by AEG, on behalf of STSC;
- Direct the site works to ensure compliance by the ground investigation contractors with existing site management protocols and procedures;
- Specify the requirements for laboratory analysis;
- Analyse the results of ground investigations; and,
- Prepare an interpretative technical report (this document);

1.4 Scope of Work

This report relates to the physical ground investigation works relating to the SLEMS Landfill.

Figure 1 and 2 within Appendix A provide details of the facility location and the site investigation areas.

The initial scope for the investigation included the use of cable percussion boreholes to confirm the thickness of BOS oxide, however due to poor recovery and difficulties in drilling through layers of slag, the scope was amended to use trial pitting to collect information on the distribution of strata beneath the site, with works conducted in two phases. Phase 1 was carried out in December 2017 and involved cable percussion drilling (BH 3, 4, 5, 6, 8 & 9) and trial pitting (TP1-TP5, TPBH03, TPBH04 &TPBH05), while Phase 2 was carried out in March 2018 and included the excavation of trial pits only (TP101-TP111). The final scope of works completed is summarised below.

- Site service and utilities clearance of exploratory locations by STSC operatives
- Phase 1- six no cable percussion boreholes to maximum depth of 17.00m (note 5 of 6 boreholes terminated at shallow depth due to refusal on slag or other obstructions).
- Phase 1- eight no machine excavated trial pits;
- Phase 2 - Advancement of 11no. trial pits using a 20 tonne tracked 360 Excavator to a target depth of 4.5m bgl or refusal;
- Review of previous intrusive investigations at the Site; and,
- Reporting.

1.5 Reliability of Information / Limitations

A complete list of Arcadis Study Limitations is presented in Appendix B.

It should be noted that ground conditions between exploratory holes may vary from those identified during this ground investigation; any design should take this into consideration. It should also be noted that groundwater levels may be subject to diurnal, tidal, seasonal, climatic variations and those recorded in this report are solely dependent on the time the ground investigation was carried out and the weather before and during the investigation.

1.6 Reliance

This report has been prepared for the use of the STSC. The contents of this report may not be used or relied upon by any person other than this party without the express written consent and authorisation of Arcadis.

2 DESK STUDY AND SITE CONSEPTUALISATION

This section incorporates a review of publicly available records, records provided by STSC, and data collected as part of the site investigation works by AEG. (Borehole logs 4154a SLEMS Investigation Final Borehole logs).

2.1 Site Location

The SLEMS landfill is located within the Cleveland Works area of the larger Former SSI Steelworks Facility. The centre of the site is approximately located at Ordnance Survey (OS) National Grid Reference: 455012, 522260.

A site location plan is presented as Figure 1 in Appendix A.

2.2 Site Description and Recent Operational Practice

The SLEMS Landfill is a mounded land raise approximately 22 Ha in area rising to a maximum elevation of approximately 20m above Ordnance datum (AOD) and approximately 15m above the surrounding area. An overhead pipe bridge and a warehouse structure housing excavators are present on the south-eastern Site boundary.

The upper surface of the landfill comprises stockpiles of BOS oxide material divided into bays. A series of settling ponds are present in the southern section of the site; formerly an aqueous suspension of BOS oxide was pumped from the BOS Plant into these ponds. Settled material dredged from the ponds was then deposited in adjacent drying bays before being placed at a final deposition point within the landfill.

The site is bounded on the south-west, north-west and north-east edges by water channels. During SSI operation these were routinely dredged and the arisings placed within the SLEMS landfill. Stockpiles of this dredged material are present in the south west and north east of the Site. The north and north western sections of the Site include a tidal overspill area.

It is understood that while the Site was mainly used for the settling and storage of BOS Oxide, slag generated on other parts of the Site was used to surface temporary roadways and create bund walls.

The current site layout is shown on Figure 2 in Appendix A

2.3 Site History

The deposition of waste materials at SLEMS is thought to have begun in the 1950's based on the Enviros report "Corus UK Ltd. – Soil and Groundwater Baseline Characterisation Study Teesside Works – Interpretative Report Volume 1, 2 and 3 of 3, June 2004".

On historical OS maps from 1953-1955 presented as part of the Enviros report "Corus Cleveland Prairie Teesside Site Phase 1 Environmental Assessment, August 2007" the site is labelled as mud having been shown on earlier maps as part of the Tees Estuary. On British Steel Drawing 1x5947 dated 30th September 1966 the site is labelled as SLEMS and includes a settlement pond on its western edge; silt drying beds are shown just to the north, the site is also labelled a "silt extraction plant". The historical maps are presented below as Figures 3 and 4 and included in Appendix A.

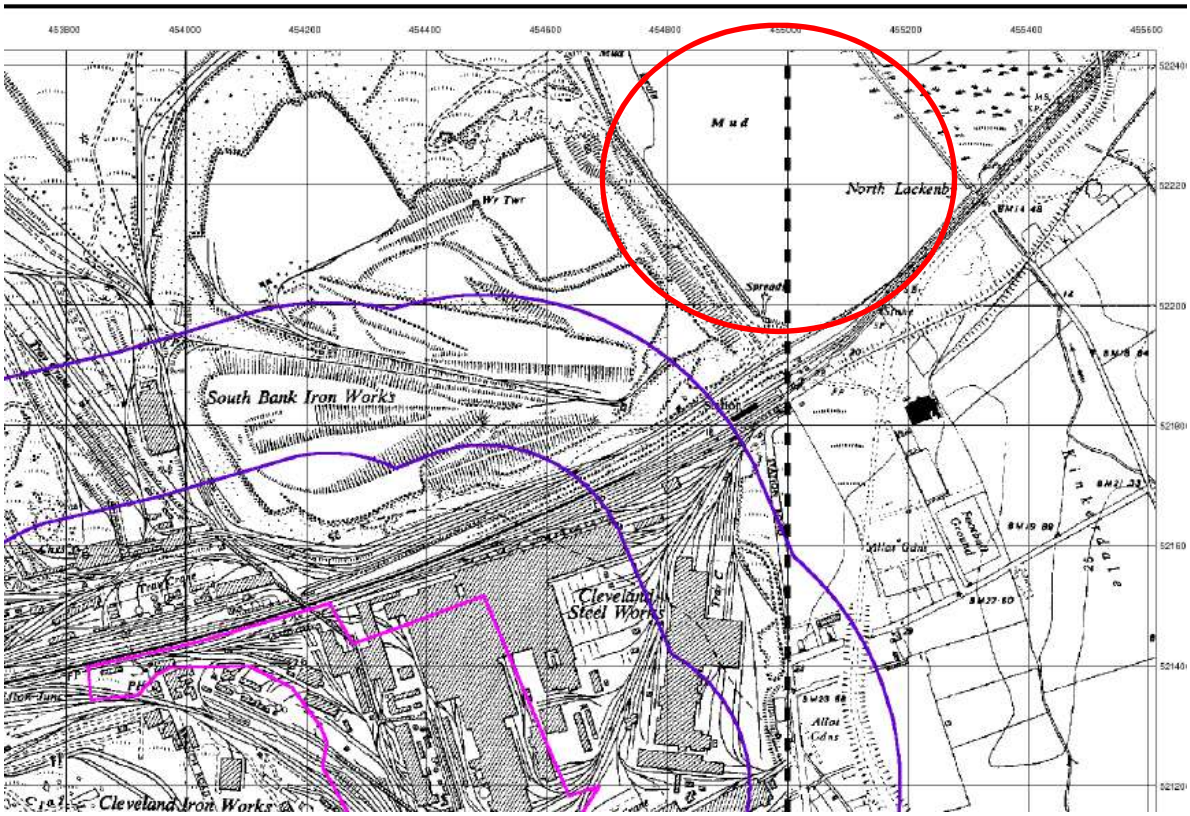


Figure 3: 1953 to 1955 OS mapping

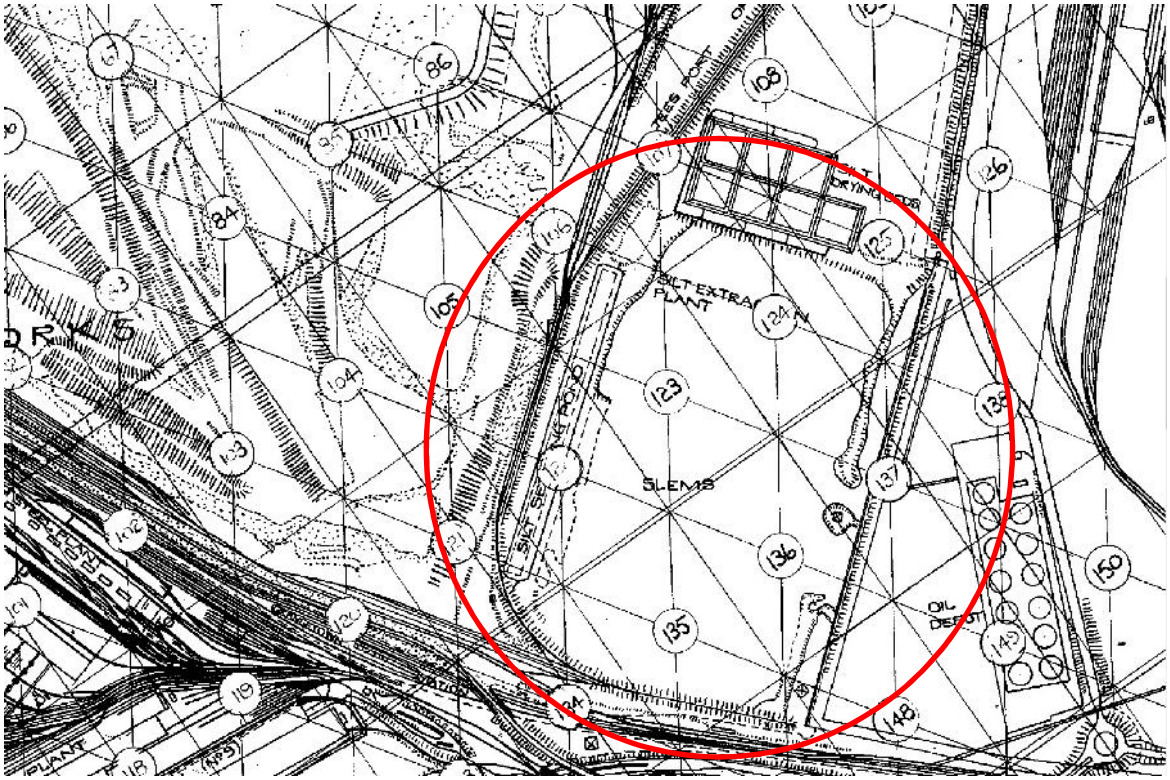


Figure 4: Excerpt from British Steel Drawing 1x5947

Information provided by STSC suggests that the SLEMS landfill was formed by placing a layer of slag across the footprint of the landfill to form a firm surface. Further deposits of slag were used to form walls between “cells” which were used to stockpile material. Conversations with the site contractor, David

Jones, indicates that during periods of inclement weather, the surface of the BOS oxide can become difficult to traffic and in such conditions slag was also used to provide a trafficable surface.

BOS oxide was transferred to the site in slurry form via a pipeline before being allowed to settle, and dry in settling ponds in the south west of the area. When dry enough to handle, the material was transferred to the holding bays for storage. It is also understood that periodically, sediment (including BOS oxide) was dredged from the Lackenby and Cleveland channels, dried, and added to the stockpiles.

A copy of a site plan and photographs from 2012 provided by STSC is included in Appendix C.

2.4 Geology

A review of British Geological Survey (BGS) data indicates the landfill is underlain by Tidal Flat Deposits (TFD) of sand silt and clay; these are likely to be underlain by interbedded Glaciolacustrine Deposits (GL) predominantly comprising laminated clays and silt and Glacial Till (GT) predominantly comprising slightly gravelly clay. The underlying bedrock is the Mercia Mudstone formation.

The following borehole records have also been identified for the site:

Reference	BH ID and Location	Depth (m bgl)	Ground Conditions (all depths m below ground level)	Elevation
BGS	Borehole NZ52SW315 (1967)Adjacent to northern boundary	10	Slag fill to 3.30m Silty sand (TFD) to 4.6m Firm silty clay (GL) to 5.8m Stiff gravelly clay (GT) to 10.05m Mercia Mudstone	Surface level 3.3m AOD Natural deposits from approximately 0.0m AOD
	Borehole NZ52SE13551/241 South east corner	4.6	Slag fill to 0.9m Gravel to 1.2m Very stiff Stony Clay (GT) to 4.6m	Not available
	4AB1 – See Figure 5	6.5	Slag fill – very sandy gravel to 3m Slag fill – very gravelly cobbles to 5.9m (oily) Made Ground – soft slightly gravelly clay to 6.5m (hydrocarbon odour), potentially natural.	Surface Level 7.1m AOD Potential natural deposits from approximately 1.6m AOD
	4AB2 – See Figure 5	6.5	Slag fill – clayey sandy gravel to 2m No recovery 2.0-4.0m Slag Fill – silty sandy gravel to 4.8m (hydrocarbon odour) Firm slightly gravelly clay to 6.5	Surface Level 4.82m AOD Natural deposits from approximately 0.02m AOD
	4AB3 – See Figure 5	7.1	Slag fill – clayey sandy gravel to 1.1m Slightly gravelly clay to 2.0m (hydrocarbon / solvent odour) Made Ground- soft blue/grey/brown clay to 6.3m (solvent odour) Soft brown clay to 7.1	Surface Level 7.17m AOD Natural deposits from approximately 0.87m AOD
	4AB4 – See Figure 5	6.7	Slag fill – clayey sandy gravel to 4.6m Stiff brown sandy gravelly clay to 6.7m	Surface Level6.64m AOD Natural deposits from approximately 2.04m AOD
	Trial pit 4AT3– See Figure 5	4	Slag fill of cobbles and boulders in a brown granular matrix including refractory bricks rubble and wood	Not available
	Trial pit 4AT4– See Figure 5	3.2	Slag Fill - Cobbles of slag in a grey slag dust to 0.8 Slag fill - Gravel cobbles and boulders in a brown clayey sand to 2.5 Slag Fill – Cobbles of slag in a very sandy clay matrix to 3.0m (hydrocarbon product) Made Ground – sandy clay with frequent organic peat to 3.2m (hydrocarbon odour)	Not available
Arcadis 2017	BH08	17	Made Ground – Silty gravelly sand with bands of slag cobbles to 14m Silty sand (TFD) to 17.0m	Surface Level 12.06m AOD Natural deposits from approximately -1.94m AOD

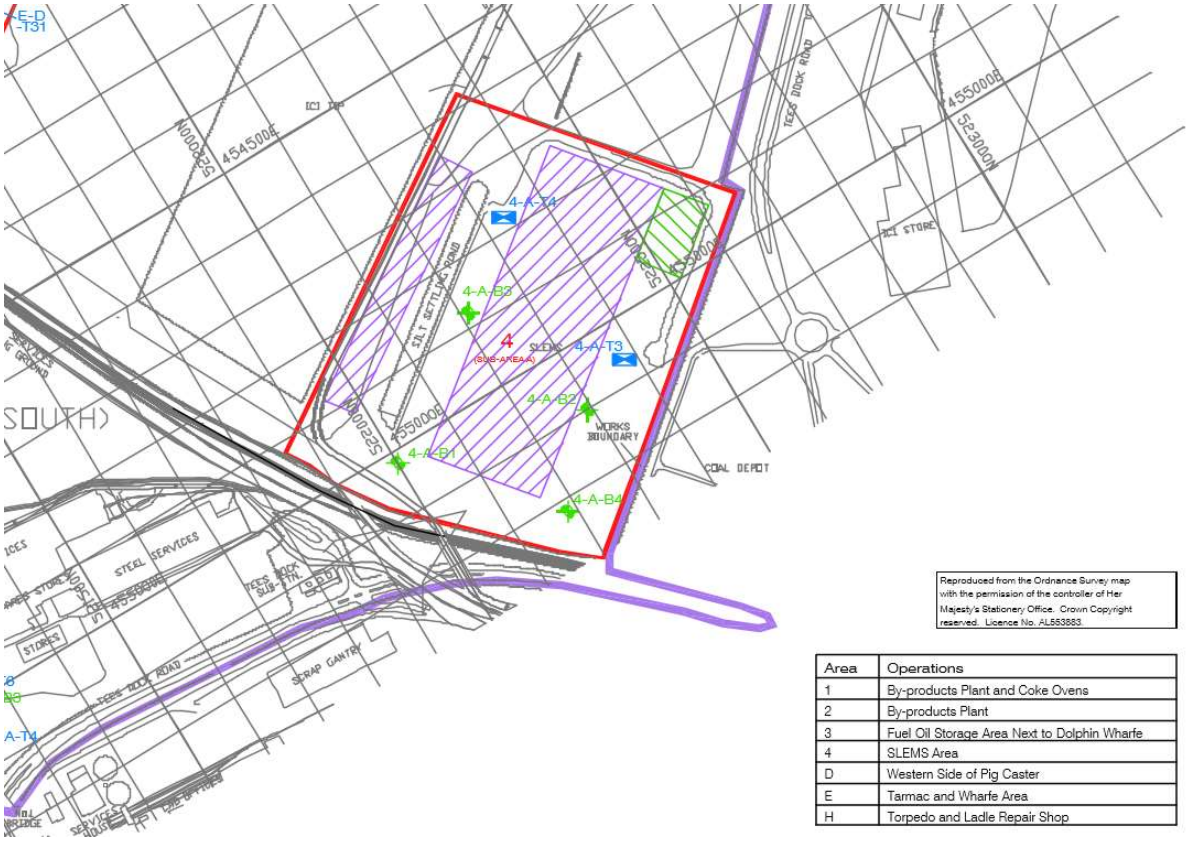


Figure 5: Extract from Enviros 2004 report showing SLEMS investigation locations

2.5 Topography

Two historic topographical surveys are known to have been undertaken of the SLEMS Landfill. An extract from the 2002 survey (Corus drawing A119236) is shown below as Figure 6 and also presented in Appendix A. The topographical survey indicated the maximum height of the landfill was approximately 12.89m AOD with the surrounding land levels ranging between 3.55m AOD and 7.24m AOD. The landfill comprises two settling ponds and three drying beds in the south corner with a fourth long drying bed running down the south western edge of the landfill in a similar location to settling pond shown on Figures 4 and 5. The centre and highest part of the landfill is marked as a drying and loading area with the northern end of the landfill marked as an overflow area.

The 2011 survey (AC Environmental Services drawing SLEMS-IN-002) shown below as Figure 7 and also presented in Appendix A does not cover as wide an area as the 2002 survey but provides a more detailed picture of the areas it does cover. The elevations indicated a significant increase in landfill levels to a maximum of 20.80m AOD.

STSC have also provided Arcadis with a copy of a recent aerial survey of the SLEMS area. This survey was undertaken in 2018 and records the maximum elevation of the site at 20m AOD. This model has been used for the subsequent volume calculations discussed in Section 4.

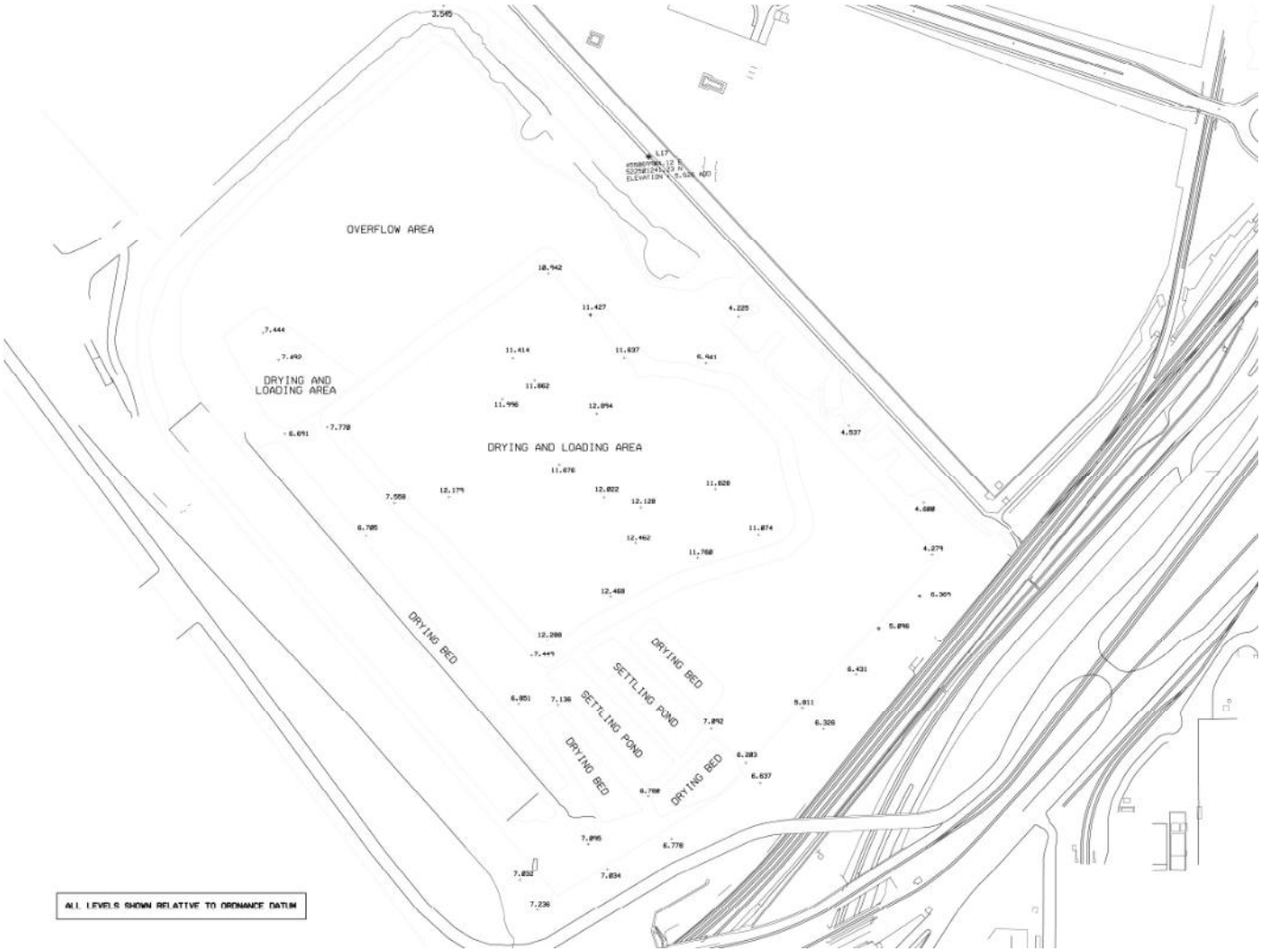


Figure 6: Extract from 2002 Topographical Survey

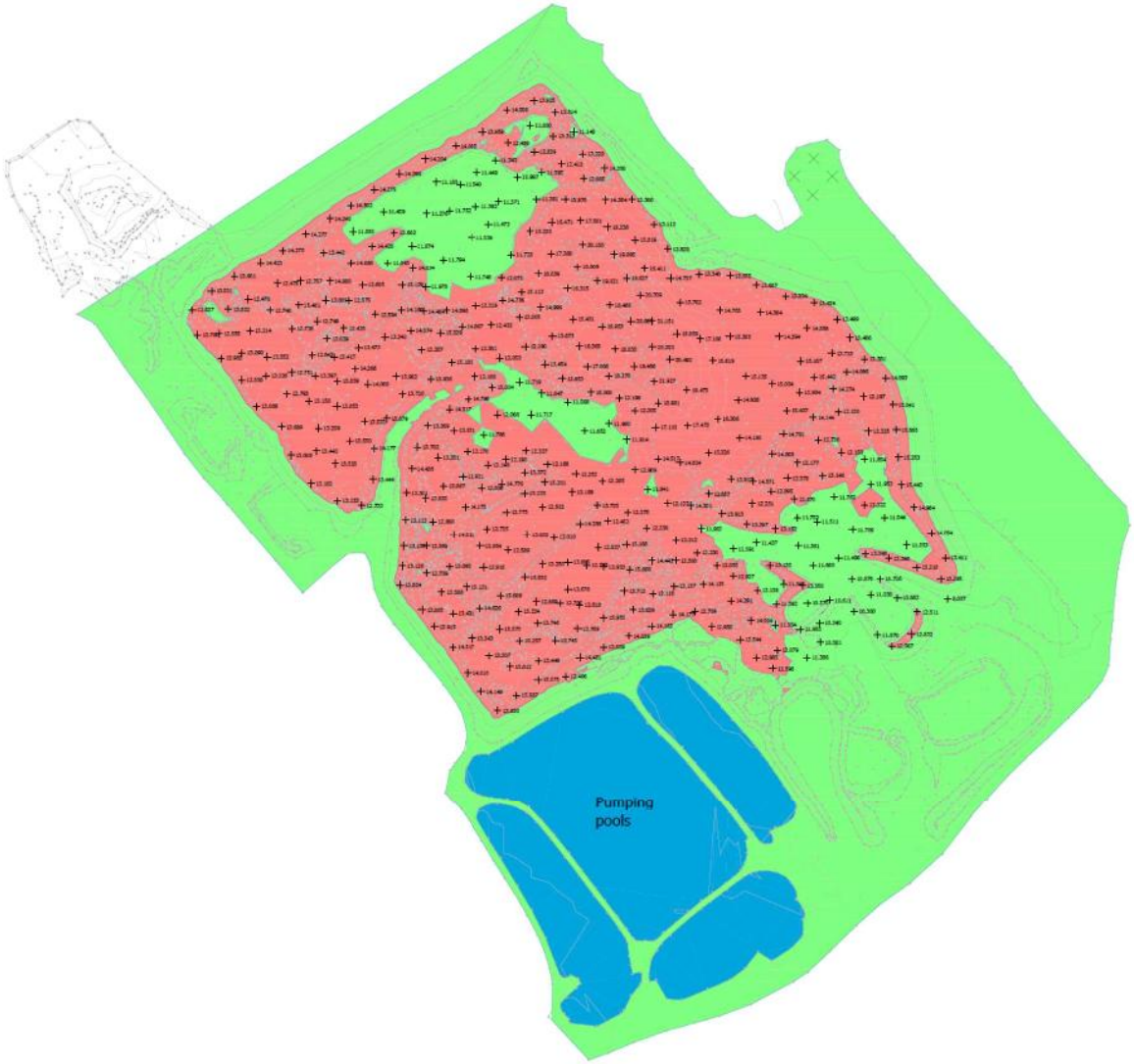


Figure 7: Extract from 2011 topographical survey

3 SLEMS LANDFILL CHARACTERISATION

3.1 Ground Conditions

In general, the ground conditions were found to comprise layers of BOS oxide typically recovered as a slightly gravelly silt, with layers of slag, refractory bricks or other wastes. Due to the presence of slag cobbles and boulders, the majority of the boreholes had to be terminated before confirming the full depth of the mound. Also, it should be noted that the quantity of the fine silt like BOS oxide recovered from the cable percussion boreholes was limited and the boreholes may overestimate the quantity of gravel and larger particles. Beneath the made ground, natural deposits were found to consist of glacial till, or black sands and laminated silts of the Tidal Flat Deposits.

The following table provides an overview of the materials encountered within the landfill during the investigation across the site, further detail is provided on the trial pit and borehole logs Appendix D.

3.1.1 Made Ground

Identification of BOS Oxide

BOS Oxide was generally encountered as a black silt containing abundant metallic ‘dust’ and occasional gravel. Bluish grey weathering was identified in some locations, and locally the BOS Oxide was noted to be red and possibly baked, site operatives suggested this may have been related to combustion of the oxide. The following variations in BOS Oxide deposits were identified:

Variation	Locations
BOS Oxide Silt locally fused to a stiff to friable consistency.	TP106 (0.0m-0.3m bgl) TP108 (0.0m 1.4m bgl) TP109 (0.0m-5.0m bgl) TP110 (0.0m-0.9m bgl)
BOS Oxide Silt fused to extremely weak to very weak rock consistency.	TP102 3.4m-5.0m bgl TP104 (2.5m-3.3m bgl) TP108 (3.1m-3.7m bgl) TP106 (2.4m-3.1m bgl)
BOS Oxide Silt oxidised to dark reddish brown	TP104 (2.5m-3.3m bgl)
BOS Oxide Silt has light blue colour	TP105 (E) (0.1m-1.45m bgl)
BOS Oxide Silt oxidised to red to orange.	TP105 (W) (0.0m-5.0m bgl) Anecdotal information indicates this location was the site of a historical ground fire.
Mixed BOS Oxide and Slag	TP109 (3.8m-5.0m bgl) TP111 (1.6m-4.5m bgl)

Identification of Slag

Slag identified within the landfill was observed to be generally light grey to white in colour, with vesicles commonly infilled with partially hydrated lime. Slag was generally recovered as a coarse, angular gravel mixed with whole and part refractory bricks, with clasts locally fused by the action of lime. Minor deposits of other waste, including metal machine parts were also encountered within slag layers.

Mixed slag/refractory brick gravel was encountered in discrete deposits in all locations with the exception of TP105 and TP109. A thin layer (0.1m) of slag was encountered at the surface in the eastern

section of TP105 only, and minor (10%) slag was observed within BOS Oxide deposits in TP109. Slag layers vary in thickness from 0.6m in TP111 to 4.0m in TP101, with an average thickness of 1.7m.

Other Made Ground Materials

Minor pockets of brown clay and silt, interpreted as representing channel dredgings were identified in locations TP104, TP106, TP107, TP109.

3.1.2 Natural Geology

Natural deposits were identified in one borehole (BH08) and three trial pits during phase 1 of the investigation as summarised below.

BH ID and Location	Depth (m bgl)	Elevation (m AOD)	Ground Conditions (all depths m below ground level)
BH8	14.00	-1.939	Dense black silty SAND
TP1	3.80	4.300	Firm brown sandy slightly gravelly CLAY
TP2	2.00	3.879	Laminated black brown SILT
TP5	2.30	4.836	Firm brown sandy gravelly CLAY

Natural deposits were not identified in any of the locations advanced during the second phase of investigation.

3.2 On-Site Environmental Screening, Visual and Olfactory Evidence

Hydrocarbon odours were detected in TP109-TP111, with a sheen noted upon water and saturated soils from TP109 and TP111.

3.3 Groundwater Strikes

Groundwater was encountered at 3.8m bgl in TP109 and at 4.0m bgl in TP111.

3.4 BOS Oxide Distribution

Results of intrusive investigation did not indicate a pattern in BOS Oxide distribution across the Site. Trial Pits advanced in the southern section of the Site (lower elevation), were generally observed to contain fewer slag deposits than locations advanced through the raised section of the Site.

To assist with determining the proportion of the various materials present on site, an approximate percentage has been made based on the thickness of discrete layers encountered during the Phase 2 trial pitting. The borehole data has been omitted due to the possibility of oversize material being “driven” ahead by the drilling technique which and the limited recovery of the finer material.

The approximate distribution of materials at the Site is summarised in the table below:

Location	Depth to Base (m bgl)	Total layer thickness (m)		Estimated Percentage Content*		
		BOS Oxide	Slag Deposit	BOS Oxide	Slag Deposits	Dredged Silts
TP101	4.5	0.5	4	11	89	-
TP102	5	3.95	1.05	79	21	-
TP103	5	2.4	2.6	48	52	-
TP104	3.3	2.55	0.75	77	23	-

Location	Depth to Base (m bgl)	Total layer thickness (m)		Estimated Percentage Content*		
		BOS Oxide	Slag Deposit	BOS Oxide	Slag Deposits	Dredged Silts
TP105 (E)	4	3.9	0.1	97	3	-
TP105 (W)	4	4	-	100	-	-
TP106	3.9	1	2.9	26	74	-
TP107	4.5	2.3	2.2	46	49	5
TP108	5	3.3	1.7	66	34	-
TP109	5	5	-	98	2	-
TP110	4.5	0.9	3.6	20	80	-
TP111	4.5	3.9	0.6	87	13	-
Average proportion				63	37	<1

*Percentage estimates account for inclusions and mixed material within predominantly BOS Oxide or Slag based layers.

3.5 Chemical Analysis

Chemical analysis results are presented in Appendix D. Metals and hydrocarbons were detected in the deposits within the landfill therefore appropriate PPE and dust suppression should be used to protect workers if the material is excavated and transported from site, further appropriate controls should be in place to prevent dust generation during transport.

No asbestos fibres or asbestos containing material were identified

A portion of the material within the landfill is saturated, appropriate measures should be in place to dewater this material prior to transportation from site, water treatment may be required before this water can be discharged.

It is beyond the scope of this report to discuss the suitability of the material for commercial reuse based on the chemical analysis.

4 BOS OXIDE VOLUME ESTIMATES

The ground conditions at the site include a thickness of made ground consisting of BOS oxide, slag and other wastes. This material rests on a basal layer of compacted slag which rests upon the natural tidal flat deposits and glacial till. The elevation of the interface between the natural deposits and the bottom of the basal slag layer varies from approximately -1.9m AOD (AEG borehole BH08) to +4.8m AOD (AEG Trial pit 5), a summary of the elevation of the interface is shown below.

Location	Consultant	Year	Elevation (m AOD)	Made Ground Interface (m AOD)
BH 4 AB1	Environ	2004	7.10	Not recorded
BH 4AB2	Environ	2004	4.82	0.02
BH 4AB3	Environ	2004	7.17	0.87
BH 4AB4	Environ	2004	6.64	2.04
NZ52SW315 (off site to north)	BGS	1967	3.28	0
BH08	Arcadis	2017	12.06	-1.939
TP01	Arcadis	2017	8.1	4.3
TP02	Arcadis	2017	5.879	3.879
TP05	Arcadis	2017	7.136	4.836

As can be seen from the above, the base of the SLEMS mound varies by several metres across the site. The borehole information also suggests that the thickness of the basal slag layer varies. It has therefore been necessary to make an assumption of the elevation of the upper surface of the basal slag layer, which has been assessed as being approximately2.5 to 3.5 m AOD based on the available borehole information and topographic elevation of the area outside of the SLEMS mound. .

CAD Civils has then been used to estimate the total volume of the mound above this elevation using the most recent topographic survey. This provides an estimated total volume of 738,425 m^3.

As noted above, the mound includes a mix of materials, however BOS oxide is estimated to comprise approximately 60% of the total volume (based on the findings from the recent trial pitting). This would suggest that the mound may contain in the order of 440,000 m^3 of reclaimable BOS Oxide.

Prior to sale, the BOS oxide is currently processed to remove oversize and unsuitable material. We understand that the BOS oxide is screened prior to sale, and that a proportion of unsuitable oversize material is removed. We are not aware of the proportion of unsuitable material which is generated, but have assumed that an estimated 10 to 15% of the total volume of BOS oxide will be unsuitable due to inclusions of slag, bund walls etc. This would suggest that approximately 44,000 to 60,000 m^3 of material is unsuitable, leaving a volume in the order of 380,000 to 400,000m^3 of BOS oxide (assuming base of mound at 2.5mAOD).

Carrying out a similar exercise assuming the base of the BOS oxide is at an average of 3.5m AOD yields an estimated volume of recoverable BOS oxide of 300,000 to 360,000 m^3.

It should be noted that these estimates are based on a number of assumptions including depth to the base of the BOS oxide deposit within the mound, the percentage of BOS oxide present and the quantity of unsuitable material which may be encountered. No allowance has been made for bulking, as it is assumed the BOS oxide is generally in a poorly compacted state. These estimates should therefore be

considered as an indication of the likely quantity of material present, rather than a measured quantity, and the quantity of recoverable BOS oxide present may vary from the figures quoted.

APPENDIX A

Figures

Figure 1 Site Location Plan

NOTES	KEY
ORDNANCE SURVEY © CROWN COPYRIGHT 2016. ALL RIGHTS RESERVED. LICENSE NUMBER 100050351	SITE LOCATION

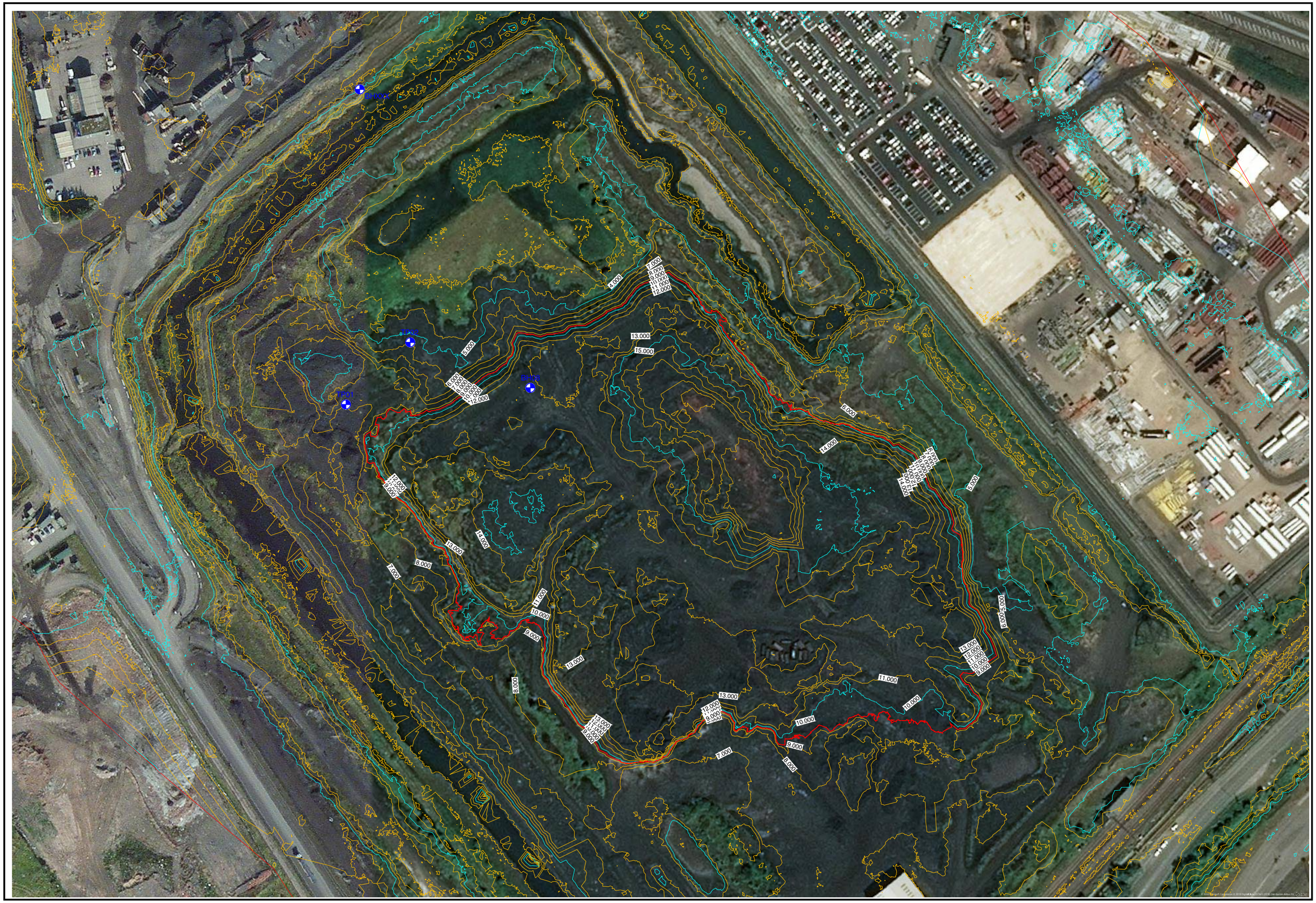
0 1 2 Kilometers

N

TITLE: SITE LOCATION PLAN		SITE: REDCAR STEELWORKS	
PROJECT: 10013655		CLIENT: SOUTH TEES SITE COMPANY	FIGURE 1
DATE: 10/01/18	PRINT: A4		
DRAWN BY: BNB	REV: -		
DRG.No.: 10013655-AUK-XX-XX-DR-ZZ-15-P1			

ARCADIS Design & Consultancy for natural and built assets

Figure 2 Site Layout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BH05
BH01
BH03
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6.000
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9.000
10.000
11.000
12.000

Figure 3 1960 Site Plan

ENVIROS

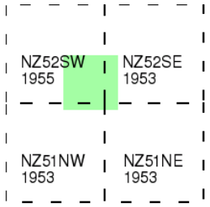
Ordnance Survey Plan

Published 1953 - 1955

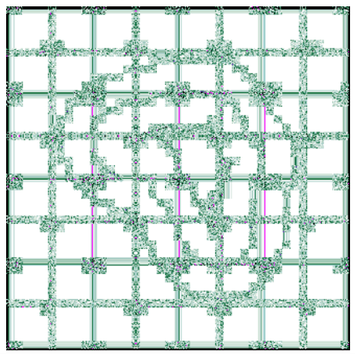
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	21960771_1_1
Customer Ref:	GR1280001
National Grid Reference:	454340, 521150
Slice:	A
Site Area (Ha):	22.55
Search Buffer (m):	500

Site Details

South Tees Prairie Area, Teesside Works, Tees Dock Road, MIDDLESBROUGH, Cleveland

LANDMARK

Tel: 0870 850 6670
Fax: 0870 850 6671
Web: www.envirocheck.co.uk

Figure 4 1952 Ordnance Survey Map

REFERENCE DRGS :-

FOR LAYOUT OF CLEVELAND NORTH OF BRITISH RAILWAYS	SEE DRG Nº	IA-29960 (SHEET 1)
FOR LAYOUT OF CLEVELAND NORTH OF BRITISH RAILWAYS	SEE DRG Nº	IA-29961 (SHEET 2)
FOR LAYOUT OF CLEVELAND SOUTH OF BRITISH RAILWAYS	SEE DRG Nº	IA-29963 (SHEET 3)
FOR LAYOUT OF CLEVELAND SOUTH OF BRITISH RAILWAYS	SEE DRG Nº	IA-29965 (SHEET 4)
FOR LAYOUT OF :	SEE DRG Nº	TX-6879
FOR LAYOUT OF CLEVELAND, LACKENBY & REDCAR WORKS	SEE DRG Nº	TX-3102 (1500 SCALE)
FOR LAYOUT OF CLEVELAND LACKENBY & REDCAR WORKS	SEE DRG Nº	TX-3104 (1500 SCALE)
FOR LAYOUT OF BILLINGHAM WORKS	SEE DRG Nº	TX-3106

DEPT.	PLANT DRAWN AT M.D.O.
TITLE	LAYOUT OF CLEVELAND, LACKENBY AND REDCAR WORKS. KEY PLAN OF AREA SHOWING DETAIL DRAWINGS
DRAWN BY	DATE WORKS INDEX CODE-G.W.L.
TRACED BY	DATE 30-9-66 ORDER NO.
CHECKED BY	DATE
PASSED BY	DATE DRAWING NO. IX-5947

REFERENCE DRAWINGS

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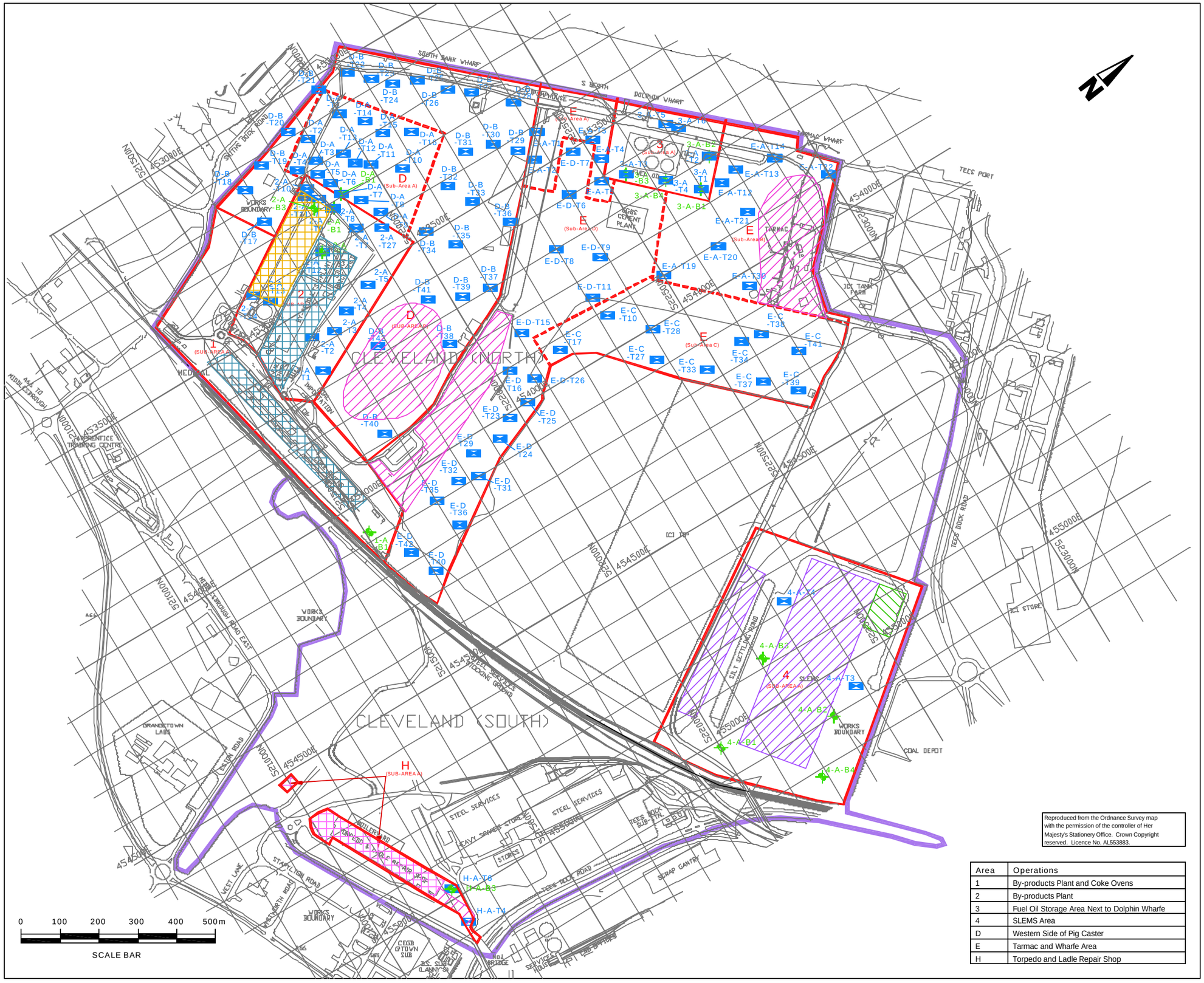
Figure 5 Enviros Plan



Reproduced from the Ordnance Survey map with the permission of the controller of Her Majesty's Stationery Office. Crown Copyrigth reserved. Licence No. AL553883.

Area	Operations
1	By-products Plant and Coke Ovens
2	By-products Plant
3	Fuel Oil Storage Area Next to Dolphin Wharfe
4	SLEMS Area
D	Western Side of Pig Caster
E	Tarmac and Wharfe Area
H	Torpedo and Ladle Repair Shop

KEY:

- Proposed Teesco Boundaries
- Enviros Sampling Boundaries
- Borehole
- Trial Pit
- Area of Plant
- Area of Plant, Buildings and Mobile Tools
- Area of Mobile Tools and Stockpiles
- Access Constricted
- Above ground services
- Concrete Hardstanding

NOTES:

REV.	DESCRIPTION	DATE

CORUS

CLEVELAND

FIGURE 5

EXPLORATORY HOLE LOCATION PLAN

SCALE	CAN
1:6,500	CO0520017A
CONTENT	DRAWN
RLP	JSF
CHECKED	DATE
	JUNE 2004

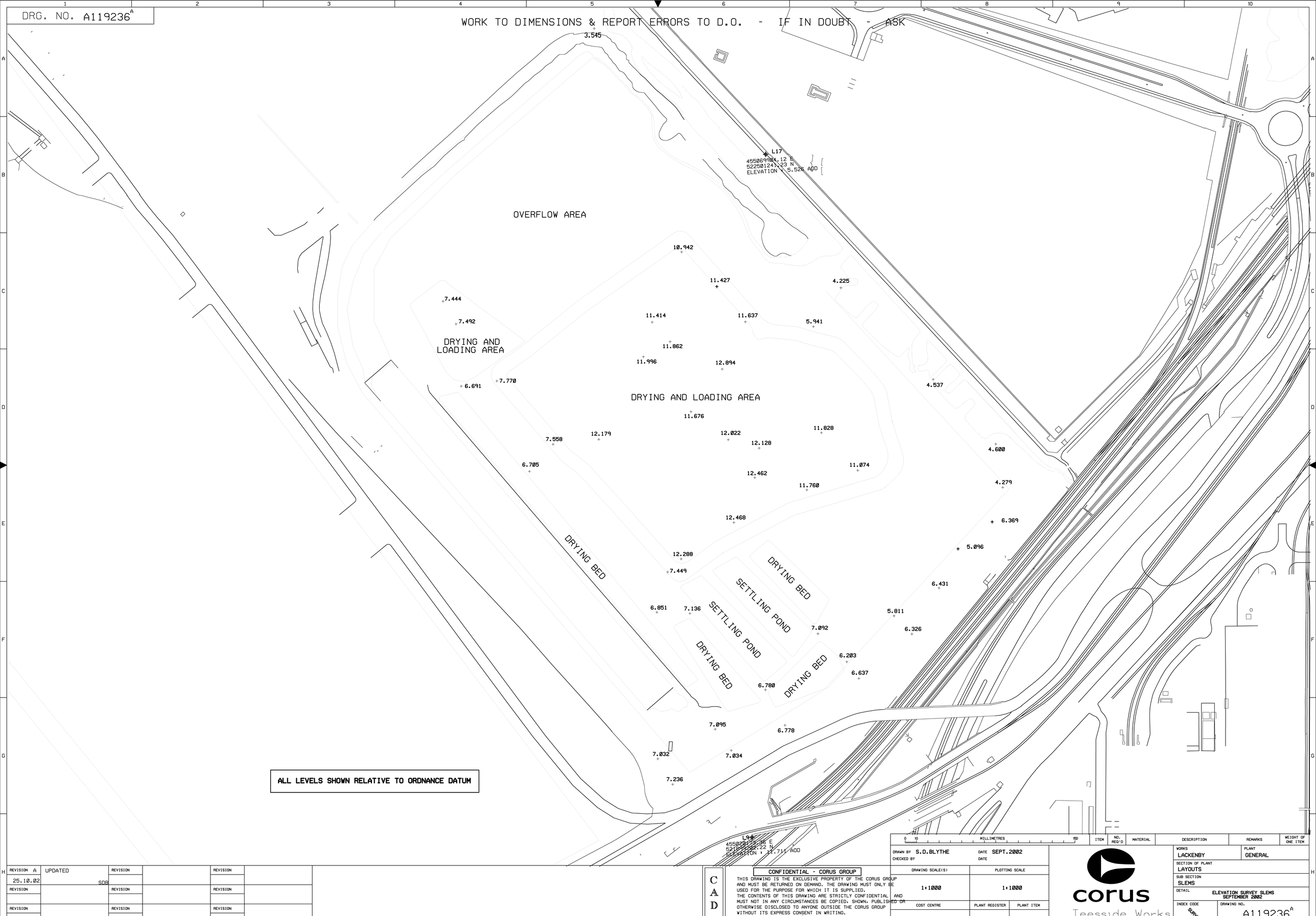
ENVIROS

File name: JSF1826.dwg Plot date: Jun 22, 2004 - 10:48am Ref:I:\DG\CADTEAM \\new\cans \CO0520017a1

Figure 6 2002 Topographic Plan

DRG. NO. A119236[A]

WORK TO DIMENSIONS & REPORT ERRORS TO D.O. - IF IN DOUBT - ASK



ALL LEVELS SHOWN RELATIVE TO ORDNANCE DATUM

REVISION A	UPDATED	REVISION		REVISION	
25.10.02 SDB					
REVISION		REVISION		REVISION	
REVISION		REVISION		REVISION	

CAD

0 10 MILLIMETRES 150

ITEM	NO. REQ'D	MATERIAL	DESCRIPTION	REMARKS	WEIGHT OF ONE ITEM

DRAWN BY S.D.BLYTHE	DATE SEPT.2002		
CHECKED BY	DATE		
DRAWING SCALE(S)	PLOTTING SCALE		
1:1000	1:1000		
COST CENTRE	PLANT REGISTER	PLANT ITEM	

corus
Teesside Works

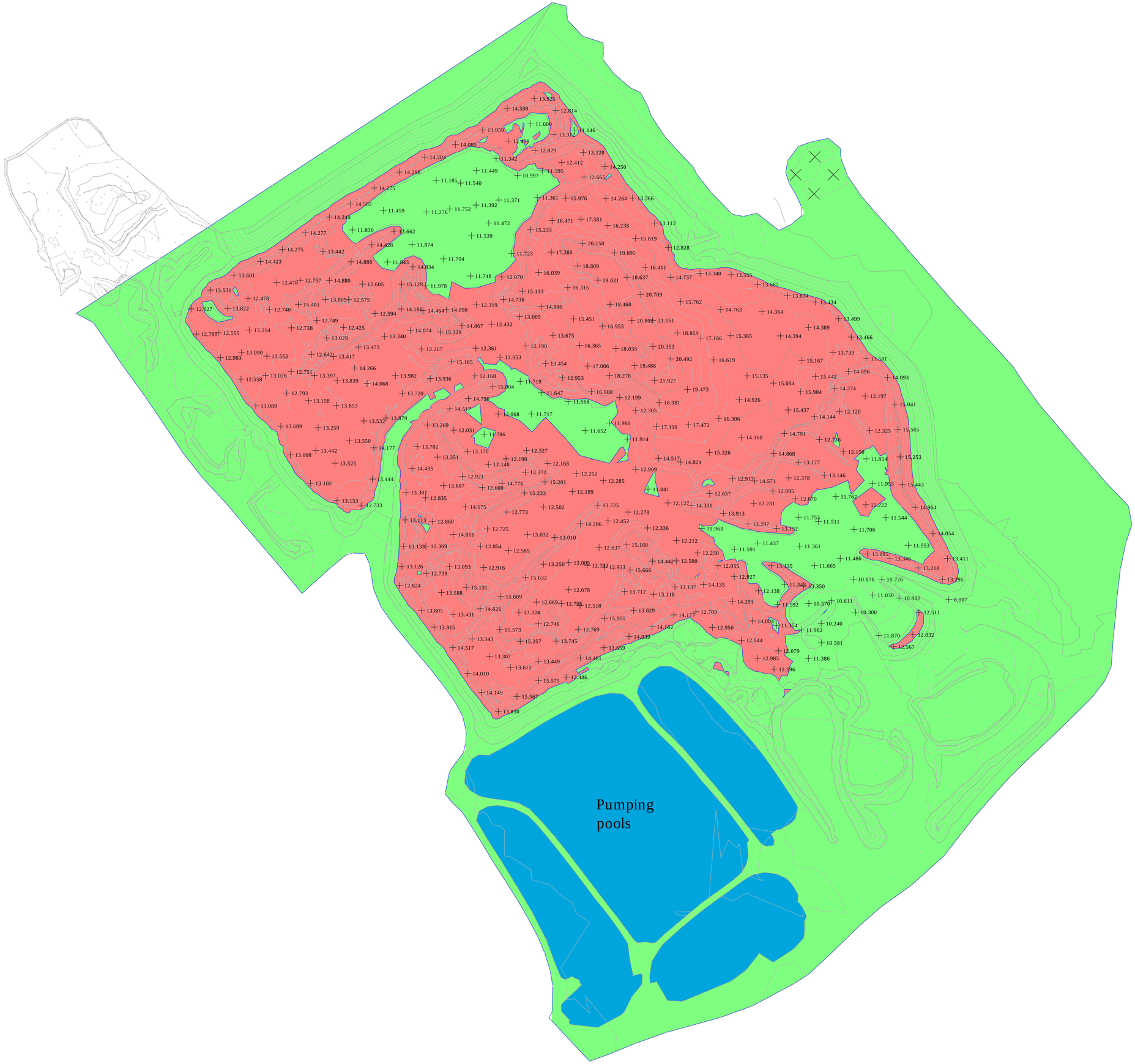
WORKS LACKENBY	PLANT GENERAL
SECTION OF PLANT LAYOUTS	
SUB SECTION SLEMS	
DETAIL ELEVATION SURVEY SLEMS SEPTEMBER 2002	
INDEX CODE SURVEY	DRAWING NO. A119236[A]

20

Figure 7 2011 Topographic Plan

Rev -

Drawing Number SLEMS-IN-002



ac ENVIRONMENTAL SERVICES

Tel: 0333 200 0125

Email: geoff@acenvironmental.co.uk

Job Title

SSI Steel Works

Location

Redcar, Middlesborough

Client

SSI

Notes:

Surface area of ground above 12m: 46,212 m2

Rev	Date	Description

Do Not Scale - If In Doubt, Ask

Drawing Status

Information Only

Drawing Title

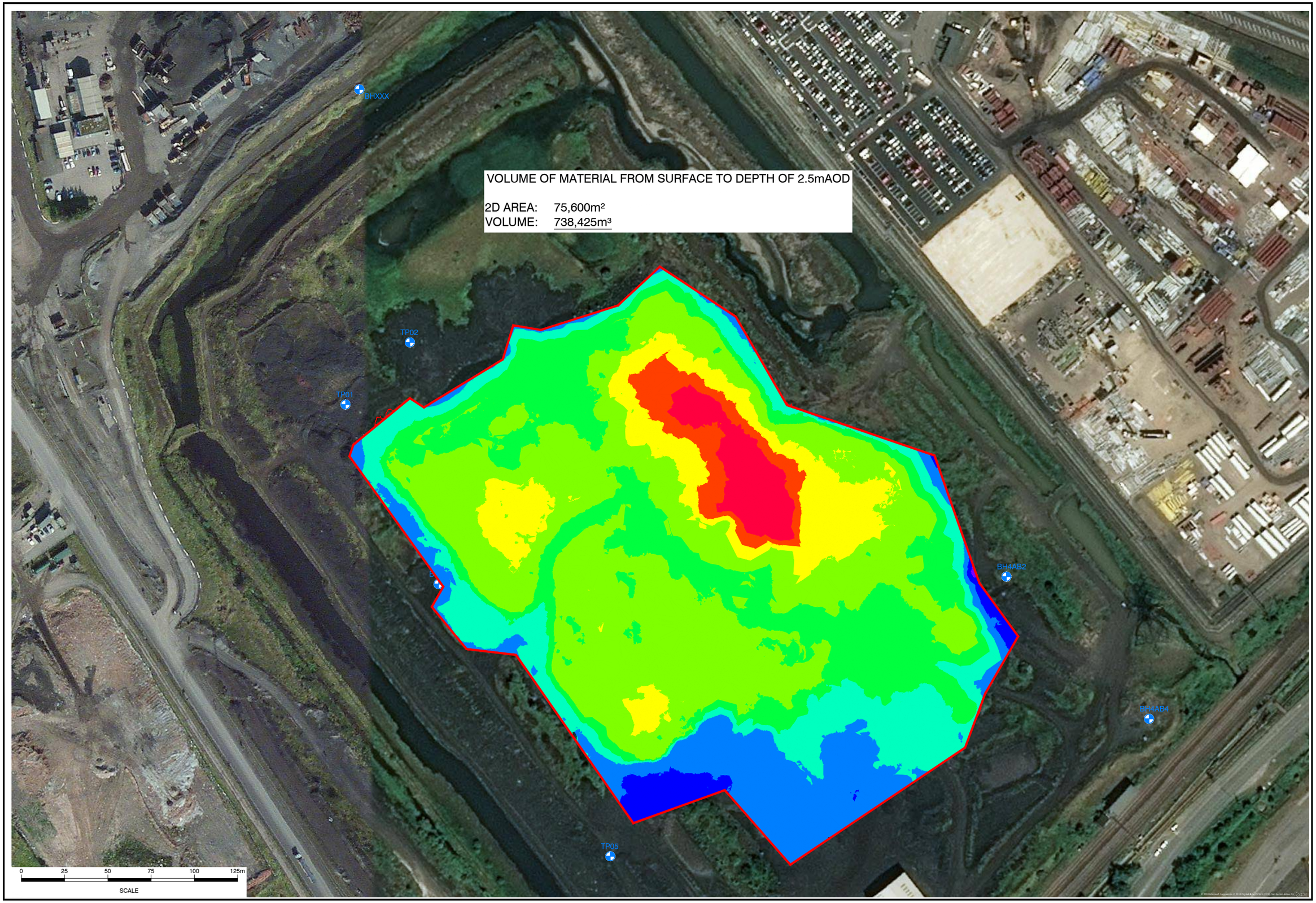
SLEMS Stockpile Survey
With Baseline (12m)

Scale: NTS
Date Drawn: 17 Nov 2011
Drawn By: LW
Reviewed By: PC
Original Size: A0 L

Drawing Number SLEMS-IN-002

Rev -

Figure 8 2018 Topographic Plan and Volume Calculation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2D AREA: 75,600m²
VOLUME: 738,425m³
BHXXX
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TP01
BH4AB2
BH4AB4
TP05
0
25
50
75
100
125m
SCALE

APPENDIX B

Study Limitations

IMPORTANT: This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1. This report has been prepared by Arcadis (UK) Limited (Arcadis), with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with South Tees Site Company (STSC) (the 'Client'). Arcadis does not accept responsibility for any matters outside the agreed scope.

2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.

3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Arcadis are unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have unpublished, more stringent objectives. Further work may be required by these parties.

4. All work carried out in preparing this report has used, and is based on, Arcadis' professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice, pending changes in legislation, of which Arcadis is aware, have been considered. Following delivery of the report, Arcadis have no obligation to advise the Client or any other party of such changes or their repercussions.

5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6. Whilst this report and the opinions made are correct to the best of Arcadis' belief, Arcadis cannot guarantee the accuracy or completeness of any information provided by third parties.

7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have been received.

8. This report refers, within the limitations stated, to the condition of the Site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the Site since the time of the investigation.

9. The content of this report represents the professional opinion of experienced environmental consultants. Arcadis does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the site have not been investigated.

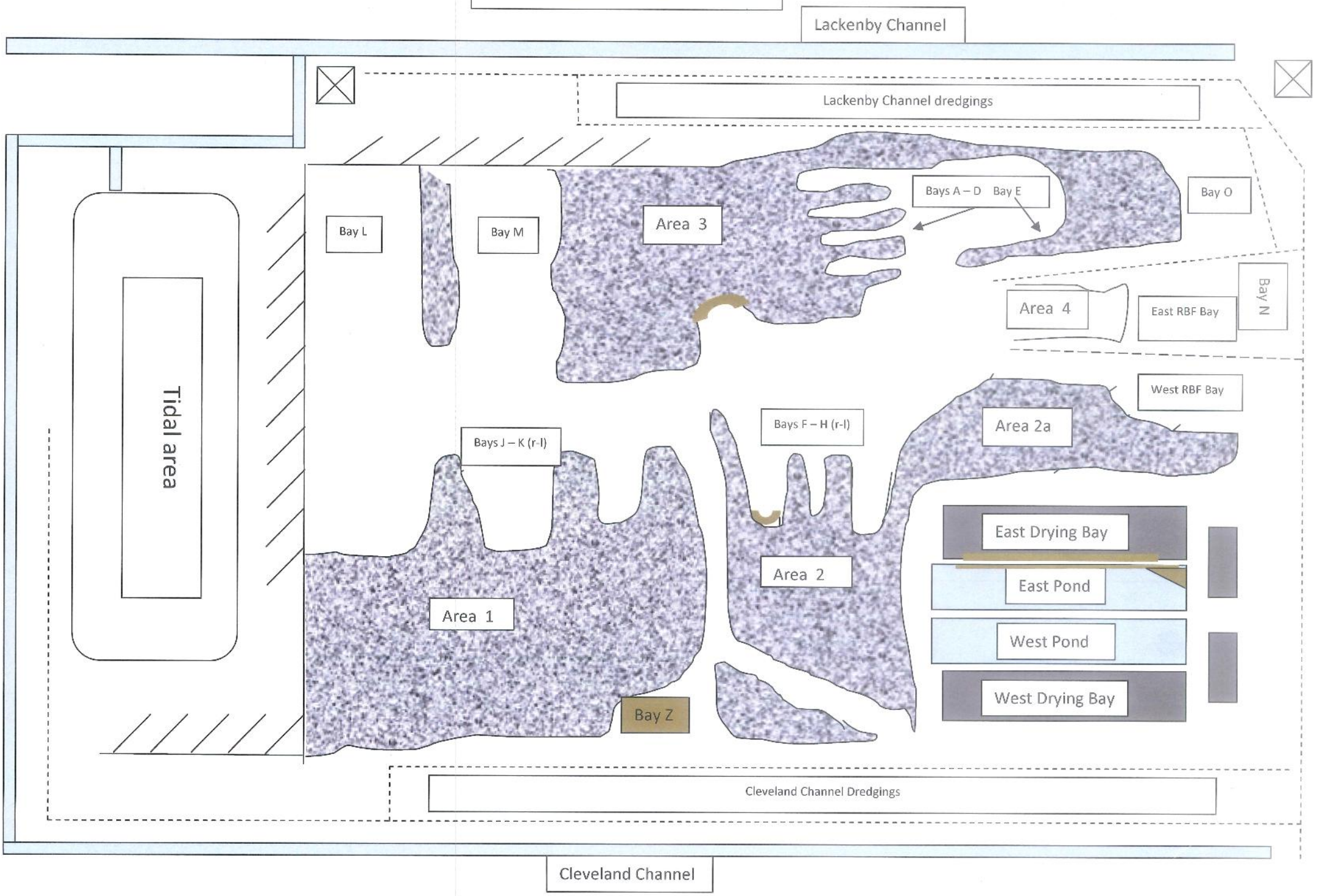
11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on Site.

12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issue

APPENDIX C

2012 Site plan and Photographs Provided by STSC

SLEMS LAYOUT MARCH 2012



Area 4	Being filled with material from RBF east and west bays	RBF Pond analysis.h	Area 4.jpg
East pond	To be emptied ready to accept BOS slurry		East_West pond.jpg
East drying bay	As above. Filled with BOS oxide and a mixed material contaminated with Ballast which is being moved to Bay Z		E drying bay.jpg
West pond	Empty ready for use		West pond.jpg
West drying bay	Empty ready for use		
E RBF bay	See Area 4	See area 4	E RBF pond.jpg
W RBF bay	See Area 4	See area 4	W RBF pond.jpg
Cleveland channel dregings	All full	SLEMS layout -Cleveland channel.	Cleveland channel dredgings.jpg
Lackenby Channel dredgings	All full	SLEMS layout -Lackenby channel.	Lackenby Channel dredgings.jpg

Key

Existing oxide material	


Area 3
10m (approx)
Contaminated wall at base of Area 3


Lakenby Channel dredgings


Cell N


Cell O


Area 2a


Area 3


Area 4


West drying bay
West pond
East pond


East drying bay


West drying bay
Cleveland Channel
West pond


East RBF pond


West RBF Pond


Cleveland Channel
dredgings


Bay C
Bay B
Bay A


Bay F
Bay G
Bay H


Bay F
Bay G


Bay I
Area 1, approx 75m
Bay J
Bay K


Contaminated wall of Bay H

APPENDIX D

Trial Pit and Borehole Logs

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH03
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455027.373 N:522230.718		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 12.500	**Start Date:** 19/12/2017	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
1.00	ES1						MADE GROUND (Black grey silty sandy gravel with high cobble and boulder content and fragments of metal. Gravel is fine to coarse angular to subangular and includes slag, ash, brick, concrete and limestone).	
1.50	B2					(3.10)		
2.00	ES3							
2.50	B4			9.400		3.10		
							Borehole terminated at 3.10m BGL - unable to progress due to tools jamming.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
19/12/2017	0.00	0.00		
19/12/2017	3.10	3.10	250	Dry

Chiselling

From	To	Hours (hh:mm)
3.00	3.10	02:30

Water Added

From	To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:19

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
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BOREHOLE RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation		**Exploratory Hole No.** BH04
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454977.784 N:522184.632	
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 14.267 / **Start Date:** 18/12/2017	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.40	J1						MADE GROUND (Black sandy very gravelly silt with fragments of metal. Gravel is fine to medium subangular to angular and includes slag and ash).	
0.80	B2					(2.00)		
1.20	ES3			12.267		2.00		
2.00	B4						MADE GROUND (Grey silty sandy gravel with low cobble content and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag and ash. Cobbles and boulders include slag).	
2.40	ES5					(1.00)		
2.60	J6							
2.80	B7			11.267		3.00		
							Borehole terminated at 3.00m BGL - unable to progress.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
18/12/2017	0.00	0.00		
18/12/2017	2.20	2.20	200	Dry
19/12/2017	2.20	2.20	200	Dry
19/12/2017	3.00	3.00	200	Dry

Chiselling

From	To	Hours (hh:mm)
2.00	2.20	00:30
2.40	3.00	04:00

Water Added

From	To
1.20	2.20
2.20	3.00

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:20

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BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH05
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455112.979 N:522291.077		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 14.329	**Start Date:** 18/12/2017	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
				14.029		(0.30) 0.30	(1) MADE GROUND (Black gravelly sand).	
						(1.10)	MADE GROUND (Black sandy gravelly silt with pockets of brown orange clay and fragments of metal. Gravel is fine to medium subangular to angular and includes slag).	
1.00	ES1							
1.20	J2							
1.20	B3			12.929		1.40		
1.50-1.95	SJ4	N23					MADE GROUND (Black grey sandy silty gravel with high cobble and boulder content and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag, ash and brick. Cobbles and boulders are subangular to angular and include sandstone, at c.1.50m BGL ... medium dense.	
1.50-1.95	B5							
2.00	ES6					(2.70)		
3.00	ES7						from c.3.00m BGL ... driller notes gravel includes concrete and lime.	
3.20	J8							
3.60	B9							
4.00	ES10			10.229		4.10	at c.4.10m BGL ... driller notes slag.	
							Borehole terminated at 4.10m BGL - unable to progress.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
15/12/2017	0.00	0.00		
15/12/2017	4.00	4.00	250	Dry
18/12/2017	4.00	4.00	250	Dry
18/12/2017	4.10	4.00	250	Dry

Chiselling

From	To	Hours (hh:mm)
3.00	4.00	02:30
4.00	4.10	03:00
4.10	4.10	04:30

Water Added

From	To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:20

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BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH06
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454996.666 N:522269.584		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 12.081	**Start Date:** 14/12/2017	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.20	J1						MADE GROUND (Black slightly silty sandy gravel with medium to high cobble content and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag and clinker. Cobbles are subangular to angular and include slag).	
0.60	B2							
1.00	ES3							
1.20	CB4	N25					at c.1.20m BGL ... medium dense.	
2.00	ES5							
2.50	CB6	1/0.94					at c.2.50m BGL ... very dense.	
3.00	ES7							
3.50	CB8	1/1.26				(7.40)		
							from c.3.90m BGL ... driller notes slag.	
4.30-4.60	B9							
5.00	CB10	1/0.94						
5.50	ES11							
6.00	CB12	1/1.26						
6.50	ES13							
				4.681		7.40	at c.7.40m BGL ... cobbles and boulders include slag.	
							Borehole terminated at 7.40m BGL - unable to progress.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
14/12/2017	0.00	0.00		
14/12/2017	3.00	3.00	250	
14/12/2017	4.60	4.60	200	3.96
15/12/2017	4.60	4.60	200	Dry
15/12/2017	7.40	7.40	200	6.19

Chiselling

From	To	Hours (hh:mm)
0.60	0.90	00:30
2.10	2.40	01:00
4.00	4.40	03:00
4.40	6.00	03:45
6.20	6.50	00:45
6.60	6.80	00:30
7.40	7.40	02:00

Water Added

From	To
4.00	4.30
6.90	7.40

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) From 3.90m BGL - driller notes very slow drilling.
(4) Chiselling break down for 4.40-6.00m BGL - 4.40-4.90m (1hr), 4.90-5.40m (1hr15mins) and 5.40-6.00m (1hr30mins).

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:21

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BOREHOLE RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **BH08**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454912.638 N:522362.633		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 12.061	**Start Date:** 30/11/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
							MADE GROUND (Black slightly silty gravelly sand. Gravel is fine to medium subangular to angular and includes slag, ash and iron ore).	
1.00	ES1					(2.00)		
1.20	J2							
1.20	B3							
1.50-1.95	SJ4	N4					at c.1.50m BGL ... very loose and loose.	
1.50-1.95	B5							
				10.061		2.00		
2.00	ES6						MADE GROUND (Black slightly silty gravelly sand. Gravel is fine to coarse subangular to angular and includes ash, slag and iron ore).	
2.20	J7							
2.30	B8							
2.50-2.95	SJ9	N4					at c.2.50m BGL ... very loose and loose.	
2.50-2.95	B10							
3.00	ES11							
3.20	J12							
3.30	B13					(3.00)		
3.50-3.95	SJ14	N12					at c.3.50m BGL ... medium dense.	
3.50-3.95	B15							
4.00	ES16							
4.20	J17							
4.40	B18							
4.50-4.95	SJ19	N8					at c.4.50m BGL ... loose.	
4.50-4.95	B20							
				7.061		5.00		
5.00	ES21						MADE GROUND (Dense black slightly silty gravelly sand with cobbles/boulders noted. Gravel is fine to coarse subangular to angular and includes ash, slag, iron ore and iron oxide. Cobbles/boulders are angular and include iron ore and slag).	
5.20	J22							
5.40	B23							
5.50-5.95	SJ24	N35						
6.00	ES26					(2.40)		
6.50-6.95	SJ27	N40						
6.50-6.95	B28							
7.00	ES29							
7.20	J30							
				4.661		7.40		
7.40	B31						MADE GROUND (Black very clayey/silty gravelly sand with cobbles noted. Gravel is fine to coarse subangular to angular and includes ash and slag. Cobbles are angular and include iron ore and slag). at c.7.50m BGL ... very dense.	
7.50-7.95	SJ32	N52						
7.50-7.95	B33							

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
30/11/2017	0.00	0.00		
30/11/2017	2.00	2.00	250	Dry
01/12/2017	2.00	2.00	250	Dry
01/12/2017	5.50	5.50	250	Dry
05/12/2017	5.50	5.50	250	Dry
05/12/2017	8.00	8.00	250	0.00

Chiselling			Water Added	
From	To	Hours (hh:mm)	From	To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:22

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BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation		**Exploratory Hole No.** BH08
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454912.638 N:522362.633	
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 12.061 / **Start Date:** 30/11/2017	**Sheet:** 2 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
8.00	ES34						*(Continued...)* MADE GROUND (Black very clayey/silty gravelly sand with cobbles noted. Gravel is fine to coarse subangular to angular and includes ash and slag. Cobbles are angular and include iron ore and slag).	
9.50	B35					(2.60)		
				2.061		10.00		
				1.961		(0.10) 10.10	(1) MADE GROUND (Boulder).	
10.20	ES36						MADE GROUND (Dense black slightly silty very gravelly sand with cobbles noted. Gravel is fine to coarse subangular to angular and includes ash, slag and iron ore. Cobbles are angular and include slag).	
10.50-10.95	C37	N33						
11.00	ES38					(1.90)		
11.10	J39							
11.30	B40							
11.50-11.95	C41	N32						
				0.061		12.00		
12.00	ES42						MADE GROUND (Dense black silty slightly gravelly sand. Gravel is fine to medium subangular to angular and includes ash and slag).	
12.50-12.95	J43	N30						
12.50-12.95	B44							
13.00	ES45					(2.00)		
13.50-13.95	SJ46	N33						
13.50-13.95	B47							
				1.939		14.00		
14.00	ES48						Dense black silty SAND.	
14.10	J49							
14.30	B50							
14.50-14.95	SJ51	N34						
15.00	ES52							
15.50-15.95	S53	N38				(3.00)		
15.50-15.95	B54							

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
06/12/2017	8.00	8.00	250	Dry
06/12/2017	8.50	8.50	250	Dry
11/12/2017	8.50	8.50	250	Dry
11/12/2017	9.50	9.50	250	Dry
12/12/2017	9.50	9.50	200	Dry
12/12/2017	10.10	10.10	200	Dry
13/12/2017	10.10	10.10	200	0.00

Chiselling

From	To	Hours (hh:mm)
8.50	9.50	01:00
9.50	10.00	01:30
10.00	10.00	00:45
10.00	10.10	00:30

Water Added

From	To
10.20	15.00

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:22

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BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH08
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454912.638 N:522362.633		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 12.061	**Start Date:** 30/11/2017	**Sheet:** 3 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
16.00	ES55						(*(Continued...)*	
16.10	J56						Dense black silty SAND.	
16.50	B57	N39						
16.50	SJ58							
16.50	B59			4.939		17.00		
17.00	ES60						Borehole complete at 17.00m BGL.	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
13/12/2017	17.00	17.00	200	16.00

Chiselling			Water Added	
From	To	Hours (hh:mm)	From	To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:22

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BOREHOLE RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH09
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454994.111 N:522361.611		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 19.569	**Start Date:** 11/12/2017	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.20	J1						MADE GROUND (Black slightly silty sandy gravel with cobbles noted and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag and clinker. Cobbles are subangular to angular and include slag).	
0.50	B2							
1.20	ES3							
1.50-2.00	CB4	N43					from c.1.50m BGL ... dense to very dense.	
2.20	ES5							
2.30	J6							
2.40	B7	N31						
2.50-3.00	CB8							
3.20	ES9							
3.50-4.00	CB10	1/3.00				(7.40)		
4.20	B11	1/0.00						
4.20	C12							
4.50-5.00	CB13	N37						
5.20	J14							
5.30	B15							
5.40	ES16	N58						
5.50-6.00	CB17							
6.20	ES18							
6.50-7.00	CB19	1/0.00						
7.20	J20			12.169		7.40		
7.40	C21	1/0.00					MADE GROUND (Very dense black slightly silty sandy gravel with cobbles and boulders noted with fragments of metal. Gravel is fine to coarse subangular to angular and includes slag and clinker. Cobbles and boulders are subangular to angular and include slag).	
7.40	J22							
7.50	CB23					(1.10)		

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
11/12/2017	0.00	0.00		
11/12/2017	1.50	1.50	200	Dry
13/12/2017	1.50	1.50	200	Dry
13/12/2017	4.20	4.20	200	Dry
14/12/2017	4.20	4.20	200	Dry
14/12/2017	7.40	7.40	200	0.00
15/12/2017	7.40	7.40	200	Dry

Chiselling

From	To	Hours (hh:mm)
3.80	4.00	02:30
4.00	4.20	02:30
4.20	4.40	01:30
7.00	7.40	06:00
7.40	8.00	03:30
8.00	8.40	05:00

Water Added

From	To
1.20	1.50
4.00	4.20
4.20	7.40
7.40	8.40

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 1.50-8.40m BGL - driller notes very slow progress.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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BOREHOLE RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation		**Exploratory Hole No.** BH09
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454994.111 N:522361.611	
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m(AOD)):** 19.569 / **Start Date:** 11/12/2017	**Sheet:** 2 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
8.20	ES24						*(Continued...)* MADE GROUND (Very dense black slightly silty sandy gravel with cobbles and boulders noted with fragments of metal. Gravel is fine to coarse subangular to angular and includes slag and clinker. Cobbles and boulders are subangular to angular and include slag).	
8.50	J25	1/0.00		11.069		8.50	Borehole terminated at 8.50m BGL - due to very slow progress.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
15/12/2017	8.40	8.40	200	0.00
18/12/2017	8.40	8.40	200	Dry
18/12/2017	8.50	8.50	200	Dry

Chiselling

From	To	Hours (hh:mm)
8.40	8.50	01:30

Water Added

From	To

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Between 1.50-8.40m BGL - driller notes very slow progress.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:30:24

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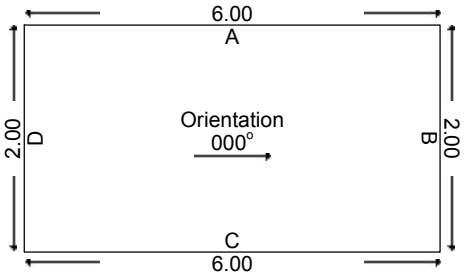
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **BH03TP**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455027.373 N:522230.718		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.500	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
							MADE GROUND (Black grey silty sandy gravel with high cobble and boulder content and fragments of metal. Gravel is fine to coarse angular to subangular and includes slag, ash, brick, concrete and limestone).
1.00	B1						
1.00	ES2						
2.00	ES3					(5.00)	
3.00	B4						
4.00	ES5						
				7.500		5.00	
5.00	ES6						Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH03TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455027.373 N:522230.718		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.500	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

Figure BH03TP.1
BH03TP

Figure BH03TP.2
BH03TP

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH03TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455027.373 N:522230.718		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.500	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure BH03TP.3
BH03TP Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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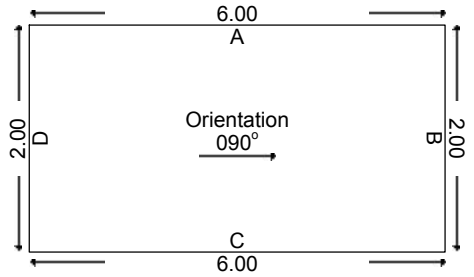
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **BH04TP**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454977.784 N:522184.632		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.267	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
						(2.00)	MADE GROUND (Black sandy gravelly silt with fragments of metal. Gravel is fine to medium subangular to angular and includes slag and ash).
				12.267		2.00	
2.00 2.00	ES1 B2					(1.50)	MADE GROUND (Grey sandy silty gravel with low cobble/boulder content and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag, clinker and cinder. Cobbles and boulders include slag).
				10.767		3.50	
3.50	ES3						Trial pit complete at 3.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH04TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454977.784 N:522184.632		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.267	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

Figure BH04TP.1
BH04TP

Figure BH04TP.2
BH04TP

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH04TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454977.784 N:522184.632		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.267	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure BH04TP.3
BH04TP

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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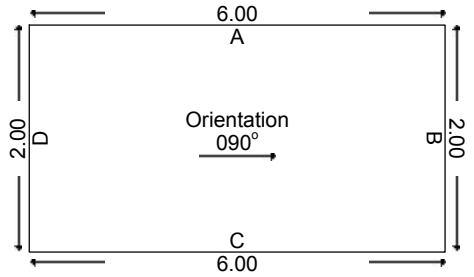
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **BH05TP**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455112.979 N:522291.077		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.329	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
						(1.50)	MADE GROUND (Black sandy gravelly silt with pockets of brown orange clay and fragments of metal. Gravel is fine to medium subangular to angular and includes slag).
				12.829		1.50	
						(3.00)	MADE GROUND (Black grey sandy silty gravel with high cobble and boulder content and fragments of metal. Gravel is fine to coarse subangular to angular and includes slag, ash and brick. Cobbles and boulders are subangular to angular and include sandstone, concrete and slag).
3.50	B1						
				9.829		4.50	
4.50	ES2						Trial pit complete 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH05TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455112.979 N:522291.077		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.329	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

Figure BH05TP.1
BH05TP

Figure BH05TP.2
BH05TP

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** BH05TP
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455112.979 N:522291.077		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.329	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure BH05TP.3
BH05TP

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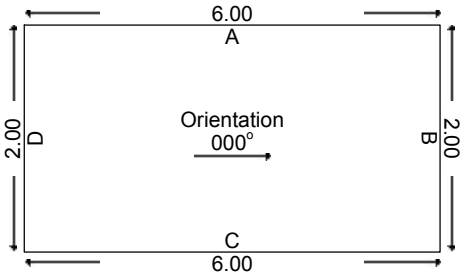
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP01**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454806.065 N:522353.231		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 8.100	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
0.50 B1 0.50 J2 0.50 ES3 1.00 B4 1.00 J5 1.00 ES6				7.300		(0.80) 0.80	MADE GROUND (Black slightly silty slightly sandy slightly silty gravel with fragments of metal. Gravel is fine to coarse angular to subangular and includes slag).
				6.100		(1.20) 2.00	MADE GROUND (Grey slightly silty slightly sandy gravel with low to high cobble and boulder content and fragment of cloth, wood and metal. Gravel is fine to coarse angular to subangular and includes ash and slag. Cobbles and boulders are angular to subangular and include slag).
2.50 B7 2.50 J8 2.50 ES9				4.300		(1.80) 3.80	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and include slag and brick).
				3.900		(0.40) 4.20	Firm brown sandy slightly gravelly CLAY. Gravel is fine to medium subangular to angular and includes sandstone and mudstone.
4.20 ES10							Trial pit complete at 4.20m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP01
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454806.065 N:522353.231		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 8.100	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

Figure TP01.1
TP01

Figure TP01.2
TP01

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP01
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454806.065 N:522353.231		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 8.100	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure TP01.3
TP01 Spoil

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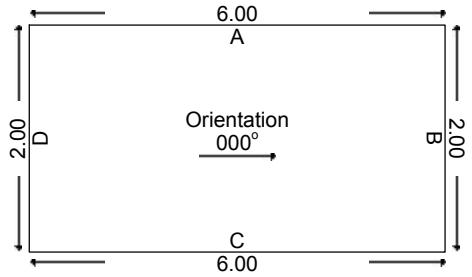
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP02**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454843.159 N:522388.888		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 5.879	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.50 1.50	B1 ES2		1	3.879		(2.00) 2.00	MADE GROUND (Black slightly sandy gravel with fragments of metal. Gravel is fine to coarse angular to subangular and include slag).
2.00 2.50	B3 ES4			2.979		(0.90) 2.90	Laminated black brown SILT.
							Trial pit complete at 2.90m BGL.

PLAN



GROUNDWATER
Water strike at 2.00m BGL (slight inflow).

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP02
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454843.159 N:522388.888		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 5.879	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP02
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454843.159 N:522388.888		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 5.879	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure TP02.3
TP02 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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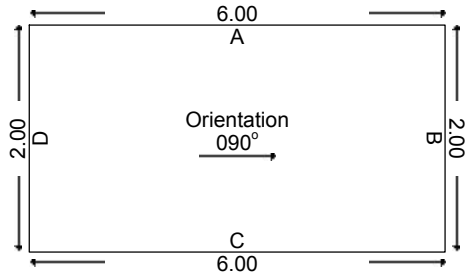
TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP03
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455197.482 N:522152.020		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.100	**Start Date:** 18/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.00 1.00 1.00	B1 J2 ES3					(1.60)	MADE GROUND (Laminated brown clayey silt).
				5.500		1.60	
1.60	B4			5.300		(0.20) 1.80	MADE GROUND (Grey cobbles and boulders with fragments of metal. Cobbles and boulders include slag).
							Trial pit complete at 1.80m BGL.

PLAN



GROUNDWATER
Water strike at 1.60m BGL (slight inflow).

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:00

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP03
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455197.482 N:522152.020		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.100	**Start Date:** 18/12/2017	**Sheet:** 2 of 3

Figure TP03.1
TP03

Figure TP03.2
TP03

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP03
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455197.482 N:522152.020		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.100	**Start Date:** 18/12/2017	**Sheet:** 3 of 3

Figure TP03.3
TP03 Spoil

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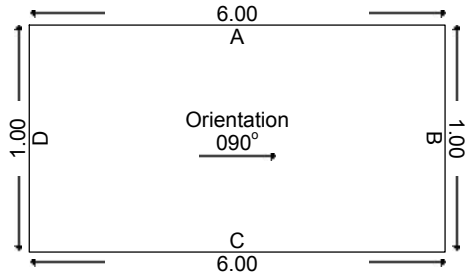
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP04**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455071.578 N:522118.278		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.176	**Start Date:** 18/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
							MADE GROUND (Black sandy slightly gravelly silt with fragments of metal. Gravel is fine to medium angular to subangular and includes slag and brick).
1.00	B1						
1.00	J2						
1.00	ES3					(3.50)	
2.00	ES4						
2.00	B5						
2.00	J6						
3.00	ES7						
3.00	B8						
3.00	J9			3.676		3.50	
							at c.3.50m BGL ... grey green cobbles and boulders.
							Trial pit complete at 3.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP04
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455071.578 N:522118.278		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.176	**Start Date:** 18/12/2017	**Sheet:** 2 of 3

Figure TP04.1
TP04

Figure TP04.2
TP04

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TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation				**Exploratory Hole No.** **TP04**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455071.578 N:522118.278			
Method (Equipment): Machine Excavated (JCB 3CX)		**Ground Level (m(AOD)):** 7.176	**Start Date:** 18/12/2017	**Sheet:** 3 of 3

Figure TP04.3
TP04 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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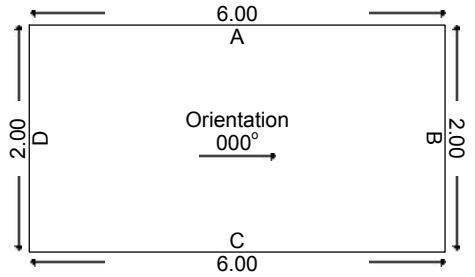
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP05**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454959.268 N:522092.616		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.136	**Start Date:** 20/12/2017	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
0.00-1.50 0.00-1.50 0.00-1.50	B1 J2 ES3					(2.30)	MADE GROUND (Black slightly silty slightly sandy gravel with fragments of metal. Gravel is fine to coarse angular to subangular and includes slag).
1.50 1.50	B4 J5						
2.00	ES6			4.836		2.30	
2.50 2.50 2.50	B7 J8 ES9					(0.90)	Firm brown sandy gravelly CLAY. Gravel is fine to medium subangular to subrounded and includes mudstone and sandstone.
				3.936		3.20	
							Trial pit complete at 3.20m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP05
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454959.268 N:522092.616		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.136	**Start Date:** 20/12/2017	**Sheet:** 2 of 3

Figure TP05.1
TP05

Figure TP05.2
TP05

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP05**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454959.268 N:522092.616		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.136	**Start Date:** 20/12/2017	**Sheet:** 3 of 3

Figure TP05.3
TP05 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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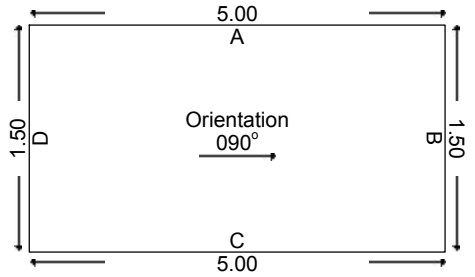
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP101**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454868.564 N:522338.688		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.245	**Start Date:** 28/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				11.745		(0.50) 0.50	MADE GROUND (Black silt).
2.00 2.00	B2 ES1					(4.00)	MADE GROUND (Grey sandy gravel with fragments of plastic and electrical components. Gravel is fine to coarse angular to subangular and includes slag and brick).
				7.745		4.50	
							Trial pit complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP101
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454868.564 N:522338.688		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.245	**Start Date:** 28/03/2018	**Sheet:** 2 of 3

Figure TP101.1
TP101 - Trial Pit Short Face

Figure TP101.2
TP101 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP101
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454868.564 N:522338.688		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.245	**Start Date:** 28/03/2018	**Sheet:** 3 of 3

Figure TP101.3
TP101 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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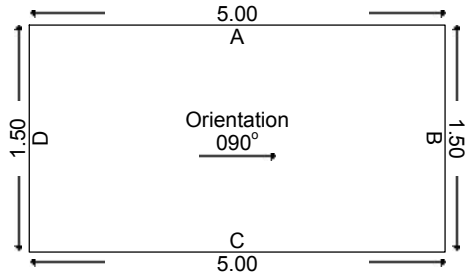
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP102**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454915.204 N:522346.272		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.370	**Start Date:** 28/03/2018	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				11.670		(0.70) 0.70	MADE GROUND (Black silt).
				10.620		(1.05) 1.75	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and includes slag, brick and hydrated lime).
2.50 2.50	B2 ES1			8.970		(1.65) 3.40	MADE GROUND (Black blue silt. Engineer notes lightly cemented. Recovered as fine to coarse angular gravel).
4.50	B3			7.370		(1.60) 5.00	MADE GROUND (Red black silt. Engineer notes lightly cemented. Recovered fine to coarse angular gravel).
							Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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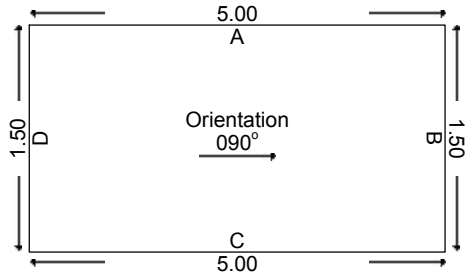
TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP103
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454990.925 N:522406.533		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 13.067	**Start Date:** 28/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.00 1.00	B1 ES2			11.667		(1.40) 1.40	MADE GROUND (Black silt).
				10.767		(0.90) 2.30	MADE GROUND (Black silt).
				8.167		(2.60) 4.90	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and includes slag).
				8.067		(0.10) 5.00	MADE GROUND (Soft black silt with blue staining within fissures). Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation				**Exploratory Hole No.** TP103
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454990.925 N:522406.533			
Method (Equipment): Machine Excavated (JCB 3CX)		**Ground Level (m(AOD)):** 13.067	**Start Date:** 28/03/2018	**Sheet:** 2 of 3

Figure TP103.1
TP103 - Trial Pit Short Face

Figure TP103.2
TP103 - Trial Pit Long Face

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP103
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454990.925 N:522406.533		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 13.067	**Start Date:** 28/03/2018	**Sheet:** 3 of 3

Figure TP103.3
TP103 - Trial Pit Base

Figure TP103.4
TP103 - Trial Pit Spoil

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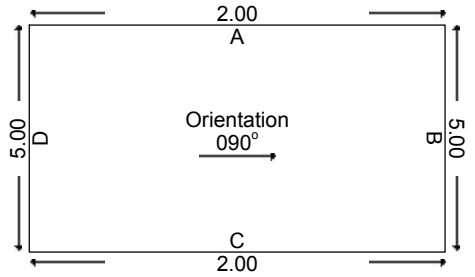
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP104**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454932.298 N:522303.415		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.156	**Start Date:** 28/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.00	ES1			12.556		(1.60) 1.60	MADE GROUND (Black silt).
2.00	ES2			11.656		(0.90) 2.50	MADE GROUND (Black gravelly silt. Gravel is fine to medium angular to subangular and includes slag).
				10.856		(0.80) 3.30	MADE GROUND (Grey sandy gravel with high cobble and boulder content. Gravel is fine to coarse angular to subangular and includes slag. Cobbles and boulders are angular and include slag).
3.50 3.50	B4 ES3			9.156		(1.70) 5.00	MADE GROUND (Black and red gravelly silt. Gravel is fine to medium angular and includes iron stained dried/cemented BOS slurry).
							Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP104
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454932.298 N:522303.415		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.156	**Start Date:** 28/03/2018	**Sheet:** 2 of 3

Figure TP104.1
TP104 - Trial Pit Short Face

Figure TP104.2
TP104 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP104
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454932.298 N:522303.415		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.156	**Start Date:** 28/03/2018	**Sheet:** 3 of 3

Figure TP104.3
TP104 - Trial Pit Spoil

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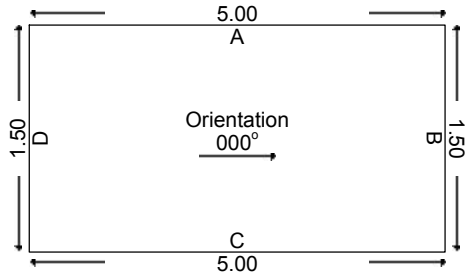
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP105**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455029.401 N:522319.272		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 19.272	**Start Date:** 28/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.00	B1			17.872		(1.40) 1.40	MADE GROUND (Grey blue silt. Gravel is fine to coarse angular and includes slag and ironstone).
3.00 3.00	B2 ES3			15.272		(2.55) 4.00	MADE GROUND (Red gravelly silt. Gravel is fine to coarse angular and includes dried/cemented BOS slurry).
							Trial pit complete at 4.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides stable below

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP105
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455029.401 N:522319.272		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 19.272	**Start Date:** 28/03/2018	**Sheet:** 2 of 3

Figure TP105.1
TP105 - Trial Pit Short Face

Figure TP105.2
TP105 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP105
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455029.401 N:522319.272		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 19.272	**Start Date:** 28/03/2018	**Sheet:** 3 of 3

Figure TP105.3
TP105 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

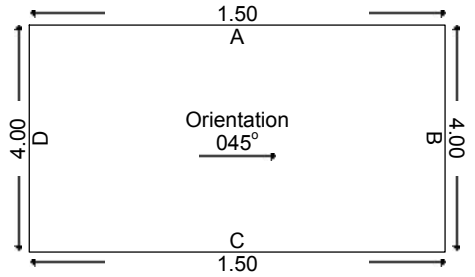
TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP106
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454949.445 N:522261.704		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.684	**Start Date:** 27/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				12.184		(0.50) 0.50	MADE GROUND (Black slightly gravelly silt. Gravel is angular to subangular and includes dried/cemented BOS slurry and slag).
1.40	B1			10.284		(1.90) 2.40	MADE GROUND (Black brown silt).
2.50	ES2			9.584		(0.70) 3.10	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and includes slag and brick).
				8.784		(0.80) 3.90	MADE GROUND (Grey gravelly sand. Gravel is fine to coarse angular and includes slag).
							Trial pit terminated at 3.90m BGL - unable to progress.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES				
Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

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ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP106
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454949.445 N:522261.704		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.684	**Start Date:** 27/03/2018	**Sheet:** 2 of 3

Figure TP106.1
TP106 - Trial Pit Short Face

Figure TP106.2
TP106 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP106
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:454949.445 N:522261.704		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 12.684	**Start Date:** 27/03/2018	**Sheet:** 3 of 3

Figure TP106.3
TP106 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

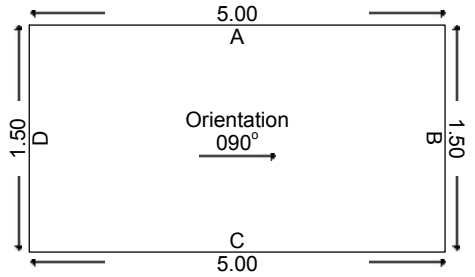
TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP107
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455082.493 N:522282.442		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.928	**Start Date:** 29/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
1.00 1.00	B1 ES3			13.228		(1.70) 1.70	MADE GROUND (Black silt).
				11.928		(1.30) 3.00	MADE GROUND (Firm laminated black brown slightly sandy clay with interbeds of black silt).
3.50	B2			10.428		(1.50) 4.50	MADE GROUND (Grey sandy gravel with fragments of wood and plastic. Gravel is fine to coarse angular to subangular and includes slag and brick).
							Trial pit complete at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:24

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP107
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455082.493 N:522282.442		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.928	**Start Date:** 29/03/2018	**Sheet:** 2 of 3

Figure TP107.1
TP107 - Trial Pit Short Face

Figure TP107.2
TP107 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP107
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455082.493 N:522282.442		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.928	**Start Date:** 29/03/2018	**Sheet:** 3 of 3

Figure TP107.3
TP107 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

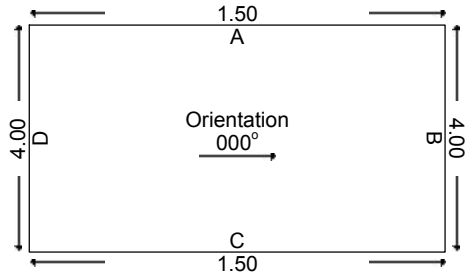
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP108**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455004.039 N:522177.496		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.081	**Start Date:** 27/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				12.681		(1.40) 1.40	MADE GROUND (Black slightly sandy silt).
1.50	B1			10.981		(1.70) 3.10	MADE GROUND (Grey sandy gravel with low cobble content and fragments of wood, plastic, fabric, rubber and metal. Gravel is fine to coarse angular to subangular and includes clag. Cobbles and boulders are angular and include slag and brick).
				10.381		(0.60) 3.70	MADE GROUND (Grey gravel. Gravel is fine to coarse angular and includes cemented slag and dried/cemented BOS slurry).
				9.081		(1.30) 5.00	MADE GROUND (Brown slightly sandy slightly gravelly silt. Gravel is fine to medium angular and includes slag).
5.00	ES2						Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:27

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP108
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455004.039 N:522177.496		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.081	**Start Date:** 27/03/2018	**Sheet:** 2 of 3

Figure TP108.1
TP108 - Trial Pit Short Face

Figure TP108.2
TP108 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP108
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455004.039 N:522177.496		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 14.081	**Start Date:** 27/03/2018	**Sheet:** 3 of 3

Figure TP108.3
TP108 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

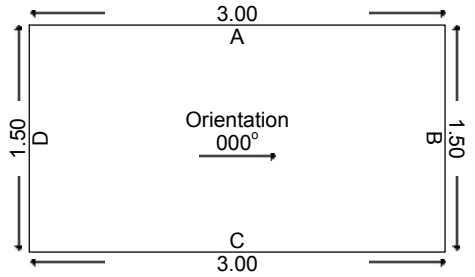
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** **TP109**
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455017.927 N:522161.278		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.240	**Start Date:** 27/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
2.00	ES2					(3.70)	MADE GROUND (Black very sandy silt with interbeds of fine to medium angular to subangular slag).
3.70	ES1		1	3.540		3.70	
				2.240		(1.30) 5.00	MADE GROUND (Black grey very silty gravel with low cobble and boulder content. Gravel is fine to coarse angular to subangular and includes slag. Cobbles and boulders are angular to subangular and include slag. Hydrocarbon odour noted).
							Trial pit complete at 5.00m BGL.

PLAN



GROUNDWATER
Water strike at 3.80m BGL (slow inflow) - hydrocarbon sheen noted.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:29

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP109
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455017.927 N:522161.278		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.240	**Start Date:** 27/03/2018	**Sheet:** 2 of 3

Figure TP109.1
TP109 - Trial Pit Short Face

Figure TP109.2
TP109 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP109
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455017.927 N:522161.278		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.240	**Start Date:** 27/03/2018	**Sheet:** 3 of 3

Figure TP109.3
TP109 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

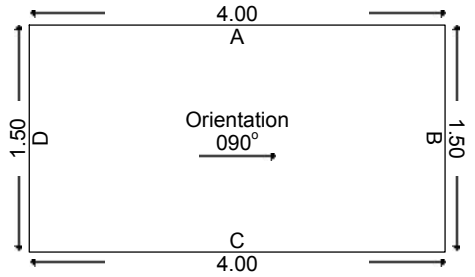
TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP110
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455132.369 N:522222.153		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 11.729	**Start Date:** 29/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				11.129		(0.60) 0.60	MADE GROUND (Black silt).
0.50	B1						
				7.229		(3.90) 4.50	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and includes slag).
4.50	ES2						Trial pit completed at 4.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:32

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP110
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455132.369 N:522222.153		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 11.729	**Start Date:** 29/03/2018	**Sheet:** 2 of 3

Figure TP110.1
TP110 - Trial Pit Short Face

Figure TP110.2
TP110 - Trial Pit Long Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP110
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455132.369 N:522222.153		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 11.729	**Start Date:** 29/03/2018	**Sheet:** 3 of 3

Figure TP110.3
TP110 - Trial Pit Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

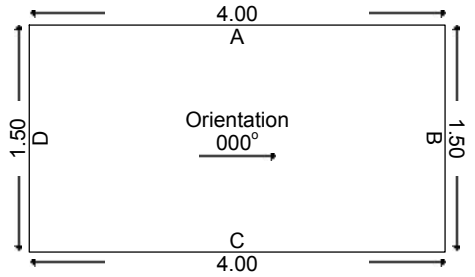
TRIAL PIT RECORD

Status:- **FINAL**

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP111
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455178.014 N:522178.826		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.376	**Start Date:** 28/03/2018	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION
				6.376		(1.00) 1.00	MADE GROUND (Black brown clayey slightly gravelly silt. Gravel is fine to medium angular to subangular and includes slag and dried/cemented BOS slurry).
				5.776		(0.60) 1.60	MADE GROUND (Grey sandy gravel. Gravel is fine to coarse angular to subangular and includes slag).
4.00	ES1		▼1	2.876		(2.90) 4.50	MADE GROUND (Black slightly gravelly silt. Gravel is fine to medium angular to subangular and includes slag. Hydrocarbon odour noted).
							Trial pit complete at 4.00m BGL.

PLAN



GROUNDWATER
Water strike at 4.00m BGL.

STABILITY
Pit sides and base stable throughout excavation.

GENERAL REMARKS

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

UNDERGROUND SERVICES

Depth	Orientation	Type	Diameter (mm)	Condition

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: KW	Logged by: A. Rees	Contract No. **4154A**

Print Date and Time: 12/06/2018 11:31:34

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP111
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455178.014 N:522178.826		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.376	**Start Date:** 28/03/2018	**Sheet:** 2 of 3

Figure TP111.1
TP111 - Trial Pit Short Face

Figure TP111.2
TP111 - Trial Pit Short Face

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

TRIAL PIT RECORD

Status:- FINAL

Project: SLEMS Landfill Investigation			**Exploratory Hole No.** TP111
Client: South Tees Site Company Ltd	**Location:** Redcar Steel Works E:455178.014 N:522178.826		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m(AOD)):** 7.376	**Start Date:** 28/03/2018	**Sheet:** 3 of 3

Figure TP111.3
TP111 - Trial Pit Spoil

APPENDIX E

Chemical Analysis Summary and Certificates

The Former SSI Steelworks, Redcar: Former SLEMS Landfill BOS Oxide Assessment

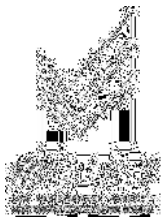
Asbestos screen

Sample ID	Material Type	Result
TP101 1 2.00	SOIL	NAD
TP102 1 2.50	SOIL	NAD
TP103 2 1.00	SOIL	NAD
TP105 3 3.00	SOIL	NAD
TP107 3 1.00	SOIL	NAD
TP110 2 4.50	SOIL	NAD
TP108 2 5.00	SOIL	NAD
TP109 1 3.80	SOIL	NAD
TP106 2 2.50	SOIL	NAD
TP104 1 1.00	SOIL	NAD

Certificate of Analysis

Certificate Number	18-00689-1
	22-Jan-18
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG
Our Reference	18-00689-1
Client Reference	4154A
Order No	CH-1400
Contract Title	4154A - SLEMS Landfill Investigation
Description	11 Soil samples.
Date Received	10-Jan-18
Date Started	10-Jan-18
Date Completed	22-Jan-18
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 18-00689, amendments.** Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 18-00689-1
Client Ref 4154A
Contract Title 4154A - SLEMS Landfill Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH03TP	3	2	1282515	15/01/2018	Dark grey, gravelly SAND
BH03TP	6	5	1282516	15/01/2018	Dark grey, gravelly SAND
BH04TP	1	2	1282517	15/01/2018	Dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
BH04TP	3	3.5	1282518	15/01/2018	Dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
BH05TP	2	4.5	1282519	15/01/2018	Dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP01	3	0.5	1282520	15/01/2018	Dark brown gravelly, sandy CLAY
TP01	9	2.5	1282521	15/01/2018	Dark brown gravelly, sandy CLAY
TP02	2	1.5	1282522	15/01/2018	Dark brown gravelly, sandy CLAY
TP02	4	2.5	1282523	15/01/2018	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP05	9	2.5	1282524	15/01/2018	Dark brown gravelly, sandy CLAY
TP05	3	0.00-1.50	1282525	15/01/2018	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis
Soil Samples

Our Ref 18-00689-1
Client Ref 4154A
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				Lab No	1282515	1282516	1282517	1282518	1282519
				Sample ID	BH03TP	BH03TP	BH04TP	BH04TP	BH05TP
				Depth	2.00	5.00	2.00	3.50	4.50
				Other ID	3	6	1	3	2
				Sample Type	ES	ES	ES	ES	ES
				Sampling Date	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17
				Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Aluminium	DETSC 2301*	1	mg/kg		8300	9800	3900	5500	10000
Antimony	DETSC 2301*	1	mg/kg		3.9	3.5	5.0	5.2	3.5
Arsenic	DETSC 2301#	0.2	mg/kg		3.1	7.0	0.7	0.9	1.9
Barium	DETSC 2301#	1.5	mg/kg		140	230	38	65	210
Beryllium	DETSC 2301#	0.2	mg/kg		0.5	0.6	< 0.2	0.3	0.2
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg		13	14	5.0	4.8	11
Cadmium	DETSC 2301#	0.1	mg/kg		0.5	0.5	0.6	2.8	1.4
Chromium	DETSC 2301#	0.15	mg/kg		240	200	330	330	200
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg		13	220	17	14	16
Iron	DETSC 2301	25	mg/kg		55000	45000	83000	100000	81000
Lead	DETSC 2301#	0.3	mg/kg		41	50	25	92	100
Manganese	DETSC 2301#	20	mg/kg		14000	21000	7400	7300	10000
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05	0.05	< 0.05	< 0.05	0.10
Molybdenum	DETSC 2301#	0.4	mg/kg		1.8	2.0	2.2	2.0	2.4
Nickel	DETSC 2301#	1	mg/kg		7.2	9.3	9.7	6.4	6.8
Vanadium	DETSC 2301#	0.8	mg/kg		460	950	210	240	180
Zinc	DETSC 2301#	1	mg/kg		170	160	150	640	440
Inorganics									
pH	DETSC 2008#				12.6	12.6	12.7	12.7	12.5
Sulphur (free)	DETSC 3049#	0.75	mg/kg		< 0.75	1.6	< 0.75	1.4	< 0.75
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg		0.11	0.14	< 0.03	0.05	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg		0.05	0.13	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg		0.04	0.08	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg		< 0.03	0.08	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg		1.7	3.3	0.07	0.19	0.24
Anthracene	DETSC 3303	0.03	mg/kg		0.18	0.32	< 0.03	0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg		2.4	3.5	0.12	0.27	0.20
Pyrene	DETSC 3303#	0.03	mg/kg		1.6	2.3	0.13	0.28	0.24
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		0.66	0.93	0.03	0.08	0.12
Chrysene	DETSC 3303	0.03	mg/kg		0.85	1.2	0.05	0.15	0.16
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		0.97	1.3	0.04	0.10	0.27
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		0.34	0.50	< 0.03	0.03	0.10
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		0.41	0.55	< 0.03	0.03	0.16
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		0.29	0.44	< 0.03	< 0.03	0.14
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		0.10	0.14	< 0.03	< 0.03	0.04
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		0.36	0.52	< 0.03	< 0.03	0.19
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		10	15	0.44	1.2	1.9

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-00689-1
Client Ref 4154A
Contract Title 4154A - SLEMS Landfill Investigation

Lab No	1282520
Sample ID	TP01
Depth	0.50
Other ID	3
Sample Type	ES
Sampling Date	20/12/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Aluminium	DETSC 2301*	1	mg/kg	540
Antimony	DETSC 2301*	1	mg/kg	7.2
Arsenic	DETSC 2301#	0.2	mg/kg	5.7
Barium	DETSC 2301#	1.5	mg/kg	18
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	1.3
Cadmium	DETSC 2301#	0.1	mg/kg	12
Chromium	DETSC 2301#	0.15	mg/kg	71
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	45
Iron	DETSC 2301	25	mg/kg	180000
Lead	DETSC 2301#	0.3	mg/kg	720
Manganese	DETSC 2301#	20	mg/kg	3400
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Molybdenum	DETSC 2301#	0.4	mg/kg	5.2
Nickel	DETSC 2301#	1	mg/kg	23
Vanadium	DETSC 2301#	0.8	mg/kg	27
Zinc	DETSC 2301#	1	mg/kg	4800
Inorganics				
pH	DETSC 2008#			10.4
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	0.19
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.16
Anthracene	DETSC 3303	0.03	mg/kg	0.04
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.19
Pyrene	DETSC 3303#	0.03	mg/kg	0.31
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.04
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.92

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Summary of Chemical Analysis
Soil Samples

Our Ref 18-00689-1
Client Ref 4154A
Contract Title 4154A - SLEMS Landfill Investigation

			Lab No	1282521	1282522	1282523	1282524	1282525
			Sample ID	TP01	TP02	TP02	TP05	TP05
			Depth	2.50	1.50	2.50	2.50	0.00-1.50
			Other ID	9	2	4	9	3
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Metals								
Aluminium	DETSC 2301*	1	mg/kg	3100	1100	10000	8400	11000
Antimony	DETSC 2301*	1	mg/kg	6.0	19	10	16	8.1
Arsenic	DETSC 2301#	0.2	mg/kg	0.6	19	46	54	9.6
Barium	DETSC 2301#	1.5	mg/kg	58	59	250	390	140
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	< 0.2	1.6	0.9	0.4
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	5.2	1.7	15	11	6.5
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	76	19	43	7.3
Chromium	DETSC 2301#	0.15	mg/kg	460	130	140	130	370
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	7.4	160	92	190	51
Iron	DETSC 2301	25	mg/kg	74000	400000	170000	230000	160000
Lead	DETSC 2301#	0.3	mg/kg	6.2	1700	3600	2100	720
Manganese	DETSC 2301#	20	mg/kg	7400	6600	6100	13000	9500
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.26	3.1	1.2	0.58
Molybdenum	DETSC 2301#	0.4	mg/kg	1.7	8.3	2.4	5.6	3.2
Nickel	DETSC 2301#	1	mg/kg	17	33	32	42	19
Vanadium	DETSC 2301#	0.8	mg/kg	260	47	180	160	240
Zinc	DETSC 2301#	1	mg/kg	27	18000	8400	11000	2500
Inorganics								
pH	DETSC 2008#			12.7	9.2	9.7	8.7	12.5
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75	100	< 0.75
PAHs								
Naphthalene	DETSC 3303#	0.03	mg/kg	0.04	0.12	97	0.93	0.06
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	11	0.25	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.08	< 0.03	120	2.4	0.06
Fluorene	DETSC 3303	0.03	mg/kg	0.40	< 0.03	68	1.3	0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	7.7	0.29	100	1.3	0.16
Anthracene	DETSC 3303	0.03	mg/kg	3.7	0.12	24	0.51	0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	3.9	0.18	48	1.9	0.11
Pyrene	DETSC 3303#	0.03	mg/kg	2.3	0.22	36	1.2	0.12
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.66	0.17	14	0.44	0.04
Chrysene	DETSC 3303	0.03	mg/kg	0.73	0.18	15	0.51	0.05
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.47	0.59	13	0.35	0.08
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.18	0.15	4.3	0.10	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.18	0.28	7.7	0.19	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.10	0.14	2.7	0.07	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.06	0.83	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.12	0.22	3.6	0.09	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	21	2.7	570	11	0.75

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 18-00689-1
Client Ref 4154A
Contract 4154A - SLEMS Landfill Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1282515	BH03TP 2.00 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282516	BH03TP 5.00 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282517	BH04TP 2.00 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282518	BH04TP 3.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282519	BH05TP 4.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282520	TP01 0.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282521	TP01 2.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282522	TP02 1.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282523	TP02 2.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282524	TP05 2.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	
1282525	TP05 0.00-1.50 SOIL	20/12/17	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Naphthalene (14 days), PAH MS (14 days), pH + Conductivity (7 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 18-08351-2

26-Apr-18

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 18-08351-2

Client Reference 4154A

Order No CH-1400

Contract Title SLEMS Landfill Investigation

Description 10 Soil samples.

Date Received 10-Apr-18

Date Started 10-Apr-18

Date Completed 26-Apr-18

Test Procedures Identified by prefix DETSn (details on request).

Notes This report supersedes 18-08351-1, Extra Testing

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
TP101	1	2	1322675	18/04/2018	Black sandy GRAVEL (Possible made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP102	1	2.5	1322676	18/04/2018	Dark brown very clayey SAND
TP103	2	1	1322677	18/04/2018	Dark brown gravelly, very sandy CLAY
TP105	3	3	1322678	18/04/2018	Brown gravelly, clayey SAND
TP107	3	1	1322679	18/04/2018	Dark grey gravelly, very clayey SAND
TP110	2	4.5	1322680	18/04/2018	Dark grey slightly sandy GRAVEL (Possible made ground - slag) (sample matrix outside MCERTS scope of accreditation)
TP108	2	5	1322681	18/04/2018	Dark brown very sandy CLAY
TP109	1	3.8	1322682	18/04/2018	Dark brown very, sandy CLAY
TP106	2	2.5	1322683	18/04/2018	Dark brown very sandy CLAY
TP104	1	1	1327120	18/04/2018	Black sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

	Lab No	1322675	1322676	1322677	1322678	1322679	1322680
	Sample ID	TP101	TP102	TP103	TP105	TP107	TP110
	Depth	2.00	2.50	1.00	3.00	1.00	4.50
	Other ID	1	1	2	3	3	2
	Sample Type	ES	ES	ES	ES	ES	ES
	Sampling Date	28/03/18	28/03/18	28/03/18	28/03/18	28/03/18	28/03/18
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Aluminium	DETSC 2301*	1	mg/kg	14000	8400	2900	1800	1800	6400
Antimony	DETSC 2301*	1	mg/kg	6.1	4.6	15	14	13	9.2
Arsenic	DETSC 2301#	0.2	mg/kg	2.0	6.6	7.8	11	11	2.1
Barium	DETSC 2301#	1.5	mg/kg	460	120	86	50	51	110
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	1.0	< 0.2	< 0.2	< 0.2	< 0.2
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.9	7.0	0.9	2.6	1.2	3.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	26	25	58	31	3.1
Chromium	DETSC 2301#	0.15	mg/kg	390	40	110	140	130	610
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	20	20	94	170	130	22
Iron	DETSC 2301	25	mg/kg	130000	270000	470000	620000	520000	200000
Lead	DETSC 2301#	0.3	mg/kg	36	1500	1000	1200	1100	93
Magnesium	DETSC 2301*	1	mg/kg	31000	11000	5300	4900	4600	31000
Manganese	DETSC 2301#	20	mg/kg	33000	1200	5900	6600	5800	18000
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.42	0.13	0.10	0.15	< 0.05
Molybdenum	DETSC 2301#	0.4	mg/kg	3.0	1.4	5.7	11	9.0	4.6
Nickel	DETSC 2301#	1	mg/kg	8.8	23	34	54	47	60
Silicon	DETSC 2301*	10	mg/kg	30000	36000	22000	9200	12000	45000
Vanadium	DETSC 2301#	0.8	mg/kg	400	46	61	60	56	530
Zinc	DETSC 2301#	1	mg/kg	190	9300	8700	5500	5800	440
Inorganics									
pH	DETSC 2008#			12.6	8.5	9.2	10.6	9.3	12.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	75	2.0	< 0.1	1.5	0.5
Organic matter	DETSC 2002#	0.1	%	0.7	5.2	5.2	1.0	4.3	1.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	15	1100	860	650	290	17
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	2.7
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	2.2	< 1.5	< 1.5	< 1.5	< 1.5	5.6
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	14	< 3.4	< 3.4	< 3.4	< 3.4	29
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	17	< 10	< 10	< 10	< 10	38
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	9.8
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	1.3	< 0.6	< 0.6	< 0.6	< 0.6	25
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	5.7	< 1.4	< 1.4	< 1.4	< 1.4	80

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

			Lab No	1322675	1322676	1322677	1322678	1322679	1322680
			Sample ID	TP101	TP102	TP103	TP105	TP107	TP110
			Depth	2.00	2.50	1.00	3.00	1.00	4.50
			Other ID	1	1	2	3	3	2
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/03/18	28/03/18	28/03/18	28/03/18	28/03/18	28/03/18
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	120
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	25	< 10	< 10	< 10	< 10	150
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.22	0.07	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.10	< 0.03	< 0.03	< 0.03	0.51
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.38	< 0.03	< 0.03	< 0.03	0.22
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.13	1.3	0.16	< 0.03	0.05	0.97
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.12	< 0.03	< 0.03	< 0.03	0.15
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	0.37	0.11	< 0.03	0.05	1.3
Pyrene	DETSC 3303#	0.03	mg/kg	0.10	0.44	0.16	< 0.03	0.11	1.2
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	< 0.03	0.48
Chrysene	DETSC 3303	0.03	mg/kg	0.05	< 0.03	< 0.03	< 0.03	< 0.03	0.54
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.59
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.21
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.41
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.29
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.31
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.49	2.9	0.50	< 0.10	0.21	7.2
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	0.4	< 0.3	< 0.3	< 0.3	< 0.3

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Summary of Chemical Analysis
Soil Samples

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

			Lab No	1322681	1322682	1322683	1327120
			Sample ID	TP108	TP109	TP106	TP104
			Depth	5.00	3.80	2.50	1.00
			Other ID	2	1	2	1
			Sample Type	ES	ES	ES	ES
			Sampling Date	27/03/18	27/03/18	27/03/18	27/03/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Aluminium	DETSC 2301*	1	mg/kg	8200	920	6200	2100
Antimony	DETSC 2301*	1	mg/kg	11	14	6.7	15
Arsenic	DETSC 2301#	0.2	mg/kg	43	13	28	14
Barium	DETSC 2301#	1.5	mg/kg	72	44	120	68
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	< 0.2	0.7	< 0.2
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	6.0	2.9	1.6	1.6
Cadmium	DETSC 2301#	0.1	mg/kg	75	37	28	94
Chromium	DETSC 2301#	0.15	mg/kg	34	170	40	120
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	26	160	42	140
Iron	DETSC 2301	25	mg/kg	240000	560000	220000	21000
Lead	DETSC 2301#	0.3	mg/kg	3100	830	2500	1600
Magnesium	DETSC 2301*	1	mg/kg	7300	6700	6500	4700
Manganese	DETSC 2301#	20	mg/kg	1600	9300	830	4500
Mercury	DETSC 2325#	0.05	mg/kg	0.29	0.10	0.54	0.35
Molybdenum	DETSC 2301#	0.4	mg/kg	2.7	6.8	3.9	6.3
Nickel	DETSC 2301#	1	mg/kg	44	46	23	27
Silicon	DETSC 2301*	10	mg/kg	34000	3200	25000	500000
Vanadium	DETSC 2301#	0.8	mg/kg	55	250	33	51
Zinc	DETSC 2301#	1	mg/kg	23000	3800	17000	21000
Inorganics							
pH	DETSC 2008#			8.6	9.6	8.4	9.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	10	5.0	140	3.1
Organic matter	DETSC 2002#	0.1	%	4.6	5.0	8.3	4.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	720	440	400	310
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.10	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.10	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	0.26	0.11	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	58	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 76.3	59	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.10	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.10	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.10	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.6
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	15
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	52

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

			Lab No	1322681	1322682	1322683	1327120
			Sample ID	TP108	TP109	TP106	TP104
			Depth	5.00	3.80	2.50	1.00
			Other ID	2	1	2	1
			Sample Type	ES	ES	ES	ES
			Sampling Date	27/03/18	27/03/18	27/03/18	27/03/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 34.3	< 10	70
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	110	59	70
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	0.39	1.4	0.37	0.17
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	1.1	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	0.13	0.38	0.11	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.59	0.36	0.55	0.20
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.06	< 0.03	0.06
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	0.23	0.14	0.15
Pyrene	DETSC 3303#	0.03	mg/kg	0.24	0.21	0.23	0.19
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	< 0.03	0.08
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.11	< 0.03	0.14
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.06
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.5	3.9	1.4	1.1
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 18-08351-2
Client Ref 4154A
Contract Title SLEMS Landfill Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1322675	TP101 1 2.00	SOIL	NAD	none	Michael Rutherford
1322676	TP102 1 2.50	SOIL	NAD	none	Michael Rutherford
1322677	TP103 2 1.00	SOIL	NAD	none	Michael Rutherford
1322678	TP105 3 3.00	SOIL	NAD	none	Michael Rutherford
1322679	TP107 3 1.00	SOIL	NAD	none	Michael Rutherford
1322680	TP110 2 4.50	SOIL	NAD	none	Michael Rutherford
1322681	TP108 2 5.00	SOIL	NAD	none	Michael Rutherford
1322682	TP109 1 3.80	SOIL	NAD	none	Michael Rutherford
1322683	TP106 2 2.50	SOIL	NAD	none	Michael Rutherford
1327120	TP104 1 1.00	SOIL	NAD	none	A Christodoulou

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 18-08351-2
Client Ref 4154A
Contract SLEMS Landfill Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1322675	TP101 2.00 SOIL	28/03/18	GJ 250ml x2, GV x2, PT 1L		
1322676	TP102 2.50 SOIL	28/03/18	GJ 250ml, GV		
1322677	TP103 1.00 SOIL	28/03/18	GJ 250ml, GV, PT 1L		
1322678	TP105 3.00 SOIL	28/03/18	PG		
1322679	TP107 1.00 SOIL	28/03/18	PG		
1322680	TP110 4.50 SOIL	28/03/18	PG		
1322681	TP108 5.00 SOIL	27/03/18	GJ 250ml x2, GJ 60ml x2, PT 1L		
1322682	TP109 3.80 SOIL	27/03/18	GJ 250ml x2, GJ 60ml x2, PT 1L		
1322683	TP106 2.50 SOIL	27/03/18	GJ 250ml x2, GJ 60ml x2, PT 1L		
1327120	TP104 1.00 SOIL		GJ 250ml x2, GJ 60ml x2, PT 1L		

Key: G-Glass P-Plastic J-Jar V-Vial T-Tub G-Bag

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Sample ID	MDL	Units	TP101	TP102	TP103	TP104	TP105	TP106	TP107	TP108	TP109	TP110	BH03TP	BH03TP	BH04TP	BH04TP	BH05TP	TP01	TP02	TP02	TP05	BH01TP	BH01TP	BH04	BH05	BH05	BH06	BH06	BH06	BH09	BH09	BH09	TP03	TP04	TP04	BH01 (TP)	BH08	BH08	BH08	BH08	BH08	BH08
Depth			2	2.5	1	1	3	2.5	1	5	3.8	4.5	2	5	2	3.5	4.5	0.5	2.5	1.5	2.5	2.5	0.00-1.50	1	2	1.2	1	4	1	2.5	5.5	2.2	5.4	8.2	1	3	1.00-2.00	1.5	8	12	15	1	3	5
Sampling Date			28/03/18	28/03/18	28/03/18	27/03/18	28/03/18	27/03/18	28/03/18	27/03/18	27/03/18	28/03/18	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	20/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	18/12/17	06/12/17	13/12/17	13/12/17	30/11/17	01/12/17	01/12/17
Metals																																											
Aluminium	1	mg/kg	14000	8400	2900	2100	1800	6200	1800	8200	920	6400	8300	9800	3900	5500	10000	540	3100	1100	10000	8400	11000	9600	8.1	6.8	8000	1600	14000	16000	2000	6000	8600	14000	5500	11000	5500	790	1700		2200	6100	4900	2400	1400	890
Antimony	1	mg/kg	6.1	4.6	15	15	14	6.7	13	11	14	9.2	3.9	3.5	5	5.2	3.5	7.2	6	19	10	16	8.1	8.1	6.8	14	1.5	5.4	15	8.5	7.3	5.6	6.1	6.1	9.1	13	20		17	5.7	11	19	20	19
Arsenic	0.2	mg/kg	2	6.6	7.8	14	11	28	11	43	13	2.1	3.1	7	0.7	0.9	1.9	5.7	0.6	19	46	54	9.6	3.7	15	13	8.6	1.3	13	1.6	7.7	2.9	3.7	4.6	43	7.6	17	3.9	9.9	9.8	17	16	14	12
Barium	1.5	mg/kg	460	120	86	68	50	120	51	72	44	110	140	230	120	51	210	18	58	59	250	390	140	290	170	110	250	130	62	91	230	800	180	350	240	50	140		85	120	120	110	110	72
Beryllium	0.2	mg/kg	0.6	1	< 0.2	< 0.2	< 0.2	0.7	< 0.2	0.9	< 0.2	< 0.2	0.5	0.6	< 0.2	0.3	0.2	< 0.2	< 0.2	< 0.2	1.6	0.9	0.4	0.4	0.4	< 0.2	1	0.4	< 0.2	< 0.2	0.6	0.8	0.5	0.7	0.8	< 0.2	< 0.2		< 0.2	0.7	0.4	0.2	< 0.2	< 0.2
Boron, Water Soluble	0.2	mg/kg	0.9	7	0.9	1.6	2.6	1.6	1.2	6	2.9	3.2	13	14	5	4.8	11	1.3	5.2	1.7	15	11	6.5	5.4	3.4	1.7	2.5	7.8	1.8	4.8	7.2	43	9	6.6	2	1.2	1	5.7	2.3	2.9	2.9	1.1	1.1	1
Cadmium	0.1	mg/kg	0.4	26	25	94	58	28	31	75	37	3.1	0.5	0.5	0.6	2.8	1.4	12	< 0.1	76	19	43	7.3	3.9	0.7	66	1.3	3.8	52	0.6	4.3	0.6	5.7	1.1	87	21	73	3.7	34	25	27	47	48	29
Chromium	0.15	mg/kg	390	40	110	120	140	40	130	34	170	610	240	200	330	330	200	71	460	130	140	130	370	530	200	100	33	320	120	640	320	420	340	450	28	110	110	190	170	48	74	88	91	120
Chromium, Hexavalent	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	0.2	mg/kg	20	20	94	140	170	42	130	26	160	22	13	220	17	14	16	45	7.4	160	92	190	51	35	150	120	36	23	140	16	100	18	33	28	23	160	150	50	170	26	75	99	110	160
Iron	25	mg/kg	130000	270000	470000	21000	620000	220000	520000	240000	560000	200000	55000	45000	83000	100000	81000	180000	74000	400000	170000	230000	160000	160000	130000	460000	55000	120000	450000	170000	170000	110000	160000	150000	210000	420000	510000		420000	200000	280000	290000	440000	480000
Lead	0.3	mg/kg	36	1500	1000	1600	1200	2500	1100	3100	830	93	41	50	25	92	100	720	6.2	1700	3600	2100	720	140	920	1200	100	110	1200	17	210	28	400	64	7900	1700	1600	270	1800	2500	2400	1400	1200	1800
Magnesium	1	mg/kg	31000	11000	5300	4700	4900	6500	4600	7300	6700	31000																																	
Manganese	20	mg/kg	33000	1200	5900	4500	6600	830	5800	1600	9300	18000	14000	21000	7400	7300	10000	3400	7400	6600	6100	13000	9500	18000	6800	3600	840	11000	7100	16000	17000	42000	22000	38000	780	5200	4200		8000	1200	2500	3900	5600	8900
Mercury	0.05	mg/kg	< 0.05	0.42	0.13	0.35	0.1	0.54	0.15	0.29	0.1	< 0.05	< 0.05	0.05	< 0.05	< 0.05	0.1	< 0.05	< 0.05	0.26	3.1	1.2	0.58	< 0.05	0.94	0.27	0.07	< 0.05	0.19	< 0.05	< 0.05	< 0.05	0.07	< 0.05	1.4	0.1	0.19	0.15	0.07	0.28	0.24	0.19	0.13	0.15
Molybdenum	0.4	mg/kg	3	1.4	5.7	6.3	11	3.9	9	2.7	6.8	4.6	1.8	2	2.2	2	2.4	5.2	1.7	8.3	2.4	5.6	3.2	4.4	8	5.4	1.2	2.6	8	2.9	5.9	2.6	3.1	2.7	2.1	7.9	5.1		7.2	1.6	4.3	5.1	4.9	6.8
Nickel	1	mg/kg	8.8	23	34	27	54	23	47	44	46	60	7.2	9.3	9.7	6.4	6.8	23	17	33	32	42	19	16	90	25	36	8.1	38	3.7	22	8.8	8.2	10	22	39	27	38	42	18	26	23	23	43
Silicon	10	mg/kg	30000	36000	22000	500000	9200	25000	12000	34000	3200	45000																																	
Vanadium	0.8	mg/kg	400	46	61	51	60	33	56	55	250	530	460	950	210	240	180	27	260	47	180	160	240	460	200	65	34	270	61	500	780	390	2800	3300	58	75	47		140	43	53	49	48	49
Zinc	1	mg/kg	190	9300	8700	21000	5500	17000	5800	23000	3800	440	170	160	150	640	440	4800	27	18000	8400	11000	2500	1000	2400	17000	310	780	14000	110	1400	180	2300	280	33000	8900	37000	960	11000	10000	12000	14000	22000	11000
Inorganics																																							11	10.3	10.3	9.1	9.5	9.8
pH			12.6	8.5	9.2	9.1	10.6	8.4	9.3	8.6	9.6	12.6	12.6	12.6	12.7	12.7	12.5	10.4	12.7	9.2	9.7	8.7	12.5	12.4	11.9	10	9.2	12.6	9.7	12.6	12.5	12.6	12.5	12.5	6.9	10.2	9.1	11.8						
Cyanide, Total	0.1	mg/kg	0.2	75	2	3.1	< 0.1	140	1.5	10	5	0.5													170													47						
Organic matter	0.1	%	0.7	5.2	5.2	4.4	1	8.3	4.3	4.6	5	1.5													13													3.7						
Sulphate Aqueous Extract as SO4	10	mg/l	15	1100	860	310	650	400	290	720	440	17													740													110						
Sulphur Free	0.75	mg/kg											< 0.75	1.6	< 0.75	1.4	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	100	< 0.75	< 0.75	870	6.9	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	1.7	< 0.75	2.4	220	< 0.75	3		< 0.75	36	28	1.6	1	< 0.75
Petroleum Hydrocarbons																																											
Aliphatic C5-C6	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.10	< 0.01													< 0.01												< 0.01						
Aliphatic C6-C8	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.10	< 0.01													< 0.01												0.15						
Aliphatic C8-C10	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01	< 0.01	0.26	< 0.01													2.2												1.1						
Aliphatic C10-C12	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5													220												< 50.0						
Aliphatic C12-C16	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2													1700												380						
Aliphatic C16-C21	1.5	mg/kg	2.2	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	5.6													4700												1100						
Aliphatic C21-C35	3.4	mg/kg	14	< 3.4	< 3.4	< 3.4	< 3.4	58	< 3.4	< 3.4	< 3.4	29													22000												6200						
Aliphatic C5-C35	10	mg/kg	17	< 10	< 10	< 10	< 10	59	< 10	< 10	< 78.3	38													28000												7700						
Aromatic C5-C7	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.10	< 0.01													14												4						
Aromatic C7-C8	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.10	< 0.01													7.9												3.8						
Aromatic C8-C10	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.10	< 0.01													6.6												4.1						
Aromatic C10-C12	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9													3400												460						
Aromatic C12-C16	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	9.8													12000												1800						
Aromatic C16-C21	0.6	mg/kg	1.3	< 0.6	< 0.6	15	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	25													6200												1300						
Aromatic C21-C35	1.4	mg/kg	5.7	< 1.4	< 1.4	52	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	80													11000												2600						
Aromatic C5-C35	10	mg/kg	< 10	< 10	< 10	70	< 10	< 10	< 10	< 10	< 34.3	120													33000												6200						
TPH AlkAro Total	10	mg/kg	25	< 10	< 10	70	< 10	59	< 10	< 10	110	150													61000												14000						
PAHs																																											
Naphthalene	0.03	mg/kg	< 0.03	0.22	0.07	0.17	< 0.03	0.37	< 0.03	0.39	1.4	< 0.03	0.11	0.14	< 0.03	0.05	< 0.03	0.19	0.04	0.12	97	0.93	0.06	< 0.03	3600	0.06	0.05	< 0.03	0.07	0.03	35	< 0.03	< 0.03	< 0.03	4.1	0.03	0.04	410	< 0.03	0.1	0.13	0.06	0.04	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	0.05	0.13	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	11	0.25	< 0.03	< 0.03	370	0.05	< 0.03	< 0.03	< 0.03	< 0.03	10	< 0.03	< 0.03	< 0.03	0.07	< 0.03	< 0.03	62	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	0.03	mg/kg	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1.1	0.51	0.04	0.08	< 0.03	< 0.03	0.08	< 0.03	0.08	< 0.03	120	2.4	0.06	0.04	3400	0.06	0.05	< 0.03	< 0.03	< 0.03	1	< 0.03	< 0.03	< 0.03	0.07	0.66	< 0.03	560	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	0.38	< 0.03	< 0.03	< 0.03	0.11	< 0.03	0.13	0.38	0.22	< 0.03	0.08	< 0.03	< 0.03	< 0.03	0.4	< 0.03	68	1.3	0.03	< 0.03	2100	0.1	0.07	< 0.03	< 0.03	< 0.03	8.9	< 0.03	< 0.03	< 0.03	0.11	1.2	< 0.03	330	< 0.03	0.09	0.16	< 0.03	< 0.03	< 0.03
Phenanthrene	0.03	mg/kg	0.13	1.3	0.16	0.2	< 0.03	0.55	0.05	0.59	0.36	0.97	1.7	3.3	0.07	0.19	0.24	0.16	7.7	0.29	100	1.3	0.16	0.14	1300	0.16	0.06	0.07	0.12	0.04	28	< 0.03	< 0.03	0.54	3.4	0.06	0.1	230	0.08	0.21	0.37	0.27	0.19	< 0.03
Anthracene	0.03	mg/kg	< 0.03	0.12	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	0.06	0.15	0.18	0.32	< 0.03	0.03	< 0.03	0.04	3.7	0.12	24	0.51	0.03	0.03	330	0.04	< 0.03	< 0.03	< 0.03	< 0.03	6.4	< 0.03	< 0.03	< 0.03	0.06	0.41	< 0.03	< 0.03	64	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	0.14	0.37	0.11	0.15	< 0.03	0.14	0.05	0.14	0.23	1.3	2.4	3.5	0.12	0.27	0.2	0.19	3.9	0.18	48	1.9	0.11	0.19	570	0.27	< 0.03	0.04	0.1	0.12	18	0.03	< 0.03	0.51	1.4	0.06	0.07	150	0.08	0.05	0.14	0.31	0.19	< 0.03
Pyrene	0.03	mg/kg	0.1	0.44	0.16	0.19	< 0.03	0.23	0.11	0.24	0.21	1.2	1.6	2.3	0.13	0.28	0.24	0.31	2.3	0.22	36	1.2	0.12	0.17	400	0.24	< 0.03	0.07	0.19	0.11	14	0.03	0.03	0.36	2.8	0.06	0.09	120	0.1	0.14	0.35	0.24	0.18	< 0.03
Benzo(a)anthracene	0.03	mg/kg	0.04	< 0.03	< 0.03	0.08	< 0.03	< 0.03	< 0.03	< 0.03	0.06	0.48	0.66	0.93	0.03	0.08	0.12	< 0.03	0.66	0.17	14	0.44	0.04	0.09	180	0.12	< 0.03	< 0.03	0.04	0.04	5.2	< 0.03	< 0.03	< 0.03	0.15	0.06	< 0.03	< 0.03	46	< 0.03	< 0.03	< 0.03	0.04	0.04	< 0.03
Chrysene	0.03	mg/kg	0.05	< 0.03	< 0.03	0.14	< 0.03	< 0.03	< 0.03	< 0.03	0.11	0.54	0.85	1.2	0.05	0.15	0.16	0.04	0.73	0.18	15	0.51	0.05	0.11	160	0.39	< 0.03	< 0.03	0.05	0.04	4.8	< 0.03	< 0.03	0.16	0.17	< 0.03	< 0.03	38	0.05	< 0.03	< 0.03	0.09	0.09	< 0.03
Benzo(b)fluoranthene	0.03	mg/kg	0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.59	0.97	1.3	0.04	0.1	0.27	< 0.03	0.47	0.59	13	0.35	0.08	0.1	200	0.06	< 0.03	< 0.03	0.04	0.04	4.9	< 0.03	< 0.03	0.15	0.04	< 0.03	< 0.03	52	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.21	0.34	0.5	< 0.03	0.03	0.1	< 0.03	0.18	0.15	4.3	0.1	< 0.03	0.03	78	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1.8	< 0.03	< 0.03	< 0.03	0.05	< 0.03	< 0.03	20	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.41	0.41	0.55	< 0.03	0.03	0.16	< 0.03	0.18	0.28	7.7	0.19	< 0.03	0.04	150	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	3.7	< 0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03	42	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.29	0.29	0.44	< 0.03	< 0.03	0.14	< 0.03	0.1	0.14	2.7	0.07	< 0.03	0.06	83	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1.7	< 0.03	< 0.03	< 0.03	0.05	< 0.03	< 0.03	20	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	0.1	0.14	< 0.03	< 0.03	0.04	< 0.03	0.04	0.06	0.83	< 0.03	< 0.03	< 0.03	20	< 0.03	< 0.03	< 0.03	< 0.03	0.57	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	5.1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.31	0.36	0.52	< 0.03	< 0.03	0.19	< 0.03	0.12	0.22	3.6	0.09	< 0.03	0.08	110	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	2.1	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	24	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	0.1	mg/kg	0.49	2.9	0.5	1.1	< 0.10	1.4	0.21	1.5	3.9	7.2	10	15	0.44	1.2	1.9	0.92	21	2.7	570	11	0.75	1.1	13000	1.5	0.23	0.18	0.61	0.43	150	< 0.10	< 0.10	2.4	14	0.18	0.31	2200	0.31	0.6	1.3	1	0.72	< 0.10
VOC and SVOC																																											
Phenol - Monohydric	0.3	mg/kg	0.4	0.4	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3													11												4.6						
Vinyl Chloride	0.01	mg/kg																							0.12												< 0.10						
Cis-1,2-dichloroethylene	0.01	mg/kg																							0.33												0.21						
Benzene	0.01	mg/kg																							120												6.2						
Trichloroethylene	0.01	mg/kg																							0.24												0.12						
Toluene	0.01	mg/kg																							140												13						
Ethylbenzene	0.01	mg/kg																							4.4												3.6						
m+p-Xylene	0.01	mg/kg																							20												17						
o-Xylene	0.01	mg/kg																							4.3												3.9						
Styrene	0.01	mg/kg																							7.3												6.5						
Isopropylbenzene	0.01	mg/kg																							0.44												0.27						
n-propylbenzene	0.01	mg/kg																							0.24												0.26						
1,3,5-trimethylbenzene	0.01	mg/kg																							4.2												4.9						
1,2,4-trimethylbenzene	0.01	mg/kg																							8.3												8.6						
1,4-dichlorobenzene	0.01	mg/kg																							0.32												0.31						
n-butylbenzene	0.01	mg/kg																							0.47												0.36						
1,2-dichlorobenzene	0.01	mg/kg																							0.22												0.2						
1,2,4-trichlorobenzene	0.01	mg/kg																							0.27												0.42						
1,2,3-trichlorobenzene	0.01	mg/kg																							< 0.10												0.18						
Phenol	0.1	mg/kg																							< 1.0												0.1						
2-Methylnaphthalene	0.1	mg/kg																							1300												14						
4-Nitrophenol	0.1	mg/kg																							< 1.0												1.3						
Dibenzofuran	0.1	mg/kg																							2400												32						
4-Nitroaniline	0.1	mg/kg																							190												2.9						
1,4-Dinitrobenzene	0.1	mg/kg																							84												< 0.1						
Azobenzene	0.1	mg/kg																							8												0.4						
Carbazole	0.1	mg/kg																							91												0.9						

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APPENDIX C

TECHNICAL NOTE – 'PORT OPERATIONS AT REDCAR BULK TERMINAL', ROYAL HASKONING DHV, FEBRUARY 2020

Note / Memo

HaskoningDHV UK Ltd.
Maritime & Aviation

To:	STDC
From:	Richard Parsons/Peter Beamish
Date:	03/02/2020
Copy:	Lichfields
Our reference:	PC1084-RHD-ZZ-XX-NT-Z-0001
Classification:	Project Related

Subject: **Port Operations at Redcar Bulk Terminal**

Introduction

Royal HaskoningDHV (RHDHV) is a multi-disciplinary independent consultant with particular expertise in maritime and port developments. RHDHV was requested by STDC to consider the area of land required to support a port utilising the existing Redcar Bulk Terminal (RBT) frontage.

It is proposed by others that the port could be expanded, continuing to handle dry bulk materials but also other cargo, such as containers.

The existing RBT quay wall is 320m long. The facility was originally developed as an import facility, handling dry bulk products supporting the steel production operations located towards the south eastern edge of the site. Recently the facility has been used for import of dry bulk products and export of scrap metal, and operates significantly below peak capacity.

The following memo has five main sections:

1. Consideration of land requirements for a bulk operation
2. Consideration land requirements for a container terminal
3. Consideration of the impact of contracted volumes from Sirius Minerals over RBT
4. Consideration of a shared facility
5. Conclusion

1 Land requirements for a bulk operation

The following section considers the land required for a new port facility handling dry bulk materials utilising RBT.

The existing facility is designed for the import of dry bulk materials from the sea with discharge to the former onsite steel works, or to the hinterland through the road and rail facilities.

The land area required for a bulk terminal is not easily assessed as “rules of thumb” or standard figures do not exist (e.g. hectares required per MTPA of throughput). Bulk operations typically have a variety of scenarios (whether the material is held temporarily for short periods of time prior to onward discharge, or

whether the land behind the quay is used to balance demand with high dwell times for held materials) and therefore rules of thumb do not exist.

A conclusion of what would normally be required is therefore not possible due to the limited information on proposed bulk handling scenarios. However it is recognised that RBT was a successful import facility in the past with its available land area.

2 Land requirements for a container terminal

The following section considers the land required for a new container terminal utilising RBT. It assumes that the berth is dedicated to containers only.

Container ports are planned such that there is enough storage area for efficient handling of container boxes. Boxes enter the yard from ships and from the surrounding hinterland (either road or rail connections) and exit on ships or to the surrounding hinterland on road/rail connections. The area required for a terminal would only be fixed following a process of detailed design and simulation to reflect the anticipated box throughput, land constraints, equipment to be used and dwell time of the boxes. There are however some typical rules of thumb, these are noted as follows:

- The length of the container terminal (parallel with the quay line) typically matches the length of the quay.
- The depth of container terminal (perpendicular with the quay line) would normally extend no more than 500m from the quay.

The RBT quay can accommodate vessels up to 304m long, according to the RBT's website (refer link) . This is equivalent to vessels up to around 8,000 TEU (Twenty-foot Equivalent Unit), which would be sufficient for a small terminal. If two vessels were to be accommodated, the maximum length of each vessel would be around 135m, equivalent to a typical 700 TEU vessel, which is expected would be too small. It is concluded that only one vessel could be accommodated at one time, and as such we would typically expect a lower level of berth occupancy (compared with a multi-berth terminal). This would therefore tend to require a smaller container terminal, and therefore the figure of 500m is considered conservative as fewer boxes would be moved through the yard.

In summary, a plan area of 16 hectares would be the nominal maximum area expected to support a container terminal operation at Redcar Bulk Terminal assuming no other competing requirements for the quay.

3 Throughput of existing quay and Impact of Sirius Minerals' Operations

This section considers the impact of the contracted Sirius Minerals throughput on the ability of the facility to accommodate additional operations.

The RBT website notes that there is a peak daily discharge (import) rate of approximately 40,000t/day, which corresponds to 14.6MTPA, if this is handled every day. It is assumed this figure is based on having two ship unloaders and the berth therefore being 100% occupied.

However, it is not possible to operate a berth at 100% occupancy in reality, since allowances are usually made for a range of issues such as; arrivals/departure, maintenance, breakdowns, weather etc.

For a dry bulk operation, we would typically limit the design berth occupancy for a single berth to between 40% to 50%, with an absolute maximum of 70%. The higher figures assume that the vessel arrivals can be accurately scheduled, and significant waiting time for the vessels is acceptable.

Adopting the 70% berth occupancy equates to an annual throughput of 10.2MTPA.

We are aware that Sirius Minerals has a contract for discharging 10MTPA of Polyhalite over RBT, as per the press release on their website (link here).

4 Mixed use berth

Container vessels generally work to a fixed schedule, typically weekly, and a vessel call might last 12 to 24 hours. The container vessel operators will expect to be provided with a fixed (weekly) berthing window, when the berth is available for their vessel. Bulk carriers do not operate on a fixed schedule, and are typically in port for 2 to 3 days. Because of this, the two operations do not mix well, and we do not consider such an operation would be commercially feasible. The container vessels would not be attracted to use the facility, and there are competing dedicated container terminals available.

Break bulk might be considered, as such vessels are not scheduled. However, a break bulk operation requires less area than a container terminal, because the cargo handling is not as efficient. A break bulk terminal typically would have a depth of terminal of around 200 to 300m, say 6 to 9 hectares.

5 Conclusions

1. In the absence of a Polyhalite export contract, a container terminal operation using RBT quay would typically require up to 16 hectares.
2. The land required to support a dry bulk operation cannot be quantified at the current time due to the lack of information on proposed bulk handling scenarios. However, with the quay largely utilised by the contracted Sirius Minerals operations, there will be inadequate quay availability to support significant additional dry bulk or container operations.