STDC Soil Treatment Hospital, Redcar, Teesside

Flood Risk Assessment & Drainage Strategy

South Tees Development Corporation

12 May 2021

Notice

This document and its contents have been prepared and are intended solely for South Tees Development Corporation's information and use in relation to a detailed planning application for a proposed temporary soil treatment hospital at the Former Redcar Steelworks site in Redcar, Teesside.

Atkins Ltd. assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	First issue	FL	PJB	IK	IK	12/05/2021

Contents

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1. Introduction

Atkins has been commissioned by South Tees Development Corporation to prepare a Flood Risk Assessment and Drainage Strategy to support a detailed planning application for a proposed temporary soil treatment hospital (the “Proposed Development”), lasting approximately five years, on a parcel of land at the Former Redcar Steelworks, Redcar, Teesside (the “Site”).

This Flood Risk Assessment has been prepared in accordance with the National Planning Policy Framework (NPPF)[1] and associated Planning Practice Guidance[2]. The scope of this Assessment has been established through consultations with the Environment Agency, the Lead Local Flood Authority (LLFA) (Redcar & Cleveland Borough Council) and Northumbrian Water Ltd.

[1] National Planning Policy Framework, June 2019, Department for Communities & Local Government.
[2] Planning Practice Guidance, October 2019, Department for Communities & Local Government.

2. Background Information

2.1. Environment Agency (EA)

An enquiry was submitted to the Environment Agency. The response received is summarised below and included in full in **Appendix A**:

- The Site is within Flood Zone 1. The EA have no record of flooding in the area. This does not necessarily mean that the site has never flooded, only that the EA do not currently have records of flooding in this area.
- The EA advise contacting the LLFA in relation to drainage discharge rates, local flood risk from ordinary watercourses, surface water and ground water flooding. The EA recommend contacting Northumbrian Water Ltd regarding flood risk from sewers.

2.2. Northumbrian Water Ltd

A Developer Enquiry request was submitted to Northumbrian Water Ltd. A response is currently awaited.

2.3. Redcar & Cleveland Borough Council

An enquiry was submitted to Redcar & Cleveland Borough Council, the LLFA. A copy of the response received is included in **Appendix A** and summarised below:

- The Ordinary Watercourse located approximately 120m to the south-west of the Site has historical flooding issues. Flood water discharges onto Tees Dock road area and causes road closures frequently during heavy and/or prolonged rainfall. The LLFA have had to manage flooding from this location in the past.
- The LLFA requires the Flood Risk Assessment & Drainage Strategy to be compliant with *Redcar and Cleveland Borough Council Local Plan (adopted May 218)* Planning Policy SD 7.

3. Site Description

3.1. Location

The Site is located within the former Redcar Steelworks, in the Lackenby area, approximately 2km south-west of Redcar. The Site is surrounded by now redundant industrial buildings and infrastructure which formed part of the former steelworks site (BOS & Concast). The wider site is now in the ownership of South Tees Development Corporation. Trunk Road and Tees Dock Road run approximately 100m to the east and 200m to the south of the Site respectively. A site location plan is shown in Figure 3-1.

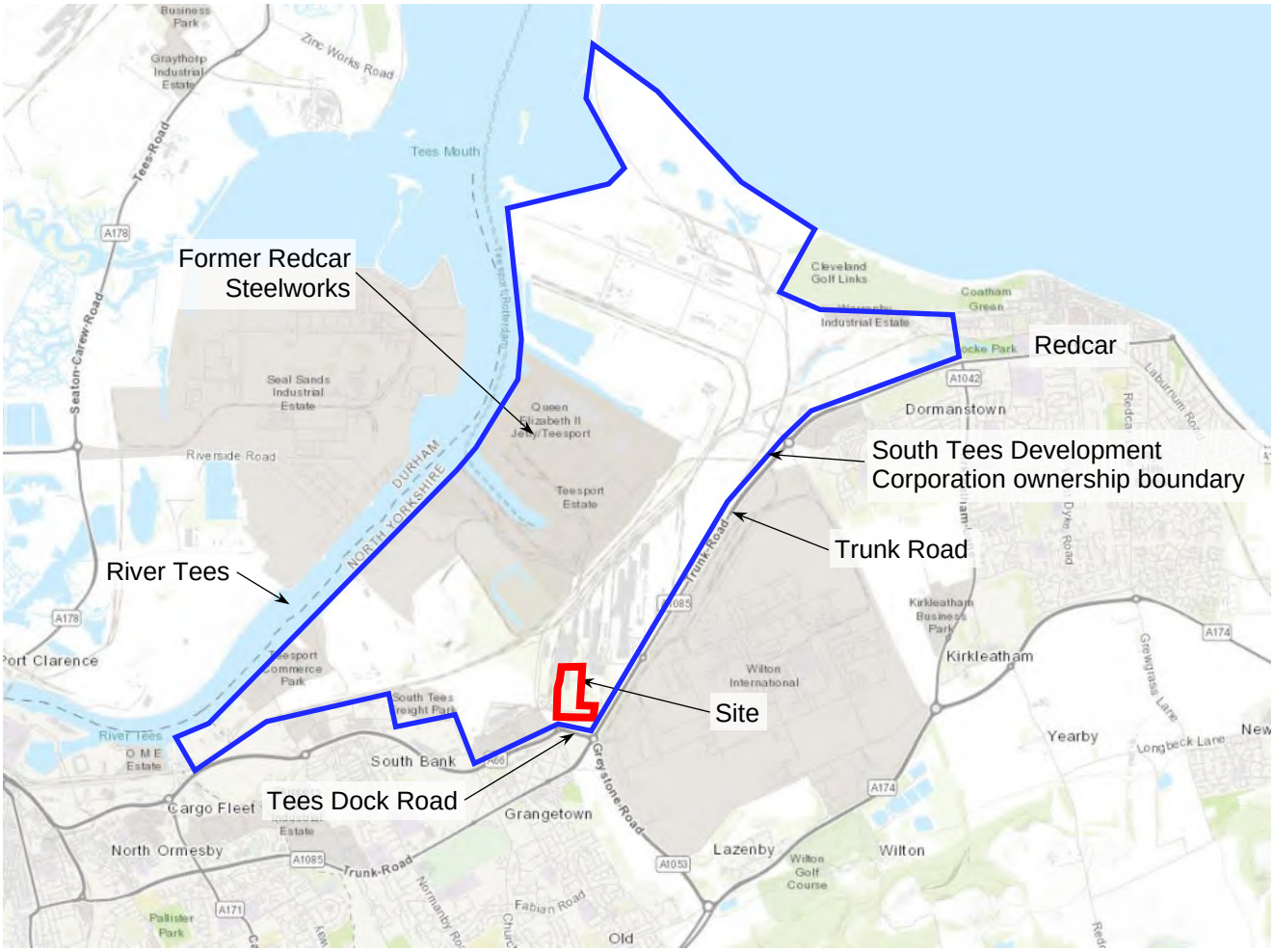


Figure 3-1 Location plan (Not to scale)

3.2. Topography

The Site has a total area of approximately 4.50ha. The topographical survey of the Site is shown on drawing number 2383_JSH024 in **Appendix B**.

The Site's northern area is currently occupied by several stockpiles of industrial materials from former steel works operations, which have been abandoned. Ground levels within the Site, with the exception of the stockpiles, vary between approximately 9.5m AOD to 10.0m AOD. The surrounding industrial area is almost completely flat, with ground levels similar to the Site levels.

3.3. Land Use

3.3.1. Historic

According to old Ordnance Survey maps, the Site and the surrounding area was undeveloped agricultural land until the late 19th century. From 1895, areas surrounding the Site became progressively more developed and industrialised. Maps from the 1960s, show the Site developed as part of the Redcar Steelworks, with industrial

buildings present in the northern area. Maps from 2017 do not show these buildings with the area now occupied by stockpiles of abandoned industrial materials.

3.3.2. Current

The Site is currently a previously developed brownfield site. The northern area surface comprises of compacted soil and granular materials. There are also base slabs associated with previously demolished buildings. This northern area is currently occupied by several stockpiles of abandoned industrial materials. The southern part of the Site is vegetated with grass and small bushes.

The surrounding area comprises of decommissioned industrial buildings and infrastructure which were part of the former Redcar Steelworks.

3.4. Ground Conditions

The content of this section has been informed by a Geotechnical Risk Assessment Report prepared by Arcadis (reference: AUK-XX-XX-RP-GE-0001-01-SSI3_GI_GRA; date: November 2018) together with information from a number of on-line public domain data sources.

3.4.1. Soils

According to Soilscapes[3], the soils on the Site are described as *slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils* with impeded drainage.

3.4.2. Made Ground

Made Ground is known to be on Site associated with the historical use of the site and the various stockpiles of industrial material.

The Geotechnical Risk Assessment Report has identified Made Ground to extend to depths of 4m or greater. The Made Ground is described to comprise slag deposits with fragments of slag ranging from gravel to cobble and occasionally boulder size. Other Made Ground materials were also identified including refractory bricks, demolition wastes and cohesive made ground.

3.4.3. Superficial Deposits

The Geotechnical Risk Assessment Report has identified that the Site is underlain by a sequence of superficial deposits comprising Glaciolacustrine Deposits and Glacial Till.

Glaciolacustrine Deposits were found to include a firm laminated clay, with silt along the laminations. Laboratory testing indicated the clay to be of medium or high plasticity.

Glacial Till predominantly comprising firm becoming stiff slightly sandy slightly gravelly clay, with boulders was recorded in some boreholes. Glacial Till can comprise a complex and variable sequence of soils which may also include sands and gravels, large boulders etc. Ground conditions may vary rapidly both laterally and vertically. At some locations, the Glaciolacustrine Deposits were found to be present between an upper and lower Glacial Till layer.

3.4.4. Bedrock

The Geotechnical Risk Assessment Report has identified the bedrock beneath the Site to be Redcar Mudstone and Mercia Mudstone formations, with the latter containing a significant proportion of gypsum.

3.4.5. Contamination

Based on the historic industrial uses of the Site, the ground is likely to be contaminated. Further information related the contamination present is presented in the Geotechnical Risk Assessment Report.

[3] Soilscapes, www.landis.org.uk/soilscapes/

3.5. Water Environment

3.5.1. Drainage

3.5.1.1. Private Drainage

Drainage plans showing surface and foul water sewers associated with the former steel works site were obtained; however, no distinction is made between private and public sewers. Drainage plans are provided in **Appendix B**. These show that there are no sewers located within the Site. There are surface water sewers, believed to be private, nearby the Site's western, northern and eastern boundary.

Measures will be taken as part of the proposed works to ensure that none of those existing sewers are adversely impacted.

3.5.1.2. Public Sewerage

Drainage plans obtained (provided in **Appendix B**) make no distinction between private and public sewers. These show that there is a foul water sewer, believed to be publicly owned, running along Tees Dock Road, to the southwest of the Site. This sewer crosses Tees Dock Road and flows in south-westerly direction.

3.5.1.3. Land Drainage

There is no evidence available of any land drainage systems being present within the Site. If any land drainage is encountered during construction, it will be reconnected and/or diverted to ensure continuity of drainage post-development.

3.5.2. Watercourses

There is an unnamed Ordinary Watercourse located approximately 120m to the south-west of the Site. This watercourse flows in a generally northerly direction, entering a culvert running underneath the former Redcar Steelworks site.

The Knitting Wife Beck and Kinkerdale Beck, designated Ordinary Watercourses, are located approximately 500m to the south-west and 500m to the east of the Site respectively. These watercourse merge approximately 450m south-east of the Site before flowing in a broadly northerly direction into a culvert that runs underneath the A1085 and the former steelworks.

The estuary of the River Tees, designated a Main River, is located approximately 2.5km to the north-west of the Site.

3.5.3. Waterbodies

There are no waterbodies located within the Site.

There is a small ground depression and a pond located close to the southern boundary and approximately 50m to the south-west of the Site respectively.

The North Sea coast is located approximately 5km to the north of the Site.

3.5.4. Groundwater

According to Environment Agency mapping, the Site is not located within any groundwater Source Protection Zones. There are no superficial deposits underlying the Site. The bedrock underlying the Site is classified as a *Secondary (undifferentiated) Unproductive* aquifer.

The Geotechnical Risk Assessment Report has identified groundwater as being present at depths between 1.0m and 2.0m below original ground level.

4. Proposed Development

4.1. Description

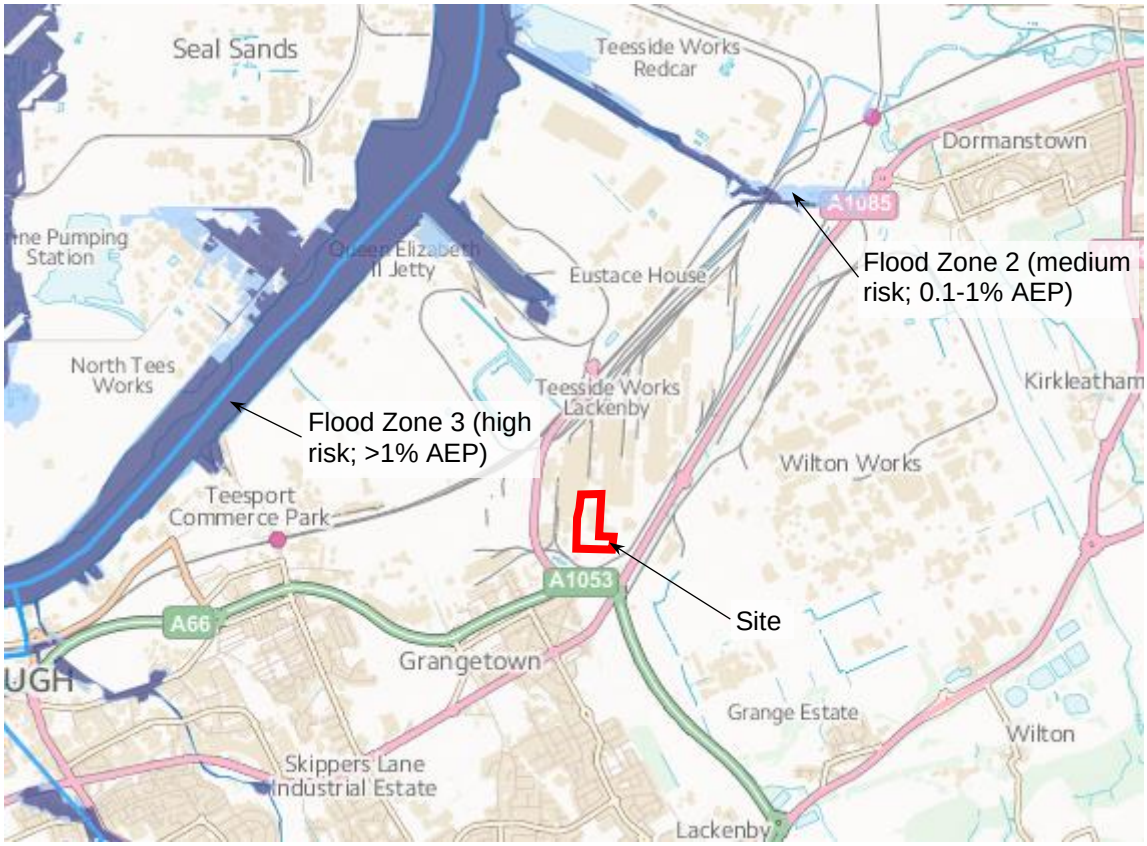
The Proposed Development comprises a compacted steel fines surface to form soil treatment area, an associated drainage system and a water treatment plant.

The proposed indicative development layout (drawing reference: TSWK-STDC-LAC-ZZ-DR-C-0012) is included in **Appendix B**.

4.2. Sequential Test

According to the Environment Agency Flood Map, shown in Figure 4-1, the Site is located wholly within Flood Zone 1 (low risk; <0.1% annual exceedance probability (AEP)).

According to the Planning Practice Guidance[2], Table 2, the Proposed Development is classified as *More Vulnerable* as it is used as a waste management facility for hazardous waste. Planning Practice Guidance, Table 3 shows that *More Vulnerable* development within *Flood Zone 1* is compatible hence the Proposed Development is deemed to pass the Sequential Test.



Source: Environment Agency

Figure 4-1 Environment Agency Flood Map

5. Flood Risk Assessment

5.1. Flooding History

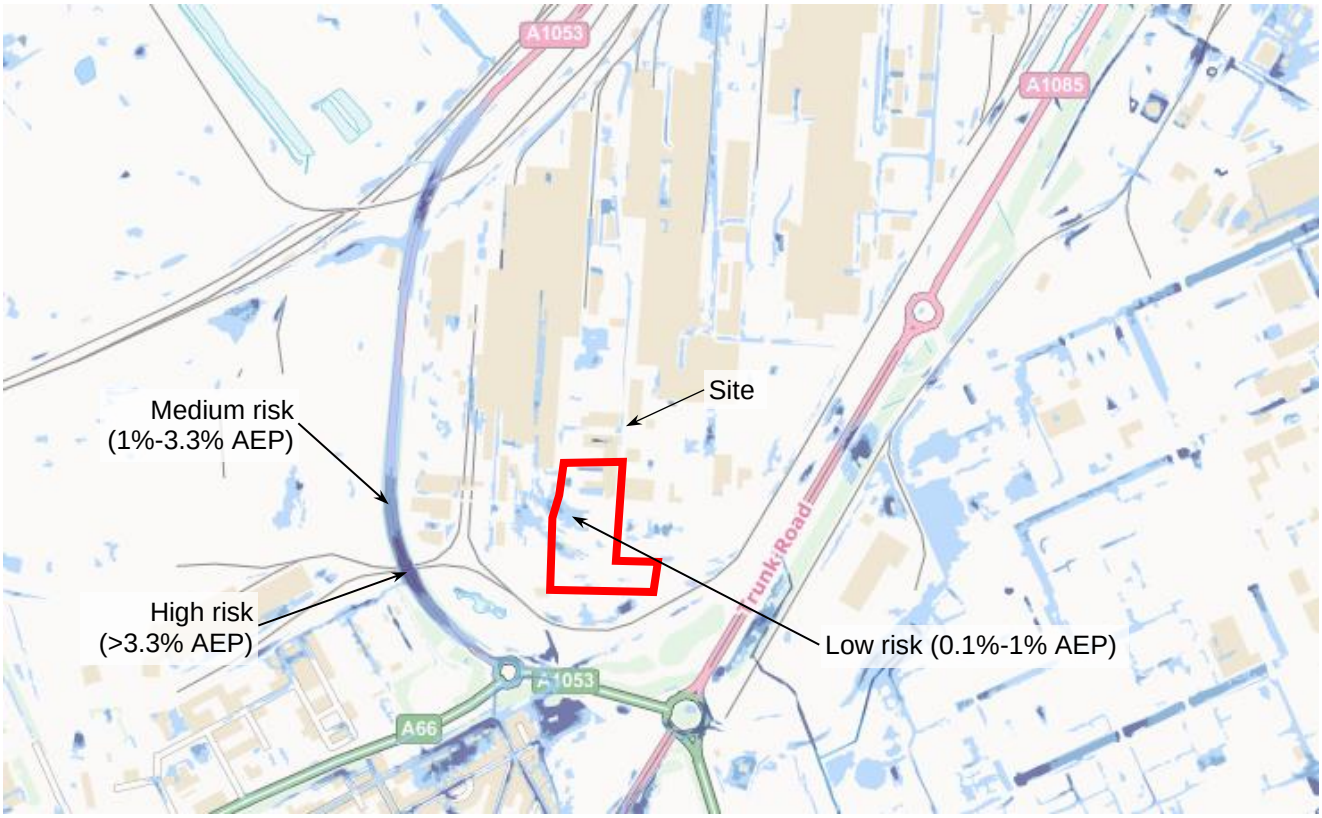
Consultation with the EA has established that they have no records of flooding at the site. This does not necessarily mean that the site has never flooded, only that the EA do not currently have records of flooding in this area.

Consultation with Redcar & Cleveland Borough Council confirmed historical flooding occurring to the south of the Site associated with the Ordinary Watercourse located approximately 120m to the south-west of the Site, which causes Tees Dock road closures during heavy and/or prolonged rainfall.

5.2. Identification of Flooding Sources

Planning Practice Guidance[2] requires that the risk of flooding from the following sources be considered:

- **Fluvial (river)** – The Environment Agency Flood Map shows the Site to be located within Flood Zone 1 (low risk; <0.1% AEP); although, as described in section 3.5.2, there are three small watercourses flowing to the south-west and south-east of the Site. In the event of a flood associated with one of these watercourses, water is unlikely to be able to reach the Site due to topographical features and infrastructure such as roads, railways and pipelines. Therefore, the risk of fluvial flooding is considered to be low and does not require further assessment.
- **Coastal, tidal and estuarine** – As described in section 3.5.2 and 3.5.3, the estuary of the River Tees and the coast facing the North Sea are located approximately 2.5km to the north-west and 5km to the north of the Site respectively. The Environment Agency Flood Map does not indicate that the Site is at risk from tidal flooding. On this basis, the risk associated with tidal flooding is considered to be low and no further assessment is necessary.
- **Surface water** - The Environment Agency Surface Water Flood Map, included in Figure 5-1, shows minor areas within the site boundary, that may be affected by surface water flooding. Anecdotal evidence from the Site indicates that flooding is not known to have occurred in the past; however surface water is known to build up on the adjacent roads during periods of heavy rainfall. As a consequence, further consideration of surface water flood risk is required.
- **Groundwater** – There have been no reports of groundwater flooding within or in the general vicinity of the Site. As described in section 3.5.4, groundwater levels has been identified at depths between 1.0m and 2.0m; however, the flat topography of the Site and surrounding areas is flat and the underlying soils and geology are of low permeability so the risk of groundwater emergence is low. On this basis, no further consideration of groundwater flooding is required.
- **Sewers** – According to information from the Northumbrian Water DG5 Register included in the Strategic Flood Risk Assessment, there are no recorded sewer flooding incidents in the vicinity of the Site. Therefore, the risk of sewer flooding is considered low and further assessment is not required.
- **Artificial sources** – There are no impounded water bodies at an elevation higher than the Site; therefore, the risk associated with this source is negligible and does not require further assessment.



Source: Environment Agency

Figure 5-1 Environment Agency Surface Water Flood Map

On the basis of the above, the risk assessment section below establishes the risks associated with surface water flooding only. The risks from fluvial, tidal, groundwater, sewers and artificial sources are considered to be low and hence do not require assessment.

5.3. Risk Assessment

5.3.1. Surface Water

The Environment Agency Surface Water Flood Map, shown in Figure 5-1, shows that the majority of the Site is at a very low risk (<0.1% AEP) of surface water flooding.

There are small areas identified as being at medium (1%-3.3% AEP) and low (0.1%-1% AEP) risk of surface water flooding. These are primarily associated with minor variations in ground levels. Due to the site being almost flat, surface water will tend to accumulate in any depressions rather than flow away. There are no surface water flow paths running through the Site.

The variations in ground levels will be removed as a result of the proposed ground reprofiling for the Proposed Development hence there is likely to be a reduction in the risk of water accumulating.

The reprofiling operations will not change or block existing flow paths hence there will be no adverse change in surface water flood risk within or beyond the Site. As such the risk of surface water flooding on the Site or surrounding areas will not be adversely affected by the development proposals.

5.4. Flood Risk Management

The proposed development will incorporate the following flood risk management measures to mitigate the risks identified above:

- The soil treatment area is bounded in the eastern, southern and western edges by a 600mm high bund. The northern edge is approximately 1m higher than the adjacent ground level and the soil treatment area slopes in a southerly direction. These measures reduce the risk of surface water flows from the surrounding area entering the Proposed Development. Additionally, run-off generated within the Proposed Development is contained rather than allowing it flow onto the surrounding ground surface.

- The Proposed Development will incorporate a positive surface water drainage system, described further in section 6, that will intercept run-off from the soil treatment area.

5.5. Residual Risks

Residual risks are those risks that remain once the flood risk management measures described above have been implemented. These are typically associated with extreme events that overwhelm drainage systems and exceed the parameters used to design any mitigation measures.

The primary residual risk that will affect this development is a rainfall event (>20% AEP) that exceeds the capacity of the proposed surface water drainage system to both intercept and convey flows. During such an event, water that is unable to enter the formal drainage system of the slab will accumulate at the southern end of the soil treatment area and, in extreme cases, may overtop the 600mm high bund and flow onto the surrounding ground surface.

The flood risk management measures described in Section 5.4 will aid in mitigating the consequences of such an event.

6. Surface Water Drainage Strategy

6.1. Existing Drainage Regime

Since the demolition of the former steel works, run-off from the Site primarily flows over the ground surface, dispersing over a large area until it is intercepted by a watercourse or other drainage feature, or infiltrates into the ground. It is possible that some run-off is intercepted by parts of the private drainage infrastructure systems associated with the former steel works; however, the extents of this are unknown.

6.2. Proposed Outfall

Surface water run-off from the Proposed Development will be discharged into a local public foul water sewer located along Tees Dock Road to the south-west of the Site. Prior to discharge, all flows will be passed through a water treatment plant to remove pollutants originating from soil that is being processed.

As described in section 3.4.5, the ground beneath the Site is likely to be highly contaminated; therefore, infiltration as a means of surface water disposal is not considered viable due to the risk of mobilising contaminants.

6.3. Maximum Permitted Discharge Rate

The maximum discharge rate from the Proposed Development into the public surface water sewer will be limited to 5l/s. This flow rate has been agreed with Northumbrian Water by the designers of the water treatment plant. The discharge rate will be controlled using the pumps which feed the water treatment plant that have a peak flow capacity of 5l/s.

6.4. Integration of SuDS

The nature of the Proposed Development is such that SuDS are not considered viable for inclusion. The proposals include flow storage to balance flow rates prior to treatment and subsequent discharge from the Site. In addition, all run-off is to be treated in a water treatment plant. Due to site conditions, these features will be heavily engineered rather than relying on natural features and processes.

6.5. Proposed Strategy

The proposed surface water drainage strategy is illustrated on drawing number TSWK-STDC-LAC-ZZ-DR-C-0014; a copy is included in **Appendix B**.

Due to the temporary nature of the Proposed Development, the drainage infrastructure has been designed to accommodate a 20% AEP rainfall event under normal free flow conditions. No climate change allowance has been included within the design. The soil treatment hospital is anticipated to be required for a period of up to 5-years. The probability of a 20% AEP rainfall event occurring during the lifespan of the facility is 67.2%. Details of the consequences of a rainfall event exceeding the 20% AEP event occurring are provided later in this section.

Run-off from the Proposed Development will drain into a storage feature before being transferred into the proposed water treatment plant and subsequently discharged from the Site. Run-off from the proposed soil treatment area will drain into a concrete channel running along the full length of the southern edge of the area. The peak run-off flow rate from the soil treatment area during the 20% AEP rainfall event has been calculated to be 189l/s, based on a rainfall intensity of 57.0mm/hr. The channel has been designed with a 1 in 250 longitudinal fall. The size of the channel has been designed to facilitate easy removal of accumulated silt.

The proposed channel will include a total of five outlets. Each outlet has been calculated to have a capacity of 52l/s. Provided that all the outlets are operational, the maximum flow rate to be conveyed by each will be 37.8l/s. The extra capacity within each outlet means that the system is capable of operating with some restrictions caused by potential build-up of silt and it is possible for one outlet to fail completely without adversely affecting the performance of the system. This resilience will enable the system to function within a high sediment load environment and also be capable of withstanding some rainfall events that exceed its design parameters.

Flow is conveyed from the proposed outlets to the storage tank via a 450mm diameter carrier pipe. The storage tank is proposed to be an open structure, either a lined basin or an open tank formed of precast concrete sections. Pumps will be used to transfer water from the storage to the proposed treatment plant; therefore, the base level of the tank is not constrained by downstream features. The storage volume required to

accommodate the 20% AEP rainfall event has been calculated using MicroDrainage Source Control to be 240m^3. The calculations are included in **Appendix C**. The plan dimensions of the storage tank can be adjusted to suit the available space with the depth set to achieve the required volume. The following must be considered when determining the tank depth and levels:

- A freeboard of at least 0.2m must be provided between the maximum water level and the top of the tank.
- The maximum water level in the tank must not exceed 8.9m AOD (lowest level of the proposed channel along the southern edge of the soil treatment area).

The pumping arrangements from the storage tank into the proposed treatment plant are to be designed by others.

While the system has been designed to accommodate up to and including the 20% AEP rainfall event, it is able to manage more extreme rainfall events by using capacity normally contained within freeboard zones. The proposed soil treatment area is surrounded by a 600mm high bund which will retain water within the area if it is unable to drain via the channel and associated outlets. If the freeboard within the storage tank is used, this will enable water to accumulate within the soil treatment area to a depth of 0.2m. This will provide a further 142m^3 of storage which is sufficient to accommodate the 5.5% AEP rainfall event.

In the event of more extreme rainfall, water will start to spill from the storage tank and potentially directly from the soil treatment area. Under these circumstances, the water will tend to flow in a south-easterly and south-westerly direction towards existing watercourses. There are no buildings or other critical facilities within this area that would be adversely affected.

6.6. Adoption & Maintenance

It is anticipated that the proposed surface water drainage system will be privately owned by South Tees Development Corporation and maintained on their behalf by a contractor.

7. Conclusions & Recommendations

7.1. Conclusions

The Site is located within Flood Zone 1 (low risk; <0.1% AEP) according to the Environment Agency Flood Map. There are three small watercourses in the vicinity of the Site. In the event of a flood associated with one of these watercourses, flood water is unlikely to be able to reach the Site due to topographical features and infrastructure such as roads, railways and pipelines. On this basis, the risk of fluvial flooding is considered to be low.

Environment Agency mapping shows small areas within the site boundary that may be affected by surface water flooding. These are primarily associated with minor variations in ground levels that result in depressions that could retain water. These variations will be removed as a result of the proposed ground reprofiling for the Proposed Development hence there is likely to be a reduction in the risk of water accumulating. The reprofiling operations will not change or block existing flow paths hence there will be no adverse change in surface water flood risk within or beyond the Site.

The risks from tidal, groundwater, sewers and artificial sources are considered to be negligible or low.

The Proposed Development will include the following flood risk management measures:

- A 600mm high bund bounding the soil treatment area's eastern, southern and western edges.
- The northern edge of the soil treatment area is approximately 1m higher than the adjacent ground level with the soil treatment area sloping in a southerly direction.
- A positive surface water drainage system.

The primary residual risk that will affect this development is a rainfall event (>20% AEP) that exceeds the capacity of the proposed surface water drainage system to both intercept and convey flows. During such an event, water that is unable to enter the formal drainage system will accumulate at the southern end of the soil treatment area and, in extreme cases, may overtop the 600mm high bund and flow onto the surrounding ground surface.

The proposed surface water drainage system will discharge surface water run-off from the Proposed Development into a local public foul water sewer located along Tees Dock Road to the south-west of the Site. Prior to discharge, all flows will be passed through a water treatment plant to remove pollutants originating from soil that is being processed. The discharge rate from the Proposed Development into the public surface water sewer will be limited to 5l/s.

The nature of the Proposed Development is such that SuDS are not considered viable for inclusion.

Due to the temporary nature of the Proposed Development, the drainage infrastructure has been designed to accommodate a 20% AEP rainfall event under normal free flow conditions. No climate change allowance has been included within the design.

Run-off from the Proposed Development will drain into a storage feature before being transferred into the proposed water treatment plant and subsequently discharged from the Site. The storage tank is proposed to be an open structure, either a lined basin or an open tank formed of precast concrete sections. Pumps will be used to transfer water from the storage to the proposed treatment plant. The storage volume required to accommodate the 20% AEP rainfall event has been calculated using MicroDrainage Source Control to be 240m^3. A freeboard of at least 0.2m must be provided between the maximum water level and the top of the tank.

While the system has been designed to accommodate up to and including the 20% AEP rainfall event, it is able to manage more extreme rainfall events by using capacity normally contained within freeboard zones. The proposed soil treatment area is surrounded by a 600mm high bund which will retain water within the area if it is unable to drain via the channel and associated outlets. If the freeboard within the storage tank is used, this will enable water to accumulate on the slab to a depth of 0.2m. This will provide a further 142m^3 of storage which enables the system to accommodate up to and including the 5.5% AEP rainfall event.

In the event of more extreme rainfall, water will start to spill from the storage tank and potentially directly from the soil treatment area. Under these circumstances, the water will tend to flow in a south-easterly and south-westerly direction towards existing watercourses. There are no buildings or other critical facilities within this area that would be adversely affected.

The surface water drainage system is anticipated to be privately owned by South Tees Development Corporation and maintained on their behalf by a contractor.

7.2. Recommendations

This Flood Risk Assessment is suitable for submission in support of a full planning application for the Proposed Development.

The design of the Proposed Development and its drainage systems must comply with the principles and parameters defined in this document.

Appendices

Appendix A. Correspondence

Lazzarin, Filippo

From: Northeast Newcastle, Customer Contact <northeast-newcastle@environment-agency.gov.uk>
Sent: 05 March 2021 09:47
To: Lazzarin, Filippo
Subject: Our ref: 206840 - FW: 210224/DR08 Enquiry regarding Help & advice for FRA - (Redcar, TS6 7RT)

Our Ref: 206840

DearFilippo,

Enquiry regarding FRA - Redcar, TS6 7RT

Thank you for your enquiry which was received on 22 February 2021.

We can confirm that your site of interest is within Flood Zone 1. Following examination of our records of historic flooding, we have no record of flooding in the area. This does not necessarily mean that the area of the property / site has never flooded, only that we do not currently have records of flooding in this area.

The Lead Local Flood Authority now agree drainage discharge rates. Please contact the LLFA to discuss this matter with them.

The Environment Agency is the relevant risk management authority for flood risk on 'main rivers'. Local Authorities now take the lead for local flood risk, including 'ordinary watercourses', surface water and ground water flooding. We recommend that you contact the Lead Local Flood Authority for further information. Regarding flood risk from sewers please contact Northumbrian Water Group.

For general advice about assessing flood risk when completing planning applications, and in particular how to complete a flood risk assessment (FRA) as part of a planning application go to https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

Our Sustainable Places Team can give more detailed advice although there is a charge for this. Here is the link to the standard terms and conditions that apply to our charged planning advice service https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions. The standard charge is £100 per hour.

We hope we have answered your query. Please see the following link for details of permitted use - http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

We now have over 100 datasets available as Open Data. Open Data allows access to our data free of charge and free of restriction, even for commercial use under an Open Government Licence. You can find out about the data we have available our new page on Gov.uk https://www.gov.uk/environmental-data

Please don't hesitate to contact me if you have any further queries.

Kind regards,

Carole Anne Pollock,

North East Customers and Engagement Team
Environment Agency | Tyneside House, Skinnerburn Road, Newcastle, NE4 7AR

Normal working hours: Tue-Fri 07:00-15:00

M : 07584526496 DD : 02077 142957

For all Freedom of Information related enquiries please send your email to northeast-newcastle@environment-agency.gov.uk

Environment Agency staff are working from home due to the Coronavirus (COVID-19) pandemic. All staff can be contacted via e-mail or telephone as usual. Please accept our apologies in advance for any delays in our service during this time, which we are minimising as much as possible.

From: Lazzarin, Filippo [mailto:Filippo.Lazzarin@atkinsglobal.com]
Sent: 22 February 2021 17:05
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Cc: Birkenshaw, Paul <Paul.Birkenshaw@atkinsglobal.com>
Subject: Enquiry regarding Help & advice for FRA - (Redcar, TS6 7RT)

Good Afternoon,

We are contacting you with reference to a proposed temporary soil treatment facility plant (lasting approximately five years) in Redcar, North Yorkshire. Please see site location details below and site location plan attached.

Site Location: Former Redcar Steelworks site, Redcar, North Yorkshire, TS6 7RT

NGR coordinates: 455489 ; 521303

We are preparing a Flood Risk Assessment to support a planning application and we would be grateful if you could confirm the following:

- The site lies within Flood Zone 1. Please could you confirm this and advise whether there are any records of flooding from any source in the vicinity of the site.

- Are you aware of any specific flood risk and/or drainage issues that we should take into account within the Flood Risk Assessment and drainage strategy for this site?

Please contact me if you require any clarification about this enquiry.

Kind Regards

Filippo Lazzarin *MEng*
Assistant Civil Engineer, Infrastructure
UK & Europe
Engineering, Design & Project Management

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[redacted]
Atkins The Axis, 10 Holliday Street, Birmingham, B1 1TF

[redacted]

[redacted]

Company

Lazzarin, Filippo

From: Lyndsey Hall <Lyndsey.Hall@redcar-cleveland.gov.uk>
Sent: 07 May 2021 13:41
To: Lazzarin, Filippo
Cc: David Pedlow; Nigel Hill
Subject: RE: Development Enquiry LLFA - (Redcar, TS6 7RT)

Good afternoon Filippo,

Apologies for the delay in responding, unfortunately I have been on extended leave. Please see below;

Boundary beck which runs just south of the right boundary line (within the blue line area) has historical flooding issues. Flood water discharges onto Tees Dock road area and causes road closures frequently during heavy and/or prolonged rainfall.
I would advise a discussion with Teesworks and British steel, they may have more detail on this flooding issue as the site is in their private ownership. The LLFA have had to manage flooding from this location recently.

With regards to a planning submission please ensure the FRA & Drainage Strategy is compliant with Redcar and Cleveland Borough Council Planning Policy SD7 of the Local Plan (adopted May 218)

If you require further assistance please contact Nigel Hill who is happy to discuss further in more detail.

Kind regards

Lyndsey

Lyndsey Hall BA (Hons) PGDip FCRM
Engineer
Engineering Services
Redcar & Cleveland Borough Council

Direct Line: 01287 612343
Mobile: 07557 481108
Email: Lyndsey.hall@redcar-cleveland.gov.uk

Corporate Directorate for Growth, Enterprise and Environment
Redcar & Cleveland House
Kirkleatham Street
Redcar
Yorkshire
TS10 1RT

STAY SAFE

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Follow us in Instagram: instagram.com/redcar.cleveland

From: Lazzarin, Filippo
Sent: 22 February 2021 17:06
To: contactus@redcar-cleveland.gov.uk
Cc: Birkenshaw, Paul <Paul.Birkenshaw@atkinsglobal.com>
Subject: Development Enquiry LLFA - (Redcar, TS6 7RT)

Good Afternoon,

We are contacting you, as the LLFA, with reference to a proposed temporary soil treatment facility plant (lasting approximately 5 years) which our client is intending to submit a planning for in Redcar, North Yorkshire. Please see site location details below and site location plan attached.

Site Location: Former Redcar Steelworks site, Redcar, North Yorkshire, TS6 7RT

NGR coordinates: 455489 ; 521303

The site is currently a brownfield site, located within the Former Redcar Steelworks in the industrial area generally known as 'South Tees'. The site is accessed via the Lackenby Gate Entrance along Trunk Road.

As part of the drainage strategy, we are looking to treat surface water run-off from the site, before discharging it into the local surface water network.

Could you please advise on site specific requirements and historic flooding?

We look forward to hearing from you.

Kind Regards,

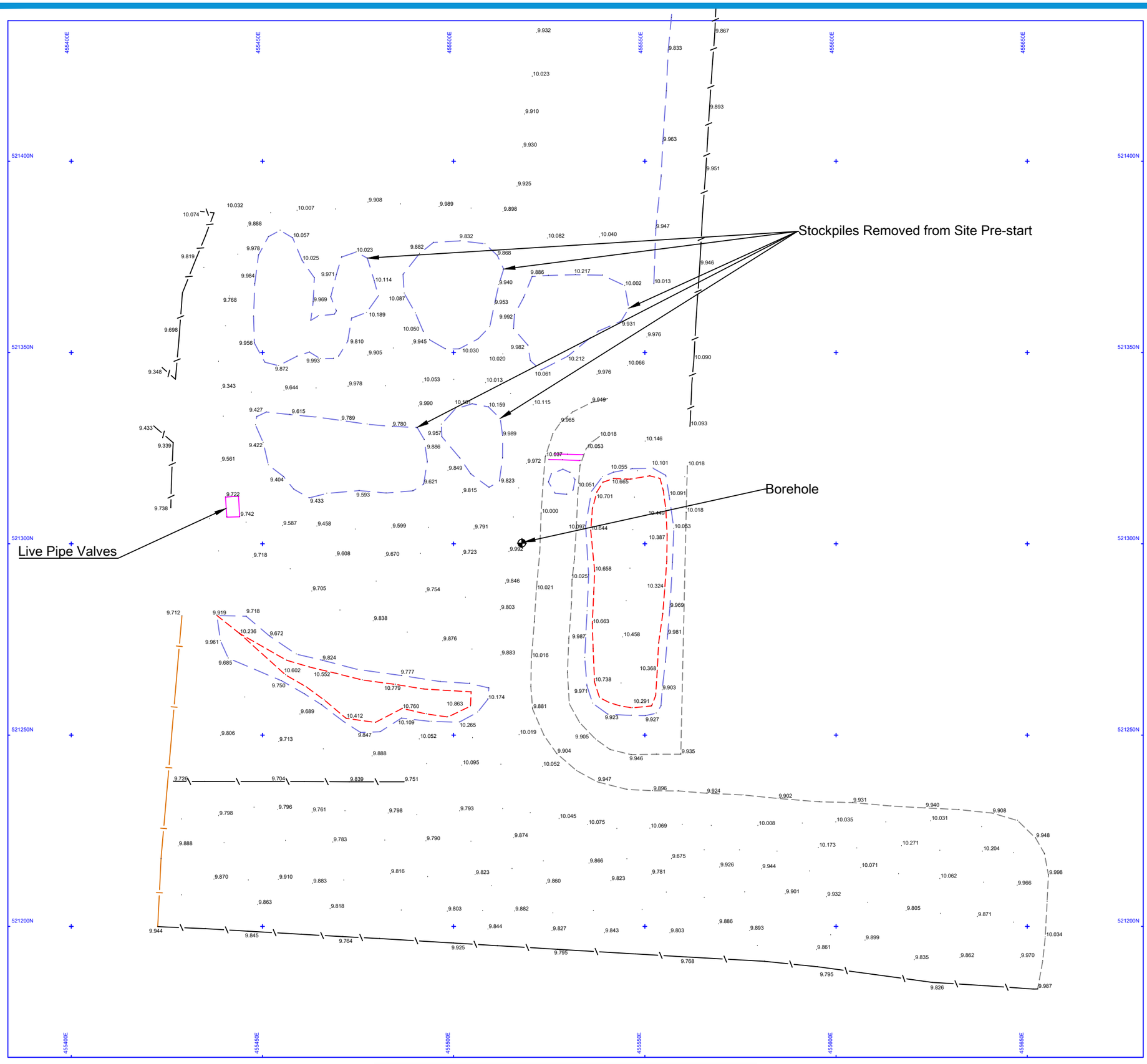
Filippo Lazzarin *MEng*
Assistant Civil Engineer, Infrastructure
UK & Europe
Engineering, Design & Project Management

+441214835583

Atkins The Axis, 10 Holliday Street, Birmingham, B1 1TF

Company

Appendix B. Drawings



N

W E

S

Hallconstruction
www.hallconstruction.uk.com

The Prairie
Redcar

JOB TITLE

STDC

CLIENT

Soil Treatment Area
Original Ground Level
Survey 06-11-20

DRAWING TITLE

1:1000 @ A3	JSH
SCALE	DRAWN
14.01.21	AJB
DATE	APPROVED

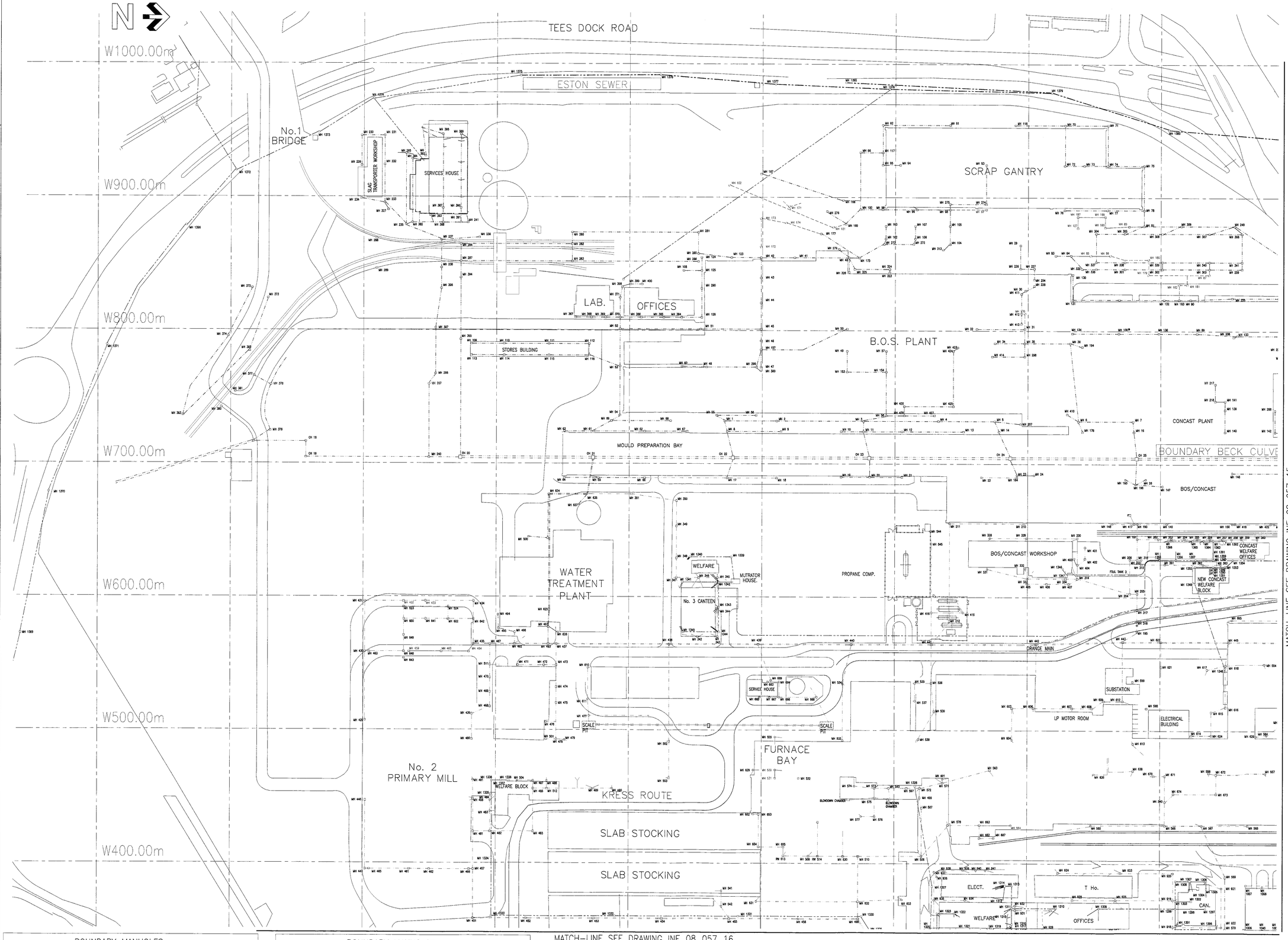
Hall Construction Services Limited

Stotforth Hill House
Windlestone
Rushyford
County Durham
DL17 0NF
Tel: 01325 311013
Fax:01325 311571

NOTES

REV	AMENDMENT	DRAWN	CHECKED

2383	JSH024	-
PROJECT No.	DRG No.	REV



MATCH-LINE SEE DRAWING INF_08_057_16

MATCH-LINE SEE DRAWING INF_08_057_15

NOTES

1. REFER TO DRAWING INF_08_057_06 FOR OWNERSHIP SKETCH TO DETERMINE OWNERSHIP WHEN DRAIN CROSSES BOUNDARY

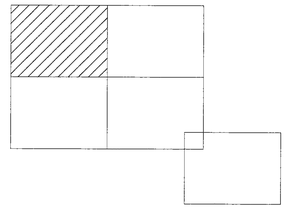
REFERENCE DRAWINGS

INF_08_057_06– FULL SITE OWNERSHIP DRAWING
INF_08_057_15– SHEET 2 OF 5
INF_08_057_16– SHEET 3 OF 5
INF_08_057_17– SHEET 4 OF 5
INF_08_057_18– SHEET 5 OF 5

KEY

- TCP BOUNDARY
- CORUS BOUNDARY
- CORUS OWN LEASED TO TCP BOUNDARY
- BEAM MILL
- COIL PLATE MILL
- BOS PLANT
- FOUL WATER DRAIN
- SURFACE WATER DRAIN

KEY PLAN



BOUNDARY MANHOLES

UPSTREAM		DOWNSTREAM		DRAIN PIPE OWNER BETWEEN MANHOLES
MANHOLE	OWNER	MANHOLE	OWNER	
535	TCP	536	CORUS	TCP
536	CORUS	441	TCP	CORUS
612	CORUS	443	TCP	CORUS
621	CORUS	622	TCP	CORUS
618	CORUS	445	TCP	CORUS
538	TCP	539	CORUS	TCP
571	CORUS	572	TCP	CORUS
1348	CORUS	1349	TCP	CORUS

BOUNDARY MANHOLES

UPSTREAM		DOWNSTREAM		DRAIN PIPE OWNER BETWEEN MANHOLES
MANHOLE	OWNER	MANHOLE	OWNER	
622	TCP	445	CORUS LEASED	TCP
506	CORUS	510	TCP	CORUS
1328	TCP	1327	CORUS	TCP
499	TCP	507	CORUS	TCP

Rev	Description	Drawn	Checked
B	OWNERSHIP BOUNDARY REMOVED	DPK 05.3.09	AF 05.3.09
A	ISSUED FOR INFORMATION	DPK 24.2.09	AF 24.2.09

ABK Consultants Ltd.
1st Floor
Steel House
Redcar
TS10 5QW
Tel. 01642 405556 Fax. 01642 404648
e-mail: officeabkconsultants@btconnect.com

Drawn	Date	Checked	Date
D.KELLY	24/02/09	A.FROST	24/02/09

Client
corus
Steel House
Redcar
TS10 5QW
Teesside Cast Products

Project
TEESSIDE WORKS
DRAINAGE INVESTIGATION WORKS

Title
DRAINAGE OWNERSHIP DRAWING
SHEET 1

WORKS	PLANT
LACKENBY	GENERAL
SECTION OF PLANT: DRAINAGE	
SUB-SECTION OF PLANT: OWNERSHIP BOUNDARY	
PEDS CODE (7/2/2)	INDEX CODE: SM/12

Scale 1:1000 AO

Client Nr. L/G 119119 A

ABK Nr. INF_08_057_14B

N

MATCH-LINE SEE DRAWING INF_08_057_15

FOR BOUNDARY TO MH 1274 REFER TO DRAWING INF_08_057_15

MATCH-LINE SEE DRAWING INF_08_057_16

MATCH-LINE SEE DRAWING INF_08_057_18

MATCH-LINE SEE DRAWING INF_08_057_18

STORES

No.3 ROAD WEIGHBRIDGE

KINKERDALE BECK CULVERT

BRITISH RAIL

MORGOIL SHOP

11 SPAN CRANE BAY

ROD MILL OFFICES

UNIVERSAL BEAM MILL

REF MILL CONTROL BUILDING

SUBSTATION

CONTROL ROOM

STATIC VOLTAGE COMPENSATORS

CAR PARK

MACHINE SHOP

BLACKSMITHS SHOP

STORES

CAR PARK

W'FARE

BUILDING SERVICES DEPARTMENT

CNES MATERIAL HANDLING TRAINING CENTRE

GARAGE

OIL STORE

BEAM MILL OFFICES

SUBSTATION

EXTRA PROCESSING

CAR PARK

STEEL BEAM STORE

LOCO VEHICLE WORKSHOP

COMPOUND

OIL TANK

PROPANE COMPOUND

ROAD WORKSHOP

BOUNDARY MANHOLES

UPSTREAM		DOWNSTREAM		DRAIN PIPE OWNER BETWEEN MANHOLES
MANHOLE	OWNER	MANHOLE	OWNER	
516	TCP	CH12A	CORUS	TCP
515	TCP	CH12A	CORUS	TCP

NOTES

1. REFER TO DRAWING INF_08_057_06 FOR OWNERSHIP SKETCH TO DETERMINE OWNERSHIP WHEN DRAIN CROSSES BOUNDARY

REFERENCE DRAWINGS

INF_08_057_06– FULL SITE OWNERSHIP DRAWING
INF_08_057_14– SHEET 1 OF 5
INF_08_057_15– SHEET 2 OF 5
INF_08_057_16– SHEET 3 OF 5
INF_08_057_18– SHEET 5 OF 5

KEY

- TCP OWNED
- CORUS OWNED
- BOS PLANT (TCP OWNED)
- BEAM MILL (CORUS OWNED)
- COIL PLATE MILL
- CORUS OWNED LEASED TO TCP
- FOUL WATER DRAIN
- SURFACE WATER DRAIN

KEY PLAN

Rev	Description	Drawn	Checked
B	OWNERSHIP BOUNDARY REMOVED	DPK 05.3.09	AF 05.3.09
A	ISSUED FOR INFORMATION	DPK 24.2.09	AF 24.2.09

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Tel. 01642 405556 Fax. 01642 404648
e-mail: officeabkconsultants@btconnect.com

Drawn	Date	Checked	Date
D.KELLY	24/2/09	A.FROST	24/2/09

Client: corus Steel House Redcar TS10 5QW Teesside Cast Products

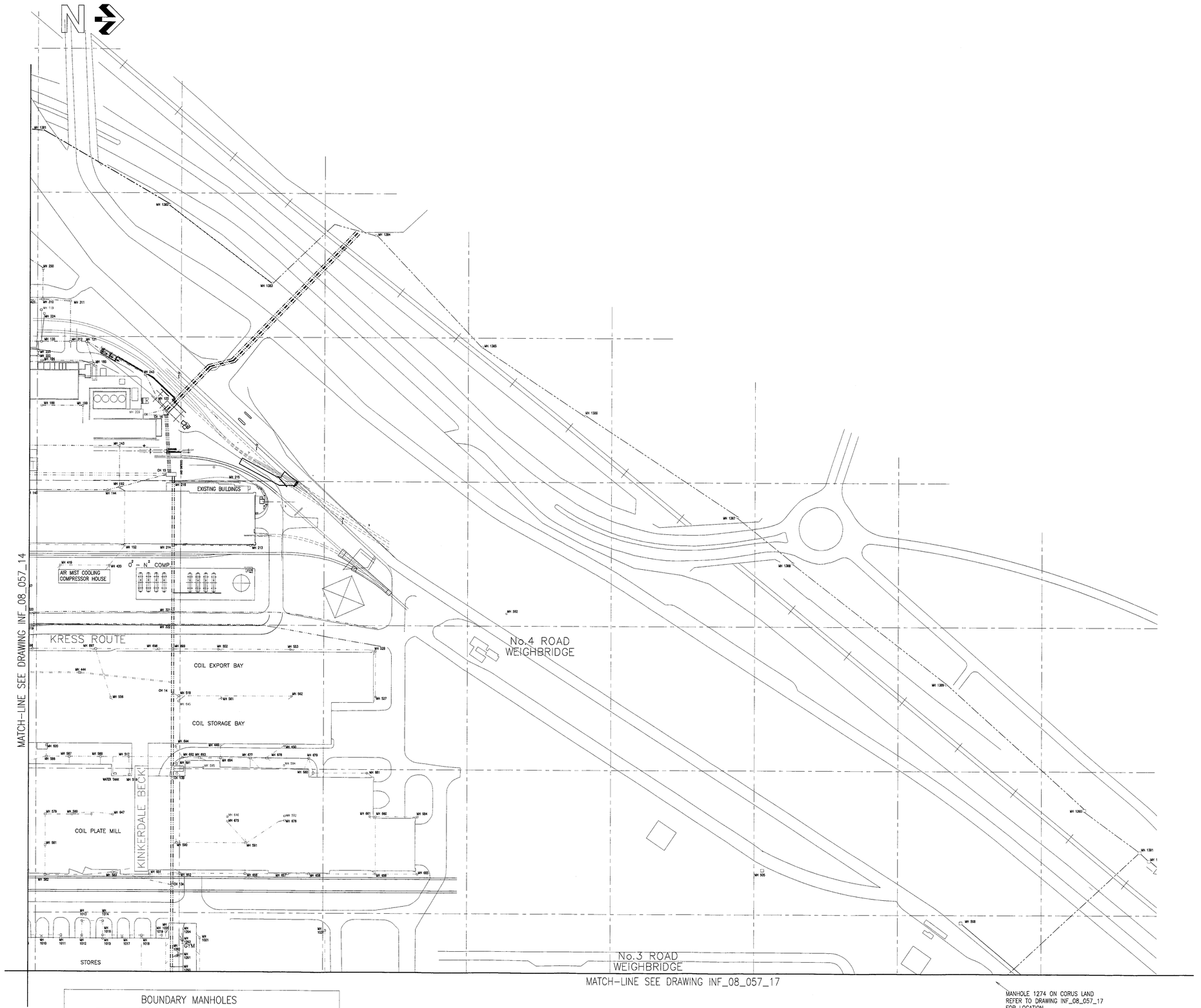
Project: TEESSIDE WORKS
DRAINAGE INVESTIGATION WORKS

Title: DRAINAGE OWNERSHIP DRAWING
SHEET 4

WORKS	PLANT
LACKENBY	GENERAL
SECTION OF PLANT: DRAINAGE	
SUB-SECTION OF PLANT: OWNERSHIP BOUNDARY	
PEDS CODE (7/2/2)	INDEX CODE: SM/12

Scale	Client Nr.	ABK Nr.
1:1000	A L/G 119122	INF_08_057_17B

A0



NOTES

1. REFER TO DRAWING INF_08_057_06 FOR OWNERSHIP SKETCH TO DETERMINE OWNERSHIP WHEN DRAIN CROSSES BOUNDARY

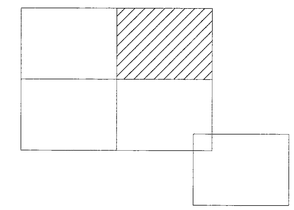
REFERENCE DRAWINGS

INF_08_057_06– FULL SITE OWNERSHIP DRAWING
INF_08_057_14– SHEET 1 OF 5
INF_08_057_16– SHEET 3 OF 5
INF_08_057_17– SHEET 4 OF 5
INF_08_057_18– SHEET 5 OF 5

KEY

- TCP OWNED
- CORUS OWNED
- BOS PLANT (TCP OWNED)
- BEAM MILL (CORUS OWNED)
- COIL PLATE MILL
- CORUS OWNED LEASED TO TCP
- FOUL WATER DRAIN
- SURFACE WATER DRAIN

KEY PLAN



BOUNDARY MANHOLES

UPSTREAM		DOWNSTREAM		DRAIN PIPE OWNER BETWEEN MANHOLES
MANHOLE	OWNER	MANHOLE	OWNER	
527	CORUS	528	TCP	CORUS
CH14	CORUS LEASED	699	TCP	CORUS LEASED
556	CORUS LEASED	697	TCP	CORUS LEASED
1274	CORUS	1391	OFFSITE OWNER	CORUS
1383	TCP	1384	OFFSITE OWNER	TCP
1381	OFFSITE OWNER	1382	TCP	OFFSITE OWNER

WHERE THE SYSTEM LIES WITHIN LAND LEASED, THE SYSTEM REMAINS THE RESPONSIBILITY OF THE LAND OWNER.

Rev	Description	Drawn	Checked
B	OWNERSHIP BOUNDARY REMOVED	DPK 05.3.09	AF 05.3.09
A	ISSUED FOR INFORMATION	DPK 24.2.09	AF 24.2.09

ABK Consultants Ltd.
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Tel. 01642 405556 Fax. 01642 404648
e-mail: officeabkconsultants@btconnect.com

Drawn	Date	Checked	Date
D.KELLY	24/02/09	A.FROST	24/02/09

Client: corus Steel House Redcar TS10 5QW Teesside Cast Products

Project: TEESSIDE WORKS DRAINAGE INVESTIGATION WORKS

Title: DRAINAGE OWNERSHIP DRAWING SHEET 2

WORKS	PLANT
LACKENBY	GENERAL
SECTION OF PLANT: DRAINAGE	
SUB-SECTION OF PLANT: OWNERSHIP BOUNDARY	
PEDS CODE (7/2/2)	INDEX CODE: SM/12

Scale: 1:1000 AO

Client Nr.: L/G 119120 A

ABK Nr.: INF_08_057_15B

N

MATCH-LINE SEE DRAWING INF_08_057_14

W300.00m

W200.00m

W100.00m

S700.00m

S600.00m

S500.00m

S400.00m

S300.00m

S200.00m

S100.00m

E100.00m

E200.00m

KRESS ROUTE

KINKERDALE BECK

KETTLE BECK

SLAB STOCKING

KINGFISHER POND

WELFARE

OFFICES

CAN.

11 SPAN CRANE GANTRY

WATER TREATMENT PLANT

OIL TANK

2 BAY EXTENSION

VISITOR CENTRE

RECUPERATOR BUILDING

ELECTRICS HOUSE

No.1 PRIMARY MILL

BEAM MILL

BEAM MILL 66KV OUTDOOR SUBSTATION

KRESS ROUTE NOT USED

MEDICAL CENTRE

SECURITY GATEHOUSE

LACKENBY 0,0

MATCH-LINE SEE DRAWING INF_08_057_17

NOTES

1. REFER TO DRAWING INF_08_057_06 FOR OWNERSHIP SKETCH TO DETERMINE OWNERSHIP WHEN DRAIN CROSSES BOUNDARY

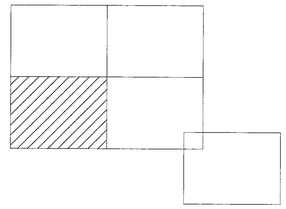
REFERENCE DRAWINGS

INF_08_057_06– FULL SITE OWNERSHIP DRAWING
INF_08_057_15– SHEET 2 OF 5
INF_08_057_16– SHEET 3 OF 5
INF_08_057_17– SHEET 4 OF 5
INF_08_057_18– SHEET 5 OF 5

KEY

- TCP OWNED
- CORUS OWNED
- BOS PLANT (TCP OWNED)
- BEAM MILL (CORUS OWNED)
- COIL PLATE MILL
- CORUS OWNED LEASED TO TCP
- FOUL WATER DRAIN
- SURFACE WATER DRAIN

KEY PLAN



BOUNDARY MANHOLES

UPSTREAM		DOWNSTREAM		DRAIN PIPE OWNER BETWEEN MANHOLES
MANHOLE	OWNER	MANHOLE	OWNER	
708	CORUS	KINGFISHER POND	TCP	CORUS
CH3	TCP	CH4	CORUS	TCP
1329	TCP	1325	CORUS	TCP
79	CORUS	59	TCP	CORUS

Rev	Description	Drawn	Checked
B	OWNERSHIP BOUNDARY REMOVED	DPK 05.3.09	AF 05.3.09
A	ISSUED FOR INFORMATION	DPK 24.2.09	AF 24.2.09

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Tel. 01642 405556 Fax. 01642 404648
e-mail: officeabkconsultants@btconnect.com

Drawn	Date	Checked	Date
D.KELLY	24/02/09	A.FROST	24/02/09

Client
corus
Teesside Cast Products
Steel House
Redcar
TS10 5QW

Project
TEESSIDE WORKS
DRAINAGE INVESTIGATION WORKS

Title
DRAINAGE OWNERSHIP DRAWING
SHEET 3

WORKS	PLANT
LACKENBY	GENERAL
SECTION OF PLANT: DRAINAGE	
SUB-SECTION OF PLANT: OWNERSHIP BOUNDARY	
PEDS CODE (7/2/2)	INDEX CODE: SM/12

Scale	Client Nr.
1:1000	A L/G 119121
AO	ABK Nr. INF_08_057_16B

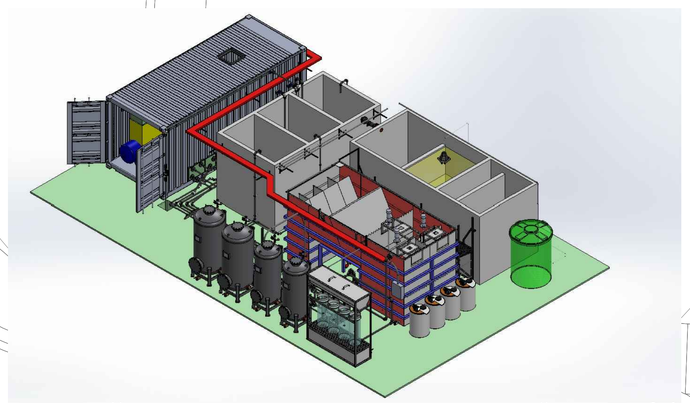
DO NOT SCALE

Millimetres 0 10 100

N

INSET 1 - INDICATIVE TANK ARRANGEMENT

INSET 2 INDICATIVE FILTRATION (SAND FILTERS AND CARBON STEEL)



INSET 3 - INDICATIVE WATER TREATMENT PLANT

10M WIDE ACCESS RAMPS CONSTRUCTED FROM STEEL FINES, 1 IN 10 SLOPE, TAPERING DOWN TO SUB-BASE.

71m

FLAT

168m

11.703

11.572

PROPOSED SOIL TREATMENT AREA

GAS PIPES

LEVELS SHOWN ARE FINISHED LEVELS AT THE TOP OF 600MM BUNDS.

GOTEXTILE COVERED BUND TO RETAIN WATER

LEVELS SHOWN ARE FINISHED LEVELS FROM SUB-BASE + 500MM OF STEEL FINES

PROPOSED CHANNEL OUTLETS. SEE TYPICAL SECTION FOR DETAILS

PROPOSED DRAINAGE CHANNEL SEE TYPICAL SECTION FOR DETAILS

PROPOSED CHANNEL 1:250 FALL

PROPOSED CHANNEL OUTLETS. SEE TYPICAL SECTION FOR DETAILS

GEOTEXTILE COVERED 600MM HIGH BUND TO 3 SIDES OF SOIL TREATMENT AREA WITH 500X500 ANCHOR TRENCH FOR CLAY LINER.

450 DIA. PIPE @1/250

450 DIA. PIPE @1/250

GEOTEXTILE COVERED 600MM HIGH BUND TO 3 SIDES OF SOIL TREATMENT AREA WITH 500X500 ANCHOR TRENCH FOR CLAY LINER.

WATER TREATMENT PLANT (MAX 3M HIGH) SITTING ON CONCRETE SLAB 10 X 10 X 250MM THICK

PROPOSED STORAGE. 240m³. BASE LEVEL: 8.10m. PLAN DIMENSIONS 22x10m SHAPE AND LOCATION SHOWN INDICATIVELY AND SUBJECT TO CONFIRMATION

Tanks

Tank

Posts

Teesside Works
Lackenby

Posts

Path

NOTES:

1. DO NOT SCALE OFF THIS DRAWING.

2. THIS DRAWING IS BASED ON THE TOPOGRAPHICAL SURVEY AND PROPOSED FORMATION LAYOUT/LEVELS SHOWN ON HALL CONSTRUCTION SERVICES LTD. DRAWING NUMBER 2383-JSH008 (DATE: 3RD DECEMBER 2020).

3. ALL LEVELS STATED ARE IN METRES ABOVE ORDNANCE DATUM.

4. ALL CONTOURS REPRESENT THE PROPOSED FINISHED LEVELS AND HAVE AN INTERVAL OF 0.1m. ALL SPOT LEVELS IN BLACK ALSO REPRESENT PROPOSED FORMATION LEVELS.

5. ALL SPOT LEVELS IN GREY ARE EXISTING GROUND LEVELS.

6. THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWINGS AND SPECIFICATIONS RELATING TO THE PROPOSED SURFACE WATER DRAINAGE PLAN.

7. THE DESIGN OF THE TREATMENT PLANT AND THE MEANS BY WHICH WATER IS REMOVED FROM THE STORAGE TANK AND TRANSFERRED TO THE TREATMENT PLANT HAS BEEN UNDERTAKEN BY OTHERS.

8. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES WITHIN THE AREA OF THE WORKS PRIOR TO CONSTRUCTION COMMENCING. ANY CONFLICTS WITH THE PROPOSED WORKS MUST BE REPORTED TO THE ENGINEER.

9. ALL ACCESS COVERS, GRATINGS AND FRAMES MUST BE MIN. D400 DUCTILE IRON IN ACCORDANCE WITH BS EN 124 AND KITEMARKED.

10. ALL PROPOSED PIPEWORK TO BE NON-PERFORATED STRUCTURED WALL HDPE PIPEWORK.

11. ALL PIPEWORK SHALL HAVE GRANULAR BED AND SURROUND (CLASS S) UNLESS THE COVER TO THE PIPE IS LESS THAN 0.9m WHEN CONCRETE BED AND SURROUND (CLASS Z) SHALL BE USED.

12. ALL ACCESS CHAMBERS BEYOND THE PROPOSED CHANNEL SHALL BE PRECAST CONCRETE WITH A MINIMUM DIAMETER OF 1500mm.

13. THE MEANS BY WHICH THE PROPOSED STORAGE IS TO BE PROVIDED IS PRE-CAST CONCRETE UNITS.

14. THE PROPOSED COLLECTION AND STORAGE SYSTEMS ARE DESIGNED TO ACCOMMODATE AT LEAST THE 1 IN 5-YEAR RAINFALL EVENT WITH POTENTIAL CAPACITY FOR UP TO THE 1 IN 20-YEAR EVENT. AS THE PROPOSED WORKS ARE TEMPORARY (MAXIMUM LIFE SPAN OF 5 YEARS), NO CLIMATE CHANGE ALLOWANCE HAS BEEN INCLUDED WITHIN THE DESIGN.

15. THE PROPOSED STORAGE IS SIZED BASED ON A MIN. OUTFLOW RATE TO THE TREATMENT PLANT OF 5l/s. IF THIS RATE IS VARIED, THE ENGINEER MUST BE INFORMED TO REVIEW THE SIZE OF THE STORAGE.

16. DRAWING BASED ON ATKINS MODEL, REFER TO DRAWING 5203829-ATK-XX-DR-C-0500.

17.FOR CDM BOUNDARY AND LOCATION LAYOUT REFER TO DRAWING NUMBER TSWK-STDC-LAC-ZZ-DR-C-0002.

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

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

South Tees Development Corporation

Project Title:

TEESWORKS
The UK's largest industrial zone

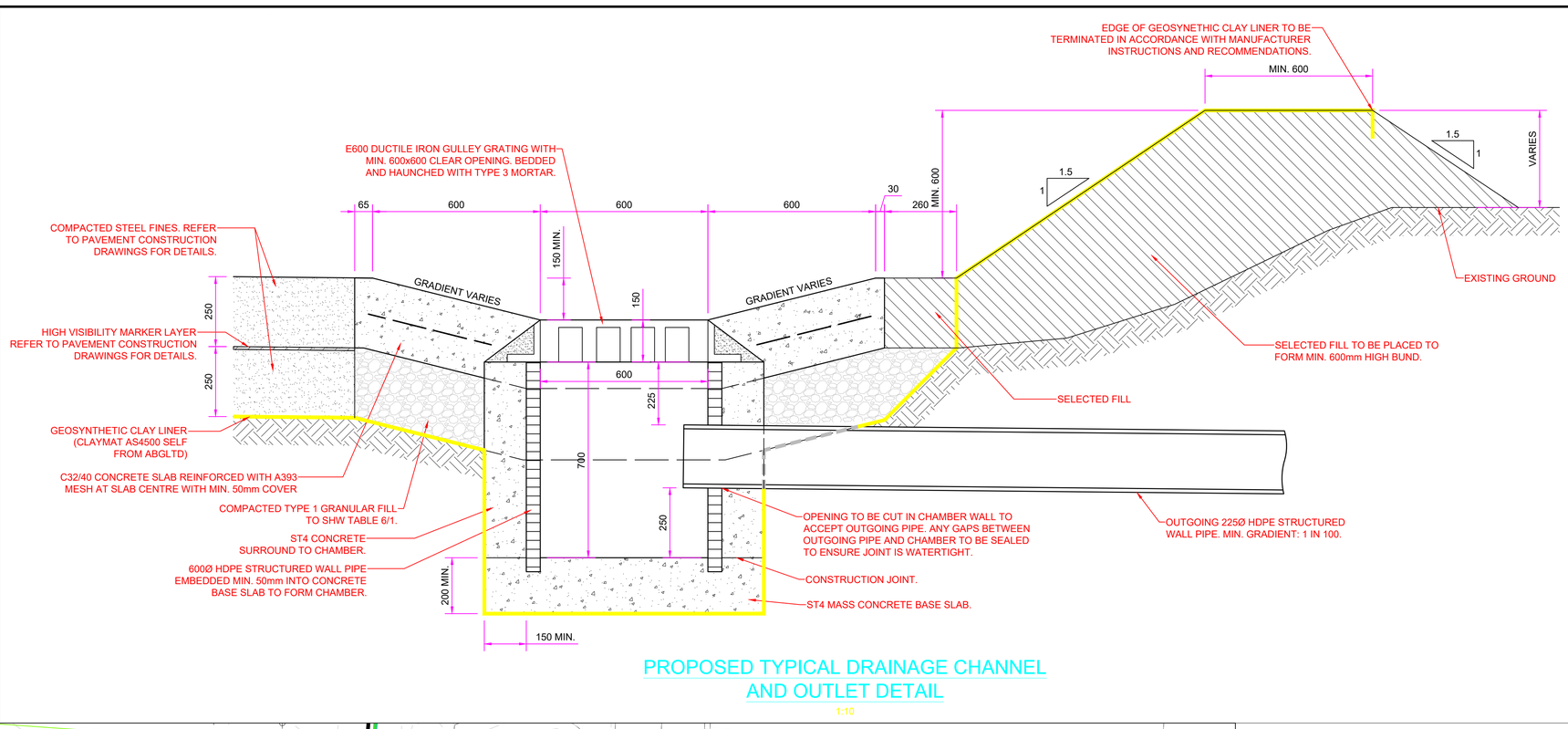
Drawing Name:

SOIL TREATMENT HOSPITAL GENERAL ARRANGEMENT

Drawn by: KW	Date: MAY 2021
Checked by: IKP	Date: MAY 2021
Approved by: JMc	Date: MAY 2021
Drawing Number: TSWK-STDC-LAC-ZZ-DR-C-0012	Revision: -
Drawing Scale: 1:500	Page Size: A1

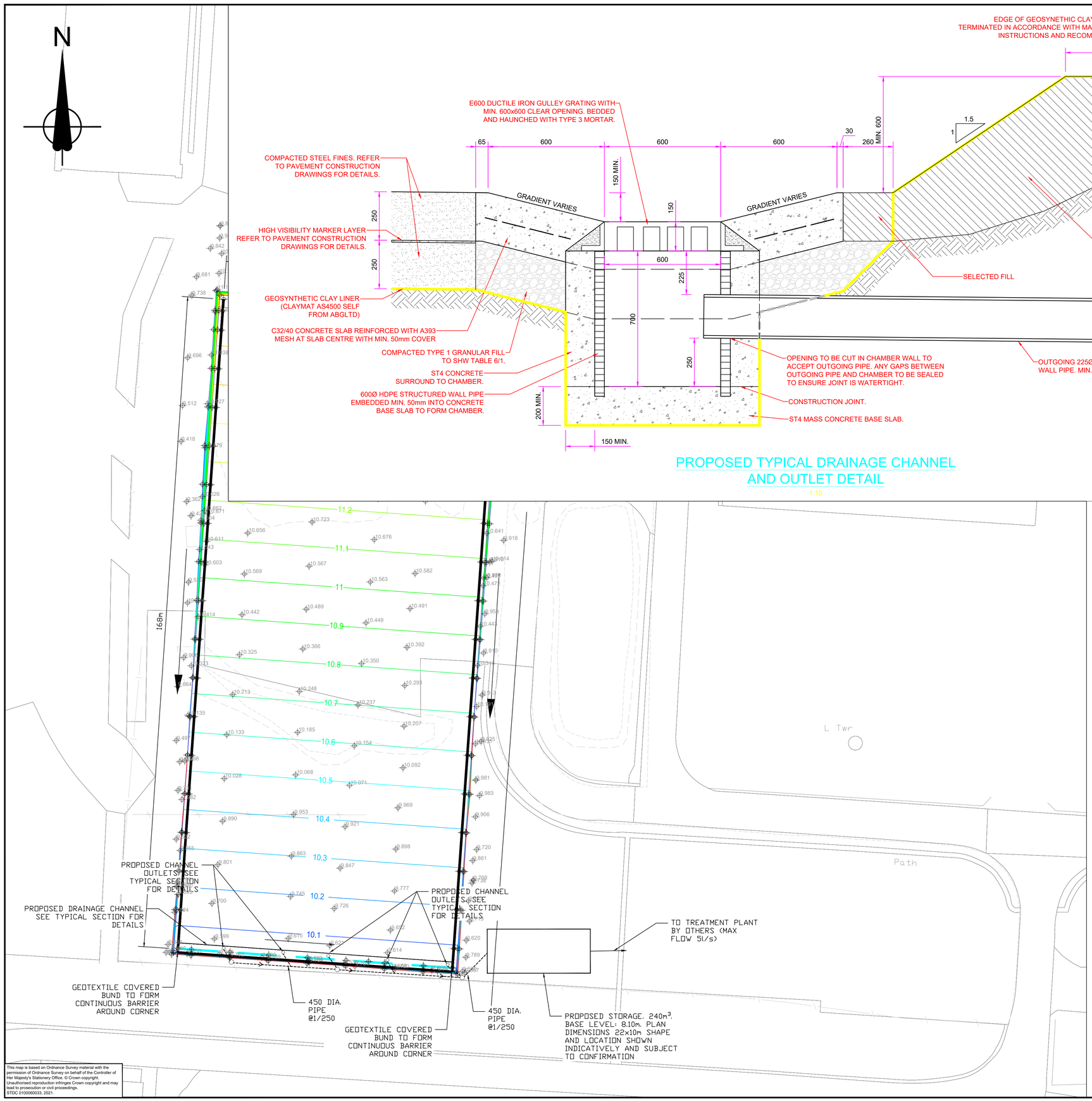
DO NOT SCALE

Millimetres 0 10 100



PROPOSED TYPICAL DRAINAGE CHANNEL AND OUTLET DETAIL

1:10



NOTES:

1. DO NOT SCALE OFF THIS DRAWING.

2. THIS DRAWING IS BASED ON THE TOPOGRAPHICAL SURVEY AND PROPOSED FORMATION LAYOUT/LEVELS SHOWN ON HALL CONSTRUCTION SERVICES LTD. DRAWING NUMBER 2383-JSH008 (DATE: 3RD DECEMBER 2020).

3. ALL LEVELS STATED ARE IN METRES ABOVE ORDNANCE DATUM.

4. ALL CONTOURS REPRESENT THE PROPOSED SLAB FORMATION LEVELS AND HAVE AN INTERVAL OF 0.1m. ALL SPOT LEVELS IN BLACK ALSO REPRESENT PROPOSED FORMATION LEVELS.

5. ALL SPOT LEVELS IN GREY ARE EXISTING GROUND LEVELS.

6. THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWINGS AND SPECIFICATIONS RELATING TO THE PROPOSED CONCRETE SLAB.

7. THE DESIGN OF THE TREATMENT PLANT AND THE MEANS BY WHICH WATER IS REMOVED FROM THE STORAGE TANK AND TRANSFERRED TO THE TREATMENT PLANT HAS BEEN UNDERTAKEN BY OTHERS.

8. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES WITHIN THE AREA OF THE WORKS PRIOR TO CONSTRUCTION COMMENCING. ANY CONFLICTS WITH THE PROPOSED WORKS MUST BE REPORTED TO THE ENGINEER.

9. ALL ACCESS COVERS, GRATINGS AND FRAMES MUST BE MIN. D400 DUCTILE IRON IN ACCORDANCE WITH BS EN 124 AND KITEMARKED.

10. ALL PROPOSED PIPEWORK TO BE NON-PERFORATED STRUCTURED WALL HDPE PIPEWORK.

11. ALL PIPEWORK SHALL HAVE GRANULAR BED AND SURROUND (CLASS S) UNLESS THE COVER TO THE PIPE IS LESS THAN 0.9m WHEN CONCRETE BED AND SURROUND (CLASS Z) SHALL BE USED.

12. ALL ACCESS CHAMBERS BEYOND THE PROPOSED CHANNEL SHALL BE PRECAST CONCRETE WITH A MINIMUM DIAMETER OF 1500mm.

13. THE MEANS BY WHICH THE PROPOSED STORAGE IS TO BE PROVIDED IS SUBJECT TO CONFIRMATION FOLLOWING DISCUSSION WITH THE PROJECT TEAM.

14. THE PROPOSED COLLECTION AND STORAGE SYSTEMS ARE DESIGNED TO ACCOMMODATE AT LEAST THE 1 IN 5-YEAR RAINFALL EVENT WITH POTENTIAL CAPACITY FOR UP TO THE 1 IN 20-YEAR EVENT. AS THE PROPOSED WORKS ARE TEMPORARY (ASSUMED LIFE SPAN OF 5 YEARS), NO CLIMATE CHANGE ALLOWANCE HAS BEEN INCLUDED WITHIN THE DESIGN.

15. THE PROPOSED STORAGE IS SIZED BASED ON A MIN. OUTFLOW RATE TO THE TREATMENT PLANT OF 5l/s. IF THIS RATE IS VARIED, THE ENGINEER MUST BE INFORMED TO REVIEW THE SIZE OF THE STORAGE.

16. DRAWING BASED ON ATKINS MODEL, REFER TO DRAWING 5203829-ATK-XX-DR-C-0500.

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

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

South Tees Development Corporation

Project Title:

TEESWORKS
The UK's largest industrial zone

Drawing Name:

SOIL TREATMENT HOSPITAL PROPOSED SURFACE WATER DRAINAGE ARRANGEMENTS

Drawn by: KW	Date: MAY 2021
Checked by: IKP	Date: MAY 2021
Approved by: JMc	Date: MAY 2021
Drawing Number: TSWK-STDC-LAC-ZZ-DR-C-0014	Revision: -
Drawing Scale: 1:1250	Page Size: A1

Appendix C. Calculations

Summary of Results for 5 year Return Period

Half Drain Time : 405 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.045	0.545	0.0	5.0	5.0	92.7	O K
30 min Summer	8.205	0.705	0.0	5.0	5.0	119.8	O K
60 min Summer	8.365	0.865	0.0	5.0	5.0	147.1	O K
120 min Summer	8.547	1.047	0.0	5.0	5.0	178.1	O K
180 min Summer	8.638	1.138	0.0	5.0	5.0	193.5	O K
240 min Summer	8.682	1.182	0.0	5.0	5.0	200.9	O K
360 min Summer	8.710	1.210	0.0	5.0	5.0	205.8	O K
480 min Summer	8.708	1.208	0.0	5.0	5.0	205.3	O K
600 min Summer	8.689	1.189	0.0	5.0	5.0	202.1	O K
720 min Summer	8.657	1.157	0.0	5.0	5.0	196.8	O K
960 min Summer	8.580	1.080	0.0	5.0	5.0	183.6	O K
1440 min Summer	8.478	0.978	0.0	5.0	5.0	166.3	O K
2160 min Summer	8.339	0.839	0.0	5.0	5.0	142.6	O K
2880 min Summer	8.214	0.714	0.0	5.0	5.0	121.3	O K
4320 min Summer	8.010	0.510	0.0	5.0	5.0	86.6	O K
5760 min Summer	7.854	0.354	0.0	5.0	5.0	60.1	O K
15 min Winter	8.113	0.613	0.0	5.0	5.0	104.3	O K
30 min Winter	8.291	0.791	0.0	5.0	5.0	134.4	O K
60 min Winter	8.475	0.975	0.0	5.0	5.0	165.8	O K
120 min Winter	8.687	1.187	0.0	5.0	5.0	201.8	O K
180 min Winter	8.797	1.297	0.0	5.0	5.0	220.5	O K
240 min Winter	8.861	1.361	0.0	5.0	5.0	231.4	Flood Risk
360 min Winter	8.912	1.412	0.0	5.0	5.0	240.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	43.080	0.0	96.0	18
30 min Summer	28.200	0.0	125.8	33
60 min Summer	17.840	0.0	159.1	62
120 min Summer	11.420	0.0	203.8	122
180 min Summer	8.703	0.0	232.9	182
240 min Summer	7.150	0.0	255.2	240
360 min Summer	5.390	0.0	288.6	322
480 min Summer	4.395	0.0	313.8	384
600 min Summer	3.744	0.0	334.2	450
720 min Summer	3.283	0.0	351.6	516
960 min Summer	2.662	0.0	380.2	654
1440 min Summer	1.977	0.0	423.4	924
2160 min Summer	1.476	0.0	474.1	1324
2880 min Summer	1.207	0.0	516.8	1728
4320 min Summer	0.921	0.0	591.9	2464
5760 min Summer	0.766	0.0	656.2	3168
15 min Winter	43.080	0.0	107.6	18
30 min Winter	28.200	0.0	140.9	33
60 min Winter	17.840	0.0	178.2	62
120 min Winter	11.420	0.0	228.3	120
180 min Winter	8.703	0.0	261.0	178
240 min Winter	7.150	0.0	285.9	234
360 min Winter	5.390	0.0	323.3	344

Summary of Results for 5 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
480 min Winter	8.908	1.408	0.0	5.0	5.0	239.4	Flood Risk
600 min Winter	8.885	1.385	0.0	5.0	5.0	235.5	Flood Risk
720 min Winter	8.853	1.353	0.0	5.0	5.0	229.9	Flood Risk
960 min Winter	8.763	1.263	0.0	5.0	5.0	214.8	O K
1440 min Winter	8.582	1.082	0.0	5.0	5.0	183.9	O K
2160 min Winter	8.352	0.852	0.0	5.0	5.0	144.8	O K
2880 min Winter	8.148	0.648	0.0	5.0	5.0	110.2	O K
4320 min Winter	7.833	0.333	0.0	5.0	5.0	56.6	O K
5760 min Winter	7.650	0.150	0.0	5.0	5.0	25.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
480 min Winter	4.395	0.0	351.5	448
600 min Winter	3.744	0.0	374.3	482
720 min Winter	3.283	0.0	393.7	556
960 min Winter	2.663	0.0	425.8	712
1440 min Winter	1.977	0.0	474.3	1010
2160 min Winter	1.476	0.0	531.0	1428
2880 min Winter	1.207	0.0	578.9	1820
4320 min Winter	0.921	0.0	663.0	2548
5760 min Winter	0.766	0.0	734.9	632

Rainfall Details

Rainfall Model	FEH
Return Period (years)	5
FEH Rainfall Version	2013
Site Location	GB 455477 521285 NZ 55477 21285
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	5760
Climate Change %	+0

Time Area Diagram

Total Area (ha) 1.190

Time (mins) From:	To:	Area (ha)
0	4	1.190

Model Details

Storage is Online Cover Level (m) 9.100

Complex Structure

Tank or Pond

Invert Level (m) 7.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	170.0	1.400	170.0	1.600	170.0

Tank or Pond

Invert Level (m) 8.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	0.0	0.200	1420.0

Level Controlled Pump Outflow Control

Invert Level (m) 7.500 Cut In Height (m) 0.150 Cut Out Height (m) 0.000

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Summary of Results for 18 year Return Period

Half Drain Time : 617 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.326	0.826	0.0	5.0	5.0	140.4	O K
30 min Summer	8.583	1.083	0.0	5.0	5.0	184.1	O K
60 min Summer	8.843	1.343	0.0	5.0	5.0	228.3	Flood Risk
120 min Summer	8.999	1.499	0.0	5.0	5.0	266.5	Flood Risk
180 min Summer	9.031	1.531	0.0	5.0	5.0	286.7	Flood Risk
240 min Summer	9.044	1.544	0.0	5.0	5.0	298.2	Flood Risk
360 min Summer	9.056	1.556	0.0	5.0	5.0	309.2	Flood Risk
480 min Summer	9.057	1.557	0.0	5.0	5.0	310.4	Flood Risk
600 min Summer	9.055	1.555	0.0	5.0	5.0	308.0	Flood Risk
720 min Summer	9.051	1.551	0.0	5.0	5.0	304.5	Flood Risk
960 min Summer	9.039	1.539	0.0	5.0	5.0	293.8	Flood Risk
1440 min Summer	9.023	1.523	0.0	5.0	5.0	280.9	Flood Risk
2160 min Summer	9.002	1.502	0.0	5.0	5.0	267.9	Flood Risk
2880 min Summer	8.968	1.468	0.0	5.0	5.0	253.2	Flood Risk
4320 min Summer	8.796	1.296	0.0	5.0	5.0	220.3	O K
5760 min Summer	8.597	1.097	0.0	5.0	5.0	186.5	O K
15 min Winter	8.428	0.928	0.0	5.0	5.0	157.7	O K
30 min Winter	8.717	1.217	0.0	5.0	5.0	206.8	O K
60 min Winter	8.980	1.480	0.0	5.0	5.0	257.7	Flood Risk
120 min Winter	9.048	1.548	0.0	5.0	5.0	301.7	Flood Risk
180 min Winter	9.071	1.571	0.0	5.0	5.0	325.7	Flood Risk
240 min Winter	9.083	1.583	0.0	5.0	5.0	341.3	Flood Risk
360 min Winter	9.094	1.594	0.0	5.0	5.0	356.9	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	64.616	0.0	144.1	19
30 min Summer	42.756	0.0	190.8	33
60 min Summer	27.159	0.0	242.4	64
120 min Summer	16.517	0.0	294.8	122
180 min Summer	12.320	0.0	329.9	182
240 min Summer	9.997	0.0	356.9	242
360 min Summer	7.441	0.0	398.5	360
480 min Summer	6.031	0.0	430.6	468
600 min Summer	5.128	0.0	457.7	518
720 min Summer	4.494	0.0	481.4	584
960 min Summer	3.659	0.0	522.6	712
1440 min Summer	2.754	0.0	589.9	982
2160 min Summer	2.097	0.0	673.9	1404
2880 min Summer	1.737	0.0	744.2	1816
4320 min Summer	1.338	0.0	859.5	2632
5760 min Summer	1.112	0.0	953.1	3400
15 min Winter	64.616	0.0	161.4	19
30 min Winter	42.756	0.0	213.7	33
60 min Winter	27.159	0.0	271.5	62
120 min Winter	16.517	0.0	330.2	120
180 min Winter	12.320	0.0	369.5	178
240 min Winter	9.997	0.0	399.7	236
360 min Winter	7.441	0.0	446.3	352

Summary of Results for 18 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
480 min Winter	9.098	1.598	0.0	5.0	5.0	362.8	Flood Risk
600 min Winter	9.098	1.598	0.0	5.0	5.0	362.7	Flood Risk
720 min Winter	9.095	1.595	0.0	5.0	5.0	358.7	Flood Risk
960 min Winter	9.088	1.588	0.0	5.0	5.0	348.5	Flood Risk
1440 min Winter	9.070	1.570	0.0	5.0	5.0	325.6	Flood Risk
2160 min Winter	9.046	1.546	0.0	5.0	5.0	300.0	Flood Risk
2880 min Winter	9.009	1.509	0.0	5.0	5.0	271.8	Flood Risk
4320 min Winter	8.752	1.252	0.0	5.0	5.0	212.8	O K
5760 min Winter	8.417	0.917	0.0	5.0	5.0	155.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
480 min Winter	6.031	0.0	482.3	462
600 min Winter	5.128	0.0	512.6	572
720 min Winter	4.494	0.0	539.1	672
960 min Winter	3.659	0.0	585.3	762
1440 min Winter	2.754	0.0	660.6	1070
2160 min Winter	2.097	0.0	754.7	1536
2880 min Winter	1.737	0.0	833.5	1964
4320 min Winter	1.338	0.0	962.6	2808
5760 min Winter	1.112	0.0	1067.5	3576

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